3.3 Water Resources

3.3.1 Existing Conditions

3.3.1.1 Surface Water Resources

The proposed project is situated south and east of the Columbia River in Walla Walla County, Washington, and Umatilla County, Oregon. This is a semi-arid region, with an average annual precipitation of about 10 inches per year and a 24-hour 100-year rainfall of 1.8 inches.

Major rivers in the vicinity of the project area include the Columbia River to the west and north of the project, the Walla Walla River in the center of the project area, and the Snake River to the north and east. The plant site would be located a short distance east of the Columbia River, whereas the transmission line right-of-way would roughly parallel the river about 1 to 3 miles to the east or south of it, for a distance of approximately 34 miles. This right-of-way would cross over the Walla Walla River about 1 mile upstream from its confluence with the Columbia River.

Generation Plant

The plant site is situated about 800 feet east of the Columbia River, which is impounded behind McNary Dam about 25 miles downstream, forming Lake Wallula. Construction of McNary Dam began in 1947 and the reservoir filling began in 1953. The reservoir surface elevation generally fluctuates between 335 and 340 feet above MSL (Corps undated).

As shown in Figure 3.3-1, the plant site slopes generally southwesterly toward the Columbia River, from about 406 feet MSL to about 360 feet MSL. Because of the combination of the relatively high permeability of the site soils, the moderately deep water table, and the low rainfall of the area, no surface water drainage features have developed on the site.

There are four ponds on the property, all constructed around 1979 for use in conveying irrigation water to agricultural cropland at the site. For the purpose of this discussion, these wetland ponds are labeled A, B, C, and D. The physical characteristics and general water quality information for each of these surface water bodies are summarized in Table 3.3-1, and their locations are shown on Figure 3.4-1 in Section 3.4, Wetlands and Vegetation. These ponds and additional wetlands in the project area are discussed in detail in Section 3.4.

Based on consultations between the applicant, the Natural Resources Conservation Service, and the U.S. Army Corps of Engineers, the ponds on-site are not naturally occurring and do not have direct connectivity to the Columbia River/Lake Wallula (Wallula Generation 2001).

Table 3.3-1. General Characteristics of Project Site Irrigation Ponds

Name	Location on Site, Size, and Shape	Water Level	Water Quality
Irrigation pond A	Northeast corner. Triangular pond of 3 acres when full.	Full during the irrigation season; usually dewatered outside the irrigation season except during heavy rainfall periods	Variable (i.e., clear to turbid) due to intermittence; hard water, high nutrient, pH and dissolved oxygen contents leading to eutrophic conditions; high fecal coliform counts
Wetland/pond B	Southwest corner. Small (0.35 acre), circular.	Usually contains standing water	7.0 to 7.3 pH, clear with relatively high dissolved solids, low fecal coliform, moderate levels of algal parameters, moderate to high nutrient and dissolved oxygen levels
Wetland/pond C	Southwest quarter. Narrow, steep-banked, 0.67 acre.	Contains some subsurface inflow at all times	7.0 to 7.3 pH, clear with relatively high dissolved solids, low fecal coliform, moderate levels of algal parameters, and moderate to high nutrient and dissolved oxygen levels
Wetland/pond D	Northwest corner. Complex shape with two interconnecting ponds linked by emergent wetland. Approx. 2.3 acres.	Contains some subsurface inflow; retains water year round; excess water drains off-site to drainage channel and ditches	7.0 to 7.3 pH, clear with relatively high dissolved solids, measurable fecal coliform, moderate levels of algal parameters, moderate to high nutrient and dissolved oxygen levels, slightly increasing pH along drainage to wetland (to 8.1)

Pipelines

The proposed natural gas pipeline and makeup water supply pipeline would traverse the gently to moderately rolling terrain east of the Columbia River and north of the Walla Walla River (see Figure 3.3-1). This area, which slopes generally southwestward toward the Columbia River, is covered by cropland, irrigation circles, and unpaved roads.

No prominent surface water features drain this area. However, there is a prominent southwesterly-trending dry wash that would be crossed by the natural gas pipeline and water pipeline approximately 0.75 mile south of the project site. Farther to the south, in the vicinity of the town of Wallula, the proposed water line would cross two small intermittent streams. The natural gas pipeline would also cross the headwaters of one of these intermittent streams about a mile farther to the east.

The only other surface water bodies in this area are two small constructed irrigation storage ponds near the proposed water pipeline and a 1-acre constructed irrigation storage pond near the natural gas pipeline. Based on consultations between the applicant, the Natural Resources Conservation Service, and the Corps, there are no naturally occurring ponds in the immediate vicinity of the proposed pipeline laterals (Wallula Generation 2001).

Transmission Line and Associated Facilities

The transmission line right-of-way would span the Walla Walla River, Juniper Canyon Creek, and numerous ravines and drainage areas where the presence of surface water is intermittent. The drainages spanned by the proposed transmission lines drain westward or northward to the Columbia River.

Other water bodies near the right-of-way corridor include Smiths Harbor (a moderate-sized lake formed along the Walla Walla River), Juniper Canyon Creek, an ephemeral stream in Spring Gulch Canyon, Cold Springs Creek irrigation stream (a channelized stream), various dry drainage ditches, and various wetland areas. The wetland areas include the potholes and ponds in the McNary Potholes Area and the wetlands on either side of U.S. Highway 395, approximately 0.25 mile south of U.S. Highway 730. The McNary Potholes is a portion of the 2,817-acre Wanaket Wildlife Area, an artificial wetland area created through a flood irrigation system from Columbia River water (operating March 1 to October 31).

The major water bodies along the right-of-way are discussed in the following subsections. The general characteristics, type, size, and shape of the water bodies traversed or nearby the right-of-way are summarized in Table 3.3-2.

Walla Walla River

The Walla Walla River is the largest water body crossed by the proposed transmission line corridor. At the right-of-way crossing, about 1 mile upstream from the Columbia River (Lake Wallula), the river is estimated to be approximately 165 feet wide and approximately 350 feet in elevation. The floodplain at the proposed crossing is approximately 1,400 feet wide and gently sloping with flat benches along the shoreline. The active stream channel is incised about 3 to 5 feet into the floodplain.

The U.S. Geological Survey has had a gauging station on the Walla Walla River since 1952, located approximately 18 miles upstream from the mouth and 2.8 miles downstream from the town of Touchet. The drainage area above this station is 1,657 square miles. No major tributaries to the Walla Walla River occur downstream of this gauging station; thus the flow at the station approximates the flow at the right-of-way crossing. The mean annual flow at the station is 574 cubic feet per second (cfs), with a maximum discharge of 22,400 cfs (December 22, 1964) and a minimum flow of zero (on several occasions). The flow is affected by many upstream diversions for irrigation.

Juniper Canyon Creek

Aside from the Walla Walla River, Juniper Canyon is the largest drainage feature along the right-of-way. The proposed transmission line crossing is about 2.5 miles upstream from the mouth of the creek where it enters the Columbia River. In this area the stream has incised a canyon to a depth of as much as 600 feet below the adjoining plateau. The canyon floor at the proposed crossing location is relatively flat and approximately 250 to

300 feet wide. A small stream flows along a fairly wide (20 to 30 feet) riparian zone along the canyon floor. The creek drains much of the plateau areas to the south and east that are covered by irrigated croplands, so it is likely fed to some extent by irrigation runoff. The U.S. Geological Survey does not monitor the flow in this stream.

McNary Potholes Area

McNary Potholes is part of the 2,817-acre Wanaket Wildlife Area, which is an artificial wetland area created through a flood irrigation system from Columbia River water. The right-of-way traverses a portion of the wildlife area. This area has a local relief of 30 feet, with elevations ranging from approximately 440 feet to 470 feet MSL.

Table 3.3-2 General Characteristics of Water Bodies along the Transmission Line Right-of-Way

Water Body Name	Location	Water Body Type	Size and Shape	Comments
Columbia River	West and north of the right-of-way.	River	Large	Structures are to be constructed above the 100-year floodplain.
Walla Walla River	Section 25 (T7N, R31E).	River	165 feet wide, floodplain approx. 1,400 feet wide at right-of-way crossing.	This area is a portion of a Habitat Management Unit.
Smiths Harbor	Approx. 500 feet west of existing transmission line. Located on the border in the east halves of Sections 23 and 26 (T7N, R31E).	Lake	Approx. 1 mile long by 0.25 miles wide; depth unknown.	Proposed transmission line would not cross directly over this area. This area is a portion of a Habitat Management Unit.
Spring Gulch	Section 15 (T6N, R31E), directly under right-of-way.	Ephemeral stream	Active wash approx. 25 feet wide. Canyon floor 150 to 200 feet wide. Canyon approx. 350 feet below plateau.	Stream channel was dry during fieldwork, with very small puddles visible on basalt bedrock portions of streambed floor.
Juniper Canyon Creek	Section 31 (T6N, R31E), directly under right-of-way.	Stream	Stream 2 to 4 feet wide, riparian corridor (floodplain) 20 to 30 feet wide. Canyon floor 200 to 300 feet wide. Canyon 400 to 600 feet below plateau.	Runoff possibly draining into this area may include relatively high levels of nitrate from fertilizers used on surrounding irrigated fields.
Unnamed Pond, Marsh and Stream	Near T57-1 on the Hat Rock Quad	Pond, marsh and stream	Marsh approx. 1 acre. Pond approx. 0.75 acre. Stream approx. 2 feet wide.	The area surrounding the pond can be considered marshland. The stream channel was small – streams in this area seem to be enhanced for irrigation purposes.
Cold Springs Creek	Either side of State Highway 207 off U.S. Highway 730.	Stream converted into a small irrigation canal	Small irrigation channel approx. 2 feet wide.	Located within horse pastureland.
McNary Potholes	Hat Rock and Umatilla, Oregon Quadrangles south of U.S. Highway 730.	Wetlands/ponds	Various potholes and ponds of various sizes.	Potholes and ponds with open water, some are almost entirely filled.
Highway 395 Wetlands	Located within Sections 15 and 16 (T5N, R28E).	Wetlands	Encompasses at least 0.25 square mile.	Emergent vegetation.
Source: Modified from information provided by Bonneville Power Administration.				

