2.4 Water Resources

Existing conditions related to water resources were characterized by reviewing USGS topographic maps, Federal Emergency Management Agency (FEMA) floodplain data, the Groundwater Atlas of the United States, and other information.

Surface waters were investigated during field surveys conducted October through December 2008 and during February, May, and June 2009 by SWCA. These investigations included an onsite survey of streams within the environmental permitting corridors containing the turbine strings and associated infrastructure. If there was a potential for Project facilities to impact water resources, water resources within the environmental permitting corridor were examined. The field investigation focused on areas with USGS-mapped streams and areas determined to have the potential to contain waters based on aerial photographs of the Project area (SWCA 2009). All the delineated stream segments contained a defined bed and bank and/or displayed evidence of seasonal flow.

2.4.1 Affected Environment

2.4.1.1 Watersheds

The USGS delineates watersheds at the federal level using Hydrologic Unit Codes (HUCs). The Project area is located within several federally defined watersheds, including the Pataha Creek watershed, the Upper and Lower Tucannon River watersheds, the Deadman Creek watershed, and the Snake River/Penawawa Creek watershed. Each WRA is discussed separately below with respect to its location within federal watersheds.

The State of Washington classifies watersheds into Water Resource Inventory Areas (WRIAs), which are formalized under WAC 173-500-040. Ecology has responsibility for developing and managing the administrative and planning boundaries of the WRIAs. All four WRAs of the Project are in the Middle Snake River Watershed, WRIA 35. The Middle Snake River Watershed occupies 2,250 square miles in Whitman, Garfield, Columbia and Asotin counties (Middle Snake Watershed Planning Unit 2005).

At its closest point to the Project, the Snake River is approximately 1.2 miles north-northwest of the Kuhl Ridge WRA. It originates in Yellowstone National Park in Wyoming and is the largest tributary of the Columbia River. The Snake River flows south into Idaho, west across the Snake River plain of southern Idaho, and north into Washington, where it eventually joins the Columbia River near Pasco (Ecology 1995a).

The 10-digit HUCs defining watersheds at the federal level are discussed below for each WRA.

Tucannon WRA

The Tucannon WRA is primarily within the Upper and Lower Tucannon River watersheds (HUC# 1706010706 and 1706010707). The Tucannon River headwaters are located in the Blue Mountains and it is the largest tributary of the Snake River. Located in the Middle Snake River Watershed, it is a major salmonid habitat river (Ecology, Environmental Assessment Program 2005). Its two major drainages are the mainstem Tucannon River and Pataha Creek. The mainstem drains 391 square miles and flows into the Snake River at River Mile (RM) 66.2. The major tributaries of the mainstem include Willow, Kellogg, Cummings, Panjab, and Sheep, and Bear creeks, as well as the Little Tucannon River.

Kuhl Ridge WRA

The majority of the Kuhl Ridge WRA is within the Deadman Creek Watershed (HUC# 1706010703) and the Snake River/Penawawa Creek Watershed (HUC# 1706010708). The southern portion of this WRA is within the Pataha Creek Watershed (HUC# 1706010705). Pataha Creek is a tributary of the Tucannon River and drains approximately 200 square miles, most of which is comprised of rangeland, dryland farms, and irrigated farmland. The headwaters of Pataha Creek are in the Umatilla National Forest, approximately 10 miles south of Pomeroy (Ecology, Environmental Assessment Program 2005). Major tributaries of Pataha Creek are the seasonal streams Dry Pataha Creek, Sweeney Gulch, Balmaier Gulch, Linville Gulch, Taman Gulch, and Dry Hollow.

Dutch Flats WRA

The Dutch Flats WRA is primarily within the Pataha Creek Watershed (HUC# 1706010705), discussed above.

Oliphant Ridge WRA

The Oliphant WRA is also primarily within the Pataha Creek Watershed (HUC# 1706010705). This WRA's southern portion is within the Upper Tucannon River Watershed (HUC# 1706010706).

2.4.1.2 Surface Water

General Hydrology

All Four WRAs

Precipitation, runoff, and direct groundwater discharge are the sources of water to surface waterbodies in the WRAs. Precipitation generally occurs between September and May and ranges from 14-22 inches/year, based on weather stations in Pomeroy and Pullman. During the winter, less than 10% of this precipitation falls as snow. Along with precipitation, meltwater from the snowpacks in the higher elevations runs down and supplies stream flow in the spring and summer, with some of this runoff infiltrating down into the soil to become groundwater. Groundwater contributes significantly to the flows in the Tucannon River. The Blue Mountains of the Umatilla National Forest provide most of the annual runoff in the Pataha Creek Watershed, resulting in peak flows in May or June (Middle Snake River Watershed Planning Unit 2005).

Fish and wildlife depend on adequate water, as do many recreational activities; therefore, rules are established through WAC to ensure that sufficient water is present in rivers and streams. WAC 173-500, the Water Resources Management Program, authorizes Ecology to establish required “instream flow” for specific locations for a defined time and typically following seasonal variations. Typically measured in cubic feet per second (cfs), instream flows are usually defined as the flow needed to protect and preserve instream resources and values such as fish, wildlife, and recreation. No instream flow rules exist for the Middle Snake River WRIA (Ecology 2009d). Most of the streams in this basin likely only flow during snowmelt and heavy spring rains, and are not used significantly by fish, wildlife, or humans (SWCA 2009). These features would likely be classified as Type 5 waters under Washington State’s five-tier interim water typing system (WAC 222-16-031; SWCA 2009). Table 2-4 provides the definitions of waters, along with their associated required buffer width, according to the CAOs for Garfield and Columbia counties (see Section 2.14 Land Use for a detailed discussion of these ordinances). Stream buffers benefit water quality by filtering pollutants and retaining soil particles. Buffers also retain streamside vegetation, which helps regulate instream temperature.

Table 2-4 Stream Type and Buffer Requirements

<table>
<tr><th>Stream Type</th><th>Definition
(WAC 222-16-031)</th><th>Garfield County
Buffer Width</th><th>Columbia County
Buffer Width</th></tr>
<tr><td>Type 1
(Type S = Shoreline)</td><td>Shorelines of the state (perennial)</td><td>250 feet</td><td>250 feet</td></tr>
<tr><td>Type 2
(Type F = Fish-Bearing)</td><td>Other perennial streams; high fish, wildlife, and human use</td><td>250 feet</td><td>250 feet</td></tr>
<tr><td>Type 3
(Type F = Fish-Bearing)</td><td>Other perennial streams; moderate fish, wildlife, and human use</td><td>200 feet for streams 5–20 feet wide

150 feet for streams < 5 feet wide</td><td>200 feet for streams 5–20 feet wide

150 feet for streams < 5 feet wide</td></tr>
<tr><td>Type 4
(Type Np = Non-Fish Perennial)</td><td>Perennial non-fish habitat streams</td><td>150 feet</td><td rowspan="2">Type 4 or 5, or intermittent streams and washes with low mass wasting potential – 150 feet

Type 4 or 5, or intermittent streams and washes with high mass wasting potential – 200 feet</td></tr>
<tr><td>Type 5
(Type Ns = Non-Fish Seasonal)</td><td>Seasonal non-fish habitat streams</td><td>150 feet</td></tr>
</table>

Note: Garfield and Columbia counties define Type 4 and 5 streams as other intermittent streams and washes.

Streams are classified using the DNR Water Type Maps, where applicable. Under DNR's stream classification system, streams are classified in accordance with WAC 222-16-030 as Type S (shoreline), Type F (fish bearing), Type Np (non-fish perennial), and Ns (non-fish seasonal). Most of the drainage features mapped within the Project area are classified as Type U (unknown) and thus have not yet been classified by DNR, but would likely be classified as Type Ns. The few named perennial streams within the Project area are typically mapped as DNR Type S and F streams (SWCA 2009). These perennial streams are the Tucannon River; the Pataha, Weimer, Meadow, and Kellogg creeks; Tatman, and Linville gulches. Additionally, the Tucannon River, Pataha Creek and Tatman and Linville gulches have a defined stream classification. The classifications associated with these waterbodies are provided in Table 2-5.

Table 2-5 Project Area Stream Type Classifications

Waterbody Name	Stream Type (WAC 222-16-030; WAC 222-16-030)
Pataha Creek downstream of Linville and Tatman confluence, Tucannon River	Type S – Type 1
Pataha Creek upstream of Linville and Tatman confluence	Type F – Type 2
Tatman Gulch, Linville Gulch, Meadow Creek, Brown Gulch	Type F – Type 3
Weimer Creek and Benjamin Gulch	Type Np – Type 4
All other streams	Type Ns – Type 5
Additional streams may be added to this table upon completion of the wetland and waters delineation	

Surface Water Features

Streams and drainage features identified in the Project area have been grouped by feature type and are discussed below (SWCA 2009).

- **Grassed drainages.** These are natural swales or constructed waterways, typically broad and shallow and covered in grasses that convey surface water from or through cropland. The swales are usually 5 to 10 feet in width and are dominated by upland grasses. Defined channels are usually lacking, except in occasional small, discontinuous, distinct sections.

- **Erosional features.** These are natural features formed by flows associated with large precipitation events. No defined bed, bank, or channel is present, and there is no evidence of recent flow. Ephemeral gullies are included in this type; they have small channels eroded by concentrated flow that can be easily filled by normal tillage, to be reformed again in subsequent years in the same location as a result of storm events.

- **Ephemeral drainages.** These features have a defined bed and bank and/or defined channel, with or without evidence of recent flow, and have a short duration of flow in response to large precipitation events. They would be categorized as DNR Stream Type Ns and Columbia and Garfield counties Type 4 and 5 streams. Most of the streams and drainage features within the Project area are ephemeral drainages.

- **Intermittent drainages.** These features are typically associated with upstream springs and have a longer duration of flow than ephemeral drainages (i.e., continuous flow at least seasonally). These waterbodies do not provide fish habitat and typically go dry at some time of the year. They would be categorized as DNR Stream Type Ns and Columbia and Garfield counties Type 4 and 5 streams.

- **Perennial drainages (non-fish bearing).** These features have a defined bed and bank with flow present throughout the year during years of normal precipitation. These waterbodies are non-fish habitat streams due to downstream blockages or limited seasonal flow. Perennial non-fish bearing drainages would be categorized as DNR Stream Type Np and Columbia and Garfield counties Type 3 streams.

- **Perennial drainages (Fish Bearing).** These features have a defined bed and bank with flow present throughout the year during years of normal precipitation. These waterbodies are fish bearing streams that are wider than the non-fish bearing streams and tend to occur in lower landscape positions.

As indicated above, most of the drainage features within the Project area are ephemeral drainages. These features range from channels less than a foot wide to gulches that average 10 feet wide (SWCA 2009). Some of these ephemeral drainages are hydrologically connected to downstream intermittent and perennial features.

Surface waterbodies within each of the WRAs are discussed separately below, along with the drainage patterns within each area. These discussions are based on a review of USGS topographic maps and GIS analyses. USGS mapped springs were field verified and delineated as wetland or stream features.

Tucannon WRA

Several streams originate in the Tucannon WRA. These streams are divided into four principal drainage systems, generally draining to the north, toward the Tucannon River. Table 2-6 gives stream miles of the streams in the Tucannon WRA.

Table 2-6 Waterbodies in the Tucannon WRA

Waterbody Name	GIS Length (miles)
Kellogg Creek	6.3
McKay Creek	0.78
Smith Hollow	7.3
Tucannon River	2.1
Willow Creek	6.5

In addition to the streams discussed above, there are also several unnamed springs within the WRA. One spring is associated with a tributary of Smith Hollow, and two are associated with tributaries of Kellogg Creek (see Figure 2-3).

Kuhl Ridge WRA

Several streams originate within the Kuhl Ridge WRA. These streams are divided into four principal drainage systems, draining west-northwest to the Snake River or south to Pataha Creek. Table 2-7 lists the stream miles of Kuhl Ridge WRA streams.

Table 2-7 Waterbodies in the Kuhl Ridge WRA

Waterbody Name	GIS Length (miles)
Coyote Canyon	1.2
Dry Gulch	10.5
Heaton Gulch	1.2
Meadow Creek	6.6
New York Gulch	12.0
Pataha Creek	3.5
Phalen Gulch	1.0
Weimer Creek	3.3

In addition to the streams discussed above, there are also several springs within the Kuhl Ridge WRA: Falling Springs and Twin Springs, as well as several unnamed springs. These unnamed springs are associated with Weimer Creek, Meadow Creek, New York Gulch, and a tributary of Pataha Creek (see Figure 2-4).

