Wallowa Falls Hydroelectric Project

FERC No. P-308

Preliminary Licensing Proposal

October 2013

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

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FERC No. P-308

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
APE	area of potential effect
ARPA	Archaeological Resources Protection Act
BMP	best management practices
BPL	lower bypassed reach
BPU	upper bypassed reach
CFR	Code of Federal Regulations
Corps	Army Corps of Engineers
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CTCR	Confederated Tribes of the Colville Reservation
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DEV	Developed
DEQ	Oregon Department of Environmental Quality
DO	dissolved oxygen
DSL	Department of State Lands
DSSMP	Dam Safety Surveillance and Monitoring Plan
EA	environmental assessment
EFI	East Fork inflow
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
GPS	global positioning satellite
GWh	Gigawatt hours
Ha	hectare
IFIM	instream flow incremental methodology
ILP	Integrated Licensing Process
kVA	Kilovolts
kW	kilowatt
kWh	kilowatt-hour
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NPT	Nez Perce Tribe
NRHP	National Register of Historic Places

ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OHRM	ordinary high water mark
OPRD	Oregon Parks and Recreation Department
ORBIC	Oregon Biodiversity Information Center
PAD	Pre-Application Document
PAG	Plant Association Group
PHABSIM	Physical Habitat Simulation System
PLC	Programmable Logic Control
PLP	Preliminary Licensing Proposal
Psi	pounds per square inch
RHCA	Riparian Habitat Conservation Area
PM&E	protection, mitigation and enhancement
RL	reporting limits
RV	Recreational Vehicle
SCADA	Supervisory Control and Data Acquisition
SCORP	Oregon Statewide Comprehensive Outdoor Recreation Plan
SD	Scoping Document
SHPO	State Historic Preservation Officers
TCP	Traditional Cultural Properties
TDG	total dissolved gas
THPO	Tribal Historic Preservation Officers
USFS	Forest Service
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
VRM	Visual Resource Management
VQO	Visual Quality Objectives
WFC	West Fork confluence
WWNF	Wallowa-Whitman National Forest

Appendices

1.0 INTRODUCTION

1.0 INTRODUCTION

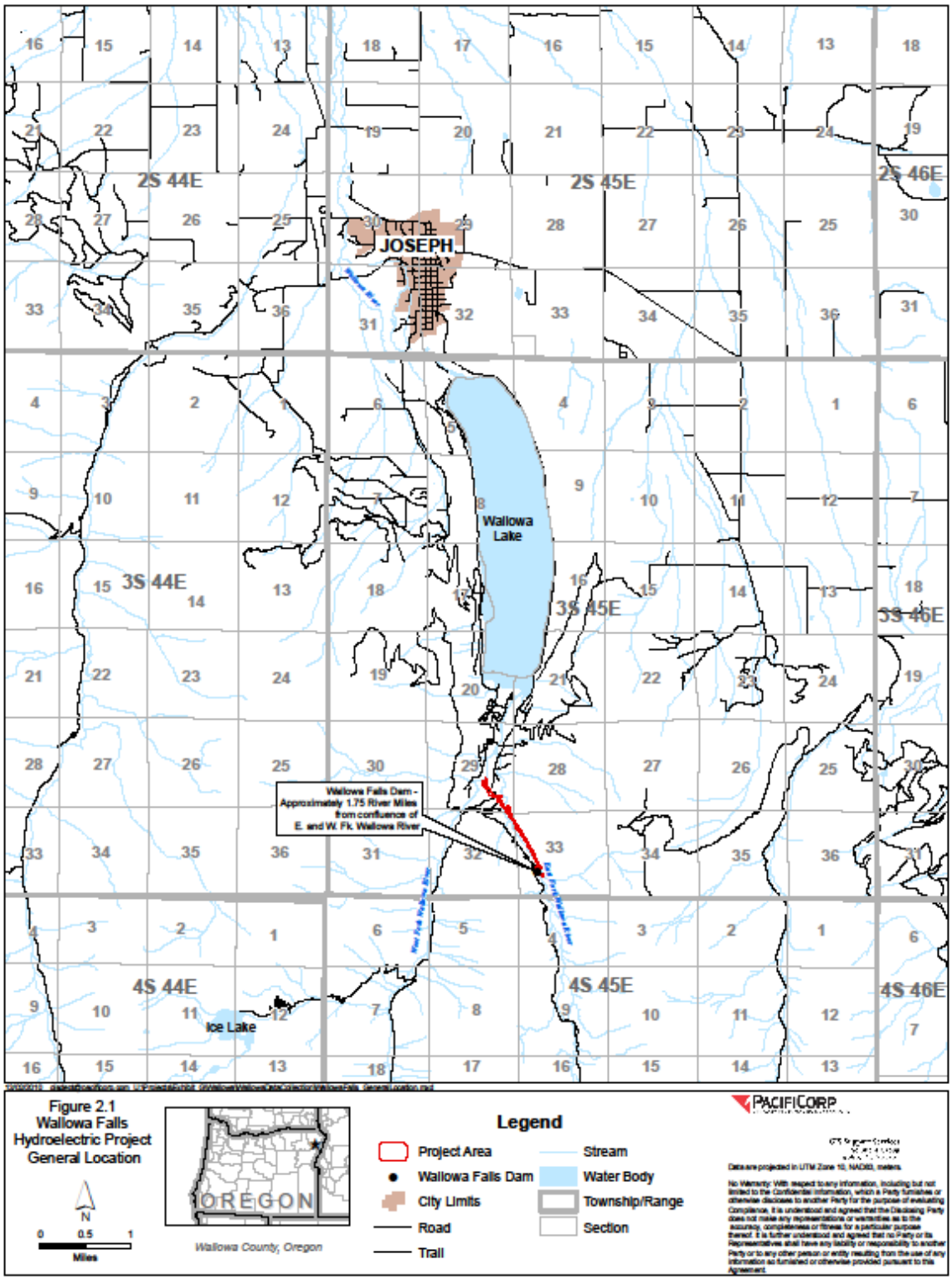
PacifiCorp Energy (PacifiCorp) plans to file an application for subsequent (new) minor license for the Wallowa Falls Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC or Commission) Project No. 308, on the East Fork Wallowa River, West Fork Wallowa River and Royal Purple Creek in Wallowa County, Oregon (Figure 1). The current license will expire on February 28, 2016. The Project has a generation capacity of 1,100 kilowatts (kW) and produces an average of 7,000,000 kilowatt hours (kWh) annually. The current Project boundary occupies 6 acres (2.4 hectares (ha)) of private land owned by PacifiCorp and 12 acres (4.9 ha) of federal land managed by the Wallowa-Whitman National Forest.

PacifiCorp is not proposing any modifications to the Project to increase generation capacity. However, PacifiCorp is proposing to construct approximately 1,000 feet (305 meters (m)) of buried 30-inch (76.2 centimeter (cm)) diameter pipe for the purpose of rerouting the Project tailrace from its current location discharging into the West Fork Wallowa River to the East Fork Wallowa River. This would result in the return of all generation flow to the lower 2,600 feet (793 m) of the fish habitat portion of the bypassed East Fork Wallowa River. The reroute structure would include appropriate energy dissipation and fish protection measures. In addition, PacifiCorp proposes to release 4 cubic feet per second (cfs) as measured just below the dam (at the current FERC "compliance point"). Gaging at the compliance point will be improved to increase flow measurement accuracy. PacifiCorp proposes to amend the Project boundary to include the forebay access road, proposed buried tailrace and other project facilities. The proposed Project boundary occupies 8 acres (3.2 ha) of private land owned by PacifiCorp and 12.5 acres (5 ha) of federal land managed by the Wallowa-Whitman National Forest (WWNF).

1.1 Purpose of the Preliminary Licensing Proposal

This document presents PacifiCorp's Preliminary Licensing Proposal for the continued operation of the Wallowa Falls Project (Project), FERC No. 308, under the terms of a new license. The purpose of a Preliminary Licensing Proposal (PLP) is to present an applicant's or licensee's preliminary proposal for protection, mitigation and enhancement (PM&E) measures that are intended to address the effects of the continued operation of a project on the existing area resources (18 CFR § 5.16). PacifiCorp firmly believes that the measures presented in this PLP fairly address the multiple requirements of the Project; to provide instream flows below the Project that protect and sustain aquatic species and habitat and balance power and non-power resources while providing a reliable power source to PacifiCorp's electric customers.

Figure 1. Location of the Wallowa Falls Hydroelectric Project, FERC No. 308, Oregon



The PM&E measures presented in this document reflect PacifiCorp's proposals for the term of a new license. PacifiCorp began the licensing process in 2011 and since that time has been conducting studies and consulting with stakeholders on measures that best address the continued effects of Project operation on natural and social resources in the Project area. While there appears to be consensus on a number of the measures described and evaluated in Sections 2.0 and 3.0 of this document, others may be considered as works-in-progress. Consultation with the stakeholders will continue as the parties attempt to reach agreement on all issues and measures prior to filing a Final License Application with the Federal Energy Regulatory Commission (Commission) in February 2014. This PLP meets the requirement of 18 CFR § 5.16 relating to Commission's Integrated Licensing Process (ILP) and is organized in sections as described below.

- Section 1.0 INTRODUCTION
- Section 2.0 PROPOSED ACTION and ALTERNATIVES
- Section 3.0 ENVIRONMENTAL ANALYSIS
- Section 4.0 LITERATURE CITED

Within each subsection of Section 3.3 – Proposed Action, the existing environment is described, effects of continuing Project operations on each resource area identified, and the benefit of each measure analyzed. This PLP document lays the foundation for continuing consultation with stakeholders on those issues and measures not yet resolved, and for the environmental exhibit (Exhibit E) of the Final License Application.

1.2 Process Plan and Schedule

PacifiCorp is following the Integrated Licensing Process (18 CFR Part 5) for relicensing the Project. The Integrated Licensing Process is intended to streamline the Commission's licensing process by providing a predictable, efficient, and timely licensing process that continues to ensure adequate resource protections. Table 1 presents a schedule and milestones for pre-application filing activities. Completed activities are highlighted in green.

PacifiCorp formally initiated the relicensing process for the Project on February 23, 2011 by filing a Notice of Intent to seek a new operating license and a Pre-Application Document (PAD) describing the existing Project and environment. Over the ensuing two years, PacifiCorp has conducted 20 studies to investigate the potential effects of continuing operation of the Project on natural, cultural, and social resources, held numerous stakeholder meetings, and developed protection, mitigation and enhancement (PM&E) measures (see Sections 2.0 and 3.0) to address the potential effects of ongoing Project operation.

Table 1. Pre filing Schedule and Milestones for the Integrated Licensing Process for Wallowa Falls.

Responsible Party	Pre-Filing Milestone	Date	FERC Regulation
PacifiCorp	File NOI/PAD with FERC	2/23/11	5.5, 5.6
FERC	Issue Notice of Proceeding Commencement & Scoping Document 1	4/24/11	5.8
FERC	NEPA Scoping Meetings	5/24/11	5.8(b)(viii)
All Stakeholders	NOI/PAD/SD1 comments due to FERC	6/23/11	5.9
FERC	Issue SD2	8/7/11	5.2
PacifiCorp	File Proposed Study Plan with FERC\Stakeholders	8/7/11	5.11(a)
PacifiCorp	Proposed Study Plan Meeting	9/6/11	5.11(e)
All Stakeholders	Study Plan Comments Due to FERC	11/5/11	5.12
PacifiCorp	File Revised Study Plan with FERC\Stakeholders	12/5/11	5.13(a)
All Stakeholders	Revised Proposed Study Plan Comments Due to FERC	12/20/11	5.13(b)
FERC	Issue Director's Study Plan Determination	1/4/12	5.13(c)
FS, FWS, Oregon DEQ	No Study Disputes Filed with FERC	1/24/12	5.14(a)
PacifiCorp	First Study Season	2012	5.15(a)
PacifiCorp	File Initial Study Report	1/3/13	5.15(c)
PacifiCorp	Initial Study Report Meeting	1/18/13	5.15(c)(2)
PacifiCorp	File Initial Study Report Meeting Summary	2/2/13	5.15(c)(3)
All Stakeholders	No Study Disputes/Request to Modify Study Plan Filed with FERC	3/04/13	5.15(c)(4)
PacifiCorp	Second Study Season	2013	5.15
PacifiCorp	File Updated Study Report	1/3/14	5.15(f)
PacifiCorp	Hold Updated Study Report Meeting	1/18/14	5.15(f)
PacifiCorp	File Updated Study Report Meeting	2/2/14	5.15(f)
All Stakeholders	Study Disputes/Request to Modify Study Plan Due	3/4/14	5.15(f)

Responsible Party	Pre-Filing Milestone	Date	FERC Regulation
All Stakeholders	Responses to Disputes/Study Requests	4/3/14	5.15(f)
FERC	Director's Study Plan Determination	5/3/14	5.15(f)
PacifiCorp	File Preliminary Licensing Proposal	10/1/13	5.16(a)
All Stakeholders	File Comments on Preliminary Licensing Proposal	12/30/13	5.16(e)
PacifiCorp	File License Application	2/28/14	5.17
PacifiCorp	Issue Public Notice of License Application Filing	3/14/14	5.17(d)(2)
	Current FERC License EXPIRES	**2/28/16**	

Lines shaded in blue may not be applicable if there are no study disputes.

Following the distribution of PacifiCorp's PLP by October 1, 2013, all stakeholders and interested parties will have 90 days, until December 30, 2013, to file with the FERC comments on the proposed PM&Es described and analyzed in the document. All comments will be evaluated and reflected in the Final License Application, either by incorporation of a recommendation into the body of the document, or by an explanation of the reason the recommendation was not adopted. PacifiCorp envisions continuing to work with stakeholders to resolve issues and identify mutually acceptable PM&E measures during the 90-day PLP review and comment period, and beyond as needed.

Following filing of the Final License Application by February 28, 2014, the FERC will undertake its review of the information in accordance with the Federal Power Act, National Environmental Policy Act (NEPA), and other federal laws relevant to the relicensing of a hydroelectric project. The FERC's preliminary plan and schedule for the post-filing activities is shown in Table 2.

Table 2. Wallowa Falls Post-filing Schedule and Milestones for Integrated Licensing Process

Responsible Party	Post-Filing Milestone	Date	FERC Regulation
PacifiCorp	File License Application	2/28/14	5.17
All Stakeholders	Any Disputes/Requests to Amend Study Plan Due	3/4/14	5.15(f)
PacifiCorp	Issue Public Notice of License Application Filing	3/14/14	5.17(d)(2)
FERC	Issue Public Notice of License Application Filing (Tendering Notice)	3/14/14	5.19

Responsible Party	Post-Filing Milestone	Date	FERC Regulation
FERC	Director's Determination on Any Additional Study Requests and Notification of any Deficiencies	3/30/14	5.19(e); 5.20(a)(2)
All Stakeholders	Responses to Disputes/Amendment Requests Due	4/3/14	5.15(f)
FERC	Issue Public Notice Accepting Application and Ready for environmental Analysis (REA)	4/29/14	5.22
FERC	Director's Determination on Disputes/Amendments	5/3/14	5.15(f)
All Stakeholders	Comments/ Interventions, 10(a) Recommendations Due	6/28/14	5.23(a)
Agencies	10(j) Recommendations; 4(e) Terms and Conditions; Fishway Prescriptions Due	6/28/14	5.23(a)
PacifiCorp	Request 401 Water Quality Certification from Ecology	6/28/14	5.23(b)
PacifiCorp	Reply Comments Due	8/12/14	5.23(a)
FERC	Issue Environmental Assessment	10/26/14	5.24
Agencies	Modified Terms and conditions Due	1/24/15	5.24(d)
FWS/NMFS	ESA Biological Opinion As Needed	30/10/15	ESA
FERC	Issue License Order	3/25/15	FPA

1.3 Public Review and Comment

This PLP is being provided to participating agencies, tribes, NGOs, and the public for review and comment. As required by 18 CFR § 5.16(e), comments must be filed no later than ninety (**90) days** from the issuance date of the PLP. Comments to the Commission should be sent to the following:

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

A copy of comments sent to the Commission should also be sent to PacifiCorp at the following address:

Russ Howison
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825 NE Multnomah, Suite 1500
Portland, OR 97232
503-813-6626

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2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 No-action Alternative

2.1.1 Existing Project Facilities

The Project was initially constructed in 1921 by the Enterprise Electric Company with a generating capacity of 800 kilovolts (kVA). The original license was issued on June 27, 1924 and expired on March 31, 1974. On October 19, 1928 the Commission approved the transfer of the license to the Inland Power and Light Company. By order dated November 23, 1942, the Commission approved the transfer of the license from Inland Power and Light Company to Pacific Power and Light Company[1]. At the time of completion, the Project replaced several small generation sources in the Wallowa Valley and was connected to an existing transmission line servicing the communities of Joseph, Enterprise, Lostine and Wallowa. By order issued April 8, 1929 the Commission amended the license to include the construction of minor Project works for the diversion of water from Royal Purple Creek. In 1967 the original generator was replaced with a new 1,375 kVA (1,100 kW) unit which is still in service. By order dated March 29, 1976 the Commission issued a new license for the Project for a period of ten years. The current license was issued on August 28, 1986 for a period of thirty years. Detailed maps showing lands and waters within the proposed Project boundary, land ownership and Project facilities are provided in Appendix A.

The existing Project consists of:

[1] Pacific Power and Light Company is a prior company name of PacifiCorp Energy.

(1) a 2-foot-high (0.6 m), 9-foot-long (2.7 m) concrete diversion dam, having a 1-foot-wide (0.3 m) spillway, at elevation 5,838 feet (1.780 m) on Royal Purple Creek which is a tributary to the East Fork Wallowa River;

(2) a 240-foot-long (73.1 m), 8-inch (20.3 cm) diameter pipeline (120 feet of wood-stave pipe and 120 feet of PVC pipe) conveying water from the Royal Purple diversion to the Wallowa Falls forebay, 200 feet (61 m) upstream of the East Fork Wallowa River dam;

(3) an 18-foot-high (5.5 m), 125-foot-long (38.1 m), buttressed rock-filled timber crib dam with impervious gravel and asphalt core, having a 30-foot-wide (9.1 m) spillway, at elevation 5,795 (1,766 m) feet on the East Fork Wallowa River;

(4) a 0.2-surface-acre (0.08 ha) forebay;

(5) a partially enclosed power intake structure containing a 24 by 24-inch square (61 x 61 cm) sluice gate (headgate). The three-sided concrete intake enclosure prevents damage to the headgate from rocks, sediment, and other debris. Water to be used for generation flows over the top of the enclosure through an inclined steel trash rack;

(6) a low level sluiceway consisting of a vertical steel trash rack, a 24-inch (61 cm) cast iron canal gate (sluice gate), and a 24-inch (61 cm) steel pipe that passes through the dam. The sluiceway is located adjacent to the power intake structure and continually provides 0.8 cfs of in-stream flow through a 3-inch (7.6 cm) nipple affixed into the center of the gate;

(7) a 5,688-foot-long (1,734 m) steel penstock running from the power intake structure through the dam to the powerhouse. The penstock constricts from 24-inch (61 cm) to 18-inch (45.7 cm) in a transition section immediately below the intake head gate. The majority of the penstock is buried with two small above ground sections supported on timber crib trestles. Heading down slope from the dam the 18-inch (45.7 cm) diameter steel pipe is buried until it transitions to aboveground approximately 400 pipe feet (122 m) below the dam. The elevated section of pipe is approximately 150 feet (46 m) long and sits on a timber crib trestle structure. Continuing down slope the penstock is buried. At approximately 3,000 feet (915 m) down slope from the dam the penstock reduces to a 16-inch (40.6 cm) diameter pipe for the remainder of its length to the powerhouse. At approximately 4,500 feet (1,372 m) below the dam the penstock crosses the East Fork Wallowa River on an elevated timber crib trestle. This section of elevated pipe is approximately 90 feet (27 m) in length. The remainder of the penstock is buried to the powerhouse. The lower and upper penstock trestles were completely re-built in 1999 and 2000 respectively;

(8) a powerhouse containing a single generating unit with a rated capacity of 1,100 kW operating under a head of 1,168 feet (356 m) producing an average annual energy output of 7.0 GWh;

(9) a 2,000 foot-long (610 m), unlined tailrace discharging Project flows into the West Fork Wallowa River; and,

(10) a 20-foot-long (7 m), 7.2-kilovolt (kV) transmission line which connects to Wallowa Falls substation.

The normal maximum water surface area and normal maximum water surface elevation (mean sea level), and gross storage capacity of the Project impoundment (forebay) is:

Area – 0.2 Acre Maximum
Elevation – 5,792-ft (spillway), 5,795-ft (dam crest)
Storage – Effectively none as the Project is operated as "run-of-the-river" with no peaking or flood control capability.

The number, type, and minimum and maximum hydraulic capacity and installed (rated) capacity of the turbines or generators include:

Generator: One 1,375 kVA Allis-Chalmers Company synchronous generator rated at 80% power factor, 514 rpm, three-phase, 60 cycles, and 7200 volts.

Minimum Hydraulic Capacity: Turbine can be manually operated to 0 kW\0 cfs. During standard operation (automated mode) minimum capacity is approximately 200kW\3 cfs.

Maximum Hydraulic Capacity: 17.8-cfs

Turbine: One 48-inch (122 cm) diameter, 1,500 hp, George J. Henry Jr. impulse turbine with motorized needle valve. The turbine runner (pelton wheel) was replaced in 1996, with a unit manufactured by Canyon Industries.

Transmission: A 20-foot-long (6.1 m), 7.2-kilovolt (kV) transmission line connects the powerhouse to the Wallowa Falls substation and is the only transmission line included in the Project. A 6.7 mile-long (10.8 kilometer (km)), 23 kV line connects the Wallowa Falls substation with Pacific's Enterprise Substation. An additional 2-mile-long (3.2 km) transmission line interconnects this facility with the 230 kV transmission grid at Pacific's Hurricane Substation.

The estimated dependable capacity is 505 kW. The average annual generation is 7,000,000 kWh. The average monthly generation is 502,000 kWh.

The State of Oregon has not made a navigability determination on the Wallowa River or its tributaries. However, the portions of the East Fork Wallowa River and Royal Purple Creek within the Project area appear too shallow or not wide enough to allow a boat to pass or to transport commercial timber. Therefore, PacifiCorp believes the East Fork Wallowa River and Royal Purple Creek are non-navigable.

During the current license term PacifiCorp made the following capital improvements to the Project dam structure and access:

In 1994 PacifiCorp completed a rebuild of the dam. The original timber crib dam was modified by the addition of a rock fill toe and embankment and the construction of an impervious gravel and asphalt core between the existing timber crib and the embankment rock fill. The spillway was widened from its original design width of 24-feet (7.3 m) to 30-feet (9.1 m) which increased its capacity by approximately 50 percent. The side walls of the spillway were constructed of rock filled gabion baskets and the full width and length of the spillway was sheathed with steel aircraft landing mats. A 3-foot (0.9 m) wide structural aluminum footbridge with railing was constructed to span to 30-foot (9.1 m) spillway.

For the dam rebuild Project PacifiCorp constructed a dirt access road to the forebay along the east side of the East Fork Wallowa River. The new access road roughly follows the alignment of the original penstock construction trail. Two pedestrian foot bridges crossing the East Fork Wallowa River between the new access road and Forest Service Trail 1804 were also constructed. By order received September 18, 1995 the Commission approved PacifiCorp's revised Exhibit F-2 and F-4 for the diversion dam and forebay access road respectively.

The Exhibit G for the Project was never revised to include the forebay access road in the Project boundary. The approved Exhibit G for the Project is provided in Appendix B. Additionally, other Project features including the forebay access road, portions of the existing tailrace, and the proposed tailrace are not in the current Project boundary. It is PacifiCorp's assumption that the Project boundary under the new license will include the forebay access road and other appropriate Project features. PacifiCorp therefore treated existing features such as the forebay access road as though they are within the Project area in conducting the relicensing studies. Additional studies of resource conditions in the vicinity of the proposed tailrace are warranted.

The bypassed portion of the East Fork Wallowa River within and near the Project area is approximately 1.75 miles (2,800 m) long from the Project diversion dam to its confluence with the West Fork Wallowa River. Gradient in this reach is high, with the upper 1 mile (1,600 m) averaging 19 percent and the lower .75 mile (1,200 m) averaging 8.5 percent. Channel morphology within most of the upper reach is dominated mainly by steep bedrock, vertical waterfalls, and cascades over boulders; though the upper reaches are steep, the lower .5 mile (800 m) to the confluence with the West Fork is a shallower gradient consisting of numerous riffles and pools. Over the course of its length, the bypassed East Fork Wallowa River drops approximately 1,200 feet (365 m) from the dam to the confluence with the West Fork Wallowa River.

The East Fork Wallowa River is a snowmelt runoff stream. As such snow acts as an important flow regulator or storage mechanism, holding a significant proportion of the precipitation in the area during the winter and releasing it later in the year as it melts. Peak runoff occurs generally from May through mid-July, from melting snowpack. By late July, little snow is left in the Wallowa Mountains. Runoff recedes to low flows by August and

September. Flows may increase in fall in response to autumn rains, but relatively low flows generally persist from late fall through winter due to freezing conditions in the contributing high-elevation watershed areas, which result in little or no direct runoff during this time.

As explained in the PAD (PacifiCorp 2011), historic flow information for the Project area is largely confined to USGS stream flow data gathered at two locations in the Project vicinity over a 58-year period from October 1924 through September 1983. The two historic USGS gages were located in the Project tailrace (USGS Station 13324500) and in the East Fork one quarter mile (402 m) upstream of the confluence with the West Fork (USGS Station 13325000). The USGS also developed flow data for a third "reporting station" (USGS Station 13325001) that is a summation of data collected at the two gage sites. The data for the reporting station (USGS Station 13325001) represents the best data available for characterizing the hydrology of the East Fork in the Project vicinity.

Based on the 58-year period of record, average monthly minimum flows in the East Fork ranged from 7.7 cfs in March to 25.2 cfs in June, and average monthly maximum flows ranged from 14.6 cfs in March to 142.2 cfs in June. Average mean monthly flows in the East Fork ranged from 11 cfs in February and March to 61 cfs in June. During the period of record, monthly flows met or exceeded 10 cfs 90 percent of the time, 14 cfs 50 percent of the time, and 45 cfs 10 percent of the time.

Additional flow information is being collected in the East Fork in the Project vicinity as part of the Water Resources study. This additional information is being processed and will be included in the final Water Resources Technical Report in January 2014.

2.1.2 Project Safety

The Project has been operating for more than 27 years under the existing license. During this time, Commission staff has conducted periodic environmental compliance and operational safety inspections focused on ensuring that Project operations are within the terms of the license, and that the condition of the Project structures and routine maintenance conducted continue to ensure the safety of the public. As part of the relicensing process, Commission staff will continue to evaluate the adequacy of proposed Project facility changes under a new license. Special articles may be included in a new license issued, as appropriate. Commission staff would continue to inspect the Project during the new license term to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction, operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The Wallowa Falls Hydroelectric Project is operated as a run-of-the-river Project. The current license does not specify any daily/seasonal ramping rates, flushing flows, reservoir operations, or flood control operations. Following the installation of an automated control system in 1996 the Wallowa Falls plant is now designed for unmanned operation and is

controlled by a programmable logic controller. The normal mode of operation is for the plant to be unattended. A local Project operator is located in Enterprise, Oregon and visits the Project on a monthly basis and as called out by PacifiCorp's Hydro Control Center located in Ariel, Washington. The Hydro Control Center monitors the Project operations remotely and notifies the local operator when an issue arises. Prior to 1996 the Project was manually operated locally. In 1996, an automated control system was installed at the Project. The penstock pressure, generator load, forebay level, needle valve percent open position, generator stator temperature and front bearing temperature are all now monitored by the Supervisory Control and Data Acquisition (SCADA) system at the Wallowa Falls plant and are visible remotely to a Hydro Control Operator at the Hydro Control Center.

During most unit outage scenarios, the penstock headgate will remain open and the Project tailrace channel will remain watered up. Under all conditions of a forced unit outage (unit trip), a turbine needle valve will automatically close to a forty percent open position[2] and a deflector plate will engage to redirect the flow away from the turbine buckets and into the tailrace. The forty percent open position of the needle valve allows approximately 6 cfs of water to bypassed the turbine and flow through the draft tube providing a continuous flow into the tailrace channel. As discussed above, an automated control system was installed at the Project in 1996 and the headgate control system was further modified in 2000. The normal mode of operation is for the plant to be unattended. The Programmable Logic Control (PLC) controls the shutdown relay on the generator unit. Fault shutdowns of the generating unit are automatic. However, there is no generator protection control or feedback control scheme on the penstock headgate in the PLC routine for the Wallowa Falls powerhouse. This means that switchyard trips or line frequency trips result in a generator unit trip but do not result in a headgate closure.

There are two conditions that will initiate a generator lockout, a headgate closure and the complete dewatering of the penstock and tailrace channel; loss of voltage to the gate control cable or a 'low penstock pressure' indication. As a result of the FERC mandated modifications, in 2000 a continuously energized solenoid valve was installed at the headgate and the powerhouse control system was modified to automatically close the headgate in the event that voltage is removed from the gate control cable. If voltage is removed from the cable due to a loss of power or damage to the wiring, the solenoid valve that operates the headgate is designed to release the oil from the cylinder whereby the weight of the headgate will cause it to drop to the closed position. The control system, as originally installed in 1996, will also automatically close the headgate in the event of a 'low penstock pressure' indication. A low penstock pressure indication would be the result of a penstock failure or a restricted inflow condition at the forebay intake caused by turbine outflow exceeding inflow. A pressure relay at the powerhouse senses any change in penstock pressure. If penstock pressure drops to approximately 430 pounds per square inch (psi), an alarm will be relayed to a Hydro Control Operator, located at the Hydro Control Center in Ariel Washington, who can make adjustments to correct a problem without a headgate closure. Any drop in penstock pressure below approximately 375 psi, such as a penstock rupture, triggers an automated

[2] Based on local plant operator knowledge.

signal to the headgate causing it to close and the unit to trip and lockout. In either of these scenarios, the headgate closes, the needle valve closes to a forty percent open position, the deflector plate engages, and the volume of the penstock drains through the generating unit over the course of approximately two hours, resulting in the dewatering of the Project tailrace. Additionally, debris in the needle valve, nozzle or damage to the turbine requires the headgate be closed to allow for clearing of debris or equipment repair.

The penstock pressure, generator load, forebay level, needle valve percent open position, generator stator temperature, and front bearing temperature are all monitored by the SCADA system at the powerhouse and are visible to a Hydro Control Operator at the PacifiCorp Hydro Control Center located in Ariel, Washington. Once the headgate at the forebay closes, it must be opened manually by a local operator at the forebay.

PacifiCorp has reviewed its records of forced outages for the Wallowa Falls generating unit for the period of March 1, 1986 through July 30, 2011. The results of that review were provided to the FERC in a letter dated August 8, 2011 titled Wallowa Falls Hydroelectric Project Outage Report from 3/1/1986 through 7/31/2011 (PacifiCorp, 2011). All forced outages greater than fifteen minutes were reported. The report provides each forced outage start date and time, the cause of the outage, an explanation of what occurred, and the outage end date and time. As explained above, under all generating unit trip conditions, with the exception of a loss of voltage to the headgate control cable, 'low penstock pressure indication' or an unanticipated malfunction at the headgate (e.g. lightning strike), water continues to flow, at approximately 6 cfs, past the turbine into the powerhouse tailrace channel. Any forced outages, and their durations, that resulted in a headgate closure are reported. Once the headgate closes at the forebay, it takes approximately two hours for the tailrace channel to completely dewater, and it will remain dewatered until the headgate is manually opened and the unit brought back online. Since the headgate control modifications became functional in 2000, approximately 31 headgate closures have been recorded due to forced outages.

Annual Project maintenance is routinely conducted between June and September each year and involves vegetation management on Project lands, erosion control or road maintenance activities and as-needed maintenance on the water conveyance system and generating unit. The timing and scope of annual maintenance activities are coordinated with the Wallowa-Whitman National Forest as provided in the Special-Use Permit issued for the Project by the U.S. Department of Agriculture, Forest Service (Forest Service). Throughout the history of the hydroelectric project native sediment has been routinely flushed past the Wallowa Falls dam during high runoff events and routine forebay flushes. Forebay flushes have historically occurred during annual maintenance, usually in the months of July or August during low flow conditions so as to allow the forebay to completely drain via the low level sluiceway pipe.

