Habitat Characterization and Rare Plant Resources Report Wild Horse Wind Power Project

DRAFT

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EXECUTIVE SUMMARY

Zilkha Renewable Energy (the "Applicant") proposes to construct and operate approximately 136 wind turbines on high open ridge tops between the towns of Kittitas and Vantage in Kittitas County, Washington, on and near Whiskey Dick Mountain. This report summarizes the results of characterization of the habitat at the 8,500-acre Project site and results of surveys for rare plant species. Also included is an evaluation of the proposed mitigation parcel for the project. Field work for the project was conducted in April and May, 2003 with follow-up visits in July, September, and October 2003.

Seven habitat types were mapped in the Project area, including shrub-steppe, herbaceous, herbaceous/rock outcrop, pine forest, woody riparian, rock outcrop, and a small seasonal water body. Shrub-steppe comprises the overwhelming majority of the Project area (92 percent). The shrub-steppe was broken down based on relative spatial density of the shrub layer – dense, moderate, and sparse. In general, areas with a dense shrub layer were found on deep-soiled sites on slopes and dominated by big sagebrush, antelope bitterbrush, or squaw current. Areas with a moderate shrub layer were flat to gently sloping, and typically dominated by big sagebrush or stiff sagebrush. Areas with sparse shrub cover were generally found on exposed ridgetops and knolls and dominated by low-growing stiff sagebrush, or in some areas, various buckwheats. Herbaceous habitats comprise an additional 7.5 percent of the project area and are generally limited to very steep slopes and exposed ridges that do not support shrubs.

A semi-quantitative assessment of habitat quality was conducted by comparing the observed communities with climax communities as reported by the Natural Resource Conservation Service. Habitat quality ranges from "fair" to "good" throughout the Project area. Livestock grazing appears to have resulted in fewer grasses and less grass cover with a resulting shift to higher shrub cover than would be expected in the climax communities. Although the Project area appears to have experienced a minor shift in species composition to higher shrub cover, native species dominate. No invasive species (e.g. cheatgrass) were observed that have significantly altered species composition. It is assumed that the relatively isolated setting has minimized the introduction and spread of noxious and/or invasive species that occurred throughout much of our western rangeland.

Washington Natural Heritage Program database includes several records for a tracked plant species and communities in the general vicinity of the Project area. These include Hoover's tauschia, Pauper milk-vetch, hedgehog cactus, and one occurrence of a Wyoming big sagebrush/bluebunch wheatgrass community. None of these are federally-listed threatened or endangered species, although Hoover's tauschia is a federal "species of concern". Field surveys did not locate any federal or state listed Endangered, Threatened, Proposed, Candidate, or Sensitive plant species. Potential habitat, however, does occur for a number of these species throughout the Project area. These habitats were searched thoroughly, but none of these species were found. One plant species on the Washington State 'Review' list, hedgehog cactus, was found in the Project area. Much of the suitable habitat present in the Project area (lithosol, including sparse shrub-steppe and herbaceous habitats) was found to contain scattered individuals.

A reconnaissance level survey of a proposed mitigation parcel located within the 8,500- acre Project area was conducted. The parcel meets Washington Department of Fish and Wildlife (WDFW) guidelines for mitigation at wind power sites and was shown to include several additional benefits above and beyond WDFW guidelines. The parcel is estimated at approximately 600 acres and the Applicant has proposed to fence the parcel to eliminate livestock grazing. The Applicant has also proposed to fence the springs within the Project area to eliminate livestock grazing. Fencing used for the mitigation parcel and the springs will be designed to keep livestock out but allow game species to cross. Final mitigation measures will be negotiated with WDFW.

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INTRODUCTION

Zilkha Renewable Energy (Applicant) proposes to construct and operate approximately 136 wind turbines on a 8,500-acre site (the "Project area") on high open ridge tops between the towns of Kittitas and Vantage in Kittitas County, Washington, on and near Whiskey Dick Mountain. The Wild Horse Wind Power Project (the "Project") is anticipated to provide up to 204 megawatts (MW) of generating capacity. It would be constructed on privately owned land and public land administered by the Washington Department of Natural Resources (WDNR) and the Washington Department of Fish and Wildlife.

The Applicant contracted with Western EcoSystems Technology, Inc. (WEST) to (1) characterize the habitat types in the Project area, including development of a habitat map and an assessment of potential impacts to vegetation in the Project area (2) conduct a survey for rare plants in the main Project area and along two proposed feeder line routes from the main Project area to existing transmission lines (BPA transmission line and PSE transmission line), including an assessment of potential impacts to rare plants, if any are present, and (3) provide a qualitative evaluation of habitat at a proposed mitigation site for the project. This report summarizes the results of these tasks.

PROJECT AND SITE DESCRIPTION

Location

The Project is to be constructed in central Washington's Kittitas County (Figure 1). The Project will be built on high open ridge tops between the towns of Kittitas and Vantage at a site located about 10 miles east of Kittitas, on and near Whiskey Dick Mountain. The site boundary is located approximately 2 miles north of the Old Vantage Highway. The Project turbines will be located on open rangeland owned primarily by the Applicant; some turbines will be located on lands administered by the Washington Department of Natural Resources (WDNR) and Washington Department of Fish and Wildlife (WDFW). The site extends over an area of approximately 8,500 acres. The Project site has been selected for its energetic wind resource and access to power transmission lines that have adequate capacity to allow the wind generated power to be integrated into the power grid.

The Project (including the main Project area and two feeder lines) is located in portions of the following sections:

- Township 18 North, Range 21 East, Sections 15, 16, 17, 19, 20, 21, 22, 27, 28, 29, 32, 33, 34, and 35
- Township 18 North, Range 20 East, Sections 22, 23, and 24
- Township 17 North, Range 21 East, Sections 2, 3, 4, 8, 9, 17, and 18
- Township 17 North, Range 20 East, Sections 13, 14, 15, and 23

Facility Description

The Project consists of several prime elements that will be constructed in consecutive phases including roads, foundations, underground and overhead collection system electrical lines, one or two grid interconnection substations, one or two step-up substations, one or two feeder lines running from the on-site step-up substations to the interconnection substations, an operations and maintenance (O&M) center and associated supporting infrastructure and facilities (Figure 2). A permanent footprint of approximately 165 acres of land area will be required to accommodate the proposed turbines and related support facilities.

The Project will consist of up to 136 wind turbines and have an installed nameplate capacity of up to 204 megawatts (MW). The Project will utilize 3-bladed wind turbines on tubular steel towers each ranging from 1 MW to 3 MW (generator nameplate capacity) and with rotor diameters ranging from 197 to 295 feet (60 to 90 meters). If the smallest turbine contemplated for the Project, with a rotor diameter of 197 feet (60 meters) and each with a nameplate capacity of 1 MW is used, up to 158 units would be installed for a Project nameplate capacity of 158 MW. If the largest contemplated turbine, with a rotor diameter of 295 feet (90 meters) and generator nameplate 3 MW is used, up to 104 units would be installed for a Project capacity of 312 MW. The Project Site Layout in Figure 2 shows 136 turbines with a turbine spacing based on a 236 feet (72 meter) rotor diameter, which is in the middle of the range of turbines proposed and represents the anticipated Project configuration.

The Project site is currently crisscrossed by a network of existing roads and wherever practical, existing roads have been utilized to minimize new ground disturbance. As such, roughly 17.3 miles of new gravel roads will be constructed and approximately 14.7 miles of existing roads will be improved for access to the turbines. The roads will generally consist of a 32-foot wide compacted graveled surface to allow for the safe passage of heavy construction equipment.

The Project transmission feeder lines will require the installation of a construction trail. The construction trail will be a 12-foot wide swath that is cleared of large boulders to allow high clearance vehicles to pass. The trail will be installed to allow access to support the construction of the feeder lines. Once construction is complete, the trail will remain as a minimum maintenance access way that will be used approximately every 6 months for inspection and maintenance. The PSE feeder line will require approximately 8 miles and the BPA feeder line will require approximately 5 miles of new construction trails.

Physiography and Soils

The Project area is located within the Columbia Basin physiographic province (Franklin and Dyrness 1988). This lowland province is surrounded on all sides by mountain ranges and highlands. The elevation increases from approximately 400 feet at the confluence of the Snake and Columbia Rivers to 1,300 feet near the Waterville Plateau and 1,800 feet along the eastern edge of the province. The province is incised by a network of streams and rivers that empty into the centrally located Columbia River.

The Project area is approximately 8,500 acres, made up of ridges and drainages. The highest point in the project area, Whiskey Dick peak at 3,873 feet, is located in the southwest portion of the Project area; ridges to the north are lower in elevation and generally have flatter topography. Slopes in the Project area range from approximately 10 to greater than 60 percent. Several intermittent creeks drain the Project area. The largest creeks are Whiskey Dick Creek, which flows to the east and empties into the Columbia River approximately 6 miles east of the Project area and Whiskey Jim Creek, which flows to the west and empties into Parke Creek approximately three miles west of the Project area. Several springs occur in the Project area; most of which have been modified to pipe the flow into livestock watering tanks.

The proposed BPA feeder line route lies to the west of the main Project area and primarily follows exposed ridgetops, except where it crosses Parke Creek. Likewise, the PSE feeder line route, which heads south out of the Project area and crosses the Vantage Highway and then heads southwest to the interconnection with the existing PSE line, primarily follows ridgetops, except where it drops down and crosses an unnamed creek, a county road, and the Highline Canal.

The Soil Survey for Kittitas County is currently out-of-print, but the local USDA Natural Resource Conservation Service office provided some limited soil descriptions for the Project area. The soils in the Project area are primarily complexes of very to extremely gravelly, stony, or cobbly loams. Most of the affected soils are very shallow (5 to 12 inches) to shallow (12 to 20 inches) with a dark colored surface layer, while a few ridges have moderately deep soils (20 to 40 inches).

Climate

The Columbia Basin physiographic province lies within the rain shadow of the Cascade mountain range, and is characterized by semi-arid conditions, as well as a large range of annual temperatures indicative of a continental climate. However, the relatively close proximity of the Pacific Ocean and the dominant westerly winds of the region combine to moderate the continental influence (Franklin and Dyrness, 1988). Annual precipitation ranges from 7 inches in the drier localities along the southern slopes of the Saddle Mountains, Frenchman Hills and east of Rattlesnake Mountains, to 15 inches in the vicinity of the Blue Mountains.

