

4. CUMULATIVE IMPACTS

Cumulative impacts are the incremental impacts of a proposal when considered in the context of other past, present and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.

In the context of the proposed Desert Claim Wind Power Project, cumulative impacts are evaluated largely on the basis of significant proposed and reasonably foreseeable future developments. These include, primarily, the Kittitas Valley and Wild Horse wind power projects proposed by Zilkha Renewable Energy; Zilkha would develop these two projects in other areas of Kittitas County according to their respective plans and schedules. Past and ongoing activities in the project area and background growth, in both urban and rural areas, are also considered in the cumulative impact assessment. **Chapter 4** includes a complete discussion of cumulative impacts for all elements of the environment, following the same order of presentation as in **Chapter 3**.

4.1 EARTH RESOURCES

Ground disturbance during construction or decommissioning of the Desert Claim project would result in minor, localized soil erosion impacts. These impacts would occur within the context of erosion associated with current and expected future land uses in the project vicinity (primarily agricultural activities and scattered rural residential development). Widespread or significant erosion problems in the project vicinity have not been identified. Based on the magnitude, extent and timing of possible erosion impacts from the Desert Claim project, these impacts would not result in the potential for significant cumulative erosion impacts in the local area.

Construction and operation of the Desert Claim project would not increase the existing landslide hazard risks on or immediately adjacent to the project area, provided appropriate mitigation measures were implemented, and would have no effect on the degree of seismic hazard applicable to other existing or future uses in the project vicinity. Therefore, direct and indirect effects from the project would not add to the ongoing effects of other activities in the local area and would not create the potential for cumulative impacts related to landslide or seismic hazards.

Impacts to earth resources from development of the Kittitas Valley and/or Wild Horse wind power projects would be similar to those described for the Desert Claim project, and would generally be confined to localized, temporary erosion impacts from ground disturbance during construction. The Kittitas Valley and Wild Horse project areas are not characterized by extensive areas of high geologic hazards, or by widespread or significant existing impacts to earth resources. The earth resource impacts of each project would occur within the construction footprint for the respective project and would not be overlapping in geographic extent. Consequently, there would not be an interactive effect among any two of the projects or all three projects (e.g., erosion impacts related to the Desert Claim project would not exacerbate erosion conditions in the vicinity of the Kittitas Valley project), and the impacts of the respective projects would not represent the potential for significant cumulative impacts to earth resources.

4.2 AIR QUALITY

Development of the Desert Claim project would result in vehicle exhaust and fugitive dust emissions during the construction period, and in similar impacts during decommissioning. Because these emissions would be temporary, would typically occur within only a portion of the project area at a given time, and would not be noticeable in extensive off-site areas, they would represent insignificant air quality impacts. These impacts would occur within the context of air emissions associated with existing and expected future land uses in the project vicinity and elsewhere in the Kittitas Valley. The Kittitas Valley is a predominantly agricultural area in which operation of agricultural equipment in cultivated fields and vehicle traffic on gravel and dirt roads are common sources of exhaust and dust emissions. Kittitas County is not designated as a non-attainment area for air pollutants of concern, and current air quality problems are not known to exist. The additive effect of the temporary exhaust and dust emissions associated with the Desert Claim project would not constitute the potential for significant cumulative air quality impacts.

The Desert Claim project is one of three wind power facilities proposed for different locations in the Kittitas Valley. The baseline conditions and expected impacts to air quality from the construction and operation of the Kittitas Valley and/or Wild Horse wind power projects would be similar to those described for the Desert Claim project. Vehicle exhaust from construction equipment and fugitive dust from construction activities would be the primary air emissions, and the air quality impacts from these emissions would be temporary and localized. Air quality impacts from project operation would be negligible for all three projects. One identifiable difference among the projects is that gravel needed for construction of the Wild Horse project would be obtained from on-site quarries, while gravel for the Kittitas Valley and Desert Claim projects would more likely be transported from off-site sources. This would essentially result in a tradeoff in location of impacts, with greater exhaust emissions from additional vehicle traffic and greater dust emissions from additional traffic on gravel roads for the latter two projects, and more concentrated emissions from quarry and batch plant operations in the Wild Horse project area. On balance, the incremental difference in total dust emissions would not likely be substantial with respect to overall air quality impacts for these two projects.

It is unlikely that there would be interactive air quality effects among multiple wind power projects, i.e., that construction activity at one project would add to emissions from one or both of the other projects and thereby create cumulative impacts within a given local area. Based on the prevailing west-northwesterly wind direction, it is possible that under peak wind conditions dust generated by construction activity in the Kittitas Valley project area could be carried into portions of the Desert Claim project area and contribute to localized dust impacts in that area. In general, however, any dust emissions that might be transported beyond any of the three project areas would typically be carried into undeveloped areas to the east and southeast, rather than into the more populated areas of the Kittitas Valley.

The air emissions from contemporaneous construction of multiple wind projects would be additive in terms of their contribution to total regional pollutant loads. Based on the combined area of wind project construction activity and volume of construction traffic relative to existing sources of air emissions in Kittitas County (e.g., vehicle traffic on I-90 and other roads, and agricultural activities on over 350,000 acres of commercial agricultural lands), however, it is not anticipated that the incremental impact of the aggregate air emissions from construction of multiple wind power projects would be sufficient for regional air pollutant concentrations to temporarily exceed the applicable air quality standards. Consequently, there does not appear to be a potential for significant cumulative air quality impacts from

the development of multiple wind power projects in the Kittitas Valley, even if all three projects were constructed during approximately the same period.

4.3 WATER RESOURCES

Existing water resource conditions in the project area and the surrounding region reflect past activities and current land use. According to the Upper Yakima Basin Watershed Assessment (EES 2001), natural and man-made causes of water quality degradation in the Yakima River Basin include:

- nutrient loading from fertilizers, animal waste, sewage treatment plants, urban runoff, and septic systems;
- suspended sediment and turbidity from agriculture and ranching, natural sources, timber harvest and related road building, loss of vegetative cover, mining, off-road vehicle use, and erosion from other land disturbance;
- synthetic organic compounds from pesticides and household hazardous wastes; and
- water temperature changes from timber harvest and conversion of forest lands, low water/flow, discharges of treated effluent, and loss of riparian cover.

Significant changes to the natural conditions in the basin have resulted from activities related to agriculture, grazing, and water diversion (EES 2001). Irrigation ditches and canal leakage have influenced aquifer recharge throughout the Yakima River Basin. Irrigation and leakage from the North Branch Irrigation Canal specifically may have affected the flow in streams in the vicinity of the Desert Claim project. Similarly, crop production and grazing have modified the existing vegetation in the basin and in the project vicinity.

The Desert Claim project's effects on water resources (described in **Section 3.3.2**) would be additive to other effects from past, present, and reasonably foreseeable actions in the project vicinity. The water resource impacts of the project, however, would be localized to the immediate area of specific project facilities and would primarily be temporary effects limited to the project construction period. Direct and indirect impacts to streams and riparian areas in the project area would be minor, and could be reduced or avoided through micro-siting of individual turbines and related project facilities. The project would have minimal ongoing demands for water consumption, and re-establishment of pre-construction contours and vegetation would allow surface waters to infiltrate back into existing ground water recharge areas. Consequently, the project would have negligible effects on water quantity conditions for surface water or ground water resources. Existing regulations to protect water quality are expected to be sufficient to avoid significant adverse impacts from project activities.

The incremental effects of the Desert Claim project would not substantially change baseline water resource conditions in the project vicinity, and would have a negligible effect on conditions in the Upper Yakima watershed. Therefore, the potential water resource impacts of the Desert Claim project would not result in significant cumulative impacts at the local level or on a watershed basis.

Three utility-scale wind power projects are currently proposed for Kittitas Valley locations within 13 miles of Ellensburg. These include the Desert Claim project, located approximately 8 miles north of Ellensburg; the Kittitas Valley project, located approximately 12 miles northwest of Ellensburg; and the Wild Horse Project, located approximately 13 miles east of Ellensburg. Two of the three projects are located within the Upper Yakima drainage basin and near streams that drain to the Yakima River near Ellensburg (Desert Claim and Kittitas Valley), while one is primarily within the drainage basin of the

middle Columbia River (Wild Horse). As mentioned in **Section 3.3.1**, the Yakima River is currently on Washington State's Clean Water Act 303(d) list of impaired water bodies, based on reported high concentrations of copper (Ecology 1998).