Dutch Flats WRA

Several streams originate within the Dutch Flats WRA. These streams are divided into four principle drainage systems, all of which flow into Pataha Creek. A large portion of the Dutch Flats WRA drains to the north, to Pataha Creek. The southwestern portion of the WRA generally drains to the west-northwest, into the Tatman Gulch and out of the WRA. Table 2-8 provides a list of streams present in the Dutch Flats WRA and their associated stream miles.

Table 2-8 Waterbodies in the Dutch Flats WRA

Waterbody Name	GIS Length (miles)
Benjamin Gulch	4.8
Bihmaiser Gulch	1.3
Brown Gulch	1.5
Tatman Gulch	0.7

In addition to the streams discussed above, there are also several springs within the Dutch Flats WRA; these are Bihmaier Springs and two unnamed springs associated with Brown and Benjamin gulches (see Figure 2-5).

Oliphant Ridge WRA

Several streams originate within the Oliphant Ridge WRA. These streams are divided into four principal drainage systems, which generally flow to the west-northwest, into Pataha Creek. Table 2-9 lists stream miles of Oliphant Ridge WRA streams.

Table 2-9 Waterbodies in Oliphant Ridge WRA

Waterbody Name	GIS Length (miles)
Chard Gulch	2.9
Dry Hollow	9.6
Linville Gulch	1.6
Miller Gulch	3.7
Pataha Creek	6.2
Tucannon River	2.2

There are also several unnamed springs within the Oliphant WRA, associated with tributaries of Pataha Creek and a tributary of the Tucannon River (see Figure 2-6).

Water Quality

All Four WRAs

Water quality data for the watersheds indicate that temperature and sediment are the primary issues affecting aquatic habitat, and fecal coliform has been identified as a source of degraded drinking water quality. Elevated temperatures and sediment loadings in Pataha Creek, the Tucannon River, and Snake River have been identified, and fecal coliform is a concern in Pataha Creek, requiring a total maximum daily load (TMDL; Middle Snake Watershed Planning Unit 2005). The TMDL establishes limits on pollutants that can be discharged to the waterbody and still allow for state water quality standards to be met.

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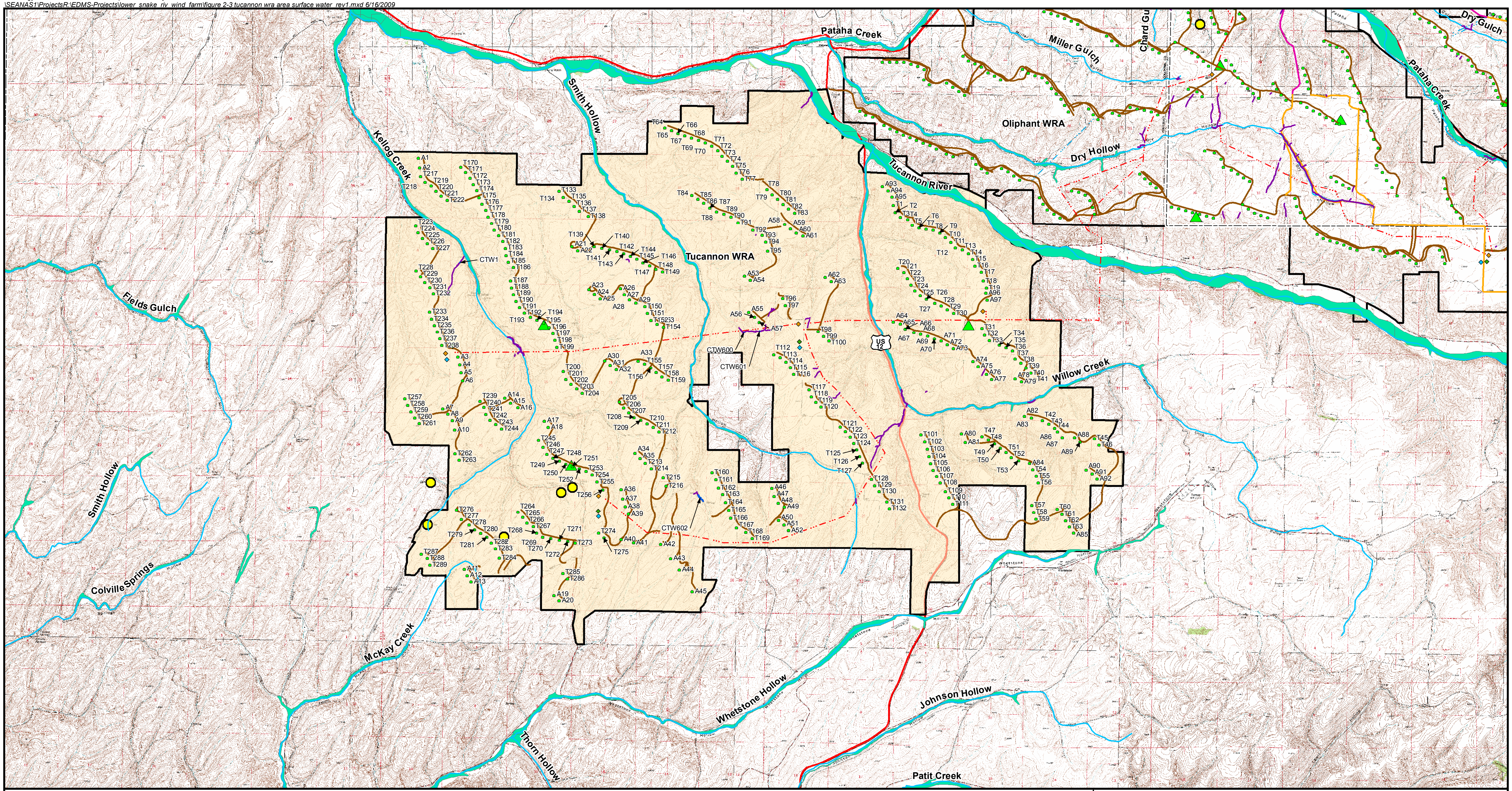

Legend

- Turbine Location
- City
- Laydown
- Operations & Maintenance
- Substation
- Met Towners
- Spring Location
- Streams
- County Lines
- 35 kV Transmission Line
- 230 kV Transmission Line
- Existing Roads
- New Roads
- Existing Roads to be Upgraded

Special Flood Hazard Area (SFHA)

- FEMA Special Flood Hazard Area (SFHA)
- Project Area

Wetlands - Streams

- SWCA Observed Streams
- SWCA Observed Wetlands

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-3
Tucannon WRA Surface Water

0 0.5 1 2 3 4 5
Miles
Scale 1:95,000

Source Information:

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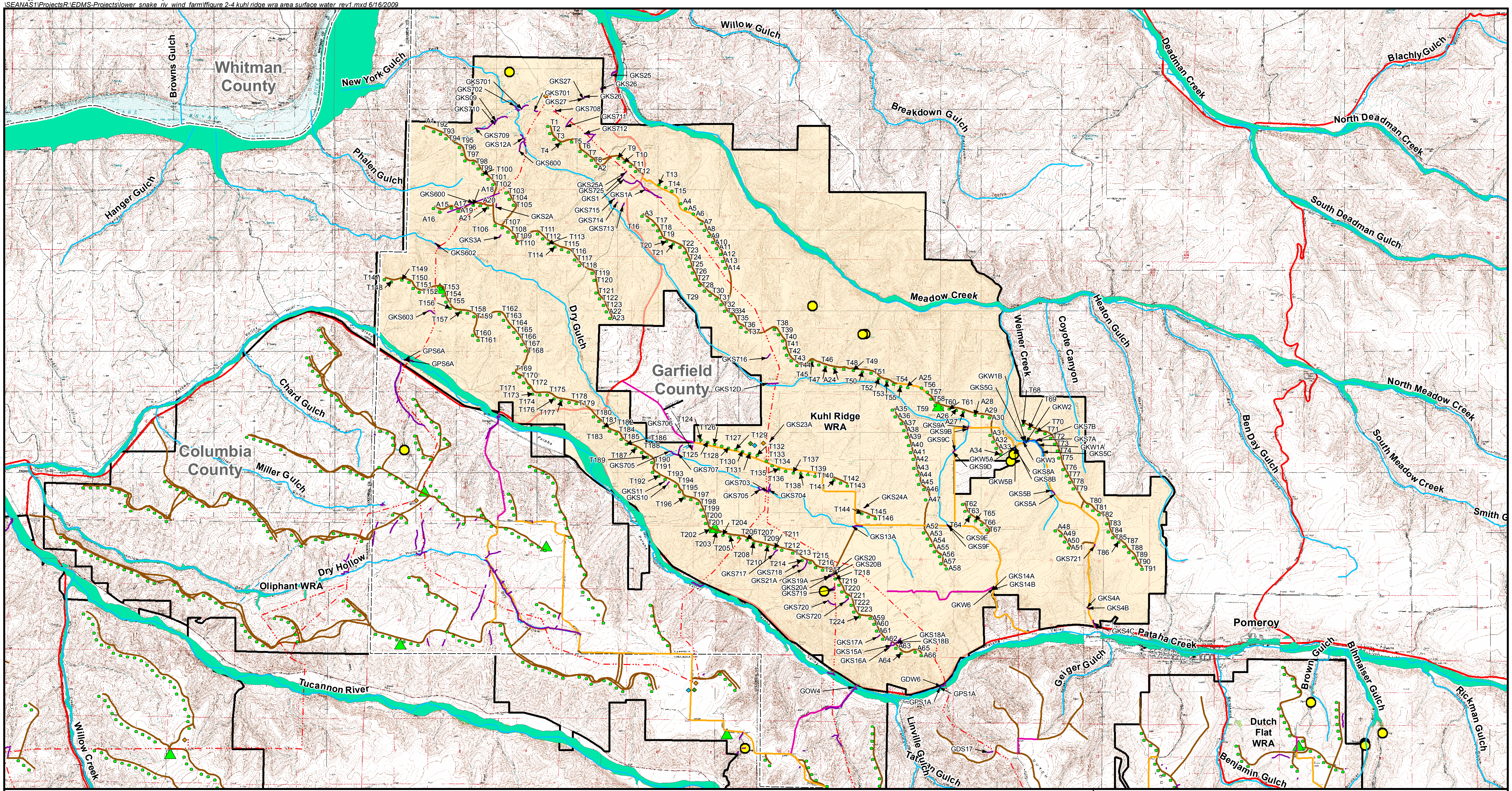


Legend

- Turbine Location
- City
- Laydown
- Operations & Maintenance
- Substation
- Met Towners
- Spring Location
- Streams
- County Lines
- 35 kV Transmission Line
- 230 kV Transmission Line
- Existing Roads
- New Roads
- Existing Roads to be Upgraded

Special Flood Hazard Area (SFHA)