Summer precipitation is usually associated with thunderstorms. During July and August, it is not unusual for four to six weeks to pass without measurable rainfall. The last freezing temperature in the spring occurs during the latter half of May in the colder localities of the Columbia Basin. The first freezing temperature in the fall is usually recorded between mid-September and mid-October (*Climate of Washington*, Western Region Climate Center (WRCC)).

The Ellensburg, WA weather station is located along the Yakima River, approximately 15 air miles west of the Project area. The coldest average monthly temperatures at Ellensburg occur in January, with a minimum of 18.6º Fahrenheit (F), and a maximum of 34º F. The warmest average monthly temperatures in Ellensburg occur in July, when the minimum is 53º F and the maximum is 84º F. The average total annual precipitation at Ellensburg is 8.9 inches. The wettest month is December with an average total monthly precipitation of 1.45 inches, while the driest month is August with an average total monthly precipitation of 0.27 inches. Snowfall typically occurs from November through April, with the heaviest average monthly snowfall of 9.4 inches occurring in each December and January. Ellensburg's average annual snowfall is 28 inches (WRCC, 2003).

The highest point in the Project area is approximately 2,000 feet higher in elevation than the reporting station in Ellensburg. Therefore, it is expected that the Project area likely experiences cooler temperatures and receives more precipitation than that reported for the Ellensburg station.

Existing Land Uses

The land within the Project area is primarily privately owned, except for the southeastern sections, which are administered by the WDNR and WDFW. Livestock grazing is the primary land use, although recreation uses, such as hunting, off-road vehicle use, and bird-watching, are common. The Project area also provides habitat for various wildlife, particularly for several big game species including elk and mule deer. A cluster of communication towers is located on a ridge top in the southeast portion of the Project area. The Beacon Ridge road runs through the center of the Project area and is improved in the southern portion of the Project area.

Land uses in the surrounding area include the Vantage Highway right-of-way, limited cattle ranching, gravel quarrying, and private residences.

METHODS

Habitat Characterization

Vegetation in the Project area was mapped according to "habitat types," which are considered to be the generally recognizable assemblages of plant species that occur in a pattern across the landscape. The area mapped included the 8,500-acre main Project area and the two proposed feeder lines. Habitat types were determined based on visual assessment of dominant plant species. Commercially available black and white digital aerial photography dated 2000 with a pixel size of 1 meter was used for the habitat mapping. The habitat types were mapped during late April – early May 2003, with follow-up visits in fall 2003. Initially, the roads in the Project area were driven in order to correlate habitat types with the signature (color, shading, texture) on the aerial photos. Each habitat type was then mapped based on either visual observation of the habitat from a road or high point, or by walking the boundaries of the habitat. Due to the scale of the aerial photos used, fine-scale intermingling in transition areas and small inclusions of one habitat type within another are not shown. The mapped boundaries of each habitat type were digitized using ArcView™.

In addition to the habitat map that was developed for the Project area, a literature review was conducted to gain an understanding of previous work in similar habitats. Daubenmire (1970), in particular, is noteworthy for characterization of the vegetative communities of eastern Washington.

In accordance with draft guidelines developed by WDFW for baseline and monitoring studies for wind projects, an assessment of habitat quality was conducted (WDFW 2003). The guidelines state that "where a wind project will affect [shrub-steppe] habitat in "excellent" condition (based on federal methodologies for assessing range land), wind project developers will engage in additional consultation with WDFW regarding suitable mitigation requirements for such habitat". In order to meet the requirements for determining habitat in "excellent" using federal methodologies, a BLM botanist who specializes in shrub-steppe habitat was contacted (R. Rosentreter, BLM, pers. comm.). The BLM suggested using Natural Resource Conservation Service (NRCS) "Range Condition Classes", which classify range condition as "excellent", "good", "fair", or "poor", based on a comparison of the existing community composition to the climax community composition.

The Releve' method (Braun-Blanquet 1932) was used to document the existing community composition. The Releve' method provides a semi-quantitative analysis of vegetation, useful for comparison purposes. Sample points were taken at each turbine string. A data sheet was filled out at a sample location judged to be most representative of the habitat for each turbine string. Existing plant species were listed at each sample location. Climax community composition data was obtained from the NRCS. Although the Soil Survey for Kittitas County is currently out-of-print, the soil map and characteristic climax plant community data were available from the local NRCS office. The climax community composition data is provided for each soil type. The relative abundance of each species is also provided based on weight. According to the NRCS range condition classification, comparison of the existing community composition to the climax community composition allows an assessment of habitat quality. Based on NRCS guidelines (USDA SCS 1973), rangeland with 75 to 100 percent of its climax vegetation is in "excellent" condition. Rangeland with 50 to 75 percent of its climax vegetation is in "good" condition. Rangeland with 25 to 50 percent of its climax vegetation is in "fair" condition, and less than 25 percent is in "poor" condition.

Rare Plant Survey

The method used for the rare plant survey is similar to methods used at other wind power projects in Washington, including Zilkha's Kittitas Valley wind project and the Maiden wind project in Benton County (Eagle Cap Consulting 2001, 2002).

Study Area

For the purposes of the rare plant investigation, the study area included all lands that would be occupied by proposed facilities and a 164-foot (50 meter) buffer. This included proposed turbine strings, underground and overhead electrical lines, access roads, staging areas, substation sites, potential quarry sites, and the two proposed feeder line routes (BPA and PSE). In most cases, the resultant study corridors were 328 feet wide, although in some areas, several Project facilities are proposed to be located along side each other, resulting in a wider study corridor.

Although for the purposes of impact analysis, only the study corridors were considered, a larger area was addressed during the pre-field review to determine which rare plant species had potential for occurrence within the Project area. This was necessary to analyze the Project area in a regional context, and ensure that the target species list for the investigation was complete.

Target Species

For the rare plant investigation, the target species included all plant taxa listed as 'Endangered', or 'Threatened' by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act that potentially occur in the Project area. In addition, taxa that have been formally proposed or are candidate species for federal listing, or taxa listed as "species of concern" that potentially occur in the Project area were also considered target species. The "species of concern" status is an unofficial status for species that appear to be in jeopardy, but information is insufficient to support listing. Target species also included all plant taxa defined as 'Endangered', 'Threatened', 'Sensitive', 'Review', or 'Extirpated' by the Washington Natural Heritage Program (WNHP) that potentially occur in the Project area. The WNHP, part of the WDNR, maintains the most complete database available for state-listed species. Taxa meeting the above criteria were targeted by the investigation to determine their presence or absence within the study area. Determinations of status for rare plant species were based on information provided by the USFWS and the WNHP's list of tracked plant species (WNHP 2003a).

It should be noted that the Endangered Species Act of 1973 (16 USC 1531, *et seq.*, as amended) (ESA), does not give plant species legal protection on non-federal lands unless a State law or regulation is being violated (ESA Section 9(a)(2)(B)). Rare plant species are not legally protected in Washington State (Swope Moody, WNHP, pers comm). Despite the lack of legal protection, every effort was made to locate rare plant species that could be impacted by the project and, if present, identify mitigation measures to avoid or minimize impacts to rare plant species.

Prefield Review

As part of the investigation, a review of available literature and other sources was conducted to identify the rare plant species potentially found within the Project area. As per Section 7(c)(1) of the ESA, a letter was sent to the USFWS requesting a list of federally Threatened, Endangered, or Proposed taxa that have potential to occur within the Project area (Appendix 1). In addition, the WNHP was contacted to obtain element occurrence records for any known rare plant populations in the vicinity. To supplement the

information provided by the above agencies, a number of other resources were consulted. These sources provided additional information on rare plant species potentially occurring in the study area, including critical information such as habitat preferences, morphological characteristics, phenologic development timelines, and species ranges. Sources included taxonomic keys and species guides (WNHP 2003b; USFWS, 2001; Cronquist et al. 1977; Hitchcock and Cronquist, 1973) and online databases of common and rare plant species (Ilanga Inc. 2003; USDA, 2003).

Using data collected during the pre-field review, a list of rare plant species potentially occurring in the Project area was compiled (Table 1). Habitat preferences and identification periods were derived from the literature for each potential species. Using this information, along with topographic maps of the Project area, a field survey plan was developed to guide the timing and intensity of the field surveys.

Field Investigation

All fieldwork was performed by a trained botanist with experience performing rare plant surveys in the region. A summary of the investigator's education and experience is included in Appendix 2.

A pedestrian field survey was performed from April 21 – 27 and May 5 – 9, 2003 to locate rare plant species within the study area (the "study area" is defined above). Additional pedestrian field surveys were performed on July 25, September 24, and October 31, 2003 to search areas that were added or modified from the original project layout. The survey was timed to locate as many target species as possible, particularly those most likely to occur in the affected habitats (sagebrush-steppe). The survey was accomplished by performing meander pedestrian transects, zigzagging back and forth across the survey corridor. The intensity of the pattern and the speed at which the surveyor walked was variable, and depended on the structural complexity of the habitat, the visibility of the target species, and the probability of species occurrence in a given area. In habitats of low visibility with a high probability of sensitive species occurrence, a tighter grid pattern was walked. Care was taken to thoroughly search all unique features and habitats encountered with high probability of occurrence of sensitive species. A GPS unit showing the survey boundaries was used for navigation, supplemented by 7.5 U.S. topographic maps.

During all surveys a list of all vascular plants encountered was made. Informal collections of unknown species were taken for later identification. *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1973) was the primary authority used for vascular plant species identification. Updated taxonomy referenced in the NRCS PLANTS database or Washington Flora Project database is noted where applicable (USDA, 2003; Ilanga Inc. 2003). Notes were also taken regarding general plant associations, land use patterns, unusual habitats, etc. Photographs of the habitat types and representative individual plants were taken using a digital camera.