The water resource impacts of the Kittitas Valley and Wild Horse projects are expected to be similar to those described for the Desert Claim project. All of the projects would involve the same types of construction activities and project features, relatively similar areas of ground disturbance, similar restoration and mitigation actions, and similar water demands. In the case of the Wild Horse project, however, the proposed construction program includes development of gravel quarries and one or more concrete batch plants within the project area. Consequently, water resource impacts associated with gravel extraction and concrete manufacture for the Wild Horse project would be on-site and more concentrated, while these effects would be off-site and more dispersed for the Kittitas Valley and Desert Claim projects. Construction activities for each project would be required to follow stringent surface water protection regulations. None of the projects would require extensive construction activity or permanent project facilities along or near major streams. Overall, the effects of the individual projects on water quantity and quality would be minor, and would not be likely to result in noticeable changes in downstream areas.

When the water resource effects of the three proposed projects are considered collectively, they are likewise not expected to represent significant local or regional changes in surface water or ground water conditions. That expected outcome is based on the magnitude and extent of the project-specific changes and the geographic relationship among the projects. Most of the Kittitas Valley project area is located within the drainage of Dry Creek, which is an ephemeral stream that joins the Yakima River northwest of Ellensburg, while a portion of the area drains directly to the river. The Desert Claim project area is situated within the drainages of Reecer Creek and several tributaries to Reecer Creek, which flows into the Yakima River near the confluence with Dry Creek. Neither of these streams is a major tributary to the Yakima River; Dry Creek is not a perennial stream, while Reecer Creek is perennial but has a documented flow range of 4 to 68 cfs. Most of the Wild Horse project area is within the drainages of Whiskey Dick and Skookumchuck Creeks, which are small streams that drain eastward to the Columbia River. Part of the Wild Horse area drains to Whiskey Jim Creek and subsequently to Parke Creek, which is a minor tributary of the Yakima River that enters the river southeast of Ellensburg.

Because the three projects are sufficiently distant from each other and are located in different tributary watersheds, there would not be combined effects from multiple projects on the same stream. The minor, localized effects of each project would occur within the drainages of minor tributaries to the Yakima River and the Columbia River, and at a distance of at least several miles upstream from either river. Therefore, significant cumulative effects on water resources within the Upper Yakima River basin or the northeastern portion of the Kittitas Valley are not expected, even if all three projects were constructed.

4.4 PLANTS AND ANIMALS

4.4.1 Vegetation

Development of the Desert Claim project would result in both temporary and permanent loss of vegetation within the project area, with corresponding impacts to several types of plant communities present. These impacts would occur within the context of disturbance and vegetation change associated with current and expected future land uses in the project vicinity, primarily agricultural activities and scattered rural residential development. While much of the project area appears to have been converted from native vegetation to pastures (grasslands) or agricultural crops, more than half of the project area

remains in shrub-steppe vegetation dominated by native species. Construction of Desert Claim project facilities would result in the permanent loss of 100 acres of existing vegetative cover, including approximately 51 acres of shrub-steppe and 6 acres of grassland lithosol. Based on the limited extent of vegetation loss resulting from the Desert Claim project, in the aggregate for the 5,237-acre project area and with respect to specific communities, these impacts would not result in the potential for significant cumulative vegetation impacts in the local area.

Impacts to vegetation from development of the Kittitas Valley and/or Wild Horse wind power projects would be similar to those described for the Desert Claim project, and would generally consist of localized impacts to the same types of vegetation communities. The permanent footprint for the Kittitas Valley project would displace approximately 93 acres of existing vegetation, including approximately 41 acres of shrub-steppe and 29 acres of lithosol. Corresponding figures for the Wild Horse project include 165 total acres displaced, including 87 acres of shrub-steppe habitat. Lithosol habitats are also abundant on the Wild Horse site, but were classified as a soil type. For each project, the area of existing vegetation permanently displaced by the project facilities amounts to a small portion (approximately 2 percent or less) of the respective project area. The combined figures for the three projects amount to approximately 297 total acres of existing vegetation lost, including 177 acres of shrub-steppe and at least 35 (and no more than 100, based on a conservative estimate for Wild Horse) acres of lithosol habitat. Based on the limited incremental loss of native vegetation relative to the local distribution of these communities, the combined effects of the three projects would not represent a significant cumulative impact on vegetation.

No federally-listed rare plants were identified at either the Kittitas Valley or Wild Horse project sites. The hedgehog cactus, a state-listed species identified for review, was found extensively in lithosol habitats on the Wild Horse site (EFSEC, 2003a). Less than 10 percent of the identified individual plants of this species would be subject to potential disturbance from development of the Wild Horse project. The wet meadow areas in the Desert Claim project area provide potential habitat for the Ute ladies' tresses, an orchid that is federally listed as endangered. Field surveys of the wet meadow habitats resulted in no findings of this species, however, and no other rare plants protected by either the federal or state governments were found in searches of the areas of likely disturbance in the Desert Claim project area. The minimal potential impacts of the proposed wind projects on rare plants would not represent a significant cumulative impact to any species.

The Kittitas Valley in general has recently experienced an increase in residential and second-home development in the rural areas, and this trend is expected to continue. Past and ongoing development and agricultural activities create the potential for the introduction of new noxious weeds or the spread of existing noxious species, with potential negative consequences for both native and cultivated vegetation communities. The development of multiple wind energy projects would result in equivalent (and possibly lesser) opportunities for similar types of noxious weed impacts. The degree of collective impact associated with the proposed projects would be minimized or reduced through control measures implemented or required by Kittitas County, EFSEC, individual landowners (which would include the WDNR) in each project area, and each project's developer and owner. In addition, the three projects are all located in areas where past and existing human activity has already created some opportunity for noxious weed infestation, and where existing control programs are active. Therefore, it is unlikely that there would be a significant increase in the risk of noxious weed infestation from the development of multiple wind energy projects in the Kittitas Valley.

4.4.2 Wetlands

The effects of the Desert Claim project on wetlands would be additive to other effects from past, present, and reasonably foreseeable actions. As discussed in **Section 3.3.4**, existing environmental conditions in the project area have been influenced by past and present activities. Significant changes to the project area have resulted from activities related to crop cultivation, grazing, water diversion for irrigation, and residential development in and near the project area. The incremental contribution from the project would not substantially change the condition of wetland resources in the project area. The majority of the wetlands in the project area are marginal-quality wetlands dependent on artificial hydrology (i.e., irrigation return flows and leakage from canals). Based on the current plans for the project, construction activities would temporarily disturb approximately 16 acres of wetland area, while the permanent project footprint would overlap with an area estimated at 9 acres. Final micro-siting for project facilities could be used to avoid at least some of these wetland areas. To the extent that avoidance of wetland areas was not feasible, mitigation would be developed to enhance or replace wetland areas. Existing regulations to protect water quality are expected to be sufficient to avoid significant indirect effects to project area wetlands through stormwater runoff, and thus the potential for hydrologic changes to wetlands would be minimal. With mitigation, the disturbance effects of Desert Claim project construction would not constitute a significant cumulative impact on wetlands in the local area.

Wetlands are rare in the project areas for both the Kittitas Valley and Wild Horse wind power projects. Field studies for the Kittitas Valley project identified two wetlands within a short distance of planned locations for project components; a small area (less than 0.05 acre) of one wetland would be affected by construction of a project access road. No wetlands were identified within a 50-meter buffer around the planned locations for Wild Horse project facilities, so no impacts to wetlands are anticipated for that project. Consequently, the Kittitas Valley and Wild Horse projects would have negligible to nonexistent impacts to wetlands.

The collective effects of the three proposed projects would essentially be the same as the effects identified for the Desert Claim project. As discussed above, the wetland impacts of the Desert Claim project would be minor as a result of wetland avoidance and/or required mitigation for wetlands that could not be avoided. Because the collective effects of these projects would be minor and are not expected to extend to downstream surface waters or wetlands, there would not be a potential for significant cumulative effects on wetland resources.

4.4.3 Wildlife

This section is based upon a comprehensive report (Young and Erickson 2003) that provides a cumulative impacts analysis for avian and other wildlife resources from three proposed wind projects in Kittitas County, Washington. Aside from the Desert Claim Wind Power Project, Zilkha Renewable Energy has proposed to develop the Kittitas Valley and Wild Horse wind power projects. Implementation of all three projects would result in construction of a combined total of from 361 to 391 wind turbines.

4.4.3.1 Birds

Using mortality estimates from existing wind plants with similar habitat and bird use, combined mortality of passerines (bird of the order Passeriforme, which includes perching birds and songbirds such as finches, warblers, sparrows blackbirds and jays) for the three projects would range from 430 to 740

fatalities per year. This level of mortality would not exceed that which has been reported at other, newer-generation wind plants in the Pacific Northwest and is not expected to have any population-level consequences for individual species. This conclusion is based on the expected low fatality rates for most species and the high population sizes of the locally-occurring common passerine species such as European starling, American robin, horned lark, American pipit, and western meadowlark.

