APPENDIX B

Water Resources

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Stream and Wetland Delineation Report

Desert Claim Wind Power Project
Kittitas County, Washington

August 2004

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Stream and Wetland Delineation Report

1.0 Executive Summary

This report presents results of a delineation of streams and wetlands, and water-associated habitats for a proposed Desert Claim Wind Power (Desert Claim) Project located approximately 5 miles north of the City of Ellensburg in Kittitas County, Washington. Desert Claim is proposing to construct and operate a wind energy facility with a maximum of 120 wind turbines, with associated towers, footings, and pad-mounted transformers, each capable of generating a minimum of 1.5 Megawatts (MW) of electricity. Other proposed project elements include power collection, substation and transmission facilities, project access roads, and a project operations and maintenance facility.

The wetland delineation results are based on the routine on-site determination methodology (Environmental Laboratory, 1987) performed by Ecology and Environment, Inc., (E & E). E & E was retained by Huckell Weinman Associates, Inc. to delineate wetlands and waters of the United States within Desert Claim's project area. The delineation covered the entire project area, including locations planned for wind turbines and other above ground facilities as well as the surrounding area of influence. The term *project area* refers to the specific lands where Desert Claim has the landowners' permission to permit and construct the Project.

Water features were identified in the survey area, including 5 perennial streams, 14 intermittent streams and creeks, ephemeral drainages or washes, the North Branch Irrigation Canal, and numerous irrigation ditches and stock ponds. All 5 perennial streams exhibited characteristics of a Type 3 stream and the remaining 14 streams exhibited characteristics of a Type 4 or 5 stream. Twenty (20) water features are crossed by access roads or located within the construction area for wind turbines or the substation. Table 6.1.1 names those jurisdictional water features identified within the project area. Table 6.1.2 provides a list of potential temporary and permanent impacts to water features as a result of the proposed project. All waters were classified using the Washington Department of Natural Resources (WDNR) stream typing maps.

A total of 76 wetlands containing all three wetland parameters (hydrology, vegetation, and soils) were identified within the project area. While some wetlands were connected to perennial streams and/or associated riparian corridors, the majority of the wetlands delineated within the project area were fed by artificial irrigation. Numerous irrigation ditches flow from the North Branch Irrigation Canal across the properties to supply water to agricultural fields and/or grazing areas. During the delineation, it was noted where

artificial irrigation supplied the only hydrology for the wet areas. The majority of the wetlands exhibited features characteristic of Category III or IV or poor-quality wetlands, as classified by the Washington Department of Ecology (Ecology) for the eastern region of the state (site reference to ranking system). No wetlands could be classified as high quality Category I or II wetlands.

Of the 76 wetlands, 48 are crossed by access roads or within the operation or construction area for wind turbines. Table 6.2.1 provides a list of wetland features identified in the project area. Table 6.2.2 provides a list of potential temporary and permanent impacts to wetlands as a result of the proposed project. The total calculated acreage of delineated wetlands within the proposed construction area, which includes temporary extra workspace areas, is 17.1 acres.

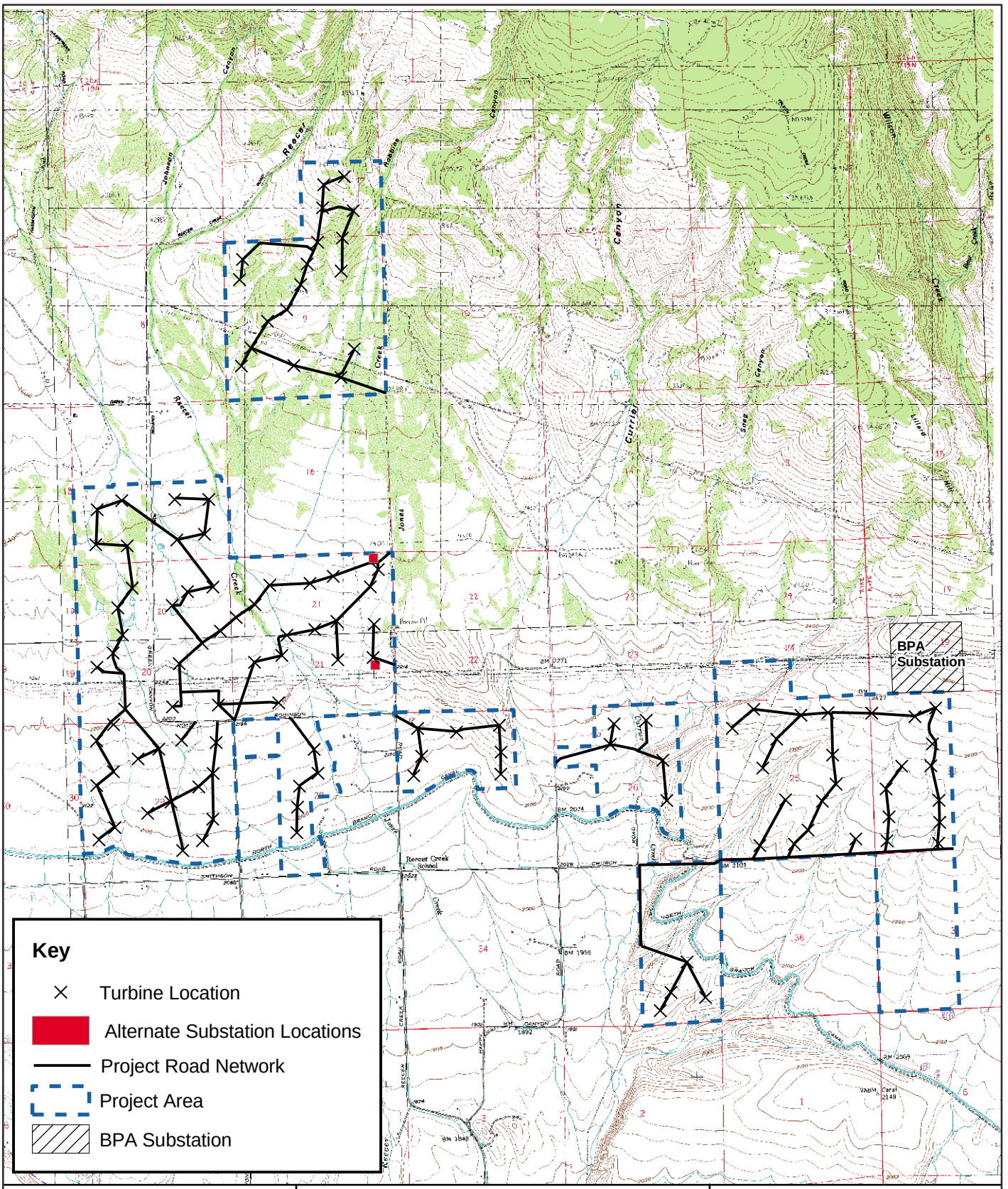
Data sheets and photographs are on file with Kittitas County.

2.0 Project Description

Desert Claim is pursuing the opportunity to construct and operate a wind energy facility located approximately 5 miles north of the City of Ellensburg in Kittitas County, Washington and 8.5 miles from the city center (see **Figure 1**). The project area consists of 5,309 acres of agricultural land that is relatively flat and open. Land within the project area is zoned Agriculture 20 (Ag-20) and Forest and Range (FR) under the Kittitas County Zoning Code. Existing land use includes grazing, pasture, feed crop production, and rural residential development. In addition, the project area is within a major cross-state electrical transmission corridor. Eight high-voltage electrical transmission lines either directly cross or are located adjacent to the project area. The site was selected based on favorable conditions including: sufficient winds to support the project, existing roads, adjacent electrical power transmission lines, land owner concurrence, and the lack of major environmental limitations.

The facility would include a maximum of 120 wind turbines, with associated towers, footings, and pad-mounted transformers, each capable of generating a minimum of 1.5 Megawatts (MW) of electricity. Other proposed project elements include power collection, substation and transmission facilities, project access roads, and a project operations and maintenance facility. The project area is generally described in the following Townships/Ranges/ and Sections: T19N, R18E, Sections 4, 8, 9, 17, 20, 21, 24-29, and 35; and T19N, R19E, Sections 30 and 31, as shown on **Figure 1**.

Each turbine consists of an above ground component measuring 12 feet in diameter and 393 feet (120 m) in height, as well as an underground base measuring 42 to 17 feet in width and 8 feet in depth (Inverted T Type Foundation) or measuring 12 to 15 feet in width and 25 to 35 feet in depth (Pile Type Foundation). Transformer pads will also be located at the base of the turbines. There will also be a substation located in Township 19N Range 18E Section 21. The turbines and access roads are permanent features that will be utilized during long-term project operation.



N
W E
S

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Figure 1
SITE MAP
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.15 0.3 0.6 0.9 1.2 1.5
Miles

Job Id:
001775.HW04.01

Date:
July 14, 2004

Developed by:
AVH

Map Source Information: USGS Topo Quads
N. Ellensburg, Reecer Creek, Swauk, and Thorp

During construction, additional temporary extra workspace will also be required around each of the turbine locations. It is anticipated that construction crews will require an additional 130 square feet of extra workspace radiating around each of the turbine locations. As such, the delineation included the area required for facility operation, as well as the temporary extra workspace needed during construction.

The project area waters of the United States, including wetlands, were delineated to identify the locations and extent of areas regulated by the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA), the Washington State Department of Ecology (Ecology), and Kittitas County. This wetland delineation report was prepared in order to facilitate the project's environmental permitting.
In order to minimize potential impacts to "Waters of the United States," Desert Claim will implement best management practices (BMPs) discussed in the Kittitas County Critical Area Ordinance.

3.0 Regulatory Environment

3.1 United States Army Corps of Engineers

The Federal CWA was enacted in 1972 and regulates discharges into "Waters of the United States." Section 404 of this Act regulates activities including fills placed in wetlands that are adjacent to navigable "Waters of the United States." In 1976, USACE and the United States Environmental Protection Agency adopted a regulatory definition of *wetlands*:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (33 Code of Federal Regulations 328.3)

The USACE *Wetland Delineation Manual* (Environmental Laboratory 1987) is used to delineate wetlands and other waters of the United States.

3.2 Washington State Department of Ecology

Ecology does not have general authority to regulate wetlands or other waters of the United States. However, Ecology does have authority to regulate uses of specific activities in wetlands. According to Section 401 of the Federal CWA, Ecology may require any permit issued by USACE to meet State Water Quality Standards. Conditions placed on the issuance of a Section 401 certification by the State of Washington become part of the Section 404 permit issued by USACE. Ecology has the regulatory authority to deny a Section 401 certification. A Section 404 permit cannot be issued by USACE if there is a denial of the Section 401 certification by the State of Washington.

3.3 Kittitas County Critical Areas Ordinance

Kittitas County Critical Areas Ordinance (KCCAOAO) establishes procedures to designate and classify ecologically sensitive and hazardous areas per requirements of the Kittitas County comprehensive plan and the Growth Management Act.

The KCCAOAO protects the designated critical areas in accordance with the Growth Management Act and the WAC 365-195-900 through 365-195-925. Additional protection by federal and state agencies is required, and addressed through agency coordination and permitting. Compliance with the KCCAO requires the submittal of a checklist containing the following information:

- Legal description of the land, and assessor's parcel number.
- Wetlands;
- Erosion hazard areas;
- Floodplains and floodways;
- Riparian habitat;
- Geologically hazardous areas;
- Landslide hazard areas;
- Mine hazard areas;
- Seismic hazard areas;
- Streams and rivers;
- Other information requested by Kittitas County for processing an application.

Wetlands in KCCAO are defined in Section 17A.02.310 and classified in four categories. The Department of Ecology wetland rating system in the Washington State Wetland Rating System documents (Western Washington, *Ecology Publication #93-74*, Eastern Washington, *Ecology Publication #91-58*) contains the rating definitions and methods.

a. **Category I.** Category I wetlands are those that meet the following criteria:

   i. Documented habitat for federal or state listed endangered or threatened fish, animal, or plant species;

   ii. High quality native wetland communities, including documented category I or II quality Natural Heritage wetland sites and sites which qualify as a category I or II quality Natural Heritage wetland (defined in the rating system documents);

   iii. High quality, regionally rare wetland communities with irreplaceable ecological functions, including sphagnum bogs and fens, estuarine, wetlands, or mature forested swamps (defined in the rating system documents); or

iv. Wetlands of exceptional local significance.

b. **Category II.** Category II wetlands are those not defined as Category I wetlands and that meet the following criteria:

i. Documented habitats for state listed sensitive plant, fish or animal species;

ii. Wetlands that contain plant, fish or animal species listed as priority species by the Department of Fish and Wildlife;

iii. Wetland types with significant functions that may not be adequately replicated through creation or restoration;

iv. Wetlands possessing significant habitat value based on a score of twenty-two (22) or more points in the habitat rating system; or

v. Documented wetlands of local significance.

c. **Category III.** Category III wetlands are those that do not satisfy category I, II or IV criteria, and with a habitat value rating of twenty-one 21 points or less.

d. **Category IV.** Category IV wetlands are those that meet the following criteria:

i. Hydrologically isolated wetlands that are less than or equal to one (1) acre in size, have only one wetland class, and are dominated (greater than eighty percent (80%) areal cover) by a single non-native plant species (monotypic vegetation); or

ii. Hydrologically isolated wetlands that are less than or equal to two (2) acres in size, and have only one wetland class and greater than ninety percent (90%) areal cover of non-native plant species.

Wetland buffers also are protected through the KCCAO (Section 17A.04.020). The wetland buffer width establishes requirements to reflect the impact of certain intense land uses on wetland function and values (KCCAO 17A.02.322 High, Medium, and Low). Wetland buffers may be modified by averaging buffer widths only if a project applicant demonstrates:

- Necessary to avoid an extraordinary hardship caused by circumstances peculiar to the property;

- The wetland contains variations in sensitivity due to existing physical characteristics;

- The proposed use would be located adjacent to areas where buffer width is reduced, and that such land uses are low in impact;

- That width averaging will not adversely impact wetland function and values.

Kittitas County employs the USACE 1987 *Wetland Delineation Manual* to determine and delineate wetlands in its jurisdiction.

Waterbodies in KCCAO are defined in Section 17A.02.300. The term "Waters" includes all surface waters not otherwise owned pursuant to water rights established under state law, as defined in Section 17A.02.290. Kittitas County uses Washington State's five-tier water typing system (WAC 222-16-030) to classify streams, lakes and ponds by their flow and habitat quality. Types 1, 2, 3, 4 and 5 waters are adopted and are classified according to the following system:

- Type 1 Waters: All waters, within their ordinary high water mark (OHWM), as inventoried as "shorelines of the state" under Chapter 90.58 RCW, but not including those waters' associated wetlands as defined in Chapter 90.58 RCW;
- Type 2 Waters: Segments of natural waters not classified as Type 1 that have a high fish, wildlife, or human use;
- Type 3 Waters: Segments of natural waters which are not classified as Type 1 or 2 and have a moderate to slight fish, wildlife, or human use;
- Type 4 Waters: Segments of natural waters within Kittitas County which are not classified as Type 1, 2 or 3 and have a channel width of two feet or more between the ordinary high water marks.*
- Type 5 Waters: Segments of natural waters within Kittitas County which are not classified as Types 1, 2, 3 or 4 waters and have a channel width of two feet between the ordinary high water marks, including streams with or without well-defined channels.*

*Type 4 and 5 waters are not truly waters, but are waterways which are intermittent in nature and may be dry beds at any time of the year. (Ord. 96-14 (part), 1996; Ord. 95-15 (part), 1995; Ord 94-22 (part), 1994).

3.4 Washington Department of Fish and Wildlife

The Washington Department of Fish and Wildlife (WDFW) requires a Hydraulic Project Approval (HPA) permit for construction activities in or near state waters (RCW 220.100-160). The state legislature has given WDFW the responsibility of preserving, protecting, and perpetuating all fish and shellfish resources of the state. The HPA permit would have permit conditions, such as timing and construction methods, to limit impacts on state fish resources.