RESULTS

Habitat Characterization

Habitat Description

The steppe vegetation of eastern Washington has been characterized by Daubenmire (1970). Daubenmire's classification includes nine vegetation zones; each zone is based on climate, vegetation structure, and floristics. The Project area is within the *Artemisia tridentata – Agropyron* zone. In an undisturbed condition, this zone is distinguished by big sagebrush (*Artemisia tridentata*) as the principal

shrub and bluebunch wheatgrass (*Agropyron [Pseudoroegeneria] spicata*) as the principal grass. The soils in this zone are mostly loams or stony loams. Grazing by cattle and horses in this zone tends to result in a decline in large perennial grasses and an increase in annual cheatgrass. Big sagebrush cover can vary from 5 to 26 percent, and Daubenmire did not find a correlation with grazing (Daubenmire 1970).

In addition to big sagebrush, a number of other shrub species may be present in the *Artemisia tridentata – Agropyron* zone in small numbers; these include rabbitbrushes (*Chrysothamnus* spp. and *Ericameria* spp.), threetip sagebrush (*Artemisia tripartita*), and spiny hopsage (*Grayia spinosa*). The bluebunch wheatgrass is supplemented by variable amounts of needle-and-thread grass (*Hesperostipa comata*), Thurber's needlegrass (*Achnatherum thurberianum*), Cusick's bluegrass (*Poa cusickii*), and bottlebrush (*Elymus elymoides*). A low layer of plants consisting of Sandberg's bluegrass, cheatgrass, and flatspine stickseed (*Lappula occidentalis*) may also be present (Daubenmire 1970).

Within the steppe region, a variety of habitats occur that have soils sufficiently unusual in physical or chemical properties to develop unique climax communities that are not necessarily associated with a particular vegetation zone. Lithosol (shallow soils) habitats are one such habitat that commonly occurs on the ridgetops within the Project area. Daubenmire (1970) recognizes a variety of lithosolic plant associations. All are typically composed of a uniform layer of Sandberg's bluegrass, over a crust of mosses and lichens, with a low shrub layer above. Within the Project area, the shrub layer on lithosols is principally composed of stiff sagebrush (*Artemisia rigida*) and/or several different buckwheat species (*Eriogonum spp.*).

The above descriptions of generalized vegetation zones and associations are based on climax communities, which typically develop over time in the absence of anthropogenic disturbance. Within most of the shrub-steppe region, including the Project area, many of the plant communities have been modified due to numerous disturbance factors. Livestock grazing, introduction of exotic plant species, and ground disturbance from recreational activities have influenced the plant community composition in the Project area from the climax communities described above. Notable in the Project area is fewer native grass species and grass cover in general, attributable to livestock grazing (L. Stream, WDFW, pers. comm.). Additionally, the Project area does contain some non-native species and weedy species; however, native species overwhelmingly dominate the Project area.

The following habitat types were mapped in the main Project area (Figure 3) and are described below:

- *Shrub-steppe* –7,992 acres in the Project area (92 percent)
- *Herbaceous* – 469 acres in the Project area (5 percent)
- *Herbaceous/Rock Outcrop* – 97 acres in the Project area (1.1 percent)
- *Pine Forest* - 31 acres in the Project area (0.4 percent)
- *Woody Riparian* – 54 acres in the Project area (0.6 percent)
- *Rock Outcrop* – 5.6 acres in the Project area (0.1 percent)
- *Seasonal Water Body* – 1.7 acres in the Project area (0.02 percent)

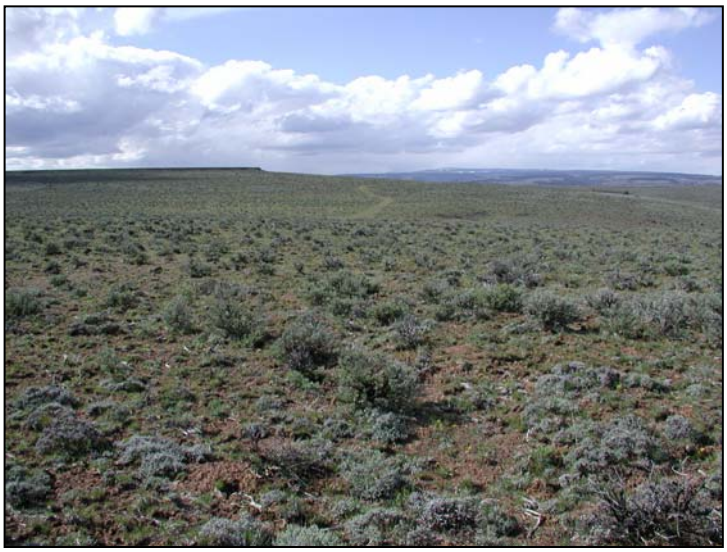
The following habitat types occur along the BPA and PSE transmission line routes within the 328-foot buffer that was surveyed for rare plants:

- *Shrub-steppe* – 438 acres (91 percent of the survey area)
- *Herbaceous* – 37.4 acres (7.5 percent of the survey area)
- *Pasture* – 3.6 acres (0.7 percent of the survey area)
- *Rock Outcrop* - 2.4 acres (0.5 percent of the survey area)
- *Woody Riparian* – 1.3 acres (0.3 percent of the survey area)

Within the Project area, the primary habitat type is shrub-steppe. This upland habitat type is dominated by shrubs; big sagebrush and stiff sagebrush and the most common dominants, occasionally threetip sagebrush (*Artemisia tripartita*), antelope bitterbrush (*Purshia tridentata*), and squaw current (*Ribes cereum*) dominate. A mix of grasses and forbs make up the understory. Big sagebrush is typically dominant in areas with deeper soils, while stiff sagebrush is dominant on exposed sites with shallow soils (i.e., lithosols). The shrub-steppe habitat type was broken down into three categories based on relative spatial density of the shrub layer – dense, moderate, and sparse. These categories are subjective, but generally fall into the following cover categories:

- dense – greater than 60 percent shrub cover
- moderate – between 30 and 60 percent shrub cover
- sparse – less than 30 percent shrub cover

In general, areas with a dense shrub layer were found on deep-soiled sites (primarily on gentle to moderate slopes and valley bottoms) and were dominated by big sagebrush, antelope bitterbrush, or squaw current. The Project area has approximately 1,435 acres of dense shrub (17 percent of the Project area). Areas with a moderate shrub layer were found on flat to gently sloping sites, and were typically dominated by big sagebrush or stiff sagebrush, although threetip sagebrush was common in some areas. Most of the shrub steppe fell into the moderate category; approximately 4,935 acres (57 percent of the Project area) were mapped as moderate. Areas with sparse shrub cover were generally found on exposed ridgetops and knolls and dominated by low-growing stiff sagebrush, or in some areas, various buckwheats. Approximately 1,623 acres (19 percent of the project area) were mapped as sparse.



Typical shrub-steppe habitat in Project area.

Areas dominated by herbaceous speices (grasses and forbs) comprise approximately 5 percent of the Project area and are generally limited to very steep slopes and exposed ridges that do not support shrubs, although scattered individual shrubs (usually stiff sagebrush or buckwheats) may be found. The herbaceous habitat type includes a variety of plant associations dominated by grass species, particularly Sandberg's bluegrass (*Poa secunda*) and bluebunch wheatgrass; forb species typically co-dominate. Common forbs include Hood's phlox (*Phlox hoodii*), Hooker's balsamroot (*Balsamorhiza hookeri*), and narrowleaf goldenweed (*Haplopappus stenophllus*). Lithosols are common in this habitat type, especially on exposed ridgetops. Sandberg's bluegrass is the dominant grass on lithosols. On some steeps slopes, fingers of exposed cobbles and rock are intermingled among the herbaceous habitat. This herbaceous/rock outcrop habitat type makes up an additional 1.1 percent of the Project area. A 5.6 acre site (0.1 percent of the Project area) on top of Whiskey Dick peak is classified as simply rock outcrop.

Herbaceous/Rock outcrop habitat in Project area

While the shrub-steppe habitat type dominates the landscape in and around the Project area, a small amount of Ponderosa pine (*Pinus ponderosa*) forest occurs in a narrow strip along one of the main Project area drainages (31 acres or 0.4 percent of the Project area). This narrow strip of forest contains mature Ponderosa pine in the overstory, with a mix of grasses and forbs in the understory.

Riparian areas associated with creeks and springs are limited, but present in the Project area. The predominant riparian area is the narrow woody riparian strip along Whiskey Dick Creek. This area comprises approximately 54 acres or 0.6 percent of the Project area. Small to medium sized trees dominate the overstory, including black hawthorn (*Crataegus douglasii*) and alder (*Alnus sp.*). Scattered shrubs occur in the understory (e.g., squaw current and big sagebrush) along with grasses and forbs such as bulbous bluegrass (*Poa bulbosa*) and fern-leaved lomatium (*Lomatium dissectum*). The riparian habitats associated with springs are degraded from heavy livestock use, and much of the riparian vegetation has been removed. The weedy species bur buttercup (*Ranunculus testiculatus*) was common around most springs.

One seasonal water body occurs near 'String K'. Water was present during the April - May survey period, however this site was dry during later site visits. Other on-site investigators report that this water body is generally dry by late May. This water body, approximately 1.7 acres in size, is located just

outside the 164-foot buffer for 'String K'. The area is heavily used by livestock and wildlife for water and the rocky shore had very little or no riparian vegetation.

Both of the proposed BPA and PSE feeder lines are routed along exposed ridge tops in shrub-steppe habitat. The BPA feeder line heads west out of the Project area for approximately 2.5 miles along a ridge with sparse to moderate sagebrush cover; lithosol is intermixed in the shrub-steppe habitat. The line is then routed down a narrow drainage and across Parke Creek and a dirt road. Woody riparian habitat occurs along Parke Creek at the proposed transmission line crossing location. The overstory consists of tree species including black hawthorn and aspen (*Populus tremuloides*). The shrub layer includes snowberry (*Symphoriocarpos* sp.), Wood's rose (*Rosa woodsii*), golden current (*Ribes aureum*), and willow (*Salix* sp.). The understory consists of a variety of grasses and forbs. The riparian area is within a cattle pasture and the understory is heavily grazed. West of the Parke Creek and road crossing, the line once again enter shrub-steppe habitat for the remaining approximately 1.5 miles to the interconnect with the existing BPA transmission line.