- FEMA Special Flood Hazard Area (SFHA)
- Project Area

Wetlands - Streams

- SWCA Observed Streams
- SWCA Observed Wetlands

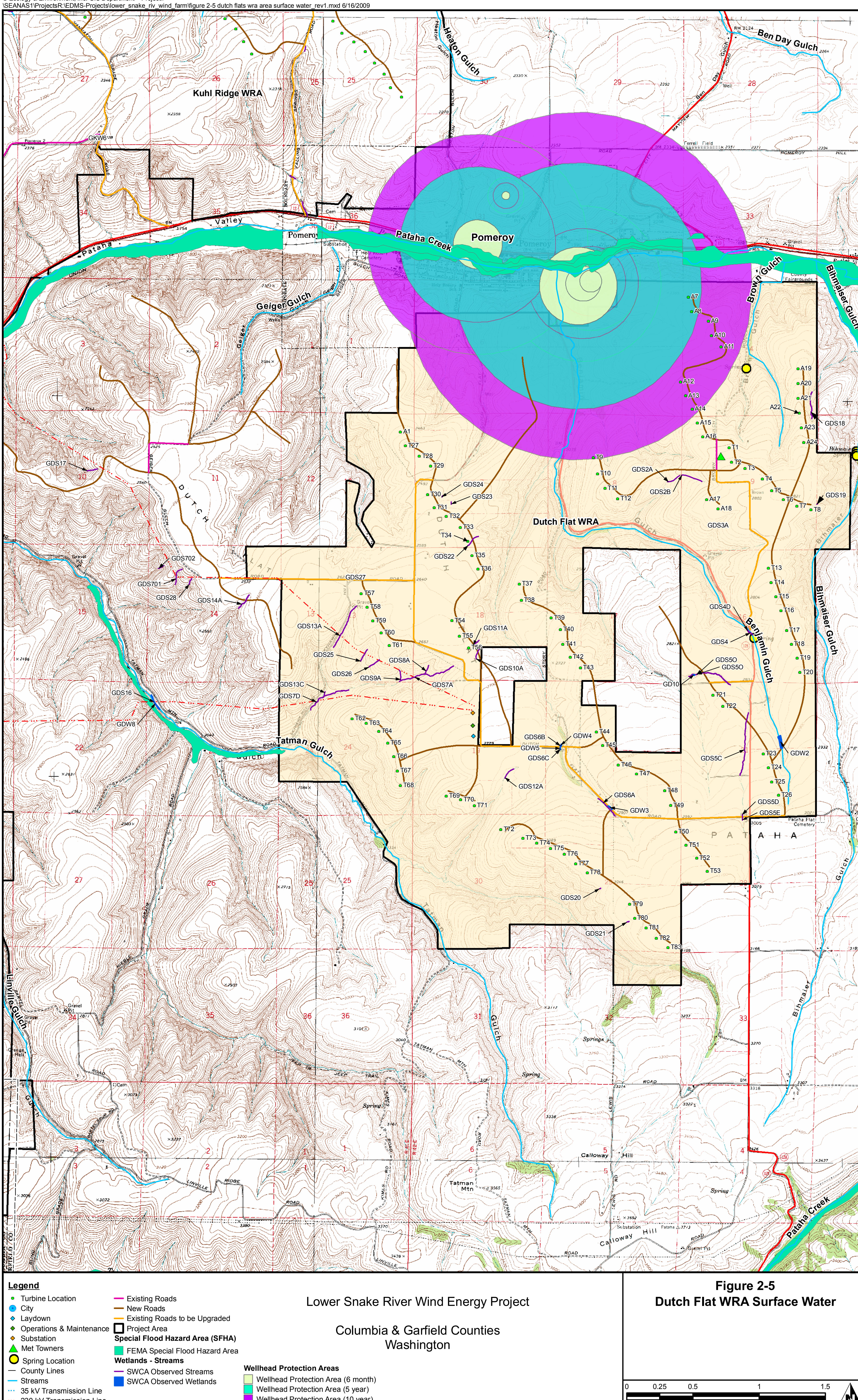
Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-4
Kuhl Ridge WRA Surface Water

0 0.5 1 2 3 4 5
Scale 1:94,000 Miles

Source Information:


Kuhl Ridge WRA
Pomeroy
Pataha Creek
Dutch Flat WRA
Benjamin Gulch
Tatman Gulch
Bihmaier Gulch
Legend
Turbine Location
City
Laydown
Operations & Maintenance
Substation
Met Towners
Spring Location
County Lines
Streams
35 kV Transmission Line
230 kV Transmission Line
Existing Roads
New Roads
Existing Roads to be Upgraded
Project Area
Special Flood Hazard Area (SFHA)
FEMA Special Flood Hazard Area
Wetlands - Streams
SWCA Observed Streams
SWCA Observed Wetlands
Wellhead Protection Areas
Wellhead Protection Area (6 month)
Wellhead Protection Area (5 year)
Wellhead Protection Area (10 year)
Lower Snake River Wind Energy Project
Columbia & Garfield Counties
Washington
Figure 2-5
Dutch Flat WRA Surface Water
0 0.25 0.5 1 1.5
Miles
Scale 1:43,000

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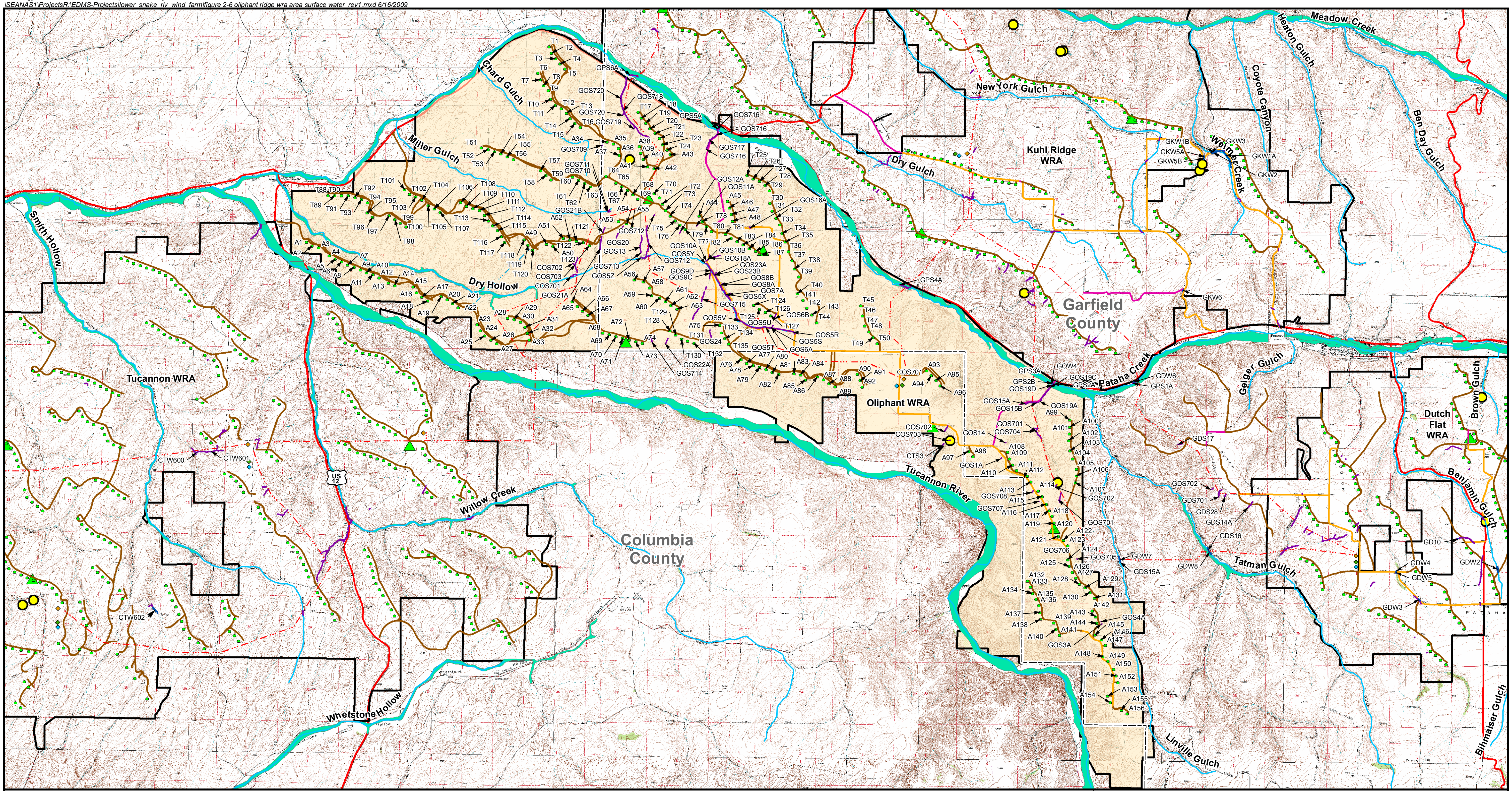

Legend

- Turbine Location
- City
- Laydown
- Operations & Maintenance
- Substation
- Met Towners
- Spring Location
- Streams
- County Lines
- 35 kV Transmission Line
- 230 kV Transmission Line
- Existing Roads
- New Roads
- Existing Roads to be Upgraded

Special Flood Hazard Area (SFHA)

- FEMA Special Flood Hazard Area (SFHA)
- Project Area

Wetlands - Streams

- SWCA Observed Streams
- SWCA Observed Wetlands

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-6
Oliphant WRA Surface Water

0 0.5 1 2 3 4 5 6
Scale 1:100,000 Miles

Source Information:

Section 305(b) of the Clean Water Act (CWA) requires that each state conduct water quality assessments to determine whether its streams, lakes, and estuaries are sufficiently "healthy" to meet their designated best uses. This information is updated and reported to EPA every two years. The state's 305(b) report is the primary source of information for developing the "Impaired Waters" list for the state, known as the 303(d) list. Impaired waterbodies are those that do not meet the water quality standards for specific designated uses. If a waterbody contains levels of pollutants that are greater than the water quality standards, it will not support one or more of its designated uses and will be considered to have "impaired" water quality. Thus, when a waterbody is included on the 303(d) list, the designated use that is impaired, or not in achievement of the specific water quality standards for that use, is identified.

Ecology is responsible for assessing water quality and determining whether waters meet their specified water quality standards. The 2008 Water Quality Assessment 305(b) Report and 303(d) List was submitted, and the EPA granted approval on January 29, 2009. Table 2-10 lists the Category 5 (impaired) waters within each of the WRAs, as well as impaired waterbodies within 0.5 miles of the Project area boundary. These waterbodies require the development of a TMDL. The water quality impairments listed in Table 2-10 are not unexpected, given the agricultural nature of the surrounding land use. There are no impaired waters within the Dutch Flats WRA. Figure 2-7 provides a graphical depiction of the locations of these impaired waters.

Table 2-10 Impaired Waterbodies

Waterbody	Impairment
Tucannon WRA	
Tucannon River	Temperature
Oliphant Ridge WRA	
Pataha Creek	Fecal coliform, pH, temperature
Tucannon River	Temperature
Tucannon River*	Fecal coliform, pH, temperature
Kuhl Ridge WRA	
Meadow Creek	Fecal coliform, pH, dissolved oxygen, temperature
Pataha Creek	Fecal coliform, pH
*Meadow Creek	Temperature
*Pataha Creek	Fecal coliform, temperature

Source: Ecology2008
Notes:
*indicates impaired waterbodies within the 0.5-mile buffer area around the Project area.
As indicated in Figure 2-7 these impairments are found in different sections of the waterbodies.

Ecology has several water quality stations in the Project area, monitored for pH and turbidity. Managed by the Freshwater Monitoring Unit, these stations are at the Tucannon River near Marengo, the Tucannon River at Territorial Road, the Pataha Creek at Tatman Road, and the Pataha Creek at Archer Road. The Water

Quality Index (WQI) is used at these stations to rate general water quality. Monitoring results are converted to scores from 1 to 100. The last year of record for monitoring data for these stations was 2003; therefore, the water quality data associated with the 2008 Water Quality Assessment 305(b) Report and 303(d) List and included in Table 2-10 are the most up-to-date.

2.4.1.3 Floodplains

Waterbodies in the Project area, including all four WRAs, generally do not support extensive floodplains; however, there are several smaller FEMA-designated "Special Flood Hazard Areas." These areas have a 1% annual chance of flooding to base flood elevations (the elevation to which floodwater is anticipated to rise during a 100-year flood) (Ecology 2009d). Floodplains and their locations are discussed for each WRA below.

Tucannon WRA

Floodplains in the Tucannon WRA are associated with the Tucannon River, Willow Creek, Smith Hollow, and Kellogg Creek (see Figure 2-3). Total floodplain acreage in this WRA is approximately 434.9 acres.

Kuhl Ridge WRA

Floodplains in the Kuhl Ridge WRA are associated with Pataha Creek and Meadow Creek (see Figure 2-4). Total floodplain acreage in this WRA is approximately 591.7 acres.

Dutch Flats WRA

The majority of the Dutch Flats WRA is devoid of floodplains; approximately 0.75 acres of floodplain exists along Tatman Gulch in the southwestern corner of the WRA (see Figure 2-5).

Oliphant Ridge WRA

Floodplains in the Oliphant Ridge WRA are associated with the Tucannon River, Pataha Creek, and Dry Hollow (see Figure 2-6). Total floodplain acreage in this WRA is approximately 637.7 acres.