3.3.1.2 Runoff

Near-surface soils within the project area exhibit moderate to moderately rapid permeability, allowing precipitation to readily infiltrate the ground surface (refer to Section 3.1, Earth for a discussion of soil types). However, because of variability in topography and depth to bedrock, the runoff rate can range from slow to rapid. In areas where slopes exceed 30%, or where bedrock is exposed, the runoff rate typically is rapid.

When precipitation exceeds the rate of infiltration, water runoff is directed by topography toward ravines and drainage areas. Because of the generally loose, erodible nature of the surface soils, runoff during periods of heavier precipitation can contain suspended solids. However, water quality data are not available because of the intermittent nature of most streams in the area.

Generation Plant

The soils at the project site have relatively high infiltration rates of 2.5 to 10 inches per hour (USDA 1964). Consequently, because of the relatively low precipitation rates, the potential for runoff from the site is low. Most of the rainfall that falls at the plant site either infiltrates the soil and percolates to the underlying gravel aquifer, or is lost to evaporation and evapotranspiration. Only during very heavy rainfall or rapid snowmelt would much runoff be expected. Given the irregular rolling topography and the lack of any developed drainages, most runoff does not travel far before infiltrating into the ground. A small portion of the runoff may be captured in the irrigation ponds that do not have continuity with other nearby surface water bodies.

Pipelines

As with the plant site, most soils in the vicinity of the pipelines have relatively high infiltration rates. Consequently, most of the rainfall that falls in this area either infiltrates the soil and percolates to the underlying gravel aquifer or is lost to evaporation and evapotranspiration. The remainder flows to the intermittent drainages or is captured in irrigation ditches and ponds that do not have continuity with other nearby surface water bodies.

Transmission Line and Associated Facilities

Much of the rainfall that falls along the transmission line right-of-way is lost to evaporation and evapotranspiration due to the semi-arid climate. Most of the remainder infiltrates into the soils and percolates to the underlying aquifers. During normal rainfall events, runoff would be limited to areas where the surficial materials have low permeability or are compacted, such as road surfaces or bedrock exposures or where bedrock is very shallow and the soil profile is rapidly saturated.

During a very heavy rainfall runoff would be highly variable. High runoff would occur on hard surfaces such as roadways and where bedrock is exposed (e.g., Spring Gulch Canyon) and lesser amounts would occur in the irrigated lands (where infiltration capacity is reached slowly). Runoff may not occur in the predominantly sandy soils that have high infiltration capacities (greater than 2.5 inches per hour). In some areas (e.g., the western segment of the right-of-way), some runoff is captured in irrigation ditches and ponds that do not have continuity with other nearby surface water bodies.

3.3.1.3 Floodplains

Generation Plant

The plant site is located about 800 feet east of the Columbia River. In this reach, the Columbia River is impounded behind McNary Dam, forming Lake Wallula. The spillway of McNary Dam is designed to pass the probable maximum flood, which is 356.5 feet MSL, whereas the existing ground elevations at the site range from about 366 feet to 406 feet. According to a 1983 flood insurance study completed by the Federal Emergency Management Agency (FEMA), referenced in Wallula Generation (2001), the project site is above the 100-year floodplain boundaries of the Columbia River and the probable maximum flood level behind McNary Dam (Figure 3.3-2).

A catastrophic failure of a major impoundment dam upstream of the plant site would result in a considerably larger flood that could threaten the project site, although such an event is considered unlikely. A failure of the Grand Coulee Dam represents the highest potential for inundation at the plant site. For this scenario, the highest probable water level is 378 feet MSL in Lake Wallula. Therefore, under this unlikely scenario, some inundation would be possible along the lower, western portion of the project site.

Pipelines

The proposed pipelines would be located from within 1,000 feet to several miles east of the Columbia River, at elevations ranging from approximately 370 to over 600 feet MSL. According to the flood insurance study by FEMA, the pipeline alignments are above the 100-year floodplain boundaries of the Columbia River (Figure 3.3-2).

The pipeline alignments would all be located entirely above the 100-year floodplain and the Lake Wallula pool elevation of 356.5 feet MSL based on the probable maximum flood. With the exception of a short section of the combined pipeline alignment across the unnamed dry wash about 0.75 mile south of the project site, the pipeline laterals would also be well above the catastrophic flood that could occur in the event of a rapid breach of the Grand Coulee Dam. As described above for the plant site, the Grand Coulee Dam failure scenario represents the highest potential for inundation in the area. For this scenario, the highest probable water level in Lake Wallula is 378 feet MSL, compared to an elevation of approximately 370 feet MSL where the proposed pipelines would cross the dry wash south of the plant site.

Transmission Line and Associated Facilities

The proposed transmission lines and switchyard would be located at elevations well above the 100-year flood, probable maximum flood, and potential catastrophic flood that could occur as a result of an upstream dam failure along the Columbia River. However, the transmission right-of-way crosses the Walla Walla River approximately 1 mile upstream from the Columbia River at a river elevation of approximately 350 feet MSL. Since the water level in this reach of the Walla Walla River is affected by the level of Lake Wallula and McNary Dam is designed to pass the probable maximum flood of 356.5 feet MSL, this component of the project technically would be affected by the probable maximum flood. It would also be affected by the worst-case catastrophic flood resulting from failure of the Grand Coulee Dam with the highest probable water level in Lake Wallula of 378 feet MSL.

3.3.1.4 Groundwater

Generation Plant and Pipelines

The hydrogeology of the plant site and surrounding area is known primarily from surface and subsurface geologic mapping and from geologic and hydrogeologic information obtained from a large number of water supply wells in the area. These wells include the new Port of Walla Walla water supply well (which would be used to supply water for the plant site), and seven new geotechnical borings that were converted to monitoring wells. Figure 3.3-1 portrays documented water wells in the vicinity of the project site. Information on local wells and water supply is included as Table 3.3-3.

Hydrostratigraphy (Aquifers and Aquitards)

The hydrostratigraphic units that are significant for the project site and pipeline laterals include the shallow Pasco Gravel aquifer and the deeper, upper and lower Saddle Mountain Basalt aquifers. The distribution of these units below the site area is shown in profile on Figure 3.1-8 in Section 3.1, Earth. Most local wells that produce water from within the basalt are 250 to 500 feet deep, within the upper Saddle Mountains Basalt aquifer. The new Port of Walla Walla well and the J.R. Simplot wells are considerably deeper and draw water from the lower Saddle Mountains Basalt aquifer at depths of about 800 to 900 feet.

The hydrogeologic characteristics of the main hydrostratigraphic units in the project area are summarized in the following subsections.

Table 3.3-3. Chemical Analyses of Supply Water (mg/L)

Parameter (as ion, unless noted)	Boise Cascade Corporation Fiber Farm Well #2 (Gravel Aquifer)	J.R. Simplot Shop Well (Basalt Aquifer)	Combined Water Supply to the Raw Water Storage Tank*
Barium	0.017	0.01	0.015
Calcium	23	1.77	15.5
Iron	0.11	ND	0.07
Lead	<0.0010	ND	0
Magnesium	6.9	0.10	4.5
Manganese	<0.005	ND	0
Potassium	< 5.0	8.6	6.27
Silica	32	43.6	36.1
Sodium	13	70.2	39.2
Strontium	0.085	ND	0.06
pH	7.83	9.16	8.30
Conductivity (μmho/cm)	245	331	275
Alkalinity, total as CaCO3	104	129	113
Bicarbonate alkalinity, as CaCO3	ND	77	27.1
BOD (5-day)	< 2.00	12	5.53
Chloride	4.21	20.1	9.81
Fluoride	0.373	3.5	1.48
Nitrate (as nitrogen)	0.201	0.10	0.17
Phosphorus, total	0.051	0.03	0.04
TDS	142	283	192
TSS	2.6	ND	1.68
Sulfate	9.09	0.8	6.17
Carbon, total organic (TOC)	1.14	ND	0.74
Turbidity (NTU)	0.70	0.5	0.63

* Data are based on analyses available at the time the Application for Site Certification was prepared.
ND = no data

Sedimentary Units. The unconfined aquifer underlying the project area is situated within the unconsolidated sediments above bedrock. The uppermost of these sedimentary deposits is a mantle of wind-blown silt and sand that forms the rolling dunes east of the Columbia River. These dune deposits generally occur above the water table; they transmit recharge water vertically downward to the water table. The dune sands and silts are underlain by the Hanford Formation that, depending on location, may include silts and sands of the Touchet Beds and sands and gravels of the Pasco Gravel (see Figure 3.1-8 in Section 3.1, Earth).

The Pasco Gravel is a layer of unconsolidated gravel and sand deposited during catastrophic glacial flooding approximately 13,000 years ago. Most of the Pasco Gravel is saturated with groundwater and comprises the unconfined (or water table) aquifer over a wide area of the Pasco Basin and downstream of Wallula Gap. Near the plant site, the gravel thickness varies widely, and its use as an aquifer is limited to areas where it is relatively thick. On-site borings indicate that the maximum thickness of the Hanford Formation is about 35 feet, of which the lower 10 feet is the Pasco Gravel. To the west, where the bedrock is considerably shallower, the thickness decreases to as little as about

6 feet. South of the plant site, water supply wells for the Boise Cascade Corporation fiber farm are completed in a thicker section of Hanford Formation. At that location the Pasco Gravel ranges from 28 to 50 feet thick, all of which is below the water table. The mean hydraulic conductivity for the Pasco Gravel is estimated to range from about 480 to 1,260 feet per day based on specific capacity measurements and aquifer tests (Drost et al. 1997, Barr Engineering 1997).