The PSE feeder line heads south out of the Project area along ridge tops dominated by moderate to sparse shrub-steppe habitat for approximately 2 miles where it then crosses the Vantage Highway and heads southwest. South of the Vantage Highway, the transmission line continues along ridge tops primarily in shrub-steppe habitat, although it passes through several small areas dominated by herbaceous species (primarily grasses) on exposed knolls. The western-most half-mile of the PSE line crosses an irrigated pasture, a small creek, a local road, and the Highline Canal and then interconnects with an existing PSE transmission line.

Quality Assessment

Results of the habitat quality assessment conducted at each turbine string show that habitat quality ranges from "fair" to "good" (Table 2). Based on NRCS guidelines (USDA SCS 1973), rangeland with 75 to 100 percent of its climax vegetation is in "excellent" condition. Rangeland with 50 to 75 percent of its climax vegetation is in "good" condition. Rangeland with 25 to 50 percent of its climax vegetation is in "fair" condition, and less than 25 percent is in "poor" condition. No sample locations fell into the "excellent" category, presumably due to the history of grazing. Grazing appears to have resulted in fewer grasses and less grass cover than would be expected in a climax community. A similar observation was reported by Daubenmire (1970), who noted a decline in large perennial grasses due to grazing, although he could find no correlation among big sagebrush cover and grazing. Similarly, no sample locations fell into the "poor" category. Although the Project area appears to have few grasses than would be expected, native species dominate and no significant weedy invasions (e.g. cheatgrass) were observed that could alter species composition to such as degree as to result in a "poor" rating. Although the sample locations were at the turbine strings, the "fair" to "good" rating can be applied across the Project area based on general observations.

Thirteen of the eighteen sample locations were rated as "good", and five were rated as "fair". The percentages that observed vegetation differed from climax vegetation ranged from 36 percent to 60 percent. "Fair" is defined as rangeland with 25 to 50 percent of its climax vegetation, and "good" rangeland has 50 to 75 percent of its climax vegetation. Five sample locations were at 50 percent, and were "rounded up" to the "good" category. No spatial pattern was found for the sample locations rated as "good" verses "fair", although the "good" locations are generally more isolated, away from the main roads (except String E), and the "fair" locations are closer to main roads (except String M). The "fair" to "good" ratings are indicative of past land use and relatively isolated setting. Although the area has been grazed, no significant changes in species composition were observed, such as conversion of native

vegetation to cropland. It is assumed that the relatively isolated setting has minimized the introduction and spread of noxious and/or invasive species that occurred throughout much of our western rangeland.

Rare Plant Survey

Preview Review

The USFWS Section 7 response letter listed one federally threatened plant species and one candidate plant species with potential for occurrence in the Project area (Appendix 1). The threatened species is Ute ladies'-tresses (*Spiranthes diluvialis*) and the candidate species is basalt daisy (*Erigeron basalticus)*. No other plant species were listed in the USFWS letter.

The WNHP reported one element occurrence record for a tracked plant species in the area crossed by the proposed PSE powerline route (WNHP, 2003). This species occurrence, Hoover's tauschia, was reported from portions of Sections 4 & 9, Township 17N, Range 21E. Additional element occurrences were reported by WNHP within a three-mile radius of the Project area and include 11 occurrences of Pauper milk-vetch, 12 occurrences of Hoover's tauschia (including the one crossed by the PSE powerline), six occurrences of hedgehog cactus, and one occurrence of a Wyoming big sagebrush/bluebunch wheatgrass community. The locational information for WNHP data is not precise and generally covers portions of several sections.

Field Investigation

The field surveys did not locate any USFWS Endangered, Threatened, Proposed, or Candidate plant species. No habitat for Ute ladies'-tresses occurs in the survey area. Limited potential habitat was found for the federal candidate species, basalt daisy. Although basalt daisy is typically restricted to the extensive cliffs along the Yakima River and Selah Creek, all rock outcrops within the Project area were searched intensively for the presence of the species, but none were found.

Potential habitat was found within the survey area for a number of federal 'Species of Concern'. These include Columbia milkvetch, Hoover's desert-parsley, least phacelia, Seely's silene, and Hoover's tauschia. In all cases, where potential habitat was found for these species, the area was searched carefully, with none found.

Likewise, the field surveys did not locate any plants listed as Endangered, Threatened, or Sensitive by the State of Washington. Potential habitat, however, was found for a number of these species throughout the Project area. These habitats were searched thoroughly for the presence of the target species, but none were found.

One plant species on the Washington State 'Review' list, hedgehog cactus, was found in the survey area. Species on the 'Review' list are of potential concern within the state, but in need of additional field work before a status can be assigned (WNHP 2003). The Review designation carries no legal requirement for protection; however, WNHP personnel are interested in tracking occurrences of Review species to aid in the assignment of status. Most of the suitable habitat present in the Project area was found to contain scattered individuals. Suitable habitat consists of the lithosol habitats, or those areas mapped as sparse shrub-steppe and herbaceous. Most of the plants were in flower at the time of the spring survey; additional populations were found during the summer and fall surveys. Since the populations were extensive and extended well beyond the edge of the study corridors, mapping the entire extent was not undertaken.

Hedgehog cactus

The hedgehog cactus populations found within the Project area are located in lithosolic habitats. These habitats are well represented within the Project area, intermingled among sagebrush steppe and herbaceous habitats. Much of the suitable habitat searched was found to contain the species. In addition, a large amount of suitable habitat exists adjacent to the survey corridors. Although areas outside of the corridors were typically not surveyed, it is reasonable to assume that much of this suitable habitat also contains hedgehog cactus.

A list of all plant species observed and identifiable during the rare plant survey is included in Table 3.

IMPACT ASSESSMENT

Habitat

Tables 4 and 5 summarize the amount of permanent and temporary impacts to habitat types in the Project area. Six of the eight habitat types mapped in the main Project area would be affected; affected habitat types include herbaceous, herbaceous/rock outcrop, shrub-steppe dense, shrub-steppe medium, shrub-steppe sparse, and rock outcrop. Pine forest and woody riparian habitats would not be impacted by project facilities, either temporarily or permanently. Habitats along the BPA and PSE transmission lines that would be affected include herbaceous, pasture, shrub-steppe dense, shrub-steppe medium, shrub-steppe sparse, and rock outcrop. A total of approximately 148 acres would be permanently impacted, with the majority (127 acres or 86 percent) in shrub-steppe habitats. An additional 323 acres would be temporarily disturbed; 293 acres (91 percent) in shrub-steppe habitats. A breakdown of permanent and temporary impacts by habitat type is shown in Table 5.

Rare Plants

Due to the absence of any known populations and lack of habitat within the Project area, no Project-related impacts are anticipated to any federally Endangered, Threatened, Proposed, or Candidate plant species. Likewise, no Project-related impacts are anticipated for any Washington State Endangered, Threatened, or Sensitive plant species.

Limited impacts are anticipated, however, to one species on the Washington State Review list, hedgehog cactus. Ground disturbance related to construction and operation of the proposed Project could cause direct adverse impacts to individuals if they are located within the impact footprint. However, due to their frequent occurrence in lithosol habitats and the high likelihood that many more individuals occur in the area adjacent to the impact corridors, the Project is not expected to significantly impact the species' viability in the Project area. Approximately 10 percent of the individuals in the Project area are estimated to be directly impacted by the Project. This level of direct impact is not anticipated to jeopardize the continued existence of the local population, or lead to the need for state or federal listing.

In addition to direct impacts from ground disturbing activities, the Project also has the potential to impact hedgehog indirectly if the Project leads to the degradation of habitat in the area through the introduction and spread of noxious weeds or the increase of human presence in the area. Although little is known about how hedgehog cactus responds to competition from non-native species, it is safest to assume that significant increases in noxious weeds in the area could adversely impact the species. At the present time, the lithosolic habitat where hedgehog cactus is found is relatively intact. If the Project leads to the degradation of these habitats by increasing noxious weed densities, it is possible that some level of adverse impact to the hedgehog populations would occur. Furthermore, uncontrolled access to the project area increases the possibility of cactus collectors on-site. Collection of hedgehog cactus for gardens has been cited as a reason for decline of the species (Taylor 1992).

MITIGATION

A mitigation parcel has been identified within the 8,500-acre Project area. The mitigation parcel is T18N, R21E, Section 27, except for the portion of this section that will be developed as part of the Project; i.e., String 'L' follows a ridgeline that dissects Section 27 from north to south. The areas to the east and west of String 'L' proposed for mitigation are estimated to total approximately 600 acres. Use of this parcel would meet the guidelines for mitigation outlined by the WDFW for wind power projects (WDFW 2003). The Applicant intends to coordinate with WDFW regarding specific mitigation measures for this parcel, such as fencing the parcel to eliminate livestock grazing. In addition to Section 27, the Applicant has proposing to fence the springs within the Project area to eliminate livestock grazing. Fencing used for the mitigation parcel and the springs will be designed to keep livestock out but allow game species to cross. Final mitigation measures will be negotiated with the WDFW.

WDFW guidelines for wind power projects east of the Cascades provide a list of general principles for mitigation. These principles were followed during selection of Section 27 as a potential mitigation site for the Wild Horse Project. Section 27 provides opportunity for "like-kind" replacement habitat of equal or higher habitat value than the impacted area and it occurs in the same geographical region as the impacted habitat. Furthermore, since the Applicant has an option to purchase the property if the Project goes forward, the Applicant can provide legal protection and protection from degradation for the life of

the Project. Under WDFW's general principles, grassland habitat would be replaced at a 1:1 ratio and shrub-steppe habitat at a 2:1 ratio.

Additional benefits of Section 27 as a mitigation parcel for the Project include:

- Protection of a segment of Whiskey Dick Creek
- Continuity of habitat with adjacent state lands
- Preservation of a diversity of habitats

Use of Section 27 as a mitigation parcel would result in protection of an approximately 1-mile segment of Whiskey Dick Creek near its headwaters. Protection of waterways and their adjacent riparian habitat provide significant benefits above and beyond replacement of "like-kind" habitat at agreed upon ratios. Protection of this segment of Whiskey Dick Creek provides benefits for water quality, wildlife, and species diversity. In addition, Section 27 is adjacent to state-owned lands. WDNR administers Section 34 to the south and WDFW administers Section 26 to the east. Use of Section 27 for mitigation will provide continuity of habitat with these adjacent state sections. Finally, a variety of habitat types that occur in the general Project area are found in Section 27, so a diversity of habitat types would be preserved. These include shrub-steppe (moderate and dense), herbaceous, herbaceous/rock outcrop, and woody riparian (Figure 3).