2.4.1.4 Groundwater

All Four WRAs

Groundwater in the Project area occurs in two principal aquifer systems: (1) the suprabasalt sediment aquifer system, and (2) the underlying Columbia River Basalt Group (CRBG) aquifer system (Kennedy/Jenks Consultants 2005). The suprabasalt sediment aquifer system consists of multiple, localized water-bearing sand and gravel aquifers that are less than 5 to 40 feet below ground surface and less than 50 feet thick. This system is typically located in relatively narrow canyons and stream valleys in the Project area (Kennedy/Jenks Consultants 2005). Water table elevation within this system is thought to vary seasonally in response to changes in stream discharge, and is generally a few feet to tens of feet below

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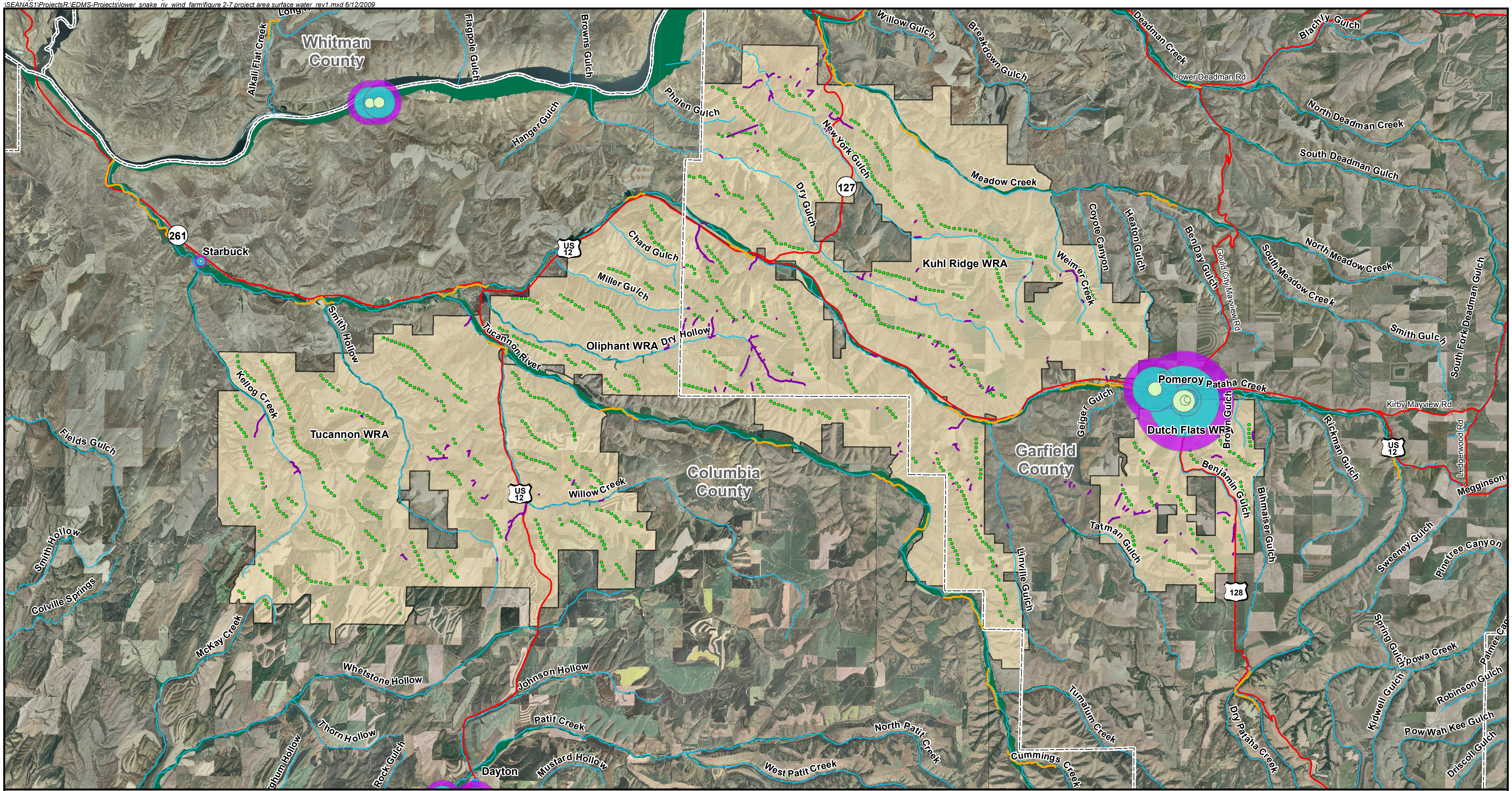

Legend

- Turbine Location
- Spring Location
- City
- Streams
- SWCA Observed Streams
- County Lines
- Project Area
- Impaired Waters (Washington Department of Ecology 303d list)

Wellhead Protection Areas

- Wellhead Protection Area (6 month)
- Wellhead Protection Area (5 year)
- Wellhead Protection Area (10 year)

Special Flood Hazard Area (SFHA)

- FEMA Special Flood Hazard Area (SFHA)

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-7
Project Area Surface Water Features, Impaired Waters, and Wellhead Protection Areas

0 1 2 4 6 8
Miles
Scale 1:160,000

Source Information: Federal Emergency Management Administration (FEMA) Floodplain Management.

ground surface. Yields from wells in the suprabasalt aquifer tend to vary widely, but in general seem to be less than 200 gallons per minute (Kennedy/Jenks Consultants 2005).

The Project area is part of the Columbia Plateau regional aquifer system, which extends across a portion of northern Idaho, northeastern Oregon, and a large portion of southeastern Washington. The aquifers underlying the Project area are basalt aquifers, derived from volcanic rock, and are part of the CRBG (Whitehead 1994). These basaltic-rock aquifers can be as much as 15,000 feet thick in places and are overlain by unconsolidated deposit aquifers. The thickness of the unconsolidated deposit aquifers in the vicinity of the Project area ranges from 0 to 50 feet (Whitehead 1994). The shallowest of the basalt aquifers is closely connected hydraulically with surface water sources. Groundwater discharge to streams is significant in the Middle Snake River basin, ranging from approximately 30% in the winter months to greater than 90% of the stream flow during the summer (Middle Snake Watershed Planning Unit 2005).

Groundwater levels in the Columbia Plateau have been modified by irrigation practices in the region. Water diverted or pumped from streams or reservoirs for irrigation has resulted in local increases in recharge and a rise in groundwater levels. Water level rises of as much as 300 feet have been recorded locally in Washington (Whitehead 1994). Irrigating with groundwater sources has resulted in local declines in water level of as much as 150 feet in Washington (Whitehead 1994).

Groundwater well depth in Garfield County can vary from less than 100 feet to almost 1,000 feet below the surface. Columbia County wells evidence a greater range of well depths, from 50 to 2,000 feet below the surface (Whitehead 1994). Ecology's Well Log Database lists numerous wells within the Project area. These include both water supply wells and resource protection wells, and range in depth from 10 feet to more than 1,000 feet. Most wells have depths between 100 and 200 feet (Ecology 2009b).

In Columbia County, the City of Dayton is the only population center served by a public water system; all unincorporated areas, which include the Project area, rely on private wells (Columbia County 2007). In Garfield County, the City of Pomeroy uses the aquifers and springs as its drinking water sources (Garfield County 2008a), and the unincorporated areas of the county rely on similar sources.

Several protections exist under the Safe Drinking Water Act for groundwater resources that are drinking water sources. The Act includes protections for sole-source aquifers, which are aquifers designated as the sole or principal drinking water source for an area and that, if contaminated, would create a significant hazard to public health. EPA Region 10 data show no sole-source aquifers within the Project area (EPA Region 10 2008).

The Safe Water Drinking Act also mandates that each state develop a wellhead protection program. EPA's Wellhead Protection Program is a community-based approach to protect groundwater that supplies drinking water to public water wells and wellfields. Wellhead protection areas are defined as the surface and subsurface area surrounding a water well, wellfield, or spring supplying a public water system through which contaminants are reasonably likely to move toward and reach such water wells or a wellfield.

The Washington wellhead protection program has been in place since 1994, when the WAC was revised to include mandatory wellhead protection measures for all Group A[1] public water systems that use wells or springs as their water supply source. WAC 246-290-135, Source Water Protection, outlines the requirements for wellhead protection areas. The delineation of the wellhead protection area boundaries includes the sanitary control area; 6-month, 1-year, 5-year, and 10-year time of travel boundaries for groundwater; and a buffer, if needed. In addition, all "ground-water-using" Group A systems are also required to submit a susceptibility assessment to the Washington Department of Health (WDOH), Office of Drinking Water (ODFW) as part of their wellhead protection program (WDOH 2005). Assessment of the source waters focuses on the physical susceptibility to contamination. Low, moderate, and high susceptibilities are assigned, defined as follows (WDOH 2005):

- Low susceptibility systems have met stringent criteria for source hydrogeologic setting, historical water quality, and well construction.
- Moderate susceptibility systems have met the same stringent criteria for historical water quality and well construction as low susceptible systems, but are located within a higher risk hydrogeologic setting.
- High susceptibility systems are not able to meet one or more of the moderate susceptibility requirements.

According to WDOH data, there are two wellhead protection areas in the Kuhl Ridge WRA and five areas in the Dutch Flats WRA (see Figure 2-7 and Table 2-11). All are associated with City of Pomeroy community systems.

Under the Garfield County Critical Areas Ordinance, wellhead protection areas are included under the critical area heading of critical aquifer recharge area, in accordance with WAC 365-190-080(2)(d).

[1] A "Group A public water system" meets the federal definition of a public water system and includes all public water systems that serve 25 or more people or 15 or more connections (WDOH 1995).

Table 2-11 Wellhead Protection Areas

Wellhead Protection Area	Description
Kuhl Ridge WRA	
10-year WHPA	City of Pomeroy community system with a capacity of 750 gallons per minute (gpm); high susceptibility; well source
5-year WHPA	City of Pomeroy community system with a capacity of 750 gpm; high susceptibility; well source
Dutch Flats WRA	
5-year WHPA	City of Pomeroy community system with a capacity of 750 gpm; high susceptibility; well source
5-year WHPA	City of Pomeroy community system with a capacity of 300 gpm; high susceptibility; Bihmaier Springs is source
6-month WHPA	City of Pomeroy community system with a capacity of 300 gpm; high susceptibility; Bihmaier Springs is source
5-year WHPA	City of Pomeroy community system with a capacity of 300 gpm; low susceptibility; well source
5-year WHPA	City of Pomeroy community system with a capacity of 300 gpm; moderate susceptibility; well source

2.4.2 Impacts and Mitigation

2.4.2.1 Preferred Alternative

Construction Impacts

Construction of the Project will affect surface waters from site clearing and grading activities; installation of the electrical collector system in underground trenches; construction of new roads and upgrades to existing roads; and construction/installation of the turbines, O&M facilities, substations, and permanent meteorological towers. Clearing and grading activities will result in short-term indirect impacts to water quality, primarily through soil exposure leading to erosion and sedimentation. Approximately 2,750 acres within the Project area will be temporarily disturbed by activities including clearing and grading. Direct impacts to beds and banks of streams will occur where streams intersect new roads; the turbines will be sited on ridgetops and thus will not be co-located with streams. Streams crossed by roads will be culverted. Construction activities will be carried out in a manner that minimizes impacts to jurisdictional waters. Groundwater may be encountered during the turbine foundation construction.

Construction impacts are discussed below for stormwater, sedimentation, and erosion; water use during construction; and groundwater, as these impacts transcend all WRAs. Stream crossings are discussed separately for each WRA.

During construction, all mitigation measures inherent in Project design will be adhered to (refer to Mitigation for a detailed discussion of these measures).

All Four WRAs

Stormwater, Sedimentation, and Erosion

Stormwater runoff potential will be the greatest during construction of the Project, when large quantities of soil will be disturbed during construction of roads, turbine foundations, and other Project facilities. Precipitation during construction can result in stormwater runoff, which exacerbates the rates of erosion and sedimentation. Sedimentation affects water quality physically, chemically, and biologically. The concentration of suspended sediments increases turbidity in receiving waters and affects availability of light for photosynthesis. Sedimentation can destroy fish spawning beds and macroinvertebrate habitat. Sediment often carries organic matter, nutrients such as phosphorus, and chemicals, all of which can impact the water quality of a stream. If nutrients are bound to the sediment particles, a decrease in dissolved oxygen levels in the stream may result, leading to adverse impact to aquatic life. Implementation of proper erosion and sedimentation control measures can minimize sedimentation impacts to surface waters. Specific mitigation measures for sedimentation are discussed under mitigation.

