# MASON DAM HYDROELECTRIC PROJECT

FERC Project No. P-12686

# Preliminary Licensing Proposal

*Submitted by:*

*Baker County*

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# 1.0 EXISTING AND PROPOSED PROJECT FACILITIES

## 1.1 PROJECT LANDS AND WATERS

The Mason Dam Hydroelectric Project (FERC No. P-12686) is located in Baker County, Oregon approximately 15 miles southwest of Baker City off of State Highway 7. Mason Dam was built by the US Bureau of Reclamation (Reclamation) on the Powder River for irrigation, water delivery and flood control. The water stored behind Mason Dam in Phillips Reservoir is released by Baker Valley Irrigation District (BVID). The project is located in the Wallowa-Whitman National Forest (WWNF) (Figure 1).

The Northwest Power and Conservation Council gives this general description of the Powder Basin in their Powder River Subbasin Plan (Novak, 2004), "The subbasin is defined by the Blue Mountains to the west, the Snake River to the east, the Wallowa Mountains and Grande Ronde subbasin to the north and the Burnt River subbasin to the south…The Powder River flows 144 miles from its source in the Blue Mountains to join the Snake River at river mile (RM) 296 about 11 miles downstream of Richland, Oregon. The Powder River begins near Sumpter, Oregon (RM 144), where the McCully Fork, Cracker Creek and several smaller tributaries join, and flows east-southeast through the tailings of past dredge mining and into Phillips Reservoir (RM 136). The river exits Phillips Reservoir at RM 131, continuing east for about 7 miles before turning north through the Bowen Valley and Baker City, Oregon (RM 113). From here the river meanders the floor of the Baker Valley and passes by the cities of Haines (RM 98) and North Powder (RM 82) where it is joined by the North Powder River. The Powder River again turns southeast (RM 78), flows through Thief Valley Reservoir (RM 71), through the Lower Powder Valley and enters the Snake River System through the Powder Arm of Brownlee Reservoir (RM 10) near Richland, Oregon. Eleven dams on the Columbia and Snake rivers separate the Powder River from the Pacific Ocean. Most surface and ground water use is for irrigation."

### 1.1.1 PHILLIPS RESERVOIR

Phillips Reservoir was formed when Mason Dam was constructed from 1965-1968. The tributaries that drain into Phillips Reservoir include the Powder River, Deer Creek, Miners Creek, Smith Creek, Dean Creek, Clear Creek, and several unnamed creeks. The watershed contains 105,345 acres. The reservoir surface area is 2,234 acres at an elevation of 4,070.5 with a capacity of 95,540 acre feet.

### 1.1.2 POWDER RIVER

The Powder River is a tributary to Phillips Reservoir and is also the river that receives the water discharged from Mason Dam. There are several tributaries that flow into the Powder River above Phillips Reservoir near the town of Sumpter. These include Sawmill Gulch, Cracker Creek, and McCully Fork. There are gauging stations that measure the flow of the Powder River into Phillips Reservoir and the flow released from Mason Dam.

The Powder River possesses a low gradient C-type channel that has been thoroughly disturbed by dredge mining and is currently confined by tailings to mostly B-type or F-type channels. In this watershed more than one-third of the length of the main Powder River valley is covered by Phillips Reservoir. (Powder Basin Watershed Council, 2001).

### 1.1.1 MASON DAM

Mason Dam was constructed by the Bureau of Reclamation (Reclamation) from 1965-1968. It is an earth-fill type dam with a structural height of 173 feet and a crest elevation of 4082 feet. The dam has a hydraulic height of 159 feet and a maximum release through the Outlet Works of 895 cubic feet per second (cfs). There is an un-gated spillway with an OG crest at Elevation 4076 and a concrete channel down the left abutment, ending in a pool (tailrace) below the Outlet Works.

The Outlet Works include:

- A short submerged intake shaft with a circular intake equipped with trash racks consisting of bars at 6 inch centers. The sill of the intake is Elevation 3,975 which is 6.63 feet below the inactive pool;
- A 6 foot 6 inch diameter, 325 foot long concrete lined tunnel from the intake to the centerline of the dam. There is an abandoned section of tunnel upstream from the intake that was presumably used a diversion during construction;
- A hydraulically operated 4 foot by 4 foot guard gate in a concrete chamber;
- A 350 foot long, 56-inch discharge conduit with a Y that splits into two branches each fitted with 2 foot 9 inch high pressure side gates. The gates are mounted in a downward sloping conduit that discharges into the tailrace below the water line.

The discharge conduit is located inside a horseshoe shaped tunnel with a walkway on the right side of the conduit. There is a 12 inch diameter pipe that is used to discharge low flows during the non-irrigation season, and a 9 inch diameter ventilation pipe, both mounted below the ceiling of the tunnel.

There is a Gate Control Structure equipped with a hydraulic power unit (HPU) and a blower. The HPU is used to operate the slide gates and the guard gate.

### 1.1.2 MASON DAM TAILRACE

The tailrace includes reinforced concrete training walls below the spillway and Gate Control Structure that feed discharges from the two high pressure control gates. From the seat of the high pressure gates the water travels down a 2:1 slope that drops 11 feet in elevation to the floor of the tailrace. Due to the turbulent nature of the water released, a baffle was installed at the end of the tailrace to prevent damage to the floor.

### 1.1.3 ACCESS ROAD

The portion of the old State Highway remaining below the dam serves as an access road to the dam control house, to the dam operator's house and garage, and to the recreational area below the dam along Powder River. The Bureau assumes full responsibility for this road from a point opposite the most westerly end of the recreation area on the north side of Powder River on to the dam control house, and provides a locked gate at this point to deny access to unauthorized personnel. The Forest Service has responsibility for the road from the point opposite the westerly end of the recreation area eastward to the junction with the State Highway.

The gravel surfaced access road turns left near the base of the dam and continues across two bridges over the spillway and tailrace training walls. There is a triangular shaped flat area and a road that continues up the hill along the right abutment. The powerhouse would be located in the flat area, and the buried transmission line will follow the road.

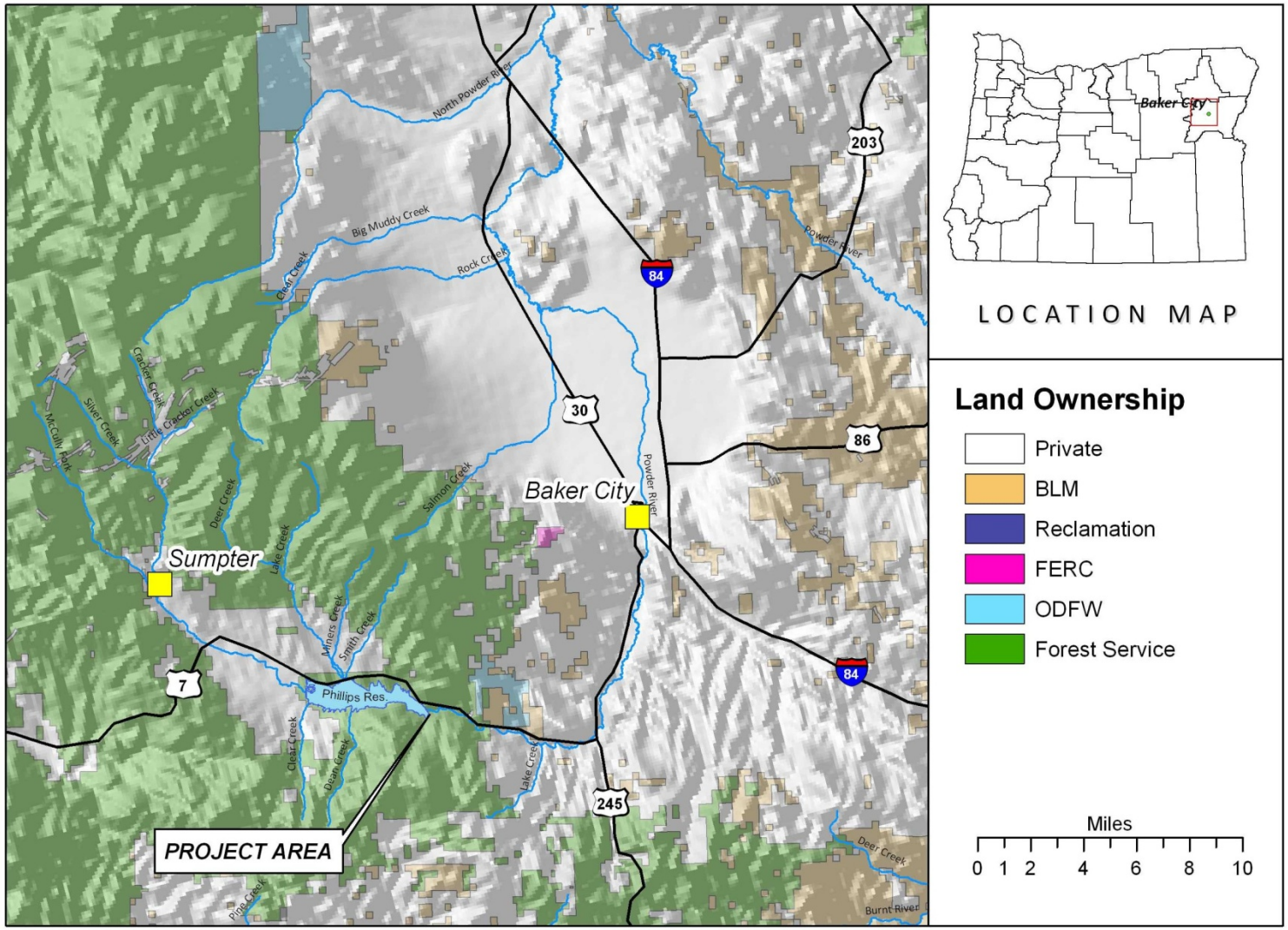


**FIGURE 1. PROJECT VICINITY MAP.**

## 1.2 PROPOSED PROJECT FACILITIES

The proposed project is a 3.4 MW facility consisting of an intake valve bifurcation, a powerhouse, tailrace, transmission line and substation.

### 1.2.1 FERC PROJECT BOUNDARY

The FERC project boundary surrounds all project facilities and construction work areas and includes a buffer zone to assure that all project activities are contained within the boundary. The proposed project facilities include:

- *Intake bifurcation* – approximately 30 ft from the downstream end of the existing 56" penstock through Mason Dam, where the penstock will be bifurcated to route water into the powerhouse
- *Powerhouse* – Metal building containing the turbine, generator, and ancillary equipment
- *Tailrace* – Piping and flow control structures/earthworks to route discharge from the powerhouse back into the Powder River
- *Transmission line* – buried transmission line from the powerhouse to the point of interconnect with an existing Idaho Power 138 kV line; other options still under consideration
- The proposed underground power-line easement and fifty feet on either side
- *Substation* – Electrical facility at the point of interconnect
- *Construction staging area* – Area for temporary storage of construction equipment and materials

The Mason Dam facilities, which are owned by the Bureau of Reclamation, are not included within the project boundary except as required for the operation of the project. Figure 2 shows the proposed FERC boundary. Appendix A contains preliminary design drawings of the hydroelectric facilities.

### 1.2.2 INTAKE BIFURCATION

A 56-inch by 56-inch by 72-inch steel bifurcation will be installed just upstream from the Y branch in the existing conduit. A thrust block will be tied into the existing mass concrete around the Y branch. A new portal structure will be constructed to provide access to the tunnel upstream of the bifurcation. A new 72-inch diameter, ½ inch wall Penstock, approximately 105 feet long will extend to the powerhouse and feed a horizontal shaft Francis Turbine. A 54-inch diameter shut off valve (TSV) located in the powerhouse would be provided to isolate the turbine from the Reclamation Outlet Works.

### 1.2.3 POWERHOUSE

A 40 foot by 28 foot Powerhouse with a metal building above grade level would be located in the flat area on the right side of the training walls below the Gate Control Structure. The proposed powerhouse will be located near the existing valve house in a fenced off location. This building will be designed to blend in with the surrounding area that consists of cement structures and large boulders that make up the face of Mason Dam.

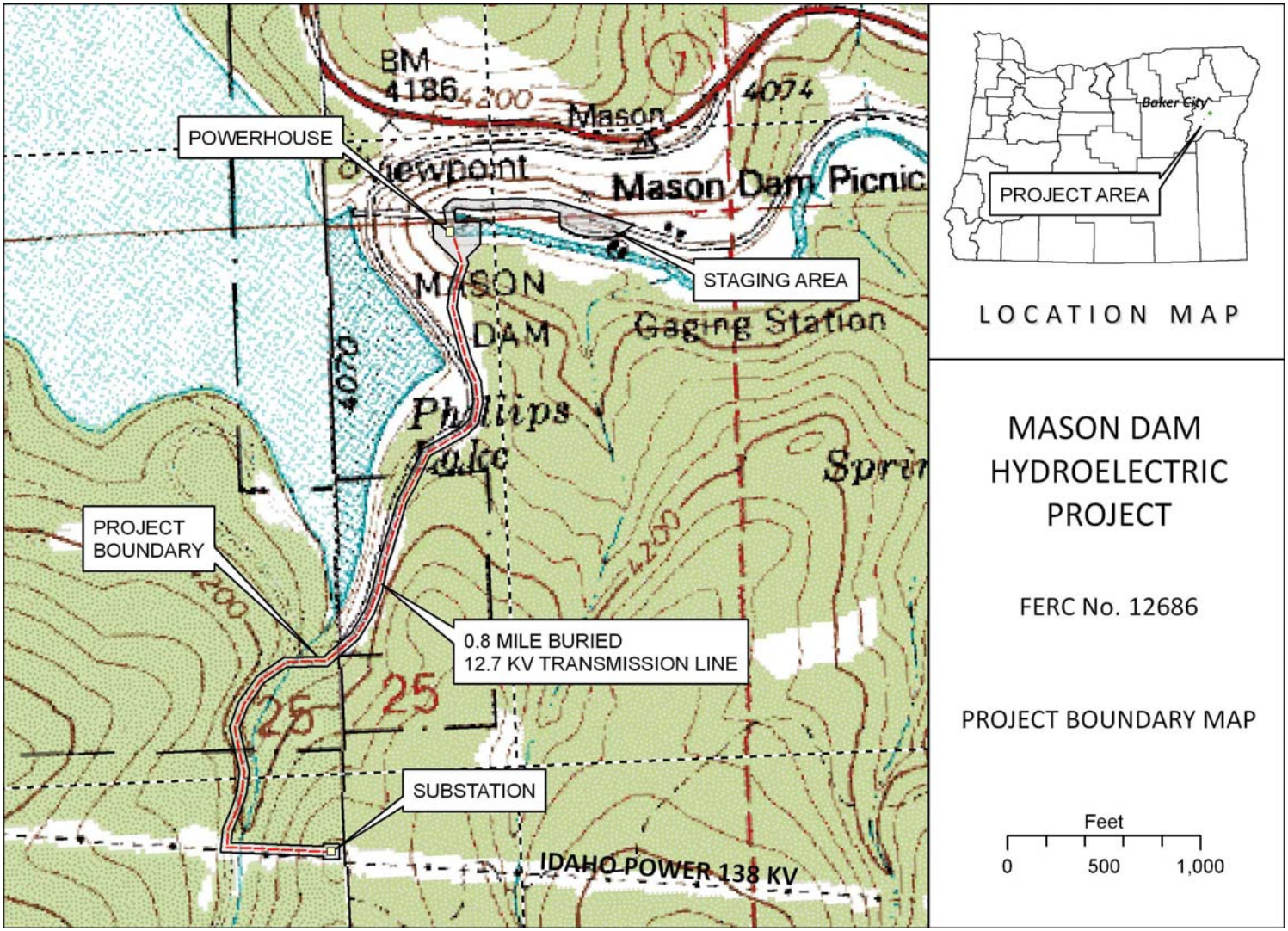


**FIGURE 2. PROJECT BOUNDARY MAP.**

The powerhouse will contain a single horizontal shaft Francis turbine (140 feet net head, 514 RPM) connected to a 3.4 MW 60 hertz, 12,640 volt generator with a brushless exciter. It will operate efficiently over a head range of 110 to 150 feet, and flows from 120 to 300 cfs. The turbine shaft will be 3.3 feet above minimum tailwater. An extended downward tilted draft tube will discharge into the tailrace. The draft tube will be fitted with aeration fittings to provide aspiration of air to increase dissolved oxygen in the river.

Plant switchgear will be utility grade. Plant controls will include a synchronous bypass signal to initiate operation of the Reclamation slide gates during turbine shut down. A new HPU will be provided to increase the rate of slide gate opening to more closely match the rate of flow lost when the turbine shuts down. All other necessary and usual plant mechanical and electrical auxiliaries including a HPU for operation of the turbine and TSV and DC controls will be provided.

#### 1.2.4 TAILRACE

The existing tailrace will be modified to accommodate discharge from the powerhouse without affecting the existing jet-valve discharge area. The tailrace will use the existing pool. Rip-rap will be placed on the slopes of the pool on the right side, and a new concrete wall that ties into the existing training wall will form the left side.

#### 1.2.5 TRANSMISSION LINE

The transmission line will be approximately 0.8 miles long. The current plan is for the line to be buried starting from the powerhouse at the south edge of Mason Dam, extending along the dam face to Black Mountain Road, then continuing in the Black Mountain Road right-of-way to its intersection with an existing Idaho Power transmission line. Other transmission line options are still being considered. Final selection of a transmission line option will depend on both economic and environmental factors.

#### 1.2.6 SUBSTATION

The substation will include a 12.47 KV by 138 KV, 4 to 5 MVA transformer, and necessary circuit breakers and disconnects. A disconnect will also be provided at the powerhouse.

#### 1.2.7 CONSTRUCTION STAGING AREA

The recreational parking area located approximately 600 ft downstream of the tailrace pool would be utilized as a construction staging area.

# 2.0 EXISTING AND PROPOSED PROJECT OPERATION AND MAINTENANCE

## 2.1 EXISTING PROJECT OPERATIONS

The Bureau of Reclamation is responsible for overall management of the project facilities. Baker Valley Irrigation District (BVID) provides day-to-day operation and maintenance of the facilities under an agreement with Reclamation. An Operation and Maintenance Manual formalizes this relationship. The overall operation plan for Mason Dam provides flood control regulation as well as downstream irrigation water delivery.

Reclamation determines releases for flood control, if needed, during late winter and early spring when snow melt runoff and precipitation are most likely to exceed reservoir capacity. When the reservoir

water surface is within the flood control pool, elevation 4062.40 to elevation 4070.50, discharges from the reservoir are made in accordance with the flood control approved by the Corps of Engineers entitled "Flood Control Regulations, Mason Dam and Reservoir". If the water surface in the reservoir exceeds the top of the flood control pool at elevation 4070.50, water is released simultaneously through the spillway and the outlet works with all high-pressure gates fully open. Use of the spillway is avoided, and to date, all releases have been through the high-pressure gates.

The irrigation season officially begins on March 1 and ends November 1, but in practice the season usually runs between April 15 and October 1. During the irrigation season, releases generally remain above 100 to 200 cfs and can go up to 350 cfs. The Baker Valley Irrigation District has an agreement with the Oregon Department of Fish and Wildlife to release enough water to meet a 10 cfs minimum instream flow at Smith Dam, which is about 5 miles below Mason Dam. As a result of this requirement and the need to release water for flood storage during the spring, flows, releases average approximately 10 cubic feet per second (cfs) between October and January and increase to an average of 20 to 50 cfs during February and March.

## 2.2 Existing Project Maintenance

Maintenance is performed by BVID as needed and as directed by Reclamation. Reclamation performs annual maintenance/inspections, periodic facility review every three years, and comprehensive facility reviews every six years. A BVID supervisor visits the project on weekdays, and weekends when necessary. Use of the 12-inch bypass pipe during winter months makes it possible to do repairs and other maintenance when the Outlet Works facilities (gates HPU, etc.) can be taken out of service.

## 2.3 Proposed Project Operations

The hydroelectric plant will operate in a "run of the river" mode using flows determined by Reclamation and BVID for established purposes. No change in flows will be permitted to accommodate the power plant.

## 2.4 Proposed Project Maintenance

Following start-up of the power plant and an initial operations period to familiarize personnel with the plant operations and maintenance, BVID personnel will perform all maintenance functions. The power plant will not operate during minimum flow providing a period each winter for repair, upgrade and long term maintenance that cannot be undertaken when the plant is operating.

## 2.5 Summary of Protection, Mitigation, and Enhancement Measures

The following protection, mitigation and enhancement measures are planned as part of the project proposal:

- All displaced soil will be utilized on-site as backfill material.
- A water bypass plan, reviewed and approved by Reclamaton, would assure that all required water would be delivered downstream during construction work on the main discharge pipe from Mason Dam.