Older, more consolidated fluvial sands and gravels and lacustrine silts and sands of the Ringold Formation underlie the Hanford Formation in some areas, most notably in the uplands to the east of the plant site. As shown in Figure 3.1-8 in Section 3.1, the Ringold Formation is absent under the plant site but underlies the Hanford Formation a short distance to the east. The Pasco Gravel appears to directly overlie basalt near U.S. Highway 12 and the Columbia River. The U.S. Geological Survey (Drost et al. 1997) estimated that the median hydraulic conductivity of the Ringold Formation ranges from 25 to 180 feet per day.

Basalt Units. The Columbia River Basalt Group underlies the sedimentary deposits in the project area. The elevation of the top of basalt, which is plotted and contoured on Figure 3.1-7 (in Section 3.1, Earth), is an important hydrogeologic horizon because it is the lower boundary of the unconfined aquifer. The surface of the basalt, and therefore the thickness of the overlying unconfined aquifer, is irregular due to the catastrophic floods that caused severe erosion of the basaltic bedrock.

An understanding of the basalt units and internal structures is important in understanding their role in groundwater management, storage, and movement. Key basalt units and structures are shown in Table 3.3-4.

Table 3.3-4. Key Basalt Units and Structures

Geologic formations	Saddle Mountains Basalt Wanapum Basalt Grand Ronde Basalt
Inter-flow units and structures	Sedimentary (generally fine-grained) layers interbedded with basalt (members of the Ellensburg Formation) Highly porous inter-flow zones characterized by palagonite, scoria, vesicles, dense fracturing, and occasional pillow basalt
Intra-flow structures	Colonnade and entablature portions of the basalt flows typically characterized by sparse to moderate vertical fracturing

The bedrock formations in the project area are distinct from both a technical and regulatory perspective. Each formation is composed of several individual basalt flows. Each formation is separated from adjacent basalt formations by prominent sedimentary (volcaniclastic and fluvial) interbeds of the Ellensburg Formation. Exchange of water between basalt formations is limited because of the fine-grained sedimentary interbeds. The State of Washington has formally recognized this limited interchange by managing water rights according to the geologic formations. Water rights are associated with a particular formation (Saddle Mountains, Wanapum, or Grand Ronde). The intervals between individual basalt flows in each formation are often highly productive aquifers.

The Saddle Mountains Basalt (along with the overlying sediments where they are sufficiently thick) is the primary source of groundwater in the project vicinity. There are few, if any, deeper wells in the area that tap the aquifers in the Wanapum or Grande Ronde Basalts. The Saddle Mountains Basalt, which is about 900 feet thick in wells near the plant site, contains at least two highly productive water-bearing zones, referred to here as the upper and the lower Saddle Mountains Basalt aquifers.

An aquifer pumping test conducted in the new Port of Walla Walla well at the plant site provides information on the hydraulic properties of the lower Saddle Mountains aquifer underlying the site. Based on step-drawdown and 24-hour constant-rate aquifer pumping tests and concurrent monitoring of nearby observation wells, this aquifer behaves as a leaky confined aquifer below the project site (Pacific Groundwater Group 2001). The transmissivity of this aquifer is about 51,150 gallons per day per foot with a storage coefficient of approximately 1.26×10^{-3}.

The Port of Walla Walla well test also provided qualitative information on connections between the aquifers. Water levels in on-site observation wells completed in the Pasco Gravel aquifer and upper Saddle Mountains Basalt aquifer were monitored during the tests. Water levels in the Pasco Gravel aquifer and upper Saddle Mountains Basalt aquifer did not draw down in response to pumping the lower Saddle Mountains Basalt aquifer in this well. Low hydraulic conductivity layers apparently separate the aquifers and vertically isolated the effects of pumping over the duration of the test. Nonetheless, the leaky response of the lower Saddle Mountains Basalt aquifer suggests that some flow occurs between the upper and lower Saddle Mountains Basalt aquifer.

Groundwater Flow

Water enters the ground in the region from infiltration of precipitation and irrigation waters. Most local irrigation water is derived from the Columbia River, and thus a net increase in groundwater storage and flux has occurred since irrigation began. In addition to the regional irrigation and precipitation sources, the shallow groundwater underlying the plant site is also derived from the continuous infiltration of unused J.R. Simplot Company stock water in the ponds directly east of the plant site (estimated at more than 100 gpm). The J.R. Simplot Company stock water is derived from the new shop well that is screened in the lower Saddle Mountains Basalt aquifer. Thus, the groundwater is redistributed within the subsurface by pumping deep wells and infiltrating the unconsumed water to the shallow subsurface.

Groundwater in the Pasco Gravel aquifer moves southwestward across the plant site toward the Columbia River (Figure 3.3-3). Continuous southwestward flow of groundwater in this aquifer is expected as a result of the continuous regional recharge and J.R. Simplot Company water sources. However, some annual fluctuation likely occurs as a result of the varying irrigation return flows and seasonal evapotranspiration demand of plants.

Barr Engineering (1977) conducted a study of groundwater flow in the gravel aquifer in the vicinity of the Boise Cascade Corporation Wallula Mill located south of the plant site, in the vicinity of the proposed pipeline laterals. Results from that study indicated a southwesterly groundwater flow direction. They also found that when irrigation wells are pumping, the groundwater flow directions near the wells are convergent, including a component of flow from the Columbia River.

Available data indicate that groundwater in the Pasco Gravel aquifer occurs at a higher elevation (potential energy) than groundwater in the Saddle Mountains Basalt aquifers or the Columbia River (normal river elevation is 335 to 340 feet above sea level). Therefore, water could potentially move downward from this unconfined aquifer to the Saddle Mountains Basalt aquifers. However, the highly developed layering of the basalt and Ellensburg Formation members limits flow downward to the basalt aquifers and thereby promotes lateral flow from the unconfined aquifer to the Columbia River.

The lower Saddle Mountains Basalt aquifer underlies the upper Saddle Mountains Basalt aquifer and is tapped by the J.R. Simplot Company's new shop well and the new Port of Walla Walla supply well. The depth to static (nonpumping) water level in the new Port of Walla Walla well at the plant site was about 60 feet below ground surface in May 2001. The estimated groundwater level elevation for that date is 326 feet above MSL, or 14 feet below the river elevation of about 340 feet. Therefore, on-site groundwater in the lower Saddle Mountains Basalt aquifer is not moving toward the river. The relatively low water level in the new Port of Walla Walla well could be the result of continuous extraction of about 1,200 gpm by the nearby J.R. Simplot Company well. The aquifer test using the new Port of Walla Walla well suggested that there is substantial leakage of groundwater into the aquifer. This may indicate that historical pumping has likely resulted in a new lower equilibrium water level.

Groundwater Quality

Information on regional groundwater quality comes from previous regional and local studies and from samples collected for this project. Most of the data focus on nitrate concentrations because shallow groundwater in much of the Pasco Basin has been contaminated by agricultural activities and nitrate levels are commonly high. For this project, a wider analytical array was obtained to evaluate the quality of the water that would be used for makeup cooling water for the generation plant.

Spalding et al. (1982) found that the primary source of groundwater nitrate in the project vicinity was leaching of agricultural fertilizers, with influences from septic drainfields in the residential neighborhoods of the community of Burbank, and animal waste leaching in an alfalfa field irrigated with water from a cattle wastewater lagoon. The maximum nitrate concentration measured was 51 milligrams per liter (mg/L) nitrate, from a well downgradient of the wastewater spray field in the Wallula area. Two-thirds of the nitrate concentrations measured in that study fell in the range 6 to 14 mg/L.

Barr Engineering (1997) performed a detailed analysis of local groundwater quality in the gravel aquifer for Boise Cascade Corporation. They found that major ion chemistry of the shallow groundwater near the Columbia River has low total dissolved solids (TDS) (less than 250 mg/L), is of the calcium-chloride type, and changes upgradient (north and northeast) to the sodium-bicarbonate type with increased TDS (greater than 1,500 mg/L). Concentrations of sodium, potassium, calcium, iron, manganese, chloride, sulfate, ammonia, nitrate, bicarbonate, color, tannins and lignins, TDS, and specific conductance are high in upgradient areas and low in downgradient areas near the Boise Cascade Corporation Wallula Mill and irrigation wells. Water pumped from the irrigation wells is presumed to be a mixture of upgradient groundwater and infiltrated Columbia River water.

For this project, limited groundwater quality information from public water supplies was obtained from the Walla Walla County Health Department. They provided records of eight public water supplies that use 14 wells for industrial and public water supplies. The water quality data from these wells indicate that groundwater supplies near the proposed power plant meet most, but commonly not all, chemical requirements for untreated drinking water (maximum contaminant levels or MCLs). In particular, nitrate and fluoride consistently exceed drinking water MCLs at these sources. Local public water sources with nitrate concentrations above 10 mg/L treat drinking water to reduce nitrate concentrations. Agricultural and industrial water uses have different water quality criteria than drinking water, and the exceedance of MCLs does not necessarily indicate problems for agricultural and industrial use.

Three of the public supply wells identified produce from the unconfined gravel aquifer, at depths ranging from 14 to 100 feet. Nitrate concentrations in these wells vary from 0.6 to 15.1 mg/L, compared to the primary MCL of 10 mg/L. Nine of the public supply wells produce from the Saddle Mountains Basalt aquifers. The shallow basalt wells (132 and 175 feet deep) are high in nitrate (15.9 and 35.7 mg/L) but all the deeper basalt sources contain nitrate concentrations of less than 2 mg/L. The public supply wells near the plant site have higher nitrate concentrations than wells to the north or south. The water quality data also indicate that fluoride concentrations exceed the secondary MCL of 2 mg/L in four of the local public water sources; however, none of those sources exceeded the primary MCL of 4 mg/L for fluoride.

Water quality data from two wells completed within the proposed project water sources are summarized in Table 3.3-3. The first of these wells is the Boise Cascade Corporation Fiber Farm Well #2 (BC Well #2), which is one of the 10 gravel aquifer wells currently supplying the Boise Cascade Corporation fiber farm. The second is the J.R. Simplot Company's New Shop Well (JSC Well) located just east of the project site. This well draws water from the lower Saddle Mountains Basalt aquifer, the same aquifer used by the Port of Walla Walla well.