A reconnaissance level survey of Section 27 was made during late April 2003 to evaluate the parcel for use as a mitigation site for permanent impacts to Project area. The reconnaissance included a walk through both the "western half" and "eastern half" of Section 27; during these walks notes were taken on general habitat quality, species observations, plant associations, and current use of the parcel.

The "western half" of Section 27 consists of the Whiskey Dick Creek drainage and the adjacent steep slopes. The elevation of Whiskey Dick Creek in Section 27 is approximately 2,800 feet; the adjacent ridges are over 3,300 feet in elevation. The USGS 7.5 minute topographic map shows Whiskey Dick Creek to be an intermittent creek fed by Pine Spring and Government Spring (both located in the Project area). The dry, steep, west-facing slope consists of herbaceous habitat intermingled with fingers of rock outcrop. Species observed on this slope include bluebunch wheatgrass and a variety of native forbs, such as arrowleaf balsamroot (*Balsamorhiza saggitata*). Scattered individual shrubs were found, including big sagebrush, antelope bitterbrush, and squaw current. Some non-native grasses were also noted including bulbous bluegrass (*Poa bulbosa*) and cheatgrass. Shrub-steppe habitat is found on the east-facing slope and portions of the west-facing slope. Big sagebrush and stiff sagebrush are the dominant shrubs, although patches of antelope bitterbrush and squaw current were noted. Shrub composition and density appear correlated with soil type and depth. Big sagebrush was more common in drainages and on more moderate slopes in deeper soils. In some locations, mature big sagebrush was very robust. Stiff sagebrush was more common on shallow soils on exposed ridges and upper slopes.

A narrow riparian zone occurs along Whiskey Dick Creek, which is confined by steep slopes on both sides in Section 27. The riparian area has a woody overstory dominated by small to medium sized trees including black hawthorn (*Crataegus douglasii*) and alder (*Alnus sp.*). Scattered shrubs occur in the understory (e.g., squaw current and big sagebrush), along with grasses and forbs such as bulbous bluegrass and fern-leaved lomatium (*Lomatium dissectum*). Several game trails were observed throughout the "western half" of Section 27 and Whiskey Dick is likely an important source of water and shade for area wildlife. Several bird nests were noted in the trees.

The "eastern half" of Section 27 is moderately sloping shrub-steppe habitat (dense and moderate) with some areas dominated by herbaceous species. Due to the moderate slope, soils are relatively deep and support dense, diverse shrub-steppe, often with a bluebunch wheatgrass component that is absent in other parts of the Project area shrub-steppe. The "eastern half" of Section 27 was the most diverse shrub-steppe observed in the Project area and dominated by native species. Very few weeds were observed. Several species of sagebrush were observed, including big sagebrush, stiff sagebrush, and three-tip sagebrush, along with other shrubs such as antelope bitterbrush and squaw current. Relatively dense grasses and forbs were found in the understory. Grasses observed include bluebunch wheatgrass and Sandberg bluegrass. Forbs include several species of *Eriogonum*, several species of *Lomatium*, several species of *Lupinus*, Hooker's balsamroot, and Yakima milkvetch (*Astragalus reventiformis*).

Herbaceous habitat, "western half" Section 27

Woody riparian habitat along Whiskey Dick Creek, "western half" Section 27

Shrub-steppe habitat, "eastern half" Section 27

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TABLES

Table 1. Rare Plant Species with Potential for Occurrence in the Wild Horse Wind Power Project Area

Common Name *Scientific Name*	**Federal Status**	**State Status**	**Typical Habitat**	**ID Period**
Tall agoseris *Agoseris elata*		S	Meadows, open woods, and exposed rocky ridgetops	June-August
Pasque flower *Anemone nuttalliana*		S	Prairies to mountain slopes, mostly on well-drained soil	May-August
Palouse milk-vetch *Astragalus arrectus*		S	Grassy hillsides, sagebrush flats, river bluffs, and openings in open ponderosa pine and Douglas fir forests	April-July
Columbia milk-vetch *Astragalus columbianus*	SOC	LT	Sagebrush-steppe	March-June
Pauper milk-vetch *Astragalus misellus* var. *pauper*		S	Open ridgetops and slopes	April-mid June
Dwarf evening-primrose *Camissonia pygmaea*		T	Unstable soil or gravel in steep talus, dry washes, banks and roadcuts	June-August
Naked-stemmed evening primrose *Camissonia scapoidea*		S	Sagebrush desert, mostly in sandy, gravelly areas	May-July
Bristle-flowered collomia *Collomia macrocalyx*		S	Dry, open habitats	late May-early June
Golden corydalis *Corydalis aurea*		R1	Varied habitats, moist to dry and well drained soil	May-July
Beaked cryptantha *Cryptantha rostellata*		S	Very dry microsites within sagebrush steppe	late April –mid June
Shining flatsedge *Cyperus bipartitus*		S	Streambanks and other wet, low places in valleys and lowlands	August-September
Wenatchee larkspur *Delphinium viridescens*	SOC	T	Moist meadows, moist microsites in open coniferous forest, springs, seeps, and riparian areas	July
White eatonella *Eatonella nivea*		T	Dry, sandy, or volcanic areas within sagebrush-steppe	May
Basalt daisy *Erigeron basalticus*	C	T	Crevices in basalt cliffs on canyon walls	May-June
Piper's daisy *Erigeron piperianus*		S	Dry, open places, often with sagebrush	May-June
Sagebrush stickseed *Hackelia hispida* var. *disjuncta*		S	Rocky talus	May-June
Longsepal globemallow *Iliamna longisepala*		S	Sagebrush-steppe and open ponderosa pine and Douglas fir forest	June-August
Hoover's desert-parsley *Lomatium tuberosum*	SOC	T	Loose talus and drainage channels of open ridgetops within sagebrush-steppe	March-early April

Table 1. Rare Plant Species with Potential for Occurrence in the Wild Horse Wind Power Project Area

Common Name *Scientific Name*	**Federal Status**	**State Status**	**Typical Habitat**	**ID Period**
Suksdorf's monkey-flower *Mimulus suksdorfii*		S	Open, moist to rather dry places within sagebrush-steppe	mid April-July
Coyote tobacco *Nicotiana attenuata*		S	Dry, sandy bottom lands, dry rocky washes, and other dry open places	June-September
Cespitose evening-primrose *Oenothera cespitosa* ssp.*cespitosa*		S	Open sites on talus or other rocky slopes, roadcuts, and the Columbia River terrace	Late April - mid June
Hedgehog cactus *Pediocactus simpsonii* var. *robustior*		R1	Desert valleys and low mountains	May-July
Brewer's cliff-brake *Pellaea breweri*		S	Rock crevices, ledges, talus slopes, and open rocky soil	April-August
Fuzzytongue penstemon *Penstemon eriantherus* var.*whitedii*		R1	Dry open places	May-July
Least phacelia *Phacelia minutissima*	SOC	S	Moist to fairly dry open places	July
Sticky goldenweed *Pyrrocoma hirta* var. *sonchifolia*		R1	Meadows and open or sparsely wooded slopes	July-August
Seely's silene *Silene seelyi*	SOC	T	Shaded crevices in ultramafic to basaltic cliffs and rock outcrops, and among boulders in talus	May-August
Ute ladies'-tresses *Spiranthes diluvialis*	LT	E	broad low-elevation intermontane valley plains, with deltaic meandered wetland complexes; restricted to calcareous, temporarily inundated wet meadow zones and segments of channels and swales where there is stable subsurface moisture and relatively low vegetation cover.	Mid July - August
Hoover's tauschia *Tauschia hooveri*	SOC	T	basalt lithosols within sagebrush-steppe	March-mid April

Federal Status:
LT = Listed Threatened. Likely to become endangered
C = Candidate species. Sufficient information exists to support listing as Endangered or Threatened.
SOC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

State Status:
E = Endangered. In danger of becoming extinct or extirpated from Washington.
T = Threatened. Likely to become Endangered in Washington.
S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state.
R1=State Review Group 1. Taxa for which there is insufficient data to support listing in Washington as Threatened, Endangered, or Sensitive

Table 2. Assessment of Habitat Quality at the Proposed Turbine String Sites			
Facility	**Observed Vegetation[1]**	**Characteristic Climax Vegetation (Based on Soil Type)[2]**	**General Quality Assessment**
Turbine String 'A'	Sandberg's bluegrass, Gray's lomatium, Hood's phlox, rock buckwheat, Hooker's balsamroot, big sage-brush, narrowleaf goldenweed, three-nerved violet	Sandberg's bluegrass, stiff sagebrush, thymeleaf buckwheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf goldenweed, rock buckwheat, bitterroot	String 'A' is located on lithosol (sparse shrub-steppe and herbaceous habitats) with exposed cobbles and rock. Habitat quality is considered "**good**" because 50% of the observed vegetation is in common with the climax vegetation. Native species dominate. The existing vegetation has a notable absence of bluebunch wheatgrass and bottlebrush squirreltail compared with the climax. Also of note is the presence of Gray's desert parsley.
Turbine String 'B'	Sandberg's bluegrass, Gray's lomatium, Hood's phlox, rock buckwheat, Hooker's balsam- root, big sage-brush, narrowleaf goldenweed, three-nerved violet	(North end) Sandberg's bluegrass, stiff sagebrush, thymeleaf buckwheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf goldenweed, rock buckwheat , bitterroot (South end) Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltai, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	The sample location for String 'B' was made at the northern end of the string in the same soil type described for 'String A'. Habitat quality is rated "**good**" because 50% of the observed vegetation is in common with the climax vegetation. The southern end is located in deeper-soiled shrub-steppe habitat on a slope. Although no samples were taken in this soil type, habitat quality is also assumed to be "good. Several weedy species were observed in the rock outcrop habitat adjacent to String 'B', due to past disturbance associated with oil and gas drilling and subsequent rehabilitation.