Red-tailed hawks, American kestrels, and northern harriers account for much of the raptor use at the three projects during spring, summer and fall. During winter and early spring, red-tailed and rough-legged hawks account for most of the raptor use. These species are expected to be the raptor species with the highest risk of mortality across the projects. Some individual breeding raptors might use both the Kittitas Valley and Desert Claim project areas. Because the Wild Horse project is at least 13 miles distant from either of the other projects, individual breeding raptors using the Wild Horse area are not expected to also use the Kittitas Valley and/or Desert Claim areas. Based on levels of raptor use within the study areas, raptor mortality is expected to be slightly higher than other new generation wind projects with similar turbine types. For all three proposed Kittitas County projects combined, 14 to 15 raptor fatalities per year could occur. Recent published data for existing new wind energy projects in the West, indicates there have been few northern harrier fatalities recorded at these wind plants, and no bald eagle or rough-legged hawk fatalities have been observed (Erickson *et al.* 2002). Golden eagle use of the three proposed project areas is low relative to other wind sites, and mortality is expected to be very low.

Cumulative impacts to bald eagles conceivably could be loss of winter habitat and fatalities. None of the projects would contribute to the loss of roosting habitat (which is limited to the Yakima River riparian corridor) or foraging areas (which are primarily cattle lots and calving operations). To date, no bald eagle fatalities have been reported from wind plants in the U.S. Foraging behavior of wintering bald eagles, primarily scavenging, may make them less susceptible to collision with wind turbines because they are presumably less focused on moving prey and more attentive to their surroundings while searching for carrion. Based on low use of the proposed project areas by bald eagles, and the lack of any reported fatalities at any operating wind plant in the U.S., fatalities are expected to be nearly zero. However, due to nearby roosting and foraging areas, bald eagles might regularly move through the project areas and thereby increase their exposure. Assuming risk of collision is proportional to use, 1 bald eagle fatality across all three projects might occur every 2 to 3 years. The effect of this low level of mortality on the increasing bald eagle winter population in the Kittitas Valley and the State of Washington would not be measurable.

4.4.3.2 Mammals

Temporary displacement of wintering mule deer and elk would be anticipated if construction occurred during the winter, and this impact might be greater if two or more of the projects were under construction simultaneously during winter. While human-related activity at wind turbines during regular maintenance would be less than during the construction period, it is not known if human activity associated with regular maintenance activity would exceed tolerance thresholds for wintering mule deer or elk. For all three projects, operational impacts to wintering mule deer and elk are expected to be low due to the current level of disturbance associated with existing residential development and roads in the vicinity of the projects.

Based on studies at other wind plants, bat fatalities are likely to occur at all three Kittitas County projects, but no loss of key bat habitat is expected. Most bat fatalities found at wind plants occur during the fall and have been tree-dwelling migratory bats, with hoary and silver-haired bats being the most prevalent.

Using mortality estimates from other wind plants, total annual bat fatalities for all three projects would range from 361 to 782. The significance of bat mortality from the three projects is hard to predict because there is very little information available regarding the size of bat populations. Some studies suggest, however, that resident bats do not appear to be significantly affected by wind projects because nearly all observed mortality has occurred during the fall migration period (Johnson et al., 2003; Gruver, 2002). On that basis, significant adverse impacts to resident bat populations are not expected.

4.4.4 Fish

Past and existing human activities have affected fishery resources in the Desert Claim project area. Construction and water diversion from the North Branch Irrigation Canal may have caused migration barriers for anadromous and resident fish in project area streams. In addition, irrigation and leakage from the North Branch Irrigation Canal may have affected natural stream flow and associated fish habitat. Agriculture and grazing have also affected the existing vegetation in the riparian areas along streams, and thereby contributed to changes in in-stream habitat conditions. Development of the Desert Claim project would result in minor disturbance or displacement impacts to streams and riparian zones in the project area; because none of the affected streams are known to contain fish communities, direct impacts to fish resources are expected to be negligible or nonexistent. Similarly, the potential indirect effects of the project on water quality and quantity would have a negligible effect on downstream water resources or the fish habitat they provide. Therefore, the Desert Claim project would not result in significant cumulative impacts on fisheries resources.

Studies conducted for the Kittitas Valley wind power project did not identify any fish-bearing habitat within 0.5 miles of proposed facility or construction locations, and no impacts to fish habitat or fish species resulting from construction and operation of the Kittitas Valley project is expected (EFSEC, 2003). Similarly, no fish are known to occur in the Wild Horse project area, and the nearest fish habitat is located along Quilomene Creek approximately 1 mile north of the project. The lower reaches of Whiskey Dick and Skookumchuck Creeks also provide habitat for salmonids; these areas are approximately 5 miles downstream from the Wild Horse site. Assuming best management practices were employed for erosion and sediment control (as would be required permit conditions for all three projects), the Wild Horse project would not result in adverse impacts to fish or fish habitat on-site or in downstream areas.

The collective effects of the three proposed projects would consist of negligible direct and indirect effects on water resources in three localized areas of the Kittitas Valley. Because the effects of the respective projects would be negligible and would not extend to downstream waters, there would not be a potential for significant cumulative effects on fishery resources.

4.5 ENERGY AND NATURAL RESOURCES

Construction of the Desert Claim project would require substantial quantities of local construction material inputs, primarily sand and gravel, as well as smaller quantities of water and fuel and non-local resources (such as steel) used to manufacture wind turbine components. Incremental increases in the consumption of energy and other natural resources attributable to construction of the project, either relative to the supply of resources available locally or within the context of the total baseline use of energy and natural resources in the County, would be small and temporary. Energy and natural resource consumption for the operation of the project would be negligible. Electrical energy produced by the operation of the project would represent a significant addition to the local production of energy.

The impacts of construction of the Kittitas Valley and Wild Horse projects on energy and natural resources would be very similar to those described for the Desert Claim project. All of the projects would involve the same types of construction activities and project features, similar numbers of wind turbines, similar quantities of facilities such as access roads and collection cables, and similar energy and water demands. The combined demands of the three projects for fuel and construction materials would add measurably to the local and regional consumption of these non-renewable resources on a temporary basis, but is not expected to have a noticeable effect on the supply or availability of these resources. The single largest demand would be for sand and gravel resources, which are abundant in the local area and might, in at least two cases, be obtained from sources within the project area. Overall, based on timing considerations and the incremental resource demands associated with the projects, the development of multiple wind energy projects in Kittitas County would not represent the potential for significant cumulative adverse impacts on energy and natural resources.

The three proposed wind power projects would provide a combined nameplate capacity of approximately 560 to 565 MW of electricity (under the “middle scenario” for development of the Kittitas Valley project). Assuming long-term operation of the three projects at a typical plant factor of 33 percent, the Kittitas Valley, Desert Claim and Wild Horse projects would produce approximately 186 average MW of electricity on a long-term basis. That collective energy output would represent a substantial increase in the amount of electricity currently produced within Kittitas County. Operation of the three projects would also add substantially to the capacity, production and availability of renewable energy sources in Washington and the Pacific Northwest. Energy produced by the three wind power projects would provide a sustainable, renewable source of electric power supply to supplement the region’s existing hydroelectric and thermal (nuclear, coal-fired and gas-fired) power sources, although it would represent a relatively small addition to the total regional electricity supply. Utilities receiving the wind energy would be able to diversify their energy resource portfolios and stabilize a portion of their long-term energy supply costs. Power produced by the wind projects would also be responsive to the identified needs of regional utility providers, including Puget Sound Energy, Avista and PacificCorp.

4.6 CULTURAL RESOURCES

Direct and indirect impacts to cultural resources within the Desert Claim project area would occur within the context of comparable impacts from past and ongoing land uses in the vicinity. Agricultural activities, irrigation development, construction of roads and power transmission lines, and rural residential development have no doubt disturbed or destroyed cultural resources that existed in the project vicinity at one time, and have altered the historic setting for the resources that remain. Based on the results of the field survey of the Desert Claim project area, however, numerous identifiable artifacts remain in the area. Given the relatively small area of temporary disturbance associated with development of the project, it is unlikely that the additional impacts to remaining cultural resources would represent a significant cumulative change compared to impacts from past and ongoing activities.