Undesirable pH, temperature, and fecal coliform levels are primary indications of existing impaired waterbodies in the Project area. Given the surrounding agricultural land use, these impairments are expected, but further degradation as a result of Project construction activities is not expected. Fecal coliform will not be a contaminant of concern during construction or activities. Managing stormwater runoff properly and in compliance with permitting and other requirements during construction will ensure that it does not contain fuels or chemicals that could otherwise modify instream pH.

Water Use during Construction

Construction of the Project will require water for road construction, concrete production, wetting of concrete, dust control, and other activities. Water for dust suppression will be applied directly, using tank trucks equipped with rear-end sprinkler systems and absorbed onsite or evaporated. Water used during construction activities will be purchased by the Engineering, Procurement, and Construction (EPC) contractor from an offsite vendor and transported to the site in water-tanker trucks. No water from onsite will be used. Approximately two to three water trucks will be onsite during road construction, and one truck will be onsite when the batch plant is in operation. It is possible that the same water trucks will be used for both road construction and batch plant operations; thus, on average, there will be two to three water trucks onsite during construction per WRA.

The amount of water required for dust control depends highly on whether a dust palliative such as lignin is used, as well as the timing of the application and the weather. Existing county dust abatement processes will be adhered to and locally approved chemicals will be used. Garfield County uses a magnesium chloride compound (a magnesium lignin blend) for dust abatement. Columbia County uses a mixture of 85% lignin sulfinate and 15% magnesium chloride. These mixtures will be used during construction and will reduce the amount of water used for dust control by an estimated 50%.

Groundwater

Water for Project construction activities will not be obtained from new groundwater resources in the Project area but will be transported to the site from local providers in accordance with applicable state (Ecology) rules and regulations.

Excavation, drilling, and blasting for wind turbine foundations and rock quarries could penetrate depths up to 40 feet in the underlying basalt. The suprabasalt sediment aquifer system that underlies the Project area consists of localized water-bearing sand and gravel aquifers that are less than 5 to 40 feet below ground surface in lowland areas (Kennedy/Jenks Consultants 2005). Wind turbines will be located on ridges that are typically above the local water table. If groundwater is encountered during excavation and construction activities and dewatering is required, the water generated from dewatering will be discharged to upland areas through a hose, allowing distribution of the water over a large surface area to facilitate evaporation and/or infiltration. In addition, dissapators, sediment basins, and/or fabric bags will be used, if necessary, to avoid transport of silt into adjacent fields. No direct discharge to surface waters or riparian areas will occur during dewatering; upland discharge will be done away from surface waterbodies. Additional geotechnical analysis at Project facility locations will further limit the possibility of impacting groundwater.

Groundwater quality could be degraded through infiltration of stormwater runoff. Groundwater quality degradation could also result from fuel or chemical spills during construction activities.

Stream crossings, floodplains, and groundwater resources are discussed below for each WRA.

<u>Tucannon WRA</u>

Stream Crossings

One stream in this WRA (unnamed stream CTS2) may intersect a new road and may require a culvert (see Figure 2-3).

Installation of the new overhead 230-kV transmission line will require 10 overhead riparian crossings. Kellogg Creek, Smith Hollow, and Willow Creek will be crossed to facilitate the connections between Project substations (see Figure 2-3). The riparian areas of six unnamed streams will also be crossed: CTS20 (tributary of Kellogg Creek), CTS602, CTS 601, CTS14, CTS605, CTS 16 and CTS9 (see Figure 2-3). In addition, to connect the Tucannon WRA with the Oliphant Ridge WRA, a crossing of the Tucannon River will be necessary for the installation of a new overhead 230-kV transmission line (see Figure 2-3).

The collector lines that will connect individual turbine strings will be installed parallel to the road system. These lines will be buried underground in a trench approximately 3 feet wide and 3 to 4 feet deep. In addition, required construction ROWs will contribute to additional disturbed areas. If the lines cannot be installed through boring beneath the drainages, the lines will be brought overhead. The location of the collector system has not been finalized; the layout will be finalized when the geotechnical analysis and final engineering drawings are available. Additional analyses may be needed to determine site-specific impacts to water resources.

In addition to the streams discussed above, there are also 20 other streams which are present in the environmental permitting corridor; however, they will not be altered or disturbed under the proposed layouts. These features are listed in Table 2-12 below, and should be taken into consideration during micrositing.

Table 2-12 Unaltered/Undisturbed Streams Present in Tucannon Environmental Permitting Corridors

Stream	Location Description
CTS6	Flows along western boundary of environmental permitting corridor, west of T231 near Kellogg Creek
CTS609A	Flows within environmental permitting corridor, west of T163
CTS608	Flows within environmental permitting corridor, west of T163
CTS610	Flows within environmental permitting corridor, west of T163
CTS701	Ephemeral stream within environmental permitting corridor, south of T144
CTS12/13	Within environmental permitting corridor in the northeastern corner of the WRA
CTS600	Within environmental permitting corridor, west of T93
CTS603	Flows parallel to eastern boundary of environmental permitting corridor, south of A57
CTS4	Flows adjacent to a new road, parallel to the road, east of A56, A57
CTS3	Within environmental permitting corridor and south of the new road, east of A56, A57
CTS15	Flows into environmental permitting corridor northwest of T98 and the transmission line
CTS604	Within environmental permitting corridor on eastern side, east of T116
CTS607	(same as Smith Hollow) flows across corridor, southwest of T128
CTS15	Within corridor, northeast of transmission line and T127
CTS14	Within corridor, flows along western boundary of corridor, northeast of T127
CTS18	Flows down the center of the corridor, northeast of T127 and west of U.S. Route 12
CTS11	Within corridor, east of U.S. Route 12
CTS10	Within corridor, east of U.S. Route 12
CTS11	(same as Willow Creek) flows across corridor

Siting of above-ground Project facilities will not occur within any existing springs.

Floodplains
No permanent above-ground structures will be placed in 100-year floodplains. Overhead transmission lines and collector lines will cross floodplain areas.

Groundwater
No additional groundwater impacts beyond the general construction impacts discussed above will result from construction activities in this WRA. There are no wellhead protection areas in the Tucannon WRA.

Kuhl Ridge WRA

Stream Crossings
Construction of new roads and alterations to existing roads may result in the alteration of the natural drainage course of Dry Gulch, New York Gulch, and Weimer Creek (see Figure 2-4). Culverts may be installed to facilitate road crossings.

In addition, the natural drainage course of several unnamed streams identified by SWCA may be altered due to construction of new roads and alterations to existing roads, including unnamed streams GKS720, GKS20A, GKS13A, GKS9E, GKS14A, and GKS4A – C (see Figure 2-4).

Installation of the new overhead 230-kV transmission line will require 17 riparian crossings. Pataha Creek, Dry Gulch, and New York Gulch, all perennial streams, will each be crossed twice to facilitate the connections between Project substations (see Figure 2-7). In addition, several unnamed streams identified by SWCA will be crossed: GKS2A, GKS12A, GKS1-1A, GKS719, GKS603, GKS701, GKS711, GKS712, GKS725, and GKS716 (see Figure 2-4).

Please refer to the collector line discussion under the Tucannon WRA.

In addition to the streams discussed above, there are also eight other streams which are present in the environmental permitting corridor; however, they will not be altered or disturbed under the proposed layouts. These features are listed in Table 2-13 below, and should be taken into consideration during micrositing.

Siting of above-ground Project facilities will not occur within any existing springs.

Table 2-13 Unaltered/Undisturbed Streams Present in Kuhl Ridge Environmental Permitting Corridors

Stream	Location Description
GKS721	Ephemeral stream within corridor on the eastern side, east of A51
GKS720	Flows across the corridor, perpendicular to the corridor, west of T221
GKS717	Ephemeral stream in corridor west of road, and east of T211
GKS24a	Flows across the eastern boundary of the corridor north of T144
GKS703	Ephemeral stream, flows across eastern corridor boundary, south of T134
GKS707	Ephemeral stream, flows across corridor east of T190
GKS706	Ephemeral stream, flows across corridor west of T124
GKS708	Ephemeral stream within the corridor, northeast of T1

Floodplains
No permanent above-ground structures will be placed in 100-year floodplains. Overhead transmission lines and collector lines will cross floodplain areas.

Groundwater
No additional groundwater impacts beyond the general construction impacts discussed above will result from construction activities in this WRA. There will be no Project features within the wellhead protection areas in Kuhl Ridge, thus no construction will occur within those areas.

Dutch Flats WRA

Stream Crossings
Construction of new roads associated with the Project may result in the alteration of approximately 40 feet of Benjamin Gulch, a perennial stream (see Figure 2-5). This stream intersects a new road and may be culverted to accommodate the road crossings. Additionally, four unnamed streams identified by SWCA may be crossed by Project roads: GDS5O, GDS5C, GDS6C, and GDS22 (see Figure 2-5). Stream GDS22 is classified as a swale.

Installation of the new overhead 230-kV line will require five riparian crossings in the Dutch Flat WRA. Five unnamed streams (GDS13B, GDS7C, GDS13B - D, GDS25, and GDS26), identified by SWCA, will be crossed (see Figure 2-5). All five flow across the environmental permitting corridor, perpendicular to the transmission line but will not be disturbed by any Project facilities.

In addition to the streams discussed above, there are also seven other streams which are present in the environmental permitting corridor; however, they will not be altered or disturbed under the proposed layouts. These features are listed in Table 2-14 below, and should be taken into consideration during micrositing.

Table 2-14 Unaltered/Undisturbed Streams Present in Dutch Flats Environmental Permitting Corridors

Stream	Location Description
GDS12A	Flows along eastern environmental permitting corridor boundary, northeast of T71
GDS27	Flows into environmental permitting corridor North of T57
GDS20	Flows into environmental permitting corridor on west side, southeast of T78
GDS10	Flows across environmental permitting corridor southeast of T56
GDS11A	Flows across environmental permitting corridor, east of T56
GDS24	Flows into eastern corridor boundary northeast of T31
GDS18	Flows along eastern corridor boundary east of A22

Please refer to the collector line discussion under the Tucannon WRA.

Siting of above-ground Project facilities will not occur within any existing springs.

Floodplains
No permanent above-ground structures will be placed in 100-year floodplains. Overhead transmission lines and collector lines will cross floodplain areas.

Groundwater
In addition to the general groundwater construction impacts discussed above, several Project features will be located within the wellhead protection areas in this WRA. Turbines A9, A10, A11, A12, A13, and A14 and the associated new roads will be located within the 10-year Bihmaier Springs high susceptibility wellhead protection area (see Figure 2-5). In addition, turbines A7 and A8 and their associated new roads will be located within the 5-year Bihmaier Springs high susceptibility wellhead protection area (see Figure 2-5). Groundwater contamination, resulting from spills during construction activities, is possible; however, it will be minimized through mitigation measures specified in the SWPPP.

<u>Oliphant Ridge WRA</u>

Stream Crossings
Improvements to existing roads may result in alterations to Dry Hollow, an ephemeral stream (see Figure 2-6). In addition, unnamed stream GOS21A may be crossed by the construction of a new road west of T123 (see Figure 2-6).

In addition, road widening may alter five unnamed streams identified by SWCA: GOS6A, GOS5D, GOS17C, GOS708, and COS702 (see Figure 2-6).

Installation of the new overhead 230-kV transmission line will require two riparian crossings of Dry Hollow to facilitate the connections between Project substations (see Figure 2-6). In addition, to connect this WRA with the Kuhl Ridge WRA, there will be three crossings of Pataha Creek, which are discussed above under that WRA heading (see Figure 2-6). In addition, seven unnamed streams will each be crossed once by the transmission line: GOS704, GOS15A, GOS718, GOS719, GOS720, COS702, GOS13, and GOS715 (see Figure 2-6).

Please refer to the collector line discussion under the Tucannon WRA.

In addition to the streams discussed above, there are also 12 other streams which are present in the environmental permitting corridor; however, they will not be altered or disturbed under the proposed layouts. These features are listed in Table 2-15 below, and should be taken into consideration during micrositing.

Table 2-15 Unaltered/Undisturbed Streams Present in Oliphant Ridge Environmental Permitting Corridors

Stream	Location Description
GOS3A	Crosses the edge of the eastern environmental permitting corridor boundary, east of A144
GOS4A	Crosses the edge of the eastern environmental permitting corridor boundary, east of A144
GOS701	Ephemeral stream within corridor, east of A116
GOS702	Ephemeral stream within corridor, east of A114
GOS14	Within corridor, north of A108
COS701	Farm swale within corridor, northwest of substation
COS703	Ephemeral stream, south of T122
GOS20	In corridor, west of A54
GOS712	Within corridor, parallel to eastern corridor boundary, east of A55
GOS714	Ephemeral stream flowing perpendicular to the corridor, east of A74
GOS22a	Ephemeral stream flowing perpendicular to the corridor, east of A74
GOS24	Flows within corridor, west of T133

Siting of above-ground Project facilities will not occur within any existing springs.