Table 2. Assessment of Habitat Quality at the Proposed Turbine String Sites

Facility	Observed Vegetation[1]	Characteristic Climax Vegetation (Based on Soil Type)[2]	General Quality Assessment
Turbine String 'C'	Stiff sagebrush, three tip sagebrush, Gray's lomatium, Sandberg's bluegrass, Hood's phlox, bluebunch wheatgrass, rock buckwheat, hedgehog cactus	Sandberg bluegrass, stiff sagebrush, thymeleaf buckwheat, Bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, narrow-leaf goldenweed, rock buckwheat, bitterroot	String 'C' is located on lithosol (primarily sparse shrub-steppe habitat) with some exposed rock. Habitat quality is considered "**good**" because 56% of the observed vegetation is in common with the climax vegetation. Native species dominate.
Turbine String 'D'	Three tip sagebrush, stiff sagebrush, Sandberg bluegrass, longleaf phlox, narrowleaf goldenweed, Hooker's balsamroot, trace amount various forbs	Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	'String D' is located on lithosol in herbaceous habitat. Habitat quality is considered "**fair**" because 40% of the observed vegetation is in common with the climax vegetation. Native species dominate, however weeds were noted along the existing road, including Russian thistle, knapweed, and bur buttercup.
Turbine String 'E'	Stiff sagebrush, narrowleaf goldenweed, Gray's lomatium, thymeleaf buck-wheat, Hood's phlox, Sandberg bluegrass, three-nerved violet, hedgehog cactus	Bluebunch wheatgrass, Sandberg bluegrass, rock buckwheat, Hood's phlox, narrowleaf goldenweed, threetip sagebrush, balsamroot, Hooker's balsamroot, lupine, thymeleaf buckwheat	This string includes deeper-soiled moderate shrub-steppe mixed with shallow-soiled lithosol. Habitat quality is considered "**fair**" because 40% of the observed vegetation is in common with the climax vegetation. Native species dominate. Existing vegetative cover is comprised of more shrubs and fewer grasses than would be expected in the climax community.
Turbine String 'F'	Thymeleaf buckwheat, Sandberg bluegrass, Hood's phlox, Grey's lomatium, stiff sagebrush, narrowleaf goldenweed, yarrow	Sandberg bluegrass, stiff sagebrush, thymeleaf buckwheat, Bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, narrow-leaf goldenweed, rock buckwheat, bitterroot	String 'F' is located on lithosol (primarily herbaceous habitat) with exposed rock. Habitat quality is considered "**good**" because 56% of the observed vegetation is in common with the climax vegetation. Native species dominate.

Table 2. Assessment of Habitat Quality at the Proposed Turbine String Sites			
Facility	**Observed Vegetation[1]**	**Characteristic Climax Vegetation (Based on Soil Type)[2]**	**General Quality Assessment**
Turbine String 'G'	Three tip sagebrush, Sandberg bluegrass, bluebunch wheatgrass, rabbitbrush, stiff sagebrush, Hooker's blasamroot, Hood's phlox, thymeleaf buckwheat	Sandberg bluegrass, stiff sagebrush, thymeleaf buckwheat, Bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, narrow-leaf goldenweed, rock buckwheat, bitterroot	String 'G' is located in moderate shrub-steppe habitat with shallow soils and some exposed rock. Habitat quality is considered "**good**" because 56% of the observed vegetation is in common with the climax vegetation. Native species dominate.
Turbine String 'H'	Stiff sagebrush, Sandberg bluegrass, thymeleaf buck-wheat, Hoods' phlox, Hooker's balsamroot	Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	String 'H' is located in moderate density shrub-steppe on shallow soils. Antelope bitterbrush and squaw current occur at the southern tip of the string in the buffer zone. Habitat quality is considered "**good**" because 50% of the observed vegetation is in common with the climax vegetation. Native species dominate. No weedy species were noted.
Turbine String 'I'	Stiff sagebrush, Sandberg bluegrass, thymeleaf buck-wheat, Hoods' phlox, Hooker's balsamroot, narrowleaf goldenweed	Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	This string consists of deeper-soiled moderate shrub-steppe interspersed with areas of lithosol and exposed rocks and boulders. A portion of the associated overhead electric line crosses a patch of dense shrub habitat dominated by squaw current. Habitat quality is considered "**good**" because 60% of the observed vegetation is in common with the climax vegetation. Native species dominate. No weedy species were noted.

Table 2. Assessment of Habitat Quality at the Proposed Turbine String Sites			
Facility	**Observed Vegetation[1]**	**Characteristic Climax Vegetation (Based on Soil Type)[2]**	**General Quality Assessment**
Turbine String 'J'	Stiff sagebrush, big sagebrush, bluebunch wheatgrass, rock buckwheat, Sandberg bluegrass, trace amounts of various forbs.	Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	String 'J' is located in moderate density shrub-steppe on fairly shallow soils. Habitat quality is considered "**fair**" because 40% of the observed vegetation is in common with the climax vegetation. Native species dominate. Existing vegetative cover is comprised of more shrubs and fewer grasses than would be expected in the climax community. Bur buttercup, a weedy species, was noted along road.
Turbine String 'K'	Stiff sagebrush, Sandberg bluegrass, Gray's lomatium, Hood's phlox, bulbiferous prairie star, thymeleaf buckwheat, trace amount various forbs	Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	This string is located in deeper-soiled moderate shrub-steppe at the south end and cobbley lithosol with sparse shrub steppe at the north end. Habitat quality is considered "**fair**" because 40% of the observed vegetation is in common with the climax vegetation. Native species dominate. Bur buttercup, a weedy species, was common near the adjacent water body.

Table 2. Assessment of Habitat Quality at the Proposed Turbine String Sites			
Facility	**Observed Vegetation[1]**	**Characteristic Climax Vegetation (Based on Soil Type)[2]**	**General Quality Assessment**
Turbine String 'L'	Big sagebrush, stiff sagebrush, three-tip sagebrush, Hooker's balsam-root, rock buckwheat, Sandberg's bluegrass, bluebunch wheatgrass, and trace amounts of other forbs.	Sandberg bluegrass, stiff sagebrush, thymeleaf buckwheat, Bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, narrow-leaf goldenweed, rock buckwheat, bitterroot	'String L' is the longest string at approximately 3 miles in length. It runs along an undulating ridge in one primary soil type and minor inclusions of other soils types. Moderate shrub steppe is found at the north end and sparse shrub steppe at the south end. The sample observation was made at a representative site in the moderate shrub steppe. Habitat quality is considered "**good**" because 50% of the observed vegetation is in common with the climax vegetation. Native species dominate. Weeds were relatively infrequent.
Turbine String 'M'	Big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, lupine, stiff sagebrush, Gray's lomatium, western groundsel, trace amount other forbs.	Bluebunch wheatgrass, Sandberg bluegrass, antelope bitterbrush, arrowleaf balsamroot, big sagebrush, buckwheat, Cusick's bluegrass, threadleaf sedge, thruber needlegrass, lupine, wax (squaw) current	Sring 'M' occurs in moderately dense shrub-steppe with generally shallow soils. Habitat quality is considered "**fair**" because 36% of the observed vegetation is in common with the climax vegetation. Native species dominate. Shrub composition is different than would be expected in the climax community. Minor amounts of weedy species were noted including bur buttercup and a patch of cheatgrass along the access road.

Table 2. Assessment of Habitat Quality at the Proposed Turbine String Sites

Facility	Observed Vegetation[1]	Characteristic Climax Vegetation (Based on Soil Type)[2]	General Quality Assessment
Turbine String 'N'	Stiff sagebrush, big sagebrush, lupine, Sandberg bluegrass, bluebunch wheatgrass, Gray's lomatium, rock buckwheat, narrowleaf goldenweed, trace amounts of other grasses and forbs, including cheatgrass	Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	String 'N' is located in moderate density shrub-steppe on shallow soils. Habitat quality is considered "**good**" because 50% of the observed vegetation is in common with the climax vegetation. Native species dominate. Existing vegetative cover is comprised of more shrubs and fewer grasses than would be expected in the climax community. Several weedy species were noted at this site, including cheatgrass & bur buttercup.
Turbine String 'O'	Stiff sagebrush, big sagebrush, Sandberg bluegrass, bluebunch wheatgrass, Gray's lomatium, rock buckwheat, narrowleaf goldenweed, Hood's phlox	Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, narrowleaf goldenweed, rock buckwheat, bitterroot	String 'O' is located in sparse shrub-steppe habitat with shallow soils and some exposed rock. Habitat quality is considered "**good**" because 56% of the observed vegetation is in common with the climax vegetation. Native species dominate.
Turbine String 'P'	Stiff sagebrush, big sagebrush, Sandberg bluegrass, Gray's lomatium, thymeleaf buckwheat, lupine, Hooker's balsamroot, Hood's phlox, narrowleaf goldenweed	Idaho fescue, bluebunch wheatgrass, antelope bitterbrush, lupine, Sandberg bluegrass, three-tip sagebrush, big sagebrush	String 'P' is located primarily in sparse shrub-steppe habitat with some shallow soils and exposed rock. Habitat quality is considered "**good**" because 57% of the observed vegetation is in common with the climax vegetation. Native species dominate.