The Kittitas Valley and Wild Horse wind power projects would likewise create the potential for adverse impacts to cultural resources through ground disturbance, increased opportunity for removal of artifacts or vandalism of cultural sites, and/or changes to the settings of cultural sites. Based on the geographic relationship among the projects and the potential mechanisms for impacts to cultural resources, adverse impacts would in general be confined to the vicinity of each project and would be determined by the specific conditions for each project. For example, construction activities for the Desert Claim project would not have the potential to damage cultural sites in the Kittitas Valley project area. Similarly, development and operation of the Kittitas Valley project would have no bearing on accessibility to (and

opportunity for disturbance of) cultural sites in the Desert Claim project area. The possible existence of interactive effects among the projects would be limited to a situation in which the visual setting of a cultural site could be indirectly affected by visible facilities of multiple wind power projects. As indicated in the discussion of aesthetic impacts, however, there are few areas from which turbines of both the Kittitas Valley and Desert Claim projects would be visible at foreground and/or middleground viewing distances.

The direct and indirect effects of each project on cultural resources are not yet known with precision, as avoidance of identified cultural resource sites can be taken into account in final micro-siting of project facilities. Therefore, the combined cultural resource impacts of the three projects are uncertain. Studies conducted for the Kittitas Valley project identified two previously unrecorded archaeological sites in the project area, which could potentially be subject to ground disturbance during construction (EFSEC, 2003). In addition, the visual setting of one historic site (a North Branch Canal tunnel) could be indirectly affected by the presence of Kittitas Valley project facilities. Cultural sites in or near the Wild Horse project area include six previously recorded archaeological and historical sites and three previously unrecorded archaeological sites (personal communication, P. Trautman, Lithic Analysts, Olympia, Washington, October 22, 2003). None of these cultural sites were likely to be disturbed by construction activity, although visible evidence of project facilities would indirectly affect the setting for three of the sites.

In comparison, the density of cultural resources in the Desert Claim project area appears to be considerably greater than in the Kittitas Valley and Wild Horse areas; as documented in **Section 3.6**, the field survey of the Desert Claim project area identified 13 previously unrecorded prehistoric sites and 18 previously unrecorded historic sites (as well as one recorded historical site), along with more numerous prehistoric and historic isolates. Potential direct and indirect impacts to those cultural resources, however, could generally be avoided or reduced through final turbine micro-siting and other mitigation measures. Therefore, the combined effects of the three proposed projects on cultural resources appear to be the possible disturbance of a small number of sites and the alteration of the visual setting for up to approximately 35 to 40 cultural sites. Based on the incremental nature of the unregulated setting changes ongoing in the Kittitas Valley and the uncertain historical significance of the identified cultural sites, it is unlikely that the combined effects of the project would represent a significant cumulative impact on the cultural resources of the region.

4.7 LAND AND SHORELINE USE

Cumulatively, the three wind power projects would be located in an area of approximately 17,966 acres. These lands are currently used primarily for agricultural activities (grazing and rangeland). Based on adopted Comprehensive Plan (Rural, in all three cases) and zoning designations (Forest and Range for Wild Horse, and a mixture of Forest and Range and Ag-20 for Kittitas Valley and Desert Claim), agriculture is the intended long-term use of the majority of this land. Together, the areas potentially affected by the proposals represents approximately 4 percent of the total lands in Kittitas County zoned Ag-20 and Forest and Range. Some dispersed rural residential uses are located adjacent to the Desert Claim and Kittitas Valley sites, and at further distances (approximately 3 miles) from the Wild Horse site. These areas are also characterized by the presence of electric transmission facilities.

Existing uses and activities would not be displaced by proposed wind power facilities. Collectively, the 3 proposals would result in the long-term (i.e., 30 year) conversion of an estimated 350 acres of agricultural land as a result of construction of wind power facilities. This represents less than 2 percent of the total

site area of the 3 proposals. Agricultural activities would continue unaffected on the remainder of the affected sites.

Kittitas County considers wind farms to be a “utility” use, which, depending on site-specific conditions, is potentially compatible with ongoing agricultural activities. The proposed wind energy facilities would not collectively disrupt or change the underlying land use pattern of this portion of the county. Wind facilities are not inherently more intensive than many other agricultural, energy or utility uses that occur in rural areas in terms of their potential external impacts (e.g., off-site noise, land use conflicts). While some localized land use conflicts could occur based on the location of specific turbines, these are seen as site-specific and not indicative of conflict with the broader, underlying rural land use pattern.

Individually and collectively, the proposals would not be likely to attract supporting uses or generate spin-off development. The combined number of operational full-time employees (30-42) is modest and the wind power facilities would be widely dispersed. They would not create a cumulative demand for supporting commercial or industrial uses and would not create pressure to change or convert existing land uses.

Proposed wind turbines (approximately 360 cumulatively) would be significantly larger in scale than nearby rural and agricultural uses and structures, would be dispersed over a large area, and would result in some degree of visual discord or intrusion with existing uses. Viewers would be able to see both the Desert Claim and Kittitas Valley proposals from some view locations within certain visual assessment units. However, these cumulative visual impacts are not indicative of a conflict with the underlying land use pattern. Cumulative visual impacts are considered in detail in **Section 3.10** of this EIS.

It is possible that the proximate Desert Claim and Kittitas Valley proposals (together more than 12,000 acres) could cumulatively discourage residential uses to some degree in their general locations. (The location and topography of the Wild Horse site generally makes it less susceptible to residential development.) This could have the effect of reducing pressure for the conversion of agricultural lands to residential uses, which could be seen as positive, and would be consistent with Kittitas County’s policies to preserve agricultural uses. Some nearby residential users might seek to relocate if they felt that wind facilities, individually or collectively, conflicted with elements of their lifestyles.

Cumulatively, proposed wind energy facilities would be consistent with Growth Management Act goals and policies for rural areas, and with relevant Growth Management Hearings Board decisions. Turbines would not be defined as “urban growth” (RCW 36.70A.030(17): they would not make intensive use of the land for buildings and structures (330 acres collectively, or 2 percent of the combined site areas), and they would not be incompatible with the primary use of rural lands for agricultural activities. Please refer to the discussion in **Section 3.7.2.2**.

4.8 HEALTH AND SAFETY

4.8.1 Mechanical Hazards

Construction and operation of the Desert Claim project would add to the existing health and safety risks that currently exist in the project vicinity, and would introduce some new types of risks. Existing mechanical hazards for humans primarily include those associated with operating motor vehicles, lawn and garden equipment (e.g., mowers, snow blowers, string trimmers), agricultural machinery, and other types of equipment typically used in rural areas (e.g., portable generators, chain saws). At many locations

in the project area people must be aware of the risks of living and working around low- and high-voltage electric lines. Wildland and structure fires can occur, and the project is considered to be in a high-hazard area for wildland fires. While the existing risks are diverse, the possibilities of serious adverse consequences for a given individual or location are small or remote. The Desert Claim project would introduce new hazards, such as blade throw and ice throw, which would likewise have remote probabilities of occurrence. Given the distance separation from human use areas and other safety features incorporated into project plans, as well as the mitigation measures incorporated into the modified project design which includes safety zones, it is anticipated that the Desert Claim project would add to the existing health and safety risks in the project area to a very small degree.

Development of the Kittitas Valley and/or Wild Horse wind power projects would involve the same types of hazards associated with the Desert Claim project. With respect to the health and safety risks specific to wind energy projects, including mechanical hazards and shadow flicker, the potential impacts of the three projects would be localized to the respective project areas and are not expected to be cumulatively significant. While the probability of any specific hazard occurring would be essentially the same for each project (based on very similar numbers and sizes of wind turbines), the risk of exposure to those hazards would vary with the level of human activity in the near vicinity of each project. In general, the risk of exposure would be greatest (although still low, in probability terms) for turbines that are in close proximity to residences or public roads; turbines in such circumstances are also the focus of the mitigation measures that have been identified for this issue. Some individuals living in the northern portion of the Kittitas Valley might have common travel patterns that would involve trips through or past portions of both the Kittitas Valley and Desert Claim project areas, which could result in exposure to ice throw or similar mechanical risks associated with elements of both projects. Based on the low probability associated with these hazards and the measures to reduce risks included in the modified Desert Claim project, which are also available for use in the other proposed projects, this situation is not anticipated to involve a significant cumulative increase in health and safety risks.

Development of two or more wind energy projects in Kittitas County could result in a cumulative increase in the risk of wildfire in the central and eastern portions of the County. The greatest fire risk for each project would occur during the construction period, because of the level of activity and the numbers of workers and equipment active at that time. The greatest cumulative fire risk would occur if and when construction schedules for two or all three of the projects overlapped. While wind energy project construction would introduce additional human activity, machinery and fuels into the affected environment for each project, it would also result in higher levels of watchful presence in and around each project site, the use of stringent fire protection measures, and the presence of trained personnel who could respond to fire hazards. In addition, the construction program for each project would include contracted fire protection services from the respective local rural fire district, which would facilitate prompt response to any incidents that might occur. Based on the heightened level of fire prevention and protection that would exist during project construction, it is unlikely that the cumulative increased risk of fire during this period would be significant.