2.1.4 Existing Environmental Measures

The current license includes the following three articles which are considered environmental measures:

Article 401. The licensee shall maintain in the bypassed reach of the East Fork Wallowa River a continuous minimum flow of 0.5 cfs as measured immediately downstream from the dam or inflow to the reservoir, whichever is less, for the protection of fish and wildlife resources in the East Fork Wallowa River. This flow may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee and the Oregon Department of Fish and Wildlife.

Compliance for minimum stream flows is measured by a rated staff gage and level logger located in the bypassed reach of the East Fork Wallowa River directly below the diversion dam (FERC-compliance gage). Annual stream flow reports are submitted to the FERC and flows are reported as a daily average. PacifiCorp maintains minimum flows through a release of water from a low level sluice gate at the dam.

Article 402. The licensee shall restrict Project forebay flushing to the period from May 1 to August 30 of each year to protect Kokanee eggs and sac fry in the gravel areas above Wallowa Lake.

The current license does not specify any daily/seasonal ramping rates, flushing flows, reservoir operations, or flood control operations. As discussed in Section 2.1.3 above, PacifiCorp has flushed the Project forebay to reduce sediment build-up on a routine basis throughout the history of the Project.

Article 403. The licensee, before starting any ground-disturbing or land-clearing activities within the Project boundaries, other than that specifically authorized in this license, shall consult the Oregon State Historic Preservation Officer (SHPO) about the need for a cultural resources survey and salvage work. The licensee shall file with the Commission documentation of the management plan and a schedule to conduct the necessary investigation, together with a copy of a letter from the SHPO commenting on the plan and schedule, 60 days before starting any such ground-disturbing or land-clearing activities. The licensee shall make funds available in a reasonable amount for the required work. If the licensee discovers any previously unidentified archeological or historic sites during the course of constructing or developing Project works or other facilities at the Project, the licensee shall stop all construction and development activities in the vicinity of the sites and shall consult a qualified cultural resources specialist and the SHPO concerning the eligibility of the sites for listing in the National Register of Historic Places and any measures needed to avoid the sites or to mitigate effects on the sites. If the licensee and the SHPO cannot agree on the amount of money to be spent for Project specific archeological and historical purposes, the Commission reserves the right to require the licensee to conduct the necessary work at the licensee's own expense.

The majority of ground disturbing and land clearing activities within the Project boundaries conducted under the current license have been minor operation and maintenance disturbances

authorized in the license. The SHPO was consulted for the 1994 dam rebuild project and a pedestrian survey was conducted. A detailed discussion of the survey effort and results is provided in the Wallowa Falls Hydroelectric Project, FERC No. P-308, Study Progress Report (Draft Technical Report), Cultural Resources (PacifiCorp. 2012a).

Additional measures voluntarily provided by PacifiCorp at the Project include the following:

(1) Pacific Park, a 8 unit campground along the Project tailrace on lands owned by the company. Portions of the campground are outside the current Project boundary;

(2) The Project forebay access road provides public access to the bypassed reach and forebay on National Forest and company lands, and receives some hiking and equestrian use. As stated in Section 2.2.1, the majority of the forebay access road is outside the current Project boundary;

(3) There are a number of other user-defined trails on PacifiCorp property immediately adjacent to the Project but outside of the current Project Boundary.

2.2 Applicants Proposal

2.2.1 Proposed Project Facilities

PacifiCorp proposes to modify the Project tailrace by re-routing it from its current configuration discharging into the West Fork Wallowa River by constructing a buried 30-inch (76.2 cm) diameter, approximately 1,000-foot long (305 m), pipe discharging into the bypassed reach of the East Fork Wallowa River. The new tailrace pipeline will convey the full powerhouse discharge, from the powerhouse tailrace to the East Fork of the Wallowa River. The conveyance pipeline will consist of a reinforced concrete intake structure, buried pipeline, and reinforced concrete outfall structure. The intake structure will include an isolation gate at the pipeline entrance and overflow channel leading to the existing tailrace channel for maintenance and emergency overflow purposes. The outfall structure will include a drop structure or velocity barrier to prevent all fish species and life stages from entering the pipeline. A set of draft design drawings of the tailrace reroute are provided in Appendix C.

The existing tailrace channel, which discharges to the West Fork Wallowa River, will be retained for use as an emergency spillway. The main channel of the tailrace that currently cuts through Pacific Park on the south side of the park road will be retained and possibly deepened to handle the full generation flow. The braided tailrace side channels on the north side of the park road will be reclaimed and restored to match surrounding contours.

PacifiCorp proposes to revise the Project boundary to include the proposed tailrace alignment and other appropriate Project features that are not in the current boundary such as the Royal Purple diversion and forebay access road. The proposed Project boundary occupies 8 acres (3.2 ha) of private land owned by PacifiCorp and 12.5 acres (5 h) of federal land managed by

the Wallowa-Whitman National Forest. Maps showing the proposed Project boundary are provided in Appendix A.

2.2.2 Proposed Project Operation

The Project would continue to be operated in run-of-river mode during all times of generation. The automated control system equipment would be set to divert no more than PacifiCorp's water right of 16 cfs, from the East Fork Wallowa River.

It is necessary to flush accumulated native sediment form the Wallowa Falls Hydroelectric Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. PacifiCorp proposes to modify the historic practice of flushing entrained native sediment from the forebay during the summer low flow period to flushing sediment from the forebay during the peak-spring runoff in the month of June. Annual forebay flushing would result in the removal of accumulated sediment from forebay and the mobilization and transport of that sediment into the bypassed reach of the East Fork Wallowa River. Based on a volumetric survey of native sediment entrained in the forebay in August 2012, conducted by Haner, Ross and Sporseen, P.C, approximately 250 to 500 cubic yards of native material would be flushed annually.

The proposed tailrace reroute will be used for the discharge of all generation flows to the East Fork Wallowa River under normal operating conditions. However, the existing tailrace channel, which discharges to the West Fork Wallowa River, will be used as an emergency spillway in the event that there is an operational failure of the tailrace pipeline.

2.2.3 Proposed Environmental Measures

2.2.3.1 Construction

The following general measures will be implemented for proposed construction actions.

- Obtain all necessary local, state and federal permits.

- To the extent practical, developed areas (e.g., existing roadways and parking areas) will be utilized for access and materials/equipment staging.

- Erosion and pollution control measures will meet or exceed best management practices (BMPs) and other performance standards contained in the applicable state and federal permits.

- BMPs prescribed for equipment fueling, maintenance, storage, spill prevention, and control will follow procedures prescribed in the Oregon Department of Environmental Quality (DEQ) Erosion and Sediment Control Manual (Appendix D – Non-Stormwater Pollution Control BMPs).

- A location for generator and equipment refueling will be designated prior to the start of sluicing activities. The location will be away from the waterway, on level and stable ground, as practicable. An appropriate containment vessel or technique will be utilized when refueling to catch spills or leaks.

- All vehicles and equipment on site will be monitored for petroleum leaks and receive regular preventive maintenance to reduce the chance of leakage.

- Petroleum products will be stored in tightly sealed containers which are clearly labeled.

- Spill cleanup materials will be stored on-site inside the existing storage shed. In the event that a spill occurs, maintenance staff will contain and clean the spill immediately, and dispose of contaminated soils appropriately. Any applicable regulatory procedures will be observed.

- PacifiCorp shall ensure that any fill materials that are placed for the proposed habitat improvements in any water of the state do not contain toxic materials in toxic amounts.

- All disturbed soils will be graded and revegetated.

- Work areas behind temporary cofferdams or isolated work areas below the ordinary high water mark (OHWM) will be dewatered with pumps. All pumped water will be discharged to unsaturated upland vegetated areas for infiltration.

- All water intakes used for a construction project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated, and maintained according to National Marine Fisheries Service (NMFS) fish screen criteria.

- Before and intermittently during pumping to isolate an in-water work area, attempt to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury. The entire capture and release operation will be conducted or supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all Endangered Species Act (ESA) listed fish. The work will comply with the requirements in the U.S. Fish and Wildlife Service (USFWS) biological opinion issued with the new license and PacifiCorp's State Scientific Collection Permit issued by Oregon Department of Fish and Wildlife (ODFW).

- All construction debris shall be properly disposed of on land so that the debris cannot enter the waterway or cause quality degradation of state waters. Retention areas, swales or impoundments will be used to prevent discharge of water from construction staging areas.

Environmental effects and resource protection measures are discussed in greater detail in the following resource specific sections.

2.2.3.2 Operation

PacifiCorp Proposes to:

- Operate the Project releasing a year-round minimum in-stream flow of 4 cfs as measured at the FERC-compliance gage immediately below the dam, or inflow, whichever is less;

- Improve the gaging equipment at the in-stream flow compliance point to increase flow measurement accuracy;

- Incorporate a routine geologic hazard assessment into the Dam Safety Surveillance and Monitoring Plan (DSSMP) for the Wallowa Falls Project. The assessment will be performed by a qualified geotechnical and/or engineering geologist and will evaluate the condition of known hazards and identify any new hazards that may have developed. The assessment will be submitted to the Division of Dam Safety and Inspections and will be accompanied by a plan and schedule to address any hazards that represent a tangible threat to Project features and/or public safety.

2.2.3.3 Geology, Sediment and Substrate

PacifiCorp proposes to:

- Implement BMPs for sediment and erosion control during Project construction activities (as listed above under measures for Construction);

- Implement a sediment management program for forebay maintenance flushing;

- Incorporate a routine assessment of geologic hazards at the Project into PacifiCorp's DSSMP for the Project.

2.2.3.4 Water Resources

PacifiCorp Proposes to:

- Implement BMPs for sediment and erosion control during Project construction activities (as listed above under measures for Construction);

- Operate the Project with increased instream flow releases in the bypassed reach (release 4 cfs as measured at the compliance gage below the dam and full powerhouse flow at the point of tailrace reroute discharge);

- Implement a Project flow monitoring program;

- Implement a sediment management program for forebay maintenance flushing;

- Implement a monitoring plan associated with forebay maintenance flushing.

2.2.3.5 Fish and Aquatic Resources

PacifiCorp Proposes to:

- Implement BMPs for sediment and erosion control during Project construction activities (as listed above under measures for Construction);

- Reroute the Project tailrace from its current location discharging into the West Fork Wallowa River to the East Fork Wallowa River. This would result in the return of all generation flow to the lower 2,600 feet (792 m) of the fish habitat portion of the bypassed East Fork Wallowa River. This will improve aquatic habitat in the affected portion of the bypassed reach and eliminate the potential to strand or dewater aquatic species in the existing Project tailrace;

- Operate the Project releasing a year-round minimum in-stream flow of 4 cfs as measured at the FERC-compliance gage immediately below the dam, or inflow, whichever is less. This will improve aquatic habitat between the natural fish barrier (falls) and the location of the proposed tailrace discharge;

- Implement a Project flow monitoring program:

- Implement a sediment management program for forebay maintenance flushing that minimizes impacts to aquatic habitat and species.

2.2.3.6 Wildlife and Terrestrial Resources

PacifiCorp Proposes to:

- Implement a noxious weeds management plan to control and minimize the spread of noxious weeds;

- Implement a Vegetation Management Plan to minimize the potential risk that hazard trees and other vegetation that may pose to facilities, operations, public safety, or personnel;

- Permit and/or mitigate the wetland loss associated with the proposed tailrace reroute according to all Federal, state, and local permits;

- Implement a sediment management program for forebay maintenance flushing that minimizes impacts to riparian vegetation, amphibians, and other aquatic wildlife.

2.2.3.7 Recreation Resources

PacifiCorp and the Oregon Parks and Recreation Department (OPRD) are currently discussing the acquisition by OPRD of long term usage rights (through a lease, easement, or other agreement) to PacifiCorp lands adjacent to the proposed FERC Project boundary. The lands under consideration include: the existing Wallowa State Park maintenance facility; Wallowa State Park-Little Alps Day Use Area, Pacific Park Campground; and all or some portion of, the slope and ridge between Pacific Park Campground and the West Fork Wallowa River Gorge. This off-license-agreement would result in OPRD providing and managing all recreation opportunities on lands currently owned by PacifiCorp on the west side of the Joseph-Wallowa Lake Highway and southwest of the Project Powerhouse. PacifiCorp will continue to coordinate with the Forest Service and OPRD to provide recreation opportunities (primarily trail and interpretive opportunities) on PacifiCorp lands on the east side of the Joseph-Wallowa Lake Highway and within the FERC Project boundary.

PacifiCorp's proposed recreation measures under the existing recreation management situation (no off-license-agreement with OPRD) are presented below. If an off-license-agreement between PacifiCorp and OPRD is reached prior to the issuance of a new FERC license, the proposed measures for Pacific Park Campground and the slope and ridge west of the campground (eliminating user-created trails, establishing new trails, and providing scenic overlook signage) would not be implemented by PacifiCorp and these lands would not be included in the Project boundary. If an off-license-agreement with OPRD is not reached in a timely manner, PacifiCorp is prepared to implement the proposed measures identified below.

If an off-license-agreement with OPRD is not reached, PacifiCorp proposes the following improvements at Pacific Park Campground and at the slope and ridge between Pacific Park Campground and the West Fork Wallowa River Gorge:

- Install a new entry sign at Pacific Park Campground;

- Construct a campground host area at Pacific Park Campground;

- Construct an Americans with Disabilities Act (ADA) compliant ramp at the existing vault toilet;

- Improve campsite identification signage;

- Improve campsite definition at Pacific Park Campground**;**
- Restore tent/vehicle pads at Pacific Park Campground;
- Perform a general clean-up at Pacific Park Campground;
- Construct fencing between Pacific Park Campground, Little Alps Day Use Area and the slope to the west of the campground near user-created trails;
- Construct a new, formalized access trail from Pacific Park Campground to the "overlook point" west of the Campground above the West Fork Wallowa River Gorge and connecting to the WWNF Chief Joseph and West Fork trails;
- Decommission and restore user-created trails in the vicinity of Pacific Park Campground;
- Install an informational sign and wilderness registration station along the new formalized access trail to the overlook point described above;
- Install overlook area interpretive sign at the north end of the ridge west of the Pacific Park Campground.

PacifiCorp proposes the following improvements in the powerhouse vicinity and along the forebay access road regardless of the pending off-license agreement with OPRD:

- Install forebay access road signs;
- Improve the connection trail (approximately 100 linear feet (30.5 m)) between the forebay access road and East Fork Wallowa River Trail;
- Improve year-round pedestrian recreational access across the dam spillway catwalk;
- Install interpretive signage at the terminus of the Joseph-Wallowa Lake Highway and Wallowa Lake Trailhead;
- Replace Wallowa Lake Trailhead sign.

2.2.3.8 Aesthetic and Visual Resources

PacifiCorp proposes to:

- Implement an aesthetics and visual resource management program that meets the WWNF Forest Plan-Visual Quality Objectives (VQOs) for the portion of the Project located within the WWNF and better blends Project facilities with the surrounding environment on PacifiCorp lands. Specifically, the program includes the measures below:

- Improve the forebay intake structure by installing wood shake-siding to the exterior and roof of the equipment house;

- Improve the laydown and storage area on east side of forebay;

- Install interpretive sign at the west side of forebay;

- Enhance the upper penstock trestle and penstock pipe by painting them a uniform dark color in consultation with the WWNF;

- Replace the fencing at the terminus of Joseph-Wallowa Lake Highway;

- Install low-maintenance landscape improvements, (native vegetation, boulders, rock, cobble, and/or gravel) at the Project powerhouse, and the edge of the Joseph-Wallowa Lake Highway terminus;

- Recoat the powerhouse exterior.

2.2.3.9 Cultural Resources

PacifiCorp proposes to:

- Engage in additional consultation with the FERC, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Nez Perce Tribe (NPT), the Confederated Tribes of the Colville Reservation (CTCR), and the SHPO to amend the Area of Potential Effect (APE) for cultural resources. The APE amendment would include the area potentially affected by the proposed tailrace reroute;

- Conduct additional cultural resources investigations within the revised Project APE upon approval;

- Implement an unanticipated discovery plan for cultural resources and human remains. A draft unanticipated discovery plan is attached in Appendix K;

- Develop as needed, a Historic Properties Management Plan (HPMP) to address any Project effects that may be identified from the results of the additional investigations

associated with the proposed tailrace reroute, and the forthcoming Traditional Cultural Properties (TCPs) reports currently being prepared by the affected tribes;

- Conduct archaeological monitoring of any ground disturbing activities associated with planning and engineering of the proposed tailrace reroute.

2.2.4 Modifications to Applicants's Proposal – Mandatory Conditions

Currently, no mandatory conditions have been prescribed by any of the agencies holding conditioning authority.

3.0 ENVIRONMENTAL ANALYSIS

3.1 General Description of the River Basin

The Wallowa River Basin covers a drainage area of 950 square miles (1,530 sq. km) from its headwaters to its confluence with the Grande Ronde River (USGSa). Ninety five percent (907 sq. mi.) of the basin is along the main-stem of the Wallowa River downstream of the confluence of the East and West Forks. The basin is divided into two geographic sub-regions by Wallowa Lake, a lake of 1,508 surface acres (610 ha). The upper basin, where the Project is located, lies south of Wallowa Lake, and is characterized by high steep mountains. The lower basin is characterized by more open gently sloping plains. Most of the precipitation in the basin falls as winter snow.

There are three Project-affected tributaries within the basin. The West Fork Wallowa River is approximately 14 miles long (22.5 km) and has a drainage area of 33 square miles (53 sq. km) ((USGSb). The current Project tailrace enters the West Fork Wallowa River 1.1 miles (1.8 km) above Wallowa Lake. The East Fork Wallowa River is approximately 7 miles (11.3 km) long, with a drainage area of 10 square miles (16 sq. km) including Royal Purple Creek (USGSc). The Project dam and impoundment is on the East Fork Wallowa River 2.25 miles (3.6 km) above Wallowa Lake. Royal Purple Creek is considered a sub-basin of the East Fork and is approximately 2 miles (3.2 km) long. The Royal Purple diversion is located 2.25 miles (3.6 km) above Wallowa Lake.

Per the Projects' State of Oregon water right, up to 15 cfs may be diverted from the East Fork Wallowa River to the Project. A second state water right allows up to one cfs to be diverted from Royal Purple Creek. Combined, up to 16 cfs may be discharged into the West Fork of the Wallowa River by the Project.

Major land uses in the basin including the Project area are federal and private forest, range, and cropland. Primary water uses in the greater Project vicinity include aquatic habitat, irrigation, industrial, and domestic uses.

There is one dam in addition to the two Project diversion dams in the Wallowa River basin. Wallowa Lake Dam is an irrigation dam owned by the *Associated Ditch Companies, Inc.*, of Joseph, OR. This dam is used for irrigation purposes only and has no electric generation facilities. It is located at the outlet of Wallowa Lake, approximately 5 miles downstream of the Project tailrace.

3.2 Cumulative Effects

3.2.1 Resources that Could Be Cumulatively Affected

Based on a review of agency comments and FERC staff analysis described in Scoping Document II, it was determined that anadromous fish reintroductions within Wallowa River and Wallowa Lake in the vicinity of the project is a reasonably foreseeable action that could be affected by the Project.

3.2.2 Geographic Scope

The FERC Scoping Document II tentatively identified the Wallowa River (including the Project tailrace and East and West Forks) upstream of Wallowa Lake, Wallowa Lake, and the Wallowa River immediately downstream of Wallowa Lake dam as the geographic scope of analysis for anadromous fish reintroductions. FERC chose this geographic scope because Project operations may affect the success of potential anadromous fish reintroduction efforts within this reach.

3.2.3 Temporal Scope

Based on the potential term of a new license, the temporal scope is 30-50 years into the future, concentrating on the effect to the resources from reasonably foreseeable future actions.

3.2.4 Discussion of Past Present and Future Actions

The Wallowa River and Wallowa Lake, with respect to industrial and residential development, has been in a relatively stable state for many years. Some new developments (primarily residential and resort-tourism based) have taken place in the recent past, and there have been several Project related erosion events that have had short term effects on aquatic habitat within the geographic scope. No significant modifications to Project operations affecting environmental resources have occurred. The Project dam is located above numerous natural physical barriers to anadromous species, and therefore does not result in any reduction in aquatic resource connectivity.

The Project has little impact on water quality parameters, as they pertain to anadromous fish habitat including temperature and dissolved oxygen. Short term turbidity and substrate effects associated with forebay sediment flushing have occurred in the past and are expected to continue. Studies performed as part of this relicensing support this conclusion.

Modifications to the Project facilities or operations are being proposed to address these resource issues. Thus it is anticipated that no significant, impacts to potential future anadromous fish populations will occur as a result of relicensing the Project.

The ongoing human activity in the area of geographic scope will undoubtedly have some cumulative impact on anadromous fish habitat and other aquatic resources. However, the environmental measures proposed in Section 2.2.3 of this PLP should result in a significant improvement overall in aquatic habitat conditions.

3.3 Proposed Action and Action Alternatives

3.3.1 Geology, Sediment and Substrate

This section describes existing conditions in the Project Area related to geology, soils, sediment and substrate. This includes existing conditions and how those conditions are affected by existing Project facilities and operations. The descriptions in this section provide the baseline by which the Proposed Action is assessed.

Affected Environment

The Project is located on the East Fork Wallowa River, which originates in the Eagle Cap Wilderness on the northern flank of the Wallowa Mountains of eastern Oregon. The Wallowa Falls Hydroelectric Project diverts up to 15 cfs of water from the East Fork Wallowa River (and 1 cfs from Royal Purple Creek) for power generation. Stream flows not diverted for power generation are passed through or over the Wallowa Falls diversion dam into the East Fork Wallowa River. The portion of the East Fork below the dam is referred to as the "bypassed reach". The East Fork Wallowa River flows into the West Fork Wallowa River approximately 1.75 miles (2,800 m) below the Wallowa Falls dam, which then flows into Wallowa Lake approximately 2.25 miles (3,621 m below the dam).

The Upper Wallowa River watershed is predominantly undeveloped forest lands, with a mix of residential development and small industry, mostly mining, livestock grazing and other agricultural uses. The watershed is typified by its location within the Wallowa Mountains. The topography of the area is steep, and includes narrow mountain valleys below rugged mountain peaks. Valley floors and lower slopes are predominately forested, with upper slopes characterized by ridges, rock outcrops and talus slopes.

The bypassed portion of the East Fork Wallowa River is characterized by steep rocky slopes that constrain the channel in a narrow v-shaped valley. The upper portion of the bypassed reach located from the diversion dam to approximately one mile (1,609 m) downstream is

high gradient (19 percent) and characterized by numerous vertical waterfalls and cascades; substrate is dominated by bedrock and boulders. Downstream from this reach, to the confluence of the West Fork Wallowa River, the bypassed reach is characterized by a gentler gradient (8.5 percent) and numerous riffles and pools (PacifiCorp 2011). A natural waterfall located approximately .9 miles (1,563 m) below the diversion dam presents a complete barrier to upstream migrating fish. The hydrology of the East Fork Wallowa River is discussed in Section 3.3.2 of this document.

To determine baseline conditions and potential impacts of the Proposed Action, PacifiCorp and Cornforth Consultants completed several studies in 2012 designed to characterize 2.2.1geology and potential geologic hazards in the Project area and assess sediment quality and substrate characteristics in the Project forebay and bypassed reach. The results of the geologic assessment are contained in the Wallowa Falls Hydroelectric Project: Geology and Soils Study Progress Report (PacifiCorp 2012a). The results of sediment and substrate characterization studies are contained in the Technical Memorandum – Wallowa Hydroelectric Project Sediment and Substrate Characterization provided to relicensing stakeholders in November, 2012 (PacifiCorp 2012b). The following presents a brief summary of baseline conditions within the Project area.

Sediment and Substrate

Results of sediment composition and grain size analysis for samples collected within the Project forebay in 2012 are shown below (Table 3 and Figure 2). Medium sand was the primary sediment type/size present in the forebay during sampling in August 2012, followed by fine sand, suggesting that the forebay is a depositional area for material ranging in size from gravel to fine sand. Silt and clay size particles were a minor fraction of the material sampled (Mason, Bruce and Girard, 2013).

Table 3. Size classifications for sediment samples collected in the Project Forebay, August 14, 2012.

Size Ranges		Sample A	Sample B	Sample C
Boulder		0%	0%	0%
Cobble		0%	0%	0%
Gravel		14.5%	8.6%	8.3%
Coarse sand		18.3%	14.1%	18.5%
Medium Sand		43.5%	20.3%	45.1%
Fine Sand		18.9%	43.2%	17.8%
Silt and clay		4.8%	13.8%	10.3%

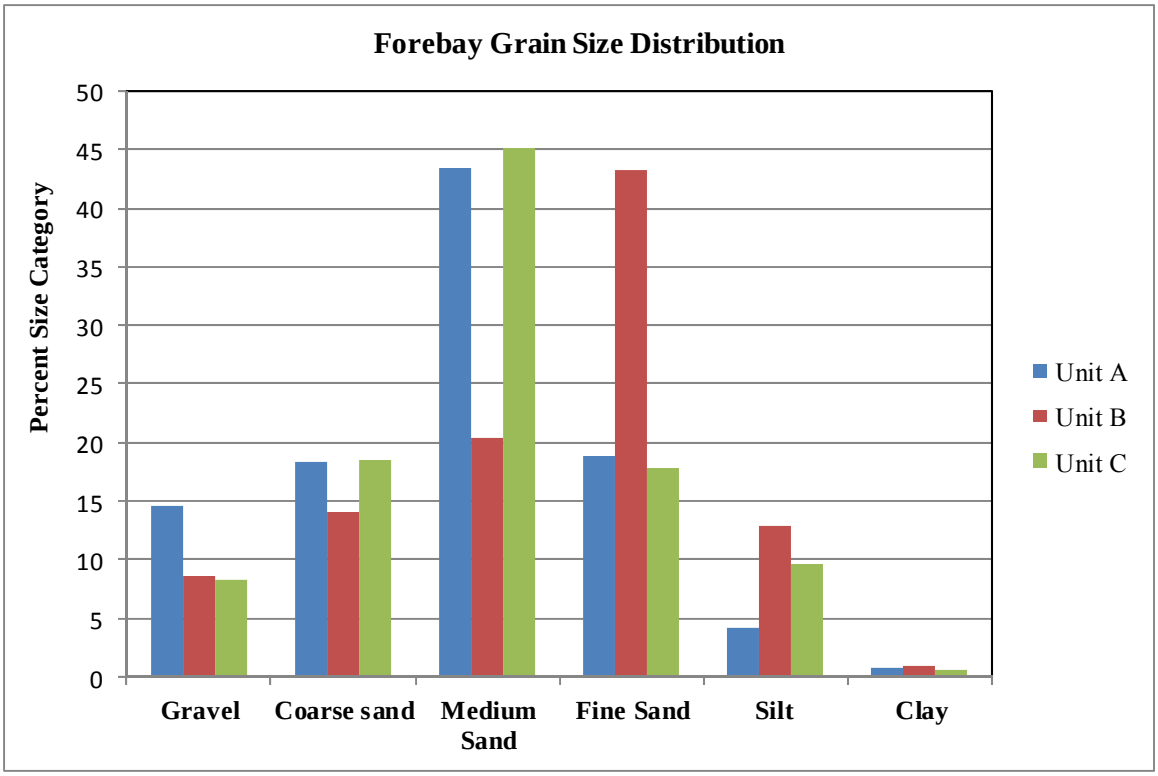


Figure 2. Grain size distribution in the Project forebay, August, 2012.

During the week of October 22, 2012, PacifiCorp assessed the streambed surface sediment layer at five transect locations within the East Fork Wallowa River to develop an understanding of the sediment and substrate characteristics within the lower 2,953 feet (900m) of the bypassed reach downstream of the natural fish passage barrier. Wolman pebble counts were completed at each of the five transects. For each transect, measured particles were put into size categories and converted to percentages by size class (Figure 3). The primary substrate size classification observed at the five Wolman pebble count transects in the bypassed reach of the East Fork Wallowa River was gravel (Figure 3). Quantitative sampling of the subarmor layer of river substrates was also conducted at three of the transect sites. Laboratory grain size analysis of the three subarmor substrate bulk samples also indicated that the primary substrate size classification in the samples was gravel (PacifiCorp 2012b).

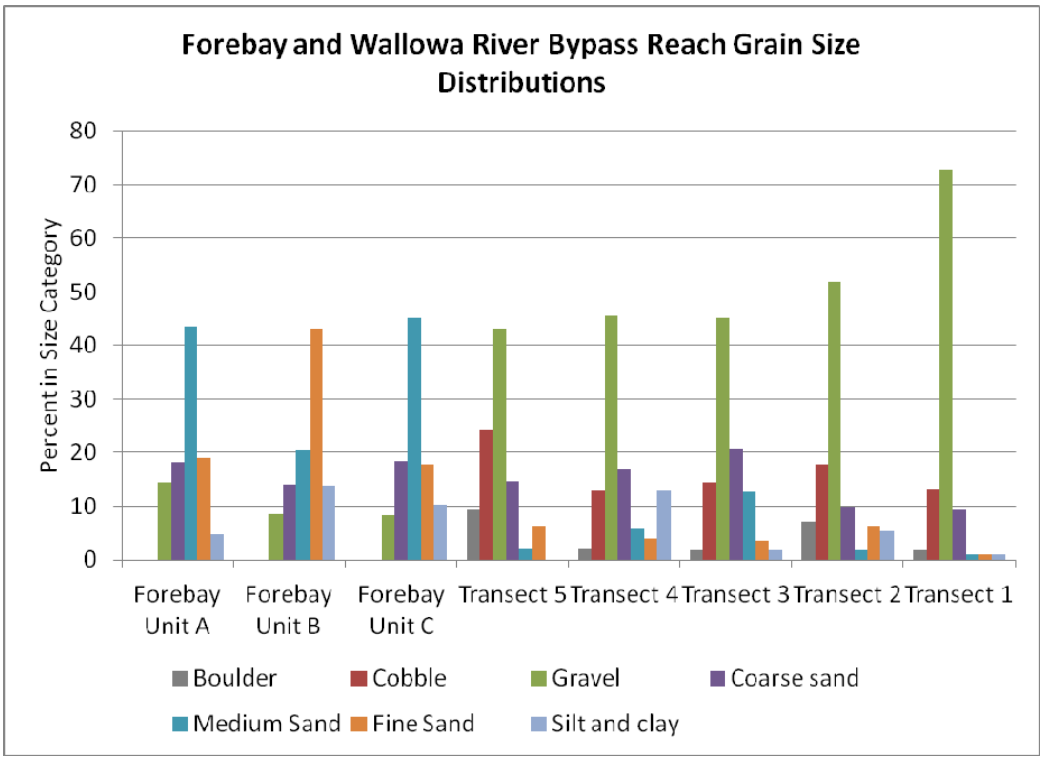


Figure 3. Project forebay and East Fork Wallowa River substrate particle size distributions (cumulative percent per size class)

PacifiCorp sampled sediments accumulated in the Project forebay for metals in 2012. Sediment samples were analyzed as prescribed in the Sediment Evaluation Framework for the Pacific Northwest (RSET 2006); results are shown below (Table 4). Given the location of the Project forebay in close proximity to the Eagle Cap Wilderness Area, agricultural and industrial chemical contamination is expected to be negligible, with nutrients derived from natural sources. A mineral resource analysis of the area (Weis et al. 1976) indicates the primary source rock types are granodiorite, limestone, and argillite. There are a few minor mining claims within the watershed; the main potential mining commodities are silver, lead, gold, and copper.

Chromium, copper, and zinc were detected in forebay sediment samples; all other metals were below instrument reporting limits (RL). Detected metals are discussed in more detail below.

Table 4. Metals content in sediment samples collected at Wallowa Falls Hydroelectric project forebay, August 2012. ND=non-detect, RL=reporting limit; all values mg/kg.