4.0 General Site Conditions

4.1 Overview of Project Location and Topography

The project area is located within the relatively flat and open Kittitas Valley, with a gradual south-to-north rise in elevation totaling approximately 1,000 feet over approximately 5 miles. Gently sloping creeks dissect north to south across the project area, forming shallow depressions on the otherwise slightly sloping landscape.

Except for the northernmost portion, the project area lies below the foothills of the Wenatchee Mountains and Table Mountain. Elevation ranges from approximately 2,100 feet to 2,500 feet above sea level across most of the project area.

The highest elevations and steepest slopes in the project area are in the northernmost portion, in Township 19N, Range 18E, Sections 4, 8 and 9, where the project area includes a small hill coming off the foothills of the Wenatchee Mountains. Here, elevation rises from approximately 2,600 feet to approximately 3,100 feet above sea level.

In addition, on the western edge of the site, a long ridge rises up, approximately 400 feet in elevation, between the project area, U.S. Route 97, and the Yakima River, forming a natural sight barrier that would shield the Project from areas to the west and southwest.

4.2 Hydrogeographic Setting

Geologic History

The Kittitas Valley northwest toward Snoqualmie Pass in the Cascade Mountains is a broad U-shaped valley caused by receding glaciers during the last ice age (USGS 1982).

The project area lies in the northeast edge of the valley, where the low slopes slowly begin the steep climb from the valley into the Wenatchee Mountains. Streams drain from the steep, narrow canyons of the mountainous regions to the north into the wide, low-angle plains and plateaus of the Kittitas Valley in the south and spread into wide alluvial fans. The project area crosses these alluvial fans, as well as glacial outwash deposits (loess), and stream terraces (remnant flood plains). The alluvium present across the project area, is mainly composed of sediments from the Ellensburg Formation and the Columbia River Basalts (CRBs) Group (Economic and Engineering Services, Inc [EES] 2001).

The CRBs Group is a series of basalt lava flows, found locally both deep under the Kittitas Valley and at the surface along the ridgelines to the north of the project area (EES 2001). These basalts occur throughout the project area, sometimes at shallow depth, vary in permeability, and contain confined aquifers (EES 2001).

The Ellensburg Formation is comprised of volcanic materials (ash and pumice) and varies in permeability depending on the depositional thickness of ash and the level of fracturing of the formation (United States Geologic Survey [USGS] 1982; EES 2001), which overlie the Columbia River Basalts. The Ellensburg Formation is also known for non-uniform areas of perched and confined aquifers.

The Kittitas Valley is the trough of a down-fold (syncline), while the Wenatchee Mountains to the north are formed by an upfold (anticline) (USGS 1982, Alt, 1994). These geologic structures are another factor in the perched artesian aquifers along the valley side slopes of the project area (EES 2001; USGS 1982).

Surface Water

The project area is located within the Yakima River Basin. The Yakima River Basin lies in the "rain shadow" east of Washington State's Cascade Range, which receives little direct precipitation (EES, 2001).

Nineteen streams are located in the project area. Streams were identified during field surveys based on the presence of a defined bed and bank. Using the DNR Forest Practices stream-typing map, those streams were then classified as either perennial or intermittent. There are 5 perennial streams and 14 intermittent streams. In addition, the North Branch Canal traverses the project area. One of the identified streams was classified as intermittent above the North Branch Canal and perennial below the canal. There are also several irrigation ditches and stock ponds within the project area that are used for agricultural purposes.

Groundwater

Two principle Aquifers, the Columbia Plateau aquifer and the Pacific Northwest Basin-fill aquifer, underlie the project area (National Atlas, 2003).

The Columbia Plateau aquifer system is characterized by basalt and other volcanic rock, which is generally very permeable and capable of accepting large volumes of precipitation that recharge underlying aquifers. While the aquifer is well below ground surface, groundwater levels in the Columbia Plateau have risen due to irrigation practices. Water diverted from Canals and streams for irrigation have increased groundwater recharge and groundwater levels in the area. Conversely, in locations where groundwater has been the main water source for irrigation practices, groundwater levels have shown declines up to as much as 150 feet.

The Pacific Northwest Basin-Fill aquifer system is primarily composed of unconsolidated deposits up to 100 feet thick. The unconsolidated deposits are mainly alluvial deposits consisting of clays, silts, sands and gravel, but in some locations can be eolian, glacial, or volcanic deposits. Permeability of the unconsolidated deposits is variable (USGS, 1994). Local well logs indicate that the primary water-bearing zone is located approximately 110 feet below ground surface (Ecology, 2003).

Depth to first water can vary throughout the project area. This is partly due to irrigation and leakage from local canal channels, which can create a perched water table (EES, 2001). Areas identified as wetlands within this report may exhibit saturated soils and standing water as a result of canal leakage and the subsequent perched water table.

As a result of the irrigation and leakage mentioned above, low topography, and snowmelt-fed streams, there are numerous wetlands located in the project area. While some of these wetlands are connected to perennial streams such as Reecer Creek and/or associated riparian corridors, according to field observations, the majority of these wet areas are fed by leaks in the North Branch Irrigation Canal and/or by pasture irrigation. Wetlands identified in the National Wetland Inventory (NWI) that are also within the study area are shown in **Figure 2.** Further discussion of the Waters of the United States is provided in Section 6.0.

4.3 Vegetation

The existing upland vegetation in the project area is characteristic of cropland and grazing land. Dominant plants include pasture grasses such as brome (*Bromos mollis*), Poa grasses (*Poa sp.*), and Fescue grasses (*Festuca sp.*). Desert shrub species such as sagebrush (*Artemisia sp.*) and antelope bitterbrush (*Prushia tridentata*) also dominate the uplands. Existing croplands producing hay and other feed crops are located primarily in the western portion of the project area and south of the North Branch Irrigation Canal.

Shrub-steppe vegetation is present in various states of disturbance across small portions of the project area. The shrub-steppe environment occurs primarily in the eastern portion of the project area and north of the North Branch Irrigation Canal. The shrub-steppe also is interspersed with areas of grassland steppe and ephemeral snowmelt-fed streams. This vegetation has been disturbed by grazing. Sagebrush is the dominant species, with *Artemisia tridentata* found on deeper soils and *Artemisia rigida* found on shallow soils.

A review of federal plant species lists suggests that one species could occur in the project area based on the type of habitats present: the Ute ladies'-tresses (*Spiranthes diluvialis*), a federally listed threatened species that grows in wetlands and seeps. According to the Washington State Natural Heritage Database, there are only two records for state sensitive species in or adjacent to the project area. These is one historic record (1959) for Piper’s daisy in the western portion of the project area, which grows in dry, open places, often with sagebrush; and one current record (1991) for long-sepal globemallow adjacent to the eastern end of the project area, which grows in sagebrush foothills to Ponderosa Pine woodlands.

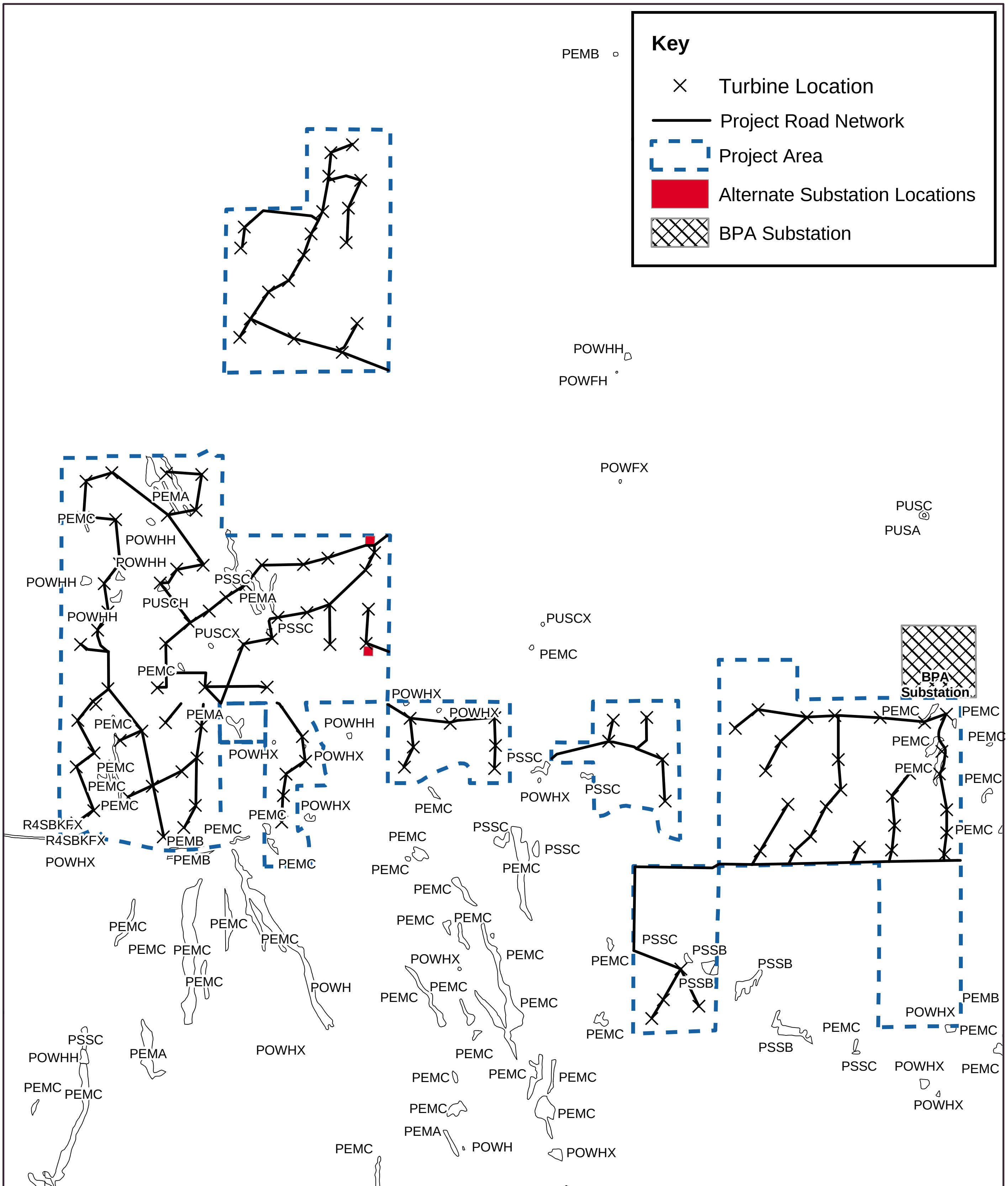


Figure 2

National Wetlands Inventory (NWI) Map
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Job Id:
001775.HW04.01

Date:
July 14, 2004

Developed by:
AVH

Map Source Information:
National Wetlands Inventory

The vegetation in lower, wetter areas consists mainly of the following hydrophytic vegetation: Baltic Rush (*Juncus balticus*), Spike rush (*Eleocharis palustris*), Slough sedge (*Carex obnupta*), Red fescue (*Festuca rubra*), Monkey flower (*Mimulus guttatus*), and willows (*Salix lucida* and *Salix exigua*). Forget-me-nots (*Myosotis laxa*), White clover (*Trifolium repens*), and Iris (*Iris missouriensis*) were also dominant in lowlands.

4.4 Soils

The soils found across the project site were unusually dark and varied in color from dark brown to dark gray-brown and black and contained non-uniform concentrations of clay and ash. While such low chroma colors would normally be present in hydric conditions, these characteristics are likely a function of the parent alluvium, and not necessarily hydrology.

Soil series descriptions and associations found in the vicinity of the project area are taken from the *draft* Soil Survey for Kittitas County (USDA 2003). The United States Department of Agriculture (USDA) Soil Conservation service (SCS) is currently revising and updating the 1947 Soil Survey. **Table 4.4-1** provides the SCS draft soil descriptions. In addition, the locations of hydric soils have not yet been determined by the SCS. As a result, none of the soils crossed in the project area are described as hydric. Potential changes to the SCS soil descriptions are included in parenthesis. See **Figure 3** for a map of the *draft* Soil Survey for Kittitas County.

Table 4.4-1 Soils Present in the Desert Claim Wind Power Project Area

Name	Soil Description
Maxhill Series	The Maxhill series is an ashy loam that is very deep and well drained. It is found on 0 to 5 percent slopes, is very dark brown (10YR4/2,10YR4/3), and increases in abundance of gravel from 10 inches. Formed on alluvial fans and terraces, and it is usually moist, but is dry for 90 to 100 consecutive days following the summer solstice.
Modsel Series	The Modsel series is a very deep ashy loam, moderately well drained soil found on 0 to 5 percent slopes. It is a dark greyish brown (10YR4/2, 10YR5/3, 10YR5/4) and increases in abundance of gravel from 10 inches. It is formed in alluvium mixed with volcanic ash at the surface, and is usually moist, but is dry for 60 to 75 consecutive days following the summer solstice. This soil has an irrigation-induced water table at 30 to 48 inches during the mid-May to mid-October growing season (USDA 2003).
Varodale Series	The Varodale series consists of clay, very deep, moderately well drained soil found on slopes of 0 to 5 percent. It is black for the first 22 inches before grading to a dark brown (10YR2/1, 10YR3/2, 10YR3/3, 10YR4/2), and forms in alluvium with an influence of volcanic ash. It is usually moist, but is dry for 60 to 75 consecutive days following the summer solstice, and has an irrigation-induced water table at 30 to 60 inches during the mid-May to mid-October growing season. (More investigation is expected for this soil to confirm the degree of andic properties.)
Weirman Series	The Weirman series consists of very deep, somewhat excessively drained fine sandy loams. The soil increases in abundance of gravel from 20 inches, is very dark greyish brown to dark greyish brown (10YR3/2, 10YR4/2), and is located on slopes from 0 to 5 percent. The Weirman Series is formed in the alluvium on flood plains and low terraces. As a result these soils, while typically dry, are subject to occasional long to brief periods of flooding. (More investigation is expected for this soil to determine if

Table 4.4-1 Soils Present in the Desert Claim Wind Power Project Area	
Name	**Soil Description**
	this series should include an Oxyaquic subclass.)
Pachneum Series	The Pachneum series is a very deep, well-drained loam. Formed on slopes of 2 to 30 percent on hillsides, footslope, dissected plateaus and piedmont slopes, this soil is very dark brown to very dark greyish brown (10YR2/2, 10YR3/2, 10YR3/3). It is usually moist, but is dry for 75 to 90 consecutive days following the summer solstice. (This draft represents a change from mixed, mesic Pachic Argixerolls to mixed, superactive, mesic Vitrandic Argixerolls.)
Brickmill Series	The Brickmill series consists of deep, moderately well drained very cobbly loam. Slopes vary from 0 to 5 percent, and soils form in old alluvium on piedmont slopes grading from mountain footslopes to basin floors. It increases in abundance of cobbles from the surface, and grades from very dark brown through to very dark greyish brown with a few distinct strong brown mottles starting at 8 inches to yellowish red mottles starting at 19 inches (10YR2/2, 10YR3/3, 10YR4/3, 2.5YR3/2; mottles 7.5YR 4/6, 5YR4/6). These soils are continuously saturated with water within one meter of the soil surface for 90 or more days in most years.
Lablue Series	The Lablue series is a very gravelly ashy loam that is very shallow and well drained. It forms slopes of 3 to 15 percent in alluvium and glacial drift over a duripan with an influence of loess and volcanic ash at the surface, on old uplifted fan remnants. It is yellowish brown to pale brown (10YR3/2, 10YR3/3, 7.5YR3/3, 10YR5/2), and increases in gravel from 8 inches. It is usually moist, but is dry for 90 to 100 consecutive days following the summer solstice. (This draft relects a change in classification from Palexerollic Durixerolls to Haplic Durixerolls.)
Reelow Series	The Reelow series consists of shallow, well-drained very gravelly ashy loam. It is formed in alluvium and glacial drift with an influence of loess and volcanic ash in the surface, on old uplifted fan remnants, old terraces, and old till plains with slopes of 2 to 15 percent. Color ranges from very dark brown to very pale brown at depth (10YR2/2, 7.5YR3/3, 7.5YR4/4, 10YR4/4, 10YR4/2), with gravel increasing in abundance from 6 inches. It is usually moist but is dry for 90 to 100 consecutive days following the summer solstice. (This draft reflects a change in classification from Palexerollic to Haplic Durixerolls.)
Reeser Series	The Reeser series is an ashy loam that is moderately deep and well drained. Slopes vary from 2 to 15 percent, and soils form in alluvium and glacial drift with an influence of loess and volcanic ash in the surface, on old uplifted fan remnants, old terraces, and old till plains. Color varies from greyish brown to yellow brown (10YR2/2, 7.5YR3/3, 7.5YR4/4, 10YR4/4, 7.5YR4/4, 10YR4/2), and increases in gravel from 22 inches. It is usually moist but is dry for 90 to 100 consecutive days following the summer solstice. (This draft represents a reclassification a new type location based on a thorough investigation and resulting revision of series concept.)
Sketter Series	The Sketter series is a moderately deep, well-drained gravelly loam. It is formed in slopes of 2 to 15 percent on old uplifted fan remnants, old terraces, and old till plains in alluvium and glacial drift with an influence of loess and volcanic ash in the surface. Gravels increase in abundance from the surface and the soil varies from very dark greyish brown to very pale brown at depth (10YR2/1, 10YR3/3, 10YR5/3, 10YR4/4, 10YR4/2). It is usually moist but is dry for 90 to 100 consecutive days following the summer solstice.
Kayak Series	The Kayak series is a very deep, somewhat poorly drained gravelly ashy loam. It is formed on flood plains in slopes of 0 to 2 percent in alluvium with an influence of volcanic ash at the surface. Gravels increase in abundance from the surface and the soil varies from very dark greyish brown to dark grey depth (10YR3/2, 5Y4/1).