Analyses were performed for a wide range of chemical parameters necessary to evaluate the suitability of the water for power plant uses. The chemistry of the source water samples is generally consistent with the origins and ages of the waters. The BC Well #2 draws upgradient groundwater mixed with river water that has infiltrated the Pasco Gravel aquifer. The TDS is 142 mg/L (low) and pH is slightly alkaline. Dissolved iron (0.11 mg/L) and total organic carbon (1.14 mg/L) are detectable indicating low dissolved oxygen. The relatively high silica concentration (32 mg/L) suggests substantial contribution from upgradient groundwater. The lack of substantial nitrate in this sample (0.2 mg/L) indicates low concentration of nitrate in the upgradient groundwater in this area. Water quality from the other Boise Cascade Corporation fiber farm wells is likely similar, although variability is expected based on the work of Barr Engineering (1997).

Groundwater from the JSC Well is derived from the lower Saddle Mountains Basalt aquifer. The water is older, with attendant increases in TDS (283 mg/L), silica (43.6 mg/L), chloride (20.1 mg/L) and sodium (70.2 mg/L) and a decrease in calcium (1.77 mg/L). The pH is strongly alkaline (9.16) and alkalinity is higher than other samples (129 mg/L as CaCO3). The biological oxygen demand (BOD) is detectable (12 mg/L) but iron and manganese were not detected. Water quality from the new Port of Walla Walla well is likely similar based on its proximity and comparable depth.

Conditions Specific to Pipelines

The groundwater resources and hydrogeology along where the proposed pipeline laterals would be located is very similar to that at the plant site. The reader is referred to the preceding discussion of plant site hydrostratigraphy, groundwater flow, and groundwater quality for information relevant to conditions along the pipelines, with the following exceptions.

The shallow gravel aquifer increases in thickness to the south of the plant site. As shown in Figure 3.1-7 (in Section 3.1, Earth), the elevation of the top of the basalt bedrock decreases to the south, as the thickness of the overlying sediment increases. Within the sedimentary sequence, the gravel aquifer is also thicker to the south. As a result of this thicker shallow aquifer, many of the water supply wells in the Wallula area draw water from the gravels.

To the east, along the proposed natural gas pipeline, the thickness of surface deposits of windblown silt and sand increases, and the depth to bedrock increases considerably. The depth to the water table also generally increases with the higher elevations toward the east. Well logs indicate that the windblown deposits in much of this area are underlain by Pasco Gravel and Touchet Beds, which in turn are underlain by fluvial and lacustrine deposits of the Ringold Formation. The fine to coarse grained Ringold sediments are commonly water-bearing and are generally in hydraulic continuity with the unconfined aquifer in the overlying Pasco Gravel.

Groundwater flow in the unconfined aquifer underlying the eastern end of the proposed natural gas pipeline is likely to be southwestward toward the Walla Walla River, unlike the areas to the west where groundwater in this aquifer discharges to the Columbia River.

Transmission Line and Associated Facilities

Hydrostratigraphy (Aquifers and Aquitards)

Wind-blown silt and sand deposits blanket much of the area along the transmission line right-of-way. These eolian deposits are particularly thick (locally up to 50 feet thick) on the upper slopes of the Horse Heaven Hills northeast of Juniper Canyon. Except in areas near the western end of the right-of-way where they are relatively thin and rest directly on bedrock, these fine-grained eolian sediments generally occur above the water table. The depth to groundwater in the thick silts and sands in the Horse Heaven Hills is likely considerable. Because these deposits are generally lacking in layers that would impede infiltration, their role is generally to transmit recharge water vertically downward to the water table perched on the bedrock surface.

Geologic units within the Hanford Formation, including the silts and fine sands of the Touchet Beds and the gravel and sand of the Pasco Gravel, are often partially saturated and comprise the unconfined aquifer over much of the lower part of the right-of-way. From the Walla Walla River to the north along the right-of-way, the thickness of the Pasco Gravel varies widely (from 5 to 50 feet), and use of the aquifer as a source of groundwater is limited to areas where it is relatively thick. Similarly, this deposit has variable thickness under the right-of-way for several miles west of Juniper Canyon, where it provides relatively low yield to private and agricultural wells. Estimates of the mean hydraulic conductivity for the Pasco Gravel range from about 480 to 1,260 feet per day (Drost et al. 1997, Barr Engineering 1997).

Older and more consolidated sediments of the Ringold Formation underlie the Hanford Formation sediments north of the Walla Walla River along the alignment. In other areas, the Pasco Gravel appears to lie directly over the Columbia River Basalt Group. Where present, the Ringold sediments are likely water bearing and in hydraulic continuity with the unconfined aquifer. Drost et al. (1997) estimated that the median hydraulic conductivity of the Ringold Formation ranged from 25 to 180 feet per day.

The Columbia River Basalt Group underlies the sedimentary deposits throughout the transmission line right-of-way. In a few areas, primarily on south slope of the Walla Walla River Valley and in the vicinity of the McNary Potholes, the basalt is exposed at the surface. In these areas, and where the sediments are thin, the unconfined aquifer is also absent and the uppermost groundwater is confined within the basalt flows.

Several deep, confined aquifers within the thick basalt sequence are the main sources of groundwater throughout the region. However, none of the basalt aquifers would be used by the project for water supply along the right-of-way, nor would there be any contact (discharge from or recharge to) any of these aquifers.

Groundwater Flow

Water enters the ground along the right-of-way from infiltration of precipitation and irrigation waters. After entering the ground, the water moves vertically and laterally within the soil and rock layers toward the Columbia River where it discharges. The water tends to move horizontally in zones of high transmissivity (aquifers) and vertically in zones of low transmissivity (aquitards). Discharge occurs to wells and to the Columbia River and its larger tributaries.

A large percentage of the recharge to aquifers in this region results from losses of water from irrigation canals and irrigated fields. Most local irrigation water is derived from the Columbia River, and thus a net increase in groundwater storage and flux has occurred since irrigation began. Groundwater is redistributed within the subsurface in some locations by pumping deep wells and infiltrating the unconsumed water to the shallow subsurface.

3.3.1.5 Public and Private Water Supplies

The proposed project would consume a large quantity of groundwater, primarily as cooling water for the operation of the generation plant. The following discussion focuses on public and private water supplies that could be affected by that use. See Section 3.17.3 for a discussion of cumulative impacts on water resources. Incidental use of this same source of water would be required during construction and for hydrostatic testing of the pipeline.

Although there would be minor use of water associated with the construction, operation, and maintenance of the transmission lines, the amount of water used would be negligible relative to the overall water use from any likely public water supplier. Therefore, the transmission right-of-way is not discussed further with respect to public and private water supplies.

Water Rights Procurement and Water Production Plan

Cooling water for the power plant would come from four sources.

- Purchase of groundwater rights of a maximum flow of 1,200 gallons per minute (gpm) (limited to a volume of 1,800 acre-feet per year) from a deep on-site well owned by the Port of Walla Walla.
- Purchase and transfer of the water rights as part of the purchase of a portion of the Boise Cascade Corporation fiber farm agricultural land, for an instantaneous pumping rate of 9,485 gpm and a volume limited to 5,024 acre-feet per year.
- Purchase and transfer of the water rights as part of a purchase of conservation easements from the J.R. Simplot Company for a maximum instantaneous flow of 3,285 gpm (limited to 1,425 acre-feet per year).
- Stormwater captured from the bermed plant site, estimated at 38.5 acre-feet per year.

The water purchased from the Boise Cascade Corporation and J.R. Simplot Company would all be pumped from 10 existing, relatively shallow wells located on the Boise Cascade Corporation fiber farm south of the plant site. These wells draw from the unconfined gravel aquifer. The on-site water would be drawn from the existing Port of Walla Walla well and a new backup well that would be installed on-site as part of this project. These deep wells would draw from the lower Saddle Mountains aquifer. The site stormwater, when available, would be used in lieu of the groundwater from the shallow aquifer wells at the Boise Cascade Corporation fiber farm.

The total amount of water that can be delivered to the Wallula Power Project under these rights would be an instantaneous peak rate of 13,970 gpm, and limited to 8,249 acre-feet per year. This is considerably more than would actually be used. The estimated maximum water demand is 6,243 gpm, with an estimated instantaneous peak load of 7,901 gpm. The maximum expected annual water usage is estimated to average 4,087 gpm.

The applicant has secured purchase and lease options for land and associated water rights, as summarized in Table 3.3-5. A summary of the optioned water rights and amounts expected to be available to the project for industrial use after the change and transfer request process with the state of Washington Department of Ecology (Ecology) is shown in Table 3.3-6. The combined options would provide significantly more water rights than would be required by the Wallula Power Project. The exact rights to be acquired would be finalized once the water rights change protocol is completed with EFSEC and Ecology. The applicant would exercise only those options that are necessary for the project.

Table 3.3-5. Land and Water Rights Purchase Options

Ref.	Optionor	Optionee	Purchase Or Lease	Acres			Acre-Feet Per Year
				Irrigated	Dry	Total	
1a	Port of Walla Walla	Applicant	Purchase	130	45	175	
1b	Port of Walla Walla	Applicant	Purchase	Industrial Water Rights			1,800
2a	Boise Cascade Corporation[1]	Applicant	Purchase	790	454	1,244	3,673
2b	Boise Cascade Corporation[1]	Applicant	Purchase	453	27	480	2,153
3a	J.R. Simplot Company	Applicant	Purchase[2]	475		475	1,900
3b	J.R. Simplot Company	Applicant	Lease	1,200	400	1,600	4,800

1 A new point of withdrawal has been request for the consolidated Boise Cascade Corporation fiber farm water rights. The new point of withdrawal would be the plant site to permit reuse of stormwater.
2 Purchase of conservation easements and proportionate allocation of water permit, not the underlying land.