- To assure that downstream water requirements are always met, the plant controls will include a synchronous bypass signal to initiate operation of the Reclamation slide gates during turbine shut down.
- Incidental travel outside of approved construction areas would be prohibited.
- Silt fences or fiber rolls would be installed between construction areas and adjacent wetlands or streams to prevent construction sediment from entering these areas.
- Tailrace construction within the Powder River would occur under dewatered conditions, with a cofferdam placed immediately downstream of the construction area to prevent downstream sedimentation.
- The project will develop a tiered mitigation plan in which the water quality will be monitored and adjustments made to operating criteria if DO levels fall below the state water DO standard. The tiered mitigation plan would include draft tube aspiration and, if necessary, construction of one or more aeration weirs below the stilling basin.
- The buried transmission line will be located on the side of Black Mountain Road opposite from the unnamed tributary riparian zone.
- All disturbed areas would be reseeded with native and desirable non-native seed mixes to benefit wildlife and to prevent spread of noxious weeds. The seed mix will be determined through consultation with the Forest Service.
- Wetland habitat disturbed by transmission line construction would be re-contoured and reseeded.
- To prevent the introduction of noxious weeds, construction equipment will be cleaned to remove any seeds prior to entry into construction areas.
- All disturbed areas will be reseeded with native and desirable non-native seed mixes in order to restore wildlife habitat.
- To minimize disturbance to bald eagles project construction will be scheduled to avoid loud construction activities between January and March. Construction activities on the most exposed portion of the transmission line will be scheduled to occur as much as possible between August and December.
- The Forest Service and Baker County will use recreation data to identify construction timelines that will have the least impact on recreation access and use.
- Baker County will consult with the Forest Service on appropriate paint colors and materials to make the facilities blend in with the surrounding area.
- In the event that archaeological resources or human remains are inadvertently discovered during the course of project construction, all ground disturbing activities must cease and the Wallowa-Whitman Forest Archaeologist contacted immediately for further instruction.
- Baker County will work with the CTUIR to avoid or minimize effects to traditional cultural properties.

# 3.0 DRAFT ENVIRONMENTAL ANALYSIS

## 3.1 PROJECT LOCATION AND SETTING

### 3.1.1 CLIMATE

The climate of the Project area is typical of the semiarid western intermountain area. It is characterized by light and variable precipitation, and warm sunny days and cool nights through the summer months. Winter weather is erratic and occasionally severe. Average temperatures in the Mason Dam area range from a high of about 82˚F in August to low of about 13˚F in January (Table 1). The average annual precipitation in the Project area is about 17 inches and the average annual snowfall is 38 inches (Table 1).

**TABLE 1. AVERAGE TEMPERATIURE AND PRECIPITATION DATA FOR MASON DAM, 3/1/1969 TO 12/31/2005.**

| Weather Parameter | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Max. Temperature (F) | 34.0 | 40.6 | 48.1 | 56.4 | 65.1 | 73.1 | 81.9 | 81.8 | 72.4 | 60.3 | 43.4 | 33.7 | 57.6 |
| Average Min. Temperature (F) | 12.8 | 15.8 | 22.6 | 28.7 | 35.2 | 40.6 | 44.3 | 44.3 | 37.4 | 29.9 | 23.9 | 14.8 | 29.2 |
| Average Total Precipitation (in.) | 1.92 | 1.36 | 1.54 | 1.25 | 1.79 | 1.73 | 0.86 | 0.89 | 0.82 | 0.95 | 1.85 | 1.98 | 16.94 |
| Average Total Snowfall (in.) | 11.4 | 5.6 | 2.6 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.1 | 13.1 | 38.1 |
| Average Snow Depth (in.) | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |

#### PROJECT EFFECTS

The project will not cause any measurable change in the climate of the project area. The hydroelectric project will displace approximately 5.3 gWH of fossil fuel based electricity generation. Taken together with other renewable energy projects, the Mason Dam project will reduce greenhouse gas emissions that are believed to contribute to global climate change.

#### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

No mitigation measures are proposed with respect to climate.

#### CUMULATIVE EFFECTS

Since the project has no effect on this resource, no cumulative effects are expected.

### 3.1.2 TOPOGRAPHY

#### EXISTING RESOURCES

Baker County, like most of northeast Oregon is dominated by mountains. The Blue, Elkhorn, Lookout, Malheur, and Wallowa Mountain ranges rim or cross the county, and contain nearly half of Oregon's peaks above 7,000 feet. From highs of 10,000 feet, the county plummets down sheer rock walls into Hells Canyon, to the lowest elevation in the county of 1,600 feet. Between these geographic features lay

productive but arid valleys. Four significant eastern Oregon streams rise in these mountains: the John Day River, the Grande Ronde, the Powder River and Burnt River. The Burnt River and the Powder River are the major drainages of the county.

The project area is located in the southeastern portion of the Blue Mountains Physiographic province (Franklin & Dyrness, 1988) near the southern end of the Elkhorn Range. Elevation in the project area ranges from 3,800 to 4,200 feet. Aspect is generally north, with slopes varying from 5% to more than 25%. Vertical rock walls and large outcrops are present in the vicinity of the dam.

The Phillips Reservoir area lies at the lower end of Sumpter Valley, a typical eastern Oregon "hanging valley" or basin draining into a rocky gorge. At the head of this gorge is Mason Dam. The land profile in the reservoir area is quite steep at the dam, with slopes to 100 percent. To the west, or head end of the reservoir, the surrounding land is nearly flat, except for the mounds of dredge tailings. The north and south sides of the reservoir area are bench lands with gentle slopes frequently cut by small steep side drainages.

#### Project Effects

The project will not cause any changes to the existing topography or geomorphology of the project area.

#### Proposed, Protection, Mitigation and Enhancement Measures

No mitigation measures are proposed with respect to topographic resources.

#### Cumulative Effects

No known cumulative effects are expected.

### 3.1.3 Geology

#### Existing Resources

The Upper Powder watershed, which includes Mason Dam and Phillips Reservoir, lies within the Blue Mountains physiographic province. The Blue Mountains Province is composed of five tectono-stratigraphic terranes that trend east-west across southern Oregon. These terranes, which range in age from Paleozoic to Mesozoic, resulted from accretion of an island arc complex onto the former continental margin. These five accreted terranes formed an irregular landscape that was then buried by Columbia River basalts in the mid-Tertiary. The pre-Tertiary sequences have been exposed by normal faulting, regional uplift and subsequent unroofing of the basalt cover during the later Tertiary to Quaternary. Parts of the Blue Mountain province have subsequently been extensively glaciated (Mann, 1989; Geomatrix, 1989).

Mason Dam is located in the southwestern part of the Blue Mountains at the outlet of Sumpter Valley. Sumpter valley is a 9 mile long and 3 mile wide, west northwest trending Quaternary basin. The basin is bounded to the north by Elkhorn Ridge, a partially glaciated range composed of pre-Tertiary metamorphic and intrusive rocks that rise nearly 5,000 feet above the level of the basin. The basin margin on the south rises approximately 2,500 feet above the basin floor and is formed from Miocene volcanic rocks and pre-Tertiary metamorphic and intrusive rocks. Geomatrix speculates that Sumpter Valley is a small pull-apart basin that has been active in Quaternary time (Geomatrix, 1989).

In their 1989 report for the Bureau of Reclamation, Geomatrix examined the earthquake potential at Mason Dam based on the presence of nearby active or potentially active geologic structures and on the likelihood of a random earthquake event consistent with historical seismicity patterns. Table 2 below shows the results of their investigation.

**TABLE 2. ESTIMATED MAXIMUM CREDIBLE EARTHQUAKES FOR MASON DAM (FROM GEOMATRIX, 1989).**

| Source | Classification | Closest Distance (miles) | Magnitude (Ms) |
|---|---|---|---|
| Sumpter Valley faults | Potentially active | <1 | 6.5 |
| Baker fault | Potentially active | 8 | 7 |
| Juniper Mountain fault | Active | 28 | 6.5 |
| La Grande fault | Active | 31 | 7 |
| Hope Butte fault | Active | 35 | 7 |
| Pine Valley fault | Potentially active | 43 | 6.75 |

Approximately 75% of the gold that has been produced in Oregon has been obtained from the lode and placer deposits that are located in the Blue Mountains geomorphic province. The gold belt of the Blue Mountains is around fifty miles wide and 100 miles long, and it stretches from John Day on the west to the Snake River on the east. The most important mining areas are located in Baker and Grant Counties, and in neighboring areas of Malheur and Union Counties. All of the lode deposits are in pre-Tertiary rocks and are thought to be connected with Cretaceous dioritic intrusions (Lindgren, 1901). Placer deposits are of widely differing ages, from early Miocene to Pleistocene. Blue Mountains placer deposits were first mined in about 1862. By 1870 the richest deposits were exhausted and a gradual decline continues to this day. The Sumpter area located approximately 10 miles west of Mason Dam experienced considerable gold mining activity that included use of large dredges between 1913 and 1953.

#### PROJECT EFFECTS

The project will not cause any change in the geology or geologic hazards in the project area. The hydroelectric facilities will be constructed to the seismic standards required by local building codes and/or Bureau of Reclamation. The project will not impact any existing mining operations on the Powder River nor prevent development of future mining operations.

#### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

No mitigation measures are proposed with respect to geologic resources.

#### CUMULATIVE EFFECTS

Since the project has no effect on this resource, no cumulative effects are expected.

### 3.1.4 SOILS

#### EXISTING RESOURCES

Available soil surveys in the project area at this time show there are two types of soil (Figure 3) (NRCS, 1997). Hankins very cobbly loam, 12 to 35 percent north slopes (map symbol 66D), and Top-McGarr complex, 12 to 35 percent north slopes (map symbol 167D). Hankins soil is deep and well drained where

permeability is slow, runoff is medium, and the hazard of water erosion is moderate or high. The top soil of the Top-McGarr complex is deep and well drained. Permeability is moderate to a depth of about 9 inches and moderately slow below that. Available water capacity is 3 to 7 inches with medium runoff and moderate or high water erosion.

#### PROJECT EFFECTS

A small amount of soil (< 1 acre) will be displaced to construct the powerhouse, transmission line and substation. All displaced soil will be utilized on-site as backfill material.

#### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

Standard erosion control measures will be utilized to control erosion in the powerhouse construction area.

#### CUMULATIVE EFFECTS

A long history of development in the project area has led to the displacement of native soil areas in favor of roads, buildings, water impoundments and other infrastructure. Additional soil has been lost due to erosion of unprotected soil surfaces. The small amount of soil surface area that will be lost for project construction (< 1 acre) will have no significant effect on the vast remaining soil resources in Baker County.

## 3.2 AQUATIC RESOURCES

### 3.2.1 WATER QUANTITY

#### EXISTING RESOURCES

The Powder River is a tributary of the Snake River in northeastern Oregon. The Powder River watershed is bordered by the Blue Mountains to the west, the Wallowa Mountains to the northeast, the Malheur River basin to the south, and the Snake River canyon to the east (Figure 4). The river flows predominantly east, from an elevation of about 9,600 ft in the Wallowa Mountains headwaters to about 2,000 ft at Brownlee Dam on the Snake River. The basin encompasses approximately 1,077 square miles, of which approximately 168 square miles occurs upstream of Mason Dam. Annual discharge from the basin averages 74,385 acre-feet.

Phillips Reservoir is located in the upper part of the basin behind Mason Dam at river mile 131 above the Powder River confluence with the Snake River. Phillips Reservoir and Mason Dam are Reclamation facilities used for flood control and irrigation storage. The reservoir has a total storage capacity of 95,500 acre-feet, and an active storage capacity of 90,500 acre-feet of water. Additionally, there is a minimum pool of 5,000 acre-feet below the outlet. Phillips Reservoir is the largest reservoir in the Powder River basin, and the maximum water storage occurred in 1983 with 86,337 acre-feet stored.

Releases from Phillips Reservoir are measured and recorded by the Bureau of Reclamation. Figure 5 shows average monthly flow releases from Phillips Reservoir based on Reclamation records for the period from 1968 to 2009. Figure 6 shows a flow exceedance curve for the same period of record.


## Map Unit Legend

| Baker County Area, Oregon (OR604) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| 65D | Hankins silt loam, 12 to 35 percent north slopes | 21.3 | 1.4% |
| 66D | Hankins very cobbly loam, 12 to 35 percent north slopes | 62.9 | 4.2% |
| 74D | Highhorn-Huntrock very gravelly silt loams, 12 to 30 percent south slopes | 53.2 | 3.5% |
| 167D | Top-McGarr complex, 12 to 35 percent north slopes | 36.8 | 2.4% |
| W | Water | 111.9 | 7.4% |
| **Subtotals for Soil Survey Area** | | **286.2** | **18.9%** |
| **Totals for Area of Interest** | | **1,513.9** | **100.0%** |

| Wallowa-Whitman National Forest, Oregon (OR631) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| NOTCOM | Not Complete | 1,227.7 | 81.1% |
| **Subtotals for Soil Survey Area** | | **1,227.7** | **81.1%** |
| **Totals for Area of Interest** | | **1,513.9** | **100.0%** |

**FIGURE 3. SOILS MAP FOR PROJECT AREA.**

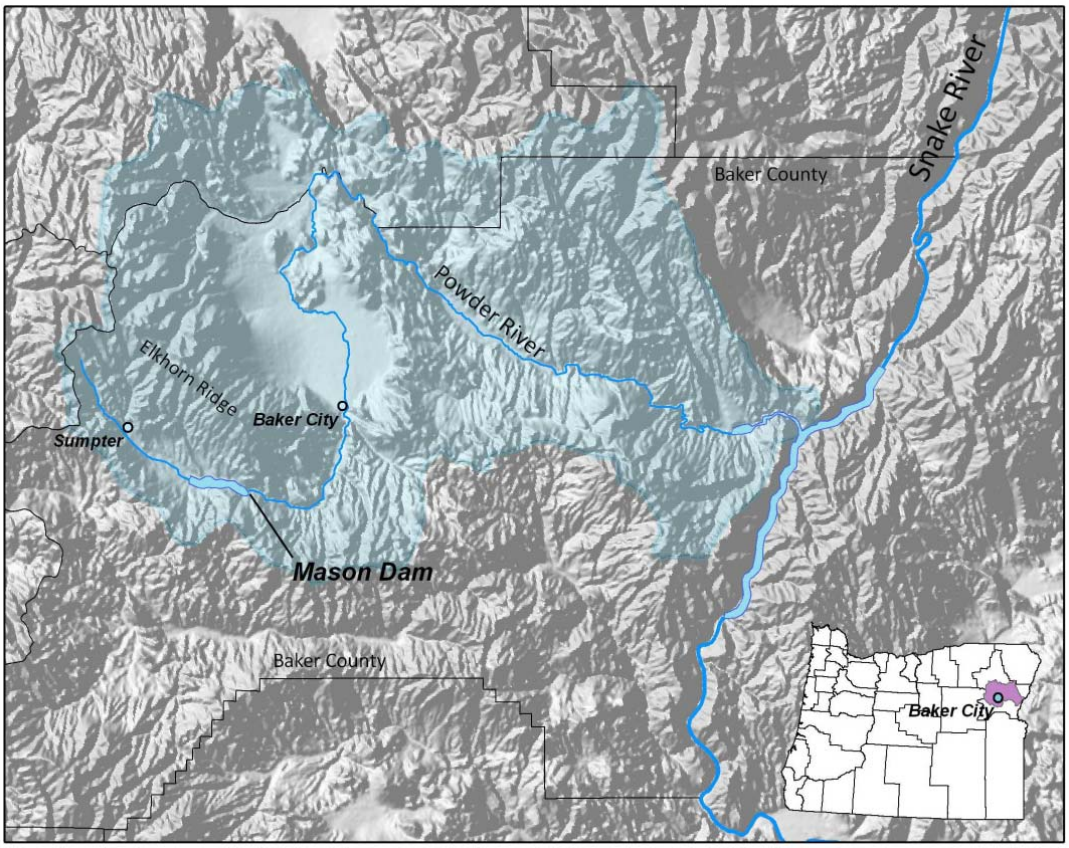


**FIGURE 4. MAP SHOWING EXTENT OF POWDER RIVER WATERSHED.**

The Baker Valley Irrigation District has an agreement with the Oregon Department of Fish and Wildlife to release enough water to meet a 10 cfs minimum instream flow at Smith Dam, located roughly 10 miles below Mason Dam (RM 120.7). The irrigation season officially begins on March 1 and ends November 1, but in practice the season usually runs between April 15 and October 1. Primary irrigated crops are grain, alfalfa hay, pasture, and some grass seed. The Upper Division provides supplemental water for some 19,000 acres, which includes some contiguous areas previously dry-farmed near the city of Baker.

The proposed Project is part of the Bureau of Reclamation's Baker Project and Phillips Reservoir and Mason Dam are owned by Reclamation. The Upper Division of the Baker Project, including all Mason Dam facilities, is operated by the Baker Valley Irrigation District (BVID) through a formal agreement with Reclamation. BVID manages water to supply supplemental water to approximately 19,000 acres of irrigated land along the Powder River. All Phillips Reservoir water rights are owned by Reclamation. The Applicant would apply for a non-consumptive water right to utilize releases from Mason Dam for an additional beneficial use, power generation. This water right would be jointly held with Reclamation and would be junior to all existing water rights on the Powder River (Reclamation, 2009).

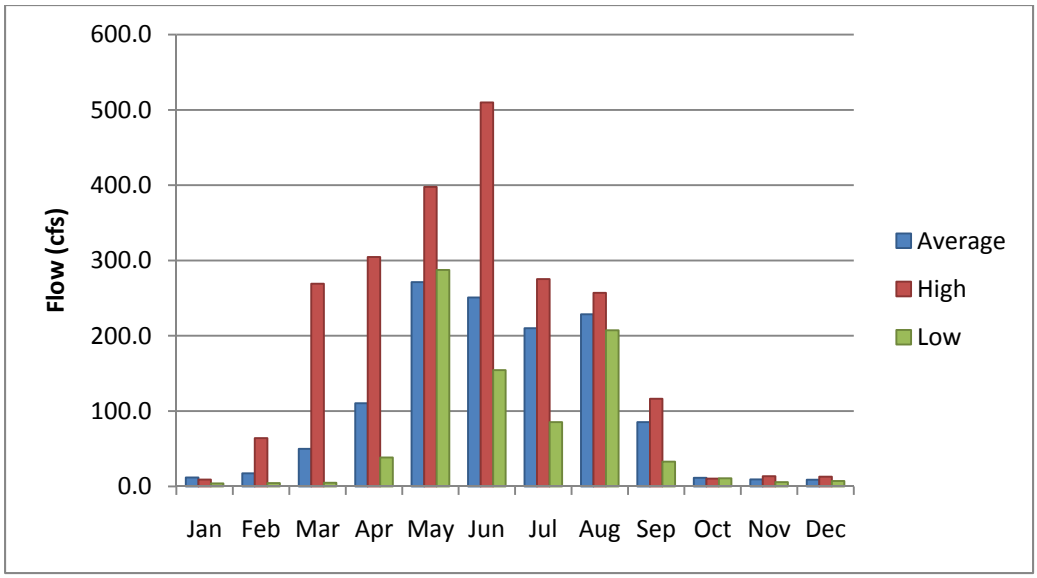


**FIGURE 5. AVERAGE MONTHLY FLOWS IN THE POWDER RIVER BELOW MASON DAM FOR LOW (1992), AVERAGE, AND HIGH (1983) WATER YEARS (SOURCE: BUREAU OF RECLAMATION).**

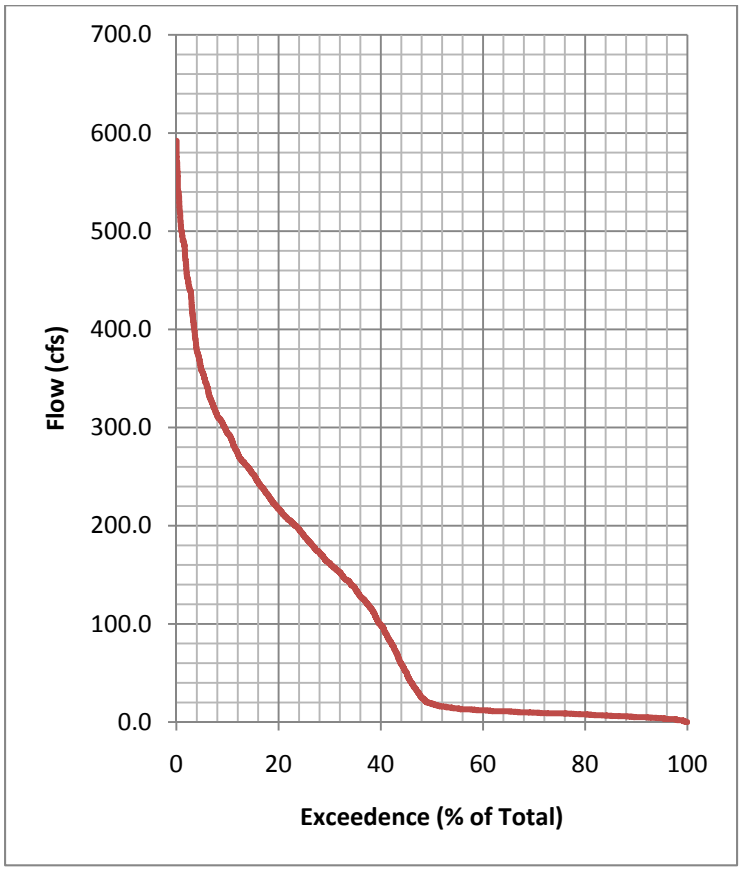


**FIGURE 6. FLOW EXCEEDANCE CURVE FOR REALEASES FROM MASON DAM (SOURCE: BUREAU OF RECLAMATION).**

### PROJECT EFFECTS

The project will have no effect on the storage capacity of Phillips Reservoir or on the amount and timing of water released from Phillips Reservoir into the Powder River. The hydroelectric project will simply generate power using existing water released for flood control, irrigation or in-stream flow as determined by water rights and other agreements currently in place.

### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

A bypass plan, reviewed and approved by Reclamation, would assure that all required water would be delivered downstream during construction work on the main discharge pipe from Mason Dam.

To assure that downstream water requirements are always met, the plant controls will include a synchronous bypass signal to initiate operation of the Reclamation slide gates during turbine shut down. A new HPU will be provided to increase the rate of slide gate opening to more closely match the rate of flow lost when the turbine shuts down.

### CUMULATIVE EFFECTS

The proposed project would constitute an additional flow control system affecting waters of the Powder River. However, since the project will operate in a run-of-river mode, the additional control would not contribute to any cumulative adverse effects on downstream water delivery, flood control, or powder River instream flow.

## 3.2.2 WATER QUALITY

### EXISTING RESOURCES

The Powder River begins in the City of Sumpter at the convergence of McCully Fork and Cracker Creek. The Powder River continues east from Phillips Reservoir and turns north around Elkhorn Ridge, flowing towards Baker City. The uppermost site routinely monitored by Oregon Department of Environmental Quality and Reclamation is on the Powder River at Campbell Street in Baker City. There are no significant point sources on the Powder River upstream of Baker City, so impacts to water quality at this monitoring site are due to non-point source pollution from logging, mining (dredge tailings), grazing, erosion, and field and urban runoff. Oregon Water Quality Index[1] scores for the Powder River at Campbell Street are good throughout the year, averaging 89 for summer, and 85 for fall-winter-spring (Oregon Department of Environmental Quality, 2009). To date, no TMDL implementation plan has been developed for the Powder River.

### WATER QUALITY STANDARDS

Oregon water quality standards are based on designated beneficial uses and fish use designations. Table 3 shows the designated beneficial uses for the Powder River. The entire Powder River (including Phillips Reservoir) is designated for use by Redband and/or Lahontan Cutthroat Trout.

[1] The Oregon Water Quality Index (OWQI) is a single number which expresses water quality by integrating measurements of eight carefully selected water quality parameters. OWQI values range from 10 (worst case) to 100 (ideal).

**TABLE 3. DESIGNATED BENEFICIAL USES FOR THE POWDER RIVER BASIN**

| Beneficial Uses | All Basin Waters |
|---|---|
| Public Domestic Water Supply[1] | X |
| Private Domestic Water Supply[1] | X |
| Industrial Water Supply | X |
| Irrigation | X |
| Livestock Watering | X |
| Fish & Aquatic Life[2] | X |
| Wildlife & Hunting | X |
| Fishing | X |
| Boating | X |
| Water Contact Recreation | X |
| Aesthetic Quality | X |
| Hydro Power | |
| Commercial Navigation & Transportation | |

[1] With adequate pretreatment (filtration & disinfection) and natural quality to meet drinking water standards.
[2] Designated for Redband Trout and/or Lahontan Cutthroat Trout

In general, hydroelectric facilities have no measurable effect on most water quality parameters including turbidity, pH, nutrients, hydrocarbons and heavy metals. The primary hydropower related water quality impacts are with regard to dissolved oxygen (DO) and water temperature. Oregon Administrative Rule OAR-041-0028(4)(e) specifies the following water temperature standard for the Powder River in the project area:

- Beneficial Use: Lahontan cutthroat trout or redband trout
- Applicable Year round criteria: 20.0 °C, 7-day average maximum

Oregon Administrative Rule 340-041-0260 provides no specific information regarding the DO standard for the Powder River basin; rather, the rule states that water quality in the Powder River basin must be managed to protect designated beneficial uses and designated fish uses. The complete Oregon DO standard is given in Figure 7. According to ODEQ, the waters of Phillips Reservoir and the Powder River downstream of the reservoir are designated as “Cool Water” for purposes of applying DO standards. Thus, the DO standard for project waters may be summarized as follows:

- 6.5 mg/L, 30-day mean minimum
- 5.0 mg/L, 7-day mean minimum
- 4.0 mg/L, absolute minimum

| Class | Concentration and Period[1] (All Units are mg/L) | | | | Use/Level of Protection |
|---|---|---|---|---|---|
| | 30-D | 7- D | 7- Mi | Min | |
| Salmonid Spawning | | 11.0[2-3] | | 9.0[3] | Principal use of salmonid spawning and incubation of embryos until emergence from the gravels. Low risk of impairment to cold-water aquatic life, other native fish and invertebrates. |
| | | | | 8.0[4] | |
| Cold Water | 8.0[5] | | 6.5 | 6.0 | Principally cold-water aquatic life. Salmon, trout, cold-water invertebrates, and other native cold-water species exist throughout all or most of the year. Juvenile anadromous salmonids may rear throughout the year. No measurable risk level for these communities. |
| Cool Water | 6.5 | | 5.0 | 4.0 | Mixed native cool-water aquatic life, such as sculpins, smelt, and lampreys. Waterbodies includes estuaries. Salmonids and other cold-water biota may be present during part or all of the year but do not form a dominant component of the community structure. No measurable risk to cool-water species, slight risk to cold-water species present. |
| Warm Water | 5.5 | | | 4.0 | Waterbodies whose aquatic life beneficial uses are characterized by introduced, or native, warm-water species. |
| No Risk | No Change from Background | | | | The only DO criterion that provides no additional risks is "no change from background". Waterbodies accorded this level of protection include marine waters and waters in Wilderness areas. |

**Note:**
*Shaded* values present the absolute minimum criteria, unless the Department believes adequate data exists to apply the multiple criteria and associated periods.

[1] 30-D = 30-day mean minimum as defined in OAR 340-41-006.
7-D = 7-day mean minimum as defined in OAR 340-41-006.
7-Mi = 7-day minimum mean as defined in OAR 340-41-006.
Min = Absolute minimums for surface samples when applying the averaging period, spatial median of IGDO.

[2] When Intergravel DO levels are 8.0 mg/L or greater, DO levels may be as low as 9.0 mg/L, without triggering a violation.

[3] If conditions of barometric pressure, altitude and temperature preclude achievement of the footnoted criteria, then 95 percent saturation applies.

[4] Intergravel DO criterion, spatial median minimum.

[5] If conditions of barometric pressure, altitude, and temperature preclude achievement of 8.0 mg/L, then 90 percent saturation applies.

**FIGURE 7. OREGON WATER QUALITY CRITERIA FOR DISSOLVED OXYGEN AND INTERGRAVEL DISSOLVED OXYGEN.**

For Phillips Reservoir, the following water quality standards are taken from Oregon Administrative Rule OAR-340-041-0061:

> *(15) Reservoirs or managed lakes are deemed in compliance with water quality criteria for temperature, pH, or dissolved oxygen (DO) if all of the following circumstances exist.*
>
> *(a) The water body has thermally stratified naturally or due to the presence of an impoundment.*
>
> *(b) The water body has three observable layers, defined as the epilimnion, metalimnion, and hypolimnion.*
>
> *(c) A layer exists in the reservoir or managed lake in which temperature, pH, and DO criteria are all met, and the layer is sufficient to support beneficial uses.*
>
> *(d) All practicable measures have been taken by the entities responsible for management of the reservoir or managed lake to maximize the layers meeting the temperature, pH, and DO criteria.*

*(e) One of the following conditions is met:*

*(A) The streams or river segments immediately downstream of the water body meet applicable criteria for temperature, pH, and DO.*

*(B) All practicable measures have been taken to maximize downstream water quality potential and fish passage.*

*(C) If the applicable criteria are not met in the stream or river segment immediately upstream of the water body, then no further measurable downstream degradation of water quality has taken place due to stratification of the reservoir or managed lake.*

303D LISTING

See Table 4.

**TABLE 4. 303D LISTINGS FOR POWDER RIVER IN PROJECT REACH.**

| River Miles | Parameter | Season | Criteria | Beneficial Uses |
|---|---|---|---|---|
| 0 to 146.3 | Alkalinity | Year Around | Table 20 Toxic Substances | Aquatic life |
| 0 to 146.3 | Antimony | Year Around | Table 20 Toxic Substances | Human health |
| 0 to 146.3 | Arsenic (tri) | Year Around | Table 20 Toxic Substances | Aquatic life; Human health |
| 0 to 146.3 | Barium | Year Around | Table 20 Toxic Substances | Human health |
| 0 to 146.3 | Beryllium | Year Around | Table 20 Toxic Substances | Human health |
| 0 to 146.3 | Cadmium | Year Around | Table 20 Toxic Substances | Aquatic life; Human health |
| 0 to 146.3 | Chromium (hex) | Year Around | Table 20 Toxic Substances | Aquatic life; Human health |
| 0 to 146.3 | Copper | Year Around | Table 20 Toxic Substances | Aquatic life |
| 0 to 146.3 | Dissolved Oxygen | January 1 - May 15 | Spawning: Not less than 11.0 mg/L or 95% of saturation | Resident trout spawning |
| 0 to 146.3 | Dissolved Oxygen | Year Around (Non-spawning) | Cool water: Not less than 6.5 mg/l | Cool-water aquatic life |
| 0 to 146.3 | Iron | Year Around | Table 20 Toxic Substances | Aquatic life; Human health |
| 0 to 146.3 | Lead | Year Around | Table 20 Toxic Substances | Aquatic life<br><br>Human health |
| 0 to 146.3 | Manganese | Year Around | Table 20 Toxic Substances | Human health |

| River Miles | Parameter | Season | Criteria | Beneficial Uses |
|---|---|---|---|---|
| 0 to 146.3 | Nickel | Year Around | Table 20 Toxic Substances | Aquatic life; Human health |
| 0 to 146.3 | Phosphate Phosphorus | Summer | Total phosphates as phosphorus (P): Benchmark 50 ug/L in streams to control excessive aquatic growths | Aquatic life |
| 0 to 146.3 | Selenium | Year Around | Table 20 Toxic Substances | Aquatic life; Human health |
| 0 to 146.3 | Silver | Year Around | Table 20 Toxic Substances | Aquatic life; Human health |
| 0 to 146.3 | Thallium | Year Around | Table 20 Toxic Substances | Human health |
| 0 to 146.3 | Zinc | Year Around | Table 20 Toxic Substances | Aquatic life |
| 114.1 to 146.3 | Ammonia | Year Around | Table 20 Toxic Substances | Aquatic life |
| 115.6 to 130 | Chlorophyll a | Summer | Reservoir, river, estuary, non-thermally stratified lake: 0.015 mg/l | Aesthetics; Fishing; Livestock watering; Water contact; recreation; Water supply |
| 115.6 to 130 | Fecal Coliform | Fall/Winter/Spring | Fecal coliform log mean of 200 organisms per 100 ml; no more than 10% > 400 per 100 ml | Water contact recreation |
| 115.6 to 130 | Fecal Coliform | Summer | Fecal coliform log mean of 200 organisms per 100 ml; no more than 10% > 400 per 100 ml | Water contact recreation |
| 115.6 to 130 | pH | Fall/Winter/Spring | pH 6.5 to 9.0 | Anadromous fish passage; Resident fish and aquatic life; Salmonid fish rearing; Salmonid fish spawning; Water contact recreation |
| 115.6 to 130 | pH | Summer | pH 6.5 to 9.0 | Anadromous fish passage; Resident fish and aquatic life; Salmonid fish rearing; Salmonid fish spawning; Water contact recreation |
| 115.6 to 130 | Temperature | Summer | Rearing: 17.8 C | Anadromous fish passage; Salmonid fish rearing |

PHILLIPS RESERVOIR

Temperature and DO measurements were made in Phillips Reservoir by Baker County from May 2007 to September 2007, with some additional measurements made in October 2009 (EcoWest Consulting, 2009a). The measurements were made near the location of the Mason Dam intake structure in an attempt to sample the water column that was being drawn through the dam and released into the Powder River below.

The 2007 temperature data show that Phillips Reservoir began to stratify by early May, has developed strong stratification by July, and mixed back to uniform conditions by October (Figures 8). The epilimnion reaches a maximum temperature of about 23 C in July, while deep hypolimnion waters remain at 10 °C and below throughout the year. As the season progresses, the transition layer between the warm surface water and cool bottom water drops down and passes through the depth of the Mason Dam intake. As a result, water released from Mason Dam has characteristics of the bottom water from about November to June, surface water from late August to October, and is transitional between surface and bottom water during July to late August (Table 5).

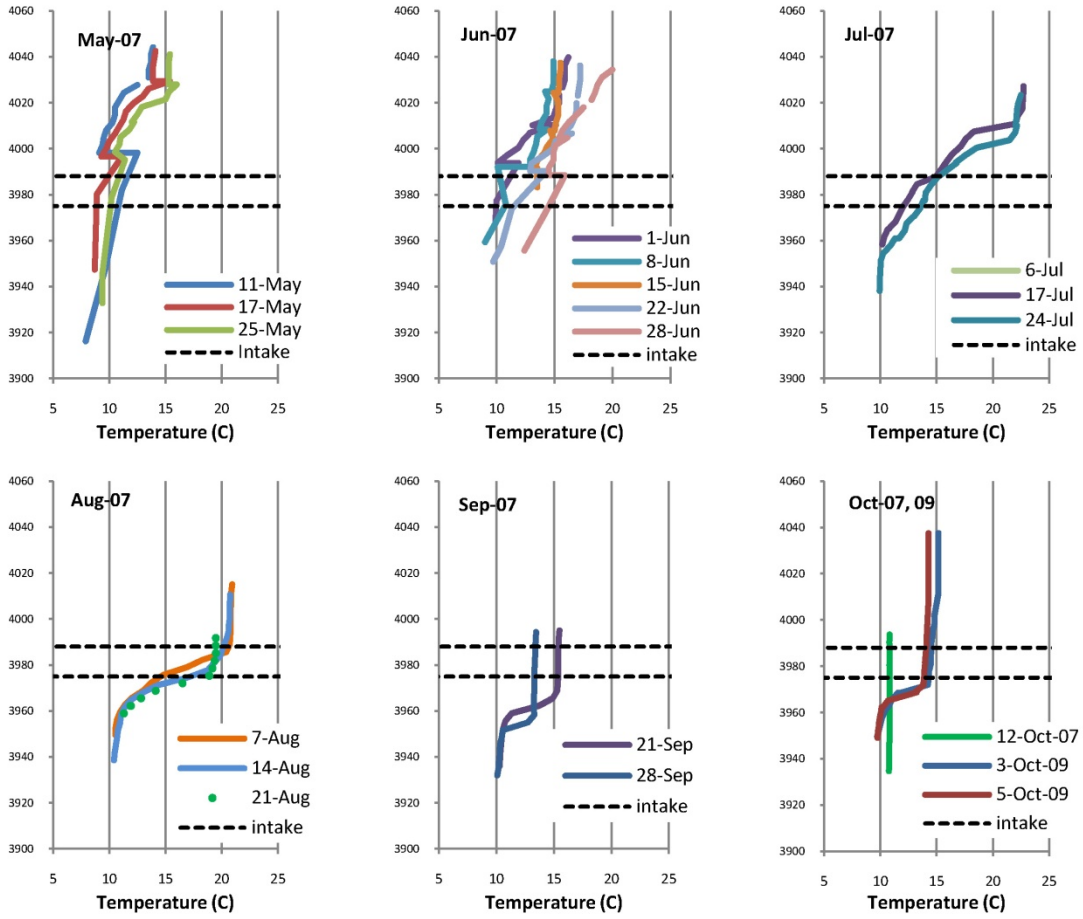


**FIGURE 8. TEMPERATURE PROFILES FOR PHILLIPS RESERVOIR FOR 2007, 2009.**

**TABLE 5. AVERAGE 2007 MONTHLY TEMPERATURE AT THE MASON DAM INTAKE.**

| Month | Temperature (°C) |
|---|---|
| May | 10.1 |
| June | 11.9 |
| July | 12.7 |
| Aug | 16.9 |
| Sep | 17.0 |
| Oct | 10.8 |

The 2007 DO data show DO stratification similar to temperature stratification. In the case of DO, the transition between more oxygenated surface waters and less oxygenated bottom waters becomes very sharp by mid-summer (Figure 9). Anoxic conditions occur at the level of the Mason Dam intake by July and continue through August. By late August and September, oxygenated surface waters are once again present at the intake level (Table 6).

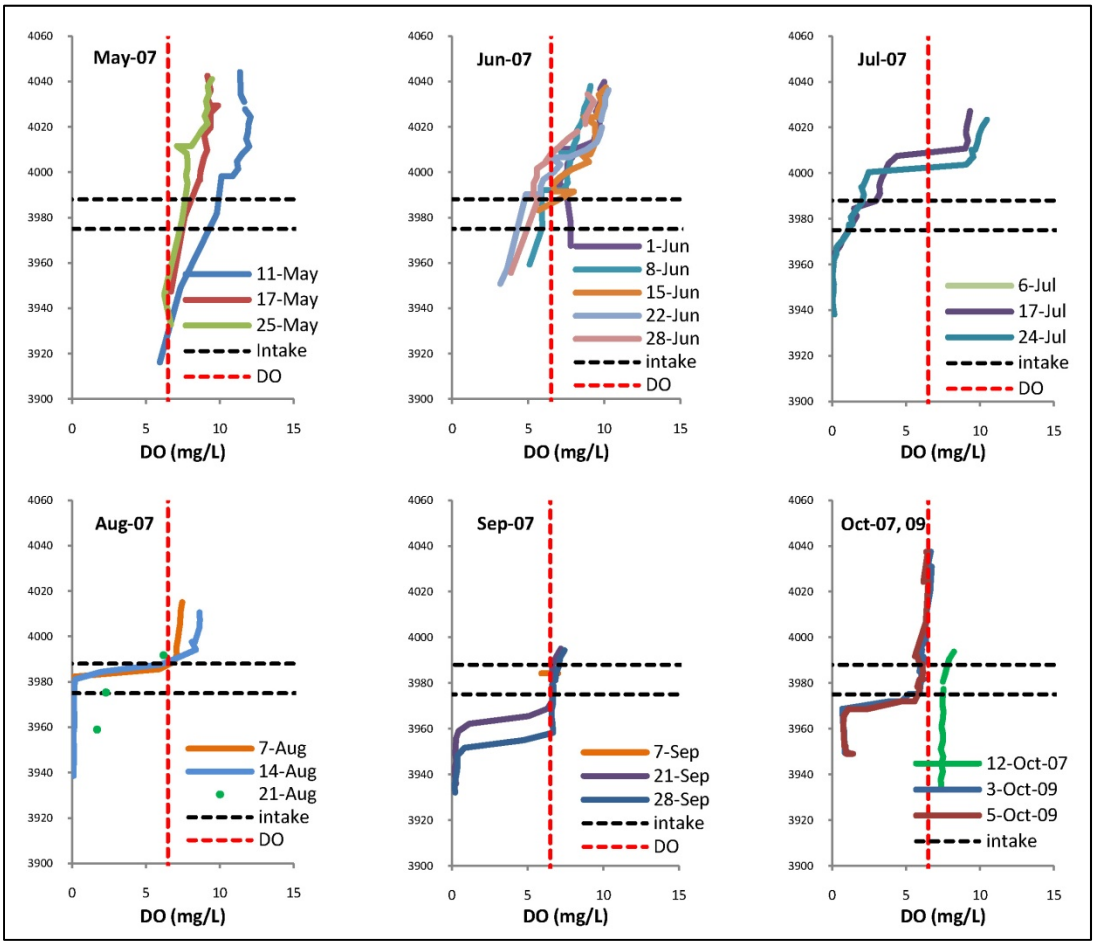


**FIGURE 9. DISSOLVED OXYGEN PROFILES FOR PHILLIPS RESERVOIR FOR 2007, 2009 SHOWING 6.5 MG/L STANDARD.**

**TABLE 6. AVERAGE 2007 MONTLY DO AT THE MASON DAM INTAKE.**

| Month | DO (mg/L) |
|---|---|
| May | 7.8 |
| June | 5.5 |
| July | 1.8 |
| Aug | 0.8 |
| Sep | 6.7 |
| Oct | 6.4 |

POWDER RIVER

Temperature and DO measurements were made by the applicant in the Powder River below Mason Dam from May to October 2007 (EcoWest Consulting, 2009a). Currently, water is released from Phillips Reservoir through two 33-inch adjustable jet valves and one 12-inch pipe fitted with a sleeve valve on the downstream end. The intake for these penstocks is at an elevation of about 3,975 – 3,988 ft, near the middle of the water column in the reservoir forebay.