Table 4.4-1 Soils Present in the Desert Claim Wind Power Project Area	
Name	**Soil Description**
	These soils are continuously saturated with water within one meter of the soil surface for 90 or more days in most years, if not artificially drained. This soil has an irrigation-induced water table at 18 to 42 inches during the mid-May to mid-October growing season.
Mippon Series	The Mippon series is a very cobbly loam that is very deep and moderately well drained. It forms in recent alluvium on stream terraces and slopes of 0 to 5 percent. It varies in color from very dark greyish brown to brown at depth (10YR2/2, 10YR3/2), and cobbles and gravel increase in abundance with depth from the surface. These soils are subject to brief periods of overflow. (The Meirmick series needs further investigation as to how it competes with the Mippon series. Correlation of Meirmick into Mippon should be considered if it cannot be adequately competed.)
Metser Series.	The Metser series consists of a very deep, moderately well drained clay loam. Formed in alluvium with an influence of volcanic ash on terraces and alluvial fans, the soils are found on slopes of 0 to 5 percent. Gravel starts at 30 inches at increases in abundance with depth; color goes from black to very dark grayish brown (10YR2/1, 10YR3/2, 10YR5/3, 10YR4/4, 10YR4/2). These soils are usually moist but are dry in all parts of the moisture control section for 60 to 75 consecutive days following the summer solstice. (More investigation is needed to confirm the degree of andic properties.)
Argabak Series	The Argabak series is a very cobbly loam that is very shallow, well-drained soil. Formed in loess and residuum from basalt on ridgetops, hillslopes, and benches on slopes of 0 to 65 percent. Cobbles and gravel increase to basalt bedrock at 6 inches, and the soil is very dark and dark brown (10YR3/3, 7.5YR3/2). These soils are dry more than half the time.

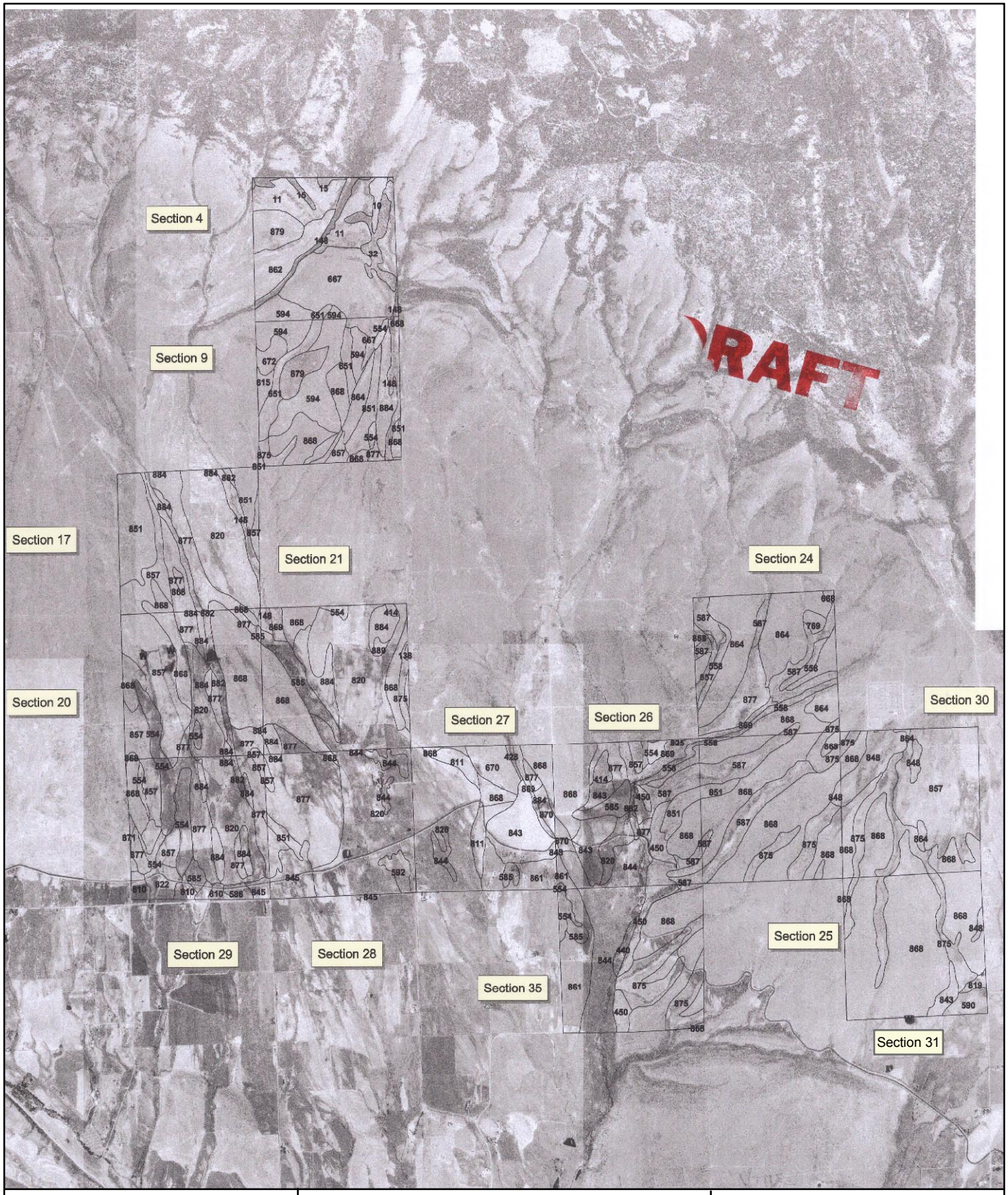


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Figure 3

NRCS SOIL MAP
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

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Miles

Job Id:
001775.HW04.01

Date:
June 9, 2003

Developed by:
AVH

Map Source Information: Soil Survey Map
Kittitas County, Washington

5.0 Delineation Methodology

5.1 General Methods

The delineation of waters of the United States and wetlands was conducted by E & E in June of 2003. E & E's technical support team included wetland ecologist and wildlife biologist Noreen Roster, geologist Jessica Spiegel, hydrologist Erin Murphy, and environmental scientist Ben Martich. Wetlands and other waters of the United States were identified using the routine on-site determination method outlined in the USACE *Wetland Delineation Manual* (Environmental Laboratory 1987).

E & E reviewed the following sources for information relevant to this delineation:

- United States Geological Survey (USGS) 7.5-minute topographic maps,
- NWI maps,
- Soil Survey data, and
- Standard biological references and field guides.

Soil, hydrology, and vegetation data were collected for streams and wetlands. The wetland boundaries were determined based on distinct changes in soils, hydrology, and vegetation.

Determination of hydric soil conditions was based on an assessment of soil characteristics at each sample location inspected to a depth of at least 12 inches, unless otherwise noted on the data sheet due to refusal. Each sample location was assessed for soil matrix color, soil texture, and presence of mottling or gleying. The soil hue, value, and chroma were determined using Munsell Soil Color Charts (1990 Edition). The wetland scientists used professional judgment to determine whether the soil criteria were met at each sample location.

Soils were also assessed using the *draft* Soil Survey for Kittitas County (USDA 2003). Kittitas County is currently in the process of revising the 1947 soil survey report and has not yet determined the locations of hydric soil. As such, hydric soils were based upon low chroma color and mottling.

Hydrophytic vegetation was identified by visual observation of dominant plant species (defined as plants that comprise 20% or more of the cover value observed at a site). An area was considered to have hydrophytic vegetation when more than 50% of the dominant species were Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC) (Environmental Laboratory 1987). At each sample location where there was no overstory, vegetation was analyzed within an approximately 5-foot radius of the sample location. In areas where there was an overstory (tall shrubs and/or trees), vegetation was analyzed within a radius up to 30 feet.

When plants could not be identified to species because of seasonal constraints or impacts caused by land use (e.g., grazing), only the genus or plant community was listed. The indicator of each species was confirmed using *National List of Plant Species that Occur in Wetlands* (Reed 1988). Plant nomenclature followed Hitchcock and Cronquist (1973).

Wetland hydrology was determined to be present if the sample location had one or more of the following characteristics:

- Landscape position and surface topography (e.g., position of the site relative to an upslope water source, a location within a distinct wetland drainage pattern, or concave surface topography);

- Inundation or saturation for a long duration (either inferred based on field indicators or observed during field surveys); and

- Residual evidence of ponding or flooding (e.g., scour marks, sediment deposits, algal matting, or drift lines).

Delineated wetlands and waters of the United States were mapped and alphanumerically identified on USGS 7.5-minute topographic maps, and cross-referenced to the corresponding data sheet for each sample location.

5.2 Wetland Methodology

The extent of wetlands is determined by examining the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. Under normal circumstances, all three of these parameters must be satisfied for an area to be considered a jurisdictional wetland under Section 404 of the CWA. Methods used to evaluate hydrophytic vegetation, hydric soils, and wetland hydrology are described below.

Hydrophytic vegetation is defined as:

> "The sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. The vegetation occurring in a wetland may consist of more than one plant community (wetland plant communities may contain plant species that are Obligate [OBL], Facultative Wetland [FACW], Facultative [FAC], Facultative Upland [FACU], Upland [UPL], No Indicator [NI], and/or Not Listed [NL])" (Environmental Laboratory, 1987).

Hydric soils is defined as:

> "A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of its stratum." (Environmental Laboratory 1987)

Wetland hydrology is defined as:

> "All hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively." (Environmental Laboratory 1987)

6.0 Results

This section summarizes the results of field surveys to identify wetlands and waterbodies. Delineated waters of the United States are presented below. Refer to **Figure 4** for a map of the delineated features in the project area. **Table 6.1-1** and **6.1-2** list the streams in the proposed project area and an estimate of the potential short term and long term impacts resulting from construction and facility operation. Table 6.2-1 and 6.2-2 list the wetlands in the project area, information on whether the wetland criteria were met, and an estimate of the potential short term and long term impacts resulting from construction and facility operation. Data sheets and photographs are on file with Kittitas County.

6.1 Waters of the United States

<u>Affected Environment</u>

Perennial, intermittent, and ephemeral streams were delineated as waters of the United State in the project study area. Jurisdictional waters of the United States were defined using the following criteria:

- The feature must have a definite bed and bank (of any size); and
- The feature must be an area where water flows periodically (ranging from intermittent to ephemeral) to provide a bed and bank.

The KCCAO classifies perennial and intermittent streams according to WAC 222-16-030. Streams do not include irrigation ditches, waste ways, drains, outfalls, operational spillways, channels, storm water runoff facilities or other wholly artificial watercourses (KCCAO 17A.02.273).

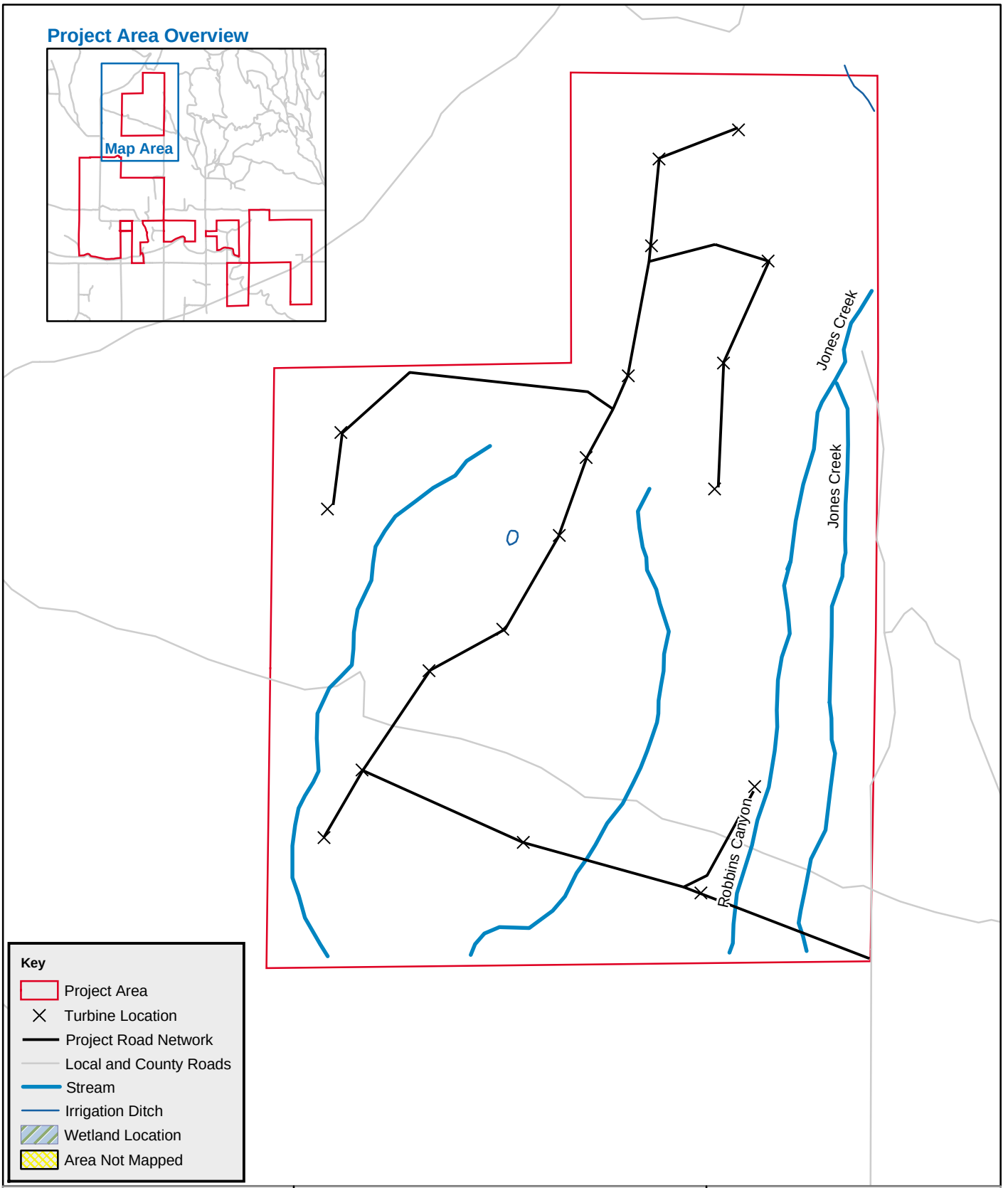

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Figure 4A

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.04 0.08 0.16 0.24 0.32 0.4
Miles