Metal	Sample Result			RL			
	1	2	3		DEQ 2007 Ambient Sediment Levels[1]	DEQ Screening Levels[2]	DEQ/EPA Toxicity Screening JSCS[3]
Antimony	ND	ND	ND	6	0.9	3	64
Arsenic	ND	ND	ND	6	2.8	6	33
Cadmium	ND	ND	ND	2.4	0.16	0.6	5

Metal	Sample Result			RL			
	1	2	3		**DEQ 2007 Ambient Sediment Levels[1]**	**DEQ Screening Levels[2]**	**DEQ/EPA Toxicity Screening JSCS[3]**
Chromium	8.1	12	9	2.4	25.1	37	111
Copper	22	38	38	2.4	23	36	149
Lead	ND	ND	ND	6	10	35	128
Selenium	ND	ND	ND	6	None	None	5
Silver	ND	ND	ND	6	0.38	4.5	5
Zinc	38	53	44	12	68	123	459

[1]Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment (DEQ 2007).
[2]Screening Level values in Guidance for Ecological Risk Assessment (DEQ 1998).
[3]McDonald et al., 2000, *in* Portland Harbor Joint Source Control Strategy (DEQ 2005).

A number of reference data sets and screening levels for sediment metals concentrations have been developed and are currently in use by DEQ and the U.S. Environmental Protection Agency (EPA). These include ambient (background) levels of several metals (DEQ 2007), screening values for ecological risk assessment (DEQ 1998), and screening levels that DEQ and EPA have jointly developed in connection with the Portland Harbor Joint Source Control Strategy (JSCS) (DEQ 2005). Comparison of Wallowa Falls Forebay sediment metals data to these values indicates that detected metals (chromium, copper, zinc) were well below toxicity screening values reported in Oregon DEQ's JSCS (DEQ 2005), and were near or below published ambient levels (DEQ 2001). The JSCS values can be considered upper level toxicity thresholds (pers. comm. with Jennifer Peterson, DEQ, March 6, 2013). Two of the three copper samples were slightly higher than DEQ's 2001 screening levels for freshwater sediment developed for ecological risk assessment. However for the reasons discussed below, this is likely representative of background copper levels in native material within the watershed.

The Eagle Cap Wilderness is at a northern margin of a belt of metalliferous geologic deposits, with the principal metals being gold, copper, and silver, with minor lead (Weis et al. 1976). There is a history of mining in the Eagle Cap Wilderness, although the specifics about mining claims in the vicinity of the project are not very well documented. Copper, molybdenum, tungsten, gold and silver are known to be in the quartz veins and tactite zones of the Wallowa batholith or along its margins (Weis et al. 1976). Copper was identified as the most abundant metal in the Eagle Cap Wilderness with significant concentrations documented in the Aneroid Basin directly upstream of the Wallowa Falls Dam and forebay (Weis et. al. 1976). Based on this information, concentrations of copper detected in sediments collected from the forebay do not represent levels elevated above natural background conditions, nor do they represent an ecological risk.

The sediment metals data suggest that metals concentrations in Wallowa Falls Forebay sediments are low and with the exception of copper as discussed above, below screening values set by DEQ and/or EPA. In several cases RLs themselves were higher than screening levels. However, as noted above, given the remoteness of the project and lack of agricultural

and industrial inputs, metals contamination is expected to be negligible, and if present derived from natural sources.

Geology and Soils

The Project is located on the northern flank of the Wallowa Mountains within the Blue Mountain physiographic providence of northeast Oregon. The dominant rock type observed near the upper (southern) portion of the Project appears to be andesite from the Clover Creek Greenstone formation (Wagner 1955) and basaltic andesite from the Columbia River Basalt Group. The lower (northern) portions of the Project (the powerhouse and tailrace) are dominated by alluvial and glacial deposits. The Project area was formed by extensive glaciation that occurred during the last ice age (Wisconsin Glacial Episode) as recently as 10,000 years ago (Budlong et. al. 2005). The Wallowa Glacier was thought to be at its deepest near the junction of the East Fork and West Fork Wallowa River resulting in very deep glacial deposits in the area around the powerhouse and tailrace. Conversely, the upper Project area is located in a recently scoured area with relatively shallow soils.

The objectives of the geologic assessment were to characterize the existing geology, identify long-term surficial erosion potential in the area, and identify potential geologic hazards that could pose a risk to both the Project facilities (i.e. the penstock and the access road) and the surrounding drainages. The geologic hazards of concern consist of ancient landsides, historically active landslides, rockfalls, and debris flow slides in the steep slopes within the East Fork Wallowa River drainage (PacifiCorp 2012a).

Based on the desktop evaluation, Cornforth Consultants, Inc. concluded that the Project area has no history of large translational landslides, and no signs of ancient landslide terrain or global instability were observed during the site reconnaissance. No historically active deep-seated slumps or rotational slides were observed as well. In addition, the hazards associated with rockfall or instability of the talus piles within the Project area is considered relatively low.

Drainages in areas that have steep mountainous terrain and thin overburden soils overlying shallow bedrock are susceptible to debris flow slides. They typically occur during high intensity rainfall events. These destructive events give little to no warning before they occur. A significant debris flow slide occurred in 2006 on the west slope of the bypassed reach of the East Fork Wallowa River. The debris flow slide caused significant damage to the Forest Service 1804 trail located on the opposite side of the river from the penstock, and the event deposited a significant amount of debris and sediment that temporarily dammed the river and undoubtedly caused major river sedimentation. Based on the steeper slopes and thinner soil and vegetation cover, the western slopes above the East Fork Wallowa River appear more susceptible to debris flows than the eastern slopes; therefore, the penstock and access road are less vulnerable to this type of slide event. However, there is the potential for debris flow slides to occur upstream of the dam that could generate significant quantities of sediment and debris that could cause sedimentation issues at the forebay.

Cornforth Consultants conducted a site reconnaissance effort on September 17-18, 2012. The slopes above the east side of the bypassed reach of the East Fork Wallowa River (where the penstock alignment and access road are located) are comprised of colluvium which consists of silty sand to sandy silt with numerous gravel- to boulder-sized rock fragments. In addition, expansive talus fields associated with the steep to near vertical rock outcrops located at higher elevations to the east were observed. In general, the slope angles on the east side of the river are roughly 32 to 35 degrees, and the slopes are sparsely to moderately vegetated with shrubs and trees. In contrast, the slopes on the west side of the East Fork Wallowa River are relatively less vegetated, have steeper overall inclinations (35 to 45 degrees), and are covered by finer-grained granular soils (scree) and relatively younger talus and rockfall debris. In general, mass wasting appears to be more prevalent and the slopes appear more active on the west side of the river as compared to the east side of the East Fork Wallowa River (where the penstock alignment and access road are located). The slopes immediately around the forebay are relatively flat and well vegetated; however, they steepen considerably over a short distance to the east and west (i.e. outside of the river channel).

Localized areas of minor sloughing associated with cut and side cast construction techniques along the access road were observed during the site reconnaissance. These areas do not pose an immediate risk to the penstock; however, worsening conditions have the potential to cause localized instability concerns. They will likely continue to be an access road maintenance issue. Localized areas of minor soil erosion associated with the access road were also observed during the site reconnaissance. The amount of sedimentation associated with these localized erosion areas is relatively small and likely on par with what the Forest Service trails contribute throughout the area. However, worsening conditions could lead to increased erosion and sedimentation concerns in the future.

No signs of landslide activity, slope instability, or erosion were observed around the forebay or dam.

There is one problem area along the penstock alignment where there has been significant sloughing along the downslope side of the access road, and the slope between the road and the bypassed reach of the East Fork Wallowa River is failing. This area is located along the access road, approximately 800 feet (245 m) below the diversion dam. At this location the penstock is buried beneath the access road and is at risk of being exposed due to erosion of the access road. PacifiCorp has designed an engineering solution in the form of a mechanically stabilized earth wall, and is currently working with the Wallowa Whitman National Forest and the FERC to obtain approval for construction. The slope stabilization project will be completed within the term of the current FERC license and does not constitute a proposed facility or environmental measure under this PLP.

3.3.1.1 Environmental Effects

This section describes the effects of PacifiCorp's proposed facilities, operations and environmental measures (as described in Section 2.2) on geology, soils, sediment and substrate within the Project Area. The discussion of effects in this section is divided under

subheadings associated with the specific proposed facilities, operations, and environmental measures as they pertain to geology and soils or sediment and substrate conditions.

Effects of Construction and Operation of Proposed Project Facilities and Implementation of Associated Best Management Practices (BMPs)

As described in Section 2.2.1, the proposed rerouted Project tailrace facilities would include construction of a new intake structure near the existing powerhouse tailrace, a new buried conveyance pipeline (consisting of a 30-inch (76.2 cm) diameter, 1,000-foot (305 m) long pipe), and a reinforced concrete outfall structure that would discharge powerhouse flows back to the East Fork Wallowa River. As described in Section 2.2.3, PacifiCorp would implement a number of BMPs for erosion, sediment, and spill prevention and control during proposed construction activities. BMPs would be determined in consultation with and approved by applicable regulatory agencies, such as DEQ (related to applicable 401 Water Quality Certification) and the U.S. Army Corps of Engineers and Oregon Department of State Lands (DSL) (related to applicable Section 404 and DSL Removal-Fill Permits).

Sediment and Substrate

The construction and operation of the proposed rerouted tailrace would have direct effects on sediment and substrate conditions in the Project area. There would be short-term construction related impacts associated with the potential temporary placement of a cofferdam and excavation and disturbance of stream channel substrate in the localized area of the pipe outfall. Shoreline stabilization and placement of rip-rap in the area of the outfall would have long-term effects of altering local substrate conditions. Small areas of cobble, gravel or sand may be replaced with larger riprap material or concrete. The proposed location of the pipeline outlet structure is on the west bank of an existing low gradient side channel to the west of the main channel of the East Fork Wallowa River. The current side channel has an approximate gradient of two percent with small substrate size categories ranging from silt/clay to course gravel and a fair amount of small downed wood and organic material. The introduction of generation flows into the side channel habitat would likely have the short-term effect of localized erosion and scouring through the side channel and at the confluence of the side channel and the main channel of the East Fork Wallowa River for the first one or two years of operation. Although these impacts are unavoidable, due to the small area of impact, they are not expected to adversely impact overall substrate conditions within the bypassed reach.

In addition to the proposed rerouted tailrace facilities, PacifiCorp would retain and possibly deepen the main channel of the current tailrace, which runs through Pacific Park on the south side of the park road, for use as an emergency spillway. Deepening the tailrace channel would involve mechanical excavation of existing substrate to increase channel capacity. This would have a permanent impact on substrate conditions within the channel. However, since the proposal is to only use this channel during maintenance or emergency conditions, it is not expected that the substrate alterations would have an adverse impact on aquatic species or habitat.

The existing braided tailrace side channels on the north side of the park road would be reclaimed and restored to match surrounding contours. Restoration of these side channels would include the filling of the channel with clean soils, final grading to direct stormwater runoff away from the park road and into the undeveloped vegetated area to the north, and revegetation with native seed and plants. Data collection has not indicated fish or amphibian use of the current side channels. Although fish and amphibian use is certainly possible, it is likely not significant. Therefore, substrate condition within the side channels has not been formally assessed. It is not expected that removal of these channels would have a significant impact on aquatic habitat or species within the project area. Furthermore, restoration of the existing tailrace side channels is expected to reduce erosion and sediment transport (via the existing channel) to the West Fork Wallowa River.

The construction and operation of a tailrace discharge into the East Fork Wallowa River could have direct effects on chemical contamination within the bypassed reach. Construction of the pipe and outfall would involve heavy equipment use, excavation, concrete placement and rip-rap placement immediately adjacent to or below the ordinary high water mark of the East Fork Wallowa River. There is a negligible possibility of chemical contamination from the operation of construction equipment near or over the water during construction of the pipe outfall. The contractor would adhere to the project's erosion and sediment control plans, best management practices for equipment operation, fueling and maintenance and all applicable project permits to minimize the risk of a petroleum or chemical discharge to the bypassed reach. Construction-related effects associated with the tailrace reroute would be minor and temporary. After pipe construction an accidental release of oil or lubricants from the Wallowa Falls Hydroelectric plant would potentially be discharged into the bypassed reach of the East Fork Wallowa River via the tailrace pipe. To mitigate this risk, PacifiCorp maintains a Spill Prevention Control and Countermeasure Plan for the plant, and all containers or equipment with a volume of greater than or equal to fifty-five gallons are stored in adequate secondary containment. Spill prevention and response materials are also stored onsite.

Water quality impacts in the form of short-term increases in total suspended solids and turbidity can be expected within the bypassed reach of the East Fork Wallowa River below the tailrace pipeline outfall. These impacts are discussed in the Section 3.3.2, Water Resources.

Geology and Soils

Construction of the proposed rerouted tailrace facilities would require significant excavation and fill placement for the installation of the buried pipeline and tailrace intake and outfall structures. The final engineering design for the tailrace facilities would incorporate the results of a geotechnical investigation by a professional geotechnical engineer. Construction of the buried pipeline would require excavation of a pipeline trench between the existing powerhouse and bypassed reach of the East Fork Wallowa River. An erosion and sediment control plan would be prepared and implemented during construction to control potential

erosion and stormwater runoff from disturbed areas. Following construction, the pipeline alignment would be reclaimed by mounding excavated soils over the pipeline, providing stormwater drainage pathways, revegetating all disturbed soil with native seed and plants and distributing habitat logs and woody debris on the local landscape.

Construction of the tailrace intake structure would include the excavation, placement and backfill for a precast concrete collection basin located at the edge of the existing concrete apron below the powerhouse discharge. The main channel of the current tailrace that runs through Pacific Park on the south side of the park road would be retained for use as an emergency spillway. The braided tailrace side channels on the north side of the park road would be reclaimed and restored to match surrounding contours. Restoration of these side channels would include the filling of the channel with clean soils, final grading to direct stormwater runoff away from the park road and into the undeveloped vegetated area to the north, and revegetation with native seed and plants. Restoration of the existing tailrace side channels is expected to reduce erosion and sediment transport (via the existing channel) to the West Fork Wallowa River.

As discussed under *Sediment and Substrate* above, the tailrace pipeline would daylight on the west bank of a low gradient side channel to the west of the main channel of the East Fork Wallowa River. Conceptually, the pipeline outlet structure would be a reinforced concrete structure that would include a drop structure or velocity barrier to prevent all fish species and life stages from entering the pipeline. The outlet structure would include rip rap and/or concrete headwalls to prevent shoreline sloughing and erosion.

A full suite of best management practices, including an Erosion and Sediment Control Plan, would be employed to mitigate any short term erosion impacts during all above described construction. Although there would be short-term direct effects to soils in the construction area, long-term geologic effects associated with the rerouted tailrace pipeline are not expected.

Effects of Proposed Sediment Management Program for Forebay Maintenance Flushing

As described in Section 2.2.2, it is necessary to flush accumulated native sediment form the Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. PacifiCorp proposes to cease the historic practice of flushing entrained native sediment from the forebay during the summer low-flow period in favor of flushing sediment from the forebay during peak spring runoff in the month of June. Annual forebay flushing would result in the removal of approximately 250 to 500 cubic yards of accumulated sediment from the forebay and the mobilization and transport of that sediment into the East Fork bypassed reach.

Sediment and Substrate

Based on the type of work proposed and the existing site conditions, the action area for the forebay flushing includes the in-water forebay flushing area and outfall, as well as the East Fork Wallowa

River to the confluence with the West Fork Wallowa River, and the mainstem Wallowa River channel downstream to Wallowa Lake (approximately 2.25 river miles (3,621 m) downstream from the action site). This area is expected to encompass all reasonably foreseeable impacts from proposed forebay flushing activities within the river's active channel, including the likely occurrence of temporary downstream turbidity (see Section 3.3.2, Water Resources for further discussion) and sediment redistribution (Mason, Bruce and Girard 2013). The downstream extent of the action area is based on sediment and substrate sampling data collected in 2012, the type of work proposed, the length and gradient of the river, the amount of sediment accumulation within the forebay and the timing of flushing.

PacifiCorp proposes flushing 250 to 500 cubic yards in an annual sediment flushing event lasting 24 to 72 hours. Flushing would occur in early June to coincide with the onset of annual high flows within the East Fork Wallowa River. The average mean monthly flow in the bypassed reach during the month of June is 61 cfs (PacifiCorp 2011). Flushing as early in the peak flow period as possible would minimize sediment deposition by allowing as much sediment as possible to initially move downstream. Subsequent peak flows would further distribute sediment and minimize deposition throughout the bypassed reach.

The baseline substrate data presented in Section 3.3.1.1 reflects the results of Wolman pebble counts in the bypassed reach of the East Fork Wallowa River two months after the Project forebay was drained on August 14, 2012, when sediment was unintentionally released from the forebay through the low level outlet pipe to downstream reaches of the bypassed reach. Therefore, pebble count data, presented in the previous section, reflect streambed surface conditions after recent sediment input to the lower reaches. In contrast to the average monthly flow of 61 cfs in June, the Project inflow, as measured at the staff gage located in the East Fork Wallowa River approximately 15 feet (4.6 m) above the Project forebay, on August 14, 2012 was 15.7 cfs. Throughout the history of the hydroelectric project sediment has been routinely flushed past the Wallowa Falls dam in forebay flushing events during the months of July or August during low flow conditions. The proposed sediment management program is particularly important for protecting fish, macroinvertebrates, and aquatic and riparian habitat. The specific effects related to these resources are discussed under Aquatic Resources (in Section 3.3.3) and Terrestrial Resources (in Section 3.3.4).

Substrate analysis of the action area below the natural passage fish passage barrier in 2012 revealed that, on average, over 50 percent of the substrate sampled along the five transects was gravel, with a size range of 0.079- 2.52 inches (2-64 millimeters (mm)). Percent fines, as defined by USFWS (1998a) (0.033 inches (< 0.85 mm)) along each transect ranged from 12-38 percent. However, bypassed reach sampling occurred in October 2012, two months after an inadvertent release of sediment from the Project forebay and during annual low flow conditions, when the largest fraction of smaller sized material would be expected. Over 70 percent of the substrate sampled in the East Fork Wallowa River bypassed reach was comprised of boulder/cobble/gravel size classes, with sand size particles accounting for an

average of 20 percent of the measurements (0.0024-0.039 inches (0.063–1 mm). In contrast, sand comprised an average of 80 percent of the forebay samples. Release of sediment from the Project forebay in August (two months earlier) may have slightly shifted particle size distribution in the lower bypassed reach, increasing the percentage of smaller size class material. However, the proposed flushing of the forebay during the June high flow period would be expected to minimize effects on downstream substrate composition.

Short-term localized effects to the existing baseline substrate conditions in the action area may occur as a result of forebay flushing. However, based on the results of sediment and substrate monitoring in 2012, the limited human activity within the upper watershed, the high gradient of the East Fork Wallowa River, an in-water substrate with a broad distribution of size classes, and a forebay sediment composition dominated by medium sand, the forebay flushing is not expected to adversely affect substrate conditions in the action area.

No section of the Wallowa River or East Fork Wallowa River above Wallowa Lake is on the Oregon 303(d) list of impaired water bodies (PacifiCorp 2011). The Upper Wallowa River watershed originates in the Eagle Cap Wilderness in the Wallowa Mountains. As such, there are no known sources of anthropogenic pollutants within or above the action area.

As discussed above, PacifiCorp collected sediment samples within the Project forebay in August 2012, and analyzed them for a suite of metals. Detectable metals (Cr, Cu, Zn), were well below DEQ's toxicity threshold established jointly with EPA in connection with the Joint Source Control Program for management of Portland Harbor sediments (DEQ 2005). Two of the sediment copper values were slightly above ecological risk assessment screening values established by DEQ for freshwater sediment (DEQ 2007). These results are not deemed significant from the standpoint of effects to aquatic resources, and are likely a result of high background levels of copper. As noted in Section 3.3.1 mineral resource analysis of the area identifies copper as the most abundant metal in the Eagle Cap Wilderness Area, with elevated concentrations documented in the Aneroid Basin directly upstream of the Wallowa Falls Dam and forebay (Weis et. al., 1976). Concentrations of copper detected in sediments collected from the forebay do not appear to be elevated above natural background levels, nor do they represent an ecological risk. Annual forebay flushing is expected to have no effect on chemical contamination within the action area.

Although, no long-term effects to sediment and substrate within the action area are expected, short-term impacts to water quality in the form of elevated suspended sediments and turbidity within the action area would occur. These effects are discussed in the Section 3.3.2, Water Resources.

Geology and Soils

Annual forebay flushing is not expected to have any impacts on geologic conditions or soils within the Project area.

Routine Assessment of Geologic Hazards at the Project for Incorporation into PacifiCorp's Dam Safety Monitoring Plan for the Project

As described in Section 2.2.2, PacifiCorp proposes to incorporate a routine geologic hazard assessment into the Dam Safety Surveillance and Monitoring Plan (DSSMP) for the Wallowa Falls Project. The assessment would be performed by a qualified geotechnical and/or engineering geologist to review the condition of known hazards and identify any new hazards that may have developed. The assessment would be submitted to the Division of Dam Safety and Inspections and accompanied by a plan and schedule to address any hazards that represent a tangible threat to project features and/or public safety.

This assessment would facilitate early detection of real or potential landslide activity, rock fall, slope instability, or excessive erosion. Early detection of these types of conditions would protect Project facilities, public and worker safety, and terrestrial and aquatic habitats.

Regular assessment of geologic hazards within the Project area has the potential to have a direct positive effect on instream substrate conditions within the East Fork Wallowa River. Prevention of significant rockfall or landslide events, which could result in erosion and sediment transport, would reduce sedimentation within the bypassed reach of the East Fork Wallowa River.

3.3.2 Water Resources

This section describes the existing conditions in the Project area related to hydrology and water quality. This includes hydrology and water quality conditions that currently exist and how these conditions are affected by existing Project facilities and operations. The descriptions in this section serve as the baseline against which the effects on hydrology and water quality of proposed Project facilities and operations are assessed (in Section 3.3.2.1 below).

Affected Environment

Hydrologic Conditions in the Project Area

The East Fork and West Fork of the Wallowa River, along which the Project facilities are located, are relatively pristine streams that originate in the Eagle Cap Wilderness Area in the Wallowa Mountains. The East Fork and West Fork join about 0.5 miles below the Project powerhouse tailrace, and the Wallowa River continues to flow north about 0.6 miles into Wallowa Lake. The East Fork and West Fork of the Wallowa River are snowmelt runoff streams. Peak runoff occurs in late spring to early summer, generally from May through mid-July, from melting snowpack. By late July, little of the snow is left in the Wallowa Mountains. Runoff recedes to low flows by late summer, usually August and September. Flows can again increase in fall in response to autumn rains, but lower flows generally persist from late fall through winter due to freezing conditions in the contributing high-elevation watershed areas, which result in little or no direct runoff during this time.

Available flow information for the Project area includes USGS streamflow data from two locations in the Project vicinity over a 58-year period from October 1924 through September 1983 (PacifiCorp 2012c)[3]. Based on this previous 58-year period of record, average monthly minimum flows in the East Fork ranged from 7.7 cfs in March to 25.2 cfs in June, and average monthly maximum flows ranged from 14.6 cfs in March to 142.2 cfs in June. Average mean monthly flows in the East Fork ranged from 11 cfs in February and March to 61 cfs in June. During the period of record, monthly flows met or exceeded 10 cfs 90 percent of the time, 14 cfs 50 percent of the time, and 45 cfs 10 percent of the time.

PacifiCorp has collected additional flow data at five sites in the Project vicinity during 2012 and 2013, including the East Fork inflow to the Project forebay (site EFI), the Royal Purple Creek inflow to the Project diversion (site RPI), the upper end of the East Fork bypassed reach just below the Project diversion (site BPU), the lower end of the East Fork bypassed reach (site BPL), and the Powerhouse tailrace (site PHT). As of the publication date of this PLP, only the 2012 data are available, with the 2013 data still being retrieved and processed.

The overall average annual flows for WY 2012 (i.e., October 2011 through September 2012) at the five gaged study sites were 21.1, 19.5, 10.9, 10.5, and 1.8 cfs, respectively, at sites EFI, BPL, BPU, PHT, and RPI. Flows at the EFI site were normal in most months compared to the available 58-year historic data from the USGS gages (as described above). The exceptions were March 2012 and September 2012, which were dry by comparison, and April 2012, which was wet by comparison. Flows further downstream in the bypassed reach at site BPL were normal in the spring and summer months (i.e., May through September), but were wet by comparison in the winter months, particularly in December 2011 and January 2012 when average monthly flows were higher than any recorded previously in the available 58-year historic data. These wet winter conditions were the result of substantial peak flows caused at lower elevations by rain-on-snow events that were recorded at the lower elevation BPL site during WY 2012 (PacifiCorp 2012c).

Flows at site PHT, indicative of flow-related powerhouse operations, were relatively uniform throughout much of the year at flow levels between about 10 and 14 cfs, with a few relatively short periods of negligible flow when powerhouse operations were stopped for maintenance purposes. These flow levels corresponded to (i.e., were within) typical standard operations at the Project powerhouse. The maximum hydraulic capacity of the powerhouse is 16 cfs, and the total amount of flow diverted to the Project powerhouse typically ranges from 3 to 16 cfs (PacifiCorp 2011).

The differences in flows between the upper bypassed reach (BPU) and lower bypassed reach (BPL) sites were used to estimate baseflow and runoff contributions in the Project bypassed reach (PacifiCorp 2012c). These estimates indicate that baseflow and runoff contributions of

[3] The two locations include USGS gages in the Project tailrace (USGS Station 13324500) and in the East Fork one quarter mile upstream of the confluence with the West Fork (USGS Station 13325000). The summation of data from the two sites constitutes a third "reporting station" (USGS Station 13325001) that represents the overall hydrology of the East Fork in the Project vicinity.

flow in the reach vary by time of year and meteorological conditions. During the fall, winter, and spring periods of more active watershed runoff events from rain storms, rain-on-snow, or snowmelt, runoff contribution is appreciable (typically 5 cfs or greater) and at times substantial (e.g., nearly 20 cfs on average in December). By contrast, during the dry late summer period, estimates indicate that baseflow contribution was low or absent (PacifiCorp 2012c).

As discussed in Section 1.0, the Project diverts portions of the flow from the East Fork (and lesser diversions from Royal Purple Creek) for use at the Project powerhouse. The minimum hydraulic capacity of the powerhouse is approximately 3 cfs and the maximum hydraulic capacity is 16 cfs; thus, the total amount of flow diverted to the Project powerhouse generally ranges from 3 to 16 cfs. Historically, the median monthly average amount of flow diverted to the Project powerhouse was 8.6 cfs based on the 58-year period of record at the Project tailrace USGS Station 13324500 (PacifiCorp 2012c). During 2012, the average daily Powerhouse diversion amount was 10.5 cfs, with the highest daily average of 13.8 cfs occurring in October and the lowest daily average of 5.3 cfs occurring in January.

The current FERC license for the Project requires that flow releases be provided from the East Fork diversion dam to maintain a continuous minimum instream flow in the East Fork bypassed reach. The required minimum instream flow release is 0.5 cfs or the natural inflow to the reservoir, whichever is less, as measured immediately downstream from the diversion dam. However, instream flows in the bypassed reach typically exceed the required minimum instream flow release for three reasons:

- The required minimum flow is released through a fixed pipe at the diversion dam. To insure continuous compliance with the existing minimum flow provision of 0.5 cfs, PacifiCorp typically releases an additional discharge of 0.3 cfs. Accordingly, actual flow released may range between 0.5 and 0.8 cfs largely depending on season.

- Natural accretion of flow occurs in the bypassed reach. Information on the extent of accretion is limited to only a few measurements by PacifiCorp personnel during relatively low flow conditions, indicating accretion in the bypassed reach on the order of a 1 to 2 cfs in summer. A larger amount of accretion in the bypassed reach possibly occurs seasonally, such as during snowmelt runoff conditions.

- During higher-flow times of the year (e.g., the snowmelt runoff period), flows arriving at the diversion dam from upstream are likely in excess of 16 cfs, which is the maximum hydraulic capacity of the powerhouse. At these times, all flows in excess of 16 cfs remain within the bypassed reach. This can occur in many months, but is particularly prevalent in the higher-flow months of May, June, and July.

Water Quality Conditions in the Project Area

Overall water quality in the Wallowa River watershed is generally excellent, due to the relatively pristine location and physical characteristics of the watershed areas, most of which

lies within the Eagle Cap Wilderness Area (Nowak and Kuchenbecker 2004). Because the East Fork and West Fork are supplied by direct snowmelt runoff or groundwater baseflow, they are consistently relatively cold throughout the year.

PacifiCorp has collected water temperature data during 2012 and 2013 at the same five sites in the East Fork where flow data has been collected (as discussed above). In addition, PacifiCorp has collected water temperature data in the West Fork upstream of the Powerhouse tailrace (site WFI), and in the Wallowa River downstream of the East Fork and West Fork confluence (site WRC). The water temperature data shows that the highest mid-summer seven-day average of the maximum daily temperature (7-DAD Max) for the study sites were 15.0°C, 14.2°C, 13.9°C, 13.4°C, 12.9°C, and 12.7°C, respectively, at sites WFI, WRC, BPL, RPI, EFI, and BPU. Minimum water temperatures ranged up to about 3.0 °C in mid-winter, and were similar among the sites. Of the five thermal classifications (i.e., cold, cold-cool, cool, cool-warm, and warm) for temperate streams in the U.S. and Canada developed by Chu et al. (2009), the coldest (i.e., "cold") classification includes locations that have daily maximum water temperatures of 15.9°C or less. Based on the data obtained in this study, all of the study sites fall within this "cold" classification.

Based on comparison of the main inflow sites (sites EFI and WFI), water temperatures in the East Fork are generally cooler than the West Fork during summer. The data suggest that the cooler water temperatures in the East Fork are the result of a smaller watershed area draining to the EFI site compared to the WFI site. The larger drainage area to the WFI has comparatively lower mean elevation, lower average gradient, greater stream width, and longer stream reach length in the West Fork, which are factors that act to cause a relatively higher rate of stream heating as waters flow downstream (Isaak and Hubert 2001).

The comparison of water temperature trends between the BPU and BPL sites indicates that flows are consistently warmer at BPL from spring through summer (PacifiCorp 2012c). The progressive warming of flows as they travel downstream in the Project bypassed reach, particularly during summer, is reasonable to expect given that the gradient of the reach drops from about 5,800 to 4,600 ft in elevation between the two sites. Elevation is expected to have a direct effect on the rate of stream heating, particularly in mountain landscapes, because of the adiabatic lapse rate, which can result in heating of air temperatures by about 3.5°C per 1,000 feet (305 m) drop in elevation (Isaak and Hubert 2001). The additional reach length between sites (about 2 mi) also increases the time that flows can be exposed to solar radiation and air temperatures during the day.

PacifiCorp collected dissolved oxygen (DO) data at sites EFI, BPU, and BPL in the East Fork on a continuous hourly basis during multi-day sampling events in August and September 2012. The data indicated that DO was at or near full saturation (100 percent) in all measurements at each of the sites during the sampling events at concentrations between about 9.0 and 11.5 mg/L. The relatively high elevation of the Project area is an important factor in that full saturation (100 percent) of DO in the water is reached at lower concentrations than would occur at sea level. There is a direct relationship between atmospheric pressure and DO—at higher elevations, where air pressure decreases relative to

sea level, the relative oxygen solubility decreases.

PacifiCorp collected total dissolved gas (TDG) measurements twice-daily for two-day sampling periods each month from June to September 2012 (PacifiCorp 2012c). The TDG measurements (in percent-saturation) at the powerhouse tailrace site were all at or near 100 percent saturation. These values indicate that TDG supersaturation (i.e., TDG saturation greater than 110 percent) from potential turbine air entrainment, which can be a problem for aquatic organisms, is not a concern at the Project powerhouse.

During the course of past Project operations, PacifiCorp has flushed the forebay behind the East Fork diversion dam on an as-needed basis to reduce sediment build-up. The current FERC license restricts forebay flushing to the period of May 1 through August 30 of each year for the protection of kokanee eggs and sac fry in the gravel areas upstream of Wallowa Lake. Such flushing temporarily increases turbidity and suspended fine sediments downstream of the diversion dam.