Table 3.3-6. Optioned Water Rights Versus Maximum Expected Water Demand

Water Source and Use	Under Option		After Purchase, Change and Transfer		
	Instantaneous gpm	Acre-Feet Per Year	Average gpm	Instantaneous gpm	Acre-Feet Per Year
Port of Walla	1,200	1,800	1,115	1,200	1,800
Boise Cascade Corporation[1]	11,000[2]	5,826	2,700	9,485	5,024
J.R. Simplot Company	4,381	1,900	883	3,285	1,425
Total	16,581	9,526	4,698	13,970	8,249
Maximum Expected Water Demand			4,087	7,901	6,591
Optioned Water Supply Margin			611	6,069	1,658

1 A new point of withdrawal has been requested for the consolidated Boise Cascade Corporation fiber farm water rights. The new point of withdrawal would be the plant site to permit reuse of stormwater.
2 This would be 11,000 gpm from March 1 to November 30 and 3,500 gpm from December 1 to February 28.

Water Rights Options

The applicant would execute two separate options to purchase land and associated water rights from the Boise Cascade Corporation. Boise Cascade Corporation currently uses the agricultural land as a fiber farm to grow hybrid cottonwood, which it either sells to third parties or uses in its own pulp and paper mills. Boise Cascade Corporation has other fiber farms in the region that are newer and more efficient and intends to focus its fiber farm activities in those areas. The Wallula North and Wallula South fiber farm options entitle the applicant to purchase a total of 1,704 acres from Boise Cascade Corporation. Water rights associated with this property allow the irrigation of 1,243 acres, as shown in Table 3.3-7. Boise Cascade Corporation's current water rights certificates allow a total withdrawal of 5,826 acre-feet per year for agricultural purposes, with a permitted instantaneous withdrawal rate of 11,000 gpm from March 1 to November 30 and 3,500 gpm from December 1 to February 28.

The applicant would execute an option to purchase conservation easements and lease agricultural land and associated water rights from the J.R. Simplot Company (see Table 3.3-8). Currently, J.R. Simplot Company uses the agricultural land as part of its Grandview Farms operation with irrigation provided through the LeGrow Irrigation District. Water is withdrawn from the Wallula Pool in the McNary Reach of the Columbia River through nine pumps located at a riverside pumping station. Irrigation water is withdrawn between March 1 and November 30 and is distributed to approximately 18,000 acres under center-pivot irrigation through an extensive pumping and piping system.

The J.R. Simplot Company option entitles the applicant to purchase conservation easements on 475 irrigated acres and to receive a proportional water right entitlement based upon 4 acre-feet per year per acre. It also entitles the applicant to lease up to an additional 1,200 irrigated acres in quarter-section (160-acre) increments (each of these quarter sections has 120 to 130 central-pivot-irrigated acres) and to receive a proportional water right entitlement based upon 4 acre-feet per year for as long as the project remains as a viable commercial enterprise. Table 3.3-8 provides a summary of this proposed transaction.

Since the facility would use more than a total of 5,000 gallons of water per day from all sources, it would be necessary for the applicant to obtain a water right for the capture and beneficial use of stormwater. Since this water would otherwise infiltrate and recharge the unconfined gravel aquifer, the applicant has requested of Ecology that a new, additional point of withdrawal be established for the consolidated Boise Cascade Corporation fiber farm water rights. That new point of withdrawal would be at the plant site to permit reuse of the stormwater.

Table 3.3-7. Wallula North and South Fiber Farm Purchase Options Water Rights

Fiber Farm Location	Certificate Number	Family Farm Certificate	Reference Well Number	Priority Date	Allowable Irrigated Acres	Acre-Feet Per Year Per Acre	Acre-Feet Per Year	Gallons Per Minute	Time of Use Restrictions
North Farm	G3-28146C	Yes	43, 44, 45, 46, 47 (BCC 1, 2, 3, 4, 5)	1986	600	4.65	2,790	5,000	3/1 to 11/30
North Farm	G3-28683C	Yes	43, 44, 45, 46, 47 (BCC 1, 2, 3, 4, 5)	1989	190	4.65	883	2,500	3/1 to 11/30
South Farm	G3-21038C	No	35 (BCC 6)	1978	60	4.65	279	560	None
South Farm	G3-24791C	No	40 (BCC 7)	1976	901	5.1671	4651	3101	None
South Farm	G3-21037C	No	42 (BCC 8)	1973	80	4.65	372	800	None
South Farm	G3-21039C	No	39 (BCC 9)	1973	160	4.65	744	1,300	None
South Farm	G3-21936C	No	41 (BCC 10)	1973	63	4.65	293	530	None

Notes: A portion of G3-24791C is supplemental, or secondary, to G3-21037C. The supplemental portion is 340 gpm, 158 acre-feet per year, for the irrigation of 34 acres. These quantities were subtracted from G3-24791C to avoid double counting
A new, additional point of withdrawal has been requested for the consolidated Boise Cascade Corporation fiber farm water rights. The new point of withdrawal would be at the power plant location to permit reuse of stormwater collected on site.

Table 3.3-8. J.R. Simplot Company Water Rights Purchase and Lease Options

Certificate Number	Family Farm Certificate	Priority Date	Purchase Or Lease	Optioned Irrigated Acres	Acre-Feet Per Year Per Acre	Acre-Feet Per Year	Gallons Per Minute	Time of Use Restrictions
S3-2470P	No	11/13/75	Purchase	475	4.00	1,900	3,920	3/1 to 11/30
S3-2470P	No	11/13/75	Lease	≤ 1,200	4.00	≤4,800	≤11,070	3/1 to 11/30

Protocol for Water Rights Transfer Requests

Background

The applicant has worked with Ecology to define an appropriate protocol for the review, negotiation, and approval recommendation process for applicant's requested changes to the above-mentioned optioned water rights. The applicant has requested to participate in an environmental mitigation and enhancement program as described in the proposed mitigation program outlined below. The applicant also has requested that Ecology make a determination that the proposed mitigation program qualifies the Wallula Power Project to receive expedited processing of its water rights transfer requests as if Ecology had exclusive jurisdiction. Ecology and the applicant intend to negotiate the transfer and change process early in the EFSEC application review process. Once finalized, the applicant and Ecology would provide a written stipulation agreement to EFSEC, and request that EFSEC approve the requested changes to the water rights or licenses under option by the applicant for use at the facility. The EFSEC approval of the water rights changes would be contingent upon issuance and governor approval of the Site Certification Order. The net effect of the water rights transaction and change approval process would be the creation of an in-stream flow benefit to the Walla Walla River and Columbia River due to reduction in actual water withdrawals from current levels.

The specific transfer requests are designed to:

(a) Make all water withdrawals (except the Port of Walla Walla deep basalt well[s]) from Boise Cascade Corporation's fiber farm wells 1 through 10. This would eliminate the need to develop a new well field.

(b) Transfer Boise Cascade Corporation's water rights, including the Family Farm Certificates, directly to the applicant through an ownership change once the applicant exercises the options.

(c) Change the type of use from agricultural to industrial.

(d) Change the place of use from the agricultural lands where the water currently is being used to the Wallula Power Project.

(e) Expand the time of use for the seasonal water rights to year round.

Water Rights Discounting Procedure

Only water rights that have been in demonstrated use over the previous 5 years may be transferred. For irrigation water rights, the quantity "used" is defined as the quantity consumed by plants. The Boise Cascade Corporation fiber farm water rights that would be changed to an industrial use are based upon a crop demand of 4.25 acre-feet of water per irrigated acre. The J.R. Simplot Company water rights that would be changed from agricultural to industrial use are based upon a crop demand of 3.50 acre-feet of water per irrigated acre.

Proposed Mitigation Program

Currently, the Walla Walla River habitat is stressed during low flows because of elevated water temperatures and reduced dissolved oxygen. The applicant has consulted with Ecology on measures it could take to improve in-stream flows in the Walla Walla River as a step to improve the aquatic habitat and thereby meet the requirements of Chapter 173-152 WAC for priority processing of an application for a transfer or change of water rights. Specifically, an application may be processed prior to competing applications if "the change or transfer if approved would substantially enhance the quality of the natural environment" (Chapter 173-152-050(3) WAC).

To meet Ecology's requirement for expedited processing, the applicant would contribute to the purchase of water rights on the Walla Walla River previously negotiated under a purchase option agreement between Ecology and the landowners in question. A financial contribution of $344,200 by the applicant would allow Ecology to complete the purchase of the final 573.66 acre-feet per year contemplated by the option agreement. Assuming the full 702 acre-feet per year represents an in-stream flow benefit, the voluntary contribution by the applicant represents 12% of the Wallula Power Project's maximum expected annual water usage of 5,826 acre-feet from shallow groundwater.

3.3.2 Impacts of the Proposed Action

3.3.2.1 Construction

Potential impacts during construction would primarily affect surface water as a result of increased runoff and sedimentation or spills of contaminants. However, the mitigation measures proposed for protection of surface water from contaminants apply equally to protection of groundwater. This is particularly true for this project, where many of the surface soils are relatively permeable and the groundwater is relatively shallow. The following discussion addresses mitigation measures that would be implemented to protect both surface water and groundwater during construction.

Surface Water, Runoff, and Groundwater

Surface water runoff is typically more rapid from areas that have been cleared of vegetation or have disturbed soil than from areas with undisturbed vegetation or soil. The vegetation intercepts and temporarily stores some of the rainfall. Consequently, although the rainfall ultimately reaches the ground, this occurs over a longer time than rain falling directly on the ground. Vegetation also returns moisture to the atmosphere by evapotranspiration, which reduces the total runoff. Thus, more runoff would occur more rapidly after an area as been cleared. Also, undisturbed soil is generally more permeable than soil that has been disturbed by construction activities. Consequently, infiltration rates tend to decrease and the potential for runoff and erosion increases in areas that have been disturbed.

Sediment carried in surface water runoff is the most common cause of surface water degradation. However, runoff can also transport contamination from fuel spills, herbicides, and other contaminants to surface water bodies.

Plant Site

The following measures to reduce or eliminate environmental impacts to water resources during construction of the proposed generation plant are included in the applicant's proposal.