Job Id:
001775.HW04.02

Date:
July 15, 2004

Developed by:
avh

Map Source Information:

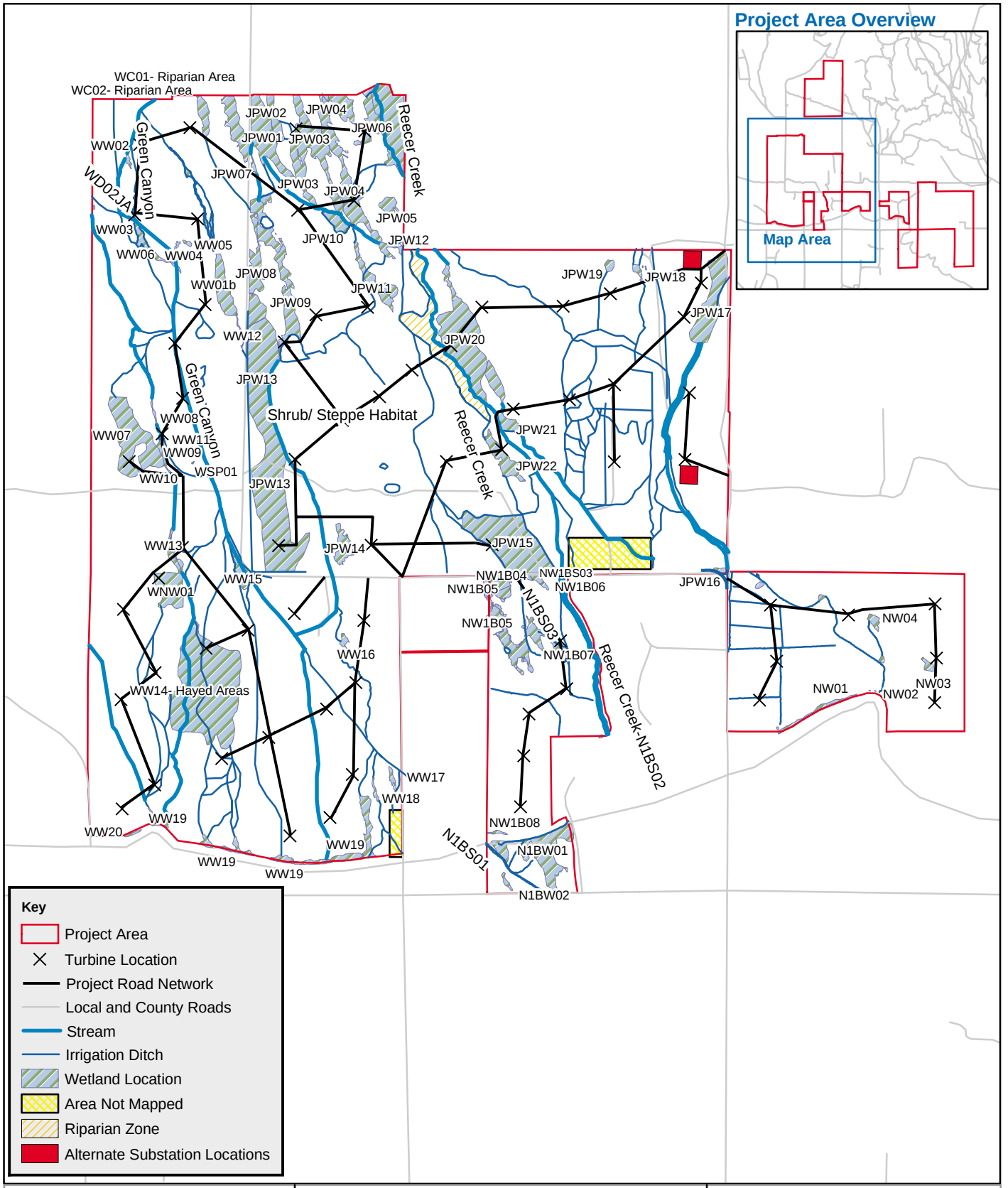

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Figure 4B

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.125 0.25 0.5 0.75
Miles

Job Id:
001775.HW04.02

Date:
July 15, 2004

Developed by:
avh

Map Source Information:

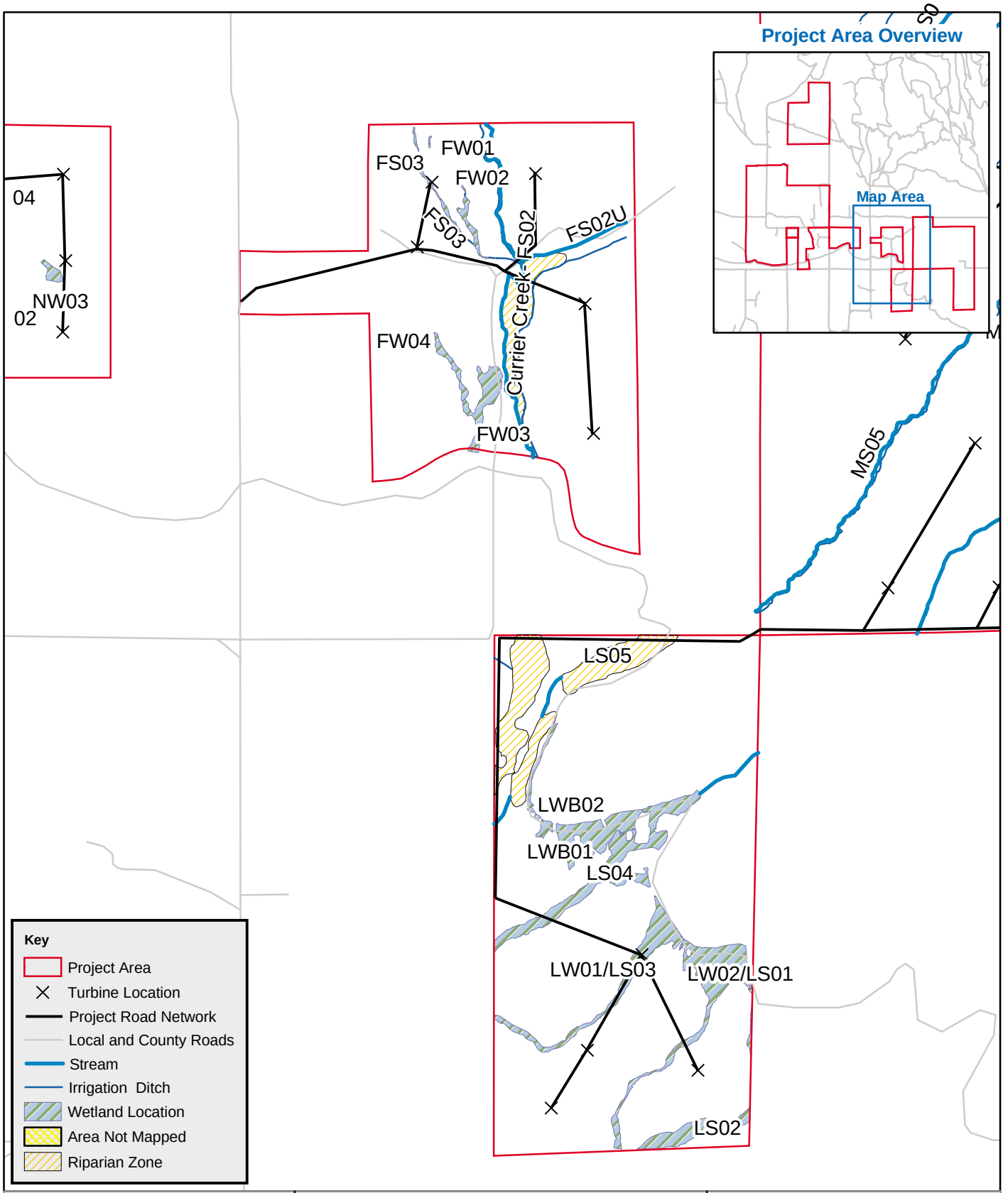

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Figure 4C

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.05 0.1 0.2 0.3 0.4 0.5
Miles

Job Id:
001775.HW04.02

Date:
July 15, 2004

Developed by:
avh

Map Source Information:

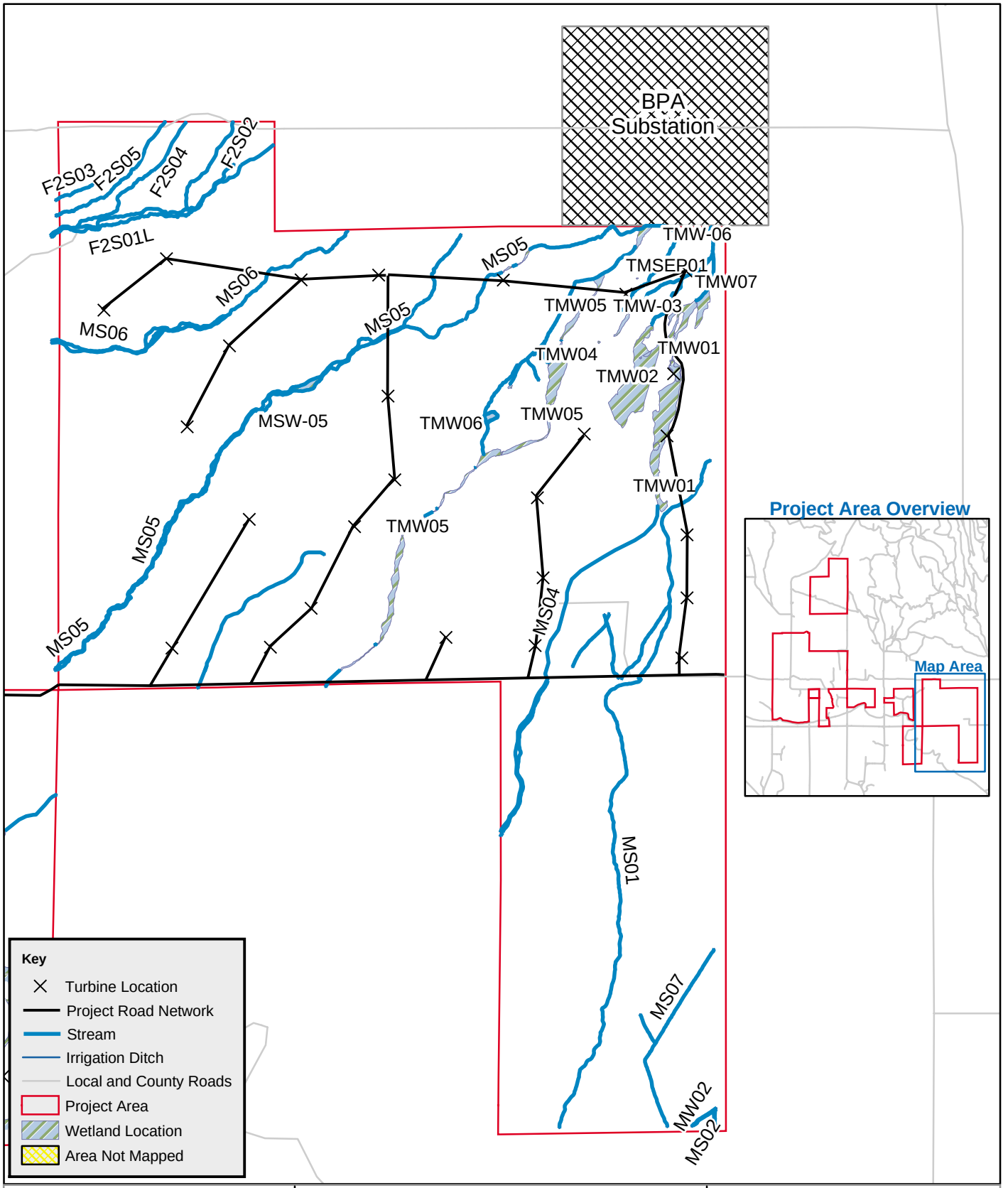

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Figure 4D

Wetland and Stream Delineation Results
Desert Claim Wind Power Project

Ellensburg, Kittitas County, Washington

0 0.05 0.1 0.2 0.3 0.4 0.5
Miles

Job Id:
001775.HW04.01

Date:
July 15, 2004

Developed by:
avh

Map Source Information:

Table 6.1-1

Stream Delineation Results

Stream Name West to East	Stream ID	Legal Description of Stream Location	Flow Type	Bank to Bank Bank Width	Water Tributary of	DNR Stream Typing[1]
unnamed stream	No ID	T19N R18E Sec 29 W 1/2	Intermittent	Unavailable	unnamed stream [2]	5
unnamed stream	No ID	1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 W 1/2	Intermittent	Unavailable	Dry Creek [3]	5
Green Canyon Creek	WC-03	1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 E 1/2	Perrenial	4 ft	Dry Creek	3
unnamed stream	No ID	T19N R18E Sec 17 S 1/2 T19N R18E Sec 20 E 1/2 T19N R18E Sec 29 E 1/2	Perrenial	Unavailable	Green Canyon Cree	3
unnamed stream	No ID	T19N R18E Sec 9 W 1/2	Intermittent	Unavailable	Reecer Creek	5
unnamed stream	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2	Intermittent	Unavailable	Reecer Creek	5
Robbins Canyon Creek	No ID	T19N R18E Sec 9 E 1/2	Intermittent	Unavailable	unnamed stream [4]	5
Jones Creek	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2 T19N R18E Sec 21	Intermittent	30 ft	Currier Creek	4
unnamed stream	No ID	T19N R18E Sec 17 SE 1/4	Perrenial	Unavailable	Reecer Creek	3
Reecer Creek	RS-01(M) RS-01(U) N1BS-02	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	Perrenial	25-100ft	Yakima River	3
unnamed stream	No ID	T19N R18E Sec 21	Perrenial	Unavailable	Jones Creek	3
Currier Creek	FS-01 [5] FS-02(L)	T19N R18E Sec 26 T19N R18E Sec 35	Intermittent	3-75ft	Reecer Creek	4
unnamed stream	F2S-02	1/4	Intermittent	8ft	unnamed stream [6]	5
unnamed stream	F2S-01(U) F2S-01(L) FS-02(U)	T19N R18E Sec 24 SW 1/4 T19N R18E Sec 26	Intermittent	4-20ft	Currier Creek	4
unnamed stream	MS-05(U) MS-05(L) LS-05	1/4 T19N R18E Sec 25 T19N R18E Sec 35 NE	Intermittent	1-12ft	Currier Creek	5
unnamed stream	No ID LS-04 LS-04(M)	T19N R18E Sec 25 T19N R18E Sec 35 E 1/2	Intermittent	3-5ft	Currier Creek	5
unnamed stream	No ID LS-02	T19N R18E Sec 25 E 1/2 T19N R18E Sec 35 E 1/2	Intermittent	15-20ft	Currier Creek	5
unnamed stream	MS-04	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	Intermittent	15-20ft	Currier Creek	5
unnamed stream	MS-01(U) MS-01(M) MS-01(L)	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	Intermittent	3-50ft	Currier Creek	5

Note

All streams are within the Upper Yakima Watershed, USGS HUC Code 17030001.

[1] Department of Natural Resources evaluation of stream typing, using the Washington State stream typing system found in RCW 90.03.

[2] Flows into an unnamed stream with the legal description of T19N R18E Sec 17 SW 1/4, Sec 20 W 1/2, Sec 29 W 1/2, which subsequently flows into Dry Creek.

[3] Dry Creek is a tributary of the Yakima River.

[4] Flows into an unnamed stream with the legal description of T19N R18E Sec 21 which subsequently flows into Jones Creek.

[5] No flow was observed at FS-01 at time of site visit.

[6] Flows into an unnamed stream with the legal description of T19N R18E Sec 24 SW 1/4 and Sec 26 , which subsequently flows into Currier Creek.