Powder River water temperatures between the current stilling basin (Station 4) and the end of the water quality study area (Station 1, 2.8 river miles downstream of the dam) do not exceed 20 °C but the temperatures exceed 15 °C during August to mid-September (Figure 10).

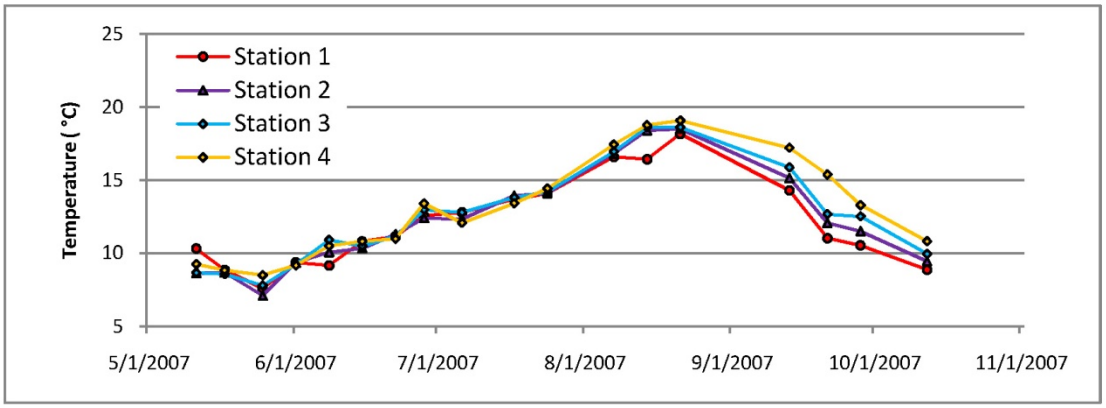


**FIGURE 10. 2007 TEMPERATURE DATA FOR THE POWDER RIVER APPROXIMATELY 0.0, 1.2, 1.7, AND 2.8 MILES DOWNSTREAM FROM MASON DAM (STATIONS 4, 3, 2, AND 1 RESPECTIVELY).**

DO concentrations throughout the river from the stilling basin (Station 4) to 2.8 miles downstream (Station 1) generally remain in the range from 7.5 mg/L to 11 mg/L. DO is highest in May, reaches a low in June, and then gradually rises again from July to October (Figure 11). DO saturation remains mostly within the range from 70% to 100%, with no clear evidence of supersaturation conditions. Occasional values exceeding 100% saturation in the stilling basin during the summer may be due to the presence of oxygen producing aquatic vegetation.

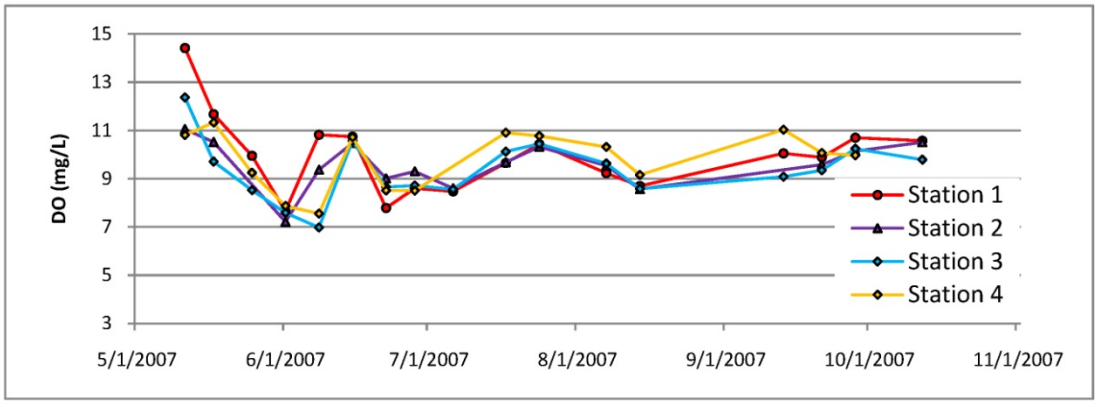


**FIGURE 11. 2007 DISSOLVED OXYGEN DATA IN MG/L FOR THE POWDER RIVER APPROXIMATELY 0.0, 1.2, 1.7, AND 2.8 MILES DOWNSTREAM FROM MASON DAM (STATIONS 4, 3, 2, AND 1 RESPECTIVELY).**

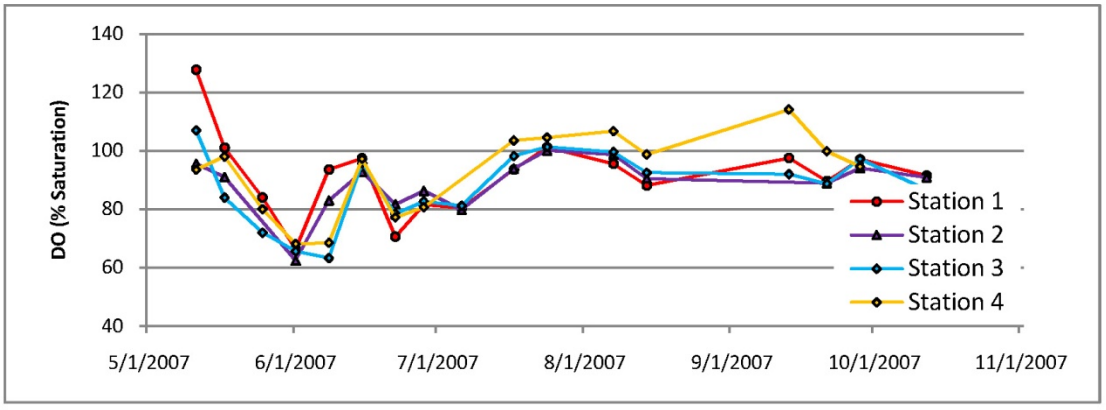


**FIGURE 12. 2007 DISSOLVED OXYGEN DATA IN % SATURATION FOR THE POWDER RIVER APPROXIMATELY 0.0, 1.2, 1.7, AND 2.8 MILES DOWNSTREAM FROM MASON DAM (STATIONS 4, 3, 2, AND 1 RESPECTIVELY).**

### Other Water Quality Parameters

No other water quality effects are traditionally associated with hydropower operations of the type proposed for Mason Dam. The Project is expected to have no effects on water quality other than those described above.

## Project Effects

### Phillips Reservoir

The project will have no effect on water quality in Phillips Reservoir. No facilities will be located in the reservoir and no construction will occur upstream of Mason Dam.

### Powder River

Project construction, particularly activities related to construction and use of the temporary cofferdam, would likely produce small, temporary sedimentation increases in the Powder River downstream from Mason Dam. This potential adverse effect will be minimized by use of standard erosion control measures during all construction activities adjacent to the river.

Project operation would potentially change temperature and DO conditions in the Powder River below the dam. No other water quality parameters would be affected. Except for temperature and DO, water quality discharged from the powerhouse will be the same as water quality entering the powerhouse from Phillips Reservoir.

By conservation of energy principles, it can be shown that the hydroelectric project will decrease water temperature slightly compared to existing conditions. Currently the potential energy of the water is converted to frictional heat within the turbulent flow created during passage through the jet valves. Under hydroelectric operations, the energy will instead be converted to electricity. The amount of the decrease, neglecting turbine/generator efficiency losses, is 0.0011 °F per foot of head. This corresponds to 0.12 – 0.18 °F for the range of head expected at Mason Dam.

During the summer months when Phillips Reservoir becomes stratified, water would be released through the powerhouse turbine rather than through the existing jet valves. As a result, the aeration benefit provided by the jet valves would be lost and water entering the Powder River would have reduced DO compared to existing conditions. The turbine draft tube will be fitted with aspirators to increase DO levels in order to meet the state cool water DO standard of 6.5 mg/L. Natural re-aeration in the relatively high gradient channel would restore DO levels to baseline values downstream of Mason Dam.

No temperature or DO data were recorded during the majority of the salmonid spawning period from 1-Jan to 15-May when the state DO standard is 11.0 mg/L or 95% saturation. A comparison of reservoir DO on 11-May (Figure 9) with Powder River DO for the same date (Figure 11) shows that the jet valves provide only incremental re-aeration. Draft tube aspiration would be implemented as necessary to meet the salmonid spawning DO standard.

### Proposed, Protection, Mitigation and Enhancement Measures

Incidental travel outside of approved construction areas would be prohibited. Silt fences or fiber rolls would be installed between construction areas and adjacent wetlands or streams to prevent construction sediment from entering these areas. Tailrace construction within the Powder River would occur under dewatered conditions, with a cofferdam placed immediately downstream of the construction area to prevent downstream sedimentation.

The project will develop a tiered mitigation plan in which the water quality will be monitored and adjustments made to operating criteria if DO levels fall below the state water DO standard. The tiered mitigation plan would include draft tube aspiration and, if necessary, construction of one or more aeration weirs below the stilling basin. Capabilities for draft tube aspiration will be installed in the draft tube during initial project construction. It is considered likely that draft tube aspiration will be adequate to meet state DO standards (both cool water and salmonid spawning) under the conditions likely to be encountered during most water years.

### Cumulative Effects

Historic dredge mining, construction of Mason Dam, and irrigated agriculture have combined to have a significant effect on the water quality of the Powder River, while at the same time providing a secure economic base for the population of Baker County. The hydroelectric project could contribute an additional adverse water quality impact by potentially lowering DO levels in the river below the dam. This adverse impact would be limited to a short distance below Mason Dam before natural aeration

processes will restore baseline DO conditions and can be largely mitigated by implementation of a tiered DO enhancement program as part of the project proposal. Although the project could contribute to cumulative effects on river water quality, the river would continue to support all current downstream beneficial water uses including the river fishery resource.

### 3.2.3 Fishery Resources

#### Existing Resources

Fish species in Phillips Lake include rainbow trout (*Oncorhynchus mykiss*), crappie (*Pomoxis spp*), smallmouth and largemouth bass (*Micropterus dolomieui, M. salmoides*), yellow perch (*Perca flavescens*) and walleye (*Sander vitreus*) (Baker County, 2009). The latter two species were introduced in the 1980's and yellow perch have subsequently dominated the lake fishery. There have been several attempts to rid the lake of yellow perch, with the most recent attempt in 2009. Lake-wide netting resulted in the collection of 46,500 yellow perch and 1,047 other fish species. No bull trout were captured during the 2009 lake-wide netting.

The Powder River subbasin holds 4 distinct populations of redband trout. These occupy the Powder River from the mouth to Thief Valley Dam, Eagle Creek, The Powder River from Thief Valley Dam to Mason Dam and the Powder River above Mason Dam (Novak, 2004). Fingerling trout and catchable trout are stocked annually. Reproduction is somewhat limited by yellow perch.

The historic distribution of the bull trout within the Powder River subbasin is unclear. Nowak (2004) identified that the species was thought to be widespread within the Powder River basin, with at least seasonal connections to the Snake River prior to 1960. Passage above RM 70 on the Powder River was blocked in 1932 by construction of Thief Valley Dam, which has no upstream passage. Mason Dam, constructed in 1968, isolated bull trout in the upper Powder River from bull trout in the North Powder River and other Powder Valley tributaries. Within the Powder River basin, bull trout are currently known from three subpopulations, with isolated local populations within each subpopulation:

- Powder River upstream of Mason Dam (Silver and Little Cracker Creeks; Lake Creek)
- Powder River tributaries between Mason Dam and the North Powder River (Salmon Creek, Pine Creek, Rock Creek, Big Muddy Creek)
- North Powder River and some of its tributaries

The FWS (2008) estimated a total of 250 to 1000 individuals within all three Powder River subpopulations, with the majority of the bull trout within Silver Creek. Bull trout are not known to occur in the immediate study area but do occur in the headwater tributaries of the Powder River. The FWS has concluded that the operation and maintenance of Mason Dam by Reclamation is “not likely to adversely affect” bull trout (US Fish and Wildlife Service, 2005).

#### Project Effects

The project would not change the amount or timing of releases from Mason Dam. The project would also not change existing downstream habitat complexity or any water quality parameters with the exception of temperature and DO.

The extraction of the water's potential energy as electricity rather than heat (from turbulence) will reduce water temperature by about 0.12 – 0.18 °F compared to existing conditions, which is a small positive benefit for Powder River aquatic species.

DO in the Powder River immediately below Mason Dam would be reduced compared to existing conditions. A tiered DO mitigation plan will be implemented to assure that DO levels meet the state cool water DO standard of 6.5 mg/L and the 1-Jan to 15-May salmonid spawning standard of 95% saturation. With these mitigation measures, adverse effects to aquatic species including salmonids will be minimized. Natural re-aeration in the relatively high gradient channel would restore DO levels to baseline values downstream of Mason Dam.

#### Proposed, Protection, Mitigation and Enhancement Measures

Water quantity and water quality mitigation measures (see Section 3.2.1, 3.2.2) implemented to protect aquatic habitat would minimize adverse effects to all aquatic species residing in the Powder River downstream from Mason Dam.

#### Cumulative Effects

Historic dredge mining, construction of Mason Dam, and irrigated agriculture have combined to have a significant effect on the water quality of the Powder River and thus to its aquatic resources. Although the hydroelectric project could contribute to cumulative effects, these effects would be limited to a short distance below Mason Dam and the river would continue to support all existing aquatic resources.

### 3.2.4 Threatened, Endangered and Special Status Aquatic Species

#### Existing Resources

Table 7 shows the federal and state listed threatened, endangered or special status aquatic species that are potentially present in Baker County (Oregon Natural Heritage Information Center, 2007; US Fish and Wildlife Service, 2009). Only one of these species, bull trout, is a state or federally listed threatened/endangered/candidate species. All of the species in Table 7 as well as Forest Service special status aquatic species were evaluated for potential adverse project impacts in a report produced for Baker County by EcoWest Consulting (EcoWest Consulting, 2009b).

**TABLE 7. FEDERAL AND STATE LISTED FISH AND AQUATIC INVERTEBRATES THAT COULD POTENTIALLY OCCUR IN BAKER COUNTY.**

| Common Name | Scientific Name | Heritage Rank | Federal Status | State Status | ORNHIC List |
|---|---|---|---|---|---|
| FISH | | | | | |
| Bull trout (Columbia River population) | *Salvelinus confluentus* | G3T2Q,S2 | LT | SC | 1 |
| Pacific lamprey | *Lampetra tridentata* | G5,S3 | SOC | SV | 4 |
| Inland Columbia Basin redband trout | *Oncorhynchus mykiss gairdneri* | G5T4,S3 | SOC | SV | 4 |
| INVERTEBRATES | | | | | |
| Blue Mountain caddisfly | *Crytochia neosa* | Rejected – too common | SOC | - | - |

KEY: LT – Listed Threatened; SOC = Species of Concern; SC = State Critical; SV = State Vulnerable; ORNHIC 1 = threatened with extinction throughout entire range; ORNHIC 4 = taxa of conservation concern but not currently threatened or endangered

BULL TROUT

The Columbia and Klamath River populations of the bull trout are listed by both the federal government and the State of Oregon as threatened. The portions of the Columbia River bull trout population within the Powder River Basin are part of the Hells Canyon Complex Recovery Unit. Within the Powder River Basin, bull trout are currently known from the Powder River upstream of Mason Dam (Silver, Little Cracker and Lake Creeks), Powder River tributaries between Mason Dam and the North Powder River (Salmon Creek, Pine Creek, Rock Creek, Big Muddy Creek) and the North Powder River and some of its tributaries. Each of these populations are isolated from each other by a number of physical and water quality barriers such as dams, diversions, channel characteristics, and water temperature (US Fish and Wildlife Service, 2002). The occupied Powder and North Powder River tributaries on private land are designated as critical habitat, with the occupied tributaries on federal land managed under other federal programs (US Fish and Wildlife Service, 2005).

Within lakes and reservoirs, bull trout inhabit the cold, deeper sections and primarily occur within the upper hypolimnion. Bull trout also forage in cool, shallow, littoral zones which tend to occur in the upper reservoir arms where tributaries enter the reservoir. However, bull trout location within a given lake or reservoir varies by season and type of lake. Within oligotrophic lakes (i.e., low nutrient, well oxygenated lakes), bull trout tend to migrate seasonally between the littoral zone (spring and fall) to just below the thermocline in summer. In meso and eutrophic lakes, oxygen levels tend to be depleted during the summer. In these types of lakes, bull trout migrate out of the lake between April and May, returning in the fall and using the water body primarily as overwintering habitat.

According to the FWS, bull trout in the Powder River basin are thought to be resident fish, as there have been no documented observations of migratory bull trout in the reservoirs, including Phillips Reservoir (US Fish and Wildlife Service, 2002). However, ODFW suspects that bull trout could currently occur in Phillips Reservoir and the FWS identifies that bull trout could expand their distribution into Phillips Reservoir during recovery. Bull trout require a combination of the following habitat elements, although not all occupied habitats contain all of these elements (US Fish and Wildlife Service, 2002):

- Relatively cool water temperatures (0 - 22 °C, with 2 - 15°C preferred)
- Complex channels
- Specifically sized substrate with a minimum of fine material
- A natural hydrograph
- Cold water sources to contribute to surface flow
- An abundant food base (terrestrial invertebrates, aquatic macroinvertebrates, forage fish)
- Permanent water of sufficient quantity and quality
- Migratory corridors

There are no known bull trout between Mason Dam and Baker City. Potential habitat is limited by large fluctuations in reservoir releases over the growing season and the lack of habitat complexity (EcoWest Consulting, 2009b). These factors are most limiting between Mason Dam and the USGS gauging station (850 feet downstream of the dam), although the stilling basin itself does provide some potential habitat. Habitat complexity increases between 0.5 to 1.0 mile downstream of the dam. There is a potential food

base in terms of prey fish for adults, but juvenile habitat is limited between the dam and the more complex habitat reach. Temperatures and DO levels are generally suitable for adult bull trout.

Mason Dam has no fish passage facilities; therefore, any bull trout potentially entering the reach below Mason Dam, e.g. via entrainment through the dam, would have no access to upstream spawning areas. The FWS has concluded that the operation and maintenance of Mason Dam by Reclamation was "not likely to adversely affect" the bull trout (US Fish and Wildlife Service, 2005).

### PROJECT EFFECTS

The bull trout is not known to occur in the study area, but does occur in the project vicinity and could expand into Phillips Reservoir in the future. The Powder River below Mason Dam lacks many of the required habitat features required by bull trout including a natural hydrograph and migration corridors to upstream spawning areas. The FWS has concluded that the operation and maintenance of Mason Dam by Reclamation was "not likely to adversely affect" the bull trout. The hydroelectric project would not change the operation of Mason Dam.

Impacts to bull trout could occur if the species entered Phillips Reservoir, were entrained through Mason Dam, and survived passage through the outlet works into the Powder River. Currently, fish entrained through Mason Dam are ejected through two 2' 9" jet flow valves into the tailrace below the dam. The FWS issued a Biological Opinion concerning bull trout entrainment through Tieton Dam in Washington as part of consultation for a proposed hydroelectric facility (US Fish and Wildlife Service, 2005). The Mason Dam outlet works are similar in many aspects to the facilities at Tieton (Table 8).