- A stormwater pollution prevention plan (SWPPP) would be developed to prescribe technology-based measures for construction stormwater management.
- Stormwater control measures would be designed in accordance with Ecology's guidance document, Stormwater Management Manual for Western Washington (Ecology 2001). These measures would be implemented as appropriate to reduce the potential for runoff during project construction. These stormwater control measures could include the following.
    - Temporary and permanent structural devices would be used to divert, store, or limit runoff from disturbed areas. This could include but not be limited to the installation of silt fences, sediment traps (catch basins), straw-bale dikes, and culvert inlet/outlet protection (rock or riprap), as appropriate.
    - Properly spaced cross drains, water bars, or other appropriate measures would be used on access roads to intercept surface runoff and divert it before erosive runoff volumes and concentrations occur.
    - Existing vegetation would be preserved where practical, especially near drainage areas. Where appropriate, disturbed areas would be temporarily seeded or mulched to reduce erosion and runoff during construction.
    - Soil stabilization might include temporary or permanent seeding, mulching, geotextiles, or aggregate surfacing.
    - Stabilization measures would begin as soon as practical where construction activities have temporarily or permanently ceased.
- BMPs such as good housekeeping measures, inspections, containment, and spill prevention practices would be used to limit contact between potential pollutants and stormwater or groundwater.
    - Storage areas for hazardous materials would be provided with secondary containment to ensure that spills in these areas do not reach surface waters.

- All construction vehicles would be monitored for oil and fuel leaks and would receive regular maintenance.
- Refueling or mixing hazardous materials would be avoided where accidental spills could enter surface or groundwater.
- Soil contaminated during construction would be removed and disposed at an approved disposal site.
- Sanitary wastes would be collected and portable units would be maintained on a regular basis. Wastes would be collected by a licensed contractor and disposed off-site in accordance with applicable regulations.
- Hazardous wastes generated during construction would be disposed of according to local or state regulations, or the manufacturer's recommendation.
- Fertilizers would be applied as recommended by the manufacturer and stored in a covered area or in watertight containers.
- All construction waste material would be collected and disposed at an approved disposal site.

Pipelines

As with any construction project where excavation and fill are required for site preparation, the potential for runoff would increase as a result of pipeline construction. Areas with the greatest potential for increased runoff would be in regions with steep topography or along drainages. Although the water pipeline would not traverse any steep slopes, it would cross three intermittent drainages where there would be a potential for an increase in runoff erosion. Similarly, the natural gas pipeline would traverse gentle to moderate slopes and a few intermittent drainages.

In order to minimize impacts to water resources, the stormwater protection measures and BMPs described above for the plant site would be implemented, as applicable, during construction of the water pipeline. Similar measures would be necessary during construction of the natural gas pipeline. The stormwater protection measures would be applicable primarily in and near the intermittent drainages, whereas the BMPs would apply to all construction activities.

Because of the lack of surface water bodies and the measures that would be implemented to prevent water degradation, no significant adverse impacts to surface waters would be expected to result from construction of the pipelines.

Hydrostatic testing is used to discover pinhole leaks, weld weaknesses, and wall strength problems with steel pipelines. Water is placed inside the pipe and pressurized along its length. If the pressure does not drop over time and/or there is no obvious leak, the test water is discharged. Because the water can become anoxic or contaminated with oil or other substances, it would be tested to meet water quality standards, treated as needed, and discharged at an approved location.

Transmission Line and Associated Facilities

The limited right-of-way clearing, tower and switchyard construction, and access road construction and reconstruction would result in an increase in peak runoff and total annual runoff. On average, an area of 0.25 acre would be disturbed for each of the 163 structures required to support the transmission lines, for about 40 acres total. The Smiths Harbor Switchyard also would also require clearing about 7 acres. The cleared or disturbed areas that are not directly covered by project structures, facilities, or appurtenances would be reseeded with naturally occurring shrubs and grasses. The runoff from these areas would be greatest during and shortly after construction and would diminish as vegetation reestablished.

Most access roads required for the project would not cross drainage areas, so impacts from access road construction generally would be low. However, three or four of the access roads would require the installation of culverts at drainage area crossings. These installations would place construction activities within intermittent sources of surface water, and because of probable sedimentation, would make moderate impacts possible.

To reduce the potential for increased runoff during project construction, stormwater control measures would be implemented. These measures include could include the use of silt fences and temporary swales to maximize stormwater infiltration into the soil, while also reducing erosion.

Potential contaminants of water resources during project construction include gasoline, diesel fuel, or oil used by construction equipment. These potential contaminants would not be stored at the project site, and their release would be limited to accidental equipment leaks. To minimize the risk of contamination, BMPs would be implemented. BMPs include good housekeeping measures, inspections, and practices that would limit contact between stormwater and potential contaminants.

The following measures are included within the project design and description to mitigate impacts to the water environment.

- Existing roads would be used for access wherever feasible, reducing the need for new road construction.
- Where feasible, structure construction on potentially unstable slopes would be avoided.
- Construction in wetland areas would be avoided to the extent practicable.
- Intermittent stream crossings would be designed to avoid adverse impacts to stream hydraulics and deterioration of streambed or bank characteristics.

- Existing vegetation would be preserved where practical, especially next to intermittent and perennial creeks and streams.
- Access roads would be gated or signed to restrict access to authorized personnel only.
- A spill prevention and contingency plan would be prepared prior to the start of construction to minimize the potential for spills of hazardous materials to migrate to streams, other water bodies, or groundwater. BMPs would be developed and implemented to prevent fuel spills and herbicide runoff from reaching streams.
- Construction crews would avoid refueling and/or mixing hazardous materials where accidental spills could enter surface or groundwater.

3.3.2.2 Operation and Maintenance

Surface Water and Runoff

Plant Site

Runoff from the project site outside of the bermed power plant complex would be directed to an unlined detention pond where it would either evaporate or infiltrate into the ground. Rainfall upon the 66-acre bermed area would be captured and routed to oil/water separators, then to a lined detention pond where the water would be collected and directed to the power plant cooling tower basin.

The following measures to reduce or eliminate environmental impacts to surface water during the operation of the generation plant are included in the applicant's proposal.

- The stormwater management procedures described in Section 3.3.2.1 would reduce the potential for contamination of stormwater in the project site area during operation.
- BMPs would be designed and implemented to prevent and minimize the discharge of pollutants in stormwater runoff, and a National Pollutant Discharge Elimination System (NPDES) permit would be required for operation of the Wallula Power Project.
- Containment would be provided around areas used to store hazardous materials. An impervious containment equivalent to 110% of tank volume would be constructed around and beneath all tanks containing potential contaminants. The sump vault beneath the ammonia storage area would be designed to contain 110% of the volume of a tanker truck used for delivery of aqueous ammonia for the NOx control system.

As discussed in Chapter 2, Section 2.2.2.1, the primary wastewater stream from the plant would be cooling water system blowdown. The blowdown water would consist of raw water that has been recycled through the cooling towers that includes concentrated salts and residues of chemicals added to the circulating water to control scaling and fouling.

No plant wastewater would be discharged to the surface or groundwater environment. Blowdown water would be drawn from the cooling water stream at a rate between 160 gpm and 280 gpm, then be sent to the wastewater storage tank. Under normal operation conditions, the wastewater is cycled directly from the tank to a brine concentrator. The wastewater is heated, water vapor forms, and a clean water distillate is drawn off for future use.

The clean distilled water would be sent to the inlet of the power plant mobile polishing units or to the service water tank for reuse in the power plant water systems. The concentrated brine fluid produced in the process would be sent to one of two 100% capacity decant basins to settle out a majority of solids before overflowing to one of two lined evaporation ponds that cover a 22-acre area. Evaporation to the atmosphere would remove the remaining liquid.

Because of the way industrial wastewater would be handled without discharge to surface or groundwater, no off-site water quality impacts would result from operation of the plant.

In addition to measures to protect surface water, there would be a net increase to in-stream flows in the Columbia River equal to 702 acre-feet per year resulting from retirement of the water rights through the purchase of existing land and water rights that would not be consumed for plant operations. This volume is equivalent to 12% of the project's maximum expected annual water usage rate.

Pipelines

Once the pipelines had been constructed and the alignment was revegetated, there would be little potential for impacts on surface water or runoff. Mitigation measures to reduce erosion during construction of the pipelines would also reduce the potential for impacts during the life of the project. It is expected that periodic inspection and maintenance of erosion controls would prevent any significant impact to surface waters.

However, in the event of a break in the water pipeline, a substantial washout could occur because of the highly erodible nature of the soils along the alignment. Depending on the volume and location of a break, such a washout could result in transport of a substantial quantity of sediment to a drainage, and possibly downstream to the Columbia River. Routine inspections of the pipeline alignment would be performed to look for evidence of settlement, ground cracking, erosion, seepage or other indications that would suggest a need for maintenance. Special inspections would be performed in the event of a perceptible earthquake.

Transmission Line and Associated Facilities

The transmission line towers and switchyard would be sited to avoid areas with steep slopes and they would not create a significant area of impervious surface. As a result, the operation of these facilities would be expected to result in only minor increases in runoff once vegetation had been reestablished following construction. Also, because the footprints of the affected areas would be very small relative to the drainage basins in which they would be located, the peak and total amount of runoff would not likely be noticeable, particularly since most runoff would likely infiltrate into the surface soils before reaching a surface water body. Consequently, the relative increase in peak flow in any one watershed would not be expected to have a significant impact on surface water quality.

Maintenance of the transmission line would occur from designated access roads. Although use of access roads would minimize the area of soils compacted by vehicular traffic, these areas would be expected to have higher runoff and erosion rates than undisturbed soils. Unauthorized use of the access roads would further increase the potential for localized runoff and erosion. As a result, there would likely be a low impact to surface water as a result of ongoing use of the transmission line access roads.