Table 6.1-2
Stream Disturbance Calculations[1]

Stream Name West to East	Stream ID	Legal Description of Stream Location	Temporary Impacts (linear feet) (Extra Workspace)					Permanent Impacts				
			Turbines	Roads	Collection System	Substation	Total	Turbines	Road Crossings	Collection System	Substation	Total
unnamed stream	No ID	T19N R18E Sec 29 W 1/2	0.00	71.08	0.00	0.00	71.08	0.00	27.60	0.00	0.00	27.60
unnamed stream	No ID	T19N R18E Sec 20 W 1/2	76.80	58.99	0.00	0.00	135.79	0.00	31.66	0.00	0.00	31.66
Green Canyon	WC-03	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 E 1/2	398.63	702.78	9.85	0.00	1111.26	41.26	426.77	0.00	0.00	468.03
unnamed stream	No ID	T19N R18E Sec 17 S 1/2 T19N R18E Sec 20 E 1/2 T19N R18E Sec 29 E 1/2	179.59	260.88	9.72	0.00	450.20	0.00	99.51	0.00	0.00	99.51
unnamed stream	No ID	T19N R18E Sec 9 W 1/2	0.00	68.77	0.00	0.00	68.77	0.00	26.79	0.00	0.00	26.79
unnamed stream	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2	0.00	127.36	10.31	0.00	137.67	0.00	49.95	0.00	0.00	49.95
Robbins Canyon Creek	No ID	T19N R18E Sec 9 E 1/2	114.13	69.99	0.00	0.00	184.13	0.00	24.60	0.00	0.00	24.60
Jones Creek	No ID	T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 E 1/2 T19N R18E Sec 21	0.00	84.64	18.41	0.00	103.05	0.00	32.32	0.00	0.00	32.32
irrigation ditches	N/A	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29	2122.96	2273.28	105.55	0.00	4501.80	169.87	682.84	0.00	0.00	852.72
unnamed stream	No ID	T19N R18E Sec 17 SE 1/4	0.00	86.95	0.00	0.00	86.95	0.00	26.71	0.00	0.00	26.71
Reecer Creek	RS-01	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	48.83	290.15	0.00	0.00	338.98	0.00	52.09	0.00	0.00	52.09
field identified riparian area	RS-01(U)	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	0.05 (acres)	2.40 (acres)	0.00	0.00	2.82(acres)	0.00	0.93(acres)	0.00	0.00	0.93(acres)
irrigation ditches	N/A	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 21	770.50	1219.52	61.00	0.00	2051.01	41.26	575.31	0.00	0.00	616.56
irrigation ditches	N/A	T19N R18E Sec 28 T19N R18E Sec 27 N 1/2	1508.74	2771.30	0.00	0.00	4280.04	90.02	1040.02	0.00	0.00	1130.04
Currier Creek	FS-01[1] / FS-02(L)	T19N R18E Sec 26 T19N R18E Sec 35	303.23	85.05	0.00	0.00	388.28	0.00	146.95	0.00	0.00	146.95
irrigation ditches	FS-03 & N/A	T19N R18E Sec 26	0.18(acres)	0.07(acres)	12.80 ft	0.00	12.80 ft 0.26(acres)	0.02(acres)	0.02(acres)	0.00	0.00	0.04(acres)
unnamed stream	MS-05 / LS-05	T19N R18E Sec 25 T19N R18E Sec 35 NE 1/4	110.76(ft) 0.02(acres)	155.11	0.00	0.00	265.87(ft) 0.02(acres)	0.00	59.34(ft) 0.02(acres)	0.00	0.00	59.34(ft) 0.02(acres)
unnamed stream	LS-04	T19N R18E Sec 25 T19N R18E Sec 35 E 1/2	0.00	75.39(ft) 0.21(acres)	10.58	0.00	85.97(ft) 0.49(acres)	0.00	26.36(ft) 0.07(acres)	0.00	0.00	26.36(ft) 0.07(acres)
unnamed stream	MS-04	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	0.00	70.05	0.00	0.00	70.05	0.00	26.72	0.00	0.00	26.72
unnamed stream	MS-01	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	0.00	152.25	0.00	0.00	152.25	0.00	56.45	0.00	0.00	56.45
irrigation ditches	N/A	T19N R18E Sec 25 T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	399.51	1199.66	11.68	0.00	1610.85	0.00	613.00	0.00	0.00	613.00
irrigation ditches	N/A	T19N R18E Sec 35 E 1/2	0.00	78.96	0.00	0.00	78.96	0.00	30.68	0.00	0.00	30.68
Stream Totals												
Stream Total (linear feet)			1231.97	2359.44	61.09	0.00	3652.51	41.26	1113.82	0.00	0.00	1155.08
Stream and Irrigation Ditch Total (linear feet)			6033.68	9902.15	417.72	0.00	16353.55	342.41	4055.67	0.00	0.00	4398.08
Stream Total (riparian acres)			0.25	2.68	0.00	0.00	2.93	0.03	0.91	0.00	0.00	0.94

Table 6.1-2
Stream Disturbance Calculations[1]

Stream Name West to East	Stream ID	Legal Description of Stream Location	Temporary Impacts (linear feet) (Extra Workspace)					Permanent Impacts				
			Turbines	Roads	Collection System	Substation	Total	Turbines	Road Crossings	Collection System	Substation	Total
Buffer Totals												
Green Canyon Creek (acres)	WC-03	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 E 1/2	2.77	1.09	0.00	0.00	3.86	0.25	0.46	0.00	0.00	0.71
unnamed stream (acres)	No ID	T19N R18E Sec 17 S 1/2 T19N R18E Sec 20 E 1/2 T19N R18E Sec 29 E 1/2	0.00	0.38	0.03	0.00	0.41	0.00	0.17	0.00	0.00	0.17
unnamed stream (acres)	No ID	T19N R18E Sec 17 SE 1/4	0.00	0.38	0.00	0.00	0.38	0.00	0.17	0.00	0.00	0.17
Reecer Creek (acres)	RS-01(M) RS-01(U) N1BS-02	T19N R18E Sec 17 SE 1/4 T19N R18E Sec 21 W 1/2 T19N R18E Sec 28	0.00	0.25	0.00	0.00	0.25	0.00	0.12	0.00	0.00	0.12
unnamed stream (acres)	No ID	T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29 W 1/2	0.31	N/A	N/A	0.00	0.31	0.03	N/A	N/A	0.00	0.03
unnamed stream (acres)	MS-04	T19N R19E Sec 31 W 1/2 T19N R19E Sec 30 W 1/2	0.82	N/A	N/A	0.00	0.82	0.07	N/A	N/A	0.00	0.07
Buffer Totals												
Total (acres)			3.90	2.10	0.03	0.00	6.03	0.35	0.92	0.00	0.00	1.27

Notes:
For permanent turbine impacts a rectangular disturbance zone measuring 120 ft. long by 40ft. wide was used to calculate impacts for turbines.
For construction impacts a 130 ft. radius from the turbine was used to calculate impacts from extra workspace.
[1] Includes irrigation ditch disturbance calculations, which do not include minor ditches on the western properties.
[2] Unnamed streams that cross multiple properties are listed under the property where they first flow into the project area.
Disturbance calculations prepared using GIS data. Calculations displayed in this table with two significant digits.

Drainage Basin
Streams delineated during the field surveys are located within the Yakima River Basin and eventually drain into the Yakima River. Because the Yakima River Basin receives little direct precipitation (8.9 inches per year), these streams are primarily fed by snowmelt off the ridges to the north of the project area (WRCC 2003).

From west to east, the following named streams bisect the project area: Green Canyon (perennial), Reecer Creek (perennial), Robbins Canyon (intermittent), Jones Creek (intermittent), and Currier Creek (intermittent).

All of the named an unnamed streams either are direct or indirect tributaries of the Yakima River. The Yakima River begins from the eastern slope of the Cascade Range at Keechulus Lake in the Upper Kittitas Valley and flows southeasterly through the lower plateau and river-bottom lands to the Columbia River (Economic and Engineering Services, Inc, 2001).

The North Branch Irrigation Canal also bisects the property, running generally east-west.

Perennial Streams
Five perennial streams were mapped and characterized in the project study area. These streams are expected to have flow throughout the year.

Intermittent Streams
Fourteen intermittent streams were mapped and characterized in the project study area. Intermittent streams (seasonal streams) are dry for a large part of the year. Flow generally occurs for weeks and/or months in response to seasonal precipitation and groundwater recharge. One of these streams is also counted under perennial streams, as it has sustained flow in a different reach within the project area.

Ephemeral Streams
Ephemeral streams were not mapped and characterized in the project area. Ephemeral streams convey runoff for only brief periods during or after rainfall events. These drainages typically have unconsolidated beds of silt, sand, gravel, cobble, or a combination of these substrate types. In general, mapped washes were characterized by a defined bed and bank and were either vegetated or un-vegetated along their banks.

Irrigation Ditches
Many of the streams discussed above convey water to irrigation ditches located throughout the project area. These ditches are particularly prevalent on the Roan, White/Wade, and Nelson properties. Several stock ponds are also present within the project area. Detailed information regarding these features was not collected during the field surveys.

Fisheries or Sensitive Habitats

There are no streams with fisheries concerns located within the project area (WDFW 2003). Five streams exhibited characteristics of a Type 3 stream and the remaining 14 streams exhibited characteristics of a Type 4 or 5 stream.

According to the Washington Department of Fish and Wildlife (WDFW), priority habitats in the project area include riparian areas located along project area streams. Impacts to priority habitat riparian areas are incorporated into Tables 6.1-1 and 6.1-2. Riparian and priority habitats are listed as Critical Areas by Kittitas County (Kittitas County Critical Area Ordinance Title 17A.02.230 and 17A.02.250).

Discussion of Impacts

Based on the on-site investigations, 19 streams were identified within the project vicinity. Table 6.1-2 identifies the streams delineated in the study area, and describes whether the drainages are impacted by turbines, the project access roads, the underground collection system, or the substation.

Buffer setback impacts are also included in Table 6.1-2. Kittitas County buffer setbacks are calculated based on the Washington Department of Natural Resources (WDNR) Forest Practices Stream Type (Kittitas County Critical Area Ordinance Title 17A.07.010). Three stream types are located within the project area, Types 3, 4 and 5. For Type 3 streams a buffer setback of 50 feet from OHWM was used for calculations. For Type 4 streams the project facilities within the project area did not cross within 500 feet of the confluence with a higher order stream (Type 1, 2 or 3). For this reason buffer setbacks of 15 feet from any permanent structures were used for both Type 4 and Type 5 streams.

Turbines

For purposes of calculating temporary disturbance impacts, it is assumed that construction crews would require an area around each of the turbines measuring 130 feet in radius for extra workspace or about 1.25 acre per turbine. This area would provide adequate space for the turbine tower and associated concrete pad, transformers, and the crane pad**.** Construction crews would use this area for constructing the tower foundation, erecting the tower, and installing the transformer. Topsoil, cleared vegetation and onsite supplies would also be stored in this workspace.

At each tower location, a smaller area would be retained for operations, measuring 120 feet long by 40 feet wide or about 0.11 acres. For the purposes of calculating impacts to streams, it is assumed that the rectangular area would be oriented with the long side overlapping with the nearby road. This area would envelop the tower, crane pad, and transformer and would be backfilled with gravel or compacted soil or otherwise altered to prevent full restoration. The turbine towers, transformers and foundations themselves would be permanent, impermeable, above ground facilities. Based on the backfill or type of operations use, this area is not expected to revert back to stream habitat and would

therefore be considered permanently impacted. The temporary disturbance zone around turbine locations overlaps with 7 stream segments, including three different reaches of Reecer Creek. A total of 1231.97 linear feet of stream channel would be within the temporary disturbance zone associated with turbine construction. In addition, three riparian areas would be impacted by temporary disturbance at the turbine locations with a total of 0.25 acres of disturbance. Streams and riparian areas within the temporary disturbance zone could be impacted by the clearance of vegetation and soil, compaction from construction equipment, and vehicular traffic. Tower foundations would permanently occupy a total of 41.26 linear feet of stream channel and 0.03 acres of riparian habitat. Foundations placed within streams or riparian areas would result in permanent filling-in of the feature in this area.

One turbine location in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the turbine will be re-located to avoid impacting the stock pond.

Three turbines are located within stream buffer zones. One is classified as a Type 3, and two are classified as Type 5, for a total of 3.90 acres of temporary impacts (see Table 6.1-2). Tower foundations would permanently occupy a total of 0.35 acres within the stream buffer zones.

Access Roads

A network of access roads would also be constructed for the project. The proposed access road layout indicates there would be access road crossings of 16 streams and of these, 8 streams would be crossed at least twice. Each access road is anticipated to be approximately 15 to 20 feet in width, plus a 15% overall increase to account for curves and intersections to non-project roads. Culverts would be installed at each stream crossing to ensure normal flow through the drainage and sized to handle the significant sheet flow that occurs each spring in this area. Within the permanent road footprint, the surface of the road would be cleared of vegetation and graded to a safe slope. Construction crews would also use a narrow area on either side of the road for grading, widening, or otherwise improving existing or creating new roads. Cleared vegetation, soil, rocks and onsite supplies would be stored in the temporary disturbance zone, anticipated to be 15 feet on either side of the road with for a temporary disturbance width of 50 feet, plus a 15% overall increase to account for curves and intersections to non-project roads.

A total of 2359.44 linear feet of stream channel would be within the temporary disturbance zone associated with access road construction. In addition, three riparian areas would be impacted by temporary disturbance for the access roads with a total of 2.68 acres of disturbance. Streams and riparian areas within the temporary disturbance zone would be impacted by the clearance of vegetation and soil, compaction from construction equipment, and vehicular traffic. The access road network would permanently cross a total of 1113.82 linear feet of stream channel and 0.91 acres of

riparian habitat. Permanent roads placed within streams or riparian areas would result in relocation of the stream bank or riparian area. Where possible, existing roads would be improved to accommodate project access needs, rather than constructing new roads

One access road located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the access road will be re-located to avoid impacting the stock pond.

The four Type 3 streams that have roads crossings within the stream buffer setback zone have a total of 2.10 acres of temporary impacts. Roads would permanently occupy a total of 0.92 acres within the stream buffer zones.

Substation

The proposed substation north of Reecer Creek Road will be approximately 300 feet by 300 feet in size or approximately 2.1 acres. During construction an extra 50 feet would be utilized on all sides for construction activities and storage. No streams are impacted by the location of this facility.

Underground Collection System

An underground collection system will be installed between each of the turbines to connect the system with the substation. Wherever possible, the collection system would be installed adjacent to existing access roads. The proposed layout indicates the collection system would cross 16 streams within the project. While there would be no permanent above-ground facilities associated with this collection system, there would be temporary impacts to streams during trenching activities to install the collection system.

Construction crews would use a 10-foot wide area centered on the collection system for digging the trench and installing the underground cables. Streams and riparian areas within the temporary disturbance zone would be disturbed by the clearance of vegetation and soil and potential subsequent erosion, as well as compaction from construction equipment and vehicular traffic. A corridor of 10 feet was used for temporary impacts calculations. A total of 61.09 linear feet of stream channel would be impacted by the installation of the underground collections system.

One underground cable located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the underground cable will be re-located to avoid impacting the stock pond.

Other Project Components

The location and dimensions of the O&M facility, communication lines, visitor facilities, and staging areas have not yet been determined. These facilities will be located so as to avoid or minimize impacts to wetlands to the extent possible.

Following installation of the wind power facility, original pre-construction contours and drainage patterns will be restored around the turbines, roads, and substations, thereby minimizing loss of stream functions or associated wildlife habitat.

6.2 Wetlands

Affected Environment

Seventy-six (76) wetlands were delineated as wetland features within the study area. Most of these wetlands were palustrine or fresh water emergent wetlands (NWI code PEM) or palustrine scrub-shrub wetlands (PSS). Some were riparian wetland communities that are located around streams and other bodies of water where groundwater is close to the soil surface. The wetlands support a variety of emergent vegetation and willow shrubs.

Several stock ponds were also identified during the surveys. Areas where wetland vegetation existed outside the defined pond bed and bank were delineated based on soil, hydric vegetation, and hydrology. In these areas, it was noted that the stock pond artificially supplied the hydrology. If vegetation was confined to the pond banks, the feature was considered an isolated, non-jurisdictional surface water feature.