**TABLE 8. COMPARISON OF OUTLET WORKS AT MASON DAM AND TIETON DAM.**

| Item | Mason Dam | Tieton Dam |
|---|---|---|
| Hydraulic head | 100 – 160 ft | 92 - 218 ft |
| Outlet works type | Gate with trashracks | Tower structure |
| Penstocks | 1 @ 56-inch | 2 @ 72-inch |
| Valve type | 2 @ 33-inch hollow jet valves | 2 @ 60-inch hollow jet valves |
| Normal discharge range | 10 – 895 cfs | 80 – 2000 cfs |
| Proposed turbines | 1 @ 300 cfs Francis | 2 @ 600 cfs |

The Biological Opinion for Tieton indicated that a conservative estimate of fish mortality through jet valves is in the range of 60% to 80% . Mortality is likely caused by a combination of physical stresses and sudden pressure differences. Like Tieton, Mason Dam is a high head facility and water exiting the jet valves is expelled with great force. It is evident that passing through the jet valve causes physical stress to fish, which may strike hard surfaces at considerable speed. Entrained fish also experience a great pressure differential as they pass the outlet works because they experience the full head pressure of the reservoir just before they are suddenly ejected from the jet valve into the air, where the pressure is about 1 atmosphere (14 psi) (Figure 13).

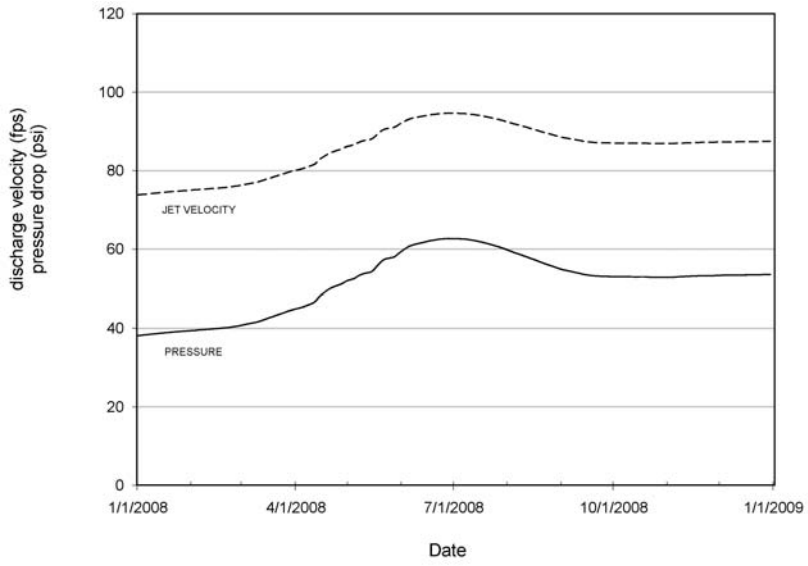


**FIGURE 13. JET VELOCITY AND PRESSURE DROP ACROSS MASON DAM JET VALVES FOR CALENDAR YEAR 2008.**

Due to the similarity in characteristics between Mason and Tieton dams, it is reasonable to expect a similar mortality rate for the existing jet valves at Mason Dam. Studies have shown that mortality rates for fish entrained into Francis turbines are substantially lower than for fish passing through jet valves. Hardin examined mortality rates of fish entrained into Francis turbines of the type proposed to be used at Mason Dam (Hardin, 2001). He found that fish mortality in turbines is related to the following variables:

- Head
- Turbine speed (rpm)
- Peripheral runner velocity
- Runner diameter
- Runner elevation above tailwater

Table 9 shows the turbine variables for the proposed project in comparison to other existing projects where entrainment studies have been performed. The relationship of these variables to each other and to mortality is a complex one. However, fish strike by the turbine blades is presumed to be the major cause of injury and mortality in turbines such as the ones proposed in this project.

**TABLE 9. AVAILABLE DATA FROM EXISTING PROJECTS AND THE PROPOSED PROJECT ON FACTORS INFLUENCING TURBINE MORTALITY FROM HARDIN (2001) AS ADAPTED FROM ELECTRIC POWER RESEARCH INSTITUTE (1987).**

| Plant | Head (ft) | RPM | Peripheral Runner Velocity (fps) | Runner Diameter (ft) | Runner Elevation Above Tailwater (ft) | Average Estimated mortality (%) |
|---|---|---|---|---|---|---|
| Cushman | 450 | 300 | 108 | 6.9 | 11.0 | 41 |
| Elwha | 104 | 300 | 59 | 4.9 | 14.0 | 10 |
| Faraday | 120 | 360 | 62 | 3.3 | 10.0 | 4 |
| Leaburg | 89 | 225 | 88 | 7.5 | 11.9 | 17 |
| North Fork | 136 | 139 | 82 | 9.7 | 5.0 | 26 |
| Publishers | 42 | 300 | 47 | 3.0 | 23.0 | 13 |
| Puntledge | 340 | 277 | 103 | 7.1 | 2.0 | 33 |
| Ruskin | 124 | 120 | 78 | 12.4 | 10.0 | 10 |
| Seton Creek | 142 | 120 | 95 | 12.0 | 16.0 | 9 |
| Shasta | 410 | 138 | 111 | 1.0 | 1.0 | 39 |
| Sullivan | 42 | 240 | 64 | 6.2 | 23.0 | 20 |
| Baker | 250 | 300 | 80 | 5.0 | -5.0 | 31 |
| Glines | 194 | 225 | 86 | 7.7 | 7.0 | 36 |
| Lequille | 387 | 519 | 121 | 4.5 | 6.5 | 48 |
| ***Mason*** | ***140*** | ***514*** | ***92*** | ***3.44*** | ***3.3*** | ***28*** |

Electric Power Research Institute reviewed 64 studies of turbine mortality and concluded that, of the variables listed above, peripheral runner velocity was the most crucial factor contributing to turbine mortality rates, particularly for Francis turbines (Eicher Associates, 1987). Hardin regressed estimates of fish mortality against peripheral runner velocity from 14 studies and found a significant relationship ($p = 0.014$). Runner velocity explains 58% of the variability in estimated mortality. The simple regression equation predicts that turbine mortality at the proposed Mason Dam project would be 28% (Figure 14).

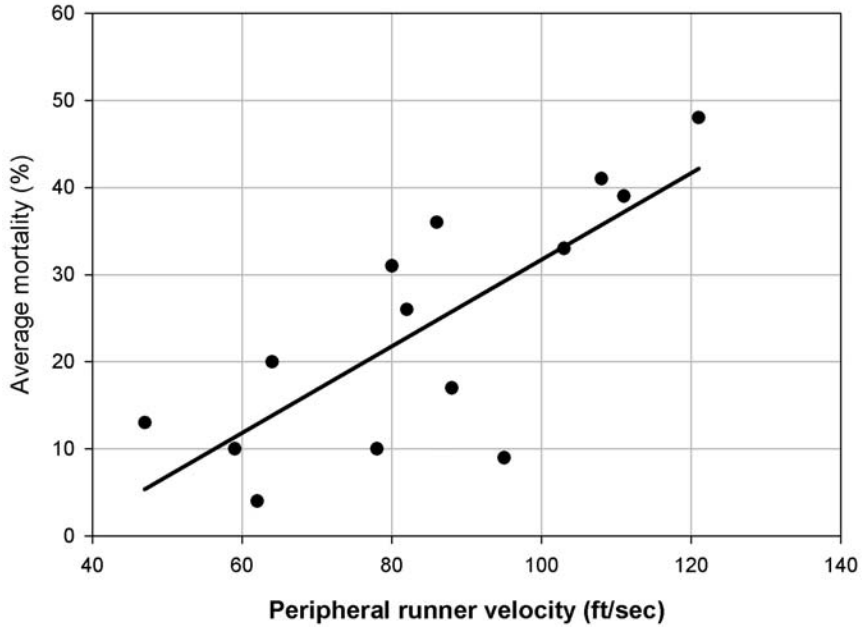


**FIGURE 14. REGRESSION OF TURBINE MORTALITY VS. PERIPHERAL RUNNER VELOCITY FOR PROJECTS IN TABLE 9.**

The mortality analysis suggests that hydropower operations could reduce fish mortality compared with existing conditions at Mason Dam. The potential therefore exists that if bull trout become established in Phillips Reservoir and are entrained through the dam, a greater number will survive passage through the turbine into the Powder River than would be the case with passage through the jet valves. Regardless of the method of passage into the Powder River, bull trout in the river below Mason Dam have no access to spawning areas and would constitute a non-reproducing population. The habitat conditions in the reach immediately below the dam, including potential reduced DO conditions, would be suitable for survival of this population.

### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

Water quantity and water quality mitigation measures (see Section 3.2.1, 3.2.2) implemented to protect aquatic habitat would minimize adverse effects to bull trout should they re-enter the Powder River downstream from Mason Dam in the future.

### CUMULATIVE EFFECTS

Turbine mortality analysis suggests that the hydroelectric project could enhance survival rates for bull trout entrained through Mason Dam should they become reestablished in Phillips Reservoir in the future. However, since bull trout in the Powder River below the dam would constitute a non-reproducing population, there would be no net cumulative impact on bull trout.

## 3.3 TERRESTRIAL RESOURCES

### 3.3.1 VEGETATION

#### EXISTING RESOURCES

A variety of vegetation cover types occur in the Mason Dam project area. The project area extends for 100 feet beyond the perimeter of the proposed powerhouse, tailrace and substation facilities and 50 feet on each side of the underground power line that will be placed within the Black Mountain Road right of way.

Vegetation mapping was performed by EcoWest Consulting during 2007 and 2008. Features of each encountered habitat were recorded in a manner that permitted habitat classification according to various classification methods in common use (EcoWest Consulting, 2009b). A summary of the vegetation communities found within the project area is provided in Table 10 and Figure 15. Detailed habitat descriptions may be found in the EcoWest Study Plan 2 & 3 report, which is on file with FERC.

**TABLE 10. SUMMARY OF PROJECT AREA VEGETATION TYPES.**

| Habitat Type | Acres | Location Within Project Area | Description |
|---|---|---|---|
| Open Water | 0.78 | Powder River below Mason Dam | Open waters of dam tailrace and Powder River |
| Powder River riparian | 0.59 | Both sides of Powder River below Mason Dam | Narrow zone on river banks; primarily shrub/cottonwood wetland dominated by black cottonwood and alder; includes small herbaceous wetlands dominated by creeping bentgrass and big leafed sedge |
| Unnamed spring riparian | 1.04 | Along spring at south end of transmission route | Narrow zone flanking 1- 3 ft wide water channel; dominant species are creeping bentgrass, alder and dogwood; shaded by adjacent dry coniferous forest habitat type |
| Dry grassland | 4.14 | Along access road to tailrace; beneath Idaho Power transmission line | Mostly non-native species including intermediate and bearded wheatgrass; scattered Ponderosa pine, sagebrush and rabbitbrush also occur, with Oregon grape beneath transmission line |
| Rock/talus slope | 5.93 | Hillside above north bank of Powder River | Steep slope area below Black Mountain Road; 10 – 15% Ponderosa pine cover, 17% shrub cover dominated by serviceberry; patchy herbaceous layer |
| Bare | 7.33 | Face of dam; roadways | Disturbed areas |
| Mixed coniferous forest | 7.52 | Upper portion of transmission line route | Canopy dominated by Douglas fir (45%) with Ponderosa pine sub-dominant (15%) and small amount of larch and grand fir; shrub cover variable from 15% to 35% cover, dominated by young conifers and snowberry; herabecous layer a mixture of pine grass, elk sedge, and blue wild rye |

| Habitat Type | Acres | Location Within Project Area | Description |
|---|---|---|---|
| Dry coniferous forest | 31.97 | Hillside above south bank of Powder River; transmission line route; lands flanking Idaho Power transmission line right-of-way | Relatively open canopy (≤ 50%); Ponderosa pine dominated with small (<1% - 10% canopy cover) provided by Douglas fir and lodgepole pine; dominant shrub species variable including snowberry, Oregon grape and young conifers; dominant herbaceous species variable including Idaho fescue, pine grass, Geyer's sedge |
| TOTAL | 54.43 | | |

In general, the overall project area is dominated by dry coniferous forest, mainly Ponderosa pine. Most of the mapped acreage is associated with the proposed transmission line route. The powerhouse area consists mainly of bare disturbed ground. The narrow riparian zone on the banks of the Powder River begins at the downstream end of the Mason Dam tailrace pool (Figure 16).

### PROJECT EFFECTS

Construction of the powerhouse and tailrace at the base of Mason Dam will not cause any permanent loss of existing vegetated habitat. Construction of these facilities will occur in previously disturbed areas barren of vegetation. No direct loss or disturbance to the Powder River riparian zone is expected to occur since the riparian zone begins at the downstream end of the tailrace pool and construction will occur at the upstream end of the pool (see Figure 16). The existing recreation parking area located just downstream of Mason Dam on the north side of the river would be used for construction staging, thus eliminating the need for any additional disturbance to existing habitat.

Cofferdam construction and excavation for the powerhouse foundation have the potential to cause short term increases in turbidity in the Powder River, which could adversely affect downstream riparian vegetation. This potential adverse effect can be minimized by use of industry standard erosion control practices.

Construction of the 0.8 mile long buried transmission line will not result in permanent loss of any forest habitat although it is likely that a small number of trees will need to be removed to accommodate trench excavation. Also, the transmission line excavation would cross the narrow riparian zone associated with the unnamed tributary at the south end of the proposed route. The interconnect with Idaho Power would require construction of a small substation station within the Idaho Power corridor, which would cause permanent loss of less than 0.2 acres of dry grassland.

Routine project operation and maintenance would utilize existing Reclamation, Forest Service and Idaho Power roads and parking areas and would have no effect on existing habitat.

### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

The buried transmission line will be located on the side of Black Mountain Road opposite from the unnamed tributary riparian zone. Incidental travel outside of approved construction areas would be prohibited. All disturbed areas will be reseeded with native and desirable non-native seed mixes. The seed mix will be determined through consultation with the Forest Service.

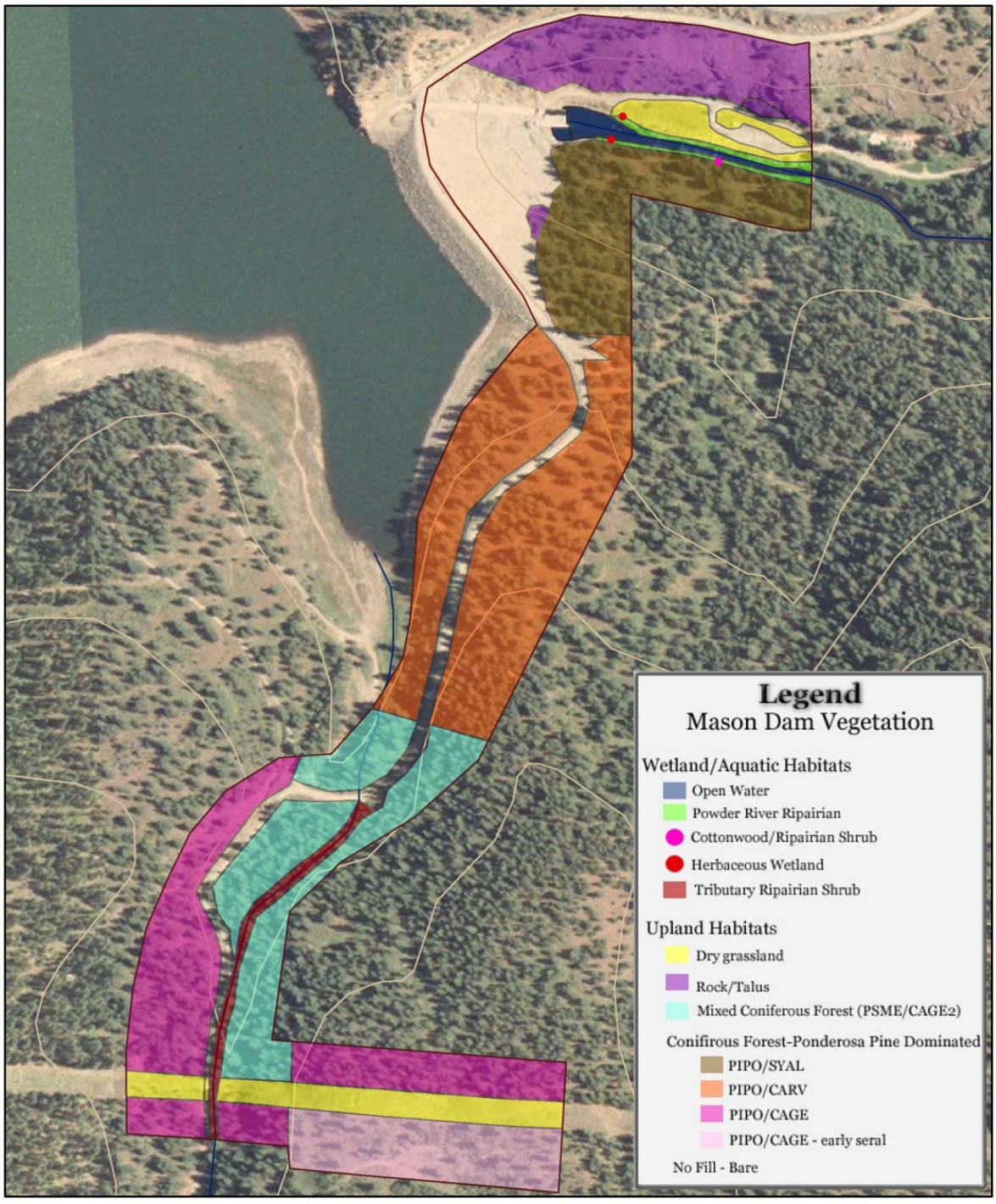


FIGURE 15. VEGETATION MAP OF MASON DAM PROJECT AREA.

**FIGURE 16. PHOTOGRAPH OF SOUTH BANK OF MASON DAM TAILRACE POOL SHOWING LIMIT OF POWDER RIVER RIPARIAN ZONE.**

#### CUMULATIVE EFFECTS

Some forest, grassland and riparian habitat areas have been previously lost by construction of Mason Dam, Phillips Reservoir and numerous roads in the area. The project will not cause any significant permanent loss of any additional vegetated habitat. No known future developments are planned for the area that would contribute further habitat loss. The amount of lost habitat from the project is therefore not likely to cause a significant cumulative adverse effect.

### 3.3.2 WETLANDS

#### EXISTING RESOURCES

Wetland mapping was performed as part of the comprehensive vegetation surveys conducted by Baker County in 2007 and 2008 (EcoWest Consulting, 2009b). Herbaceous wetlands occur in three small patches (totaling 0.07 acres) within the Powder River riparian zone (Figure 13). One herbaceous wetland patch occurs along the north bank of the Powder River at the beginning of the vegetated zone below the stilling basin. The wetland is dominated by creeping bentgrass (80% cover), but young black cottonwoods provide 20 percent cover in the shrub layer. Flow releases from Phillips Lake provide the current hydrologic support for the wetland. The Cowardin classification is PEMK: palustrine emergent marsh, hydrology artificially maintained.

Riparian wetlands also occur along the small unnamed stream east of Black Mountain Road that enters Phillips Lake (Figure 13). The unnamed tributary is spring-fed, with a narrow channel ranging from 1 to 3 feet wide and 1 foot deep. The water depth in the channel ranged in depth from 0 to 6 inches at the time of the fall 2007 surveys, with portions of the channel dry. The channel contained flow throughout the growing season in 2008 in the upper segment, but dried during the fall in the lower, steeper segment. Besides spring support, the tributary streamflow is likely also supplemented by snowmelt and other runoff, as the floodplain is 6 to 12 inches above the fall water level. The herbaceous layer is dominated by creeping bentgrass. Large-leaf Avens occurs throughout the riparian area. The Cowardin classification for the dominant wetland community types is PSSC: palustrine shrub-scrub, seasonally flooded. There are a total of 1.04 acres of riparian wetlands along the unnamed tributary, of which 0.48 acres of wetlands are located above the slope break (and within the potential construction area) and 0.56 acres below the slope break (and outside of the construction area).

#### PROJECT EFFECTS

No wetland area will be disturbed by any powerhouse and tailrace construction. Powerhouse and tailrace construction will be confined to the upper part of the tail race pool upstream of the limits of the Powder River riparian fringe. Excavation for burial of the underground transmission line would impact about 60 sq-ft of the aspen and alder riparian habitat along the unnamed tributary.

#### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

The transmission line would be routed to minimize this impact to the unnamed tributary wetland but most likely the line will have to cross the wetland at least once, resulting in disturbance to approximately 60 sq-ft of wetland habitat. The disturbed habitat would be re-contoured and reseeded after construction. This impact might be avoided depending on the final selection of a transmission line alternative.

#### CUMULATIVE EFFECTS

No other known developments are planned for the project area that would impact wetlands. Any wetland disturbed by project construction would be restored, thus eliminating any contribution to cumulative effects.