Although small increases in runoff and erosion from project facilities, or as a result of vehicle traffic along access roads for maintenance and inspection, potentially could adversely affect surface water quality, these impacts would likely be low. Impacts would be further reduced by ongoing maintenance in compliance with the SWPPP and erosion control plans that would be in place. Also, to further reduce the potential for runoff or other impacts to surface water resources during operation and maintenance of the transmission line, Bonneville would restrict access road use to authorized personnel and landowners by installing gates and posting signs.

The potential for release of hazardous materials from these facilities would be minimal because of the spill prevention and control plans and BMPs that would be in place.

Floodplains

Plant Site

A catastrophic failure of a major impoundment dam upstream of the plant site could threaten the project site, although such an event is considered unlikely. The Grand Coulee Dam failure scenario represents the highest potential for inundation at the plant site. For this scenario, the highest probable water level is 378 feet MSL in Lake Wallula. The potential for such a flood to impact the power plant would be mitigated by construction of the facility at a grade of 385 feet MSL, above the worst-case flood scenario. Under this unlikely flood scenario, some inundation and erosion would be possible along the western, low-lying portions of the project site. This would likely overtop the stormwater detention/infiltration pond “B”, the environmental consequences of which would be minimal. The more likely 100-year flood or the probable maximum flood would affect none of the site.

Pipelines

The proposed pipeline alignments would not be affected by the probable maximum flood or the 100-year flood because they would be situated well above the elevations of these floods. Only where the pipelines would cross a dry wash to the south of the plant site would their elevation be below the maximum flood level resulting from a catastrophic failure of Grand Coulee Dam upstream on the Columbia River. However, because the pipelines would be buried at least 5 feet underground, it is unlikely that such an event would affect their integrity. Consequently, there would appear to be no significant impacts associated with flooding during the operating life of the pipelines.

Transmission Line and Associated Facilities

The transmission lines would not be constructed within floodplains or narrow incised stream valleys. Therefore, there should be no potential for flood impact.

Groundwater

Plant Site

Substantial groundwater would be required to operate the Wallula Power Project. The estimated peak full load hourly water demand, at a temperature of 98^{o}F, is 7,901 gpm. The maximum expected annual usage is estimated at 4,087 gpm, which is equivalent to 6,591 acre-feet per year, whereas the estimated annual water usage is 3,235 gpm, or 5,218 acre-feet.

The water requirements for operating the generation plant would be met by groundwater extraction from a series of wells at the Boise Cascade fiber farm, which draw water from the shallow gravel aquifer, and deep on-site wells that draw water from the lower Saddle Mountains Basalt aquifer. Potable water would be provided by the Boise Cascade wells. These water uses would all be offset by termination of current uses, through the transfer and purchase of existing water rights. Cumulative impacts are evaluated in Section 3.17.

The project would include the following design elements to conserve groundwater.

- The cooling tower water chemistry is designed to accommodate 20 cycles of concentration, thus reducing the volume of cooling tower blowdown.
- The mechanical draft cooling tower would include high efficiency drift eliminators that would reduce drift water losses to 0.0002% of circulating water flow. The average annual loss from blowdown and drift loss is estimated at 161 gpm, with as much as 311 gpm during the peak month of operation.
- The plant design includes a zero discharge system to process wastewater to produce a clean distillate for reuse.

The expected impacts of the groundwater extractions for plant operation are described in the following subsections. Two aquifer systems would be affected, the shallow unconfined gravel aquifer, and the deep lower Saddle Mountains Basalt aquifer.

Effects on the Gravel Aquifer. Proposed withdrawal rates from the Boise Cascade Corporation's fiber farm wells would differ from the historical irrigation use. The maximum annual raw-water demand from these wells for the power plant is estimated at 4,793 acre-feet, compared to the 5,024 acre-feet transferable from the Boise Cascade Corporation fiber farm water rights. Comparison of monthly irrigation demand at the Boise Cascade Corporation fiber farm to raw-water demand at the power plant indicates that the latter would be lower during the maximum evapotranspiration season (May through September), but greater during the nonirrigation season.

The effects of pumping under both current and expected future conditions were analyzed using a simplified MODFLOW model of the gravel aquifer in the vicinity of the Boise Cascade Corporation's fiber farm wells. The results of the analysis indicate that existing wells would not be impaired by the change in the pattern of pumping at the Boise Cascade Corporation fiber farm wells because future water level fluctuations would be less than current fluctuations. Also, maximum water use by irrigators and domestic users occurs during the summer when water levels under future conditions would be higher than historical values.

The current water use estimates for the fiber farm wells are based on the following information provided by Boise Cascade Corporation:

- well testing data;
- the rate each well pumps when it is turned on ("operational use rate");
- the number of acres planted in hybrid cottonwood trees of varying age;
- the water demands by mature hybrid cottonwood trees; and
- the typical length of an irrigation season (6 months).

Seven water rights for Boise Cascade Corporation's fiber farm wells permit irrigation of up to 1,243 acres, whereas 1,182 acres are planted at this time. The water rights allow annual applications of 4.65 to 5.167 acre-feet of water per acre.

Tree seedlings at the Boise Cascade Corporation fiber farm have consumed about 1.25 feet of irrigation per year, whereas mature cottonwood trees (4 to 7 years old) have consumed about 4.5 feet of irrigation. Thus, each water right is periodically used to a maximum extent of about 4.5 feet of water per year. The water consumption figures are based on Boise Cascade Corporation fiber farm water application volumes and Boise Cascade Corporation's knowledge that little of the applied water goes unused. Boise Cascade Corporation knows that little water goes unused because they use soil moisture monitoring devices to prevent over-irrigation. The Boise Cascade Corporation value of 4.5 feet of annual water consumption by hybrid cottonwoods is on the low end of values documented in studies (U.S. Environmental Protection Agency 1988). The average monthly actual evapotranspiration (AET) was estimated by approximation of the seasonal rates of "Reference Evapotranspiration" for the nearest Public Agricultural Weather System at Sunnyside, Washington (54 miles west-northwest of Wallula). To estimate monthly AET at the project site, the sum of monthly AETs was scaled to equal the estimated irrigation demand of 4.25 feet (51 inches) at the Boise Cascade Corporation fiber farm. The 6-month irrigation season was assumed to encompass mid-April to mid-October.

The resulting maximum monthly irrigation demand is 1,005 acre-feet in July, which equals an average withdrawal rate over all hours of 7,335 gpm. No irrigation demand occurs from mid-October through mid-April. The monthly total irrigation demand was allocated among all wells according to their respective percent of total production capacity. This approach assumes that all wells were pumped simultaneously for the same length of time and each at its "operational use rate."

The monthly raw-water demands at the power plant were estimated for comparison to the irrigation demand estimates. The raw-water demand estimates differ slightly from the power plant requirements by an amount of uncertainty referred to as "design contingency." Consistent with the allocation of Boise Cascade Corporation water use, the applicant assumed that the total monthly demand would be met by withdrawals from existing wells according to the percent of total production capacity currently provided by each well.

During a normal precipitation year, 7 inches of on-site stormwater would be captured in a lined detention pond for reuse in the cooling towers. This would amount to 38.55 acre-feet per year of water (assuming no loss to evaporation) that no longer would percolate into the shallow gravel aquifer. Since this runoff would be reused as cooling water makeup, there would be a corresponding reduction in the project's requirement for groundwater. This loss of recharge to the shallow aquifer would be compensated by reducing commensurately the amount of pumping from the shallow gravel aquifer wells at the Boise Cascade fiber farm. Therefore, capture of rainfall for reuse would have no net impact on the aquifer. However, beneficial reuse of the runoff would require a permit from Ecology, and an additional point of withdrawal at the plant site would have to be granted for the existing water right.

Currently the plant site is irrigated farmland. Elimination of seasonal irrigation of the site would also result in a reduction of recharge to the shallow aquifer. This could lower the water table locally, and result in a reduction of groundwater discharge to the Columbia River. However, since the irrigation water currently used on the site is obtained by withdrawals directly from the Columbia River, there would be no net loss to the river; rather there could be a beneficial impact of slightly increased streamflow because evapotranspiration losses would be eliminated. Since the shallow groundwater is not in direct connection with any other surface water bodies at or near the site, this reduction in recharge would not impact other surface water bodies.

Effects on the Lower Saddle Mountains Basalt Aquifer. Drawdown of the potentiometric surface within the lower Saddle Mountains Basalt aquifer would occur as a result of pumping from the new on-site Port of Walla Walla supply wells. If the currently permitted pumping rate of 1,200 gpm is extracted from a single well, the pumping water level in that well would be expected to draw down from slightly less than 160 feet below ground surface after 60 minutes of pumping to somewhat more than 160 feet below ground surface after 10,000 days (27 years) of pumping. Similar water levels would be expected to occur in the pumping wells if the two on-site wells are interchanged periodically. If both wells were used simultaneously to produce a total of 1,200 gpm, the resulting pumping water level in each well would be shallower than if a single well were used at any given time.

Using an incremental interference method to evaluate drawdown impacts to other wells in the vicinity, Pacific Groundwater (2001) determined that the maximum drawdown impact from the effect of long-term pumping of the Port of Walla Walla well at 1,200 gpm would be to lower the static well water level by approximately 11 to 37 feet in the J.R. Simplot Company and the Iowa Beef Processors wells, and in the general vicinity. The Port of Walla Walla well is shown in Figure 3.3-1 as well 37 at the south boundary of the plant site. The J.R. Simplot well is identified on this figure as well 7, approximately 3,000 feet northeast of the Walla Walla well, and the Iowa Beef Processors wells 8 and 10 are located about 4,000 feet northeast of the Walla Walla well.

The normal pumping rate in the J.R. Simplot Company well is approximately 1,200 gpm, with an attendant pumping water level of approximately 320 feet below the top of the casing. The pump is reported to be set at either 650 or 500 feet below the wellhead. Therefore, interference drawdown caused by pumping 1,200 gpm from the Port of Walla Walla wells would not prevent the J.R. Simplot Company well from extracting their accustomed quantities of water from the new shop well because the pumping water level would remain far above their pump intake.