The wetlands consisted primarily of the following hydrophytic vegetation: Baltic rush (*Juncus balticus*), spike rush (*Eleocharis palustris*), slough sedge (*Carex obnupta*), red fescue (*Festuca rubra*), monkey flower (*Mimulus guttatus*), and willows (*Salix lucida* and *Salix exigua*). These species constituted 80% to 100% cover and were present in many of the wetlands. Other dominant vegetation found in delineated wetland areas included: Forget-me-nots (*Myosotis laxa*), White clover (*Trifolium repens*), and Iris (*Iris missouriensis*). These species constituted 50% or lower vegetative cover, but were present in a majority of the wetlands.

Some wetland areas also included riparian vegetation species such as black willow (*Salix nigra*), red alder (*Alnus rubra*) and black hawthorn (*Crataegus douglasii*) trees.

The majority of wetlands in the study area contained hydric soil indicators such as gleyed and low chroma colors, and reducing conditions, such as mottling. Typical A-horizon soils contained dark matrix colors ranging from 10 YR 2/1 to 7.5 YR 2/0. Mottle colors were usually 7.5 YR 5/8.

While no wetlands in the project area support fisheries or other protected species, some wetlands were hydrologically connected to perennial streams such as Reecer Creek and/or associated riparian corridors. Wetlands JPW-06, JPW-12, JPW-15, JPW-20, JPW-21, and JPW-22, which are located on the western portion of the project area, are saturated wetlands adjacent to Reecer Creek. Wetland JPW-06 receives water from both an irrigation ditch and Reecer Creek. Other wetlands are also located along Green Canyon Creek, or other perennial streams listed in table 6.2-1. Leaks from the North Branch Irrigation Canal also contribute water to wetlands on the western portion of the property south of the canal. Wetland JPW-17 receives water from the intermittent Jones Creek.

The remaining wetlands delineated within the project area were fed by artificial irrigation. Numerous irrigation ditches flow from the North Branch Irrigation Canal across the properties to supply water to agricultural fields and/or grazing areas. During the delineation, it was noted where artificial irrigation supplied the only hydrology for the wet areas.

It is possible that the reviewing agencies may determine that some or all of the irrigation-fed wetlands are not jurisdictional wetlands. To facilitate this determination, **Table 6.2-1** provides a summary list of all wet areas delineated within the project area, along with

Table 6.2-1
Wetland Delineation Results

Property / Wetland ID	NWI Classification	Total Wetland Area (acres)	Wetland Criteria Met? Vegetation	Hydrology	Hydric Soils	Comments
T19N R18E Sec 26						
T19N R18E Sec 24 SW 1/4						
FW-01	PEM	0.04	Y	Y	Y	Hydrology provided by irrigation.
FW-02	**PEM**	0.79	Y	Y	Y	Hydrology provided by irrigation and stream FS-03, Tributary to Currier Creek. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
FW-03	PFO	2.84	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
FW-04	PSS	0.88	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
T19N R18E Sec 17 SE 1/4						
T19N R18E Sec 20 E 1/2						
T19N R18E Sec 21						
JPW-01	PEM	8.89	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-02	PEM	2.29	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-03	PEM	12.58	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-04	PEM	14.06	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-05	PEM	1.68	Y	Y	Y	Hydrology provided by seep along hillside.
JPW-06	PEM	4.38	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property and Reecer Creek.
JPW-07	PEM	0.34	Y	Y	Y	Hydrology provided by irrigation ditch along north edge of Roan property.
JPW-08	PEM	6.47	Y	Y	Y	Hydrology provided by irrigation.
JPW-09	PEM	8.16	Y	Y	Y	Hydrology provided by irrigation.
JPW-10	PEM	2.00	Y	Y	Y	Hydrology provided by irrigation.
JPW-11	PEM	3.94	Y	Y	Y	Hydrology provided by irrigation ditch.
JPW-12	PEM	1.11	Y	Y	Y	Hydrology provided by irrigation ditch.
JPW-13	PEM	43.53	Y	Y	Y	Hydrology provided by pond. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
JPW-14	PEM	2.63	Y	Y	Y	Hydrology provided by irrigation.
JPW-15	PEM	20.42	Y	Y	Y	Hydrology provided by irrigation.
JPW-17	PEM	9.25	Y	Y	Y	Hydrology provided by Jones Creek.
JPW-18	PSS	0.54	Y	Y	Y	Hydrology provided by irrigation.
JPW-19	PEM	0.55	Y	Y	Y	Hydrology provided by irrigation; also located downstream of where Robbins Canyon Creek becomes intermittent.
JPW-20	PEM	19.72	Y	Y	Y	Hydrology provided by Reecer Creek.
JPW-21	PEM	1.99	Y	Y	Y	Hydrology provided by Reecer Creek.
JPW-22	PEM	3.78	Y	Y	Y	Hydrology provided by Reecer Creek.
T19N R18E Sec 35 E 1/2						
LW-01	PEM	5.59	Y	Y	Y	Hydrology provided by stream LS-03, Tributary to Currier Creek and leaks from the North Branch Irrigation Canal.
LD-01	PSS	3.29	Y	Y	Y	Hydrology provided by stream LS-02, Tributary to Currier Creek and leaks from North Branch Irrigation Canal.
LW-01B	U	Upland	N	N	N	Upland area.
LW-02	PEM	10.37	Y	Y	Y	Hydrology provided by stream LS-01, Tributary to Currier Creek and leaks from North Branch Irrigation Canal. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
LW-02B	U	Upland	N	N	N	Upland area.
LWB-01	PEM	5.00	Y	Y	Y	Hydrology provided by stream LS-04, Tributary to Currier Creek and leaks from North Branch Irrigation Canal.
LWB-02-2	PEM	0.52	Y	Y	Y	Hydrology provided by leaks from North Branch Irrigation Canal.
T18N R18E NE 1/4 and NW 1/4 Sec 27						
NW-01	PEM	1.11	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-02	PEM	0.01	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-03	PEM	0.59	Y	Y	Y	Hydrology provided by stockpond and irrigation.
NW-04	PFO	0.72	Y	Y	Y	Hydrology provided by stockpond and irrigation.
T19N R18E Sec 28						
T19N R18E Sec 27 N 1/2						
NW-1B-01	PEM	10.01	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-1B-01B	PEM	part of above	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-1B-02	PEM	0.36	Y	Y	Y	Hydrology provided by irrigation ditch off canal.
NW-1B-03	PEM	0.39	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-04	PEM	0.15	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-05	PEM	9.17	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-05A	U	Upland	N	N	Y	Upland area.
NW-1B-05B	U	Upland	N	N	N	Upland area.
NW-1B-06	PEM	0.18	Y	Y	Y	Hydrology provided by irrigation.
NW-1B-06A	U	Upland	N	N	Y	Upland area.
NW-1B-06B	U	Upland	N	N	Y	Upland area.
NW-1B-07	PEM	3.38	Y	Y	Y	Hydrology provided by natural spring.
NW-1B-07(U)	U	Upland	N	N	Y	Upland area.
NW-1B-08B	PEM	0.25	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
NW-1B-08A	PEM	part of above	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.

Table 6.2-1
Wetland Delineation Results

Property / Wetland ID	NWI Classification	Total Wetland Area (acres)	Wetland Criteria Met? Vegetation	Hydrology	Hydric Soils	Comments
T19N R18E Sec 25 T19N R19E Sec 30 W 1/2 T19N R19E Sec 31 W 1/2						
TMW-01	PEM	6.28	Y	Y	Y	Hydrology provided by irrigation and headwaters of stream MS-04, Tributary of Currier Creek.
TMW-01(U)	U	Upland	N	N	N	Upland area.
TMW-02	PSS	6.39	Y	Y	Y	Hydrology provided by irrigation ditch.
TMW-03	PEM	0.23	Y	Y	Y	Hydrology provided by irrigation ditch.
TMW-04	PEM	0.01	Y	Y	Y	Hydrology provided by irrigation.
TMSEP-01	PEM	0.01	Y	Y	Y	Hydrology provided by seep.
MSW-05	PFO	0.55	Y	Y	Y	Hydrology provided by MS-05, Tributary to Currier Creek.
TMW-05	PEM	6.37	Y	Y	Y	Hydrology associated with headwaters of stream LS-02. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
TMW-06	PEM	0.68	Y	Y	Y	Hydrology associated with headwaters of stream LS-02.
TMW-07	PEM	0.78	Y	Y	Y	Hydrology provided by irrigation ditch.
T19N R18E Sec 4 SE 1/4 T19N R18E Sec 9 T19N R18E Sec 17 SW 1/4 T19N R18E Sec 20 W 1/2 T19N R18E Sec 29						
WC-01	PEM	4.72	Y	Y	Y	Hydrology provided by drainage through low area.
WC-02	PEM	2.06	Y	Y	Y	Hydrology provided by drainage through low area.
WNW-01	PEM	5.42	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-01	PEM	1.36	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-01b	PEM	4.66	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-02	PEM	0.27	Y	Y	Y	Hydrology provided by irrigation.
WW-03	PEM	1.63	Y	Y	Y	Hydrology provided by irrigation.
WW-04	PEM	0.17	Y	Y	Y	Hydrology provided by irrigation. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-05	PEM	0.19	Y	Y	Y	Hydrology provided by irrigation ditch. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-06	PEM	0.57	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-07	PEM	12.96	Y	Y	Y	Hydrology provided by irrigation ditch. ounty is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-08	PEM	0.30	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-09	PEM	0.65	Y	Y	Y	Hydrology provided by irrigation ditch. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
WW-10	PEM	0.03	Y	Y	Y	Hydrology provided by irrigation.
WW-11	PEM	0.06	Y	Y	Y	Hydrology provided by irrigation.
WW-12	PEM	0.20	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-13	PEM	1.56	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-14	U	Upland	N	Y	Y	Upland area used for hay. Hydrology provided by irrigation ditch.
WW-15	PEM	2.63	Y	Y	Y	Hydrology provided by irrigation ditch.
WW-16	PEM	0.47	Y	Y	Y	Hydrology provided by irrigation.
WW-17	PEM	0.49	Y	Y	Y	Hydrology provided by irrigation.
WW-18	PEM	0.34	Y	Y	Y	Hydrology provided by irrigation.
WW-19	PEM	7.72	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal.
WW-20	PEM	0.19	Y	Y	Y	Hydrology provided by North Branch Irrigation Canal. County is currently in the process of revising the 1947 soil survey report, and has not determined locations of hydric soil. Hydric soils are based upon the low-chroma color.
Total		**293.91**				

information on whether the feature met the hydrology, soils, and vegetation criteria for wetlands. Comments are provided in the table for each wetland, describing areas with natural versus artificial hydrology. The data sheets in Appendix A provide complete details on the dominant vegetation, including hydric indicator status and relative percent cover; hydrology, including comments on level of saturation and sources of water; and soils, including map series and phase, matrix and mottle color, and any hydric soil indicators. Note that for ease of review, the soil map series and phase and description are abbreviated in the data sheets. Please refer to the Soil Description Key preceding the wetland data sheets for details on each of the soils.

Discussion of Impacts

Based on the on-site investigations, E & E identified seventy-six (76) areas meeting all three wetland parameters within the project vicinity. The wetlands delineated were identified as palustrine, emergent or scrub-shrub wetlands, which support hydrophytic vegetation. Field survey results indicate that the proposed construction area will affect a total of 17.1 acres. The operations area, including the turbines, permanent access roads, and the substation, will affect 3.2 acres of wetlands. **Table 6.2-2** provides a list of individual wetlands identified within the project area and the total acreage of wetlands that will be potentially affected by construction and operation of the proposed project.

Buffer setback impacts are also included in Table 6.2-2. Kittitas County buffer setbacks are calculated based wetland categories (Kittitas County Critical Area Ordinance Title 17A.04.020 and Title 17A.02.310). Of the 76 wetland present onsite, 70 are Category III (average value) and 6 are Category IV (less than average value). Only one Category IV wetland, NW-03, was impacted; the rest of the impacted wetlands were Category III. For Category III wetlands a buffer of 80 feet was used, and for Category IV wetlands a setback of 25 feet was used.

Turbines

For purposes of calculating temporary impacts, it is assumed that construction crews would require an operating area measuring 130 feet in radius around the base of each turbine. This factor translates into a total area of temporary construction disturbance of approximately 1.25 acres per turbine. Construction crews would use this area for constructing the tower foundations and storing topsoil, cleared vegetation and onsite supplies. Each wind turbine and associated tower is 12 feet in diameter. Permanent wetland impacts associated with turbine locations coinciding with wetland boundaries were calculated using a rectangular zone of permanent disturbance at each turbine location, measuring 120 feet long by 40 feet wide or 0.11 acres for each of the subject proposed turbine points. Pad-mounted transformers would also be installed at the base of each turbine. This includes the impacts from the pad-mounted transformers. The turbine towers and transformers would be permanent, impermeable, above ground facilities.

Table 6.2-2
Wetland Disturbance Calculations

Property Legal Description / Wetland ID	Temporary Impacts (acres)					Permanent Impacts (acres)				
	Turbines	Roads	Below Ground Collection System	Substation	Total	Turbines	Roads	Below Ground Collection System	Substation	Total
T19N R18E Sec 17 SE 1/4, T19N R18E Sec 20 E 1/2, T19N R18E Sec 21										
JPW-03	0.59	0.72	0.00	0.00	1.31	0.06	0.27	0.00	0.00	0.33
JPW-04	1.13	0.78	0.00	0.00	1.91	0.11	0.30	0.00	0.00	0.41
JPW-06	0.54	0.18	0.00	0.00	0.71	0.05	0.05	0.00	0.00	0.10
JPW-07	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
JPW-09	0.50	0.06	0.01	0.00	0.56	0.05	0.02	0.00	0.00	0.06
JPW-13	1.26	0.46	0.00	0.00	1.72	0.11	0.17	0.00	0.00	0.28
JPW-15	0.91	0.05	0.00	0.00	0.96	0.07	0.00	0.00	0.00	0.07
JPW-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JPW-17	0.00	0.25	0.00	0.00	0.25	0.00	0.10	0.00	0.00	0.10
JPW-18	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01
JPW-20	1.14	0.96	0.00	0.00	2.10	0.11	0.36	0.00	0.00	0.48
JPW-21	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
JPW-22	0.66	0.26	0.00	0.00	0.92	0.04	0.10	0.00	0.00	0.15
T19N R18E Sec 35 E 1/2										
LW-01	0.80	0.98	0.00	0.00	1.78	0.11	0.39	0.00	0.00	0.50
LW-02	0.00	0.09	0.00	0.00	0.09	0.00	0.03	0.00	0.00	0.03
T19N R18E Sec 28, T19N R18E Sec 27 N 1/2										
NW-03	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
NW-1B-07	0.33	0.29	0.00	0.00	0.63	0.00	0.12	0.00	0.00	0.12
T19N R18E Sec 25, T19N R19E Sec 30 W 1/2, T19N R19E Sec 31 W 1/2										
TMW-01	1.11	0.11	0.00	0.00	1.22	0.06	0.01	0.00	0.00	0.08
TMW-05	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01
T19N R18E Sec 4 SE 1/4, T19N R18E Sec 9, T19N R18E Sec 17 SW 1/4, T19N R18E Sec 20 W 1/2, T19N R18E Sec 29										
WC-02	0.00	0.07	0.00	0.00	0.07	0.00	0.02	0.00	0.00	0.02
WW-01	0.04	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
WNW-01	0.80	0.00	0.00	0.00	0.80	0.10	0.00	0.00	0.00	0.10
WW-06	0.25	0.17	0.00	0.00	0.42	0.03	0.09	0.00	0.00	0.12
WW-07	0.96	0.12	0.00	0.00	1.08	0.11	0.04	0.00	0.00	0.15
WW-08	0.06	0.05	0.00	0.00	0.11	0.02	0.02	0.00	0.00	0.04
WW-09	0.01	0.08	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.01
WW-10	0.00	0.03	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.01
WW-13	0.00	0.15	0.00	0.00	0.16	0.00	0.05	0.00	0.00	0.05
Total Acreage Wetlands										
Total	11.10	5.94	0.02	0.00	17.06	1.04	2.19	0.00	0.00	3.23
Buffer Disturbance Calculations by Wetland Category										
Category III Wetlands	10.99	12.66	0.80	0.10	24.54	0.92	4.77	0.00	0.00	5.69
Category IV Wetlands	0.06	0.09	0.00	0.00	0.16	0.00	0.04	0.00	0.00	0.04
Total Acreage Buffers										
Total	11.05	12.75	0.80	0.10	24.70	0.92	4.81	0.00	0.00	5.73
Total Acreage Combined										
Total	22.15	18.69	0.82	0.10	41.76	1.96	7.00	0.00	0.00	8.96

Notes

This table only lists wetlands that have the potential to be impacted by construction or operation. For all other wetlands, there would be no impacts.