### 3.3.3 NOXIOUS WEEDS

#### EXISTING RESOURCES

Existing information on noxious weeds in and near the Project area is limited. No known dedicated noxious weed surveys had been conducted in Forest Service-owned portions of the study area prior to the 2007 – 2008 vegetation mapping by EcoWest Consulting (EcoWest Consulting, 2009b). A total of 211 vascular plant species were observed and verified to species/subspecies during vegetation surveys. Of the above 211 plant species 13 are on the noxious/invasive weed lists provided by Baker County and Forest Service (Table 11). In December 2008, the locations of the previously noted weed populations were mapped and the number of individuals tallied. The data collected during the previous surveys for the related botanical resources allowed these weed concentrations to be readily relocated.

**TABLE 11. NOXIOUS WEEDS OBSERVED IN THE PROJECT AREA BASED ON WEEDS LIST FOR BAKER COUNTY (BC), LOCAL FOREST SERVICE RANGER DISTRICT (FS), AND REGIONAL FOREST SERVICE FOR PACIFIC NORTHWEST (PNW).**

| Common Name | Scientific Name | BC | FS | PNW |
|---|---|---|---|---|
| Spotted knapweed | *Centaurea macalusa* | A | 1 | - |
| Diffuse knapweed | *Centaurea diffusa* | A | 1 | - |
| Scotch thistle | *Onopordum acanthium* | A | 2 | - |
| Canada/bull thistle | *Cirsium valgare* | B | 4 | - |
| Teasel | *Dipsacus fullonum* | B | 2 | - |
| Sulfur cinquefoil | *Potentilla recta* | B | 2 | - |
| Common mullein | *Verbascum thapsis* | C | - | - |
| Canada thistle | *Cirsium arvense* | - | 2 | - |
| Cheatgrass | *Bromus tectorum* | - | - | X |
| Orchardgrass | *Dactylis glomerata* | - | - | X |
| Prickly lettuce | *Lactuca serriola* | - | - | X |
| Yellow sweetclover | *Melilotus officinale* | - | - | X |
| Stinging nettle | *Urtica dioica* | - | - | X |

KEY: A = mandatory control county wide; B = widespread and/or high concern; C = widespread and/or moderate concern; 1 = Goal is to eradicate new populations and/or control existing populations of these aggressive species; 2 = Goal is to contain existing populations of aggressive species; 4 = Goal is to contain existing populations of less aggressive species; X = not categorized

Mapping included all species listed on the Baker County 2008 Noxious Weed List (Baker County, 2008) and the species listed as invasive species in the Wallowa-Whitman National Forest Invasive Plant Program EIS (USDA Forest Service, 2009).

### Project Effects

The species of greatest concern in the study area due to (1) their highly invasive nature, (2) proximity to special habitats and (3) proximity to construction or staging areas are diffuse knapweed, creeping and bull thistles, teasel and sulfur cinquefoil (EcoWest Consulting, 2009b). All areas disturbed by construction will have the potential to encourage noxious weed invasion.

### Proposed, Protection, Mitigation and Enhancement Measures

To prevent the introduction of noxious weeds, construction equipment will be cleaned prior to arrival on the job site. Tires, tracks and undercarriage areas will be thoroughly washed to remove any seeds prior to entry into construction areas. Once the equipment has been washed, the equipment will not leave the project area until construction is completed. Travel outside of the designated construction areas will be prohibited to prevent inadvertent entrance into adjacent vegetated areas. Reseeding of all disturbed area with native and desirable non-native seed mixes will help prevent the spread of noxious weeds. The seed mix will be determined through consultation with the Forest Service.

### Cumulative Effects

Noxious weed proliferation is an existing problem in the project area that has resulted from previous land disturbing activities. Any future land disturbing activities, including the Mason Dam hydropower

project have the potential to further aggravate the noxious problem. The proposed mitigation efforts would prevent further spread of noxious weeds due to project construction, thus eliminating any contribution to cumulative effects.

### 3.3.4 THREATENED, ENDANGERED AND SPECIAL STATUS PLANTS

#### EXISTING RESOURCES

Table 12 shows the federal and state listed threatened, endangered or special status plant species that are potentially present in Baker County (Oregon Natural Heritage Information Center, 2007; US Fish and Wildlife Service, 2009). Only one of these species, Howell's spectacular thelypody, is a state or federally listed threatened/endangered/candidate species. All of the species in Table 12 as well as Forest Service special status species were evaluated for potential adverse project impacts during surveys conducted in 2007 and 2008 by EcoWest Consulting (EcoWest Consulting, 2009b). More than 200 vascular plant species were recorded during the vegetation surveys. No federally or state threatened, endangered or special status plant species were observed.

**TABLE 12. FEDERAL AND STATE LISTED PLANTS THAT COULD POTENTIALLY OCCUR IN BAKER COUNTY.**

| Common Name | *Scientific Name* | Heritage Rank | Federal Status | State Status | ORNHIC List |
|---|---|---|---|---|---|
| Howell's spectacular thelypody | *Theylpodium howelli spp. spectabilis* | G2T1,S1 | LT | LE | 1 |
| Upward-lobed moonwort | *Botrychium ascendens* | G2G3,S2 | SOC | C | 1 |
| Crenulated grape-fern | *Botrychium crenulatum* | G3,S2 | SOC | C | 1 |
| Twin-spike moonwort | *Botrychium paradoxum* | G2S1 | SOC | C | 1 |
| Stalked moonwort | *Botrychium pedunculosum* | G2G3,S1 | SOC | C | 1 |
| Clustered lady's-slipper | *Cypripedium fasciculatum* | G4,S3 | SOC | C | 2 |
| Cronquist's stickseed | *Hackelia cronquistii* | G3,S3 | SOC | LT | 1 |
| Red-fruited lomatium | *Lomatium erythrocarpum* | G1,S1 | SOC | LE | 1 |
| Cusick's lupine | *Lupinus Lepidus* var. *cusickii* | G1T1,S1 | SOC | LE | 1 |
| Snake River goldenweed | *Pyrrocoma radiate* | G3,S3 | SOC | LE | 1 |
| Wallowa ricegrass | *Achnatherum wallowaensis* | G2G3,S2S3 | SOC | - | 1 |
| Biennial stanlaya | *Stanleya confertiflora* | G1,S1 | SOC | - | 1 |
| Oregon semaphore grass | *Pleuropogon oregonus* | G1,S1 | SOC | LT | 1 |

KEY: LE = Listed Endangered; LT – Listed Threatened; SOC = Species of Concern; C = Candidate; ORNHIC 1 = threatened with extinction throughout entire range; ORNHIC 2 = threatened with extirpation from the State of Oregon

Non-vascular species were also evaluated using specifically targeted surveys. Although there were 11 lichens, and a number of moss species/genera identified in key microhabitats, none of these were sensitive species (EcoWest Consulting, 2009b).

#### HOWELL'S SPECTACULAR THELYPODY

Spectacular thelypody is listed as endangered by the State of Oregon and as threatened by FWS. It is known only from 11 sites (five populations) in Baker and Union Counties, Oregon. All of the known sites are located within a 15-mile radius of Haines in Baker County, within the Baker-Powder River valley. Occupied habitats include alkaline wet to mesic meadows within valley bottoms between elevations of 3,000 to 3,500 feet. Common associates include great basin wild rye (*Leymus cinereus*), with greasewood (*Sarcobatus vermiculatus*) typically occurring along the habitat fringes. The FWS considers that all moist, alkaline meadows dominated by greasewood, great basin wild rye or saltgrass between 3,000 to 3,500 feet in elevation within Baker, Union and Malheur Counties represent potential suitable habitat for the species (US Fish and Wildlife Service, 1999).

#### PROJECT EFFECTS

The project is expected to have no effect on spectacular thelypody or any other special status plant species since none of these plant species were not observed in the project area. With regard to Howell's spectacular thelypody, neither the plant nor the habitat and plant associations favored by the plant, were observed in the project area.

#### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

No protection, mitigation or enhancement measures are proposed for threatened, endangered or special status plant species.

#### CUMULATIVE EFFECTS

The project would have no known cumulative effect on threatened, endangered or special status plant species.

### 3.3.5 WILDLIFE

#### EXISTING RESOURCES

Wildlife inhabiting the project area is typical for the predominant habitat types consisting of dry coniferous forest with small interspersed riparian areas. Wildlife resources include large and small mammals, reptiles, waterfowl, raptors, game birds and a variety of songbirds. Table 13 lists the animal species observed during 2007 and 2008 surveys.

Twenty-nine wildlife species/sign (22 birds, 7 mammals) were observed during the habitat assessments. There were no raptor nests observed in the study area, although there is an active osprey nest near the study area, on the north side of Highway 7. The only bird nests located within the study area during either survey were a robin nest and a hummingbird nest in the planted horticultural trees in the recreation area in 2007. A rock wren was observed with a young brood on the dam face in 2008, indicating nesting in the area. No other bird nests or evidence of nesting were observed in 2008, and the planted trees have since been removed.

#### PROJECT EFFECTS

Noise and activity during project construction would result in short term displacement of some project area wildlife. Displaced animals would be expected to move to nearby areas having similar habitat characteristics.

**TABLE 13. WILDLIFE SPECIES OR SIGN OBSERVED IN THE MASON DAM STUDY AREA DURING 2007 AND 2008 SURVEYS.**

| Common Name | Open Water | Riparian | Coniferous & Mixed Forest | Grassland | Rock/talus |
|---|---|---|---|---|---|
| Golden eagle | | | X | | |
| Red-tailed hawk | X | | | | X |
| Bald eagle | X | | | | |
| Osprey | X | | | | |
| Mallard | X | | | | |
| Common merganser | X | | | | |
| American dipper | X | X | | | |
| Stellar's jay | | | X | | |
| Black-capped chickadee | | | X | | |
| Mountain chickadee | | | X | | |
| Black-billed magpie | | | | X | |
| Raven | | | | | X |
| Downy woodpecker | | | X | | |
| Red-breasted nuthatch | | | X | | |
| Pygmy nuthatch* | | | X | | |
| Brown creeper | | | X | | |
| Red-naped sapsucker | | | | X | |
| American robin* | | | | X | |
| Hummingbird* | | | | X | |
| Rock wren | | | | | X |
| Vaux's swift | | | | | X |
| Caspian tern | X | | | | |
| Mule deer | X | X | X | X | X |
| Elk* | | | X | X | |
| Beaver* | | X | | | |
| Badger* | | | X | | |
| Yellow pine chipmunk | | | X | | |
| Douglas squirrel | | | X | | |
| Northern pocket gopher* | | | | X | |

*sign only (tracks, scat, nests, other)

The project would result in permanent loss of less than one acres of dry grassland habitat due to construction of the new substation located in the Idaho Power corridor. Minimal tree clearing would be required for transmission line construction and would not significantly impact the amount and quality of forest habitat in the project area. Both grassland and forest habitat types are prevalent in the project area and the projected habitat loss is not expected to have a significant long term adverse effect on wildlife.

#### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

All disturbed areas will be reseeded with native and desirable non-native seed mixes in order to restore wildlife habitat.

#### CUMULATIVE EFFECTS

A long history of development in the project area has led to the loss of wildlife habitat. The small amount of additional lost habitat associated with the hydropower project (< 1 acre) will have no significant effect on the vast remaining wildlife habitat in Baker County.

### 3.3.6 THREATENED, ENDANGERED AND SPECIAL STATUS ANIMALS

#### EXISTING RESOURCES

Table 14 shows the federal and state listed threatened, endangered or special status animal species that are potentially present in Baker County (Oregon Natural Heritage Information Center, 2007; US Fish and Wildlife Service, 2009). Four of these species – Columbia spotted frog, bald eagle, gray wolf and California wolverine – are either state or federally listed as threatened/endangered/candidate species or have been recently delisted and are subject to special management. Of these four species only the bald eagle is known to occur in the project vicinity. All of the species in Table 14 as well as Forest Service special status species were evaluated for potential adverse project impacts during 2007 and 2008 field surveys conducted by EcoWest Consulting (EcoWest Consulting, 2009b).

**TABLE 14. FEDERALLY LISTED THREATENED, ENDANGERED OR CANDIDATE SPECIES THAT MAY OCCUR IN BAKER COUNTY.**

| Common Name | Scientific Name | Heritage Rank | Federal Status | State Status | ORNHIC List |
|---|---|---|---|---|---|
| REPTILES AND AMPHIBIANS | | | | | |
| Columbia spotted frog | Rana luteiventris | G4,S2S3 | C | SU | 2 |
| Rocky Mountain tailed frog | *Ascaphus montanus* | G4,S2 | SOC | SV | 2 |
| Northern sagebrush lizard | *Sceloporus graciosus graciosus* | G5T5,S5 | SOC | SV | 4 |
| BIRDS | | | | | |
| Bald eagle | *Haliaeetus leucocephalus* | G5, S4B,S4N | DELISTED | DELISTED | 4 |
| Northern goshawk | *Accipiter gentilis* | G5,S3B | SOC | SC | 4 |

| Common Name | Scientific Name | Heritage Rank | Federal Status | State Status | ORNHIC List |
|---|---|---|---|---|---|
| Western burrowing owl | *Athene cunicularia hypugaea* | G4T4,S3B | SOC | SC | 4 |
| Greater sage-grouse | *Centrocercus urophasianus* | G4,S3 | SOC | SV | 2 |
| Ferruginous hawk | *Buteo regalis* | G4,S3B | SOC | SC | 4 |
| Olive-sided flycatcher | *Contopus cooperi* | G4,S3B | SOC | SV | 4 |
| Willow flycatcher | *Empidonax traillii adastus* | G5T5,S3S4B | SOC | SU | 4 |
| Yellow-breasted chat | *Icteria virens* | G5,S2B,S3N | SOC | - | 2 |
| Mountain quail | *Oreortyx pictus* | G5,S4 | SOC | SU | 4 |
| White-headed woodpecker | *Picoides albolarvatus* | G4,S2S3 | SOC | SC | 2 |
| MAMMALS | | | | | |
| Gray wolf | *Canis lupus* | G4,SH | DELISTED | DELISTED | 2-ex |
| California wolverine | *Gulo gulo luteus* | G4T3Q,S1? | SOC | LT | 2 |
| Pallid bat | *Antrozous pallidus* | G5,S2 | SOC | SV | 2 |
| Pygmy rabbit | *Brachylagus idahoensis* | G4,S2 | SOC | SV | 2 |
| Townsend's big-eared bat | *Corynorhinus townsendii* | G4,S2 | SOC | SC | 2 |
| Silver-haired bat | *Lasionycteris noctivagans* | G5,S3S4 | SOC | SU | 4 |
| Western small-footed myotis | *Myotis ciliolabrum* | G5,S3S4 | SOC | SU | 4 |
| Long-eared myotis | *Myotis evotis* | G5,S4 | SOC | SU | 4 |
| Fringed myotis | *Myotis thysanodes* | G4G5,S2 | SOC | SV | 2 |
| Long-legged myotis | *Myotis volans* | G5,S3 | SOC | SU | 4 |
| Preble's shrew | Sorex preblei | G4,S3? | SOC | - | 3 |

KEY: LT – Listed Threatened; SOC = Species of Concern; SC = State Critical; SV = State Vulnerable; SU = Undetermined status; ORNHIC 2 = threatened with extirpation from the State of Oregon; ORNHIC 4 = taxa of conservation concern but not currently threatened or endangered

Co

COLUMBIA SPOTTED FROG

The Columbia spotted frog is candidate for federal listing as threatened or endangered. The range of the species has declined substantially in the past 50 years, with the decline thought to be associated with wetland loss and introduction of nonnative predators, such as bullfrogs and bass. Populations in eastern Oregon are part of the Great Basin subpopulation of the Columbia spotted frog, which is one of four recognized subpopulations of the species.

The spotted frog is an aquatic species that is associated with open, non-turbid, slack or ponded water. It is often found in association with seeps and springs, open water with floating vegetation, and larger bodies of ponded water such as lakes and stream backwaters. Habitats tend to have relatively constant water levels and temperatures (Bull E. , 2005). Breeding occurs in these open water areas with egg masses being laid in shallow water fringes (generally 6 to 12 inches or less) where they can float freely. Breeding occurs in late winter or early spring, generally between late March to April in mid-elevation areas.

The spotted frog tends to forage in adjacent wet meadows (i.e., wetland areas containing sedges, grasses and rushes), but can also be found hiding under decaying vegetation or upland habitats near water with dense cover to allow protection from predators and ultraviolet radiation. The frog is relatively inactive during winter, generally hibernating or aestivating in deep silt or muck substrates, spring heads, or undercut perennial streambanks with overhanging vegetation. The key feature of overwintering habitat is a microhabitat that is protected from freezing. The frogs can use different wetlands for breeding, foraging and overwintering and are sensitive to fragmentation of their travel routes among different wetland habitats.

There are a number of known breeding sites in northeastern Oregon in Union, Baker, Wallowa, Grant and Umatilla counties (Bull E. , 2005). One of the known sites occurs immediately upstream of Phillips Reservoir in the series of ponds that have developed in the Sumpter mine tailings (Bull E. , 2005). These ponds are not connected to the river and have no fish or bullfrogs as predators. The spotted frog also occurs in wetlands adjacent to the campgrounds on the south shore of Phillips Reservoir (A Kuehl, BLM, pers. comm).

Field surveys were conducted in October 2007 when frogs have already initiated hibernation. Therefore, the wetlands in the study area were evaluated for the potential as spotted frog habitat based on the criteria listed below:

- Provides semi-permanent or permanent shallow water with a relatively constant water level
- Known to lack, or likely lack frog or fish predators
- Provides cover (wetland or upland, or dense litter)
- Within a potential travel route to or from the above habitat
- Able to provide hibernating habitat (deep silt or muck substrate, undercut streambank, or spring head)

None of the riparian wetlands along the Powder River within the study area meet any of the above criteria. The wetlands directly border the Powder River, which has fish predators. The wetlands also are subject to substantial water level fluctuation during the frog's active season. Herbaceous or other low-to-the ground cover (such as litter) necessary for thermal and other protection is minimal. There are no

adjacent wetlands meeting the above criteria, so the riparian corridor does not function as a regular travel corridor. There is no hibernating habitat as there is no deep substrate, or cut streambanks with overhanging cover to provide protection from freezing.

Further downstream on the Powder River (0.5 to 1.0 miles downstream of dam) habitat complexity increases and the banks contain potential hibernating habitat. However, this reach meets only two of the five habitat criteria identified above.

The wetlands along the unnamed tributary lack fish predators, and provide much greater cover than the Powder River wetlands. The tributary is spring-fed, but also subject to seasonal water level fluctuations of 6 to 12 inches. As a result of the seasonal flooding, there is little to no litter accumulation and not much sediment deposition. Riparian soils are shallow to cobble. The tributary spring head approximately 350 feet upstream of the study area contains deep soils with small areas of permanent water. This spring is outside of the study area and was not investigated in detail, but does contain some suitable spotted frog habitat elements. However, the actual use by the frog is likely limited by substantial horse trampling associated with the adjacent dispersed campsite. According to Bull (2005), spotted frog use of streams and creeks is rare (less than 2% of the breeding sites) and restricted to slow moving creeks. The relatively high water level fluctuations limit the tributary as potential breeding habitat with hibernating habitat limited by lack of deep soils or other substrate to protect against freezing. The upstream spring might provide spotted frog habitat if protected but in its current condition does not. As a result, there are no known suitable habitats within at least 0.2 miles limiting the stream's value as a regular travel corridor.

BALD EAGLE

The bald eagle is known to both nest and overwinter around Phillips Reservoir upstream of the Mason Dam project area, although the wintering eagles may move to other locales, such as Unity Reservoir, elsewhere on the Powder River, the Burnt River or nearby agricultural fields, according to prey availability. Between zero to four eagles have been documented wintering at Phillips Reservoir and Unity Reservoir, with up to 15 eagles documented using the Powder and Burnt River watersheds during the winter (US Fish and Wildlife Service, 2005). The eagles tend to forage along the rivers in January and early February while the lakes are still frozen, and move to agricultural areas in February and March where they feed on cow after-birth. In addition, wintering eagles also feed on carrion.

The Phillips Reservoir bald eagle population consists of a single breeding pair of eagles along with a variable number of wintering eagles. An accurate record of nesting outcome has been kept since 1989. The history of this nesting territory prior to 1989 is unknown. The eagle nest has been used annually since 1989 (continuous nest use of 17 years). Reproductive success has generally been good, with between one to two young fledged most years. However, even though the eagles returned to the nest in 2004, 2005 and 2007, no young were produced (Isaacs & Anthony, 2007). The cause or causes of nest failure in these years are unknown.