Table 2. Assessment of Habitat Quality at the Proposed Turbine String Sites			
Facility	**Observed Vegetation[1]**	**Characteristic Climax Vegetation (Based on Soil Type)[2]**	**General Quality Assessment**
Turbine String 'Q'	Stiff sagebrush, big sagebrush, Sandberg's bluegrass, Gray's lomatium, trace amounts of Hooker's balsamroot, Hood's phlox, thymeleaf buckwheat, lupine, narrowleaf goldenweed, and three-nerved violet.	(North Half) Idaho fescue, bluebunch wheatgrass, antelope bitterbrush, lupine, Sandberg bluegrass, three-tip sagebrush, big sagebrush (South Half) Sandberg bluegrass, stiff sagebrush, thymeleaf buck-wheat, bluebunch wheatgrass, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf golden weed, rock buckwheat, bitterroot	'String Q' crosses two soil types capable of supporting differing climax commun-ities. The north-half is deeper-soiled, associated with higher grass cover in the climax community, while the south-half is shallow-soiled with species typical of lithosol (e.g. Sandberg bluegrass and stiff sagebrush). The sample location was in the south half in shallow soils. Habitat quality is considered "**good**" because 60% of the observed vegetation is in common with the climax vegetation. Native species dominate.
Turbine String 'R'	Stiff sagebrush, Sandberg's bluegrass, Gray's lomatium, trace amounts of Hooker's balsamroot, Hood's phlox, thymeleaf buckwheat, lupine, narrowleaf goldenweed, and three-nerved violet.	Sandberg bluegrass, blue-bunch wheatgrass, stiff sagebrush, thymeleaf buckwheat, rock buck-wheat, bottlebrush squirreltail, Hood's phlox, Hooker's balsamroot, narrowleaf goldenweed, bitterroot	String 'R' occurs on sparse shrub-steppe on lithosol. The associated overhead electric line crosses some deeper-soiled habitat with relatively large big sagebrush and bluebunch wheatgrass. Habitat quality is considered "**good**" because 60% of the observed vegetation is in common with the climax vegetation. Native species dominate. No weedy species were noted.

[1]Based on Releve' sampling method; one sample location was used at each turbine string
[2]Provided by NRCS office in Ellensburg, WA

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area Late April–Early May 2003		
Family	**Scientific Name**	**Common Name**
MAIN PROJECT AREA		
BERBERIDACEAE	*Berberis aquifolium*	Shining Oregon grape
	Berberis (Mahonia) repens	Oregon grape
BORAGINACEAE	*Cryptantha leucophaea*	Gray cryptantha
	Lithospermum ruderale	Columbia puccoon
	Mertensia longiflora	Long-flowered bluebells
CACTACEAE	*Pediocactus simpsonii*	Hedgehog cactus
CAPRIFOLIACEAE	*Symphoricarpos sp.*	Snowberry
COMPOSITAE (ASTERACEAE)	*Achillea millefolium*	Common yarrow
	Antennaria dimorpha	Low pussytoes
	Artemisia rigida	Stiff sagebrush
	Artemisia tridentate	Big sagebrush
	Balsamorhiza hookeri	Hooker's balsamroot
	Baslamorhiza saggiatat	Arrowleaf balsamroot
	Centaurea sp.	Knapweed
	Chrysothamnus nauseosus	Gray rabbitbrush
	Cirsium sp.	Thistle
	Erigeron sp.	Fleabane
	Haplopappus stenophyllus	Narrow-leaf goldenweed
	Senecio integerrimus	Western groundsel
	Taraxacum officinale	Common dandelion
	Tragopogon dubius	Yellow salsify
CRUCIFERAE (BRASSICACEAE)	*Arabis cusickii*	Cusick's rockcress
	Arabis divaricarpa	Spreadingpod rockcress
	*Chorispora tenalla**	Blue mustard
	Erysimum asperum	Rough wallflower
	Phoenicaulis cheiranthoides	Daggerpod
GRAMINEAE (POACEAE)	*Agropyron spicatum (Pseudoroegneria spicata)*	Bluebunch wheatgrass
	*Bromus tectorum**	Cheat grass
	Elymus (Leymus) cinerus	Basin wild rye
	Festuca idahoensis	Idaho fescue
	Poa bulbosa	Bulous bluegrass
	Poa pratensis	Kentucky bluegrass
	Poa sandbergii (secunda)	Sandberg's bluegrass
	Stipa thurberiana	Thurber's needlegrass

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area
Late April–Early May 2003

Family	Scientific Name	Common Name
GROSSULARIACEAE	*Ribes cereum*	Squaw current
HYDROPHYLLACEAE	*Hydrophyllum capitatum*	Ballhead waterleaf
	Phacelia linearis	Threadleaf phacelia
LABIATA	*Mentha sp.*	Mint
LEGUMINOSAE (FABACEAE)	*Astragalus pushii*	Woolly-pod milkvetch
	Lupinus argenteus	Silvery lupine
	Lupinus lepidus	Prairie lupine
	Lupinus sulphureus	Sulfur lupine
	Trifolium macrcephalum	Big-head clover
	Vicia Americana	American milkvetch
LILIACEAE	*Allium acuminatum*	Tapertip onion
	Brodiaea howellii *(Triteleia gndiflora var. howellii)*	Howell's brodiaea
	Fritillaria pudica	Yellow bell
	Zigadenus venenosus	Death camas
POLEMONIACEAE	*Phlox hoodii*	Hood's phlox
	Phlox longifolia	Long-leaf phlox
POLYGONACEAE	*Eriogonum douglasii*	Douglas' buckwheat
	Eriogonum ovalifolium	Cushion buckwheat
	Eriogonum sphaerocephalum	Round-headed desert buckwheat
	Eriogonum thymoides	Thyme-leaved eriogonum
PORTULACEAE	*Claytonia lanceolata*	Western springbeauty
	Lewisia rediviva	Bitterroot
RANUNCULACEAE	*Clematis ligusticifolia*	Virgin's bower
	Delphinium nuttallianum	Larkspur
	Ranunculus glaberrimus	Sagebrush buttercup
	*Ranunculus testiculatus**	Hornseed buttercup
ROSACEAE	*Amelanchier alnifolia*	Serviceberry
	Crataegus douglasii	Black hawthorn
	Prunus virginiana	chokecherry
	Purshia tridentata	Bitter-brush
	Rosa woodsii	Wood's rose
SALICACEAE	*Populus tremuloides*	Aspen

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area Late April–Early May 2003		
Family	**Scientific Name**	**Common Name**
SAXIFRAGACEAE	*Lithophragma bulbifera*	Prairie star
	Lithophragma parviflora	Small flower fringecup
SCROPHULARIACEAE	*Collinsia parviflora*	Small-flowered blue-eyed Mary
	Penstemon gairdnieri	Gairdneri's penstemon
	Veronica sp.	Speedwell
UMBELLIFERAE (APIACEAE)	*Lomatium canbyi*	Canby's lomatium
	Lomatium dissectum	Fern-leaved desert parsley
	Lomatium gormanii	Gorman's lomatium
	Lomatium grayi	Gray's lomatium
	Lomatium macrocarpum	Large-fruited lomatium
	Lomatium triternatum	Nine-leaf lomatium
VIOLACEAE	*Viola trinervata*	Desert pansy
BPA TRANSMISSION LINE		
ANACARDIACEAE	*Rhus sp.*	Sumac
BERBERIDACEAE	*Berberis (Mahonia) repens*	Oregon grape
BETULACEAE	*Alnus incana*	Alder
BORAGINACEAE	*Amsinkia sp.*	Fiddleneck
	Mertensia longiflora	Long-flowered bluebells
CAPRIFOLIACEAE	*Symphoricarpos sp.*	Snowberry
CHENOPODIACEAE	*Salsola kali*	Russian thistle
COMPOSITAE (ASTERACEAE)	*Achillea millefolium*	Common yarrow
	Antennaria dimorpha	Low pussytoes
	Artemisia rigida	Stiff sagebrush
	Artemisia tridentate	Big sagebrush
	Balsamorhiza hookeri	Hooker's balsamroot
	Balsamorhiza saggitata	Arrowleaf balsamroot
	Chrysothamnus nauseosus	Gray rabbitbrush
	Chrysothamnus viscidiflorus	Green rabbitbrush
	Cirsium sp.	Thistle
	Erigeron poliospermus.	Cushion daisy
	Haplopappus stenophyllus	Narrow-leaf goldenweed
	Senecio integerrimus	Western groundsel

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area
Late April–Early May 2003

Family	Scientific Name	Common Name
	Taraxacum officinale	Common dandelion
	Tragopogon dubius	Yellow salsify
CRUCIFERAE (BRASSICACEAE)	*Arabis divaricaarpa*	Rock cress
	*Chorispora tenalla**	Blue mustard
	Descuriana sp.	Tanseymustard
	Phoenicaulis cheiranthoides	Daggerpod
EQUISETACEAE	*Equisetum sp.*	Horsetail
GRAMINEAE (POACEAE)	*Agropyron spicatum (Pseudoroegneria spicata)*	Bluebunch wheatgrass
	*Bromus tectorum**	Cheat grass
	Elymus cinereus	Basin wild rye
	Festuca idahoensis	Idaho fescue
	Poa bulbosa	Bulbous bluegrass
	Poa pratensis	Kentucky bluegrass
	Poa sandbergii (secunda)	Sandberg's bluegrass
	Stipa thurberiana	Thurber's needlegrass
GROSSULARIACEAE	*Ribes aureum*	Golden current
	Ribes cereum	Squaw current
HYDROPHYLLACEAE	*Hydrophyllum capitatum*	Ballhead waterleaf
LEGUMINOSAE (FABACEAE)	*Astragalus pushii*	Woolly-pod milkvetch
	Lupinus argenteus	Silvery lupine
	Lupinus lepidus	Prairie lupine
	Trifolium macrcephalum	Big-head clover
	Vicia Americana	American milkvetch
LABIATA	*Nepeta cateria*	Catnip
LILIACEAE	*Allium acuminatum*	Tapertip onion
	Brodiaea howellii (Triteleia gndiflora var. howellii)	Howell's brodiaea
	Fritillaria pudica	Yellow bell
	Zigadenus venenosus	Death camas
ONOGRACEAE	*Epilobium sp.*	Willowherb
	Oenothera sp.	Evening-primrose
POLEMONIACEAE	*Phlox hoodii*	Hood's phlox
	Phlox longifolia	Long-leaf phlox

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area
Late April–Early May 2003