The proposed substation is not located near any wetlands.

Disturbance calculations prepared using GIS data. Calculations displayed in this table with two significant digits.

The assumed envelope of construction disturbance around the proposed turbine locations overlaps with the mapped boundaries of 18 wetlands. Wetlands within the temporary disturbance zone could be impacted by the clearance of vegetation and soil, alteration of contours and therefore hydrology, compaction from construction equipment, and vehicular traffic. A total of 11.1 acres of wetland area would be temporarily affected by construction disturbance. For 14 of the 18 wetlands, the permanent footprint of the turbine pad itself extends into the mapped wetland area. The permanent project facilities would displace a total wetland area estimated at 1.0 acre. Foundations placed within wetlands areas would result in permanent filling-in of the feature in this area.

One turbine location in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the turbine will be re-located to avoid impacting the stock pond.

The buffer zone impacts for turbines include an additional 11.0 acres for Category III wetlands and 0.06 acres for Category IV wetland for a total of 11.1 acres of buffer zone temporary impacts. Tower foundations would permanently occupy a total of 0.9 acre within the Category III wetland buffer zones.

Access Roads

Each project access road is anticipated to be approximately 15 feet in width with a 2-foot shoulder on each side, and 20 feet plus shoulders on the curves. As such, permanent impacts to wetlands located coincident within the road system layout were calculated using a 19-foot road width, plus a 15% overall increase to account for curves and intersections to non-project roads. Within the permanent road footprint, the surface of the road would be cleared of vegetation and graded to a safe slope. For purposes of calculating temporary impacts, it was assumed that construction activity would occur within a 15-foot area on either side of the road alignment, for a total construction disturbance width of 50 feet, plus a 15% overall increase to account for curves and intersections to non-project roads. Construction crews would use this area for grading, widening, or otherwise improving existing or creating new roads. Cleared vegetation, soil, rocks and onsite supplies would be stored in the temporary disturbance zone. Where possible, existing roads would be improved to accommodate project access needs, rather than constructing new roads. As such, the 50-foot construction disturbance width might not be used to its entirety and impact calculations for areas of disturbance may overstate the actual extent of impact to some degree.

The assumed disturbance envelope for the access road layout overlaps the mapped boundaries for 25 wetlands, for which the area of temporary construction impact was calculated at 5.9 acres. Wetlands within the temporary disturbance zone could be impacted by the clearance of vegetation and soil and potential subsequent erosion, as well as compaction from construction equipment and vehicular traffic. The map analysis indicated that 2.2 acres of wetland area would be occupied by permanent access roads.

Permanent roads placed within wetlands areas would result in conversion of wetland areas to roads.

One access road located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the access road will be re-located to avoid impacting the stock pond.

The buffer zone impacts for access roads include an additional 12.7 acres for Category III wetlands and 0.09 acres for Category IV wetland for a total of 12.8 acres of buffer zone temporary impacts. Project access roads would permanently occupy a total of 4.8 acres within the Category III wetland buffer zones.

Substation
The proposed substation north of Reecer Creek Road will be approximately 300 feet by 300 feet in size or approximately 2.1 acres. During construction an extra 50 feet would be utilized on all sides for construction activities and storage. No wetlands are located within proximity of the proposed substation.

Underground Collection System
An underground collection system would be installed between each of the turbine locations to connect them with the project substation. Wherever possible, the collection system will be installed adjacent to existing access roads. The proposed layout indicates the installation of the collection system would cross 7 wetlands. While there would be no permanent aboveground facilities associated with this collection system, there would be temporary impacts to the wetlands from soil compaction, vegetation clearing, or operation activities.

Installation of the collection system will require a 10-foot wide corridor for digging the trench and installing the underground cables. Wetlands within the temporary disturbance zone would be disturbed by the clearance of vegetation, soil compaction from construction equipment and vehicular traffic, and potential subsequent erosion. A total of 0.02 acres would be impacted within the temporary disturbance zone associated with the underground collections system. The underground collections system would have no permanent impacts.

One underground cable located in T19N R18E Section 20 is currently sited within a stock pond. This stock pond is the largest within the project area, so it is anticipated that the underground cable will be re-located to avoid impacting the stock pond.

The buffer zone impacts for underground collection systems include an additional 0.8 acres for Category III wetlands. There would be no permanent underground collection system impacts.

Other Project Components
The location and dimensions of the O&M facility, communication lines, meteorological towers, visitor facilities, and staging areas have not yet been determined. These facilities will be located so as to avoid or minimize impacts to wetlands to the extent possible.
Following installation of the wind power facility, original contours and drainage patterns will be restored around the turbines, roads, and substations, thereby minimizing loss of wetland area or hydrological functions or associated on wildlife habitat. functions and values of emergent wetlands within the construction areas are expected to be restored.

6.3 Non-Wetland Areas

Nine areas delineated within the project area were determined to be non-wetland areas based on unmet wetland criteria such as non-hydric soils. Most of these areas did not support hydric vegetation and were sampled to determine the boundaries of other wetland areas. These areas are considered upland because they do not meet one of the three criteria for delineating wetlands.

7.0 Conclusion

Waters of the United States and wetland delineations were conducted in accordance with the USACE 1987 *Wetland Delineation Manual* (Environmental Laboratory 1987) and other USACE regulations regarding waters of the United States.

Seventy-six wetlands containing all three wetland parameters (hydrology, vegetation, and soils) and 19 streams were identified within the project area.

Of the wetlands delineated within the study area, 23 wetlands and 16 streams will be impacted permanently by the construction of turbines, roads, or other facilities needed for operation. Wetlands and waters of the United States impacted temporarily by construction activities and will be returned to pre-construction conditions.

Temporary impacts shall be restored, and permanent impacts replaced through wetland creation or enhancement (KCCAO Section 17A.04.050, Ord. 94-22 (part), 1994).

The replacement ratios are seperated by Category of the wetland impacted. The actual replacement, enhancement or creation ratio is determined during the permitting process with the U.S. Army Corps of Engineers, Department of Ecology, and Kittiatas County, which takes into account the wetland function, acreage, category, and location.

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Exhibit 2

Well Database

Appendix B, Exhibit 2
Ground Water Resources
Well Database

Well	Owner's Name		Date	Log	USE	GS	Total	Well	Static	WL	Exposure	Depth		Elevation		Aquifer Test		
ID	First	Last	Completed	Avail?		Elev.	Depth	Depth	WL	Elev.	Type	Top	Bottom	Top	Bottom	Q (gpm)	s(ft)	t(hr)
18/18/5/D1	Bob	Burke	7/10/78	Y	Dom	1920	120	110	40	1880	open	110	120	1810	1810	15	25	2
18/18/6/D2	Tom	Roth	8/10/98	Y	Dom	1880	165	163	102	1778	open	163	165	1717	1717	35	160	1
18/18/6/D3	Steve an	Emery	7/31/95	Y	Dom	1880	118	118	35	1845	open	116	118	1764	1762	27-30	115	1
18/18/6/D4	Lyle	Defoor	10/21/95	Y	Dom	1880	340	340	245	1635	perf	300	340	1580	1540	30		
18/18/6/D5		Roth Land	9/15/97	Y	Dom	1920	380	380	300	1620	perf	360	380	1560	1540			
18/18/6/D6		Roth Land	1/6/99	Y	Dom	1920	200	200	58	1862	open	142	200	1778	1720			
18/18/6/D7		Ellensburg Algrl	10/14/96	Y	Dom	1920	320	320	60	1860	open	320	320	1600	1600	85	10-14	2
18/18/6/D8	Joe	Howe	5/1/97	Y	Dom	1920	140	140	50	1870	open	118	140	1802	1780			
18/18/6/D9	Howard	Mitchell	8/15/95	Y	Dom	1900	306	306	255	1645	perf	280	360	1620	1594	15		
18/19/5/D10	Jennifer	Clerf	11/16/00	Y	Dom	2160	160	160	32	2128	open	158	160	2002	2000	12-15		
19/18/2/D13	John	Wright	5/30/88	Y	Dom	5000	140	140	28	4972	open	19	140	4981	4860			
19/18/2/D14	Leon	Baker	7/23/90	Y	Dom	4400	244	244	120	4280	open	18	244	4382	4156			
19/18/3/D15	Ron	Cleaver	10/6/96	Y	Dom	4000	300	189	dry	dry	open	35	189	3965	3811			
19/18/3/D16	Jim and	Stanley	9/1/99	Y	Dom	3320	405	405	dry	dry	open	23	405	3297	2915			
19/18/5/D17	Bill	Allenbaugh	5/11/89	Y	Dom	3800	43	41	1	3799	open	39	43	3761	3759			
19/18/6/D18	Paul	Dobbins	7/18/95	Y	Dom	2960	245	245	150	2810	perf	225	245	2735	2715	7		
19/18/6/D19	Neil J.	Hoff	5/16/94	Y	Dom	2980	100	100	30	2950	perf	60	80	2920	2880	5	70	1
19/18/6/D20	Mark an	Swanberg	11/7/96	Y	Dom	3040	80	80	23	3017	open	78	80	2962	2960			
19/18/6/D21	Jeff	Hoff	11/2/96	Y	Dom	3040	800	800	471	2569	open	97	800	2943	2240			
19/18/6/D22	Randall	Clark	5/16/96	Y	Dom	3040	180	180	100	2940	perf	120	180	2920	2860	20	175	2
19/18/7/D23	Dick	Saoba	6/1/89	Y	Dom	2720	840	832	410	2310	open	115	840	2605	1888	8-35	775-725	
19/18/7/D24	Robert	Best	12/13/01	Y	Dom	2700	280	280	65	2635	open	85	280	2615	2420	7	0	4
19/18/8/D25	Edsel	Heslip	10/1/98	Y	Dom	2660	440	440	250	2410	o @ bot	440	440	2220	2220	40		
19/18/8/D26	Gordon	Cresse	9/15/97	Y	Dom	2820	435	435	312	2508	open	345	435	2475	2385			
19/18/8/D27	Ken	Moraites	6/18/99	Y	Dom	2720	626	626	510	2210	open	606	626	2114	2094	12-25	560-600	
19/18/8/D28	Gaylen	Waschell	7/28/95	Y	Dom	2670	600	600	480	2190	perf	580	600	2090	2070	10	595	1
19/18/8/D29	Judy	Feling	10/27/93	Y	Dom	2570	560	560	485	2085	perf	530	550	2040	2010	2-3	560	1
19/18/8/D30	Pat	Kinnear	10/7/95	Y	Dom	2570	640	640	465	2105	perf	580	640	1990	1930	15	630	2
19/18/8/D31	Jerry	Gudgel	8/18/95	Y	Dom	2620	560	560	470	2150	perf	480	540	2140	2060	3-4	550	3
19/18/8/D32	George	Grigg	6/1/93	Y	Dom	2580	660	640	500	2080	perf	640	660	1940	1940	15		
19/18/9/D33	Claude	Frable	10/16/91	Y	Dom	2940	895	895	678	2262	perf	855	895	2085	2045	2		
19/18/10/D34	John	Daily	7/26/96	Y	Dom	3020	380	375	275	2745	perf	355	375	2665	2645	3		
19/18/11/D35	Kevin	Greene	5/3/83	Y	Dom	3160	225	225	Art		open	220	225	2940	2935	6	120	3
19/18/11/D36	Kevin	Parssons	8/4/86	Y	Dom	3200	310	310	NA		open	240	310	2960	2890			
19/18/11/D37	Mike	Dummann	9/21/98	Y	Dom	3200	205	205	dry	dry	open	68	205	3132	2995			
19/18/11/D38	Kevin P.	Greene	7/1/89	Y	Dom	3080	322	322	Art		open	315	322	2765	2758	50		
19/18/12/D39	Shan	Rowbotham	9/14/79	Y	Dom	3720	120	120	15	3705	open	118	120	3602	3600	20	50	3
19/18/14/D40	Norman	Brush	6/1/98	Y	Dom	2800	438	425	324	2476	perf	365	425	2435	2375	4-6	420	5
19/18/14/D41	Bruce E.	Heidel	10/31/94	Y	Dom	2880	640	640	400	2480	perf	600	640	2280	2240	6		
19/18/14/D42	Greg an	Smith	7/20/94	Y	Dom	2880	520	520	61	2819	perf	500	520	2380	2360	6		
19/18/14/D43	Willie	Dones	9/30/99	Y	Dom	2540	645	NA	550	1990	perf	500	580	2040	na	1-2	590	2
19/18/14/D44	Wilbur	Whitbeck	4/20/94	Y	Dom	2730	85	85	44	2686	open	83	85	2647	2645	15	80	2
19/18/14/D46	Robert a	Patrick	12/5/79	Y	Dom	2530	390	390	300	2230	perf	330	390	2200	2140	9	60	1
19/18/14/D47	Steve an	Dahlquist	3/12/99	Y	Dom	2580	813	787	430	2150	perf	240	253	2340	1793	79	810	1
19/18/14/D48	Dan	Dantzler	7/3/88	Y	Dom	2500	125	125	100	2400	open	120	125	2380	2375	3		
18/19/16/D49	Don	Sherman	9/20/00	Y	Dom	2580	190	190	26	2554	perf	180	190	2400	2390	15		2
19/18/17/D50	Keley	Dormater	9/5/96	Y	Dom	2500	480	475	375	2125	open	460	480	2040	2025	15	475	1
19/18/17/D51	David	Boyovich	3/31/97	Y	Dom	2500	640	635	408	2092	perf	575	635	1925	1865			
19/18/17/D52	Dean	Auve	6/1/87	Y	Dom	2500	550	550	400	2100	open	340	550	2160	1950	10		
19/18/17/D53	Barry	Snover	12/10/02	Y	Dom	2460	500	500	NA		perf	440	500	2020	1960	5	490	3