Floodplains
No permanent above-ground structures will be placed in 100-year floodplains. Overhead transmission lines and collector lines will cross floodplain areas.

Groundwater
No additional groundwater impacts beyond the general construction impacts discussed above will result from construction activities in this WRA. There are no wellhead protection areas in the Tucannon WRA.

Project Facility Impacts

<u>All Four WRAs</u>

Surface Water, Runoff, and Erosion
No significant erosion or sedimentation impacts on surface waters within the Project area will occur during operation of the Project. Approximately 600 acres will be permanently disturbed from Project facilities including roads, turbines, and support facilities. Some of this permanently disturbed area will be comprised of impervious surfaces such as concrete. Impervious surfaces repel water and prevent precipitation from infiltrating soils. The primary source of impervious surfaces for the Project will be the turbine foundations, as well as the rooftops of the 4,500-square-foot O&M facilities. These areas are surrounded by pervious surfaces, including gravel and agricultural crops. Thus, the Project will generate little stormwater runoff, and the runoff that is generated will infiltrate naturally into the adjacent areas. In addition, the O&M facilities will use design features such as downspouts to convey rainwater from the building surfaces.

The permanent stormwater BMPs will include permanent erosion and sedimentation control through landscaping, grass, and other vegetative cover. The final designs for these BMPs will adhere to Ecology's *Stormwater Management Manual for Eastern Washington.*

Transmission and Collector Lines
Operation of the new 230-kV overhead transmission lines or the collection system will not affect any surface water. The overhead transmission lines will be installed at least 250 feet from the banks of fish-bearing streams and 200 feet from the banks of any from non-fish-bearing stream, and operation of those lines will not affect any crossed streams. Operation of the collection system installed in the trench will not affect any crossed streams. No discharge will result from the operation of the lines; thus, no water quality issues will result.

Water Use
Operating the Project will not require water for any use except the limited water needs of the O&M facilities. Depending on the location of those facilities, water for the bathroom and kitchen will be obtained from an exempt well constructed onsite, or will be trucked in and stored in an onsite tank. Water use will be less than 5,000 GPD for each O&M facility, for a total of 30,000 GPD if up to six O&M facilities are constructed. A Well Construction and Operator's License will be obtained from Ecology if onsite wells are constructed, and other associated approvals will be obtained for withdrawal of groundwater. In addition, the County Health districts will be contacted for information on water use and septic systems.

Avoided Water Consumption
Facility operations will also result in water savings by avoiding the consumption associated with thermal-based power generation options to deliver the equivalent power. Thermal-based power generation systems consume large amounts of

water. Water is an integral part of electric power generation and is used extensively for cooling and emissions scrubbing in thermoelectric generation (U.S. Department of Energy 2006). The Project's renewable energy output will avoid fossil-fuel-based power production. Annual water consumption for thermal-based power generation alternatives is estimated to range between 500 and 2,100 million gallons per year.

End of Design Life Impacts

Impacts on water resources from end of design life alternatives will be similar to or less than impacts from Project construction. Surface water runoff potential will be greatest during dismantling, when soil is disturbed by vehicles and removal activities. Mitigation will follow the guidance given below under Mitigation, including adhering to required stream buffer widths.

No permanent impacts to water resources are expected to result from repowering turbines or continuing Project operations beyond estimated Project life, as all such future modifications would be expected to remain within the existing Project footprint. Therefore, impacts to water resources from repowering or continuing operations of this Project will be less than those impacts described for Construction, assuming all access roads remain in place.

Mitigation

Mitigation Inherent in Project Design

The Project's final design will incorporate several inherent elements of mitigation. These elements include adherence to stream buffers, culverting of streams to facilitate road crossings, the avoidance of surface waters through micrositing for the final Project layout, and the implementation and design of BMPs in compliance with Ecology's *Stormwater Management Manual for Eastern Washington*. The final design will adhere to the surface water buffers specified by the counties' CAOs, BMPs will be employed onsite, and applicable permit requirements for runoff and sediment control will be complied with in all design scenarios. Each of these inherent mitigation measures is discussed below.

Adherence to Stream Buffers. Construction related to the overhead transmission line will be at least 200 feet from the stream bank on either side, and no heavy equipment will be used in the stream bed or riparian corridor for construction, where avoidance is feasible. BMPs will also be implemented onsite to prevent runoff into surface waters. Where avoidance of the riparian corridor is not possible, rock construction access roads will be used, and wheels and tracks will be kept above the ordinary highwater mark (OHW). Existing crossings (county road and farm road crossings) will be used to the maximum extent practicable.

Culverts. Culverts will be installed to facilitate road crossings/road widenings. For new roads, it is assumed that the culverts will be approximately 40 feet in length. For widened roads, culvert width is dependent upon the ultimate road width, which depends upon the specific vehicles and machinery used at that location.

Approximate culvert lengths will be determined during finalization of the engineering drawings.

Avoidance of Surface Waters through Micrositing. Surface water impacts at each of the WRAs will be avoided to the maximum extent practicable during the final design of the Project including site specific geotechnical analysis at Project facilities. Through micrositing, the Project layout will be designed to avoid impacts on surface water and groundwater. Project features designed to avoid or minimize impacts include:

- Minimizing new road construction by improving and using existing roads instead of constructing new roads;
- Siting construction staging areas and stormwater management facilities in upland areas with sufficient buffers from streams;
- Using existing sources of water for construction and operation;
- Locating underground cables, transmission poles, and other associated infrastructure outside any surface water, where feasible; and
- Re-seeding disturbed areas after completing construction activities.

Adherence to Ecology's Stormwater Management Manual for Eastern Washington. All mitigation measures (erosion and sediment control, stormwater management, and stormwater pollution prevention measures) will be prepared and implemented with adherence to Ecology's Stormwater Management Manual for Eastern Washington. Both Columbia and Garfield counties have adopted this manual as their stormwater guidelines. The manual provides technical guidance on measures to control the quantity and quality of stormwater runoff from new development and redevelopment activities. These measures are considered necessary to achieve compliance with state water quality standards (Ecology 2004). In addition, design and implementation of all stormwater management systems will be completed in consultation with a Washington State Licensed Professional Engineer to ensure minimal erosion.

Other mitigation measures proposed for water resources are discussed below in construction mitigation measures and operational mitigation measures subsections. These measures are applicable for all WRAs.

<u>Construction Mitigation Measures – Erosion and Sedimentation Control</u>
To minimize impacts to water quality, erosion prevention and control measures will be implemented. Construction activities will incorporate the following general practices:

- Straw mulching and vegetating disturbed surfaces;
- Retaining original vegetation wherever possible;
- Directing surface runoff away from denuded areas; and
- Minimizing constructed slope steepness and length to keep runoff velocities low.

During construction, erosion can be controlled and sediment can be retained onsite by implementing specific BMPs appropriate to the site (considering drainage, topography, soil type, and other variables) and appropriate for the season during which construction activities take place. Sediment control measures that could be implemented on the Project site include:

- **Straw bale barriers** that decrease the velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas, preventing sediment from leaving the site;
- **Silt fences** composed of a Geotextile mesh fabric that reduce transport of coarse sediment by providing a temporary physical barrier and reducing overland flow velocities;
- **Vegetated strips** with a permeable topsoil that have the same function as silt fences;
- **Sediment traps,** which are small temporary ponding areas with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction; and
- **Temporary sediment ponds,** which remove sediment from runoff originating from disturbed areas of the site.

An erosion and sediment control plan (ESCP) will be prepared before construction activities begin describing details and locations of conveyance systems, detention BMPs, and erosion and sediment control facilities. The ESCP is part of the SWPPP, discussed in detail under Construction Mitigation Measures – Stormwater Management.

Road and turbine foundations and cut slopes will be designed in consultation with a Washington State licensed Professional Engineer to ensure appropriate slope protection measures and materials are used. This accords with the Garfield County Zoning Ordinance, Section 1.05.090 Wind Power Generators, Solar and Fuel Cell Energy Conditions of Approval, and the Columbia County Commercial Wind Turbine Energy Projects Standards of Development for erosion. In addition, during the first year following construction and/or until vegetation has been established in soils disturbed during construction, the Applicant will monitor the Project site for erosion on a regular basis and after large rainfall or snowmelt events, taking corrective actions where necessary as per the NPDES permitting requirements.

Additional mitigation measures specific to onsite construction activities are discussed below.

- **Roads.** Work on access roads (new and modifications to existing), will include grading and re-graveling existing roads. Erosion control measures will be installed during road work, and will include:

- Maintaining vegetative buffer strips between the affected areas and any nearby waterways;
  - Installing sediment fence/straw bale barriers on disturbed slopes and other locations shown in the SWPPP;
  - Installing silt fencing on steeper exposed slopes; and
  - Planting designated native seed mixes at impacted areas during times that support germination.

- **Turbines.** During installation, silt fences, hay bales, or matting will be placed to minimize downslope movement of stormwater. Following construction, all disturbed areas around all crane pad locations will be re-seeded with a native seed mix.
- **Overhead Transmission Line Installation.** Construction of the overhead transmission lines will require excavation for pole installation. Excavated materials will be piled alongside the excavations for backfilling following pole installation. After backfilling, excess excavated soils will be spread around the surrounding area and brought to natural grade, and the area will be re-seeded.
- **Concrete Batch Plants.** The batch plant will use outdoor stockpiles of sand and aggregate, which will be located to minimize exposure to wind. Sediment fences, hay bales, or matting are examples of measures that will be installed near the storage areas. Cement will be discharged via screw conveyor directly into an elevated storage silo. Good housekeeping practices will be exercised and regular cleanings will be conducted of the plant, storage, and stockpile areas to minimize buildup of fine materials.

Construction Mitigation Measures – Stormwater Management
Point and non-point stormwater discharges will be managed in accordance with SWPPPs and through NPDES permits for stormwater discharges. The CWA, Section 402, established the NPDES to limit pollutant discharges into waterbodies including streams and rivers. The NPDES program regulates stormwater discharges from municipal separate stormwater systems, construction activities, and industrial activities.

A detailed Construction SWPPP will be developed for the Project to minimize the potential for discharge of pollutants from the site during construction activities. The SWPPP will be based on Ecology's *Stormwater Management Manual for Eastern Washington*. The SWPPP will also be prepared to meet the conditions of the Construction Stormwater General Permit (NPDES and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activity) and the Industrial Stormwater General Permit (NPDES and State Waste Discharge Permit for Stormwater Discharges Associated with Industrial Activities). Water quality monitoring and reporting will be conducted in compliance with permit requirements.

The Project-specific SWPPP will include the 12 construction SWPPP elements listed below and the BMPs selected for each one (Ecology 2004):

1. Mark clearing limits
2. Establish construction access
3. Control flow rates
4. Install sediment controls
5. Protect vegetation/stabilize soils
6. Protect slopes
7. Protect drain inlets
8. Stabilize channels and outlets
9. Control pollutants
10. Control de-watering
11. Maintain BMPs
12. Manage the project

Site-specific BMPs will be identified for the Project area and designed to meet the requirements set forth in Ecology's *Stormwater Management Manual for Eastern Washington*, specifically Chapter 5, Runoff Treatment Facility Design, and Chapter 6, Flow Control Facility Design.

Stormwater pollutants can be managed by effective source control. All pollutants, including waste materials and demolition debris, will be handled and disposed of in a manner that does not result in contamination of stormwater. Potential water pollutants that will be used and transported onsite include diesel fuels and gasoline, lubricating and mineral oils, and chemical cleaners. All these materials will be handled according to the SWPPP and the Spill Prevention, Containment and Control Plan.

Construction Mitigation Measures – Stream Buffers
Project-related facilities will be located outside of the county-specified stream buffers; refer to Table 2-4 for a listing of these buffers.

Construction Mitigation Measures – Groundwater Resources
Stormwater management measures described above will be sufficient to limit potential impacts to groundwater quality. A SWPPP will be prepared and will dictate appropriate BMPs for managing non-stormwater discharges and materials. It will include practices for good housekeeping and containment of materials and wastes. Stormwater drainage systems and structural BMPs will be designed to prevent infiltration of liquid contaminants or contaminated runoff into underlying aquifers.