Family	Scientific Name	Common Name
POLYGONACEAE	*Eriogonum ovalifolium*	Cushion buckwheat
	Eriogonum sphaerocephalum	Round-headed desert buckwheat
	Eriogonum thymoides	Thyme-leaved eriogonum
PORTULACEAE	*Claytonia lanceolata*	Western springbeauty
	Lewisia rediviva	Bitterroot
PRIMULACEAE	*Dodecatheon puchellum*	Shooting star
RANUNCULACEAE	*Clematis ligusticifolia*	Virgin's bower
	Delphinium nuttallianum	Larkspur
	Ranunculus glaberrimus	Sagebrush buttercup
	*Ranunculus testiculatus**	Hornseed buttercup
ROSACEAE	*Amelanchier alnifolia*	Serviceberry
	Crataegus douglasii	Black hawthorn
	Prunus virginiana	Chokecherry
	Purshia tridentata	Bitter-brush
	Rosa woodsii	Wood's rose
SALICACEAE	*Populus tremuloides*	Aspen
	Salix sp.	Willow
SAXIFRAGACEAE	*Lithophragma bulbifera*	Prairie star
	Lithophragma parviflora	Small flower fringecup
SCROPHULARIACEAE	*Castilleja*	
	Castilleja	
	Collinsia parviflora	Small-flowered blue-eyed Mary
	Verbascum thapsus	Common mullein
	Veronica sp.	Speedwell
UMBELLIFERAE	*Anthriscus caulus**	Bur chervil
(APIACEAE)	*Lomatium canbyi*	Canby's lomatium
(APIACEAE)	*Lomatium dissectum*	Fern-leaved desert parsley
	Lomatium grayi	Gray's lomatium
	Lomatium macrocarpum	Large-fruited lomatium
	Lomatium triternatum	Nine-leaf lomatium
VIOLACEAE	*Viola trinervata*	Desert pansy

PSE TRANSMISSION LINE

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area
Late April–Early May 2003

Family	Scientific Name	Common Name
BORAGINACEAE	*Amsinkia sp.*	Fiddleneck
	Lithospermum ruderale	Puccoon
	Mertensia longiflora	Long-flowered bluebells
CACTACEAE	*Pediocactus simpsonii*	Hedgehog cactus
CHENOPODIACEAE	*Salsola kali*	Russian thistle
COMPOSITAE (ASTERACEAE)	*Achillea millefolium*	Common yarrow
	Antennaria dimorpha	Low pussytoes
	Artemisia ludoviciana	Prairie sage
	Artemisia rigida	Stiff sagebrush
	Artemisia tridentata	Big sagebrush
	Balsamorhiza hookeri	Hooker's balsamroot
	Chrysothamnus nauseosus	Gray rabbitbrush
	Chrysothamnus viscidiflorus	Green rabbitbrush
	Erigeron poliospermus.	Cushion daisy
	Haplopappus stenophyllus	Narrow-leaf goldenweed
	Senecio integerrimus	Western groundsel
	Taraxacum officinale	Common dandelion
	Tragopogon dubius	Yellow salsify
CRUCIFERAE (BRASSICACEAE)	*Chorispora tenalla**	Blue mustard
	Descuriana pinnata	Tansymustard
	Phoenicaulis cheiranthoides	Daggerpod
	*Sisymbrium altissimum**	Tumble mustard
CYPERACEAE	*Carex sp.*	Sedge
DIPSACACEAE	*Dipsacus sylvestris*	Teasel
GRAMINEAE (POACEAE)	*Agropyron spicatum (Pseudoroegneria spicata)*	bluebunch wheatgrass
	*Bromus tectorum**	Cheat grass
	Elymus cinereus	Basin wild rye
	Festuca idahoensis	Idaho fescue
	Phalaris arundinaceae	Reed canarygrass
	Poa bulbosa	Bulbous bluegrass
	Poa sandbergii (secunda)	Sandberg's bluegrass
GROSSULARIACEAE	*Ribes cereum*	Squaw current
HYDROPHYLLACEAE	*Hydrophyllum capitatum*	Ballhead waterleaf

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area
Late April–Early May 2003

Family	Scientific Name	Common Name
JUNCACEAE	*Juncus balticus*	Baltic rush
LEGUMINOSAE (FABACEAE)	*Astragalus pushii*	Woolly-pod milkvetch
	Astragalus reventiformis	Yakima milkvetch
	Lupinus argenteus	Silvery lupine
	Lupinus lepidus	Prairie lupine
	Trifolium macrcephalum	Big-head clover
LILIACEAE	*Allium sp.*	Onion
	Brodiaea howellii (Triteleia gndiflora var. howellii)	Howell's brodiaea
	Fritillaria pudica	Yellow bell
	Zigadenus venenosus	Death camas
ONOGRACEAE	*Epilobium sp.*	Willowherb
POLEMONIACEAE	*Phlox hoodii*	Hood's phlox
	Phlox longifolia	Long-leaf phlox
POLYGONACEAE	*Eriogonum ovalifolium*	Cushion buckwheat
	Eriogonum sphaerocephalum	Round-headed desert buckwheat
	Eriogonum thymoides	Thyme-leaved eriogonum
PORTULACEAE	*Lewisia rediviva*	Bitterroot
RANUNCULACEAE	*Delphinium nuttallianum*	Larkspur
	Ranunculus glaberrimus	Sagebrush buttercup
	*Ranunculus testiculatus**	Hornseed buttercup
ROSACEAE	*Potenilla sp.*	Cinquefoil
	Purshia tridentata	Antelope bitterbrush
	Rosa woodsii	Wood's rose
SALICACEAE	*Salix exigua*	Sandbar willow
	Salix sp.	Willow
SAXIFRAGACEAE	*Lithophragma bulbifera*	Prairie star
	Lithophragma parvifolia	Small flower fringecup
SCROPHULARIACEAE	*Castilleja thompsonii*	Thompson paintbrush
	Collinsia parviflora	Small-flowered blue-eyed Mary
	Penstemon gairdnieri	Gairdneri's penstemon

Table 3. List of Vascular Plant Species Observed, Wild Horse Project Area
Late April–Early May 2003

Family	Scientific Name	Common Name
UMBELLIFERAE	*Lomatium canbyi*	Canby's lomatium
(APIACEAE)	*Lomatium dissectum*	Fern-leaved desert parsley
	Lomatium grayi	Gray's lomatium
	Lomatium macrocarpum	Large-fruited lomatium
	Lomatium triternatum	Nine-leaf lomatium
VIOLACEAE	*Viola trinervata*	Desert pansy

Botanical nomenclature follows Hitchcock and Cronquist 1973; other accepted names in parenthesis.
Not a complete list of vascular plants in the project area – only those identifiable during the spring survey period
** = introduced species*

Table 4. Summary of Impacts to Habitat Types by Project Facility

		Area Impacted (acres)	
Project Facility	Habitat Type	Permanent	Temporary
Wind Turbines[1]	Herbaceous	0.8	25.3
	Herbaceous/Rock Outcrop	0.0	0.6
	Shrub-steppe Dense	0.1	7.7
	Shrub-steppe Medium	4.5	133.5
	Shrub-steppe Sparse	4.0	111.6
Permanent Meteorological Towers[2]	Herbaceous	0.06	
	Shrub-steppe Medium	0.12	
	Shrub-steppe Sparse	0.12	
Substations[3]	Shrub-steppe Medium	6.0	
Operations and Maintenance Facility[4]	Shrub-steppe Medium	3.6	
	Herbaceous	0.4	
Quarry[5]	Herbaceous	4.7	
	Shrub-steppe Medium	6.9	
	Herbaceous/Rock outcrop	3.3	
Temporary Laydown Areas[6]	Shrub-steppe Medium		4.0
	Shrub-steppe Sparse		2.0
Overhead Collection Lines[7]	Herbaceous	0.02	
	Shrub-steppe Dense	0.01	
	Shrub-steppe Medium	0.04	
	Shrub-steppe Sparse	0.03	
Major Improvement Roads[8]	Herbaceous	1.7	
	Shrub-steppe Dense	0.3	
	Shrub-steppe Medium	12.3	
	Shrub-steppe Sparse	8.3	
New Roads[9]	Herbaceous	5.6	
	Shrub-steppe Dense	1.1	
	Shrub-steppe Medium	33.9	
	Shrub-steppe Sparse	19.4	
	Rock Outcrop	0.3	
Minor Improvement Road[10]	Herbaceous	1.5	
	Shrub-steppe Medium	2.0	
Underground Trench[11]	Herbaceous		1.6
	Shrub-steppe Dense		0.5
	Shrub-steppe Medium		10.1
	Shrub-steppe Sparse		5.7
Construction Trail - overhead feed line[12]	Herbaceous		2.0
	Pasture		0.1
	Shrub-steppe Dense		1.6
	Shrub-steppe Medium		11.6

Table 4. Summary of Impacts to Habitat Types by Project Facility

		Area Impacted (acres)	
Project Facility	Habitat Type	Permanent	Temporary
	Shrub-steppe Sparse		5.0
	Rock Outcrop		0.1
Feeder line (pole structures) [13]	Herbaceous	2.6	
	Pasture	0.2	
	Shrub-steppe Dense	2.1	
	Shrub-steppe Medium	15.3	
	Shrub-steppe Sparse	6.6	
	Rock Outcrop	0.1	
TOTAL		148	323

[1]Assumes a 31' radius for each turbine of permanent disturbance and a 169' radius for temporary disturbance
[2]Assumes a 50' x 50' area of permanent disturbance per meteorological tower, 5 towers total
[3]Assumes 2 substations at 3 acres each, however only one will be built
[4]Assumes a 4-acre O&M facility, including 2 acres for the building and 2 acres for parking
[5]Assumes 3 quarry sites at 5 acres each
[6]Assumes 3 temporary laydown areas at 2 acres each
[7]Assumes 250' span with a 10' x 10' area of permanent disturbance associated with each pole
[8]Assumes 22' width associated with roads requiring major improvement
[9]Assumes 32' width associated with new roads
[10]Assumes 2' width associated with roads requiring minor improvement
[11]Assumes 6' width of temporary disturbance associated with underground electric collector lines
[12]Assumes a 12' wide temporary trail associated with construction of the overhead feeder line
[13]Assumes a 12' 600' span with a 8' x 8' area of permanent disturbance associated with each pole

Table 5. Summary of Impacts by Habitat Type

Habitat Type	Impacted Area (acres) Permanent	Temporary
Herbaceous	17.4	28.9
Herbaceous/Rock Outcrop	3.3	0.6
Pasture	0.2	0.1
Shrub-steppe Dense	3.6	9.8
Shrub-steppe Medium	84.7	159.2
Shrub-steppe Sparse	38.4	124.3
Rock Outcrop	0.4	0.1
Total	148	323