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ID	First	Last	Completed	Avail?		Elev.	Depth	Depth	WL	Elev.	Type	Top	Bottom	Top	Bottom	Q (gpm)	s(ft)	t(hr)
19/18/17/D54	Ron	Stiffler	11/4/96	Y	Dom	2460	600	600	400	2060	perf	540	600	1920	1860	30	590	2
19/18/17/D55	Jeff	Wippel	2/26/97	Y	Dom	2530	440	440	340	2190	perf	380	440	2150	2090	12		
19/18/17/D56	Don	Herts	4/19/87	Y	Dom	2460	540	530	380	2080	perf	430	530	2030	1930	15		
19/18/21/D57	Jim	Roan	5/1/79	Y	Irrig	2360	700	700	180	2180	perf	300	325	2060	1660	400		
19/18/22/D58	Jerry	Salisbury	6/1/94	Y	Dom	2320	380	380	253	2067	perf	340	380	1980	1940	40		
19/18/22/D59	Donald	McLaughlin	8/23/85	Y	Dom	2340	160	160	96.6	2243	perf	114	154	2226	2180			
19/18/22/D60	Mikail	Tarasenko	9/12/98	Y	Dom	2360	305	300	205	2155	open	300	305	2060	2060	25	29	2
19/18/22/D61	Art	Manz	8/21/85	Y	Dom	2340	300	300	180	2160	open	160	300	2180	2040	25		
19/18/22/D62	David	Lee	9/8/00	Y	Dom	2290	285	285	163	2127	open	257	285	2033	2005	40-45		
19/18/23/D63	Coldwell	Banker	7/14/88	Y	Dom	2560	513	NA	373	2187	open	191	513	2369	na	15		
19/18/23/D64	Dennis	Romppel	9/27/89	Y	Dom	2440	110	110	45	2395	open	100	110	2340	2330	10	100	4
19/18/23/D65	Arnold	Volger	5/25/93	Y	Dom	2400	500	500	360	2040	perf	460	500	1940	1900	5	490	3
19/18/25/D66	Bill	Linder	6/17/83	Y	Dom	2350	148	148	37	2313	open	50	148	2300	2202	30		
19/18/25/D67	Pat	Burke	7/2/83	Y	Dom	2320	110	110	70	2250	open	106	110	2214	2210	15	0	3
19/18/26/D68	Charlie	Schantz	7/7/01	Y	Dom	2130	90	87	43	2087	open	77	87	2053	2043	50	0	4
19/18/26/D69	Scott	Manson	11/1/00	Y	Dom	2090	340	340	240	1850	open	340	340	1750	1750	12-15		
19/18/27/D70	R and U	Miller and Weicht	1/8/01	Y	Dom	2180	133	130	64	2116	open	127	133	2053	2050	9	126	2
19/18/27/D71	W.	Zuppe	5/30/78	Y	Dom	2130	282	280	195	1935	open	235	282	1895	1850	10	0	
19/18/27/D72	Kevin an	Persson	7/22/97	Y	Dom	2030	200	200	138	1892	open	178	200	1852	1830	16	180	1
19/18/28/D73	George T	Plase	11/16/77	Y	Dom	2110	363	347	230	1880	open	344	317	1766	1763	50		
19/18/28/D74	Don	Neumeister	11/28/94	Y	Dom	2150	390	350	250	1900	open	330	350	1820	1800	20	330	1
19/18/28/D75	E.W.	Nelson	11/10/00	Y	Dom	2160	360	360	255	1905	open	360	360	1800	1800	6-7		
19/18/28/D76	Nicholas	Schimtt	NA	Y	Irrig	2190	955	955	NA		open	665	955	1525	1235			
19/18/28/D77	Jill	Eichman	9/5/01	Y	Dom	2060	379	379	167	1893	open	358	379	1702	1681	30		
19/18/28/D78	Jackie	Orgill	7/16/01	Y	Dom	2060	300	300	198	1862	open	273	300	1787	1760			
19/18/28/D79	Lee	Burtchett	11/16/01	Y	Dom	2050	345	324	210	1840	open	303	324	1747	1726	15		
19/18/30/D80	Shird J.	Burks	11/8/89	Y	Dom	2100	160	160	15	2085	open	140	160	1960	1940	20	140	2
19/18/31/D81	Jamie	Gordon	10/24/97	Y	Dom	2020	160	160	90	1930	open	156	160	1864	1860	20	158	1
19/18/31/D82	Sam and	Ahlardt	7/16/97	Y	Dom	2020	170	170	82	1938	open	158	170	1862	1850	30		
19/18/31/D83	Tom	Roth	12/1/99	Y	Dom	2030	207	207	120	1910	perf	187	207	1843	1823	15-20	180	1
19/18/31/D84	Ron	Norton	11/30/00	Y	Dom	2030	116	116	55	1975	open	114	116	1916	1914	40		
19/18/31/D85	Paul	Kyllo	5/24/01	Y	Dom	2020	161	161	106	1914	open	160	161	1860	1859	25		
19/18/31/D86	Jamie	Mays	5/25/96	Y	Dom	2020	160	160	85	1935	o @ bot	160	160	1860	1860	16	155	1
19/18/31/D87		Beaconsfield Assoc.	9/1/94	Y	Dom	2000	227	227	90	1910	open	223	227	1777	1773	20	220	1
19/18/31/D88	Steve	Kyllo	6/25/96	Y	Dom	1970	180	NA	33	1937	open	158	180	1812	na	27	160	
19/18/31/D89	Gary and	Baryo	5/6/97	Y	Dom	1940	165	165	48	1892	open	119	165	1821	1775	30		
19/18/31/D90		Roth Land	7/14/97	Y	Dom	1940	180	167	64	1876	open	158	187	1782	1773	20-22		
19/18/31/D91	Paul	Kyllo	5/1/96	Y	Dom	1940	240	240	80	1860	open	190	240	1750	1700	15-20	235	
19/18/31/D92	Donald J	Rhine	8/18/97	Y	Dom	2040	100	100	50	1990	open	98	100	1942	1940	20	98	1
19/18/31/D93	John	Harris	4/19/96	Y	Dom	1920	160	100	30	1890	open	100	160	1820	1820	20	95	1
19/18/31/D94	Rober C	Sparks	9/29/89	Y	Dom	1860	131	131	27	1833	open	127	131	1733	1729	18	4	1
19/18/32/D95	Dick	Simmon	4/30/00	Y	Dom	1990	142	142	55	1935	open	139	142	1851	1848	20		1
19/18/32/D96	Lori	Kelln	3/21/94	Y	Dom	1990	100	100	40	1950	o @ bot	100	100	1890	1890	15		
19/18/32D97	Barbara	Calkins	12/3/91	Y	Dom	1990	103	103	18	1972	open	80	103	1910	1887	25		
19/18/32/D98	Paul	Noelover	7/17/78	Y	Dom	1970	125	125	60	1910	open	110	125	1860	1845	15	20	2
19/18/32/D99	A.J.	Mihelich	5/22/96	Y	Dom	1920	40	38	13	1907	open	30	40	1890	1882	20	30	1
19/18/33/D100	Cliff and	Sands	2/2/01	Y	Dom	2030	220	220	167	1863	open	199	220	1831	1810	25	0	4
19/18/33/D101	Ken	Hunt	5/21/91	Y	Dom	2030	200	200	120	1910	open	160	200	1870	1830	20	195	2
19/18/33/D102	Ed	Olson	6/11/95	Y	Dom	2030	260	260	155	1875	open	220	260	1810	1770	15		2
19/18/33/D103	Gerald	Hunt	11/6/81	Y	Dom	1950	145	145	60	1890	open	120	145	1830	1805	15	20	3

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ID	First	Last	Completed	Avail?		Elev.	Depth	Depth	WL	Elev.	Type	Top	Bottom	Top	Bottom	Q (gpm	s(ft)	t(hr)
19/18/33/D1	Ken	Helm	5/14/02	Y	Dom	1960	160	NA	60	1900	open	120	160	1840	na	15	155	3
19/18/34/D105		Klampher	11/4/90	Y	Dom	1970	135	135	35	1935	open	120	135	1850	1835	15	130	2
19/18/35/D1	Mike	Stanavich	10/28/97	Y	Dom	1980	155	155	80	1900	open	149	155	1831	1825	10	145	1
19/18/35/D1	Bill	Grueter	11/24/97	Y	Dom	1910	260	260	40	1870	perf	248	260	1662	1650	85	240	1
19/19/18/D1	Keith	Riexinger	4/7/01	Y	Dom		420	420	138	-138	perf	380	420	-380	-420	20	0	1
19/19/19/D109		Shea Construction/B	5/6/93	Y	Dom	2570	503	500	300	2270	perf	480	500	2090	2070	30		
19/19/20/D1	Frank	Arnold	2/28/98	Y	NA	2550	380	380	186	2364	open	267	380	2283	2170	30		
19/19/28/D1	Allen	Aronica	8/8/78	Y	Dom	2310	70	NA	25	2285	open	37	70	2273	na	1		
19/19/29/D1	Preston	Shugart	1/6/03	Y	Dom	2450	270	270	158	2292	perf	230	270	2220	2180	10	250	1
19/19/29/D1	Don	Smith	2/9/94	Y	Dom	2350	36	36	20	2330	o @ bot	36	36	2314	2314	45		
19/19/29/D1	Mike	Smith	12/21/93	Y	Dom	2370	260	260	95	2275	perf	220	260	2150	2110	10		
19/19/29/D1	Leonard	Nichols	5/8/78	Y	Dom	2310	40	40	5	2305	open	35	40	2275	2270	60		
19/19/29/D1	Mike	Smith	9/19/91	Y	Dom	2320	200	200	60	2260	perf	140	200	2180	2120	20	195	2
19/19/29/D1	John	Strong	9/8/95	Y	Dom	2330	305	305	137	2193	perf	261	305	2069	2025	7	301	2
19/19/30/D1	Doug	Burnett	5/14/02	Y	Dom	2450	433	433	210	2240	perf	390	430	2060	2017	10	430	1
19/19/30/D1	Ross	Marvin	11/9/01	Y	Dom	2330	505	505	220	2110	perf	445	505	1885	1825	50		
19/19/31/D120		Johnson	5/31/96	Y	Dom	2250	150	150	42	2208	open	140	150	2110	2100	8-10	150	3
19/19/31/D1	Alla Ditta	Choudary	3/6/02	Y	Dom	2240	165	134	102	2138	perf	114	134	2126	2106	5-6		
19/19/31/D1	Ken	Gamon	3/5/02	Y	Dom		202	202	103	-103	perf	162	202	-162	-202	5	200	1
19/19/31/D1	Tim	Richardson	7/23/84	Y	Dom	2220	95	95	15	2205	open	90	95	2130	2125	20	30	3
19/19/31/D1	Amir	Shaterian	11/20/02	Y	Dom	2150	230	230	40	2110	perf	190	230	1960	1920	40		
19/19/32/D1	Gabe	Reyes	9/11/01	Y	Dom	2270	265	256	67	2203	open	256	265	2014	2014	40	260	1
19/19/32/D1	Lyle D.	Ramsey	9/19/85	Y	Dom	2280	174	NA	45	2235	perf	156	166	2124	na	25		
19/19/32/D1	Walt	Kaminsky	9/9/92	Y	Dom		185	185	35	-35	perf	80	100	-80	-185	12	80	1
19/19/32/D1	Scott	Zimmerman	3/29/02	Y	Dom	2250	138	138	38	2212	perf	98	138	2152	2112	25	135	2
19/19/32/D1	Paul M.	Zeck	5/14/93	Y	Dom	2260	138	138	NA		open	138	140	2122	2122	30		
19/19/32/D1	Bruce A.	Rayfield	6/25/93	Y	Dom	2250	180	180	60	2190	perf	160	180	2090	2070	20		
19/19/32/D1	Bill	Owen	6/12/77	Y	Dom	2240	162	162	10	1840	perf	60	80	2180	2078	8	147	1
19/19/32/D132		Jim Maisson Constru	9/19/80	Y	Dom	2250	190	190	45	2205	perf	150	190	2100	2060	25		
19/19/32/D1	Walter P	Davenport	6/27/89	Y	Dom	2260	400	400	55	2205	perf	340	400	1920	1860	35		
19/19/32/D1	Harriet	Melton	8/15/88	Y	Dom	2260	120	120	47	2213	perf	60	120	2200	2140	11	120	1
19/19/32/D1	Walter	Davenport	2/16/94	Y	Dom	2260	300	200	50	2210	perf	160	200	2100	2060			
19/19/32/D1	Tom	Stevenson	6/26/79	Y	Dom	2270	80	80	20	2250	perf	43	48	2227	2190	17		1
19/19/32/D1	Gene	Emerson	6/2/93	Y	Dom	2270	160	160	60	2210	perf	140	160	2130	2110	5	140	1
19/19/32/D1	Julia A.	Potter	5/15/79	Y	Dom	2230	100	80	30	2200	open	20	100	2210	2150	8	80	1
19/19/32/D1	Darrell	Hoadley	9/16/85	Y	Dom	2230	103	97	30	2200	perf	59	97	2171	2133	20		
19/19/32/D1	Robert	Winningham	10/15/98	Y	Dom	2270	260	260	85	2185	perf	200	260	2070	2010	15	250	2
19/19/32/D1	Glen	Bare	9/18/80	Y	Dom	2230	100	100	NA		perf	60	100	2170	2130	13		
19/19/32/D1	Gil and I	Justiss and Roth	3/4/90	Y	Dom	2210	184	180	32	2178	open	114	184	2096	2030	11		
19/19/32/D1	William	Owens	5/18/89	Y	Dom	2190	200	200	21	2169	open	85	200	2105	1990	25	195	2
19/19/32/D1	Clay	Mock	10/11/96	Y	Dom	2210	300	300	39	2171	perf	240	280	1970	1910	11		
19/19/32/D1	Andy	Bacon	11/14/02	Y	Dom	2210	60	60	12	2198	perf	40	60	2170	2150	25	60	2
19/19/32/D1	Don	Cobain	5/3/90	Y	Dom	2210	100	100	4	2206	perf	70	100	2140	2110	20	100	1
19/19/32/D1	Joe and	Lunstrum	8/2/99	Y	Dom	2210	185	185	28	2182	perf	145	185	2065	2025	11-12		2
19/19/32/D1	Bobbi	Bopp	6/4/79	Y	Dom	2190	75	75	12	2178	open	70	75	2120	2115	20	15	2
19/19/32/D1	Larry	Gretves	12/10/91	Y	Dom	2190	208	NA	32	2158	perf	188	208	2002	na	20	200	
19/19/32/D1	Tom	Barker	NA	Y	Dom	2190	190	190	23	2167	perf	150	190	2040	2000	15	180	4
19/19/32/D1	Phip	Morris	4/20/96	Y	Dom	2170	260	260	27	2143	perf	220	260	1950	1910	16-18		
19/19/32/D1	Debbie	Jimmerson	9/26/96	Y	Dom	2170	220	220	39	2131	open	157	200	2013	1950	15		
19/19/33/D1	Dick	Lunstrum	3/4/80	Y	Dom	2220	80	80	14	2206	open	65	80	2155	2140	15	15	3

Appendix B, Exhibit 2
Ground Water Resources
Well Database

Well	Owner's Name		Date	Log	USE	GS	Total	Well	Static	WL	Exposure	Depth		Elevation		Aquifer Test		
ID	First	Last	Completed	Avail?		Elev.	Depth	Depth	WL	Elev.	Type	Top	Bottom	Top	Bottom	Q (gpm)	s(ft)	t(hr)
19/19/33/D15	Louise	Becker	4/8/93	Y	Dom	2230	200	200	15	2215	o @ bot	200	200	2030	2030	15	190	2
19/19/33/D15	Milt	Richards	5/17/90	Y	Dom	2190	130	130	9	2181	perf	50	113	2140	2060	30	113	1
19/19/33/D15	Milt	Richards	2/22/90	Y	Dom		120	120	26	-26	perf	70	120	-70	-120	30	120	1
19/19/33/D15	Charles	Williams	8/26/77	Y	Dom	2220	140	140	35	2185	open	136	140	2084	2080	8	100	1
19/19/33/D15	Mark	Halloway	10/28/97	Y	Dom	2210	142	142	27	2183	perf	122	142	2088	2068	12		
19/19/33/D16	Ron and	Mogee	10/16/92	Y	Dom	2210	220	215	60	2150	open	215	215	1995	1995	15	215	1
19/19/33/D16	Jerry	Hunt	7/23/92	Y	Dom	2210	65	60	50	2160	open	60	65	2150	2150	12		
19/19/33/D16	W	Bacon	10/2/78	Y	Dom	2190	49	47	10	2180	open	47	49	2143	2143	15		
19/19/33/D16	Jerry	Anderson	7/16/88	Y	Dom	2210	240	240	45	2165	open	160	240	2050	1970	12		
19/19/33/D16	Bob	Kibber	7/1/78	Y	Dom	2210	60	60	6	2204	open	50	60	2160	2150	15	10	2
20/18/31/D16	David T.	Hedges	7/3/01	Y	Dom	3160	379	368	290	2870	open	359	379	2801	2792	30	256	1
20/18/33D16	Nelson	Cox	9/5/85	Y	Dom	3800	67	67	35	3765	open	67	67	3733	3733	40	5	4

Dom= Domestic perf= perforated Note: All numbers are in feet, except where otherwise indicated
Irrig= Irrigation o @ bot= open at bottom Art= Artesian