Wellhead Protection Areas
This discussion of mitigation is specific to the Dutch Flats WRA due to the presence of the wellhead protection areas in the northern part of the WRA.

As previously indicated, wellhead protection areas are critical aquifer recharge areas under the Garfield County CAO. Section 11.8, Protection of Water Quality, sets forth specific actions to be taken to ensure protection of groundwater quality. These actions include the following (Garfield CAO, Section 11.8):

1. Contamination of groundwater by surface water use, discharge, or runoff will be prevented.
2. New developments during both construction and operational phases that generate surface drainage or runoff to ground or surface water will:
   a. Assure that the use, handling, discharge, or disposal of regulated substances be accomplished in a manner that prevents their entry into ground or surface waters;
   b. Retain and clean, to current state discharge standard, runoff prior to its discharge into ground or surface waters;
   c. Ensure that runoff stormwater drainage will not result in soil erosion or water quality degradation.

Under the Garfield County CAO, a Site Assessment Report must be prepared, which includes a site plan outlining the locations of known wells and receptors.

In addition to compliance with the CAO requirements, the Garfield County Health District has stipulated additional mitigation measures for the wellhead protection areas. For construction within the wellhead protection areas, construction crews must ensure that water drains away from the wellhead and that no ponding occurs in these areas (Tureman Pers. Comm. 2009). The Health District indicated there should not be any issues during construction of the turbine foundations unless there are very shallow wells within the immediate vicinity in accordance with existing wellhead protection area mapping (Tureman Pers. Comm. 2009).

Operational Mitigation Measures – General Stormwater Pollution Prevention Measures

As indicated above under Construction Mitigation Measures – Stormwater Management, a SWPPP will be prepared and implemented as part of the final Project design. Final designs for the permanent BMPs will be incorporated into the final construction plans and specifications. An operations manual for these permanent BMPs will be prepared and implemented throughout the operational phase of the Project.

Operational source control BMPs will be adopted as part of the SWPPP and implemented to reduce or eliminate stormwater pollutants during operation. These include good housekeeping, employee training, spill prevention and cleanup, preventive maintenance, regular inspections, and record keeping (Ecology 2004).

The Project operations group will periodically review the SWPPP against actual practice. The wind farm operators will ensure that the controls identified in the plan are adequate and that employees are adhering to them.

2.4.2.2 No Action Alternative
Under the No Action Alternative, the Project will not be constructed or operated and the existing agricultural uses in the Project area would continue. Impacts to water resources would not be expected to change from existing conditions, and would be limited to disturbances associated with agricultural activities and potential disturbances associated with transportation initiatives and upgrades.

2.4.2.3 Probable Significant and Unavoidable Adverse Impacts
As mitigated, the Project will have no probable significant and unavoidable adverse impact to water resources.

2.4.2.4 Cumulative Impacts
The Project's impact on water resources will add to impacts from other past, present, and foreseeable future development projects in Columbia and Garfield counties. Impacts to water resources will be localized and temporary and will coincide with the construction period. The only water withdrawals associated with the Project will be for domestic uses for the O&M facilities, if local groundwater wells will be the source of that water.

The existing wind power projects (Hopkins Ridge and Marengo I and II) use limited water, primarily for domestic use at the O&M facilities. These projects required culverting of streams, which cause minor hydrological modifications.

The potential future wind projects and interconnections listed in Table 2-1 will involve construction activities, disturbance types, project components, and mitigation similar to those of the Project. Because location details are unknown, it is not known whether potential future projects will locate facilities near major streams; however, these projects will assumedly adhere to the stream buffer requirements stipulated in the Garfield and Columbia counties' CAOs. Primary impacts to water resources will be short-term during construction and/or related to road crossings and associated culvert installations. It is unknown whether the future wind projects will be sited within the same watersheds as the Project, so determining additive impacts to tributaries and streams is not possible.

Groundwater impacts of the future wind projects will be similar to those described for the Project, except the future regional wind projects may use local groundwater wells. These projects will assumedly comply with Ecology requirements for groundwater well permitting and withdrawals; therefore, no significant cumulative impacts will result to regional groundwater resources.

It is not anticipated that Blue Mountain Station and Port of Columbia Industrial Park developments will increase water demand substantially in the region. Transportation-related actions within Columbia and Garfield counties will take place largely within existing ROWs, therefore not impacting surface waters.

2.5 Wetlands

Wetlands are defined as “areas that are inundated or saturated by surface or groundwater 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” (33 CFR 328.3, 40 CFR 230.3). The identification and delineation of wetlands subject to federal jurisdiction under Section 404 uses a three-parameter approach whereby wetland hydrology, hydric soils, and hydrophytic vegetation must all be present (Environmental Laboratory 1987). The final determination of jurisdictional status is at the discretion of the regulatory agencies.

Wetlands are regulated by federal (i.e., Section 404 of the CWA, Executive Order 11990), state, and local laws and policies. Under Section 404 of CWA, the U.S. Army Corps of Engineers (USACE) is responsible for regulating activities that result in the discharge of dredged or fill materials into waters of the United States. For a wetland to be considered under USACE jurisdiction, there must be a hydrological connection or significant nexus to traditional navigable waters.

Ecology is the lead state agency for regulating wetlands and provides guidelines on the delineation of wetlands, wetland characterization and function assessments, and mitigation. Ecology’s authority is governed under the State Water Pollution Control Act and the Shoreline Management Act.

At the county level, wetlands are designated as “critical areas” and fall under the local jurisdiction of the CAO of both Garfield and Columbia counties.

Wetland functions will be rated according to the Washington State Wetland Rating System for Eastern Washington (Hruby 2004). Water quality, hydrologic functions, and habitat functions will be rated to determine the categories of wetlands present in the Project and to determine the buffers that would likely be required adjacent to these wetlands by Garfield County and Columbia County. Table 2-16 provides the definitions of the wetland categories, along with their associated required buffer width, as per the CAOs for Garfield and Columbia counties (see Section 2.14 Land Use for a detailed discussion of these ordinances).

Table 2-16 Wetland Category and Buffer Requirements

Wetland Category	Definition (Hruby 2004)	Columbia County Buffer Width (High, Moderate, Low Intensity of Land Use)	Garfield County Buffer Width
Category I	Those wetlands that 1) represent a unique or rare wetland type; or 2) are more sensitive to disturbance than most wetlands; or 3) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or 4) provide a high level of functions	300, 250, 200 feet	200 feet minimum
Category II	Wetlands that are difficult, though not impossible, to replace, and provide high levels of some functions. These wetlands occur more commonly than Category I wetlands, but still need a relatively high level of protection.	200, 150, 100 feet	100 feet minimum
Category III	Includes those wetlands that are 1) vernal pools that are isolated, and 2) wetlands with a moderate level of functions. These wetlands have generally have been disturbed in some way, and are often smaller, less diverse and/or more isolated from other natural resources in the landscape than Category II wetlands	100, 75, 50 feet	50 feet minimum
Category IV	These wetlands have the lowest levels of functions and are often heavily disturbed.	50, 35, 25 feet	25 feet minimum

2.5.1 Affected Environment

2.5.1.1 Preliminary Data Review

Wetlands were investigated during field surveys conducted in October through December 2008 and during February, May, and June 2009 (Appendix B SWCA Memo). *See also* Figure 2-8. This preliminary wetland investigation was conducted in the turbine strings and associated infrastructure environmental permitting corridors. Areas near the edge of these corridors were examined if they were determined to have the potential to contain wetlands based on a review of USFWS National Wetlands Inventory (NWI) maps (USFWS 2009a), aerial photography, USGS 7.5-Minute Series topographic maps, and Garfield County and Columbia County soil surveys. The field investigation focused on those areas with USGS-mapped streams, NWI mapped wetlands, mapped hydric soils, and additional areas determined to have the potential to contain wetlands based onsite aerial photographs.

Very few wetlands are mapped on the NWI maps within the environmental permitting corridors. In general, where NWI-mapped wetlands are shown within the environmental permitting corridors, they tend to be linear wetlands associated with mapped streams. Several small wetlands ranging from a tenth of an acre to a few acres are mapped on the NWI along the major streams in or near the Project area including Pataha Creek and the Tucannon River.

Wetlands in the Project area are typically associated with onsite drainages, including those wetlands associated with perennial streams, intermittent streams, springs, or modified natural drainages. The majority of wetlands identified in the Project were not mapped on the NWI.

2.5.1.2 Wetland Characteristics of the Project Area

Riparian Wetlands

Wetlands associated with the larger perennial streams within the Project area are common adjacent to (directly abutting) the defined bed and bank of these water bodies. These wetlands are typically dominated by grasses, forbs and scattered trees and shrubs, including reed canarygrass (*Phalaris arundinacea*), giant goldenrod (*Solidago gigantea*) and poison hemlock (*Conium maculatum*), with scattered willow (*Salix* species), black cottonwood (*Populus balsamifera*) and black locust (*Robinia pseudoacacia*) (see Section 2.8 Vegetation for a detailed discussion of vegetation in the Project area). The primary source of hydrology for these wetlands is from the adjacent perennial stream.

Based on field evaluation using Ecology's *Washington State Wetland Rating System for Eastern Washington* (Hruby 2004), the majority of wetlands associated with perennial and intermittent streams in the Project area will likely be rated as Category III or IV wetlands (SWCA 2009).

Wetlands associated with intermittent streams are common downstream of spring areas and the initiation of intermittent drainages. These wetlands often directly abut the intermittent drainage and are typically dominated by a thick overstory of willow with reed canarygrass dominating the herbaceous vegetation. The high groundwater table in the Project area (see Section 2.4 Water Resources) contributes to the hydrology of these wetland areas.

Wetlands Associated with Springs

Wetlands associated with spring areas are located at the initiation of intermittent drainages. Springs are often dominated by cattail (*Typha* species) and contribute to the hydrology of the wetland. Wetlands associated with springs in the Project area will likely be rated as either Category III or IV wetlands. (Refer to Section 2.4 Water Resources for discussion on the potential impacts to springs as a result of this Project).

Wetlands Associated with Modified Natural Drainages

Wetlands associated with a modified natural drainage primarily occur in areas of historical natural drainages that have been modified by past land use. This wetland type includes slope and depressional wetlands, with high groundwater and adjacent runoff providing hydrology. Typically dominated by herbaceous vegetation, the vegetation characteristics vary throughout the wetlands. Wetlands associated with these drainages in the Project area will likely be rated as either Category III or IV wetlands.

The following wetland information is based on field observations made by SWCA (2009) (see Figures 2-3 to 2-6, 2-8). The categories of these wetlands are discussed in Table 2-17.

Table 2-17 Wetland Characteristics of Identified Wetlands within the Environmental Permitting Corridors by WRA

Wetland	Size (acres)	Category
Tucannon		
CTW1	0.018	Not yet rated[1]
CTW600	0.01	Not yet rated
CTW601	0.001	Not yet rated
CTW602	0.06	Not yet rated
Kuhl Ridge		
GKW1a	0.75	Not yet rated
GKW5a	0.005	Not yet rated
GKW6	0.002	Not yet rated
Dutch Flats		
GDW2	1.05	Not yet rated
GDW4	0.11	Not yet rated
GD10	0.04	Not yet rated
GDW3	0.07	Not yet rated
Oliphant		
GOW1	0.93	III
GOW2	0.11	III

Note: Those wetlands listed as not yet rated will be addressed in the final wetland delineation report to be prepared for this Project prior to the start of construction.

Four small wetlands, ranging from 0.001 to 0.06 acres, occur in the environmental permitting corridor at the Tucannon WRA. Three wetlands, ranging from 0.002 to 0.75 acres, occur in the environmental permitting corridor at the Kuhl Ridge WRA. Two wetlands, 0.93 and 0.11 acres, occur in the Oliphant WRA. Four wetlands, ranging from 0.04 to 1.05 acres, occur in the Dutch Flat WRA.

2.5.2 Impacts and Mitigation

2.5.2.1 Preferred Alternative

Siting of wind turbines and roadways supporting the Project will be done in a manner which avoids disturbing jurisdictional wetlands to the greatest extent possible. The Applicant has made all attempts to place turbine strings, associated infrastructure, and access roads along ridgetops and outside wetlands and their associated buffers. A final wetland delineation will be conducted upon completion of the micrositing process. The Applicant will consult with the appropriate state and federal agencies upon determination that jurisdictional wetlands may be impacted.