Turbidity and streamflow monitoring conducted by PacifiCorp during June 2012 in the East Fork bypassed reach illustrate the influence of early season high flows on turbidity and fine sediment transport (PacifiCorp 2012c). The purpose of this monitoring was to develop a record of background turbidity and flow for a typical June runoff period prior to future forebay flushing events. The monitoring data indicate that natural turbidity conditions in the East Fork generally vary in response to streamflow runoff events. For example, during the June 2012 data collection, turbidity peaked to a relatively high level of 30 nephelometric turbidity units (NTU) that occurred over a short duration coincident with the first high-flow runoff event of the spring (often called a “first flush”). Subsequent high-flow events that occurred later in the month were of similar flow magnitude (around 80 cfs) but corresponding turbidity peaks only reached around 10 NTU. Between these peaks, turbidity levels were consistently relatively low (less than 5 NTU).

3.3.2.1 Environmental Effects

This section describes effects on hydrology and water quality of PacifiCorp's proposed facilities, operations, and environmental measures (as described in Section 2.2). These effects are determined on the basis of changes from current conditions (baseline) as described in the Affected Environment section above. The discussion of effects in this section is divided under subheadings associated with the specific proposed facilities, operations, and environmental measures as they pertain to hydrology and water quality issues.

Effects of Construction of Proposed Project Facilities and Implementation of Associated Best Management Practices (BMPs)

As described in Section 2.2.1, the proposed Project tailrace reroute facilities would include construction of a new intake structure near the existing Powerhouse tailrace, a new buried conveyance pipeline (consisting of a 30-inch diameter, 1,000-foot (305 m) long pipe), and a reinforced concrete outfall structure that would discharge Powerhouse flows back to the East

Fork Wallowa River. As described in Section 2.2.3, PacifiCorp would implement a number of BMPs for erosion, sediment, and spill prevention and control during proposed construction activities. BMPs would be determined in consultation with and approved by applicable regulatory agencies, such as DEQ (related to applicable 401 Water Quality Certification) and the U.S. Army Corps of Engineers (related to applicable 404 Removal-Fill Permits).

From a water quality perspective, short-term (temporary) increases in turbidity and suspended sediment in the East Fork are expected as a result of the construction activities associated with the proposed tailrace reroute. These short-term construction-related effects could occur from the potential temporary placement of a cofferdam and excavation and disturbance of stream channel substrate in the localized area of the proposed discharge pipe outfall.

Although such construction activities in and along the East Fork would be unavoidable, they are not expected to adversely affect overall water quality conditions within the bypassed reach. The area of construction-related activities, extent and duration of in-water work, and associated disturbance would be relatively small, and the construction-related effects would be short-term and temporary in nature. In addition, the implementation of the proposed construction-related BMPs (as described in Section 2.2.3) would be expected to prevent or minimize the discharge of eroded soils, sediments, or other potential contaminants into the stream channel that might be caused from construction activities.

Effects of Proposed Project Operation with Modified Instream Flow Releases

As described in Section 2.2.2, the Project would continue to be operated in run-of-river mode during all times of generation (i.e., the Powerhouse return flows are not subject to storage and would fluctuate naturally according to East Fork inflow conditions). The automated control system equipment would be set to divert no more than PacifiCorp's water right of 16 cfs, from the East Fork Wallowa River. PacifiCorp proposes modified instream flow releases in the East Fork bypassed reach, consisting of: (1) a flow of 4 cfs released year-around from the Project Diversion; and (2) re-routing of the Powerhouse tailrace so that all Powerhouse flows are returned to the East Fork. The goal of this measure is to manage flows in the East Fork in a manner that provides habitat suitable for the production of healthy and sustainable fish populations while continuing to maintain PacifiCorp's ability to generate hydroelectric power.

No specific recommendations have been made by agencies, Tribes, NGOs, and others on instream flow releases as they pertain specifically to hydrology conditions or flow monitoring. PacifiCorp conducted an instream flow study of the East Fork using the Instream Incremental Flow Methodology (IFIM) Physical Habitat Simulation System (PHABSIM) in coordination with the Oregon Department of Fish and Wildlife (ODFW), the U.S. Fish and Wildlife Service (USFWS), and the U.S. Forest Service (Forest Service). During the process of conducting the PHABSIM study, the agencies made recommendations on aspects of the study methods and results. These recommendations deal with habitat-related matters that are discussed under Aquatic Resources in Section 3.3.3.

The effects of implementing the instream flow releases on water resources (hydrology and water quality) are discussed below. The instream flow releases are particularly important to protecting and enhancing aquatic resources (such as fish and stream habitat), terrestrial resources (such as amphibians and riparian habitat), and recreational opportunities. The specific effects related to these resources are discussed under Aquatic Resources (in Section 3.3.3), Terrestrial Resources (in Section 3.3.4), and Recreational Resources (in Section 3.3.5), respectively.

Relative to hydrology, the effects of implementing the proposed instream flow measure would be to increase flows in the East Fork bypassed reach and decrease flows in the West Fork (below the current tailrace discharge location). In the upstream[4] portion of the East Fork bypassed reach between the dam and the new tailrace discharge location, flows would be increased by about 3.2 to 3.5 cfs (i.e., the difference between the proposed 4 cfs minimum instream flow release and the 0.5 to 0.8 cfs that is currently released). In the downstream portion of the East Fork bypassed reach between the new tailrace discharge location and the mouth, flows would be increased by the returned powerhouse diversion amounts (which are currently discharged to the West Fork). In the West Fork between the current tailrace discharge location and the confluence with the East Fork, flows would be decreased by the powerhouse diversion amounts (that would be discharged to the East Fork). In the Wallowa River downstream of the confluence of the East Fork and West Fork, no changes in flow would occur because the effects of Project operations on flows dissipate as the East Fork and West Fork join.

The proposed minimum flow release of 4 cfs year-around and tailrace reroute to the East Fork would result in the following changes in the magnitude of overall flows within the upstream portion (between the dam and the new tailrace discharge location) and downstream portion (below the new tailrace discharge location) of the East Fork bypassed reach when compared to existing conditions[5]:

[4] In this Water Resources section, the terms “upstream” and “downstream” are used to differentiate the portions of the East Fork bypassed reach that lay above and below, respectively, the proposed new tailrace discharge location in the bypassed reach. These terms are not to be confused with the terms “upper” and “lower” used in the Aquatic Resources section to differentiate portions of the East Fork bypassed reach from a channel gradient and habitat perspective.

[5] PacifiCorp used historic daily USGS flow data to estimate (synthesize) flow regimes at the proposed minimum flow release of 4 cfs as compared to a baseline (current) minimum flow release of 0.8 cfs. While low in-flow and icing conditions during the winter occasionally result in instream flows below 0.8 cfs, during the summer and fall (June through November) at least 0.8 cfs is released into the bypassed reach. For this reason, 0.8 cfs was used as the baseline for analysis. The historic USGS data used for this synthesis consists of a 45-year record of daily flows (1924 to 1952 and 1967 to 1983) at the Wallowa Falls Powerplant Tailrace (USGS Gage No. 13324500) and the East Fork Wallowa River (USGS Gage No. 13325000), when these gages were simultaneously operating. Further details on the calculation methods for the synthesis of these flow regimes are provided in [***PacifiCorp 2012 (c)***].*the Water resources interim study report.*

- An average increase from 20 cfs to 21 cfs (6 percent) in the upstream portion of the reach and 20 to 35 cfs (73 percent) in the downstream portion of the reach during the spring runoff higher-flow period (April-July);

- An average increase from 1.8 to 4.4 cfs (140 percent) in the upstream portion of the reach and 1.8 to 14.7 cfs (over 7-fold) in the downstream portion of the reach during the summer/early fall low-flow period (August-October);

- An average increase from 0.9 to 4.4 cfs (390 percent) in the upstream portion of the reach and 0.9 to 10.9 cfs (over 10-fold) in the downstream portion of the reach during the late fall/winter lower-flow period (November-March).

PacifiCorp used historic daily USGS flow data to calculate the percentage of flow in the West Fork Wallowa River contributed by the Project powerhouse tailrace. The historic USGS data consists of a 15-year period-of-record (1925-1941) when USGS gages were simultaneously operating at: (1) the Wallowa Falls Powerplant Tailrace Near Joseph (USGS Gage No. 13324500); (2) East Fork Wallowa River Near Joseph (USGS Gage No. 13325000); and (3) Wallowa River Above Wallowa Lake Near Joseph (USGS Gage No. 13325500). West Fork flows were determined by subtracting the daily flows at the first and second gages from the third. Assuming that this historic data is indicative of current conditions, changes in the magnitude of overall flows within the West Fork (below the current tailrace discharge location to the confluence with the East Fork) when compared to existing conditions would be:

- An overall average decrease (over the period-of-record) of 27 percent;

- An average decrease of 8 percent) during the spring runoff higher-flow period (April-July);

- An average decrease of 30 percent during the summer/early fall low-flow period (August-October);

- An average decrease of 42 percent during the late fall/winter lower-flow period (November-March).

Relative to water quality, the Project facilities and operations do not cause any direct discharge or load of water quality-related constituents to Project waters. However, the diversion of flow has the potential to affect physical flow conditions (e.g., depths, velocities, wetted widths), which could in turn affect water quality parameters influenced by such conditions, particularly water temperature. Physical flow conditions, such as depths, velocities, and wetted widths, would be increased in the East Fork bypassed reach and decreased in the West Fork (below the current tailrace discharge location). These changes in depths and velocities would likely be similar in magnitude to the percentage changes in flow quantities as listed in the bullets above.

Analysis of water temperature is scheduled to be complete in January 2014. Therefore, an analysis of the effects of the proposed instream flow changes on water temperature is not yet available. However, as discussed previously, all of the study sites, including those affected by flow diversions (e.g., sites BPU and BPL) have relatively low maximum water temperatures that fall within a "cold" classification. The increase in flow in the East Fork bypassed reach could act to moderate the rate of thermal change (due to meteorological conditions) as waters travel down through the reach. As such, it is possible that the increase in flow in the East Fork bypassed reach may result in cooler temperatures in summer and slightly warmer (non-freezing) temperatures in winter, although the magnitude of such temperature changes, if any, would likely be minor. The decrease in flow in the West Fork could have the opposite effect, resulting in warmer temperatures in summer and colder temperatures in winter, but such temperature changes, if any, would also likely be minor.

With the exception of possible effects on temperature in the affected reach of the West Fork, effects of the reroute on other water quality constituents are not anticipated. DO and TDG are also parameters that can be potentially affected by changes in flow quantity, depths, and velocities. However, no effects on DO and TDG are expected from the potential flow changes in this case. As previously discussed, the monitoring data indicate that DO and TDG were at or near full saturation (100 percent) at all locations and times sampled.

Effects of Proposed Project Flow Monitoring

In implementing the proposed modified instream flow releases in the East Fork bypassed reach, PacifiCorp would continue to maintain a gage to monitor flow to the East Fork from the Project Diversion dam. This location is the current FERC-compliance point for monitoring instream flow, and would continue to serve as the compliance point under proposed Project operations. New gaging equipment would be installed and maintained at this gage location to enhance flow measurement accuracy. The effect of this measure would be to provide verification that proposed modified instream flow releases are being implemented as planned.

Effects of Proposed Sediment Management Program for Forebay Maintenance Flushing

As described in Section 2.2.2, it is necessary to flush accumulated native sediment from the Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. PacifiCorp proposes to cease the historic practice of flushing entrained native sediment from the forebay during the summer low-flow period and flush sediment from the forebay during peak spring runoff in the month of June. Annual forebay flushing would result in the removal of approximately 250 to 500 cubic yards of accumulated sediment from the forebay and the mobilization and transport of that sediment into the East Fork bypassed reach. Under the proposed sediment management program, flushing would also occur relatively quickly, with the flushing lasting no more than 24 to 72 hours.

The effects on water resources (water quality) of implementing the proposed sediment management program for forebay maintenance flushing are discussed below. The proposed

sediment management program is particularly important for protecting fish and macroinvertebrates, and aquatic and riparian habitat. The specific effects related to these resources are discussed under Aquatic Resources (in Section 3.3.3) and Terrestrial Resources (in Section 3.3.4).

Relative to water quality, the effects of implementing the proposed sediment management program for forebay maintenance flushing would be to minimize the magnitude and duration of potential increases in suspended sediments and turbidity in the East Fork bypassed reach and the Wallowa River below the confluence with the East Fork. Conducting the forebay flushing action during high-flow peak runoff would allow turbidity and fine sediments to pass when levels are already naturally elevated. Also, by conducting the forebay flushing action relatively quickly during the peak flow period, sediment deposition in the East Fork downstream of the forebay would be minimized by allowing as much fine sediment as possible to move downstream through the bypassed reach. Subsequent peak flows would continue to move sediment out and minimize deposition through the bypassed reach.

From a water quality perspective, forebay flushing would be expected to cause short-term (temporary) increases in turbidity and suspended fine sediments downstream in the East Fork bypassed reach and in the Wallowa River downstream of the mouth of the East Fork. However, the proposed flushing of the forebay during the June high flow period would be expected to minimize the relative increase in turbidity and suspended fine sediments over natural baseline conditions. In addition, the concentration of turbidity and suspended sediments resulting from the forebay flushing would be limited in duration to a single event (annually) of 24 to 72 hours.

Effects of Turbidity Monitoring Plan Associated with Forebay Maintenance Flushing

As described in Section 2.2.3, PacifiCorp proposes to implement a Turbidity Monitoring Plan during forebay flushing to assess and verify the effectiveness of the sediment management program for forebay maintenance flushing. The effect of this measure would be to provide verification that the sediment management program is being implemented as planned.

3.3.3 Aquatic Resources

This section describes the existing conditions in the Project area related to fisheries and other aquatic resources. This includes the aquatic species that currently exist and how they are affected by existing Project facilities and operations. The descriptions in this section serve as the baseline against which the effects on aquatic species of proposed Project facilities and operations are assessed below.

Affected Environment

Aquatic Habitat in the Project Area

The Project forebay is approximately 0.2 surface acres (0.08 ha) in size and averages 5 feet (1.5 m) deep. Because the Project operates as run of river, there is no measurable storage. Though no measurable storage is present in the forebay, habitat in this area is lacustrine, and given the shallow water depth no thermal stratification is present. Substrate in the forebay consists of deposited silt, sand, and other glacial fines. PacifiCorp documented four juvenile brook trout in the forebay during a 2013 snorkel survey.

Water diverted at the forebay travels through the flow line and penstock to the generating turbine in the Project powerhouse. Water exits the turbine and is discharged into an approximately 985-foot (300 m)[6] long tailrace discharge channel that empties into the West Fork Wallowa River. This channel has an average wetted-width of 10 feet (3.1 m) and an average depth of one foot (0.3 m). The habitat type within the tailrace channel is dominated by high gradient riffle with very few pools. PacifiCorp (2012) has documented bull trout (*Salvelinus confluentus*), brook trout (*Salvelinus fontinalis*), kokanee (*Oncorhynchus nerka*), rainbow trout (*Oncorhynchus mykiss*), mountain whitefish (*Prosopium williamsoni*), and sculpin (*Cottus* ssp.) present in the tailrace channel.

Local topography divides the 1.7-mile East Fork Wallowa bypassed reach into distinct lower and upper segments. The lower segment of the bypassed reach (lower bypassed reach) is 4,700 feet (1,433 m) long and has an average slope between 6% and 7%. Substrate is comprised chiefly of cobble and boulder. The predominant mesohabitat types include sequences of steep riffles and rapids. Individual pools are present in the lower bypassed reach, but they are rare. The upper segment (upper bypassed reach) is 4,370 feet (1,332 m) long and has an average slope between 19% and 20%. Steep cascades with turbulent flow over boulders and bedrock chutes characterized the upper segment. The two segments are divided by a 12-foot (3.7 m) falls, an impassable fish barrier. The location of this fish barrier is provided in Appendix A.

The lower bypassed reach is a valuable feature for aquatic resources in Wallowa Lake because it provides scarce spawning and rearing habitat for the species present, including Endangered Species Act (ESA) listed bull trout. The upper bypassed reach, though permanently inaccessible to bull trout and other migratory species, provides limited habitat for rainbow and brook trout out-migrating from Aneroid Lake upstream.

Since the construction of the Wallowa Falls hydroelectric project, relatively low minimum flows have been maintained in the bypassed reach. In fact, the minimum flow restrictions stipulated in the existing license are considered to be one of the limiting factors of habitat for fish in the bypassed reach.

[6] This figure only includes the primary tailrace channel. There are approximately 1,320 feet (310 m) of additional tailrace side channels. No fish species have ever been documented in the tailrace side channels.

Channel alteration is an additional effect on fish habitat in the bypassed reach. More than one-third of the lower bypassed reach has been altered by residential development. Actions such as channelization and bank armoring have resulted in an incised and confined channel with relatively high water velocities. Upstream of the residential area, on land owned by PacifiCorp, the lower bypassed reach retains many of its natural energy dissipation features, including channel sinuosity, side/braided channels, and connectivity with the floodplain.

Lack of spawning-sized substrate throughout the lower bypassed reach also contributes to the degraded habitat conditions. The downstream transport of finer substrates is obstructed by the Wallowa Falls diversion dam and the Project forebay. Periodic flushing of the forebay helps augment the bypassed reach with finer substrates, but the forebay flushing schedule has been suspended in recent years due to regulatory implications related to the discovery of bull trout in the bypassed reach.

The West Fork Wallowa River section between the confluence with the Project tailrace channel and the confluence with the East Fork Wallowa River is approximately 1,200 m in length with an average wetted-width in this section of 17 m. The West Fork Wallowa River is a high-energy, high velocity river and the substrate in this section is dominated by large boulders and cobble. The Project currently discharges the full powerhouse flow (up to 16 cfs) into the West Fork. This contribution to the West Fork makes up about 30 percent on average of the total flow of the West Fork Wallowa River during the late summer spawning period. After the West Fork and East Fork join, the Wallowa River flows for about 0.6 miles to Wallowa Lake. The Wallowa River is a relatively rapidly-flowing river along this stretch, with substrate dominated by cobble, boulders, and gravel. Because flows from the West Fork and East Fork are joined in this stretch, effects from Project operations in this reach have been attenuated and are no longer present as the Wallowa River flows to Wallowa Lake. Wallowa Lake is a natural glacially-scoured lake which contains deep and highly stratified lacustrine habitat. Species present in the lake include those noted above for the river areas plus lake trout (*Salvelinus namaycush*), and large-scale sucker (*Catostomus macrocheilus*).

Wallowa Lake and portions of the East and West Forks of the Wallowa River are listed under the Bull Trout Critical Habitat Designation Final Ruling (Federal Register, Vol. 75, No. 200 – October 2010 pgs. 63,898 – 64,070). The waterways upstream of the irrigation dam at the terminus of Wallowa Lake are listed as Essential Fish Habitat for spring Chinook and Coho under the Magnuson-Stevens Fishery Conservation and Management Act (NOAA 2008).

Fish Community in the Project Area

Fish species known to occur by direct observation in waterways within the Project area include rainbow trout, kokanee, brook trout, ESA-listed bull trout, mountain whitefish, and sculpin. Fish abundance, distribution, and species composition information comes mainly from the following three data sources:

(1) Oregon Department of Fish and Wildlife (ODFW) annual fish propagation reports;

(2) Fish salvages of the approximately 985-foot (300 m) long tailrace discharge channel immediately downstream of the Project powerhouse. Salvages were performed prior to or during de-watering events in 2009-2013; and,

(3) PacifiCorp's FERC relicensing fishery surveys performed in 2012 and 2013.

According to the 2012 ODFW Propagation Annual Report, Aneroid Lake, a small highland lake with an outlet to the East Fork five miles upstream of the Project forebay, was most recently stocked with 4,000 Cape Cod strain rainbow trout fingerlings in 2011 (ODFW 2012). Aneroid Lake currently is on a three-year stocking cycle. This same strain of rainbow trout is also annually stocked in Wallowa Lake (ODFW 2012). Cape Cod strain rainbow trout are generally thought to have lower migrating tendencies as compared to other strains of hatchery rainbow trout utilized in Oregon (Kinunen and Moring 1976). It is assumed that rainbow trout within the Project area are mainly comprised of these hatchery plants.

Historically, Wallowa Lake supported a native stock of kokanee. The native population experienced a precipitous collapse in the early 1960's, which lead to artificial supplementation of kokanee from sources located out of basin. The lake was last stocked with kokanee in 1982. The current population is self-sustaining though genetically not comprised of the native stock (Cramer and Witty 1998). In the past, kokanee have been known to spawn in the lower gradient reaches of both the Project tailrace channel and the East Fork bypassed reach.

Non-native introduced brook trout are also found within the Project area. Brook trout were stocked in Aneroid Lake starting in the early 1900's with the last hatchery plant occurring in the 1950's (Pers. Comm. Bill Knox, ODFW, September 2010). These fish have naturally persisted and are dispersed throughout the Project area.

At this time, the specific strain or local population origin of bull trout inhabiting the Project area are not known. Most native stock bull trout were thought to be extirpated by the late 1950's during an eradication effort to reduce predation and competition on rainbow trout within Wallowa Lake. This local extirpation led to a hatchery reintroduction program in 1968, when bull trout and Dolly Varden (*Salvelinus malma*) from an Alaskan hatchery were released into Wallowa Lake. This reintroduction program was believed to have failed and was discontinued in 1978 (Buchanan et al. 1997). In 1997, ODFW released 600 bull trout ranging in size from 70 – 380 millimeters (mm) into Wallowa Lake. These fish were salvaged from a decommissioned hydroelectric plant's power canal located on Big Sheep Creek in the Imnaha River drainage. No monitoring was conducted of these released bull trout, but catches of bull trout showed up periodically in lake creel surveys after the 1997 release until 2004 (Pers. Comm. Bill Knox, ODFW, September 2010). Based on the lack of bull trout observed from 2004 onward, bull trout in Wallowa Lake were once again identified as extirpated in 2005 (Goodson et al. 2005). More recently, bull trout were once again observed by PacifiCorp in 2010. To date, 119 bull trout have been captured, handled, and released from areas within or in the vicinity of the Project area. Mountain whitefish, large-

scale suckers, and sculpin in the Project vicinity are assumed to be of native stock origin and naturally persist within the Project area.

Aquatic Invertebrate Community in the Project Area

Benthic macroinvertebrate samples were obtained in the East Fork bypassed reach in summer 2012 and again in summer 2013. Analysis of the 2012 samples has been completed, and the results provide insights into the composition of the macroinvertebrate community in the Project area. Analysis of the 2013 samples is scheduled to be completed in January 2014. Therefore, a detailed analysis is not yet available of the macroinvertebrate community and the potential effects of proposed Project operations.

Analysis of the 2012 samples indicates that the macroinvertebrate community in the Project area consists of a diverse assemblage of aquatic insects, including a variety of mayflies (*Ephemeroptera*), stoneflies (*Plecoptera*), caddisflies (*Trichoptera*), and midges (*Chironomidae*). Many of the taxa observed in the samples are cold-water species typical in Pacific Northwest mountain streams and indicative of good water quality and diverse habitat (substrate) conditions. Some taxa were present in samples from the lower end of the bypassed reach that are tolerant of (and therefore indicative of) fine sediment substrate accumulation. For example, *Oligochaeta* (segmented worms) abundance was moderate to high in these samples. Oligochaetes are most often associated with fine sediment. The composition and trends in the macroinvertebrate community in the Project area will be further assessed and verified based on analysis of the 2013 samples (scheduled to be complete in January 2014).

3.3.3.1 Environmental Effects

This section describes effects on hydrology and water quality of PacifiCorp's proposed facilities, operations, and environmental measures (as described in Section 2.2). These effects are determined on the basis of changes from current conditions (baseline) as described in the Affected Environment section above. The discussion of effects in this section is divided under subheadings associated with the specific proposed facilities, operations, and environmental measures as they pertain to aquatic resource issues.

Effects of Construction of Proposed Project Facilities and Implementation of Associate Best Management Practices (BMPs)

As described in Section 2.2.1, the proposed tailrace reroute facilities construction would include a new intake structure near the existing Powerhouse tailrace, a new buried conveyance pipeline (consisting of a 30-inch (76.2 cm) diameter, 1,000-foot (305 m) long pipe), and a reinforced concrete outfall structure that would discharge Powerhouse flows back to the East Fork Wallowa River. As described in Section 2.2.3, PacifiCorp would implement a number of BMPs for erosion, sediment, spill prevention and control, and fish protection during the construction activities. There will be substrate and water quality effects from the construction of the proposed tailrace facilities. These effects are discussed in

Section 3.3.1, Geology, Sediment and Substrate and Section 3.3.2 Water Resources, respectively. Measures specific to fish protection are summarized below:

- PacifiCorp shall ensure that any fill materials that are placed for the proposed habitat improvements in any water of the state do not contain toxic materials in toxic amounts.

- Work areas behind temporary cofferdams or isolated work areas below the OHWM will be dewatered with pumps. All pumped water will be discharged to unsaturated upland vegetated areas for infiltration

- All water intakes used for a construction project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated, and maintained according to National Marine Fisheries Service (NMFS) fish screen criteria.

- Before and intermittently during pumping to isolate an in-water work area, attempt to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury. The entire capture and release operation will be conducted or supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA listed fish. The work will comply with the requirements in the and U.S. Fish and Wildlife Service (USFWS) biological opinion issued with the new license and PacifiCorp's State Scientific Collection Permit issued by Oregon Department of Fish and Wildlife (ODFW).

These measures, along with best management practices for erosion control, spill prevention and water quality protection measures are expected to mitigate any potential short-term or long-term adverse effects to fish species and habitat.

Effects of Proposed Project Operation with Modified Instream Flow Releases

As described in Section 2.2.2, the Project would continue to be operated in run-of-river mode during all times of generation (i.e., the Powerhouse return flows are not subject to storage and would fluctuate naturally according to East Fork inflow conditions). The automated control system equipment would be set to divert no more than PacifiCorp's water right of 16 cfs, from the East Fork Wallowa River. PacifiCorp proposes increased instream flow releases in the East Fork bypassed reach, consisting of: (1) a year-around flow of 4 cfs as measured at the compliance gage below the dam; and (2) rerouting of the powerhouse tailrace so that all powerhouse flows are returned to the East Fork Wallowa River bypassed reach. The goal of this measure is to manage flows in the East Fork in a manner that provides habitat suitable for the production of healthy and sustainable fish populations and eliminates the potential to strand ESA listed bull trout in the current tailrace, while continuing to maintain PacifiCorp's ability to generate hydroelectric power.

Under Article 401 of the current license, PacifiCorp is required to maintain a minimum flow of 0.5 cfs in the bypassed reach. To insure continuous compliance with the existing minimum flow provision of 0.5 cfs, PacifiCorp typically releases an additional discharge of 0.3 cfs. Accordingly, actual flow released may range between 0.5 and 0.8 cfs largely depending on season.

PacifiCorp performed an IFIM study in 2012 to evaluate the effects of various minimum flows on habitat in the East Fork bypassed reach for adult, juvenile, and spawning bull trout, as well as spawning kokanee. The study reach was limited to the lowest 1,600 feet (488 m) of the bypassed reach (the altered residential segment), where stream conditions met the fundamental assumptions of the computer model used to simulate habitat. A detailed discussion of the IFIM study methodology is provided in the Wallowa Falls Habitat Modeling Results Preliminary Report (PacifiCorp 2013). As described above, flow currently released into the bypassed reach at the dam may range between 0.5 and 0.8 cfs, dependent upon season. During winter months, icing and low in-flow to the forebay may result in flows of less than 0.8 cfs in the bypassed reach. During the summer and fall (June through November) at least 0.8 cfs is released into the bypassed reach. For this reason, the IFIM study used 0.8 cfs as the baseline for analysis.

As part of the two-fold instream flow proposal to enhance fish resources in the bypassed reach, PacifiCorp would release an increased, year-round minimum flow of 4 cfs. The increased minimum flow release of 4 cfs at the compliance point below the dam would substantially increase the availability and usability of aquatic habitat in the bypassed reach. This is particularly the case for the portion of the bypassed reach between the natural fish barrier (falls) and the location where the rerouted tailrace would discharge into the bypassed reach. This length represents a third of the accessible habitat within the bypassed reach, or approximately 1,500 feet (457 m). As explained further later in this section, the tailrace reroute would further increase the amount of aquatic habitat available in the bypassed reach below the new discharge location by restoring the natural hydrology to the lower 2,600-foot (793 m) portion of the reach.

No water velocity data or IFIM transects were assessed in this upper portion of the bypassed reach above the proposed tailrace reroute pipe outlet due to the turbulence caused by the steep gradient, confined channel, and geomorphology of the streambed in this section. As a result of the steep gradient, confined channel, and abundance of exposed bedrock, it is expected that instream flow increases do not increase wetted width, but simply increase turbulence and velocity in this upper portion of the bypassed reach. As such, it is assumed that an instream flow release of 4 cfs, which is based on conditions in the lower portion of the bypassed reach, would also maintain or enhance conditions in the higher-gradient upper portion of the bypassed reach.

About 50 percent of the 119 bull trout captured since 2010 have occurred in the upper portion of the bypassed reach. Given the documented presence of large numbers of bull trout at roughly a tenth of proposed flows, the proposed increase to a year-round minimum flow of 4 cfs would be expected to fully support bull trout in the upper portion of the bypassed reach

for two reasons. First, the bull trout population has been self-sustaining in this location at the present minimum flow release of 0.5 cfs. Second, as stated above, IFIM-based flow recommendations from the lower portion of the bypassed reach would also maintain or enhance conditions in the upper portion of the bypassed reach. The results of the IFIM modeling indicated that a minimum instream flow of 4 cfs would provide the greatest benefit to all life-stages of bull trout in terms of enhancing the availability of usable habitat in the assessed lower portion of the bypassed reach.

Bull trout spawning habitat preferences are well documented in the literature. Numerous researchers have documented their propensity to spawn in shallow, low velocity stream margin areas (Fraley and Shepard 1989, McPhail and Baxter 1996). Given the known habitat conditions and high gradient in the upper portion of the bypassed reach, it is possible that increasing minimum instream flows beyond the proposed 4 cfs level would cause water velocity to be too high during the bull trout spawning period and thereby further degrade the relatively small amount of existing bull trout spawning habitat. The proposed 4 cfs flow regime would provide a balanced flow that would be mutually beneficial to multiple life-stages of bull trout in this area while maintaining the small amount of existing spawning habitat.

As a second key element of the proposed modified instream flow releases in the East Fork bypassed reach, PacifiCorp would reroute the powerhouse tailrace from its current point of discharge into the West Fork Wallowa River, to the East Fork lower bypassed reach. The tailrace reroute provides two benefits to aquatic resources. First, it will eliminate the risk of stranding ESA-listed bull trout, kokanee and other aquatic species in the existing tailrace when unit trips cause the headgate to close as described in Section 2.1.3. Second, the tailrace reroute will increase the amount of aquatic habitat available in the bypassed reach below the new discharge location on the East Fork Wallowa River. Reintroducing the natural, un-impeded flow would further the goal of restoring the River's natural form and function in the lower bypassed reach. The tailrace reroute would affect approximately 2,600feet (793 m) of accessible habitat from the point of entry to the mouth of the East Fork Wallowa River.

The proposed tailrace reroute would convey the full powerhouse discharge to the East Fork of the Wallowa River. The conveyance pipeline would consist of a reinforced concrete intake structure, buried pipeline, and reinforced concrete outfall structure. The intake structure would include an isolation gate at the pipeline entrance and overflow channel leading to the current tailrace channel for maintenance and emergency overflow purposes. The outfall structure will include a drop structure or velocity barrier to prevent all life stages of fish species from entering the pipeline. As mentioned above, PacifiCorp proposes to retain the current tailrace channel, which discharges to the West Fork Wallowa River, for use as an emergency spillway. The main channel of the tailrace that currently cuts through Pacific Park on the south side of the park road will be retained and possibly deepened to handle the full generation flow. The braided tailrace side channels on the north side of the park road will be reclaimed and restored to match surrounding contours.

Although the main channel of the existing tailrace is currently used by bull trout, brook trout, rainbow trout, kokanee, mountain whitefish, and sculpin, the proposed tailrace reroute will result in the existing tailrace only being watered during maintenance or emergency conditions. The tailrace reroute effectively removes 985 feet (300 m) of available fish habitat (between the powerhouse and West fork Wallowa River). Though the main tailrace channel is assumed to be cold water refugia for bull trout during the summer months, it presents the significant risk of fish stranding and subsequent desiccation due to unit trips that result in the penstock headgate closing. PacifiCorp believes the risk of stranding ESA listed bull trout outweighs the benefit of existing habitat conditions in the current tailrace.