The normal pumping rate in the Iowa Beef Processors well is 450 gpm. The pumping water level is not known, however, the pump was lowered recently to maintain well yield (personal communication between Gerome Dyba, Iowa Beef Processors and Charles Ellingson, Pacific Groundwater Group, as cited in Pacific Groundwater Group 2001). The decreased yield in the Iowa Beef Processors well could be related to plugging of the well intakes, or to lower aquifer water levels. Based on this limited information, pumping 1,200 gpm from the Port of Walla Walla wells may exacerbate problems at the marginal Iowa Beef Processors well. Routine groundwater level monitoring would be performed to allow timely response to any unexpected and adverse conditions.

Other wells in the area are generally screened in shallower aquifers that would either not be affected by the groundwater extractions required to meet the project's water requirements from the Port of Walla Walla well, or the effects would be minor compared with those wells described above.

Groundwater Quality. Potential adverse impacts to groundwater quality could result from spills or releases of contaminants used or generated during operation or maintenance of the generation plant. A temporary increase in shallow groundwater nitrate concentrations may occur during construction as the alfalfa that is currently cropped on the field dies and releases fixed nitrogen to the soil. The change would be similar to that experienced by alfalfa fields being rotated to a different crop, as is commonly practiced.

Mitigation measures included within the project description and design to protect groundwater quality are as follows.

- The only wastewater that would be discharged to the ground would be domestic sanitary wastewater. It would be discharged to a septic system and drainfield designed and operated in accordance with local regulations and industry standards.
- The stormwater runoff from within the bermed area surrounding the power plant would be directed to oil/water separators and then to a lined detention pond for reuse within the facility. Stormwater from plant site areas outside the bermed power plant facility would be directed to an unlined pond for evaporation and infiltration.
- The project design would employ a zero liquid discharge system, including the use of brine concentrators and evaporation ponds. This would eliminate potential water contamination from wastewater discharges.
- The evaporation ponds would be lined with a 2-foot-thick clay liner, on top of which would be a high-density polyethylene (HDPE) liner, which, in turn would be covered with a clay liner. A leakage detection system consisting of a network of collection pipes and sumps would be installed under the evaporation ponds to detect and collect any leakage that might occur through the pond liners. This leakage system would be monitored by plant personnel to ensure the integrity of the pond liners.
- The limited quantities of hazardous materials required for water treatment would be handled within containment in accordance with regulations.
- Shallow groundwater quality would be monitored routinely in monitoring wells installed for this project.

With implementation of these measures, impacts to groundwater quality during project operation and maintenance are not expected to be significant. As discussed earlier with respect to groundwater quantity, the impacts from groundwater extraction on the shallow aquifer are not expected to be significant. Local lowering of the potentiometric surface in the lower Saddle Mountains Basalt aquifer may have some impact on nearby wells that draw water from the same aquifer. Impacts to nearby wells that are screened in overlying aquifers are expected to be insignificant.

Pipelines

Operation and maintenance of the pipelines would not require use of groundwater. Therefore, any potential impacts to groundwater from operation and maintenance would result from spills or accidental releases of fuels, lubricants, or other hazardous materials during maintenance activities. Because of the relatively permeable nature of the soils along the alignment, a liquid spill could migrate rapidly to the relatively shallow gravel aquifer. However, since relatively little maintenance would likely be required, the potential for such a release is considered to be low.

Potential groundwater contamination would be mitigated by implementation of a spill prevention and control plan.

Transmission Line and Associated Facilities

Operation and maintenance of the transmission line would not require use of groundwater. Therefore, any potential impacts to groundwater resources from operation and maintenance would be the result from spills or accidental releases of fuels, lubricants, or other hazardous materials during maintenance activities. Because of the relatively permeable nature of the soils along parts of the alignment, a liquid spill could migrate rapidly to the relatively shallow gravel aquifer. However, since relatively little maintenance would likely be required, the potential for such a release is considered to be low.

The transmission lines and associated structures would be maintained to comply with local ordinances and state and federal water quality programs. Compliance with these ordinances, laws, and programs throughout the life of the project should reduce the potential for degradation of the quality of aquifers along the transmission right-of-way.

A refueling plan and spill notification plan would be designed and implemented to protect groundwater quality. Refueling or mixing of hazardous materials would be done in a manner and location that would reduce the potential for accidental spills to impact groundwater.

Herbicides, if improperly handled, could pose a hazard to surface water and groundwater resources. Any herbicide used in operation or maintenance of the transmission line right-of-way would be EPA-approved and would be applied in accordance with the label instructions. Herbicide containers would be disposed of according to Resource Conservation and Recovery Act (RCRA) standards.

Public and Private Water Supplies

Plant Site

No significant impacts to public water supplies are anticipated from operation of the proposed power plant. The two public water supply systems closest to wells to be used for the power plant are the Boise Cascade Company Trucking Division well and the community of Wallula wells (P-2 and P-7, respectively, on Figure 3.3-1).

The Boise Cascade Corporation Trucking Division well is 84 feet deep and completed in the gravel aquifer. The static water level in the well was 36 feet below ground surface when drilled, and available drawdown was 24 feet to the top of the perforations at 60 feet depth. The well produced 33 gpm for each foot of drawdown when tested upon completion. Only about 10 gpm from the well is used, based on the "source capacity" listed on the Water Facilities Inventory provided by the Walla Walla County Health Department. Based on the well construction, water level data, and drawdown predictions, this well would experience minor interference, but its operation would not be negatively influenced by the groundwater withdrawals required to operate the power plant.

The two community of Wallula wells are reportedly completed in a basalt, probably the upper Saddle Mountains Basalt aquifer. No well logs are known to exist; the wells are not metered, and no water level data are available. The system is not limited by well production capacity according to Dee Gleesney of the community of Wallula Water System (referenced in Wallula Generation 2001).

Drawdown of the community of Wallula wells as a result of pumping the Boise Cascade Corporation wells (under existing and future conditions) is predicted to be very small because the wells draw water from a deep basalt aquifer that is hydraulically separated from the gravel aquifer used by the Boise Cascade wells. The maximum interference drawdown under the current pumping regimen is greater than predicted for the pumping regimen assuming the wells were to be used for power plant water supply.

3.3.3 Impacts of Alternatives

3.3.3.1 Alternative Transmission Structure and Longer Span Design

This alternative would employ higher towers and longer span lengths for a portion of the transmission line than the proposed alternative. As a result, it would require construction of approximately 17 fewer towers and reduce the number of spur and access roads. This alternative would not affect water resources at the plant site or pipeline alignments. However, the potential for impacts to water resources along the transmission line right-of-way would be reduced somewhat, particularly during construction. By reducing the number of towers required, there would be less soil disturbance associated with tower construction, less excess soil placement, and less road construction. Consequently, the potential for surface water degradation by sedimentation would be reduced. This reduction in potential impact would be primarily during construction, but also to some extent during operation and maintenance because fewer towers would require less overall maintenance.

Because of the reduced amount of construction activity required for this alternative, there would also be a slight reduction in the potential for a release or spill of hazardous materials along the transmission right-of-way during construction. This would reduce the potential impacts to both surface water and groundwater. However, given the protective measures that would be in place to protect against such spills, and the considerable distance to surface water and groundwater resources along most of the right-of-way, the significance of this lower potential is only a nominal benefit of this alternative.

It is also possible that the longer span lengths would provide greater flexibility for tower placement so as to avoid areas that are sensitive to surface water degradation. Depending on design flexibility, this alternative may allow for greater setbacks from drainages, wetlands and steep slopes near Juniper Canyon.

3.3.3.2 Alternative Alignment near McNary Substation

There would be very little difference in potential impacts to water resources between the two options into McNary. There would be a similar number of towers placed and a similar amount of ground disturbance.

3.3.3.3 No Action Alternative

Under the No Action Alternative, there would be no impacts to the current water quality, quantity, and uses in the project area. Project site groundwater would be produced and used during the irrigation season as it is currently. The level of stress on the aquifers would remain as it is currently, with highest stress occurring during the irrigation season. There would be no net benefit to the Columbia River flow regime through water rights withdrawals.

3.3.4 Mitigation Measures

3.3.4.1 Construction

Generation Plant

Based on an evaluation of liquefaction potential, it may be necessary to over-excavate some parts of the site to reduce the risk of liquefaction. In this event, dewatering of the excavations may be required. Provisions would need to be developed for handling and disposing of this water during construction to prevent adversely affecting surface water.

Transmission Line and Associated Facilities

If herbicides are required for right-of-way maintenance, potentially affected landowners should be contacted to find out if they have any concerns with the use of herbicides on or near their properties.

Any application of herbicides should be limited to provide a prescribed buffer around any surface water bodies and drinking water wells.

New tower and access road construction should be avoided in the proximity of the Walla Walla River and associated surface water bodies.

3.3.4.2 Operation and Maintenance

Generation Plant

A specific groundwater monitoring plan should be developed to assess whether groundwater withdrawals from the lower Saddle Mountains Basalt aquifer are adversely affecting any existing water supply wells, most notably the Iowa Beef Processors well. Mitigation measures should also be identified that could be used to remedy such an impact. These measures would necessarily be well-specific, but a range of possible measures should be specified and could include well replacement or deepening, pump lowering, or well reconditioning.

A response action plan should be developed to address the potential for a significant leak in the liner of the evaporation ponds. The design of the detection and collection system should be described in detail as part of the plan or as a supporting document.

3.3.5 Significant Unavoidable Adverse Impacts

Unavoidable impacts to water resources associated with the project include an increased potential for runoff from project facilities and along access roads. While the impact may be unavoidable, it is not expected to be significant because of the relatively small footprint of the project, the high infiltration rates of soils, the low precipitation rate throughout the project area, and the general lack of surface water bodies adjoining or near the project. Implementation of mitigation measures would further reduce the potential for runoff. As a result, no significant unavoidable adverse impacts to water resources are associated with construction or operation and maintenance of the project. Cumulative impacts are evaluated in Section 3.17.