The bald eagle breeding season generally extends from January through August. The eagles arrive at Phillips Reservoir in January, with mating during January and February. Egg laying occurs from mid-February through April, hatching from late March through early May, and fledging from late June through mid-August. The adults generally leave the nest at the end of August, after fledging occurs.

The Wallowa Whitman National Forest manages the nesting pair of eagles under *The Management Plan for the Phillips Reservoir Bald Eagle Nest Site*. This Plan defines the boundaries of the BEMA to

encompass the nest site, alternative nest sites, foraging areas and eagle flyways. The outline of the BEMA is depicted in Figure 17. The nest site is on the south shore of Phillips Reservoir. Most of the BEMA is closed year round to motorized vehicles, with no restriction on over-snow vehicles as long as the snow depth is greater than 12 inches. There are no boat use restrictions on the reservoir. The bald eagle was observed flying over Phillips Reservoir during wildlife surveys and it is known to nest and winter there.

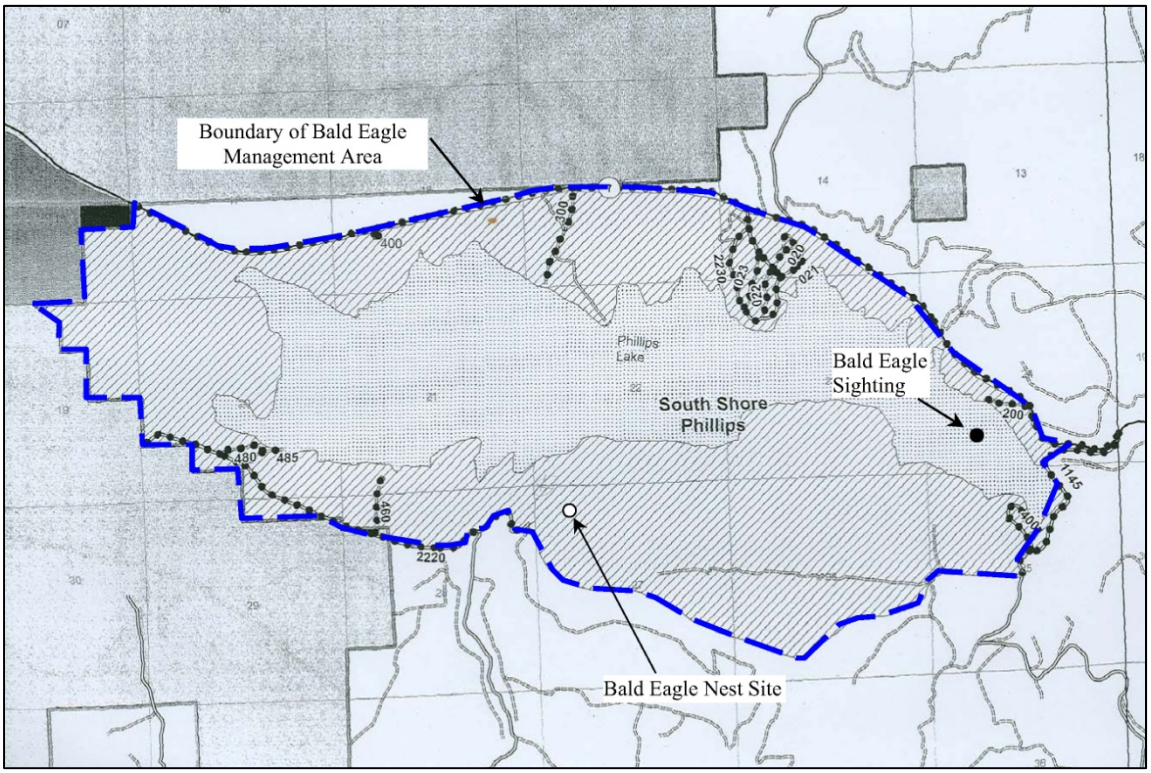


**FIGURE 17. BALD EAGLE NEST SITE AND BOUNDARY OF THE BALD EAGLE MANAGEMENT AREA.**

GRAY WOLF

The Rocky Mountain gray wolf occurs or has the potential to occur in the eastern third of Oregon, defined as east of the boundary of Highways 395/78/20. The Rocky Mountain gray wolf population was delisted on May 4, 2009. Although historically present in Oregon, wolves were not specifically re-introduced to Oregon. Instead, the gray wolf naturally dispersed into the state from Idaho. Wolves that enter the state are managed under ODFW's Wolf Plan (Oregon Department of Fish and Wildlife, 2005).

The wolf can occur in a number of different habitat types, with key features being relatively low road density/human access and an abundant food supply. The key habitat feature seems to be an abundance of prey, with the primary prey being ungulates (deer, elk and moose), and territory size can vary considerably depending on changes in prey availability and distribution. Secondary prey food sources include smaller animals such as rabbits, beavers, grouse, ravens, skunks, coyotes, porcupines, eagles and fish. When necessary, wolves also will eat insects, nuts and berries.

Since 1999, there have been six confirmed wolf occurrences in northeast Oregon, with the active occurrences being a female wolf observed near the Eagle Cap Wilderness in January 2008, and a pack in northern Union County in July 2008. The ODFW suspects that additional wolf packs occur near the

Oregon border. The other occurrences have been in the Blue Mountains near the North Fork John Day River, Highway 84 south of Baker, and unknown locations in Union County and between Ukiah and Pendleton. These occurrences represent either dead or relocated wolves.

There are no known wolf occurrences in the vicinity of Mason Dam, with the nearest known occurrences being near the Eagle Cap Wilderness and northern Union County. The wolf can occur in a number of different habitat types, with the Oregon occurrences all in forested habitats. According to ODFW, all of the Blue Mountains could provide suitable habitat (Oregon Department of Fish and Wildlife, 2005). The Mason Dam area provides suitable forested habitats with an abundance of deer prey, along with secondary prey such as beavers, ravens, eagles and fish. As such, the wolf could enter the Mason Dam area and occupy it in the future.

#### California wolverine

The California wolverine is an Oregon-threatened species that is found in California, Oregon, Washington, and part of southern British Columbia. The wolverine is a high elevation species that is found in subalpine forest and alpine meadows. In Oregon, the species has been recorded from Mount Hood, McKenzie Valley, near Three Fingered Jack Mountain and Steen's Mountain in Harney County. The Mason Dam project area does not provide suitable habitat for the California wolverine.

### Project Effects

#### Columbia Spotted Frog

There is no spotted frog habitat between Mason Dam and the gauging station, but there is potential habitat beginning at a point 0.5 mile downstream. The project would not affect the potential habitat through changes in flow or turbidity but could lower the river DO levels adjacent to the potential habitat between May and December. Oxygen levels during breeding and egg incubation (if it occurs) would not be affected by the project. The DO requirement of spotted frogs is unknown. Spotted frogs have an ability to aestivate during low oxygen conditions; however this life history strategy is generally only used in specific circumstances (Bull & Hayes, 2002).

Under the project proposal, tiered DO mitigation measures would be implemented to supplement natural re-aeration in the event that DO levels in the Powder River dropped below state water quality standards. The standards, which are designed to support cool water aquatic species and spawning salmonids, would presumably also meet DO requirements for spotted frogs should they occupy the habitat along the river beginning about 0.5 miles downstream of the dam.

#### Bald Eagle

Except for a small area to the west of Black Mountain Road, the BEMA is outside of the direct Mason Dam project area. The majority of the BEMA is in the area of indirect project influence. Specific BEMA management prescriptions that apply to indirect impacts include noise and flyway disruption. Other activities such as stand age management within the BEMA are not pertinent to this project.

Bald eagles are sensitive to disturbance at any time, but particularly so during the breeding season especially when returning to the area to mate. As a result, nesting occurs most commonly in areas free of human disturbance. Nesting sites are often chosen to be more than 0.75 miles (approximately 4,000 feet) from low-density human disturbance and more than 1.2 miles (approximately 6,400 feet) from medium- to high-density human disturbance (USDA Forest Service, 1993).

There is no set buffer around the eagle nest specified in the BEMA. Buffer zones of approximately 500 to 1,000 feet from active nests have been recommended in the Northwest (Grubb & King, 1991; Nowak, 2004). Some recommend larger buffer zones in which general human activities are restricted within 0.5 miles of nests (2,640 feet) between January and August, with logging, road building, boat launch facilities and other relatively loud activities prohibited within 0.25 miles (1,320 feet) of nests.

Project construction is not expected to adversely affect bald eagle nesting and breeding since the known nest site at Phillips Reservoir is approximately 2.5 miles from the base of Mason Dam. Construction activity may cause bald eagles to avoid foraging near the dam on a temporary basis.

#### GRAY WOLF

The proposed project will not cause loss of any significant amount of habitat suitable for wolves or for wolf prey animals; therefore, the project is expected to have no significant adverse effect on the gray wolf.

#### CALIFORNIA WOLVERINE

The project area contains no habitat suitable for the California wolverine and is expected to have no effect on this species.

#### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

Water quantity and water quality mitigation measures implemented to protect aquatic habitat (see Section 3.2.1, 3.2.2) would minimize adverse effects to spotted frogs should they occur in habitat that begins about 0.5 miles downstream of Mason Dam.

To minimize disturbance to bald eagles project construction will be scheduled to avoid loud construction activities between January and March. Construction activities on the most exposed portion of the transmission line will be scheduled to occur as much as possible between August and December.

#### CUMULATIVE EFFECTS

Potential project impacts to bald eagles would be short term and can be minimized through project scheduling. The project is therefore not expected to contribute to cumulative effects on the bald eagle.

The project would not result in the permanent loss of any wetlands or affect the population of fish predators, which are believed to be the primary causes for decline of the species. The project is therefore not expected to contribute to cumulative effects to the spotted frog.

## 3.4 RECREATIONAL RESOURCES

#### EXISTING RESOURCES

Baker County performed a project specific recreation study to determine the potential project impacts on recreation in the Mason Dam area (EcoWest Consulting, 2008). The majority of the visitors to the Powder River Recreation Area come to fish, sightsee or picnic. Groups are generally small (78% in groups from 1 to 3 people in size) and stay for an average of 0.9 hours, ranging from 0.1 to 12 hours. Most of the visitors are from Baker or nearby areas of eastern Oregon (74%) and come only for the day, not using the nearby Phillips Reservoir or Sumpter campgrounds for overnight stays. The greatest amount of

recreation use occurs in the spring and summer, with lesser amounts in the fall and winter (with very limited to no parking available in the winter).

Aspects of the area important to visitors were fairly evenly divided among restrooms, rustic nature, scenery, open pine forests, and the fishery. Features that visitors found to detract from the site experience were predominantly those that detracted from the scenery or ability to fish, such as trash, too many people to fish, or insufficient parking.

Plans to change the facility by removing some of the developed facilities were not favored, although a number of visitors indicated no concerns as long as fishing access was maintained. A majority of visitors stated that the addition of a powerplant at the base of Mason Dam would not affect their recreational visits to the area, but some conditioned their responses on the assumptions that there would be no additional taxes or fees, or that there would be no effects on either the fishery or site access after construction.

Based on a 95% confidence interval, between 9.5 to 14 groups use the Powder River Recreation Area during weekdays between May and September. On weekends, between 16.5 to 33.9 groups use the area. An average of 31 groups use the area on holidays. Most groups consist of 3 or less people traveling in a single vehicle. Except for during unique events (such as the group baptism on August 12), there were open parking spots on all survey dates.

#### Project Effects

The project is not expected to cause any long-term adverse impacts to the existing recreation resource. Noise from the powerhouse turbine/generator unit will be less than the noise level currently produced by water discharge from the project jet valves. Project facilities will not eliminate any existing fishing access to the Powder River or Phillips Reservoir.

Public parking at the parking area just below the dam may be restricted during construction activities since this parking area is proposed as a construction staging area. Lane restrictions and some minor delays may occur for Black Mountain Road during the powerline installation into the Black Mountain Road right-of-way. It may be necessary to restrict fishing access to the Mason Dam tailrace pool during parts of powerhouse and tailrace construction.

#### Proposed Protection, Mitigation, and Enhancement Measures

The Forest Service and Baker County will use recreation data to identify construction timelines that will have the least impact on recreation access and use. Baker County will consult with the Forest Service on appropriate paint colors and materials to make the facilities blend in with the surrounding area.

#### Cumulative Effects

Construction of Phillips Reservoir and the development of the tailwater fishery below Mason Dam have contributed significantly to recreational opportunities in the project area. Although the project is located nearby to these recreational areas, it would not cause any permanent change to the availability or quality of the recreation opportunities and would not contribute to any cumulative effect, either positive or adverse.

## 3.5 Scenic and Aesthetic Resources

## EXISTING RESOURCES

The project is mostly located in the Wallowa-Whitman National Forest within the Powder River Basin. Open, south-facing slopes dominated by drought-tolerant shrubs rise from the Powder River, transitioning through stands of western juniper and Ponderosa pine. Shady north-facing slopes support mixed conifer forests with well-developed understories. Subalpine mixed coniferous forests and true alpine conditions are found at the crest of Elkhorn Ridge. From Phillips Reservoir and Highway 7 the project is not visible. From the Black Mountain Road and from the parking lot of the Forest Service Recreation site closest to the dam you can see the project site (Figure 18).

Currently there are cement structures that make up the two valve houses, tail race, and spillway (Figure 19). A large concrete spill way extends from the top of the dam to the tailrace pool. The Idaho Power powerline has its own right-a-way that has been cleared of all trees and can be seen in aerial photos (Figure 18).


**FIGURE 18. AERIAL PHOTOGRAPH OF PROJECT AREA.**

**FIGURE 19. PHOTOGRAPH OF EXISTING STRUCTURES AT BASE OF MASON DAM.**

### PROJECT EFFECTS

The powerhouse area would not be visible from Phillips Reservoir or from Highway 7, but would only be visible for about 1,500 ft along Black Mountain Road and the dam access road and from the top of the dam. The powerhouse facilities will be placed in areas that have previously been disturbed by human action. The most visible structure will be the new powerhouse located next to the valve house with a backdrop of Mason Dam, which is covered with large cobble. In general, the project is expected to blend in with its surroundings. The Forest Service will be consulted in color selection to have the least amount of visual impact.

The transmission line route will be largely screened by forest cover and topography. Since the line will be buried, no long term impacts to visual resources are expected although some minor tree clearance may be required to accommodate trenching equipment. The substation constructed at the interconnect point would be visible only from a short segment of Black Mountain Road where it crosses the cleared corridor containing the 138 kV Idaho Power line.

Project operations will not affect reservoir water levels.

### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

Baker County will consult with the Forest Service on appropriate paint colors and materials to make the facilities blend in with the surrounding area.

### CUMULATIVE EFFECTS

Public access to the scenic and aesthetic resources of the project area was enhanced by the construction of Mason Dam. The dam, reservoir and associated roadways provide open vistas that are otherwise

rare. There has been little change to the scenic and aesthetic character of the area since these faculties were constructed and there are no known new developments planned that would cause a future change in these resources. The primary visual features of the proposed project, the powerhouse and substation, would not be expected to contribute to any cumulative effect on the areas visual and aesthetic resources.

## 3.6 Historic and Cultural Resources

### Existing Resources

Mason Dam and its associated facilities are located on the Baker District of the Wallowa-Whitman National Forest, on the Powder River approximately 15 miles southwest of Baker City. The Area of Potential Effect (APE) corresponds with the limits of the vegetation survey shown in Figure 13. The APE includes areas directly impacted through clearing, construction, and maintenance as well as 100 foot buffers around the powerhouse and tailrace facilities and substation, and 50 feet on either side of the powerline route.

Two studies were conducted to gather information on the existing cultural and historic resources in the project area. The first study focused on Traditional Cultural Properties (TCPs) and was conducted by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) (Karson, 2009). The second study focused on Archaeological and Historic-era Properties and was conducted by Kathryn M. Boula, MA, RPA archaeologist (Boula, 2009). The archeology study included background/archival research and a cultural resources inventory of the APE. Both reports are on file with FERC.

#### Traditional Cultural Properties

Phillips Reservoir falls well within the usual and accustomed areas used by the CTUIR. The upper Powder and Burnt River Basins, while far from the reservation where people reside today, is an area for which many people still hold memories and knowledge and continue to pass this knowledge and information on to the next generation.

The Elkhorn Mountain Range and upper and lower segments of the Powder River Basin have been used by members of today's CTUIR since time immemorial. Tribal oral history details travel routes and seasonal activity; indigenous place names reveal natural and cultural resource information connected to the landscape and these sites are identified as TCPs. The Powder River basin is a physical connection to the tribe's past and to how the CTUIR lived before contact with non-Indian people and after contact with non-Indian people, and how they continue to use the landscape today. This is a location where people traveled to for part of their subsistence, cultural endurance, and spiritual survival. Because the earth offered so much in the way of natural resources, this is a place the people promised to protect, and to obey *tamánwit* (the law).

The Powder River is a traditional fishery of the CTUIR. Mason Dam and other dams have altered the free flowing Powder River and prevent an important traditional resource, salmon, from being harvested on the tribe's ceded lands.

This area was and continues to be of importance to the CTUIR. Descendants of those who used to travel to the region for subsistence purposes on a seasonal basis still return to accessible areas to pursue hunting, fishing, and gathering activities in the region. The core activities associated with the Phillips

Reservoir region include fishing, hunting, habitation, gathering of obsidian resources, burial areas and physical and spiritual vision questing.

### Archeological and Historic-era Properties

No archeological or historic-era resources of any kind were found during the inventory survey, including previously-recorded isolates. Based on the field survey and literature review, no further archeological review is deemed necessary in the area surveyed.

### Oregon SHPO Review

Dennis Griffin Ph.D., RPA reviewed both reports. For the archeological and historic-era properties report, Mr. Griffin said the following in a letter dated January 13th, 2009:

> *"…agree that the project will have no affect on any known cultural resources. No further archaeological research is needed with this project. …if during development activities you or your staff encounters any cultural material (i.e., historic or prehistoric), all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery."*

Dennis Griffin also reviewed the Traditional Cultural Properties report but had no comment due to the fact that the report provided to him did not contain enough information due to its sensitivity.

### Project Effects

The TCP study of the project area found that several important historic properties of religious and cultural significance to the CTUIR are present near the proposed undertaking. The importance of these places to CTUIR cannot be overstated. The significance of these places continues today through the continued use, traditions, and stories that have been passed down through the generations. These locations are a physical link with the CTUIR and its history and religion. At various times, Indians have been excluded from participating in traditional cultural and spiritual practices, but these places are rooted in the Tribes' history and are important elements for perpetuating the CTUIR's ongoing cultural identity. CTUIR culture and the natural environment cannot be separated.

Past developments on the Powder River have had an adverse effect on the Powder River and CTUIR traditional use areas, including some that are now under Philips Lake. However, the impacts to the Powder River in the project area have already occurred. The construction and retrofit of the hydropower facility at Mason Dam should not further adversely affect these sites.

Since no archeological or historic-era properties were found during field inventory, the project would have no effect on any known properties.

### Proposed, Protection, Mitigation and Enhancement Measures

Changes in facility locations could make additional surveys necessary. In the event that archaeological resources or human remains are inadvertently discovered during the course of project construction, all ground disturbing activities must cease and the Wallowa-Whitman Forest Archaeologist contacted immediately for further instruction.

Future construction and operation of a hydroelectric facility at Mason Dam have the potential to adversely affect some CTUIR Traditional Cultural Properties. Baker County will work with the CTUIR, FERC, and Reclamation to avoid or minimize those effects.

### CUMULATIVE EFFECTS

Further development of the Powder River by installation of the proposed hydroelectric project will contribute to the ongoing change in the area's use away from the traditional uses valued by the CTUIR; however, the project would not prevent any known traditional uses still practiced by the CTUIR.

## 3.7 SOCIOECONOMICS

### EXISTING RESOURCES

Baker County, which was established in 1862 encompasses an area of 3,068 square miles. The USDA Forest Service and the Bureau of Land Management manage over 50% of the total area of Baker County. With a population of 15,983, the density is only 5.5 people per square mile. Fifty-seven percent of the population live in one of the eight incorporated cities: Baker City, Greenhorn (considered a ghost town now), Haines, Halfway, Huntington, Richland, Sumpter, and Unity. General population and socio-economic statistics for Baker County and the State of Oregon are presented in Table 15 (U.S. Census Bureau, 2009a).