In the event the existing tailrace is utilized during an emergency situation or put in use during maintenance activities, PacifiCorp biologists or other qualified persons will conduct a fish salvage prior to any dewatering of the channel to prevent stranding of bull trout and other fish species.

Although fish use of the tailrace side-channels is certainly possible, it is likely not significant. To date, no fish have ever been captured or directly observed in the tailrace side-channels. Therefore, removal of these side channels is not expected to have a significant impact on aquatic habitat or species therein.

Effects of Proposed Project Flow Monitoring

In implementing the proposed modified instream flow releases in the East Fork bypassed reach, PacifiCorp would continue to maintain a gage and monitor flows at the upper end of the East Fork bypassed reach just below the Project diversion (site BPU). Effects of the gage related to flow monitoring and compliance are discussed above in Section 3.3.2. Construction of the gage would cause temporary, localized disturbance of a small area of the stream channel at the gage site. The disturbance effects would be short-term and temporary in nature. In addition, the implementation of the proposed construction-related BMPs (as described in Section 2.2.3) would be expected to further minimize stream channel effects.

Effects of Proposed Sediment Management Program for Forebay Maintenance Flushing

As described in Section 2.2.2, it is necessary to flush accumulated native sediment form the Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. PacifiCorp proposes to cease the historic practice of flushing entrained native sediment from the forebay during the summer low-flow period in favor of flushing sediment from the forebay during peak spring runoff in the month of June. Annual forebay flushing would result in the removal of approximately 250 to 500 cubic yards of accumulated sediment from the forebay and the mobilization and transport of that sediment into the East Fork bypassed reach.

The forebay flushing would likely impact downstream fish and their habitat, but the sediment management program would help to minimize such impacts to the extent practicable. The forebay flushing would be conducted concurrently with the snowmelt runoff and peak flows.

As such, the increase in turbidity and fine sediments from forebay flushing would occur when turbidity and fine sediments are already naturally elevated. In addition, since the forebay flushing would be completed within 24 to 72 hours, the naturally-occurring seasonal turbidity and fine sediment runoff event would likely not be extended in duration.

Effects of the proposed forebay flushing program on sediment and substrate within the Project area are discussed in Section 3.3.1, Geology, Sediment and Substrate. Although, short-term localized effects to the existing baseline substrate conditions in the action area may occur as a result of forebay flushing, it is not expected to adversely affect substrate conditions in the Project area. The potential effects to fish of short-term elevated levels of total suspended solids and turbidity resulting from forebay flushing is discussed below.

Turbidity and fine suspended sediment effects on fish reported in the literature range from beneficial to detrimental (Newcombe and MacDonald 1991, Newcombe and Jensen 1996). For example, elevated turbidity and fine suspended sediment conditions have been reported to enhance cover conditions and reduce piscivorous fish/bird predation rates (Lloyd et al. 1987, Gregory and Levings 1998). On the other hand, elevated turbidity and fine suspended sediment conditions can cause physiological stress and reduce growth (Newcombe and Jensen 1996). Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (DeVore et al. 1980). Avoidance of turbid waters begins between about 25-70 NTU (Sigler et al. 1984, Lloyd 1987). Salmonids have been observed to move laterally (Servizi and Martens 1992), and downstream to avoid turbid plumes (McLeay et al. 1987). However, the presence of salmonids in the East Fork during the spring, when turbidity is naturally high, indicates these areas are not avoided altogether during high turbidity events.

Salmonids have evolved in river systems that periodically experience short-term (days to weeks) or seasonally-high elevated turbidity and fine sediment events (winter storms and floods) and are adapted to periodically high turbidity and fine sediment exposures. Adult and larger juvenile salmonids appear to be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjorn and Reiser 1991). However, if exposure is chronic, physiological stress responses are likely that can increase maintenance energy and reduce feeding and growth (Redding et al. 1987, Lloyd 1987, Servizi and Martens 1992).

As discussed above, PacifiCorp's Sediment Management Program will shift the timing of forebay flushing to June. This coincides with the onset of the annual high flow period, precedes the spawning period for bull trout and kokanee by three to four months, and is two to three months after fry emergence for these two species. Rearing juvenile fish may be in the bypassed reach during this period; however, given that the average monthly stream flow in the bypassed reach during the month of June is 61 cubic feet per second (cfs) (PacifiCorp 2011) juvenile bull trout, brook trout and rainbows would be expected to be holding in the interstitial spaces between rocks or in pockets of lower velocity water along the river margins. Sediment flushed during these annual peak flows is expected to be quickly transported through the action area in the higher velocity water in the thalweg of the river.

The month of June is a period of peak flows, naturally higher turbidity levels and maximum annual sediment transport within the river. It is expected that flushing sediment from the project forebay during this period will not significantly affect bull trout or other resident and rearing rainbow trout and brook trout individuals or juvenile rearing habitat within the Project area.

Given the timing of flushing during annual peak flows, the small volume of naturally-deposited sediment to be flushed, and the existing healthy and diverse macroinvertebrate community in the bypassed reach downstream of the natural fish barrier relative to other streams in the upper Wallowa River basin (PacifiCorp 2012d), annual forebay flushing is not expected to have an adverse effect on the aquatic macroinvertebrate community within the bypassed reach. It is expected that flushing sediment from the Project forebay during this period will not significantly affect bull trout or other resident and rearing rainbow trout and brook trout individuals or juvenile rearing habitat within the Project area.

As described in Section 2.2.3, PacifiCorp proposes to implement a Turbidity Monitoring Plan during forebay flushing. The Turbidity Monitoring Plan is discussed in Section 3.3.2, Water Resources.

Threatened and Endangered Aquatic Species

PacifiCorp, the Federal Energy Regulatory Commission (FERC), the USFWS, and relicensing parties have agreed to consult on one fish species per Scoping Document (SD) 1 (April 22, 2011), SD 2 (August 4, 2011) and changes in listing status since the Pre-Application Document was submitted. The federal Endangered Species Act (ESA) listing status (Threatened, Endangered or Candidate) and Critical Habitat designation for bull trout is discussed below.

Bull trout (*Salvelinus confluentus*) were first listed as threatened under the ESA on June 10, 1998 (63 FR 31647). This original listing included the Columbia River and Klamath River distinct population segments (DPSs). The USFWS later added the Jarbidge River, Coastal-Puget Sound, and St. Mary-Belly River DPSs to the listing. A final ruling was issued on November 1, 1999 that assigned threatened status to all populations of bull trout within the coterminous United States (64 FR 58910, 58933). The USFWS considers bull trout threatened because of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, and the introduction of non-native species (63 FR 31647).

Critical Habitat was originally designated for the Columbia River and Klamath River DPSs on October 6, 2004 (69 FR 59996). On January 13, 2010, the USFWS proposed to revise its designation of Critical Habitat for bull trout (75 FR 2270). In total, the USFWS proposed designating approximately 22,679 miles of streams and 533,426 acres (215,870 ha) of lakes and reservoirs in Idaho, Oregon, Washington, Montana and Nevada, and 985 miles of marine shoreline in Washington as Critical Habitat for bull trout. A final ruling on Critical Habitat for bull trout in the coterminous United States was designated on October 18, 2010, and

included lower portions of the East Fork and West Fork Wallowa Rivers (75 FR 63898) (see Figure 2). As a result of the final Critical Habitat designation, bull trout populations were divided into six Recovery Units based on "assemblages of bull trout core areas (metapopulations, or interacting breeding populations) that retain genetic and ecological integrity and are significant to the distribution of bull trout throughout the conterminous United States" (75 FR 63898). The East Fork Wallowa River is located within the MC Recovery Unit.

3.3.4 Terrestrial Resources

The Project is located in the Wallowa Mountains on the East Fork of the Wallowa River. This area is typical of mountain valleys in that it is constrained by steep topography with mountain peaks, a valley floor, and forested slopes with exposed ridges, rock outcrops, and talus. Streams and rivers are typically high gradient and constrained by steep valley walls.

To determine the impacts and develop baseline information for the Project, PacifiCorp identified 5 terrestrial resource studies: Special Status Plants, Noxious Weeds, Riparian and Wetland, Vegetation Cover Type, and Wildlife Species. Each of the terrestrial resource studies used the same Study Area which includes all lands owned by PacifiCorp or United States Forest Service (Forest Service) and that are within 328 feet (100 meters) of a Project facility. This Study Area was developed prior to the tailrace reroute, therefore only a portion of the tailrace reroute was within the Study Area. The Terrestrial map in Appendix E shows the estimated 126.5 acre (51.2 ha) Study Area which includes the entire proposed Project boundary, as well as all project facilities including the forebay, entire access road, and tailrace (PacifiCorp Energy 2011). The Project may potentially affect each of the study areas, either directly or indirectly, and some of the proposed Project actions will affect more than one study area. Each terrestrial resource study will be described independently to more accurately describe the baseline conditions and the impact from a proposed action.

Special Status Plants

Special status plants for the purposes of this Project are defined as any plant species that is on one or more of the following lists:

- Regional Forester's Special Status Species Lists for Sensitive Non-Vascular and Vascular plants on the Wallowa-Whitman National Forest

- United States Fish and Wildlife Service (USFWS) status that is Listed Endangered, Listed threatened, Proposed Endangered, Proposed Threatened, Candidate, Species of Concern, and Partial Status

- Oregon Department of Agriculture (ODA) Status that is Listed Endangered, Listed Threatened, Proposed Endangered, Proposed Threatened, Candidate

- Oregon Biodiversity Information Center (ORBIC) List 1 or 2.

There are several records of special status plant species in the vicinity of the Project. The ORBIC has 15 records of special status plant species within 2 miles of the Project, which includes 3 USFWS Species of Concern and 1 ODA Threatened species (ORBIC 2012). In 1993, PacifiCorp conducted a rare plant survey in 1993 prior to conducting construction on the dam (PacifiCorp 1993). The survey identified 157 plant species including a previously documented population of *Botrychium* spp., which is a Federal Species of Concern and State Candidate species (PacifiCorp 1993). The individual plants were unable to be distinguished to species and no other rare plants were identified during the survey.

As part of the relicensing studies, a special status plant survey was completed in the Study Area (Appendix E). This study included two field surveys during the 2012 growing season and each survey was conducted by qualified Bio-Resources, Inc. staff botanists using the currently accepted Intuitive-Controlled Methodology, as described in "Survey protocols for survey and manage strategy 2 vascular plants" (Whiteaker et al. 1998). Survey methods and processes were documented using methods described in the Documentation Section of Wallowa Falls Botanical Inventory Methodology (Forest Service 2011), and Threatened, Endangered, and Sensitive Plants Survey Field Guide (Forest Service 2005). During each survey all habitats types were visited and surveyed to the intensity level as warranted for probability. Because several data sources identified *Botrychium* species within the Study Area, all alluvial terraces along the streams and the forebay area were considered high probability habitat and were intensely surveyed to 100 percent cover (BioResources 2012).

No special status plant species were detected within the Study Area during either of the plant surveys. The survey result maps and forms are available in the Study Progress Report (PacifiCorp 2012e).

Noxious Weeds

The Wallowa Falls Hydroelectric Project is at the gateway to the Eagle Cap Wilderness Area; therefore undetected and untreated noxious weeds infestations may promote the spread of noxious weeds into the pristine habitats of the Eagle Cap Wilderness Area. Limited data exists for noxious weeds sites in and around the Project, but ODA's Weedmapper database identified Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), meadow hawkweed (*Hieracium pretense*), myrtle spurge (*Euphobia myrsinites*), spotted knapweed (*Centaurea maculosa*), and tansy ragwort (*Senecio jacobaea*) in the vicinity of the Study Area (Oregon Department of Agriculture 2011). Personal communication between Mark Porter, Coordinator of the Wallowa County Cooperative Weed Management Area, and Kendrick Moholt of Bio-resources, Inc. on 16 May 2012, identified that meadow hawkweed sites were located in a small area northwest of the confluence of Royal Purple Creek and East Fork Wallowa River and two sites south and west of the Wallowa Falls Powerhouse, and spotted knapweed had been located near the main trailhead parking area at the main Forest Service trailhead. These noxious weeds locations as well as noxious weeds infestations identified during the Noxious Weeds Study are shown on the map provided in Appendix F.

PacifiCorp conducted a noxious weeds study to create a baseline map of existing infestation from both known reports and new discoveries and to identify areas that have high, medium, and low noxious weeds potential. The following table shows the noxious weeds identified, their associated ODA and Wallowa County classification, and abundance within the Study Area (Appendix E). Appendix F provides a map of the noxious weeds locations and identifies the area of high, medium, and low weed potential in the Study Area.

Table 5. Noxious Weeds Identified within the Study Area

Common Name	Scientific Name	ODA	Wallowa County	Infestation Size
Meadow hawkweed	*Hieracium Pratense*	A & Target	B & Target	45 plants within 100 ft^2
				20 plants within 9 ft^2
St. John's Wort	*Hypericum perforatum*	B	B	50 plants within 80 ft^2
Houndstoungue	*Cynoglossum officinale*	B	B	1 plant within 1ft^2
				40 plants within 100 ft^2
Spotted knapweed	*Centaurea stoebe*	B & Target	A & Target	2 plants within 8 ft^2
Common Burdock	*Arctium minus*		B	2 plants within ¼ mile.
Bull thistle	*Circium vulgare*	B		50 plants within 1.5 mile
Canada thistle	*Circium arvense*	B	B	1000 plants within 1.5 mile
Oxeye Daisy	*Chrysanthemum leucanthemum*		B	1000 plants within 1.5 mile

Riparian and Wetland

The Project area is comprised of a v-shaped valley defined by high elevation mountain ridges and steep slopes. The gradient of the East Fork Wallowa River in the Project boundary is fairly high and varies from 8 to 19%. The steep terrain makes topographical indicators for streams relatively apparent and wetlands are primarily limited to areas with flat terrain, such as the campground and near the forebay. A Riparian and Wetland Study was completed as part of the relicensing to verify and correct locations of known waterbodies and to identify additional wetlands, seeps and/or seasonal flowing streams within the Study Area (Appendix E).

Each river, stream, and wetland in the Study Area had the appropriate category of Riparian Habitat Conservation Area (RHCA) standard width buffer amended (Forest Service 1990, Forest Service-BLM 1995). Table 6 provides the RHCA definitions, identifies which stream, river, and wetland it applies to and shows the total acres (ha) for each RHCA category within the Study Area. The map provided in Appendix G shows the location of each stream, river, and wetland in the Study Area with the appropriate RHCA buffer.

Table 6. Riparian Habitat Conservation Acre Standard Widths to Waterbodies within the Wallowa Falls Hydroelectric Project Study Area

Riparian Habitat Conservation Area Category	Minimum Riparian Habitat Conservation Area Standard Widths	Waterbody	Total Area [acres (ha)] within the Study Area
Category 1 - Fish-bearing Stream	Stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is the greatest.	EF Wallowa River, WF Wallow River, and Tailrace	91.56 (37.01)
Category 2 - Permanently-flowing non-fish bearing streams	Stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance, whichever is the greatest.	Royal Purple Creek	8.80 (3.6)
Category 3 – Ponds, lakes, reservoirs, and wetland greater than 1 acre	Consists of the body of the water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonal saturated soil, or the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.	None	0.0
Category 4 - Seasonally-flowing or intermittent streams, wetlands less than 1 acre, landslides and landslide-prone areas	Must include: a. the extent of landslides and landslide prone areas b. the intermittent stream channel and the area to the top of the inner gorge. c. the intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation. d. for watersheds identified as key or priority watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide prone area to a distance equal to the height of one-site potential tree, or 100 feet slope distance, whichever is greatest. e. for watersheds not identified as key or priority watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide prone area to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greatest.	Intermittent Streams	2.13 (0.86)
		Trail Wetland #1	0.71 (0.29)
		Trail Wetland #2	0.69 (0.28)
		Forebay Wetland	0.88 (0.36)
		Tailrace Wetland	0.48 (0.19)
		Campground Wetland	0.56 (0.27)

Vegetation Cover

A vegetation cover study was completed to assess the quality and quantity of vegetation communities within the Study Area (Appendix H) to identify habitats that may be essential to special status plants and wildlife. The entire Study Area was differentiated into discrete units based on distinct vegetation communities and obvious topographic breaks. These units were then field verified and assigned a Plant Association Group (PAG) from one of the following guides: Plant Associations of Wallowa-Snake Province (Johnson and Simon 1987), Mid-Montane Wetland Plant Associations of the Malheur, Umatilla and Wallowa-Whitman National Forests (Crowe and Clausnitzer 1997), and Deep Canyon and Subalpine Riparian and Wetland Plant Associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests (Wells 2006).

The Grand fir (*Abies grandis*) series is the most common forest cover type comprising 60.87% of the Study Area. The Grand fir/Big Huckleberry (*Vaccinium membranaceum*) is the most dominant Plant Association Group (PAG) followed by Grand fir/Twinflower (*Linnaea borealis*), and one stand of Grand fir/Queens cup (*Clintonia uniflora*) that was located in a shady mesic area. The Subalpine fir (*Abies lasiocarpa*)/Big Huckleberry comprises 14% of the total Study Area and primarily occurs above 4,500 feet (1,372 m) in elevation. Other forest types include small isolated pockets of Ponderosa pine (*Pinus ponderosa*)/snowberry (*Symphoricarpos albus*) on a rocky ridge and black cottonwood (*Populus balsamifera* L. ssp. *trichocarpa*)/pacific willow (*Salix lucida*) along the west-fork Wallowa River. Combined these two PAGs are less than 2% of the total study area.

Vegetation cover types were created for areas within the Study Area that did not meet PAG descriptions. This included developed, wetland, rock outcrops, and talus slope areas. The developed areas were identified as Developed (DEV) and include Project facilities and roads. Talus slopes were divided into 3 categories Talus (TALU) for areas that were bare rock with less than 25% vegetation cover, Talus-shrub (TALU-SHRU) are talus slopes with mixed shrub cover that ≥ 25 percent, and talus slopes that had quacking aspen tree (*Populus tremuloides*) cover that is ≥ 25 percent as Talus/Aspen (TALU-POTR). The rock outcrops with barren rock cliffs or sparse vegetation were denoted as rock outcrop (RO). The wetlands did not meet any of the PAG descriptions, so the USFWS Classification of Wetland and Deepwater Habitats of the United States system was used (Cowardin et al. 1979).

Table 7 shows each PAG, total acres (ha), and percent of total area in the Study Area. The map provided in Appendix H shows the distribution and size of vegetation cover type for the entire Study Area, as well as proximity to Project facilities and other sensitive habitats, such as rivers and wetlands.

Table 7. Plant Association Group Types and Acres within the Study Area.

PAG Name	PAG Code	Acres (ha) within the Study Area	Total Percent of the Study Area
Black Cottonwood/Pacific	POTR2/SALA2	1.35 (0.55)	1.07
Developed	DEV	1.58 (0.64)	1.25
Grand Fir/ Queen's Cup	ABGR/CLUN	1.75 (0.71)	1.38
Grand Fir/Twinflower	ABGR/LIBO2	15.24 (6.17)	12.05
Grand Fir/Big	ABGR/VAME	59.73 (24.18)	47.22
Palustrine Emergent	PEM	0.11 (0.04)	0.09
Palustrine Scrub Shrub	PSS	0.34 (0.14)	0.27
Palustrine Unconsolidated	PUB	0.28 (0.11)	0.22
Ponderosa Pine/Common	PIPO/SYAL	1.03 (0.42)	0.81
Rock Outcrop	RO	1.55 (0.63)	1.23
Subalpine Fir/Big	ABLA2/VAME	18.24 (7.38)	14.42
Talus	TALU	9.78 (3.96)	7.73
Talus/Aspen	TALU/POTR	7.74 (3.13)	6.12
Talus/Shrubland	TALU/SHRU	7.78 (3.15)	6.15
	Total	**126.50 (51.2)**	

Wildlife

Limited data is available on wildlife use within the Project area. The ORBIC database documented a 1984 record for the Wallowa rosy-finch (*Leucosticte tephrocotis wallowa*) and bald eagle (*Haliaeetus leucocephalus*) nest and roost within 2 miles from of the Project (ORBIC 2010). Additional comments from the Forest Service stated that bald eagle use is high near the Project's campground and this is a known bald eagle foraging area when kokanee (*Oncorhynchus nerka*) are spawning (Forest Service 2011).

As part of relicensing, a Wildlife Study was completed to collect baseline information on the occurrence, distribution, and relative abundance of wildlife species within the Study Area

(Appendix E). The study documented all wildlife detections with special emphasis on species identified on one or more of the following lists:

- USFWS status that is Listed Endangered, Listed Threatened, Proposed Endangered, Proposed Threatened, Candidate, Species of Concern, and Partial Status
- Oregon Department of Fish and Wildlife (ODFW) List of Threatened, Endangered and Sensitive Species
- ORBIC List 1 or 2
- Regional Forester's Special Status Species Lists for Sensitive Vertebrates and Federally Threatened, Endangered, and Proposed Management Indicator Species for the Wallowa Whitman National Forest

Field surveys were conducted in both the spring and summer of 2012 and documented all wildlife species or sign detected. Table 8 documents the species that were detected within the Study Area.

Table 8. Species Detected within the Study Area

Common Name	Species Name	Status[1]	Abundance
American dipper	*Cinclus mexicanus*	None	Common
American robin	*Turdis migratorius*	None	Common
Beaver	*Castor Canadensis*	None	Uncommon
Black bear	*Ursus americanus*	None	Uncommon
Black-headed grosbeak	*Pheucticus melanocephalius*	None	Uncommon
Dark-eyed Junco	*Junco hyemalis*	None	Common
Golden-crowned kinglet	*Regulus satrapa*	None	Common
Mac Gillivary's warbler	*Oporornis philadephia*	None	Common
Mountain chickadee	*Poecile gambeli*	None	Common
Mule deer	*Odocoileus hemionus heminous*	None	Common
Northern flicker	*Colaptes aurauys*	None	Common
Norway rat	*Rattus norvegicus*	None	Uncommon
Olive-sided flycatcher	*Contopus cooperi*	Federal Status - SOC State Status –SV ORBIC List - 4	Common
Pika	*Ochotona princeps*	None	Uncommon
Pileated woodpecker	*Dryocopus pileatus*	Federal Status- none State –SV WWNF – Management Indicator Species	Uncommon
Pine siskin	*Carduelis pinus*	None	Uncommon
Red-breasted nuthatch	*Sitta canadensis*	None	Uncommon
Red squirrel	*Tamiasciurus hudonicus*	None	Common

Table 8: Species Detected within the Study Area (continued)

Common Name	Species Name	Status[1]	Abundance
Rocky Mountain tailed frog	*Ascaphus montanus*	Federal Status –SOC State Status – SV ORBIC List – 2	Uncommon
Rubber boa	*Charina bottae*	None	Uncommon
Ruby-crowned kinglet	*Regulus calendula*	None	Uncommon
Snowshoe hare	*Lepus americanus*	None	Uncommon
Swainson's thrush	*Catharus ustulatus*	None	Common
Townsend's warbler	*Dendroica tonewnsendi*	None	Common
Western tanager	*Piranga ludoviciana*	None	Common
Western terrestrial garter snake	*Thamnophis elegans*	None	Uncommon
Western wood peewee	*Contopus sordidulus*	None	Common
White-crown sparrow	*Zonotrichia leucophrys*	None	Common
Winter wren	*Troglodytes troglodytes*	None	Common
Yellow-rumped warbler	*Dendroica coronata*	None	Common

[1]Status codes: Federal SOC= species of concern State SV= sensitive-vulnerable, ORBIC 2=threatened with extirpation from the state of Oregon, and ORBIC 4= contains taxa which are of conservation concern but are not currently threatened or endangered (ORBIC 2010a).

In addition to general wildlife observations, streams and rivers within the Study Area were surveyed for amphibians. Two Rocky Mountain tailed frogs were detected; both were located in the East Fork Wallowa River reach directly upstream of the forebay. The detection included one juvenile and one adult frog within proximity of each other. A 2013 fish study located a Rocky Mountain tailed frog and a rubber boa in the lower bypassed reach of the East Fork Wallowa River. Since the tailrace channels and entire bypassed channel provide suitable habitat for all life stages of the tailed frogs it is assumed that tailed frogs may be found in all streams and rivers within the Study Area.

3.3.4.1 Environmental Effects

Special Status Plants

Project operations with potential to affect vegetation are expected to be similar to current operations, which include road maintenance, erosion control, forebay flushing, and vegetation management. Because there are no known Special Status Plant Species within the Study Area and most operations occur in areas that have been regularly disturbed, such as the forebay, access road, penstock, or campground, it is unlikely that future operations would adversely affect Special Status Plants.

If Project operations require ground disturbance or vegetation removal in areas that are outside of the Study Area (Appendix E) then a special status plant survey would be conducted prior to conducting the activity. The proposed tailrace reroute to the East Fork Wallowa River will require ground disturbance in areas that extend beyond the Study Area, a Special Status Plant Survey will be conducted within the proposed tailrace project's footprint prior to construction to determine the effects, if any, to special status plants. This survey will

follow the same methods as described in Revised Study Plan with an updated list of special status plants (PacifiCorp 2011).

Threatened and Endangered Plant Species

PacifiCorp, the Federal Energy Regulatory Commission (FERC), the USFWS, and relicensing parties have agreed to consult on three plant species per Scoping Document (SD) 1 (April 22, 2011), SD 2 (August 4, 2011) and changes in listing status since the Pre-Application Document was submitted. The federal Endangered Species Act (ESA) listing status (Threatened, Endangered or Candidate) for each species is shown below, followed by a brief discussion of each species and results of on-site surveys where applicable.

MacFarlane's four o'clock *(Mirabilis macfarlanei)* - MacFarlane's four o'clock is federally listed as threatened. It inhabits gently sloped to very steep southwest to west aspect rock slides and canyon walls with sandy to gravelly soil underlain by talus in the Snake and Imnaha River Canyons (Oregon Flora Project 2006, Natureserve 2013). Associated plants include bluebunch wheatgrass *(Agropyron spicatum)*, cheatgrass *(Bromus tectorum)*, sand dropseed *(Sporobolus cryptandrus)*, and scorpion weed *(Phacelia heterophylla)*. This species has been able to persist in areas historically grazed by livestock since the 1870's, and presently in poor ecological condition (NatureServe 2013). No suitable habitat for this species occurs within the Study Area (BioResources 2012).

Spalding's catchfly *(Silene spaldingii)* - Spalding's catchfly occurs primarily within open grasslands (Palouse Prairies), with a minor shrub component and occasionally with scattered conifers (ponderosa pine *[Pinus ponderosa]*). It is found most commonly in the Idaho fescue *(Festuca idahoensis)*/snowberry *(Symphocarpus* sp.*)* association at elevations of 1,900 - 3,050 feet (579 – 929.6 m). Populations have been found on all aspects, although there seems to be a preference for north face slopes (WNHP 1997). Soils are almost always productive, deep loess (NatureServe 2013). No suitable habitat for this species occurs within the PSA (BioResources 2012).

Whitebark pine *(Pinus albicaulis)* - Whitebark pine is federally designated as a Candidate for Endangered Species Protection (July 19, 2011, 76 FR 42633). Whitebark pine has large, wingless, nutrient-rich seeds that remain in the indehiscent cone after maturity. It is not adapted for wind dissemination and is almost entirely dependent on Clark's nutcracker *(Nucifraga columbiana)* for successful dispersal and reproduction. This species occupies montane forests on thin, rocky, cold soils at or near timberline [4,000-12,000 feet (1219 - 3657 m)]. In moist mountain ranges, whitebark pine is most abundant on warm, dry exposures; but in semiarid ranges, it becomes prevalent on cool exposures and moist sites (NatureServe 2013). Isolated stands of whitebark pine are known to be present in the Wallowa Mountains (July 19, 2011, 76 FR 42633) and suitable habitat for the species may be present in the Project vicinity. The whitebark pine listing status change to Candidate species following the submittal of the Pre-Application Document, therefore it was not identified as a Special Status Plant or as threatened and endangered species and was not a target botanical species during field studies (BioResources 2012). The project boundary is within the range of

whitebark pine and at 5,800 feet (1768 m), but is below the timberline; therefore the project boundary is not whitebark pine habitat and unlikely to support this species. Neither the 1993 rare plant survey nor the 2012 special status plant survey identified whitebark pine in the comprehensive plant species list (BioResources 2012, PacifiCorp 1993).

The Project boundary lacks suitable habitat for two of the three botanical species (Spalding's catchfly and MacFarlane's four o'clock) and although whitebark pine habitat is within the vicinity of the project, it unlikely that it exist within the project boundary because it is below timberline. As a result, there is expected to be ***No Effect*** on ESA listed botanical species resulting from the proposed project.

Noxious Weeds

Overall the noxious weeds infestation sites are relatively small and can be easily controlled. The Class A weeds, hawkweed and spotted knapweed, are priority species to control and are only in 3 locations with less than 50 plants. The remaining noxious weeds sites are Class B and are also small populations, except for Oxeye daisy, Canada thistle, and bull thistle, which have infestations that are between 50 to 1,000 plants and are ubiquitous in the Study Area. All noxious weeds sites were located along the maintenance road, trail, and campground areas, which are areas of high and medium noxious weeds potential as identified in the map on Appendix F.

Currently PacifiCorp has no noxious weeds monitoring or management plan for the Wallowa Falls Hydroelectric Facility. Therefore as part of the relicensing efforts PacifiCorp has developed a weeds management plan to control and prevent infestations. This plan is provided in Appendix I and provides strategy for monitoring, best management practices to reduced noxious weeds infestations, and recommended control methods.

Wetland/Riparian

The Project operations with potential to affect wetland/riparian habitats, either by vegetation removal or ground disturbance, are expected to be similar to current operations which include road maintenance, erosion control, forebay flushing, and hazard tree management. Although these activities occur in RHCAs, they typically occur in the same location (e.g. dam, access road, forebay). Therefore no new RHCA are expected to be disturbed or have vegetation removal as part of routine operations.

The proposed tailrace reroute to the East Fork Wallowa River will affect wetlands. The tailrace is the primary hydrological source for both the Tailrace and Campground Wetlands (Appendix G). Once the reroute is complete, it expected these areas will dry up entirely or be significantly reduced in size and will eventually become upland habitat. The tailrace reroute extends beyond the Wetland and Riparian Study Area, so it is possible the proposed project may disturb wetlands beyond the Study Area. Prior to construction a wetland and ordinary high water mark delineation will be completed to determine all wetlands and water course

boundaries within the proposed tailrace footprint. All necessary federal, state, and local permits will be obtained prior to construction.

Vegetation Cover

The future Project operations with are expected to be similar to current operations, which include road maintenance, erosion control, forebay flushing, and are unlikely to affect vegetation to the extent that it would change the vegetation cover type. However, hazard tree management, if extensive and limited to a small area, could potentially affect a vegetation cover type. Current operations for hazard tree management include only a few trees per location and routinely occur near the hydroelectric facilities (i.e., penstock, dam, and powerhouse) and the recreational areas (campgrounds, parking area). PacifiCorp has developed a hazard tree management plan (Appendix J) to provide routine inspection and identification of hazard trees and best management practices for control.

Wildlife

The future Project operations are expected to be similar to current operations, which include road maintenance, erosion control, forebay flushing, and hazard tree management for recreation and hydroelectric facilities. Most of these operations occur in the previously disturbed areas and will not adversely affect wildlife species. Two operations that may affect wildlife include hazard tree management and forebay flushing. Hazard tree management effects to wildlife are minimized by following the best management practices in the Vegetation Management Plan (Appendix J).

The annual forebay flushing may affect Rocky Mountain tailed frogs. These frogs are highly aquatic spending most of their lives in the streams, venturing onto upland habitats only after they are fully metamorphosed and outside of the breeding season (Olson 2011). To minimize the effects to frogs, the forebay flushing is proposed to occur in early June to coincide with the onset of the annual high flow period. Flushing during the high flow period will facilitate discharging sediments into the fast moving thalweg of the river discouraging sediment deposition in the margins of the stream channel. In addition the impacts of elevated turbidity on frogs will be minimized by restricting the flushing to a short duration (24-72 hours annually) and the seasonal timing of flushing. June avoids the primary oviposit period for frogs, which occurs in the spring to early summer after the high flows abate (Olson 2011).
The Projects proposed tailrace reroute should have no impact on wildlife species. It will be completed in area that is Grand fir/big huckleberry PAG and is adjacent to area of high recreational use (i.e., the trailhead parking, Oregon State Parks warehouse, campground). The project will likely require tree removal which will occur outside of the migratory bird nesting season (March 1 to July 31) to avoid impacts to nesting birds.