As discussed in **Section 3.8.2**, certain fire risks specific to wind energy projects would also exist during the operating period for each project. Similar to the construction process, however, specific measures to counteract or manage these risks would be implemented during project operation. The wind turbine machinery is designed with fire safety in mind, and the cleared areas and gravel pads around the base of the turbines and other facilities would serve to minimize the spread of fire around the facilities. In addition, the project facilities would be continually monitored, the project areas would be regularly patrolled and access to the projects areas would be limited. Because the level of fire prevention and

protection that would exist within the respective project areas would be greater than what presently exists or what would occur in adjacent areas, it is possible that the net impact of project operation would be a reduction in the existing fire hazard level within the project areas. In any event, it is unlikely that the cumulative increased risk of fire during the operating period for multiple wind energy projects would be significant.

4.8.2 Electrical Hazards

The electric and magnetic fields associated with the Desert Claim, Kittitas Valley and/or Wild Horse wind power projects would be less than those produced by electrical facilities already present in the vicinity of the respective project areas, and would diminish to background levels at distances within which public exposure could occur. Therefore, the wind project facilities would not add to the strength or extent of electric and magnetic field exposure that might already occur, and there would not be cumulative exposure impacts from development of multiple wind energy projects. Similar conclusions apply to concerns involving electrical safety (inadvertent contact with energized electric facilities), stray voltage and lightning.

4.8.3 Shadow Flicker

Potential shadow flicker impacts from the three proposed projects would be limited to the immediate vicinity (within approximately 2,000 feet) of the wind turbines within each respective project area. There are no permanent receptor locations within this distance of the Wild Horse project, and shadow flicker impacts from this project would be minimal or nonexistent. Some residences that are close to turbine locations for the Desert Claim or Kittitas Valley projects would be subject to shadow flicker for varying numbers of hours per year. These impacts would be limited to a number of discrete locations that are well separated from each other, and would not constitute a cumulative impact from these two proposed projects.

4.9 NOISE

The proposed Desert Claim project would not be expected to induce additional development in the project vicinity beyond the proposed wind turbine generators and associated equipment. Therefore, the potential for cumulative impacts would be restricted to the construction and operation effects of the project on the existing environment and their relation to past, present and expected future noise conditions. Cumulative impacts from the project are inherently considered in **Section 3.9.3.2**, where the cumulative sound levels (i.e., the existing sound levels plus the projects sound levels) are displayed in **Table 3.9-6**. While the project would result in incremental increases in typical noise levels at a small number of selected locations, the additive effect of the project would not represent a significant cumulative impact to existing noise conditions in the project vicinity.

The noise impacts of the Desert Claim, Kittitas Valley and/or Wild Horse wind power projects would be localized to the vicinity of each project. Residences near a portion of the Kittitas Valley project area could experience a noticeable change in the ambient sound level relative to baseline noise conditions, similar to the case for selected noise receptors near the Desert Claim project. The two projects are a sufficient distance apart that residents near the Desert Claim project would not also experience elevated noise levels from Kittitas Valley project facilities, and vice versa. Noise modeling results for both projects indicate that receptors located between the two projects would be unlikely to experience noticeable increases in noise levels as a combined effect of the projects. The Wild Horse project would not affect noise levels at

any residences or other permanent receptors. Consequently, potential noise impacts from the proposed wind energy projects would be confined to certain project-specific locations, and there would not be cumulative noise impacts from the development of multiple wind projects.

4.10 AESTHETICS, LIGHT AND GLARE

Aesthetic and related impacts of the Desert Claim project would occur within the context of landscape modifications associated with past, current and expected future uses in the project vicinity. As discussed in **Section 3.10.1**, the local landscape shows evidence of changes resulting from agricultural practices, land management activities (such as timber harvest and road construction), rural residential development, and construction of infrastructure facilities such as electric transmission lines and irrigation canals. While the existing landscape in the vicinity of the project and elsewhere in the Kittitas Valley has been substantially modified, the additive visual effect of the Desert Claim project facilities would represent a significant change from the baseline aesthetic condition in areas where those facilities were visible and prominent.

The aesthetic impacts of the Kittitas Valley and Wild Horse projects would be similar to those described for the Desert Claim project, although there would be differences with respect to viewer location and viewer groups affected. In addressing the potential adverse cumulative impacts of multiple wind power projects, it is most important to consider the Desert Claim and Kittitas Valley projects together because of their proximity. Viewers exposed to wind projects tend to react more negatively to longer lines of turbines than to isolated smaller clusters (Righter, 2002). This finding suggests that the combined effects from two projects developed near each other (within 2 miles) might be greater than the sum of their individual impacts. Should both the Kittitas Valley and Desert Claim projects be built, the visual consequences would include approximately 240 wind turbines (120 for each project) on the valley floor and adjacent slopes in the north-central portion of the Kittitas Basin.

Based on the analysis provided in **Section 3.10.2**, the most significant cumulative visual impacts would be from the Northwest Valley Visual Assessment Unit, especially in views to the west from residences and roads in this unit. For viewers in this unit, the wind turbines from the two projects might appear to surround the valley. Views from the Hayward Hill, Dry Creek Slope, Yakima River, and Southwest Valley Visual Assessment Units would also experience significant cumulative visual impacts because turbines in the ridgetop configuration of the Kittitas Valley project would be prominent in their views. In addition, motorists on I-90, the Thorp Highway, U.S. Highway 97, State Route 10 and some local roads would have longer-duration wind turbine views because they would be passing two nearly adjacent projects.

The Draft EIS prepared for the Kittitas Valley project indicates there are also several locations from which the Desert Claim project would be visible in the foreground or middle ground and the Kittitas Valley project would be seen in the middle ground or background (EFSEC, 2003). These include two locations on Reecer Creek Road, one south of Smithson Road and one south of the National Forest boundary, from which views would include both projects. Simulated future views with facilities of both projects (see **Figures 4-1** and **4-2**, respectively) indicate that the visual impact at the southerly location would be primarily from the Desert Claim project, while the combined effect of both projects from the northerly location would substantially alter the existing visual character and quality of the Kittitas Valley as seen from this foothill viewpoint. **Figure 4-2** illustrates a view from a location very close to that of Key View 8A for the Desert Claim analysis, as shown in Figures G30 and G46 in **Appendix G**.

The Wild Horse Wind Power Project would be located a considerable distance from the other two projects and in a different portion of the local landscape, creating a limited potential for this project to be evident in the same view as the Desert Claim and/or Kittitas Valley projects. Nevertheless, there are likely to be some locations near the Kittitas Valley or Desert Claim project areas from which there is a clear view toward the Wild Horse site on Whiskey Dick Mountain, which is prominent at the eastern edge of the valley. The Wild Horse turbines would be quite distant in such views (up to 21 miles from the Kittitas Valley area and 14 miles from the Desert Claim area), however, and would have minimal additional effect on these views.

There may also be some viewpoints in or near the valley from which all three projects would be visible. One example is a segment of I-90 as it enters the Kittitas Basin near the Elk Heights interchange; the eastbound view in this instance includes the northern margin of the valley (with large portions of both the Kittitas Valley and Desert Claim project areas) and Whiskey Dick Mountain in the distant background. In this case, the Kittitas Valley and Desert Claim turbines would be from about 2 to 10 miles away, while the Wild Horse project would be so far away as to be an insignificant background feature. Alternatively, if a viewer were in a location triangulated from the projects, such as at the Manastash Ridge scenic viewpoint on I-82, the viewer would be so far from the projects that they would all be insignificant background features.



Figure 4-1
Simulated View of Desert Claim and Kittitas
Valley Projects from Reecer Creek Road



Figure 4-2
Simulated View of Desert Claim and Kittitas
Valley Projects from Table Mountain Slope

The preceding discussion addresses the potential for cumulative visual impacts from specific viewpoints or localized areas. The overall effect of multiple wind energy projects on the regional landscape and the experience of viewers when considered over time and at multiple locations is also a consideration. For example, drivers passing through Kittitas County on I-90 would likely notice a major wind development (the Wild Horse project) for a time in the stretch of highway east of the Columbia River and again in the eastern end of the Kittitas Valley (primarily around the community of Kittitas), and could subsequently view a more extensive area of wind turbines to the north and west of Ellensburg (the Desert Claim and Kittitas Valley projects). These repeated views of relatively large numbers of wind turbines would all be at background distances and would be intermittent, rather than continuous for this portion of the trip. Nevertheless, the viewers could recall seeing extensive wind energy development in the Kittitas Valley area.