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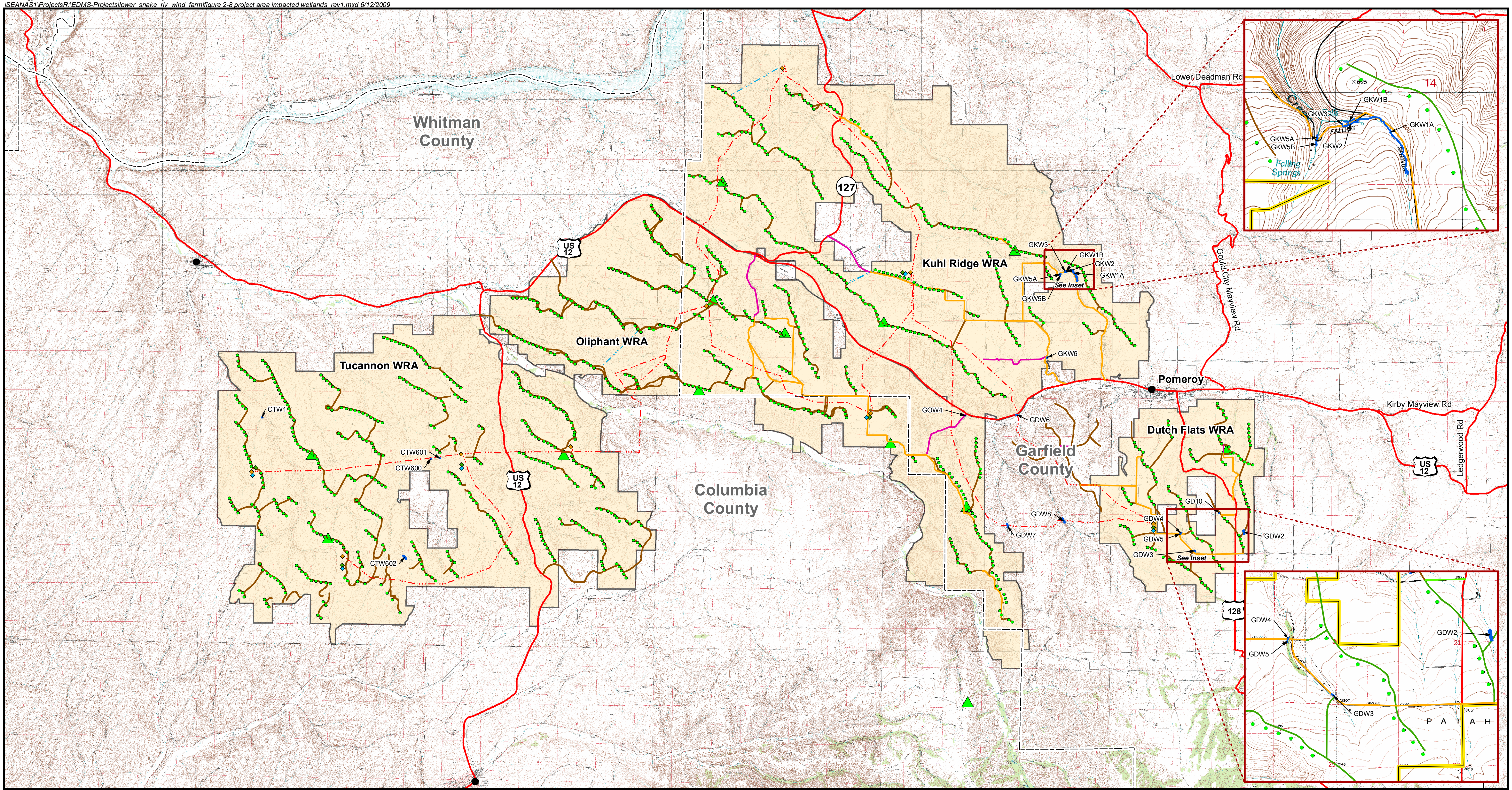
\SEANAS1\ProjectsR:\EDMS-Projects\lower_snake_riv_wind_farm\figure 2-8 project area impacted wetlands_rev1.mxd 6/12/2009



Legend

- Turbine Location
- City
- Laydown
- Operations & Maintenance
- Substation
- Met Towners
- County Lines
- 35 kV Transmission Line
- 230 kV Transmission Line
- Existing Roads
- New Roads
- Existing Roads to be Upgraded
- Project Area
- SWCA Observed Wetlands

Lower Snake River Wind Energy Project

Columbia & Garfield Counties
Washington

Figure 2-8
Project Area Impacted Wetlands

0 1 2 4 6 8
Scale 1:160,000 Miles

Source Information: SWCA Environmental Consultants field team.

As part of the permitting process for this Project, a Joint Aquatic Resources Permit Application (JARPA) will be submitted to the state and federal permitting agencies. The JARPA is likely to include applications for the following:

- U.S. Army Corps of Engineers (Corps) Section 404 Nationwide Permits;
- Washington Department of Ecology 401 Water Quality Certification; and
- Compliance with the Columbia County or Garfield County CAO.

Construction Impacts

The potential impacts to wetlands during construction of the Project are described below in general; specific impacts to identified wetlands are discussed in detail in the following subheadings organized by WRA.

Potential construction related impacts to wetlands associated with the Project include increased sedimentation as a result of road construction, impacts associated with replacing or installation of culverts at road crossings, and penetration of underground aquifers during drilling or blasting activities.

Since the majority of the construction activities will be concentrated on ridge tops, limited impacts are expected. However, road construction and installation of the electrical collection system often involve stream crossings. To minimize the impacts associated with stream crossings, the Applicant will minimize the number of stream crossings to the maximum extent possible. The electrical collector system may need to be carried on overhead transmission lines at stream crossings to avoid impacts.

The majority of the clearing and grading activities associated with the Project will be at least 200 feet from all wetlands in the Project area, which exceeds all required buffer widths under the Garfield County CAO and all but the Category I wetland buffers under the Columbia County CAO. No Category I wetlands occur in the Project area.

With the implementation of appropriate set backs from wetland features and proper erosion and sedimentation control measures, impacts to wetlands resulting from sedimentation can be minimized. Specific mitigation measures for sedimentation are discussed below under Mitigation.

Excavation, drilling, and blasting for turbine foundations and rock quarries (if established for the Project) may have the potential to penetrate the aquifer system under the Project area. Impacts to this aquifer can potentially alter groundwater flow (also see Section 2.4.2.3 Water Resources) to wetlands, resulting in dewatering of wetlands. As wind turbines will be located on ridges, typically above the local water table, dewatering of wetlands from turbine foundation construction is unlikely to occur. A thorough geotechnical analysis of each turbine foundation will be conducted prior to construction. This analysis will further limit the possibility of impacting an underground water system.

Tucannon, Kuhl Ridge, and Oliphant WRAs

Construction of the Project will not permanently disturb or fill any wetlands in these WRAs during site clearing and grading activities; installation of the electrical collector system in underground trenches; construction of new roads and upgrades to existing roads; construction/installation of the turbines; and the construction of transmission lines. Furthermore, no permanent structures will be placed within wetlands or their designated buffers in these WRAs.

Dutch Flats WRA

Two wetlands will be potentially disturbed as a result of this Project. The first is the 1.05-acre wetland (GDW2) wetland northwest of turbine T-23 (see Figure 2-8). A portion of this wetland may be filled as part of the road development and culvert installation from turbines T-23 to T-20. The second wetland, a 0.07-acre wetland (GDW3), may be filled as a result of the widening of the Dutch Flat Road and installation of a culvert.

Project Facility Impacts

All Four WRAs

No direct disturbances to wetlands are anticipated during the Project's operation or maintenance; therefore Project facility impacts will be the same across all WRAs.

Indirect impacts include the possible introduction of invasive species to wetlands. See Section 2.8 Vegetation, Mitigation, for noxious weed control and mitigation for disturbed sites, as well as revegetation that would be implemented in consultation with WDFW.

End of Design Life Impacts

There will be no disturbances to wetlands from repowering turbines or continuing operations as all modifications will remain within the existing operations footprint. Disturbances to wetlands from decommissioning this Project will be less than those described for Construction, assuming all access roads remain in place. Decommissioning vehicles will travel on established roadways generating dust and could potentially introduce or spread non-native, invasive, or noxious weeds to wetland areas. BMPs will be implemented to ensure this spread is minimized.

No permanent impacts to wetlands are expected to result from repowering turbines or continuing Project operations beyond estimated Project life, as all such future modifications would be expected to remain within the existing Project footprint.

Mitigation

A formal wetland delineation of the Project will occur upon completion of the micrositing process on all wetland features potentially impacted. The results of this study will be shared with local, state and federal agencies as appropriate to determine the required permits and preferred mitigation measures. Once proposed wetland disturbance areas are been determined, wetland functions to be disturbed by the Project will be evaluated and a mitigation plan will be designed to provide functional replacement for the proposed impacts. Wetland functions will be evaluated using Ecology's Washington State Wetland Rating System for Eastern Washington (Hruby 2004) and mitigating disturbances to wetlands will follow guidelines outlined in Ecology et al. (2006a, b). Opportunities for wetland and buffer mitigation, through restoration and enhancement, exist along the larger perennial streams in the onsite watershed. The preferred mitigation approach is to conduct mitigation along the larger perennial streams, rather then having many smaller mitigation sites located adjacent to the impact sites. Wetland mitigation and riparian buffer enhancement can occur in quantities sufficient to compensate for disturbances to wetland areas. The goal of the mitigation will be to avoid a net loss of wetlands in the region.

There are a limited number of Category III and IV wetlands within the Project area (SWCA 2009); however, the majority of the Project facilities will be located greater than 200 feet from these critical areas to prevent any impacts. During the design of the Project, Project facilities, including access roads, transmission lines, and turbine strings, were intentionally laid out to avoid, or at least minimize, disturbances to the limited wetland features in each WRA.

Features of this Project that are designed to avoid or minimize disturbances to wetlands include the following:

- Siting construction staging areas and stormwater management facilities in upland areas with sufficient buffers from wetlands;
- Using existing developed water sources for construction; and
- Locating roads, underground cables, turbine foundations, transmission poles, and other associated infrastructure outside wetlands.
- When locating roads, underground cables, turbine foundations, transmission poles, and other associated infrastructure in immediate proximity to wetlands, evaluate shallow groundwater and impacts thereto and adjust tower location to avoid impact.

Any work adjacent to wetlands will adhere to applicable federal, state and local regulations and will be addressed in Ecology's Stormwater Discharge Permit and SWPPP. BMPs will be implemented to retain sediment from disturbed areas and minimize areas of disturbance. All mitigation measures outlined in Section 2.4 Water Resources will be applicable to wetlands.

2.5.2.2 No Action Alternative

Under the No Action Alternative, the proposed wind power facility will not be constructed and the existing agricultural uses in the Project area will continue. Impacts to wetlands will not be expected to change from existing conditions, and will be limited to disturbances associated with agricultural activities and potential disturbances associated with transportation initiatives and upgrades.

2.5.2.3 Probable Significant and Unavoidable Adverse Impacts
As mitigated, the Project will have no probable significant and unavoidable adverse impact to wetlands.

2.5.2.4 Cumulative Impacts
The effects of the Project on wetlands will be additive to other effects from past, present, and reasonably foreseeable future actions. Cumulative effects of the four wind projects, including this Project, Hopkins Ridge, and Marengo I and II, can result from directly filling or grading wetland systems, as well as from indirect effects due to upslope clearing and grading activities and the resulting erosion and sedimentation or introduction of invasive species.

In general, disturbances to wetlands have been or will be either avoided or minimized by each of the approved or proposed wind power projects and transmission line developments through site planning and micro-siting. Combined with the arid nature of this region, wetlands are predominantly associated with streams and rivers. Existing wind and transmission line infrastructure of projects in the surrounding region were sited to avoid wetland disturbances.

It is unknown whether the future potential wind projects will locate project facilities near wetlands; however, it is assumed that these projects will adhere to the same wetland buffer requirements as stipulated in Garfield and Columbia counties' CAOs. Primary disturbances to wetlands will be short-term during construction and/or will be related to road crossings and associated culvert installation, as the majority of wetlands in this region are stream-associated. It is unknown whether the future potential wind projects will be sited within the same watersheds as the Project, so determining additive impacts to regional wetlands is not possible.