Threatened and Endangered Wildlife Species

PacifiCorp, the FERC, the USFWS, and relicensing parties have agreed to consult on three wildlife species per Scoping Document (SD) 1 (April 22, 2011), SD 2 (August 4, 2011) and

changes in listing status since the Pre-Application Document was submitted. The federal ESA listing status (Threatened, Endangered or Candidate) for each species is shown below, followed by a brief discussion of each species and results of on-site surveys where applicable.

North American wolverine (*Gulo gulo luscus*) is a Federal Candidate species. Their habitat consists entirely of alpine, arctic, and sub-arctic regions (USFWS 2013a). Reliable snow cover into the spring (April 15 to May 14) is key to their habitat selection (USFWS 2013b). Females depend upon deep snow to create dens for pregnancy and weaning periods (USFWS 2013a). North American wolverine habitat areas are typically isolated and often surrounded by areas of unsuitable habitat (USFWS 2013b). North American wolverines are primarily nocturnal, but are active during the day as well (NatureServe 2013). Suitable wolverine habitat is present within the vicinity of the Project and the species is suspected to be present in the Project vicinity (PacifiCorp 2012e).

Canada lynx (*Lynx canadensis*) is a Federally Threatened species that dens in forests with large woody debris, such as downed logs and windfalls, to provide denning sites with security and thermal cover for kittens. Forests older than 200 years with lodgepole pine (*Pinus contorta*), spruce (*Picea* sp.), and subalpine fir have been used for denning in Washington. Den sites must provide for minimal disturbance by humans and proximity to foraging habitat (early successional forests), with denning stands at least 2.5 acres in size. Intermediate age forests allow for lynx access between den sites and foraging areas, movement within home ranges, and random foraging opportunities (PacifiCorp 2012e). The Forest Service has identified the Project boundary as within Lynx Core Habitat Area (PacifiCorp 2012e). The species is suspected to be present in the Project vicinity (PacifiCorp 2012e).

Gray wolves *(Canis lupus*) are habitat generalists that establish territories anywhere there is a sufficient food source (PacifiCorp 2012e). Wolf packs typically hunt within specific territories. Territories as large as 50 square miles are not uncommon and can extend up to 1,000 square miles (2590 km^2) in periods of prey scarcity (USFWS 2006). Members of the Imnaha wolf pack have been documented in Wallowa County since 2008 and included eight members at the end of 2012 (ODFW 2013). Gray wolf habitat is present within the Project area and the species is suspected to be present (PacifiCorp 2012e). The Fish and Wildlife Service removed the Northern Rocky Mountain Gray Wolf Distinct Population Segment, which includes the eastern third of Oregon, from the Endangered Species List in May 2011 due to recovery.

Although habitat for North American wolverine, Canada lynx, and gray wolf is present within the vicinity of the Project and the species are suspected to be present. These species have large home ranges that the Project would comprise only a small fraction of their home range. The Project consists of ongoing operation and maintenance of existing facilities. Therefore, the proposed Project is expected to have ***No Effect*** on North American wolverine, Canada lynx, or gray wolf.

3.3.5 Threatened and Endangered Species

PacifiCorp, the Federal Energy Regulatory Commission (FERC), the USFWS, and relicensing parties have agreed to consult on three plant, three wildlife species, and one fish species per Scoping Document (SD) 1 (April 22, 2011), SD 2 (August 4, 2011) and changes in listing status since the Pre-Application Document was submitted. The federal Endangered Species Act (ESA) listing status (Threatened, Endangered or Candidate) for each species is shown below. Potential effects of proposed Project facilities, operation and environmental measures to terrestrial plant and wildlife species and fish species are discussed in Section 3.3.4.1, Terrestrial Resources and Section 3.3.3.1, Aquatic Resources, respectively.

Table 9. Federal Endangered Species Act Listing Status

Common Name	Species name	Status
MacFarlane' four o' clock	*Mibabilis macfarlanei*	Threatened
Spalding's catchfly	*Siline spaldingii*	Threatened
Whitebark pine	*Pinus albicaulis*	Candidate
North America wolverine	*Gulo gulo luscus*	Candidate
Canada lynx	*Lynx Canadensis*	Threatened
Gray wolf	*Canis lupis*	Recovered
Bull trout	*Salvenius confluentus*	Threatened

PacifiCorp is in the process of the preparing a draft Biological Assessment (BA) to address the effects of the proposed Project facilities, operation and environmental measures on all of the species identified in Table 9 as well as designated Critical Habitat for bull trout and Essential Fish Habitat as designated under the Magnuson-Stevens Fishery Conservation and Management Act of 1996. The BA will be included in PacifiCorp's License Application for the Wallowa Falls Hydroelectric Project.

3.3.6 Recreation and Land Use

Affected Environment

The Project Scoping Document identified the following two topics related to recreation that needed to be examined in recreation licensing studies:

1. The adequacy of existing recreation facilities and public access within the Project boundary to meet current and future (over the term of a new license) recreational demand and

2. Effects of the Project on the recreational experience of users accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness

The comment letter from the Forest Service responding to the pre-application document, the scoping document, and the study request letter that was sent to the FERC, dated June 23, 2011, disagreed that the first topic was an important topic associated with the relicensing of the Wallowa Falls Hydroelectric Project (Forest Service, 2011). The Forest Service believed that there are adequate recreation opportunities and facilities in the Project area, including an adequate supply of trails, but did request that a winter use study of the Project forebay access road be conducted. The forebay access road is used in the winter by recreationists to access the WWNF and Eagle Cap Wilderness to avoid avalanche prone areas along the East Fork Wallowa Trail. A winter use count was conducted for the forebay access road, and its results are discussed in Section 2.2.2: Recreational Use Patterns. The Forest Service also expressed concerns about the user-created trails on the slope west of Pacific Park Campground that provide unregulated access to the WWNF and the PacifiCorp land above the West Fork Wallowa River Gorge. One of the main concerns expressed by the Forest Service was that people using the user-created trails to access the WWNF were not completing wilderness permits and, thus, were not being counted, and use of the WWNF and Eagle Cap Wilderness was being under represented. Because of this concern, the Forest Service requested that a summer use count of the main user-created trail be conducted. A summer use count was conducted, and its results are discussed in Section 3.3.6.1, Recreational Use Patterns.

The Forest Service agreed with Topic 2. This topic is evaluated in Section 3.3.7 Aesthetic and Visual Resources.

The comment letter from the National Park Service (NPS) that responded to the pre-application document, the scoping document, and the study request letter that was sent to the FERC dated June 23, 2011, contained several items related to recreation (NPS, 2011). The NPS suggested studying the capacity of the Project to "include opportunities to create or enhance walking trails and scenic viewpoints." Proposed measures developed for the Project related to trails and overlook signage on the ridge to the west of Pacific Park Campground reflect the suggestions of the NPS.

The topics examined in this PLP respond to the comments expressed by the Forest Service and NPS, as well as topics uncovered during the development of the Recreation Resource Technical Report (PacifiCorp, 2013f). The topics that are addressed include the following:

1. The adequacies of the existing supply of recreation facilities and public access to recreational resources in the Study Area and how the proposed Project would affect adequacy and access.
2. Existing recreational use patterns in the Study Area and how the proposed Project would affect use patterns.
3. Likely future recreational demands in the Study Area and how the proposed Project would support or hinder future demand.
4. Effects of the Project on the recreational experience of users accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness.

The Study Area for recreation is located south of Wallowa Lake and encompasses an area approximately 1 mile around the FERC Project boundary. The area includes PacifiCorp-owned and -managed lands; other private lands with various land uses, including recreation and tourism support; PacifiCorp lands leased to the State of Oregon for the Wallowa Lake State Park Maintenance Facility and the Little Alps Day Use Area; Wallowa Lake State Park; and National Forest System (NFS) lands managed by the WWNF.

Recreation Supply and Access

The south end of Wallowa Lake is a relatively developed resort community that contains a wide array of public and private recreation attractions. Major public attractions include Wallowa Lake State Park, which is the tenth-most visited state park in Oregon (Oregon Live, 2012), the WWNF, and Eagle Cap Wilderness. Private-sector attractions and recreation facilities include the PacifiCorp-owned Pacific Park Campground, miniature golf courses, bumper cars, Wallowa Lake tram, horse outfitters, restaurants, camps, RV parks and campgrounds, and lodges. There are also many single-family residences in this area, some of which are used as vacation homes or vacation rentals. The following highlights the recreation facilities in the Study Area.

Recreation Facilities on PacifiCorp Project Land

Two primary types of recreational activities are supported on Project lands—camping and trail use. Camping occurs on eight campsites at Pacific Park Campground (see Table 7). These campsites are less formal and generally larger than campsites at Wallowa Lake State Park and nearby private campgrounds. Most campsites at Pacific Park Campground have areas to park more than one vehicle, electricity, established campfire rings (metal), water, and trash containers. Two vault toilets are located in the campground, but many campers appear to use the flush toilets that are located a short distance beyond the Project boundary at the Little Alps Day Use Area. The campground and Little Alps Day Use Area are separated by a tailrace channel and nearby barbed-wire fence. To cross the 2- to 3-foot-wide (0.6 to 0.9 m) tailrace users have installed logs, boards, or rocks at several locations. Much of the barbed-wire fence has been knocked over or taken down by people travelling between the two areas. The fence is in disrepair and is an eyesore.

The overall condition of Pacific Park Campground is fair, but the boundaries of campsites can be confusing as can knowing where to park (there has been some site damage from unregulated vehicle parking). The lack of signage (or difficulty seeing signs) at the campsites and at the entrance to the campground contributes to some confusion over what entity owns and manages the campground, how to contact the managing entity, and what the campground is when looking at it from nearby areas. Current management issues, such as when the gate to the campground is locked, restroom sanitation and odor, and trash removal, were mentioned as issues in a survey that was conducted of campers in 2011 (see Section 3.3.6.1, Recreational Use Patterns). Additionally, there are no ADA-compliant facilities at the campground or at Little Alps Day Use Area.

A series of user-created trails that originate next to the campground wind their way up the hillside west of the campground to a ridge overlooking the West Fork Wallowa River. Some of the trails fade a short distance from the campground, and others continue up the hillside and connect with other user-created trails on the ridge. Some of the ridge trails head north to a rock outcrop that provides spectacular views of Wallowa Lake. Other trails travel south to the boundary of the WWNF and intersect with the Chief Joseph Mountain (WWNF Trail No. 1803) and West Fork Trails (WWNF Trail No. 1820). The numerous user-created trails have damaged vegetation, created eyesores, added confusion to some recreationists attempting to follow them, and made it difficult for the WWNF to track how many people enter the Eagle Cap Wilderness.

The forebay access road is another Project feature that is used by recreationists. Some use it as an alternative to the East Fork Trail, particularly backcountry skiers and snow-shoers, who use it to avoid numerous avalanche chutes above the East Fork Trail. The forebay access road and the main WWNF access trail follow the same route south of the Wallowa Lake Trailhead for several hundred feet through PacifiCorp land before diverging. The lack of signs (or difficulty seeing them) in this area can make following the correct trail difficult for people. During site visits, several parties asked PacifiCorp staff and consultants for assistance finding trails. After leaving the route shared with the main WWNF access trail, the forebay access road turns east and steeply winds its way up the north side of the East Fork Wallowa River Canyon to the Project forebay area. Approximately 400 feet (121.9 m) downstream from the Project dam, a spur trail crosses over the Project bypassed reach and connects with the East Fork Trail (WWNF Trail No. 1804). The spur trail allows recreationists to avoid the Project forebay area and avoid crossing over the spillway catwalk (and its 36-inch-high locked gate) to access the East Fork Trail. The part of the side trail immediately east of the bridge over the Project bypassed reach is frequently muddy. Hikers seeking to avoid the mud have damaged nearby vegetation and made the trail area even muddier.

Table 10. Recreation Facilities in the Study Area

Facility	Campsites	Other Features	Notes
PacifiCorp			
Pacific Park Campground	Approximately eight locations for camping	Two vault toilets, water, and electricity	Campsite locations are somewhat flexible and the current management company is experimenting with creating more space and privacy between sites.
Oregon Parks and Recreation Department			
Wallowa Lake State Park	121 (89 nonhookup) campsites, 2 yurts, 3 group tent areas, and 1 hiker-biker area	RV dumping station, restrooms, showers, water, picnic areas, group picnic areas, boat launch, and marina	
Little Alps Day Use Area	N/A	Restrooms (with water), 5 picnic tables, and 2 campfire pits	

Table 10. Recreation Facilities in the Study Area

Facility	Campsites	Other Features	Notes
Wallowa-Whitman National Forest			
Wallowa Lake Trailhead	N/A	Trail	Located on PacifiCorp property next to the Joseph-Wallowa Lake Highway turnaround and managed by the WWNF, this trailhead provides access into Eagle Cap Wilderness for hikers, commercial outfitters, equestrians, and others. It includes a sign and registration station. Parking for the trailhead is along west side of Joseph-Wallowa Lake Highway (east side is for horse trailers – mostly associated with outfitters).
East Fork Trail (No. 1804)	N/A	Trail	Part of the trail passes through PacifiCorp property and is managed by the WWNF. The trail provides access up the East Fork Wallowa River to Aneroid Lake and Basin and Tenderfoot and Polaris Passes. The trail is 11 miles one way.
West Fork Trail (No. 1820)	N/A	Trail	Part of the trail passes through PacifiCorp property and is managed by the WWNF. It provides access up the West Fork Wallowa River into the Eagle Cap Wilderness to Hawkins Pass and other trails. The trail is 12 miles one way.
Chief Joseph Mountain Trail (No. 1803)	N/A	Trail	Part of the trail is located on PacifiCorp property and is managed by the WWNF. It provides access to Chief Joseph Mountain and Chief Joseph Basin. The trail is 7 miles one way.
Private Sector Facilities			
Scenic Meadows RV Park	16 RV spaces with hookups and 2 tent spaces	Showers, restrooms, water, and electricity	
Eagle Cap Chalets and Park at the River	48 full hookup sites and overflow area	Showers, restrooms, and laundry facilities	
Nonprofit Facilities			
Boy Scout Camp			This camp is owned by Blue Mountain Council of the Boy Scouts of America called Wa-La-Moot-Kin-Lodge.
Wallowa Lake Camp			This camp is owned by the United Methodist Church.

Source: Wallowa Lake Tourism Committee, 2012.

The Wallowa Lake Trailhead is located on PacifiCorp property on the east side of the Joseph-Wallowa Lake Highway terminus. This trailhead is where people entering the Eagle Cap Wilderness register and is near the beginning of the route used by both the forebay access road and initial WWNF-managed access trail that leads to the East Fork and West Fork Trails (both of which start on PacifiCorp land before entering the WWNF).

Wallowa-Whitman National Forest

The WWNF is located in the northeast corner of Oregon and spills into western Idaho. There are no developed WWNF campgrounds within the Study Area. The primary draw of WWNF visitors to the Study Area is the nearby Eagle Cap Wilderness. There are approximately 535 miles of trails within the 350,461-acre wilderness. To access the Eagle Cap Wilderness from the Wallowa Lake area, recreationists pass through PacifiCorp land on trails developed and maintained by the Forest Service. Most begin their trip at the Wallowa Lake Trailhead, which is also located on PacifiCorp land. People travelling to the wilderness via the East Fork Wallowa River Canyon take the East Fork Trail (WWNF Trail No. 1804), which crosses over and near the Project penstock at several locations and passes near the Project dam and forebay area. Recreationists accessing the wilderness via the West Fork Wallowa River Canyon (and going to Chief Joseph Mountain) also start at the Wallowa Lake Trailhead. Instead of branching off to the left to access the East Fork Trail, they continue up the ridge south of Pacific Park Campground where the West Fork Trail intersects with the Chief Joseph Mountain Trail and the series of user-created trails described previously. The lack of signage (or difficulty seeing signs) at the intersection of these trails (plus the presence of the user-created trails) can make finding the right trail challenging.

Oregon Parks and Recreation Department

The OPRD manages the 166-acre Wallowa Lake State Park, which is located approximately 0.75 mile north of the FERC Project boundary. The park contains 121 full hookup sites, 89 tent sites, 3 group camping areas, 2 camping sites for hikers or bikers, picnic areas, a swimming area, a marina that provides overnight moorage, a concessionaire building, boat rentals, and a boat ramp. In addition to the main park, OPRD manages the 12-acre Little Alps Day Use Area, which is adjacent to the Project boundary. PacifiCorp has leased this area to OPRD for recreational use since 1954. The park includes a restroom with hot and cold running water (but no electricity), five picnic tables, several trash receptacles, two fire pits, and several water faucets. The east side of the day use area is adjacent to the portion of the Joseph-Wallowa Lake Highway where people entering the Eagle Cap Wilderness park their vehicles. Most people visiting the Little Alps Day Use Area are starting or ending their hikes into the WWNF and/or Eagle Cap Wilderness. The Little Alps Day Use Area has several small signs that identify it by name, but it is difficult to understand what service the area provides to visitors. The distinction between the day use area and Pacific Park Campground is also not clear.

Private and Nonprofit Sector Recreation Facilities

Two private sector facilities provide camping resources within the Study Area. The Eagle Cap Chalets and Park at the River (the same facility) contains 48 full hookup sites as well as an overflow area. The Scenic Meadows RV Park consists of 16 RV spaces with hookups and 2 tent spaces. Both facilities provide restrooms, water, and other amenities. Two other areas near the Project are used by nonprofit groups for infrequent recreation activities. The Blue Mountain Council of the Boy Scouts of America owns a 7-acre parcel on the west side of the West Fork Wallowa River across the river from the Project. As a result of a series of events (i.e., fires and flooding), it is no longer an active Boy Scout camp or recreation resource; however, it is still used to a limited degree. Wallowa Lake Camp is owned and operated by the United Methodist Church. This camp contains camp-related structures. Historically, the camp was much bigger, but much of its land was subdivided and sold as needed to generate income for the camp (OPRD, 2001).

Recreational Use Patterns

This section focuses on describing recreational use patterns of Pacific Park Campground, winter use of the forebay access road, and summer use of user-created trails located on PacifiCorp land to access the WWNF, and use of Oregon Parks and Recreation Department managed facilities in the Study Area.

Pacific Park Campground

To determine use patterns at Pacific Park Campground, two sources were consulted. The most current source was provided by the property management company that manages the campground for PacifiCorp. The property management company provided data on the number of campsites that were reserved online (see Table 11). Seasonal use patterns at Pacific Park Campground are similar to those of other attractions in the Study Area. Use typically starts out slowly during the late spring months and rapidly increases during the peak months of July and August. After August or mid-September, use drops off considerably. The number of people who camped at Pacific Park Campground in the years between 2010 and 2012 ranged between 544 and 764.

Table 11. Number of Campsites Reserved at Pacific Park Campground

Year	5/1 to 5/14	5/15 to 5/31	6/1 to 6/14	6/15 to 6/30	7/1 to 7/14	7/15 to 7/31	8/1 to 8/14	8/15 to 8/31	9/1 to 9/14	9/15 to 10/1	Total	Estimated Number of Recreation Days (assume 4 people on average per site)[1]
2012	0	5	0	13	34	31	24	30	12	3	152	608
2011	0	3	3	9	16	41	31	18	12	3	136	544
2010	0	4	6	8	50	43	30	32	13	5	191	764

[1] Estimate supplied by property management company that manages Pacific Park Campground for PacifiCorp based on staff observations.

The property management company reported that on most summer weekends—and almost all summer weekdays—there were campsites available. On long summer weekends such as Labor Day and some Fourth of July weekends, all campsites might be taken. In general, however, it appears that there is not a shortage of campsites at Pacific Park Campground during most of the summer.

A second source of visitation data was obtained from the FERC-required Form 80 Recreation Reports from 2003 and 2008. The annual number of recreation days at the campground between May and September in 2003 and 2008 were estimated at 556 and 541, respectively (see Table 12). These totals are similar to those estimated for the years between 2010 and 2012 and displayed in Table 11.

Table 12. Form 80 Recreation Report Data: Overnight Stays at Pacific Park Campground

		Recreation Days	
Year	Recreation Season	Annual Total	Peak Weekend Average
2003	May 24, 2003 to October 1, 2003	556	264
2008	May 1, 2008 to September 30, 2008	541	60

The Forebay Access Road, User-Created Trails, and Access into the WWNF

In addition to Pacific Park Campground, recreationists use PacifiCorp lands to access the WWNF and Eagle Cap Wilderness. The Forest Service requested that trail surveys be conducted to obtain information that would assist in better understanding how recreationists use routes on PacifiCorp property to access the WWNF and Eagle Cap Wilderness. People starting their trips into the Eagle Cap Wilderness from the Wallowa Lake Trailhead (which comprises most users) are required to register. By using other routes and/or not registering, the number of people estimated to use the wilderness each year is underrepresented. Underrepresentation can have funding consequences for the WWNF because budgets for managing wilderness areas are frequently related to use levels.

In its comment on the pre-application document, the comments on the scoping document, and the study request letter sent to the FERC dated June 23, 2011, the Forest Service provided data from 3 years related to use at the Wallowa Lake Trailhead (Forest Service, 2011). The Forest Service reported that, in 2005, 1,765 permits were filled out and deposited in the permit deposit box at the Wallow Lake Trailhead between January 14 and November 11. Assuming a party size of 2.7 people and a compliance rate of filling out permits of 85 percent, the estimated number of people departing the trailhead to access the Eagle Cap Wilderness was estimated at approximately 5,500. Most were hikers, with 110 estimated to be using stock animals. Between January 1 and November 26, 2007, 1,730 permits were submitted, and approximately 5,400 people were estimated to have entered the area. In 2010 (between March 23 and December 8), 1,701 permits were turned in, and approximately 5,300 people were estimated to have entered the Eagle Cap Wilderness. The 3 years of estimates indicate very consistent use of the Eagle Cap Wilderness.

The Forest Service felt that winter counts of the forebay access road use would provide useful information. During the winter, recreationists using skis and snowshoes follow the forebay access road on their way into the WWNF and the Eagle Cap Wilderness to avoid avalanche chutes above the East Fork Trail. To better understand use patterns associated with winter use of the forebay access road, a winter use survey using a laser-beam counter was conducted between late January and March 2012 to count recreationists using the road (see Table 13).

Table 13. 2012 Winter Recreational Use of the Forebay Access Road

Dates	1-29 to 2-6	2-7 to 2-13	2-14 to 2-20	2-21 to 2-29	March	Total
Counts	18	8	14	13	45	98

Note: Because people using the forebay access road in the winter do so (at least in part) to avoid avalanche chutes above the East Fork Trail, it is assumed that they return via the forebay access road. Therefore, the number of people counted was divided in half to estimate usage.

Snow came late to the Study Area in the winter of 2011-2012, and as such, counts did not begin until late January 2012. A total of 98 recreationists were counted using the forebay access road between January 29, 2012, and March 31, 2012 (see Table13). The number of people counted in February (plus January 29) was 53, which is similar to the number for March (45). Winter use in the Study Area is lighter than summer use, but the forebay access road is an important resource for winter recreationists travelling to the Eagle Cap Wilderness. During the rest of the year, recreationists also access the WWNF (and Eagle Cap Wilderness) via the forebay access road. Most recreationists, however, use the East Fork and West Fork Trails to access the WWNF. However, some recreationists enter the WWNF via user-created trails located on PacifiCorp land west of Pacific Park Campground. After leaving the campground and climbing up to a ridge, some people head north on user-created trails to areas overlooking the West Fork Wallowa River Gorge and Wallowa Lake, and others travel south on user-created trails to the West Fork and the Chief Joseph Trails. The Forest Service requested that a summer survey be conducted to provide information related to the use of the user-created trails. The laser-beam counter used for the winter count was moved next to the most prominent (the "main") user-created trail west of the Pacific Park Campground. User counts were conducted between May and the end of October 2012 and are presented in Table 14.

Table 14. Summer and Fall Use of the "Main" User-Created Trail West of Pacific Park Campground.

Dates	5-21 to 6-10	6-11 to 6-25	6-26 to 7-10	7-11 to 7-27	7-28 to 8-7	8-8 to 8-30	8-31 to 9-20	9-20 to 9-30	10-1 to 10-31	Total
Counts	495	332	425	335	384	530	306	136	144	3,087

The number of people counted was not divided in half as was the case at the forebay access road winter count (Table 13) so some "double counting" of people no doubt occurred. The number of people counted indicates that the "main" user-created trail is popular and that use seemed to be highest during popular summer weekends and August. Because of the number of trail options in this area, it was difficult to determine which trails people used to access the ridge and what their destinations were once on the ridge. For some people, the ridge was their

target destination. Others likely traveled a loop via the ridge that returned to the campground area along the West Fork Trail and never entered the WWNF. Some no doubt, used the "main" user-created trail as a short-cut to the West Fork and Chief Joseph Mountain Trails and/or to avoid the dusty lower part of the West Fork Trail and did enter the WWNF. Responses from Pacific Park Campground users who were surveyed suggest that many did enter the Eagle Cap Wilderness. Of the 19 parties who responded, 13 (68 percent) reported using trails into the WWNF during their stay. A total of 46 percent reported hiking on the Chief Joseph Mountain Trail, 26 percent on the East Fork Trail, and 20 percent on the West Fork Trail. It is clear that a number of people use the user-created trails during the summer and fall and that controlling use and upgrading the trails might be warranted. Unless a registration station for people using the user-created trails near the Pacific Park Campground is established, it would remain difficult to determine how many people enter the Eagle Cap Wilderness via the user-created trails.

Wallowa Lake State Park

OPRD conducts traffic counts at two locations in the south Wallowa Lake area. Traffic counts at one area (near the Wallowa Lake State Park maintenance facility) is somewhat useful for this assessment because it includes traffic counts along a portion of Joseph-Wallowa Lake Highway that included people driving to the Little Alps Day Use Area and the Wallowa Lake Trailhead, people parking along the Joseph-Wallowa Lake Highway, people using the Joseph-Wallowa Lake Highway turnaround, and people driving to Pacific Park Campground. (Table 15). Although it is not possible to know how the people in the counted vehicles are distributed in terms of where they go after crossing the counter, the counts do depict patterns related to the seasonality of use and changes in use over a 5-year period. As would be expected, the greatest number of vehicles driving past the counter occurred in July and August. The number of vehicles increased each year from 2008 to 2011 (the count for 2012 has not been provided by OPRD).

Table 15. 2008 to 2012 Traffic Counts Near Wallowa Lake State Park Maintenance Facility—Location 2.

Year	Jan.	Feb.	Mar.	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total
2012	3,460	1,690	1,669	441	3,288	5,466	16,854						32,868
2011	2,026	1,956	3,010	1,517	5,617	20,007	17,730	31,974	9,155	3,418	2,127	1,777	100,314
2010	1,759	1,978	3,112	1,628	2,907	18,806	35,600	15,549	8,241	1,010	2,255	3,973	96,818
2009	914	1,078	1,921	905	7,117	11,153	28,872	15,077	1,161	3,502	2,379	1,742	75,821
2008	2,000	1,991	1,990	3,485	5,786	9,914	16,576	15,125	8,622	3,532	1,893	2,393	73,307

Note:
Counter was located across the Joseph-Wallowa Lake Highway right after the driveway into the Wallowa Lake State Park maintenance facility.

Recreation Demand

The recreation demand analysis included in the Recreation Technical Report was intended to determine how demands for recreation activities of relevance to the Project might change in

the future (PacifiCorp, 2013b). These data were gathered primarily from OPRD's State Comprehensive Outdoor Recreation Plans (OPRD, 2003). A 2011 OPRD-funded statewide survey of Oregon residents regarding their outdoor recreation participation produced data that proved useful for identifying 26 recreational activities that occur within Wallowa County (Rosenbeger, 2012). Most, if not all, of the activities identified in the survey as occurring in Wallowa County, were found to occur within the Study Area, on PacifiCorp lands, and/or within the Project boundary. Of the activities identified as occurring in Wallowa County, the two most popular (car camping with a tent and RV, motorhome, or trailer camping) occur at the Pacific Park Campground. Although many people who camp at Pacific Park Campground are from other areas, there is clearly a demand among Wallowa County residents for camping. The survey also reported a county demand for walking on local streets and trails as well as activities such as horseback riding, big game hunting, wildlife and nature observation, photography, fishing, backpacking, picnicking, running on trails, cross-country skiing, and snowshoeing.

In addition to Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP) documents, the Wallowa County State Parks Master Plan was examined. The master plan was adopted by OPRD in 2001 and was developed to assist and direct the planning of three OPRD units located within Wallowa County - Minam State Recreation Area, Wallowa Lake Highway State Scenic Corridor, and Wallowa Lake State Park (OPRD, 2001). Although the master plan is 12 years old, it contains useful background information about recreation demand. The following results are of relevance to the Project in terms of how it might be able to help meet future demands:

- There is demand for additional group camping facilities.
- There is demand for additional short trails or loops close to campgrounds with connections to wilderness areas.
- There is demand for more amenities and choice for types of overnight accommodations.
- There is demand for additional disabled accessible sites.

3.3.6.1 Environmental Effects

The following assesses the effects of the proposed project and its associated proposed measures for recreation on; 1) recreation supply and access, 2) recreational use patterns, 3) future recreation demand and 4) effects of the project on the recreational experience of users accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness.

As stated in Section 2.2.3, PacifiCorp and the OPRD are currently discussing the acquisition by OPRD of long term usage rights (through a lease, easement, or other agreement) to PacifiCorp lands adjacent to the proposed FERC Project boundary. The lands under consideration for this off-license-agreement include: the existing Wallowa State Park maintenance facility; Wallowa State Park-Little Alps Day Use Area, Pacific Park Campground; and all or some portion of, the slope and ridge between Pacific Park Campground and the West Fork Wallowa River Gorge. This section discusses the effects of the proposed project on recreation under the existing management situation (no off-license-

agreement is executed). If an off-license-agreement granting long term usage rights to PacifiCorp land as described in Section 2.2.3 is executed with OPRD prior to the issuance of a new FERC license, the proposed measures for Pacific Park Campground and the slope and ridge west of the campground (eliminating user-created trails, establishing new trails, and providing scenic overlook signage) would not be implemented by PacifiCorp and these lands would not be included in the proposed Project boundary. This is because these lands will be reserved for recreational uses, no longer have a project nexus due to the proposed tailrace reroute, and OPRD would most likely have its own set of improvements that it would make that would be more appropriate for the OPRD mission. OPRD would also need to improve the facilities to OPRD standards that may be different than those associated with the proposed measures. If an off-license-agreement with OPRD is not reached in a timely manner, PacifiCorp is prepared to implement the proposed measures analyzed below.

Regardless of the outcome of the off-license agreement with OPRD, PacifiCorp proposes to continue coordination with the Forest Service and OPRD in providing recreation opportunities (primarily trail and interpretive opportunities) on PacifiCorp lands on the east side of the Joseph-Wallowa Lake Highway and within the FERC Project boundary. The effects of those proposed measures are analyzed below.

Effect of the Proposed Project on Recreation Supply and Access

Although developed recreational facilities located within the Project boundary are generally in good condition, and recreation resources within the Project boundary and within the Study Area are accessible to the general public, there are opportunities to improve recreational features located within the Project boundary, improve the experience of recreationists using these features, and protect areas that have been damaged by recreational use. The following describes proposed measures that were developed for recreational features located within the Project boundary and describes how the proposed measures would address concerns related to recreation supply and access. Many of the proposed measures were developed by a group of PacifiCorp, Forest Service, and OPRD staff as a result of a series of meetings and site visits. Additional proposed measures that are included in the aesthetic and visual resource section (Section 3.3.7) would improve the experience of recreationists using facilities the Project boundary. Unless otherwise stated, the following proposed measures would be implemented within 3 years of receiving a new Project license:

- Install a new entry sign at Pacific Park Campground. The existing sign near the entrance to the campground is not easy to find and/or see, and information on it can be difficult to understand. The existing sign would be replaced with a new sign designed to meet PacifiCorp standards, meet the FERC Part 8 signage requirements, and informing the public of the campsite reservation system, trail opportunities in the area, including those leading to WWNF lands and the Eagle Cap Wilderness, etc. Note that signs designed with PacifiCorp standards have been installed at other PacifiCorp projects located on National Forests and have been approved by the National Forests in which they are located.