This type of impression would also occur, probably on a more consistent basis, for residents of and frequent visitors to the local area. While residents of Ellensburg, for example, might not see turbines from one or more of the wind projects on a daily basis, they would likely experience repetitive views of numbers of wind turbines through their local travels over a period of weeks, months or years. Consequently, some local residents and frequent visitors might perceive a substantial change to the overall character of the Kittitas Valley landscape, and such a response would be more likely with the development of multiple wind projects.

4.11 RECREATION

As documented in **Section 3.11.2**, little recreation activity occurs in or near the Desert Claim project area and impacts from the project on recreation would be low. Given the applicable baseline recreation conditions, the impacts of the project would not constitute significant cumulative impacts within the context of other past, present and foreseeable future actions.

Baseline conditions and expected impacts for the Kittitas Valley and Wild Horse wind power projects would be similar to those identified for the Desert Claim project. The other two projects are roughly the same size as the Desert Claim project and would be located primarily on private property; a small portion of the Kittitas Valley project area consists of public lands managed by WDNR, and WDNR manages approximately 1,900 acres of the Wild Horse project area. Existing recreational activities within these project areas, with the possible exception of hunting, would generally continue to be available on privately-owned lands with the permission of the landowners.

In all three cases, current public access (to the extent that it exists) through all three project areas to existing recreational resources would not be altered as a result of project operation. The potential for recreational users traveling near the projects to experience temporary congestion or access interruptions during construction might be greater than would be the case for a single project, particularly along access routes located near both the Desert Claim and Kittitas Valley project areas. Potential indirect impacts of this nature would be intermittent, and would be limited to the period of project construction. Views of the valley from these access routes and (possibly) from selected recreational sites would change with development of multiple wind power projects; impacts to aesthetics, light and glare are discussed in depth in **Section 3.10**. Based on the minor nature of the expected impacts and the negligible potential for interaction among two or more projects, development of multiple wind power projects would not result in significant cumulative impacts to recreation.

4.12 GROUND TRANSPORTATION

Cumulative construction impacts from the proposed Desert Claim, Kittitas Valley and Wild Horse wind power projects would include increases in traffic volumes generated by construction workers and the delivery of construction supplies and materials. The concrete and gravel production and delivery capacity of local suppliers would not likely be sufficient to supply all three projects at the same time. This situation would likely require the use of concrete batch plants on one or more project sites in order to maintain a dependable supply of concrete, or use of revised construction schedules to reduce or avoid overlap among projects. If batch plants were utilized extensively, there would be fewer collective concrete-truck trips on county roads.

Zilkha Renewable Energy, the applicant for the Kittitas Valley and Wild Horse wind power projects, prepared an analysis of the combined effects of the construction traffic for those two projects. This analysis is summarized below, followed by a discussion of the possible construction schedule overlap and additive construction traffic effects of the Desert Claim project.

4.12.1 Combined Kittitas Valley and Wild Horse Traffic Effects

Transporter routes for the delivery of turbine components have been defined for both the Kittitas Valley and Wild Horse projects. The single transporter route for the Kittitas Valley project begins in Seattle and continues east on I-90 to Exit 106, the interchange with US 97 west of Ellensburg. Both transporter routes for the Wild Horse project also begin in Seattle and continue east on I-90, overlapping with the entire I-90 segment of the Kittitas Valley transporter route. One of the Wild Horse routes continues eastward on I-90 to Exit 115, just south of the towns of Kittitas, while the other continues on I-90 to Exit 136 at Vantage.

The Kittitas Valley segment of I-90 is classified as a rural-interstate, according to the Washington State Department of Transportation (WSDOT) road classification system. The average daily traffic (ADT) volume (in both directions) on I-90 immediately west of Exit 106 is estimated at 22,000 vehicles, with an estimated truck percentage of 21 percent (WSDOT 2001). If construction were to occur simultaneously for both the Kittitas Valley and Wild Horse projects, the segment of I-90 west of Exit 106 would temporarily carry construction traffic for both projects. This is the only roadway that would potentially be affected by combined construction traffic from the two Zilkha projects.

To analyze the potential combined traffic effects, base year (2001) traffic volumes on this I-90 segment were forecast to the year 2004 (the presumed year of project construction) using a 2 percent growth factor. This 2 percent growth factor is based on historical increases in ADT levels and background growth in the Cle Elum and Ellensburg areas due to large nearby capital projects, and is considered reasonable because of the rural nature of the local area. This growth resulted in a background 2004 ADT of 23,320 vehicles, as indicated in **Table 4-1**. Peak-hour traffic volumes in one direction were estimated at 1,210 vehicles for 2001 and 1,283 vehicles for 2004, based on application of a standard 10-percent peak-hour factor and a 55-percent directional factor to the respective ADT levels for two-direction traffic in each year. (The 10-percent peak-hour factor is typically applied to traffic analyses for urban areas and thus is likely to overstate the peak-hour volume on a rural road segment, such as I-90 in Kittitas County, resulting in a conservatively high estimate of the baseline traffic volume.)

Methodology from the Highway Capacity Manual (Transportation Research Board, 2000) is typically used to determine the level of service (LOS) for a roadway. The methodology takes into account vehicle volumes, number of lanes, vehicle speed, roadway grade, percentage of trucks in the vehicle mix, and

other factors to calculate the operating condition based on the equivalent number of passenger cars per lane per mile, using LOS classifications ranging from LOS A to LOS F. LOS A represents free flowing conditions (the equivalent of 11 or fewer passenger cars per lane mile for a freeway), while LOS F represents extremely congested conditions (more than 45 passenger cars per lane mile). Applying the HCM methodology for a freeway to the baseline conditions for the segment of I-90 west of Exit 106 indicates this roadway segment would function at LOS A under the baseline condition in both 2001 and 2004.

**Table 4-1
Baseline I-90 Traffic Volumes and LOS without Wind Projects**

Roadway	Daily		Estimated Directional Peak Hour without Project			
	2001	2004	2001	LOS	2004	LOS
I-90 (W. of US 97)	22,000	23,320	1,210 (10.1 cars/lane mile)	A	1,283 (10.7 cars/lane mile)	A

LOS = Level of Service

Sources: Washington State Department of Transportation, 2001
Transportation Research Board, 2000

The estimated construction traffic volumes for the Kittitas Valley and Wild Horse projects were then added to the 2004 background traffic volumes to achieve a combined peak-hour directional volume with the projects. As a worst case, the Kittitas Valley project is conservatively estimated (i.e., the actual number would likely be lower, but would not be higher) to generate 149 heavy construction trips and 20 light-duty delivery truck trips traveling on I-90 during the peak hour, for a total of 169 peak-hour trips (for the medium project scenario). The corresponding trips for the Wild Horse project are conservatively estimated at 143 heavy construction trips and 15 light-duty delivery truck trips, for a total of 158 peak-hour trips traveling on Transporter Route 1 (to Exit 115). Transporter Route 2 for the Wild Horse project is estimated to carry 6 heavy construction trips in the peak hour.

The combined construction traffic for the Kittitas Valley and Wild Horse projects would result in a total maximum peak-hour volume of 1,616 vehicles, as shown in **Table 4-2**. Based on the most current Highway Capacity Manual guidance for freeway segments, with the conservative estimates of combined baseline and construction traffic volumes during the PM peak hour this segment of I-90 would operate at LOS B during the construction period. By State standards, the LOS threshold for rural highways is LOS C. Therefore, while the combined construction traffic for the two wind power projects proposed by Zilkha could result in a temporary decrease in the LOS on I-90, the resulting LOS would still exceed state standards, and thus there would not be a significant impact to traffic operations.

**Table 4-2
Total PM Peak-Hour Trips and LOS
for Combined Zilkha Project Construction Traffic Impacts**

Roadway	Baseline 2004 PM Peak*	KVWPP	WHWPP		Total PM Peak*	LOS
		Transporter Route 1*	Transporter Route 1*	Transporter Route 2*		
I-90 (W. of US 97)	1,283	169	158	6	1,610 (13.4 cars/lane mile)	B

* = Directional volumes

KVWPP = Kittitas Valley Wind Power Project; WHWPP = Wild Horse Wind Power Project

Source: EFSEC, 2003

4.12.2 Additive Desert Claim Project Construction Traffic Effects

Peak-hour construction trips for the Desert Claim project have not yet been estimated, although total turbine delivery trips and potential concrete delivery trips are discussed in **Section 3.12**. If it is assumed that the volume of construction trips for the Desert Claim project would be similar to the volumes estimated for the Kittitas Valley and Wild Horse projects, based on the similar size of the projects, the total peak-hour trips indicated above in **Table 4-2** would be increased by approximately 120 to 140 trips. Applying a mid-range factor of 130 trips, the total peak-hour trips in 2004 if all three proposed projects were under construction simultaneously would be in the vicinity of 1,750 trips. This would correspond to an equivalent of 14.7 passenger cars per lane mile, an operating condition that is still within the numerical range for LOS B. Therefore, the additive effect of the potential Desert Claim construction traffic would still not result in a significant cumulative impact on the operating condition for I-90 during the construction period.