**TABLE 15. KEY SOCIO-ECONOMIC STATISTICS FOR BAKER COUNTY AND STATE OF OREGON.**

| Socio-economic Parameter | Baker County | Oregon |
|---|---|---|
| *POPULATION* | | |
| Total, April 1, 2000 | 16,741 | 3,421,437 |
| Total, Estimated 2008 | 15,983 | 3,790,060 |
| Persons under 5 years old, percent 2008 | 4.90% | 6.40% |
| Persons under 18 years old, percent 2008 | 19.50% | 22.90% |
| Persons 65 years old and over, percent 2008 | 21.40% | 13.30% |
| *EDUCATION* | | |
| Population 25 years and over | | |
| High school graduates, 2000 | 80.30% | 85.10% |
| Bachelor's degree or higher, 2000 | 16.40% | 25.10% |
| Housing | | |
| Housing units, 2007 | 8,743 | 1,609,595 |
| Households, 2000 | 6,883 | 1,333,723 |
| Homeownership rate, 2000 | 70.10% | 64.30% |
| *INCOME* | | |
| Median household income, 2007 | $36,942 | $48,735 |
| Mean earnings, 1999 | $35,103 | NA |

Primary industries providing employment in Baker County include education, health and social services (16.1%); agriculture, forestry, fishing, hunting, and mining (14.4%); and retail trade (10.9%) (Table 16) (U.S. Census Bureau, 2009b). The estimated median household income is $36,942, nearly $12,000 below

the state average. Residences with income below the poverty level in Baker County are estimated at 17.7%, compared to a state average of 13%.

**TABLE 16. KEY EMPLOYMENT STATISTICS FOR BAKER COUNTY AND STATE OF OREGON.**

| Employment Statistics, Baker County | Number | Percent |
|---|---|---|
| Population 16 years and over, 2000 | 13,197 | 100 |
| In labor force | 7,333 | 56 |
| Civilian labor force | 7,324 | 55.5 |
| Employed | 6,717 | 50.9 |
| Unemployed | 607 | 4.6 |
| Armed Forces | 9 | 0.1 |
| Not in labor force | 5,864 | 44.4 |
| *OCCUPATION* | | |
| Employed civilian population 16 years and over | 6,717 | 100 |
| Management, professional and related | 2,048 | 30.5 |
| Service | 1,227 | 18.3 |
| Sales and office | 1,504 | 22.4 |
| Farming, fishing, and forestry | 231 | 3.4 |
| Construction, extraction, and maintenance | 628 | 9.3 |
| Production, transportation, and material moving | 1,079 | 16.1 |
| *INDUSTRY* | | |
| Agriculture, forestry, fishing and hunting, and mining | 965 | 14.4 |
| Construction | 478 | 7.1 |
| Manufacturing | 635 | 9.5 |
| Wholesale trade | 112 | 1.7 |
| Retail trade | 731 | 10.9 |
| Transportation and warehousing, and utilities | 434 | 6.5 |
| Information | 103 | 1.5 |
| Finance, insurance, real estate, and rental and leasing | 365 | 5.4 |
| Professional, scientific, management, administrative and waste management services | 258 | 3.8 |
| Educational, health and social services | 1,083 | 16.1 |
| Arts, entertainment, recreation, accommodation and food services | 651 | 9.7 |
| Other services (except public administration) | 474 | 7.1 |
| Public administration | 428 | 6.4 |

Gold mining brought the first settlers to Baker County, but the gold fields were depleted decades ago. Subsequent generations of Baker County residents have worked in the forests and fields, relying on a traditional foundation of agriculture and timber to drive the local economy. Baker County seeks to continue to use its natural resources to create jobs, promote economic recovery, enhance energy efficiency and reliability, provide recreation opportunity and generally improve the quality of life in the everyday lives of its citizens.

Mason Dam and Phillips Reservoir provide significant socio-economic benefits to Baker County as follows:

- *Irrigation* – Releases from Phillips Reservoir provide water to 18,500 acres of land. Principal crops such as alfalfa hay, grain, grass hay, pasture and some seed are produced from the irrigation waters.
- *Flood control* – There are 38,000 acre-feet of storage assigned to flood control. Of this 38,000 acre-feet, 17,000 acre-feet are exclusively for flood control, which may not be retained for irrigation but must be released as soon as possible within specified discharge and stream flow constraints. The remaining 21,000 acre-feet are assigned jointly to irrigation and flood control.
- *Recreation* – Facilities include camping, picnicking, swimming, hiking, biking, fishing, and boat launches on 5,038 acres in the Phillips Reservoir area and the almost 13 miles of shoreline.

### PROJECT EFFECTS

The Mason Dam hydroelectric project will not adversely impact the existing agricultural, flood control and recreation benefits provided by Mason Dam and Phillips Reservoir. The sale of electric power will provide revenue that the County may use to promote the socio-economic well-being of its citizens.

Project construction will create up to 30 construction related jobs and a demand for local products and services. Once operational, the Project will employ one worker to operate the project.

### PROPOSED, PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

No protection, mitigation, or enhancement measures are proposed with respect to socioeconomic resources.

### CUMULATIVE EFFECTS

The project would contribute to the ongoing development of project area resources for the economic benefit of the local community.

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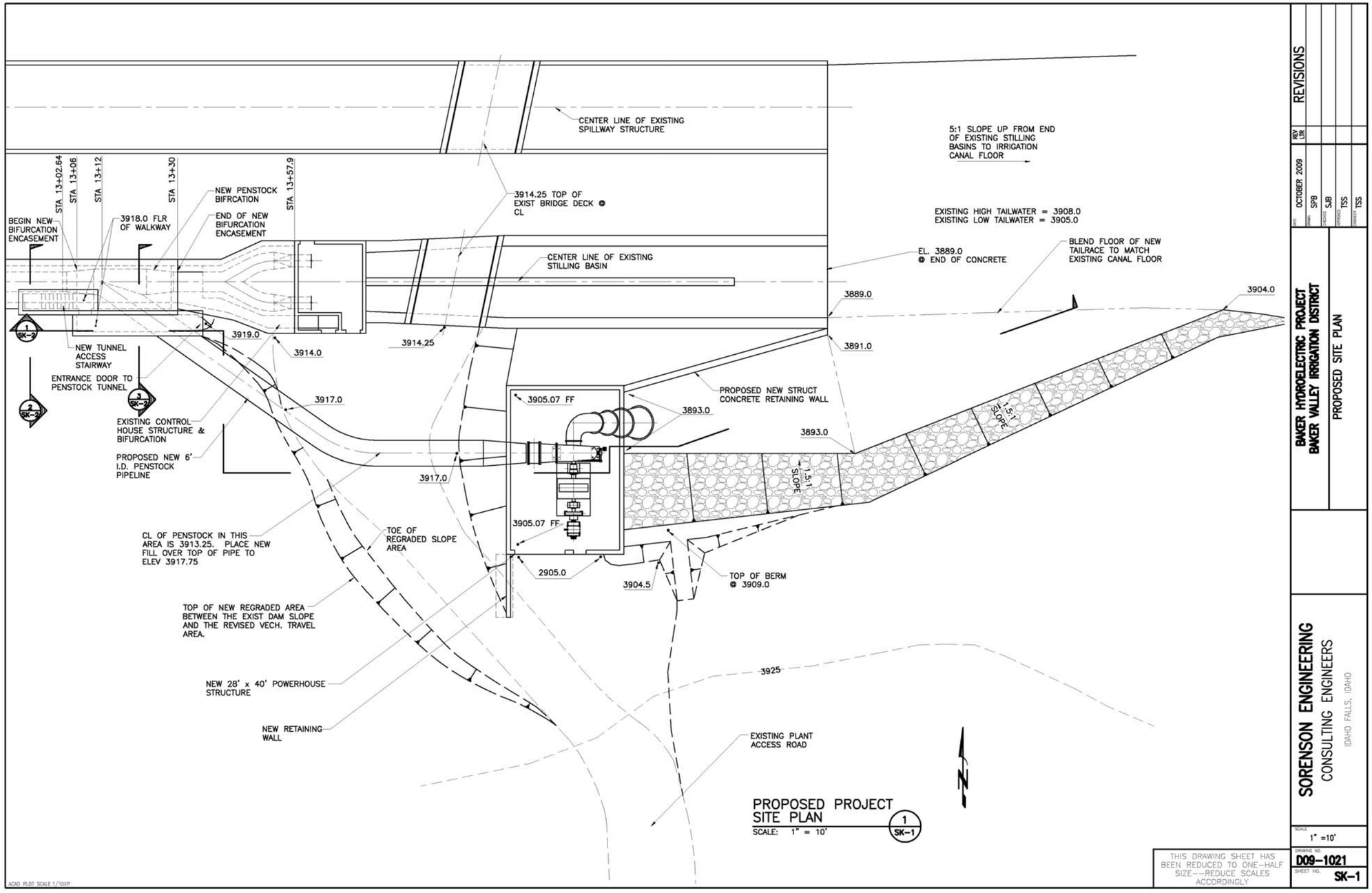
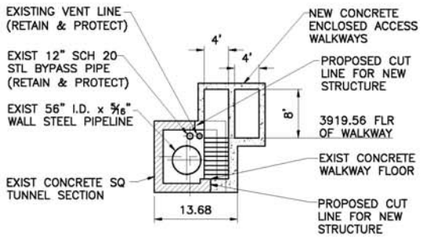
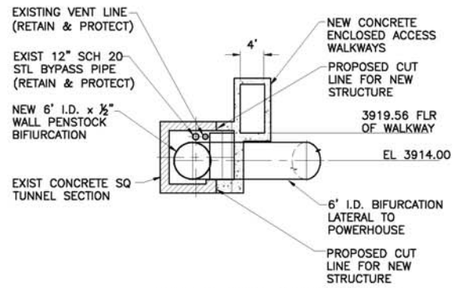
# APPENDIX A – PRELIMINARY DESIGN DRAWINGS


CENTER LINE OF EXISTING SPILLWAY STRUCTURE
5:1 SLOPE UP FROM END OF EXISTING STILLING BASINS TO IRRIGATION CANAL FLOOR
STA 13+02.64
STA 13+06
STA 13+12
STA 13+30
STA 13+57.9
BEGIN NEW BIFURCATION ENCASEMENT
3918.0 FLR OF WALKWAY
NEW PENSTOCK BIFRCATION
END OF NEW BIFURCATION ENCASEMENT
3914.25 TOP OF EXIST BRIDGE DECK @ CL
EXISTING HIGH TAILWATER = 3908.0
EXISTING LOW TAILWATER = 3905.0
CENTER LINE OF EXISTING STILLING BASIN
EL. 3889.0 @ END OF CONCRETE
BLEND FLOOR OF NEW TAILRACE TO MATCH EXISTING CANAL FLOOR
3889.0
3904.0
3919.0
3914.0
3914.25
3891.0
NEW TUNNEL ACCESS STAIRWAY
ENTRANCE DOOR TO PENSTOCK TUNNEL
3917.0
3905.07 FF
PROPOSED NEW STRUCT CONCRETE RETAINING WALL
3893.0
3893.0
1:5:1 SLOPE
EXISTING CONTROL HOUSE STRUCTURE & BIFURCATION
PROPOSED NEW 6' I.D. PENSTOCK PIPELINE
3917.0
1:5:1 SLOPE
CL OF PENSTOCK IN THIS AREA IS 3913.25. PLACE NEW FILL OVER TOP OF PIPE TO ELEV 3917.75
TOE OF REGRADED SLOPE AREA
3905.07 FF
2905.0
3904.5
TOP OF BERM @ 3909.0
TOP OF NEW REGRADED AREA BETWEEN THE EXIST DAM SLOPE AND THE REVISED VECH. TRAVEL AREA.
3925
NEW 28' x 40' POWERHOUSE STRUCTURE
NEW RETAINING WALL
EXISTING PLANT ACCESS ROAD
N
PROPOSED PROJECT SITE PLAN
SCALE: 1" = 10'
1
SK-1
ACAD PLOT SCALE 1/10XP
THIS DRAWING SHEET HAS BEEN REDUCED TO ONE-HALF SIZE--REDUCE SCALES ACCORDINGLY
REVISIONS
REV LTR
DATE OCTOBER 2009
DRAWN SPB
CHECKED SJB
APPROVED TSS
PROJECT TSS
BAKER HYDROELECTRIC PROJECT
BAKER VALLEY IRRIGATION DISTRICT
PROPOSED SITE PLAN
SORENSON ENGINEERING
CONSULTING ENGINEERS
IDAHO FALLS, IDAHO
SCALE 1" =10'
DRAWING NO. D09-1021
SHEET NO. SK-1




SECT THRU TUNNEL ACCESS STAIR & WALKWAY (2 / SK–2)
SCALE: 1" = 1'–0"




SECT THRU BIFURCATION, & WALKWAY (3 / SK–2)
SCALE: 1" = 1'–0"




SECT THRU BIFURCATION, PENSTOCKS, POWER HOUSE & TAILRACE (1 / SK–2)
SCALE: 1" = 10'

ACAD PLOT SCALE 1/10XP

| REVISIONS | REV LTR | DATE | DRAWN | CHECKED | APPROVED | PROJECT |
|---|---|---|---|---|---|---|
| | | OCTOBER 2009 | SPB | SJB | TSS | TSS |

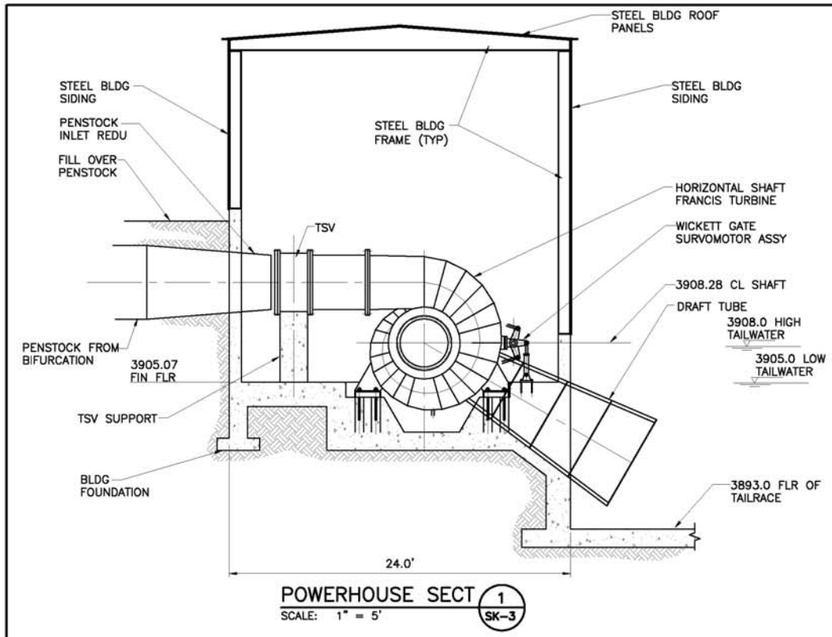
**MASON DAM HYDROELECTRIC PROJECT**
**BAKER VALLEY IRRIGATION DISTRICT**

PRELEMINARY PERMIT DRAWINGS
PROPOSED OUTLET WORKS FEATURES

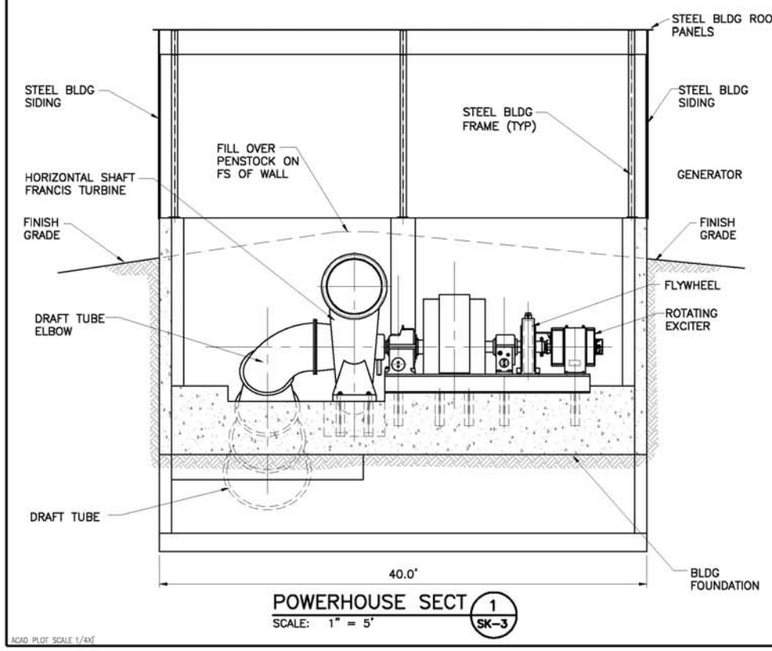
**SORENSON ENGINEERING**
CONSULTING ENGINEERS
IDAHO FALLS, IDAHO

SCALE: 1" = 10
DRAWING NO. D09–1021
SHEET NO. SK–2

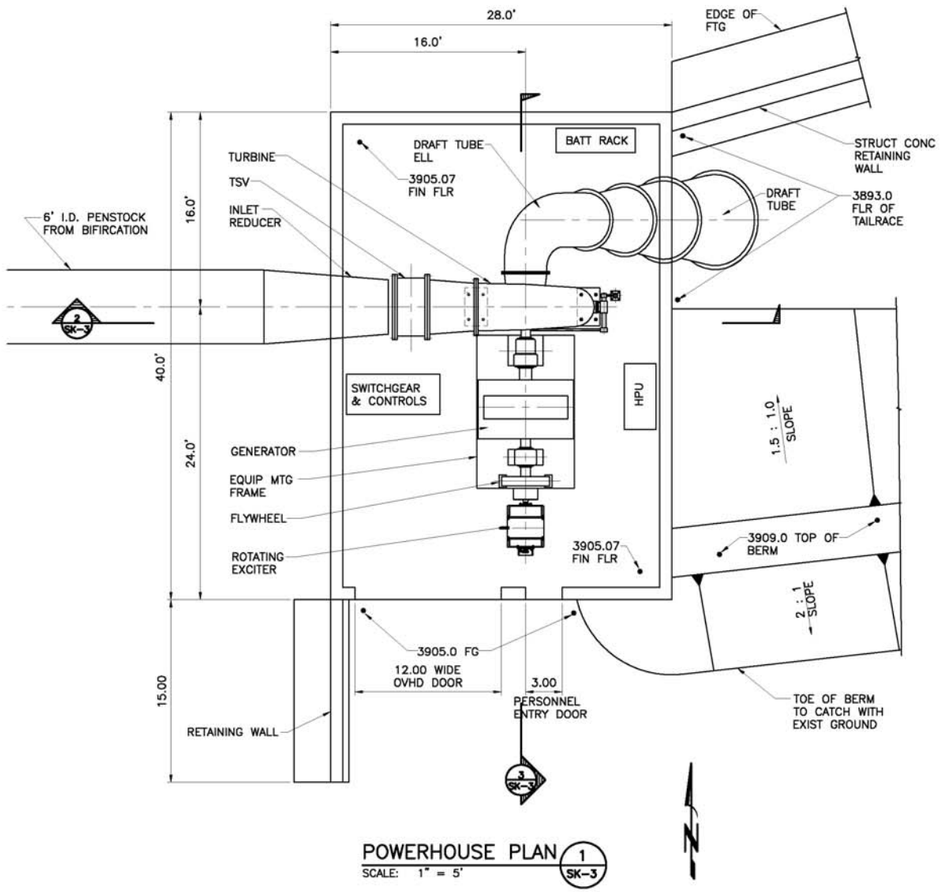
THIS DRAWING SHEET HAS BEEN REDUCED TO ONE–HALF SIZE––REDUCE SCALES ACCORDINGLY




POWERHOUSE SECT 1 / SK-3
SCALE: 1" = 5'




POWERHOUSE SECT 1 / SK-3
SCALE: 1" = 5'




POWERHOUSE PLAN 1 / SK-3
SCALE: 1" = 5'

| REVISIONS | | | |
|---|---|---|---|
| REV LTR | | | |
| DATE | OCTOBER 2009 | | |
| DRAWN | SPB | | |
| CHECKED | SJB | | |
| APPROVED | TSS | | |
| SUBMITTED | TSS | | |

**MASON DAM HYDROELECTRIC PROJECT**
**BAKER VALLEY IRRIGATION DISTRICT**

PRELEMINARY PERMIT DRAWINGS
PROPOSED NEW OUTLET WORKS FEATURES
POWERHOUSE PLAN & SECTIONS

**SORENSON ENGINEERING**
CONSULTING ENGINEERS
IDAHO FALLS, IDAHO

SCALE: 1" = 5'
DRAWING NO. D09-1021
SHEET NO. SK-3

THIS DRAWING SHEET HAS BEEN REDUCED TO ONE-HALF SIZE--REDUCE SCALES ACCORDINGLY

ACAD PLOT SCALE 1/4X