- Construct a campground host area at Pacific Park Campground. A campground host facility would be located near the campground's entrance where there is currently a storage shed. A 10-foot by 30-foot (3 by 9.1 m) concrete pad for a trailer or RV would be built and connections for electricity, water, and sewage hookup to the Little Alps Day Use Area septic system made. Having a campground host would help to disseminate information, maintain the campground, and ensure that campers and others are complying with campground rules.

- Construct ADA compliant ramp to vault toilet. There is currently no ADA accessible restroom facility or campsite at Pacific Park Campground (or at the Little Alps Day Use Area). An ADA-accessible concrete ramp and railing would be installed and connected to existing concrete landing the southern vault toilet and one campsite would be upgraded to adhere to ADA standards. Within approximately 10 years, the existing two toilets would be replaced with a new double vault toilet.

- Improve campsite identification signage. To make finding campsites easier 4-foot (1.2 m) high metal posts with campsite numbers would be placed at the entry to each campsite to indicate the campsite number.

- Improve campsite definition at Pacific Park Campground. To prevent vehicles from entering sensitive areas and to better identify and differentiate campsites, boulders and/or rocks would be placed in strategic locations to provide better definition.

- Restore tent/vehicle pads at Pacific Park Campground. Restore camping pads that have eroded with new compacted gravel and wood ties where necessary.

- Clean up campground area. Logs, stumps, and rocks situated on inappropriate areas throughout the campground would be relocated or removed.

- Construct fencing between Pacific Park Campground, Little Alps Day Use Area and the slope to the west of the campground near user-created trails. The existing barbed-wire fencing between the Pacific Park Campground and Little Alps Day Use Area would be replaced with a split-rail wood fence that provides visual separation between the two facilities. In addition, a 4-foot-high (1.2 m) wood fence with woven wire inserts would be constructed at various locations along the west side of the campground to discourage people from accessing user-created trails that would be demobilized.

- Construct a new access trail to the ridge west of Pacific Park Campground. The maze of user-created trails on the slope west of Pacific Park Campground is confusing and damages vegetation along the slope. A new, formalized access trail that would follow (with some adaptation) the "main" existing user-created trail would begin just south of Pacific Park Campground and provide access to the ridge. Once on the ridge, the main trail would be connected with existing user-created trails that would be formalized to provide northern access to the proposed overlook area at the north end of the ridge (see below) and southern access to trails. The formalization of this trail would also support the NPS request to develop trails in the Project area.

- Decommission and restore user-created trails. Debris (e.g., logs, branches) would be placed at the beginning of the user-created trails on the slope west of Pacific Park Campground to block access to them. Small signs would be posted along the trails asking the public to support vegetative restoration efforts by staying off the restoration sites and using designated trails (this message would also be at the new sign and wilderness registration facility – see below).

- Install sign and wilderness registration station along the new access trail to ridge**.** A sign with a Forest Service wilderness registration facility that would meet PacifiCorp sign standards would be located at the beginning of the new access trail from Pacific Park Campground to the top of the ridge to the west. The sign would include a map that would depict the trails on the ridge and their connection to the West Fork and Chief Joseph Trails and the observation area. The sign would explain what is required for entry into the Eagle Cap Wilderness, and a box for registering Forest Service wilderness permits and collecting fees would be placed next to the sign; it would be designed with Forest Service input.

- Install overlook area interpretive sign. To take advantage of the views of the West Fork Wallowa River Gorge and Wallowa Lake from the north end of the ridge west of Pacific Park Campground, a one-panel sign meeting PacifiCorp sign standards would explain the features that can be seen from the overlook. The sign would include input from interested agencies and tribes. This measure would support the NPS request for providing scenic viewpoints in the Project area.

PacifiCorp proposes the following improvements in the powerhouse vicinity and along the forebay access road:

- Install forebay access road signs. The portion of the forebay access road that is

also the main WWNF access trail south of the Wallowa Lake Trailhead is not well marked and somewhat confusing for some users. In addition to the improvements to the Wallowa Lake Trailhead described previously, six new metal trail and/or directional signs would be installed along the portion of the forebay access road and main WWNF access trail. Locations would be established with Forest Service collaboration and would likely include places such as where the forebay access road veers to the left of the main WWNF trail and heads up a steep slope. A sign at this location could demark the forebay access road and provide information on points of interest along the forebay access road.

- Improve the connection trail between forebay access road and East Fork Wallowa River Trail. An existing trail between the forebay access road and the East Fork Trail crosses the bypassed reach on a fairly new wood bridge. To the immediate east of the bridge, the trail is frequently muddy and people have created "new" trails above the mud to avoid it. To remedy this situation, flat rocks from a nearby talus slope would be placed as "stepping stones" along approximately 100 lineal feet (30.5 m) of the trail. This would encourage hikers to stay on the trail and prevent further damage of the vegetation.

- Improve pedestrian recreational access across dam spillway catwalk. The existing locked gate at the dam spillway catwalk would be modified to allow winter recreationists to cross. This would improve year-round pedestrian access to the East Fork Trail. The modifications would be designed to discourage equestrian use of the catwalk.

- Install interpretive signage at the terminus of the Joseph-Wallowa Lake Highway and Wallowa Lake Trailhead. A lack of information in the area around the powerhouse and Wallowa Lake Trailhead results in user confusion regarding the features this area (Pacific Park Campground, the Project powerhouse, the Wallowa Lake Trailhead sign, and the Little Alps Day Use Area). To provide information, A three-panel informational kiosk meeting FERC Part-8 requirements would be installed at the end of the Joseph-Wallowa Lake Highway informing the public on topics such as the history of the Project, its components and operation, historical use of the area, and nearby available recreation opportunities. The sign content would be developed with input from interested agencies and tribes.

- Replace Wallowa Lake Trailhead sign. A new sign meeting PacifiCorp design standards would replace the existing sign and be similar in design to other signs that would be developed as part of these proposed measures. The new sign would

include the appropriate Forest Service topical information and maps. A box for registering Forest Service wilderness permits and collecting fees also would be integrated into the sign. The sign content would be developed with Forest Service and OPRD input.

Recreational Use Patterns in the Study Area and the Relationship of the Project

The use patterns for recreation facilities located on Project lands indicate that most use of the Project's recreation facilities and nearby facilities occur during the summer. Pacific Park Campground helps meet summer demands for camping in the Study Area. As stated previously, Pacific Park Campground offers a different, less developed type of camping experience compared with Wallowa Lake State Park and nearby private campgrounds. Because the campground is not full during most of the summer, there is no reason to consider expanding the campground. The current users of the campground seem to be satisfied with it. A survey was sent to campers during the summer of 2011 that had registered to camp online and is described in the Recreation Resource Technical Report (PacifiCorp, 2013f). The survey was completed and returned by 19 parties, which is not a large number of responses but is a sufficient number to provide informational, if not statistically valid, feedback. Following are some of the responses supplied by the respondents:

- The condition of the campground (on a scale of 1 to 10) was rated 10 (excellent) by 21 percent of the respondents, 9 by 21 percent, 8 by 31 percent, 7 by 16 percent, and 4 (low average) by 11 percent.

- The quality of the camping experience was rated 10 (excellent) by 44 percent of the respondents; 9 by 22 percent; 8 by 17 percent; and either 5, 6, or 7 by 5 percent.

- Activities that were enjoyed included day hikes into the WWNF (68 percent participating), fishing (5 percent), photography (42 percent), observing nature (63 percent), and other (37 percent).

The proposed measures for Pacific Park Campground that are described previously on page 89, Effect of the Proposed Project on Recreation Supply and Access would not add capacity in terms of numbers of campsites at the campground, but would improve the camping experience for campers, who as indicated above, are already generally satisfied with Pacific Park Campground.

The proposed measures described previously for the user-created trails that originate at Pacific Park Campground would improve the setting of the campground and improve opportunities for trail users. Consolidating the user-created trails into one developed trail that would provide access to the ridge west of the campground, along with improving existing ridge top trails and providing a scenic overlook, would provide additional trail opportunities in the Wallowa Lake area. This also would be consistent with NPS suggestions for providing more trails and scenic outlooks in the Study Area. Signage associated with the proposed

improvements would also improve the experiences of trail users. The confusion regarding the trail system along the ridge and at the intersection of the West Fork and Chief Joseph Trails would be remedied with the suggested sign improvements. Signs and maps would assist people who wish to either simply hike to the ridge, complete a loop hike from Pacific Park Campground to the ridge and back to the Wallowa Lakes Trailhead, and access the WWNF.
The winter trail counts that were taken of the forebay access road indicated that 98 people were counted using the road during the winter (January through March). Although this is not a large number of people, the count clearly indicated that the forebay access road is an important winter recreation resource. The gate at the west end of the catwalk over the spillway (which people currently have to climb over) has been locked historically. To make year-round crossing of the catwalk easier, the gate would be modified to allow pedestrian passage. This action will enhance year-round recreation access in the forebay area and will be particularly beneficial to winter users.

Improvements to the forebay access road (directional signs) would make following it easier and should reduce congestion along the East Fork Wallowa River Canyon. The directional and interpretation improvements along the forebay access road and East Fork Trail described in the aesthetic and visual resource proposed measures would improve the recreational experience of people accessing the Eagle Cap Wilderness through the Project boundary.

Future Recreation Demand and the Project

The recreation opportunities that the proposed recreation measures would primarily improve include those that occur at Pacific Park Campground and on area trails. General types of outdoor recreational activities where there are current demands, and likely future demands, that Project facilities would be able to at least partially meet or supply include walking and/or hiking, horseback riding, big game hunting, wildlife and nature observation, photography, fishing, backpacking, trail running, cross-country skiing and snowshoeing, picnicking, and learning about history.

As described on page 87, Recreation Demand, the Wallowa County State Parks Master Plan identified future recreation demands in the Wallowa County area. The following describes the demands that were listed on page 87 and how the proposed recreation measures would help meet those demands:

- There is demand for additional group camping facilities. Group camping occurs unofficially at Pacific Park Campground and the campground would help (to a small degree) continue to meet this demand.
- There is demand for additional short trails or loops close to campgrounds with connections to wilderness areas. The proposed trail and forebay access road measures would help meet this demand.

- There is demand for more amenities and choice for types of overnight accommodations. The proposed mitigation measures related to improvements at Pacific Park Campground would help meet this demand.

- There is demand for additional disabled accessible sites. The proposed ADA improvements would help meet this need.

Effects of the Project on the Recreational Experience of Users Accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness

The Forest Service expressed concerned that the experience of recreationists travelling to the WWNF and Eagle Cap Wilderness on WWNF trails could be negatively affected by the visual presence of Project components, such as the penstock, trestle, and forebay area (including the dam, spillway, and catwalk), and noise associated with the Project powerhouse. The four proposed mitigation measures described in Section 2.2.3.8, Aesthetic and Visual Resources were developed to reduce potential impacts associated with Project components seen from the East Fork Trail by recreationists. It would not be possible to completely screen views of the Project components from the trail, but implementing the proposed measures would improve the Project's appearance when viewed from the trail. In addition, Forest Service and PacifiCorp staff agreed that adding interpretive signage near the East Fork Trail that explains the Project's history and what the various Project components are would help mitigate the Project's presence to recreationists who might find its presence unexpected on a trail into a wilderness area. As described in Section 3.3.7, Aesthetic and visual Resources, noise from the Project powerhouse can be heard by recreationists using WWNF trails to access the Eagle Cap Wilderness, which was of concern to the Forest Service. Noise readings were taken from around the Study Area in the summer of 2013, but ultimately no applicable county, state, or Forest Service standards were found that existing noise levels could be compared with to determine whether there was a noise-related impact (PacifiCorp, 2012a). The Project's presence would continue to be noticed by recreationists using WWNF trails to access the Eagle Cap Wilderness.

3.3.7 Aesthetic and Visual Resources

Resources that wouldn't be affected by the proposed action

In its comments on the pre-application and the scoping documents, and study request letter dated June 23, 2011, The Forest Service noted that WWNF visitors can hear noise from the powerhouse for at least the first mile while on three different trails in the WWNF and Eagle Cap Wilderness and that it considered noise a disruption to Forest visitors. The topic of noise was raised at several meetings and during site visits with PacifiCorp, the WWNF, and the Oregon Parks and Recreation Department (OPRD). The attendees were asked to help determine whether there were quantifiable, acceptable levels of noise against which noise associated with the powerhouse could be measured. No applicable county, state, or U.S. Forest Service standards were found. Noise readings were collected from multiple spots in the Project area (including trails in the WWNF) and compared with noise levels generated by various sources (e.g., normal breathing, people talking, rainfall). The results are displayed in Appendix C of the Visual and Aesthetic Resources Technical Report (PacifiCorp 2012g).

Without relevant standards to compare powerhouse generated noise against however, the value of the data is limited as there are no standards for comparison. As part of the Recreation Resource Study, campers at the Pacific Park Campground were e-mailed a questionnaire to assess their experience camping at Pacific Park and using area trails. A primary purpose of the questionnaire was to determine whether powerhouse generator noise was noticed by the respondents and, if so, if it interfered with their experience. Of the 19 parties that responded, one specifically mentioned "machinery" (the generator) but stated that s/he heard it as they first started out on the trail and that it did not affect their trip. For the reasons stated above, noise associated with the powerhouse will not be evaluated.

Affected Environment

Issues related to aesthetic and visual resources focused on two parts of the Project area: the area within the WWNF that can be viewed from the East Fork Trail and the area near the Project powerhouse and terminus of Joseph-Wallowa Lake Highway. Consistency with the VQOs of the WWNF Forest Plan is also an issue to address.

The portion of the Project within the WWNF is located in the steep, narrow, heavily timbered canyon of the East Fork Wallowa River. Access through the canyon into the WWNF is via the East Fork Trail and the Project forebay access road. On most parts of the trail the visibility of Project facilities is limited. However, the Project dam and forebay complex, can be seen from along approximately 100 to 200 feet (30.5 to 61 m) of the East Fork Trail. The openness of the area near the dam and forebay is different than most areas found along the tree-lined trail. The most visible Project facilities from the trail are the waters of the 0.2 surface-acre forebay (which has the appearance of a small pond); the buttressed, rock-filled timber crib dam that is 125 feet (38.1 m) in length and 18 feet (5.5 m) in height; and the 30-foot-wide (9.1 m) spillway over which an aluminum catwalk has been installed to provide access over the dam. A wood deck over the forebay that supports the intake structure control wheels is located just beyond the southeast side of the catwalk. The laydown and storage area is located on the southeast side of the forebay and consists of a cleared area, a storage shed (which, due to its cabin-like appearance, has visual interest), and piles of materials (e.g., old wood pipes, shakes, and other miscellaneous materials). The area appears as a clearing with a "cabin" when viewed from the East Fork Trail. When seen at a closer distance from the forebay access road, the area has more of a utilitarian appearance.

The WWNF Forest Plan uses the Visual Resource Management (VRM) system for managing its visual resources (Forest Service, 2012). Five classifications—the VQOs—are used in the VRM to provide management direction in terms of how much the landscape within a national forest can be altered and still meet Forest Plan direction for visual resources. The part of the Project that is within the WWNF has been classified with a VQO of "retention," which is the second most restrictive VQO in terms of permissible changes to the viewed landscape. In the retention VQO, human activities are not visually evident, and the valued (desired) landscape character appears intact or unaltered.

The portion of the Project outside of the WWNF near the Project powerhouse is the most visible part of the Project, but even it is not particularly visible. The Project powerhouse is situated in a relatively flat area approximately 1.2 mile south of Wallowa Lake that is surrounded by steep terrain and numerous trees. This portion of the Project is located on PacifiCorp land and includes the beginning of the forebay access road, substation, powerhouse, tailraces, and Pacific Park Campground. The area where the powerhouse and substation are located is approximately 16,500 square feet (5,029 sq. m) in size. The powerhouse is approximately 35 feet (10.7 m) wide, 45 feet (13.7 m) long, and 18 feet (5.5 m) high. The metal building is a light yellow-green color and has a functional, industrial appearance. The perimeter of the facility is surrounded by a chain-link fence topped with constantine wire (i.e., a roll of barbed wire). These facilities are not visible over a great distance (less than approximately 0.25 mile (0.4 km)) due to topography and vegetation. The primary viewers in this area are campers at the Pacific Park Campground, people using trails located on PacifiCorp land as they make their way into the WWNF, recreationists using the Little Alps Day Use Area, and people (mostly motorists) turning around at the terminus of the Joseph-Wallowa Lake Highway. The area near the terminus of the Joseph-Wallowa Lake Highway contains the Project facilities mentioned above, the entry to the Pacific Park Campground, the Little Alps Day Use Area, the Wallowa Lake Trailhead (which includes a large wood kiosk with a wilderness permit box), and ample parking for the vehicles of hikers and equestrians (trucks and horse trailers). The substation is adjacent to the southeast side of the powerhouse. Four wood poles approximately 35 feet (10.7 m) in height support the 7.2-kilovolt transmission line that connects the substation with the powerhouse.

3.3.7.1 Environmental Effects

Project Facilities Located in the WWNF and Consistency with the WWNF Forest Plan

In the comment letter sent by the Forest Service responding to the pre-application document, the FERC scoping document, and study request letter that was sent to the FERC dated June 23, 2011, the Forest Service expressed concerns related to the appearance of the Project forebay, dam, catwalk, and penstock. The Forest Service letter stated that these Project facilities are visual intrusions to East Fork Trail users due to the materials of which they are made (Forest Service, 2011). The letter also stated that, from several locations along the trail where it is visible, the penstock detracts from the natural quality of the area. In addition to the Project forebay, dam, and catwalk and penstock identified by the Forest Service in the June 23, 2011, scoping letter, PacifiCorp and Forest Service staff identified several other Project facilities that currently detract from the area's appearance when viewed from the East Fork Trail. These additional facilities are the intake structure housing, the dam laydown and storage area on the east side of the forebay, and the area adjacent to and between the East Fork Trail and the west side of the dam and spillway catwalk and forebay. The portion of the Project where these facilities are located does not meet the assigned VQO of retention. After a series of meetings with Forest Service staff (including a site visit), an aesthetics and visual resource management program was developed that would improve the appearance of the current condition of this portion of the Project. The specific proposed measures are described below:

- Improve the forebay intake structure by installing wood shake-siding to the exterior and roof of the equipment house. After discussions with Forest Service staff, it was agreed that painting the brushed-aluminum catwalk (the color of which had previously been pointed out as being an issue) or replacing the relatively new structure with a nonaluminum structure would not be practical or result in enough of a visual improvement to justify the expense. Therefore, it was dropped from consideration. Wood shakes would be attached to the intake structure-equipment house's exterior and roof (which are currently plywood) so that they would be similar in appearance to the storage structure that can be seen on the east side of the forebay; the storage structure currently has the appearance of a rustic cabin;

- Improve the laydown and storage area on east side of forebay. PacifiCorp currently uses the east side of the forebay within the FERC Project boundary to store materials needed for maintaining the dam, forebay, and other facilities. Much of the materials currently in this area would be removed and consolidated behind the existing storage structure mentioned previously so that it would not be seen from the East Fork Trail;

- Install interpretive sign at the west side of forebay. Screening the Project facilities that can be seen from the East Fork Trail with vegetation was considered, but due to the FERC requirements regarding keeping areas near dam free of vegetation, this idea was abandoned. Instead, a hydroelectric project interpretive sign will be installed along the East Fork Trail at the forebay including a map of the local trail system. Information related to the Eagle Cap Wilderness could also be included;

- Enhance the upper penstock trestle and penstock pipe by painting them a uniform dark color in consultation with the WWNF. The portion of the penstock just north (downstream) of the forebay dam and spillway that is supported by a timber trestle and visible from several locations along the East Fork Trail would be treated to make it more visually recessive. The most visible parts of this feature are the painted metal penstock, concrete and rock support structures, and support timbers that are different colors than the other support timbers. The penstock would be painted a uniform color in consultation with the WWNF. The concrete support structures would be stained with a darker gray color that would be similar to that of nearby rocks. In addition, nearby rocks would be gathered and placed on top of and adjacent to the portions of the support structures that are visible to better blend them with the surrounding environment.

With the proposed measures described above, the Project facilities would still be "visually evident" from the East Fork Trail and would not meet a VQO of retention. Although the proposed measures would not meet a VQO of retention, they would improve the existing appearance of the Project facilities viewed from the East Fork Trail on a short-term and long-

term basis. The informational signage that would be included among the proposed measures would describe the history of the Project, identify Project facilities, and provide information related to the history of the nearby Eagle Cap Wilderness. Based upon conversations in the field with people seen hiking on the trail during site visits, many people have no idea what the "pond" (the forebay) is or what other facilities are. By implementing the proposed measures, Project facilities would be less visible than they currently are and people using the trail would better understand what the Project facilities are along with the history of the Project and Eagle Cap Wilderness.

Project Facilities Located outside of the WWNF

The Wallowa County Comprehensive Plan (Comprehensive Plan) directs land use on nonfederal lands within Wallowa County (Wallowa County, 2012). Although the Comprehensive Plan has goals related to aesthetic and visual resources (Goal 5: Open Spaces, Scenic and Historic Areas, and Natural Resources), none of the goals relate directly or indirectly to the Project.

During meetings and site visits with PacifiCorp, Forest Service, and OPRD staff, the group discussed ways to improve the existing appearance of PacifiCorp facilities when viewed from the Wallowa Lake Trailhead, the Little Alps Day Use Area, and the end of Joseph-Wallowa Lake Highway. Several ideas that were generated by the group evolved into the following proposed measures:

- Replace the fencing at the terminus of Joseph-Wallowa Lake Highway with a simple, decorative metal fencing (approximately 125 linear feet (38.1 m) along the south side of the powerhouse area curving northwest to the entrance to Pacific Park). The remainder of the existing chain-link fencing would be replaced with black vinyl-coated chain-link fencing, which would be less visible than galvanized chain-link fencing;

- Install low-maintenance landscape improvements, (native vegetation, boulders, rock, cobble, and/or gravel) at the Project powerhouse, and the edge of the Joseph-Wallowa Lake Highway terminus. The intent of the landscaping would be to screen views of the fenced-in Project powerhouse yard, and make the area more attractive. Additionally, the landscape improvements would serve as a backdrop to the interpretive signs that are proposed recreation measures described in Section 2.2.3;

- Recoat the powerhouse exterior. The light-colored powerhouse roof, which is currently visible from parts of the Chief Joseph Mountain Trail, will be recoated with a more appropriate color (i.e., darker and nonreflective) within 1 to 3 years after the new license is issued. The color of the powerhouse siding will be changed to a dark green color similar to that of trees behind it to diminish the building's visibility at a time when the siding requires recoating.

Although there was no regulatory requirement to address the appearance of Project facilities on nonfederal lands, and no entity suggested that the appearance of these Project facilities be improved, PacifiCorp felt that the proposed measures would improve the appearance and image of PacifiCorp property, the entry into the WWNF and Eagle Cap Wilderness, and the terminus of the Joseph-Wallowa Lake Highway. In addition to these measures, a number of recreation-related proposed measures were developed (Section 2.2.3) that will also improve this area's order and appearance.

3.3.8 Cultural Resources

In this section, the effects of the proposed Project on cultural resources are discussed. An overview of Federal, State, and local laws and regulations relevant to this Project is provided. The affected environment (i.e., the existing condition and baseline against which effects are measured) is then discussed. A discussion and analysis of the site-specific and cumulative environmental effects follows.

Federal, State, and Local Laws and Regulations

National Historic Preservation Act of 1966 (NHPA) (16 U.S.C. 470 et seq.)

Under the National Environmental Policy Act (NEPA), federal agencies must evaluate impacts to all cultural resources and those prehistoric and historical resources that are eligible for or listed in the National Register of Historic Places (NRHP) before a project is approved. The regulations that govern the implementation of the NHPA allow for combining NEPA and Section 106 studies in an effort to streamline the environmental compliance process. The FERC is the lead Federal Agency under NEPA and NHPA.

The NHPA of 1966, as amended, requires federal agencies to identify and manage historic properties that are under their jurisdiction, and encourages the preservation of historic properties through consultation and cooperation with state and local governments, Indian tribes, and private individuals. The NHPA outlines the roles that the federal government has regarding the preservation of historic properties, including considering the effects of their actions, advancing the purposes of the Act, and avoiding activities that would be contrary to its purpose. The NHPA also outlines the roles of the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), and Tribal Historic Preservation Officers (THPOs).

Section 106 of the NHPA (36 CFR 800; 16 U.S.C. 470f.) requires that any federal agency who has direct or indirect jurisdiction over a federal or federally-assisted project or any project requiring federal licensing or permitting take into account the effect of the undertaking on historic properties listed in or eligible for the NRHP. Furthermore, Section 106 provides the ACHP with a reasonable time to comment on the undertaking

The NRHP (16 U.S.C. 470a), created under the NHPA, is the federal list of historic,

archaeological, and cultural resources worthy of preservation. Resources listed in the NHRP include districts, sites, buildings, structures, and objects that are significant in American history, prehistory, architecture, archaeology, engineering, and culture. The NRHP is maintained and expanded by the National Park Service on behalf of the Secretary of the Interior. The Oregon State Historic Preservation Office in Salem, Oregon administers the local NRHP program under the direction of the SHPO. To guide the determination of eligibility of properties for inclusion in the NRHP, the National Park Service has developed the NRHP Criteria for Evaluation (36 CFR Part 60.4). The criteria are standards by which every property is evaluated for listing in the NRHP. The quality of significance in American history, architecture, archaeology, and culture is possible in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association, and meet one of the following criteria:

> **Criterion A**: Are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> **Criterion B**: Are associated with the lives of persons significant in our past; or
>
> **Criterion C**: Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components make lack individual distinction; or
>
> **Criterion D**: Has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological sites are primarily assessed under Criterion D. Buildings less than 50 years old do not meet the NRHP criteria unless they are of exceptional importance under Criterion Consideration G, as described in the National Park Service Bulletin No. 22, "How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance Within the Last 50 Years."

Amendments to Section 106 of the NHPA specify that Traditional Cultural Properties (TCPs) may be determined to be eligible for inclusion on the NRHP. Specifically, a TCP is defined as a district, site, building, structure or object that is listed or eligible for inclusion in the National Register "because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1998). In carrying out its responsibilities under Section 106, federal agencies are required to consult with any Indian tribe that attaches religious or cultural significance to any such properties

Archaeological Resources Protection Act of 1979 (ARPA) (25 CFR 262.3)

ARPA prohibits the unauthorized excavation, removal, or damage of "archaeological resources on federal and Indian lands." Archaeological resources are comprehensively defined to include archaeological sites, structural remains, artifacts, and bones.

Oregon State Regulations

Implementing rules contained in the Oregon Revised Statutes (97.740–97.760; 358.905–358.955; 390.805–390.925; 271.715–271.795; 390.235; 358.605–358.622) and in the Oregon Administrative Rules (736-051-0080 through 0090; 660-023-0200) also apply to this Project. These rules require the identification of historic, archaeological, and cultural resources listed on or eligible for the national, state, or local registers. Measures must be considered to reduce or control impacts to identified historic properties affected by a proposed project. These rules also require the acquisition of archaeological permits for subsurface archaeological testing on lands owned by state or local political subdivisions.

Affected Environment

Archaeology and Ethnography

The Project Area lies within the Plateau Culture area, which extends from the Cascades to the Rockies, and from the Columbia River into southern Canada (Ames et al. 1998). Most of the archaeological work in the Columbia Plateau has been conducted along the Columbia and Snake Rivers. The following section discusses the broad culture history in the Southern Plateau. The antiquity of human occupation in the Plateau extends as far back as 11,500 years before present (BP), when Clovis type fluted spear points were in use. The early inhabitants of the region were called Paleo-Indians, who were highly mobile large game hunters.

The Early Archaic period (11,000-7,000 BP) is characterized by small groups of mobile hunter-gatherers who practiced a broad spectrum subsistence economy (Aikens 1993; Ames et al. 1998).

The Middle Archaic period (7,000-5,000 BP) is defined by large side-notched, corner-notched, and laurel leaf shaped stone projectile points; bifacial knives; milling stones and pestles; bone and antler tools; and semi-subterranean pit houses (Ames et al. 1998). People lived in small, mobile groups of hunter-gatherers who had a low dependence on root and seed processing.

During the Late Archaic period (5,000-150 BP), people began to settle down in pit houses, tule mat covered long houses, and lodges, and they developed a heavy reliance on fishing, the storage of salmon, and the harvesting of camas (Ames et al. 1998). The horse was introduced around 1730 A.D., which increased mobility and transport capabilities, and subsequently strengthened existing trade networks and broadened the range of trade throughout the Plateau (Haines 1938; Schalk 1980).

The ethnographic record is likely a continuation of the lifeways and subsistence strategies that were in place by at least 3,000 BP (Fagan 1974).

The Project Area is located in the ancestral territory of the Nez Perce Tribe, who refer to themselves as *Nimi'ipuu*, which means the "real people" or "we the people" (Nez Perce Tribe Information Systems Department 2009; Ray et al. 1938). The name "Nez Perce" was given to the Nimi'ipuu by an interpreter in the Lewis and Clark expedition in 1805 (Nez Perce Tribe Information Systems Department 2009). Although the traditional homeland of the Nez Perce is north central Idaho, they traveled through Oregon, Washington, and Idaho, often within the major river drainages including the Snake, the Clearwater, and the Salmon Rivers (Nez Perce Tribe Information Systems Department 2009). The Nez Perce Tribe was divided into two large bands including the Upper Clearwater and the Wallowa Valley bands, which were comprised of smaller bands that were identified by the name of the tributary stream that they lived near (Nez Perce Tribe Information Systems Department 2009). Each band had one large village with several small villages, small village leaders, large village council and chief, and their own fishing sites (Coale 1956a; Nez Perce Tribe Information Systems Department 2009). The Nez Perce Tribe spoke the Nez Perce language (*Niimiipuutímt*), one of the two language divisions in the Sahaptian subfamily of languages in Oregon (Zucker et al. 1983).

The Wallowa band of the Nez Perce, like most other Columbia Plateau groups, depended primarily on salmon and other fish as well as root crops, including camas, bitterroot, and kous, for their subsistence (Coale 1956b). As in the protohistoric period, the Nez Perce utilized seasonal camps to collect available resources, including camps at root and berry gathering sites and fishing sites. The hunting of large and small game and the collecting of other plant resources supplemented their diet throughout the year. The Nez Perce employed various hunting techniques, including horseback and the use of decoys (Coale 1956b). Horses were also used when looking for suitable camas meadows (Coale 1956b). Horses played a major role in the Nez Perce lifeway. Ethnographic accounts mention that all men, women, and children were mounted on horses when traveling, and that individuals could own upwards of 100 horses, if not more (see Coale 1956b).

Fish were the most important Nez Perce resource. Wallowa Lake served as an important communal fishing area for the Nez Perce Tribe and other Tribes, as did numerous productive fishing locations along the Wallowa River (Spinden 1908; Suphan 1974). Ray (1974) indicates the location of three such temporary village sites in the Wallowa Lake vicinity used by the Wallowa Indians and other tribal groups. Suphan (1974) also identifies two fishing sites on Wallowa Lake close to the Project Area, which are listed below:

53. Tamyac Pie yeppa, a fishing site on the east shore of Wallowa Lake used by the Umatilla, Walla Walla, Cayus); and Nez Perce. The Indians camped here in August and September. After leaving this spot they went into the mountains for deer and berries (Suphan 1974: 163).

83. Ewatam-etet, on the shores of the lower end of Wallowa Lake; here the Cayuse, Umatilla, Walla Walla, and Nez Perce fished (Suphan 1974: 166).

The Nez Perce participated in recreation activities including horse races, foot races, the stick game, and gambling, in addition to keeping dogs as pets (Coale 1956a).