Aside from the increased traffic on I-90, there would be relatively little combined construction traffic effects on other roadways because of the geographic separation of the three projects. Cumulative increases in general construction traffic volumes would likely be restricted to roadways in the area around the intersection of I-90 and SR-97, and would be associated primarily with the Desert Claim and Kittitas Valley projects. Given existing daily volumes and the design capacity of these highway facilities, it is not likely that the addition of project-related trips generated by construction workers and the delivery of general construction materials (e.g., sand, gravel, concrete) would be noticeable. However, if turbine components were being delivered to multiple projects at the same time, there could be increased delays or additional detours within the area near the Desert Claim and Kittitas Valley projects. Additional vehicle delay could affect segments of SR-97 and Smithson Road. The potential for delay could be reduced if the contractors for the different projects coordinated the delivery of turbine components to avoid a situation in which a number of transporters were traveling at the same time on a given road segment. WSDOT and/or Kittitas County could also condition the required oversize vehicle permits to limit the number of deliveries per day per project.

4.12.3 Potential Project-Related Tourist Traffic

As discussed in **Section 3.12.2**, it is possible that the Desert Claim project by itself (or the Kittitas Valley or Wild Horse project by themselves) would generate some amount of tourist interest, and local traffic associated with tourists wanting to get closer views of the project facilities. It is not possible at this time to estimate how much tourist traffic would likely occur, or how much of the activity would be new traffic rather than additional activity by visitors already in the area for other purposes.

Development of multiple wind farms in the Kittitas Valley area would likely result in a larger total number of tourists visiting wind project facilities, relative to the level of activity with a single project. However, with the geographic separation of the proposed projects, it is not likely that roads adjacent to the Desert Claim project (for example) would experience substantially more tourist traffic because one or two other projects were also developed. In fact, the presence of additional wind farms could result in spreading tourists over a larger portion of the valley, with fewer tourist visits to a single project than might otherwise be expected. In any event, tourist interest in multiple wind projects would likely result in an increase in the amount of traffic on local roads near the respective project areas. The tourist traffic would likely be localized to the individual areas around the projects and would not likely be additive or cumulative (i.e., it is likely that most tourists interested in wind energy would visit any one of the projects, but would not visit two or all three projects).

4.13 AIR TRANSPORTATION

Aircraft operations in the Kittitas Valley area, and specifically in the vicinity of Bowers Field, are already constrained to some degree by natural and human-caused factors. Pilots must take into account the obstacles represented by the higher terrain that surrounds the valley, particularly the mountains to the north and northwest. Airspace over and near the Yakima Training Center is restricted as a result of the military operations in that area. Communications towers exist at several elevated vantage points around the Kittitas Valley. Public information on Bowers Field characteristics includes identification of a 35-foot-high powerline approximately 1,600 feet from the end of Runway 25 as an obstruction that pilots should note and ensure clearance. The wind turbines installed for the Desert Claim project would represent a cumulative addition to the existing natural and constructed features that need to be acknowledged and accounted for in safe aircraft operation near the Kittitas Valley.

As discussed in **Section 3.13.2**, development of the Desert Claim project would create a potential conflict with the protected airspace associated with the visual flight rule (VFR) traffic pattern for Bowers Field, as 10 of the proposed turbines would intrude on that protected airspace. Multiple mitigation measures that would resolve that potential conflict have been identified. Available information for the Kittitas Valley and Wild Horse wind power projects indicates that the turbines and other structures for those projects would not present potential conflicts with air traffic operations at Bowers Field or other facilities, or that potential conflicts could be resolved, and there would be no adverse impacts on air transportation resulting from development of those projects. Therefore, development of multiple wind power projects in the Kittitas Valley would not result in cumulative significant impacts on air transportation.

4.14 PUBLIC SERVICES AND UTILITIES

Development of the Desert Claim project in conjunction with similar projects in the County (the Kittitas Valley Wind Power Project and the Wild Horse project) could contribute to cumulative impacts on area public services. The development and operation (to a lesser extent) of three projects could create additional demand for fire protection, emergency medical services, and police support. The level of impact would depend on the occurrence of simultaneous construction activities and the availability of emergency response resources at the time of an incident. Expected conditions for the major service categories are summarized below.

4.14.1 Law Enforcement

Calls for service could increase, primarily during the construction phase, as a result of traffic accidents and construction site theft or vandalism. The cumulative potential number of increased calls has not been quantified but is not anticipated to be significant. Both wind power project applicants would provide on-site security for their respective projects. Impacts during project operations could result from calls for service in connection with vandalism or trespass, but would not be cumulatively significant.

4.14.2 Fire Protection & Emergency Medical Service

The three proposed projects would increase the risk of fire, and the potential need for emergency medical services due to accidents, during construction and operation. Impacts for each project would generally be the same as identified in **Section 3.14** for the Desert Claim project, although differing provider jurisdictions might be affected. The western portion of the Desert Claim project area is included within Kittitas County Fire District 2, while the remainder is not within an existing fire district service area. Most of the Kittitas Valley project area is outside of existing fire district boundaries, although Fire District 1 serves a portion of the site. None of the Wild Horse site is within a rural fire district. The project proponents would need to contract with the appropriate rural fire district to obtain required fire protection services. For all three projects, such contracts would extend coverage to areas not presently served by a fire district. In the event that a fire service contract did not cover the actual costs of extending service to a project, there could be a gap between the time of occurrence of impacts prior to realization of project-generated property tax revenues.

4.14.3 Schools

The proposed wind power projects would not generate a cumulative impact to the permanent population of the local area or to student enrollment, as a result of the construction work force and scheduling characteristics described in the population, housing and employment analysis. The combined operations work force of the three projects would be approximately 30 to 42 workers. If all of these workers were hired from outside the local area and all or most of those in-migrants located in a school district with capacity limitations, there could be adverse impacts to school services. These circumstances are considered highly unlikely, however, as local residents would probably fill a portion of the operations jobs and it is unlikely that all of the in-migrants would locate in the same school district. Therefore, no significant adverse impacts to schools are anticipated from project construction or operation.

4.14.4 Water Supply and Sewer Service

Water would be used for dust suppression during construction at all three projects, and would be acquired from off-site sources. Small amounts of potable water, likely supplied from exempt on-site wells, would be used during operations. None of the projects would be connected to public sanitary sewer systems. Consequently, none of the projects would result in impacts on delivery systems for these utility services, and the combined effects of the three projects would not result in a significant cumulative impact.

4.14.5 Solid Waste, Energy and Communications

The collective impacts of the three projects on solid waste, energy and communications services would be the same as the individual impacts identified for each proposal. The energy and communications demands of the projects would be minimal. Based on the distances between residences and the respective project facilities, there does not appear to be a potential for significant interference with radio and television reception in the areas near the proposed projects. The cumulative increase in demand for solid waste disposal services would essentially be limited to the period of project construction and is not anticipated to be significant with respect to either collection capability or the capacity of the construction and demolition waste disposal site.

4.15 POPULATION, HOUSING AND EMPLOYMENT

4.15.1 Construction

For purposes of impacts analysis, and to identify potential worst-case impacts, it is assumed that all three projects could be under construction concurrently. Peak construction of each project could employ between 150 and 250 workers, or a combined total of 450 to 650 workers. These estimates are based on the experience of the applicants at other facilities. The number of construction workers who would reside within or outside Kittitas County cannot be precisely predicted. Based on the experience of the Stateline wind power project (personal communication, C. Taylor, Zilkha Renewable Energy, Portland, Oregon, 2003), and for purposes of analysis, it is assumed that approximately one-half of all workers would be local (i.e., already residing within Kittitas County or within reasonable commuting distance, such as in Yakima County) and one-half would come from outside that area (Benton County, King County, etc.). If one-half of wind facility workers are assumed to be local, approximately 75 to 80 non-local workers would be employed by each project, or a cumulative total of 225 to 240. The actual mix of local and non-local would depend on the availability and residence of construction workers with the particular skills needed for wind facilities, and competition from other, concurrent construction projects in the region (e.g., MountainStar Resort).

Because local/resident workers already have housing and are part of the existing county population, any impact to population and housing associated with these workers has already occurred. Some non-resident construction workers could require temporary housing, which could potentially affect the local housing market. Some portion of non-resident workers would commute to the project sites daily. According to 2000 census data, Kittitas County contained more than 1,900 housing units categorized as seasonal and recreational. In addition, more than 40 percent of the County's total housing stock is rental housing, with a vacancy rate (per 2000 census data) of almost 7 percent. There are also close to 50 motels/hotels, RV parks and other lodging establishments in the Ellensburg and Cle Elum/Roslyn area, which could provide temporary lodging for wind project construction workers. It is anticipated that cumulative non-resident

workers would be able to find temporary housing over the 9-12 month construction period and that there would not be a significant impact to local housing markets. Vacancy rates for temporary housing could decrease for a period of a few months, however.

4.15.2 Operation

Over their life times, each wind power project is estimated to employ 10 to 14 full time workers for operations and maintenance; cumulative operations employment would be between 30 and 42. These estimates are based on the applicants' experience with other projects. If all operations workers were hired from the local area, there would be no impact on population or housing. Experience at other wind power projects suggests that about half of the operations workers might be local residents. Even if all were assumed to be in-migrants, however, the cumulative housing impact from a population increase of this size would not be considered significant.

4.15.3 Economic Impacts

The following information is provided for general information purposes. It does not address "environmental impacts" as defined by SEPA and is not considered to be part of the EIS, based on the direction in WAC 197-11-448.

Estimated direct, indirect and induced income generated by the three wind power proposals is shown below for the construction and operation phases. These estimates are based on analyses of jobs, income, wages and similar economic impacts prepared for each proposal and included in the corresponding EISs or application materials. Basic assumptions and methodology used for the Desert Claim analysis are described in **Section 3.14** of this EIS. This methodology differs in some respects from the approach used for the Kittitas Valley and Wild Horse projects, as indicated by the differences among the projects for a given measure of economic impact.

In general, the analyses indicate that the projects cumulatively would generate substantial income for the local economy and residents – almost \$16 million during the construction period, and approximately \$5.3 million annually thereafter (see **Tables 4-3** and **4-4**). The direct impact figures for the construction phase (**Table 4-3**) primarily represent local labor income assumed to be paid to construction workers. The indirect and induced impacts reflect the local income effect from purchases of local construction inputs and the re-spending of those dollars within the local economy. The direct impacts for the operations phase (**Table 4-4**) include local labor income to operations employees and annual lease payments to landowners (which have been estimated at \$4,500 per turbine per year).

**Table 4-3
Cumulative Income/Economic Impacts – Construction Phase**

	Desert Claim	Kittitas Valley¹	Wild Horse²	Cumulative Total
Direct	\$ 3,333,000	\$ 4,577,100	\$ 4,577,100	\$ 12,487,200
Indirect	\$ 433,000	\$ 518,100	\$ 518,100	\$ 1,469,200
Induced	\$ 502,000	\$ 701,800	\$ 701,800	\$ 1,905,600
Total	\$ 4,268,000	\$ 5,797,000	\$ 5,797,000	\$ 15,862,000

Sources: Huckell/Weinman Associates, 2003; EFSEC, 2003 (based on ECONorthwest, 2002).

1. Assumes 121 turbines.

2. Estimated to be the same as the Kittitas Valley project.

**Table 4-4
Cumulative Income/Economic Impacts – Operations (Annual)**

	Desert Claim	Kittitas Valley¹	Wild Horse²	Cumulative Total
Direct	\$ 1,041,000	\$ 1,489,400	\$ 1,489,400	\$ 4,019,800
Indirect	\$ 124,000	\$ 59,400	\$ 59,400	\$ 242,800
Induced	\$ 168,000	\$ 436,700	\$ 436,700	\$ 1,041,400
Total	\$ 1,333,000	\$ 1,985,500	\$ 1,985,500	\$ 5,304,000

Sources: Huckell/Weinman Associates, 2003; EFSEC, 2003 (based on ECONorthwest, 2002).

1. Assumes 121 turbines.

2. Estimated to be the same as the Kittitas Valley project.

4.16 FISCAL CONDITIONS

The Desert Claim, Kittitas Valley and Wild Horse proposals have each prepared analyses which estimate the fiscal (i.e., governmental cost and revenue) impacts of the individual project. Each project analysis also considered indirect and induced economic impacts (quantitatively or qualitatively) as well as direct fiscal impacts. The studies were performed at different points in time and/or were organized differently; refined information is now available for some of the proposals. As such, they provide a reasonable overview and estimate of the fiscal effects of each wind power proposal. The reader should consult the respective analyses to obtain greater detail about economic and fiscal issues.

Cumulative fiscal impacts, as summarized here, are considered to be the simple addition of the direct costs and revenues of each project. There is no synergistic effect assumed from multiple projects in terms of direct revenues; such an effect could occur, however, in terms of indirect or induced economic effects (e.g., additional jobs, income, spending, etc.). For purposes of estimating impacts, each project is assumed to be approximately the same size (120± turbines), and the value of each turbine is assumed to be assessed at approximately \$765,000. Therefore, each project would have an initial assessed value of over \$90 million, and the combined assessed value for all three projects would be over \$270 million. The combined value of the three projects would represent an increase of more than 10 percent over the current assessed valuation for all real and personal property in Kittitas County of approximately \$2.5 billion.

The current property tax levy rate for all taxing jurisdictions in Kittitas County is 1.18 percent. If this levy rate were to be applied to the tax base associated with the projects, the estimated potential property tax revenues in the first operational year would be approximately \$3.8 million in total, and more than \$1 million for each project. (Revenues for Wild Horse are assumed to be the same as for the medium scenario for the Kittitas Valley proposal [121 turbines], as reported in the Draft EIS for the Kittitas Valley project [EFSEC, 2003]. As was noted in the discussion of economic impacts, differences in methodology [in this case, primarily the applied tax levy rate] result in different revenue estimates for projects with very similar capital characteristics.) The allocation of this potential property tax revenue to various government agencies/funds and special districts is shown in **Table 4-5**.

Because the value of the turbines would depreciate over time, property tax revenues would also decline over their 30-year lifetime. Depreciation schedules applicable to the projects are not available at this time. For purposes of analysis, and in response to comments received on the Desert Claim Draft EIS, a potential depreciation schedule for Desert Claim is identified in **Section 3.16** of the Final EIS. It assumes a straight line depreciation over 30 years with a salvage value of 10 percent for each turbine. Similar

ratios could be applied to the value and property tax revenues of the Kittitas Valley and Wild Horse proposals.

Current statewide legal limitations on property taxes would likely result in actual tax revenues lower than those indicated in **Table 4-5**. Initiative 747 limits the growth of local government property tax revenues to 1 percent per year, although the I-747 cap does not apply to the assessed value of new construction. Because the total assessed valuation for Kittitas County would increase substantially (over 10 percent) with inclusion of the value of the wind power projects, the tax rates levied against the total assessed valuation base might need to be reduced to stay within the I-747 limit. In that event, actual revenues derived from the projects would be less than indicated in **Table 4-5**, although all taxpayers would benefit from the reduced levy rate. On balance, the actual effect of the projects on property taxes would likely be some combination of increased revenues and decreased levy rates.

Table 4-5
Cumulative Potential Property Tax Revenues with Wind Projects
(First Operational Year)

	Desert Claim	Kittitas Valley	Wild Horse	Cumulative Total
Local Schools	\$ 375,700	\$ 407,000	\$ 407,000	\$ 1,189,700
State	\$ 264,800	\$ 376,200	\$ 376,200	\$ 1,017,200
Road District	\$ 149,700	\$ 135,300	\$ 135,300	\$ 420,300
Fire Districts	\$ 132,700	\$ 80,300	\$ 80,300	\$ 293,300
County Government	\$ 123,100	\$ 168,300	\$ 168,300	\$ 459,700
Hospital District *	\$ 40,800	\$ 63,800	\$ 63,800	\$ 168,400
Local Communities	**	\$ 112,200	\$ 112,200	\$ 224,400
Total	\$ 1,086,800	\$ 1,343,100	\$ 1,343,100	\$ 3,773,000

Numbers rounded; revenue estimates based on assessed valuation calculated for each project and multiplied by levy rate of 1.18 for Desert Claim and 1.35 for Kittitas Valley and Wild Horse.

* “Other local services” included for Kittitas Valley and Wild Horse, not for Desert Claim.

** This category of revenue was not estimated for Desert Claim

The three proposals could also generate some costs for public services (e.g., fire protection, law enforcement, road maintenance) that might not be covered by mitigation requirements. To the extent that this occurred, it would reduce the fiscal benefits that would otherwise be associated with the projects. These potential service costs have not been quantified but are estimated to be minor, both individually and cumulatively. Expected cumulative revenues are projected to be significantly higher than estimated costs for the projects and would result in a substantial benefit (a surplus of revenues relative to costs) for the affected local jurisdictions.