History

Before Euro-American settlement commenced, the Wallowa Valley was largely the territory of Chief Joseph's Band of the Nez Perce Indians (Joseph 1965; Ruby and Brown 1981). In 1805, William Clark was the first Euro-American to meet the Nez Perce near the western end of the Lolo Trail in the Bitteroot Mountains (Josephy 1965). The Washington Territory was created in 1853 by Congress. The treaty program began in eastern Washington in the summer of 1855, creating the Nez Perce Reservation (Beckham 1998; Walker 1985). Chief Lawyer, Spotted Eagle, James, Red Wolf, and Timothy, along with approximately 2,600 individuals, lived on the newly formed reservation within their homelands (Myers 2001). However, not all Nez Perce were part of the treaty and the homelands for the remaining Nez Perce, including those bands led by Joseph, Looking Glass, Toohoolsote, Eagle-From-the-Light, and others, were outside the new reservation boundary (Myers 2001). For these Nez Perce, joining the reservation would mean leaving their homelands.

The Wallowa Valley remained in the possession of the Nez Perce throughout the 1860s (Myers 2001). In 1863, Superintendent Calvin Hale secured the second treaty with the Nez Perce, which significantly reduced the size of the reservation and ceded the lands of Chief Joseph's band in Oregon; however, Chief Joseph's band was not party to the agreement (Beckham 1998). A third treaty between the United States and the Nez Perce Indians was secured in 1868 in Lapwai.

In 1860, gold was discovered on the Nez Perce Reservation on Orofino Creek, a branch of the Clearwater, which spurred a rush into the area (Ruby and Brown 1981). Gold was also discovered on the upper John Day and Powder rivers, which attracted more miners into Eastern Oregon (Beckham 1998). Communities were established in the Baker and Grande Ronde Valleys and at Canyon City on the John Day River (Beckham 1998:157). James Tulley and James Masterson were the first Euro-American settlers to descend into the Wallowa country in 1871.

Old Joseph died in 1871 and control of his band was transferred to his son, Young Joseph (*Hinmahtooyalatkekht*) (Myers 2001:110). During the early 1870s, there was much talk of war due to the growing presence of settlers, the destruction of the land, and broken promises by the U.S. government (Ruby and Brown 1981). Old Joseph advised his son to never surrender their territory (Ruby and Brown 1981:241). President Grant issued an executive order in 1873 to establish a reservation in the Wallowa Valley; however, the order was rescinded in 1875, which meant the non-treaty Nez Perce would have to move to the reservation. Meetings continued over the next two years with General Howard, Indian Agent Monteith, and the Nez Perce who signed treaties regarding the removal of the non-treaty Nez Perce to the Nez Perce reservation in Lapwai (Myers 2001:110). In 1876, Joseph agreed to a meeting in Lapwai with a commission that included General Howard, during which he almost consented to moving to the reservation (Ruby and Brown 1981). However,

Toohoolsote dissuaded Joseph from making such an agreement (Ruby and Brown 1981:242). In early 1877, Indian Agent Monteith gave Joseph one month to relocate to the reservation. Joseph sent his brother Ollicut to meet with General Howard on April 19th, 1877 in Walla Walla to ask for more time to remove from the Wallowa Valley, which was refused (Ruby and Brown 1981). Ollicut suggested the dissolution of the Umatilla Reservation and the creation of a Wallowa reservation in its place (Ruby and Brown 1981). However, on May 14th, 1877, General Howard ordered the non-treaty Nez Perce to permanently relocate to the reservation by June 14th (Myers 2001:110).

The non-treaty Nez Perce did not readily accept their forced removal to the reservation and it soon became apparent to Howard that the unrest amongst the non-treaty Indians was not confined to the Nez Perce. He issued a statement in early June 1877 that various Columbia River people had to go to a reservation (Ruby and Brown 1981:243).

With the deadline fast approaching, Joseph's band began moving across the Snake River around June 1st, 1877. They rested at a Tolo Lake meadow, and were joined by other non-treaty Nez Perces (Josephy 1965; Ruby and Brown 1981). A young Nez Perce named *Wahlitits* and his cousins, Red Moccasin Tops (*Sarpsis Ilppilp*) and Swan Necklace (*Wetyetmas*) from White Bird's band rode to Salmon River to avenge his father's death on June 13th and killed four white men (Josephy 1965; Myers 2001; Ruby and Brown 1981). The killings were not authorized by Joseph and once he had heard of them, he knew war was imminent (Ruby and Brown 1981).

The Nez Perce War of 1877 had commenced. Joseph moved his band to White Bird Canyon north of the Salmon River where gunfire was first exchanged between the Nez Perce and Captain Perry's troops (Ruby and Brown 1981). Several battles ensued around Grangeville and the Clearwater. After a defeat on the Clearwater, the non-treaty Nez Perce began traveling east on Lolo Trail with approximately 750 men, women, and children (Myers 2001). By October 1877, after several devastating battles, Joseph met with General Howard and Colonel Miles. Joseph handed his rifle to Howard, who in turn, handed it to Miles, and delivered his vow, "From where the sun now stands, I will fight no more forever" (Ruby and Brown 1981:246). Joseph and the remaining Nez Perce, who numbered approximately 418 people (87 men, 184 women, and 147 children), were moved to Fort Keogh, Montana, then to Fort Lincoln in North Dakota, then to the Quapaw Agency and finally the Ponca Agency in Indian Territory, Oklahoma in 1878 (Josephy 1965; Myers 2001; Ruby and Brown 1981). Conditions were difficult in Indian Territory and many Nez Perce suffered from melancholia and other diseases (Ruby and Brown 1981). In 1885, Joseph and the surviving 280 Nez Perce were moved to the Colville Reservation in Nespelem, Washington, and to the Nez Perce Reservation in Idaho (Beckham 1998; Josephy 1965).

Settlers first arrived in the lower portion of the Wallowa Valley after the Nez Perce were forced to relocate out of the area; they then spread out along the Wallowa River to the upper valley and to the prairie and timber areas to the north (Hopkins 1978: 35-36). By the early 1880s, towns began to develop on the banks of the river. The need for a principal commercial district led to the construction of several general merchandise stores in Joseph,

located in the upper reaches of the Valley, and in 1883 the town was the first in the Valley to be platted. The platting of Lostine followed the next year and of Enterprise in 1886.

The continued opening to settlers of Wallowa County via a railroad was in progress by 1891, a result of planning during the previous 10 years. The town of Wallowa received the County's first station in September of 1908, and exactly two months later the rail line reached Joseph (Barklow 1987:106).

The four towns that were established in the Wallowa Valley by the first decade of the 20th Century, including Enterprise, Joseph, Lostine, and Wallowa, each installed their own power plant for lighting purposes (Hopkins 1978:87). Joseph was the first community to build an electric plant in 1900. Under the direction of the Joseph Light & Power Company, the plant, which generated only enough electricity for local consumption, consisted of a 30-kilowatt inductor alternator driven by a line shaft in the Joseph Milling Company's flour mill (Dierdorff 1971:101, 103).

The previously untapped water resource near the confluence of Royal Purple Creek and the East Fork of the Wallowa River, above Wallowa Lake, was realized as a likely candidate for generating power in the Valley. The Enterprise Electric Company acted on the opportunity and constructed a small log-crib dam with a mile-long penstock connecting it to a powerhouse at the foot of the mountains just south of Wallowa Lake.

When the Wallowa Falls project was completed and put into operation, the plants at Enterprise and Wallowa were abandoned, but the Joseph unit was kept functioning as an auxiliary plant (Dierdorff 1971:103). Enterprise Electric only operated the Wallowa Falls dam until 1928 when the property was transferred to Inland Power & Light Company of Lewiston, Idaho and Clarkston, Washington. Fourteen years later, Pacific Power & Light Company (PP&L) was granted proprietorship of the Wallowa Falls project.

The Wallowa Falls Project continued as the principal source of electricity for the Wallowa Valley, as well as communities outside of the immediate area, until 1947 when serious power supply shortages occurred in the PP&L system as a whole (Dierdorff 1971:189). The inconvenience to customers caused PP&L to push for a negotiation with the Bonneville Power Administration (BPA) to construct a transmission line that could meet the greater need. The agreement was made, and the completion of the BPA line in 1953 supplemented the Wallowa Valley area with the additional power supply that was required (Dierdorff 1971: 226).

PP&L continued to operate the hydroelectric facility throughout the 20th Century. Substantial modifications were made during this time to upgrade and maintain the facilities. One of the most significant alterations occurred in 1994 when the dam was rebuilt. Other major modifications to the Project include installing a new generator in 1967, modifying the windows and other elements of the powerhouse, rebuilding portions of the Royal Purple water conveyance pipe with a historically-incompatible material, and repairs to the penstocks in 1995, 1999, 2001 (PacifiCorp Archives, PacifiCorp Energy 2011).

Area of Potential Effect

Studies for cultural resources were conducted within the Project's APE. Per 36 CFR 800.16(d), the Project's APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." For this Project, a second, larger, APE for indirect (including visual and auditory) effects to historic properties was also developed through consultation with the Indian Tribes. Both APEs were defined by the FERC through outreach and consultation with the Oregon SHPO, Forest Service, appropriate Tribes, and PacifiCorp. The APE for cultural resources includes the proposed FERC Project boundary at the time studies was being planned (see Figure 4). Historic properties most likely to be affected directly include archaeological sites and historical resources, as well as properties of religious and cultural significance, including TCPs. Direct effects include physical alterations to a historic property.

Indirect effects from the Project can affect TCPs. Indirect effects can include the diminishment of a property's aesthetics through the elimination or addition of a scenic view, changes in open space, or the introduction of a visual element that is out of character, incompatible, in contrast, or out of scale with the surrounding area. Indirect effects can also include obstruction of a property's view by blocking and intruding partial or entire scenic views, or by adding a visual element that detracts from a scenic view. Auditory effects can include an increase or a decrease in surrounding noise, and changes in noise levels that affect the setting of the historic property.

Studies conducted within the APE for direct effects identified and evaluated all historic properties. Information about TCPs within the APE for direct and/or indirect effects (Figure 2) is forthcoming and will be based on the results of the ethnographic studies currently being undertaken by the affected tribes. Additional consultation is needed with the FERC, affected Tribes, SHPO, and PacifiCorp to amend the APE to include the area potentially affected by the proposed tailrace reroute.

Consultation

PacifiCorp initiated consultation with the CTUIR, the NPT, the CTCR, the WWNF, and the Oregon SHPO. The CTUIR and NPT have requested through comments on the Proposed Study Plan, that consultation with these Tribes be conducted on a government-to-government basis with the FERC. Meetings were held regularly with the agencies and tribes to review the draft Study Plan, identify the APE, and develop scopes of work for the TCP studies. The APE for cultural resources and the Indirect/Visual APE in which the TCP studies will be conducted was approved by the SHPO and other agencies and Tribes.

Additional consultation between the FERC, CTUIR, NPT, CTCR, and the SHPO to amend the APE is needed. The APE amendment is necessary to address the area potentially affected by the proposed tailrace reroute. Upon approval of an amended Project APE, additional

consultation with the parties above will be required regarding the cultural resources investigations needed within the amended APE.

Figure 4. Map of the Cultural Resources APE plotted on USGS Joseph 7.5' series quadrangle.

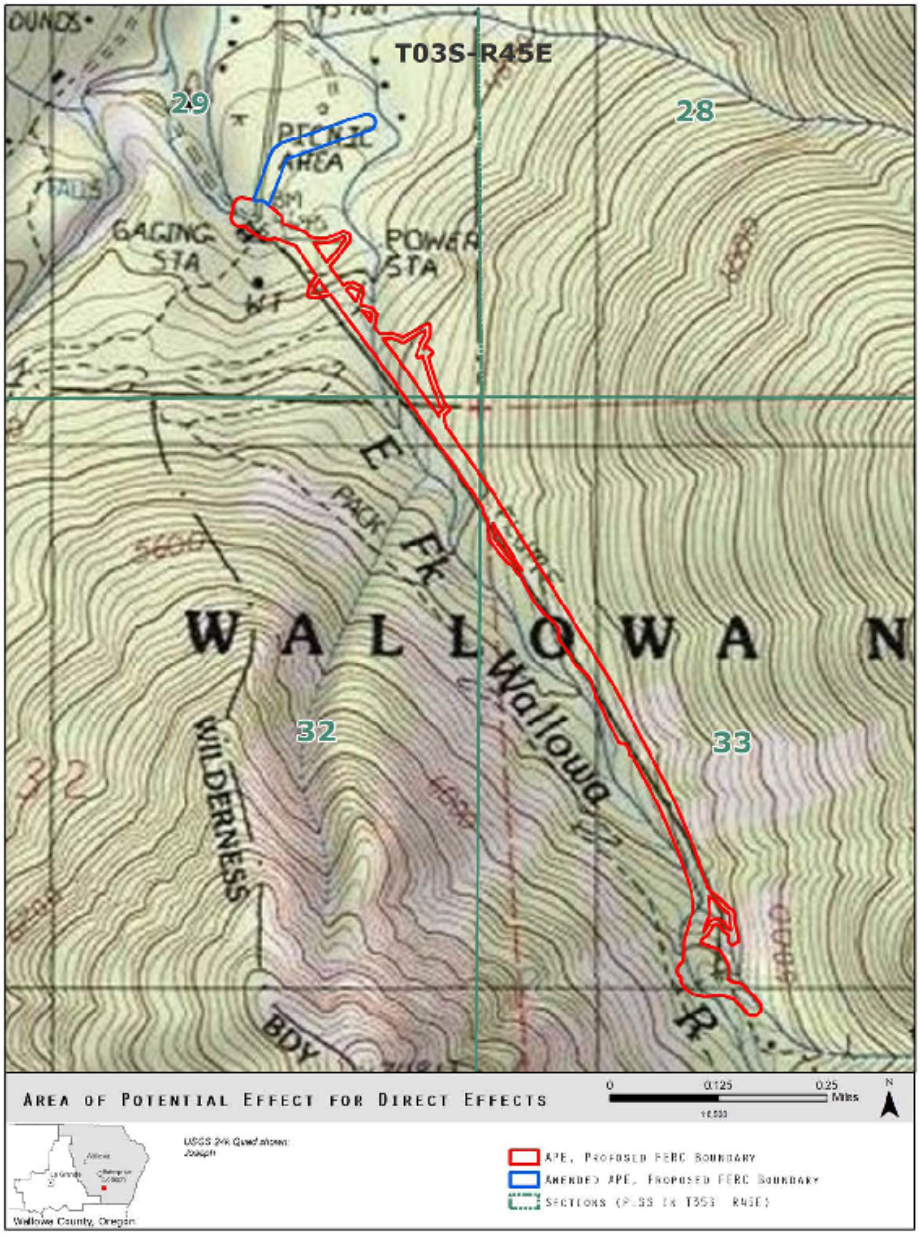
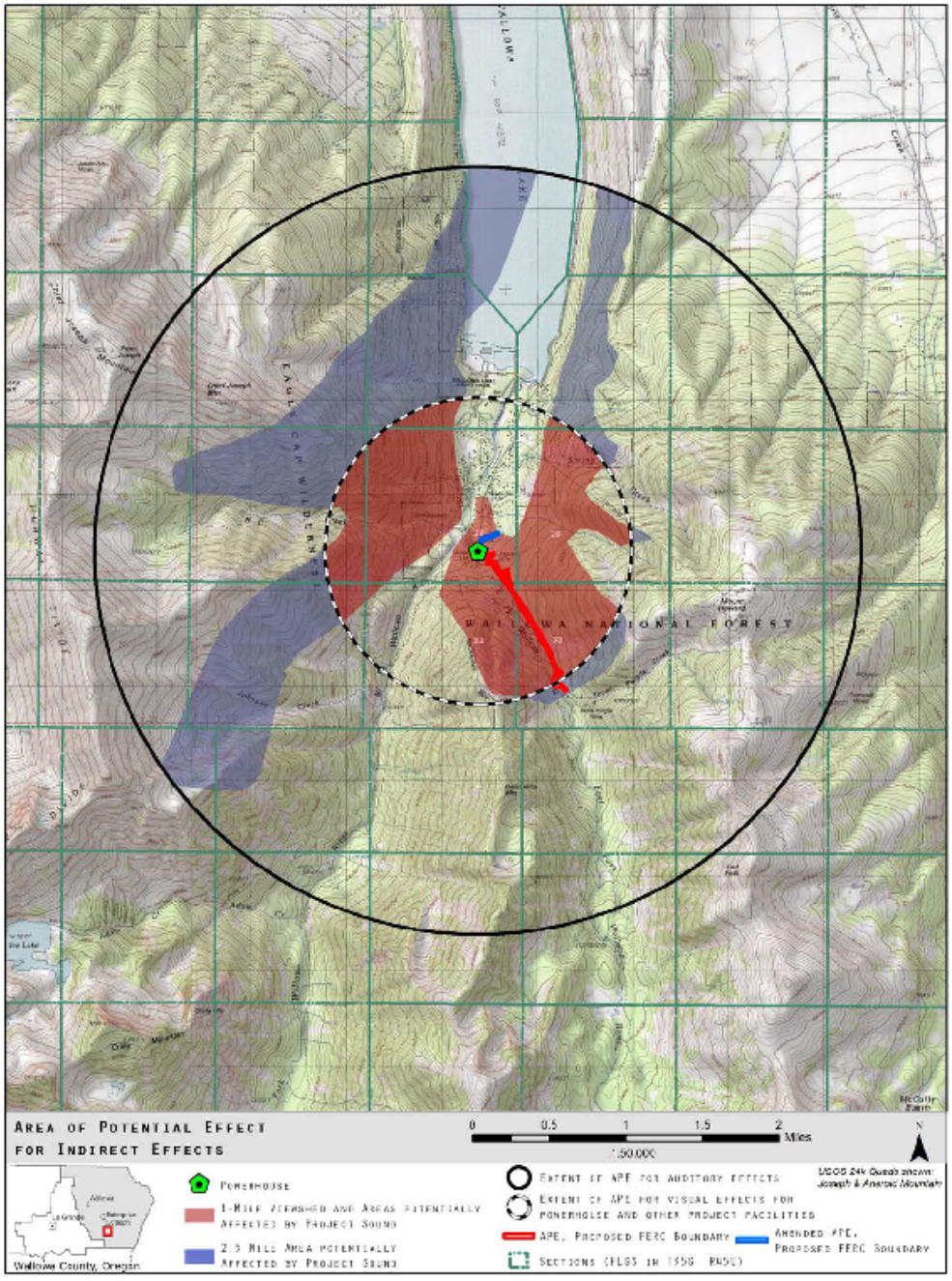


Figure 5. Map of the APE for Visual and Indirect Effects plotted on USGS Joseph 7.5' series quadrangle.



Archaeological Resources

Cardno ENTRIX archaeologists conducted an archaeological resources inventory of the APE for direct effects on July 25, 2012. The facilities were located on a timbered steep slope with a trail and bridges over the creek, and a less acute slope which includes graveled road and camping areas. At the time of survey, surface visibility varied between 0–100% due to

vegetation cover. The pedestrian survey was conducted in all accessible areas using 15-meter intervals. The cultural resources survey implemented a non-collection policy. If artifacts were located, they were recorded in the field and left in place.

No archaeological resources were identified within the APE. Additional archaeological survey work will be conducted within the annexed portion of the revised APE for the proposed tailrace reroute. The results of this survey will be incorporated into the report and appropriate treatment measures developed as needed.

Historic Resources

A Cardno ENTRIX architectural historian performed an architectural history survey on July 25, 2012, during which a historic resources inventory was conducted. Photographs and GPS points were taken of the building and structures within the APE. The architectural features of the resources were recorded on a historic property inventory form for inclusion in the Oregon SHPO historic property database.

Nine historic resources have been identified within the APE (Table 16). Additional historical resource survey work will be conducted within the annexed portion of the revised APE for the proposed tailrace reroute. The results of this survey will be incorporated into the report and appropriate treatment measures developed as needed.

Table 16. Historic Resources identified within the APE

Structure	Date	Location	NRHP Eligibility Recommendation	NRHP Eligibility Determination	SHPO Concurrence
Powerhouse	1921	South end of Wallowa Lake	Not eligible	Pending	Pending
Substation and Transmission Line		Adjacent to the powerhouse	Not eligible	Pending	Pending
Penstock		South of the powerhouse	Not eligible	Pending	Pending
East Fork Wallowa River Dam, Spillway and Bridge	1993*		Not eligible	Pending	Pending
Forebay Intake Structure, Headgate Control Platform		South of the East Fork Wallowa River Dam	Not eligible	Pending	Pending

Structure	Date	Location	NRHP Eligibility Recommendation	NRHP Eligibility Determination	SHPO Concurrence
Dam Maintenance Shed		100 feet southeast of the East Fork Wallowa River Dam	Not eligible	Pending	Pending
Royal Purple Diversion Dam and Pipeline		400 feet southeast of the East Fork Wallowa River Dam	Not eligible	Pending	Pending
Campground Maintenance Shed	Mid 1990s	North of the powerhouse	Not eligible	Pending	Pending
Campground Restrooms	Mid 1990s	In the campground	Not eligible	Pending	Pending

* Reconstructed.

The Wallowa Falls Hydroelectric facility was originally constructed in 1921 by Enterprise Electric Company, and consists of a wood crib dam, Royal Purple Creek diversion dam and discharge pipeline, forebay, penstock, small substation, powerhouse, two maintenance sheds, tailrace, and transmission line. The buildings and structures are utilitarian with minimal architectural embellishment. Construction materials are primarily wood, steel, and native basalt. The original wood crib dam was rebuilt in 1993 and the majority of the other structures associated with the Project have been significantly modified. The individual buildings and structures have been evaluated for NRHP eligibility as a historic district as discussed below.

Statement of Significance and NRHP Eligibility

Although the Wallowa Falls Hydroelectric Project played a role in providing power to communities in Wallowa County, the majority of the structures have been significantly altered. Due to the alterations and loss of integrity of its most important elements, the facility is not eligible as a historic district for the NRHP. The two features that have not been significantly altered are the transmission line and the East Fork Wallowa Falls dam maintenance shed. Individually these features are not eligible under Criterion A for a significant contribution to the broad patterns of our history or under Criterion B: Resources due to an association with the lives of persons significant in our past. The modest structures are not eligible under Criterion C as they do not embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose

components make lack individual distinction.

Traditional Cultural Property Studies

PacifiCorp has contracted with the CTUIR, NPT, and CTCR to conduct individual TCP studies. The studies are currently underway and fieldwork was conducted in the spring and summer of 2013. A preliminary status report is expected from each tribe by October 31, 2013 and a final report will be completed by December 31, 2013. The results of the tribe-prepared TCP reports will be incorporated into the Cultural Resources Final Technical Report and appropriate treatment measures will be proposed as needed. Each individual tribal TCP report will be attached to the Cultural Resources Final Technical Report as appendices.

3.3.8.1 Environmental Effects

Archaeological Resources

Based on the cultural resource investigation results currently available, the proposed Project would have no direct or indirect effects on archaeological resources. No archaeological resources that are considered historic properties have been identified to date within the APE. Additional information on historical resources will be collected and analyzed in the annexed portion of the APE once the revised APE is finalized.

Historical Resources

Based on the cultural resource investigation results currently available, the proposed Project would have no direct or indirect effects on historic resources. There are currently no historical resources that are considered historic properties within the APE. Additional information on historical resources will be collected and analyzed in the annexed portion of the APE once the revised APE is finalized.

Traditional Cultural Properties

Direct and indirect environmental effects to TCP's from the proposed Project will be identified upon receipt of the results of the tribe-prepared TCP reports identified above.

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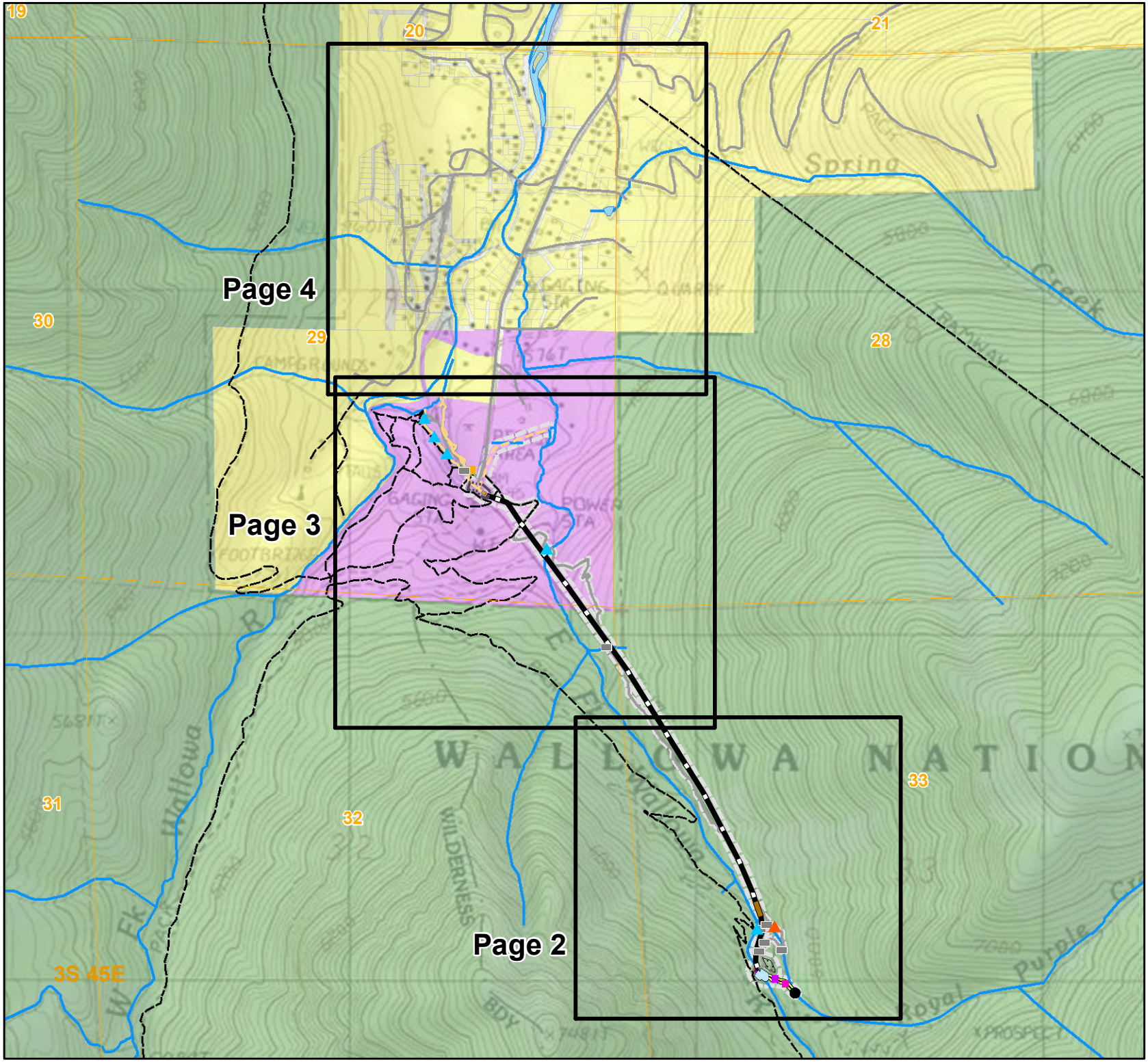
Appendix A
Wallowa Falls Project and Vicinity



Appendix A
Wallowa Falls Project and Vicinity

Page 1

Legend

- Proposed Project Boundary
- Road
- Trail
- Trailhead Parking
- Culvert

PacifiCorp Facility

- Anchor Block
- Royal Purple Pipe Outlet
- Recreation Storage Shed
- Royal Purple Diverson
- Gate
- Bridge
- WALLOWA FALLS PLANT FENCE
- 7.2 KV TRANSMISSION LINE
- ELEVATED TRESTLE
- LOW LEVEL OUTLET
- ROYAL PURPLE DIVERSION CHANNEL
- ROYAL PURPLE FLOWLINE - BURIED
- ROYAL PURPLE FLOWLINE - EXPOSED
- SPILLWAY CATWALK
- EXISTING TAILRACE
- PROPOSED TAILRACE
- WALLOWA FALLS PENSTOCK
- DAM
- INTAKE AND CONTROL STRUCTURE
- LAYDOWN AND STORAGE AREA
- SPILLWAY
- STORAGE SHED
- SUBSTATION
- WALLOWA FALLS FOREBAY
- WALLOWA FALLS POWERHOUSE
- Section
- Township
- Waterbody
- Stream

Land Ownership - County Data

- Private
- PACIFICORP
- USFS

0 750 1,500 Feet

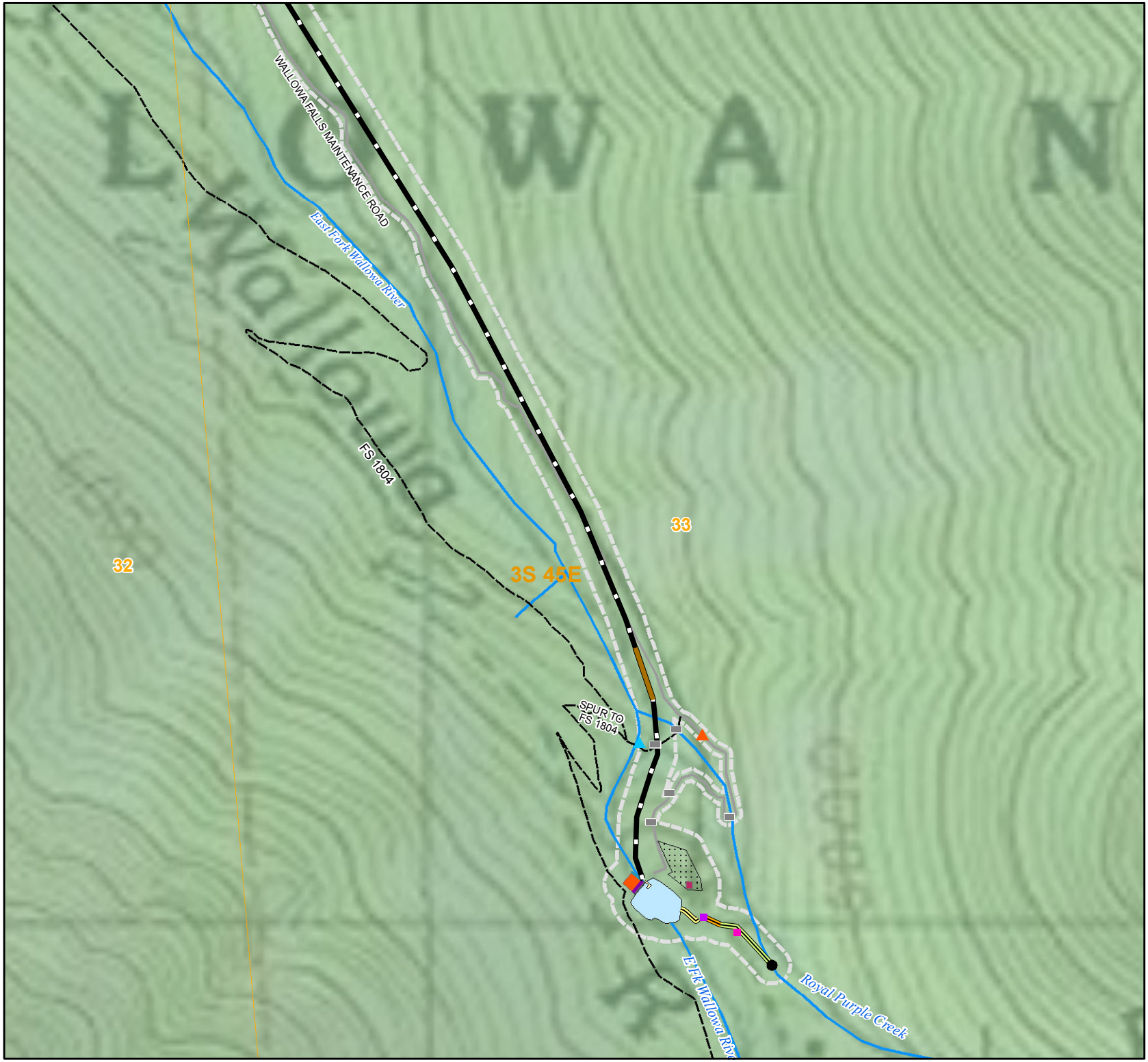
PACIFICORP ENERGY
A DIVISION OF PACIFICORP

N

Data are projected in UTM Zone 11, NAD83, meters.

Appendix A
Wallowa Falls Project and Vicinity

Page 2



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- WALLOWA FALLS POWERHOUSE
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- Waterbody
- Stream

Land Ownership - County Data

- Private
- PACIFICORP
- USFS

0 215 430 Feet

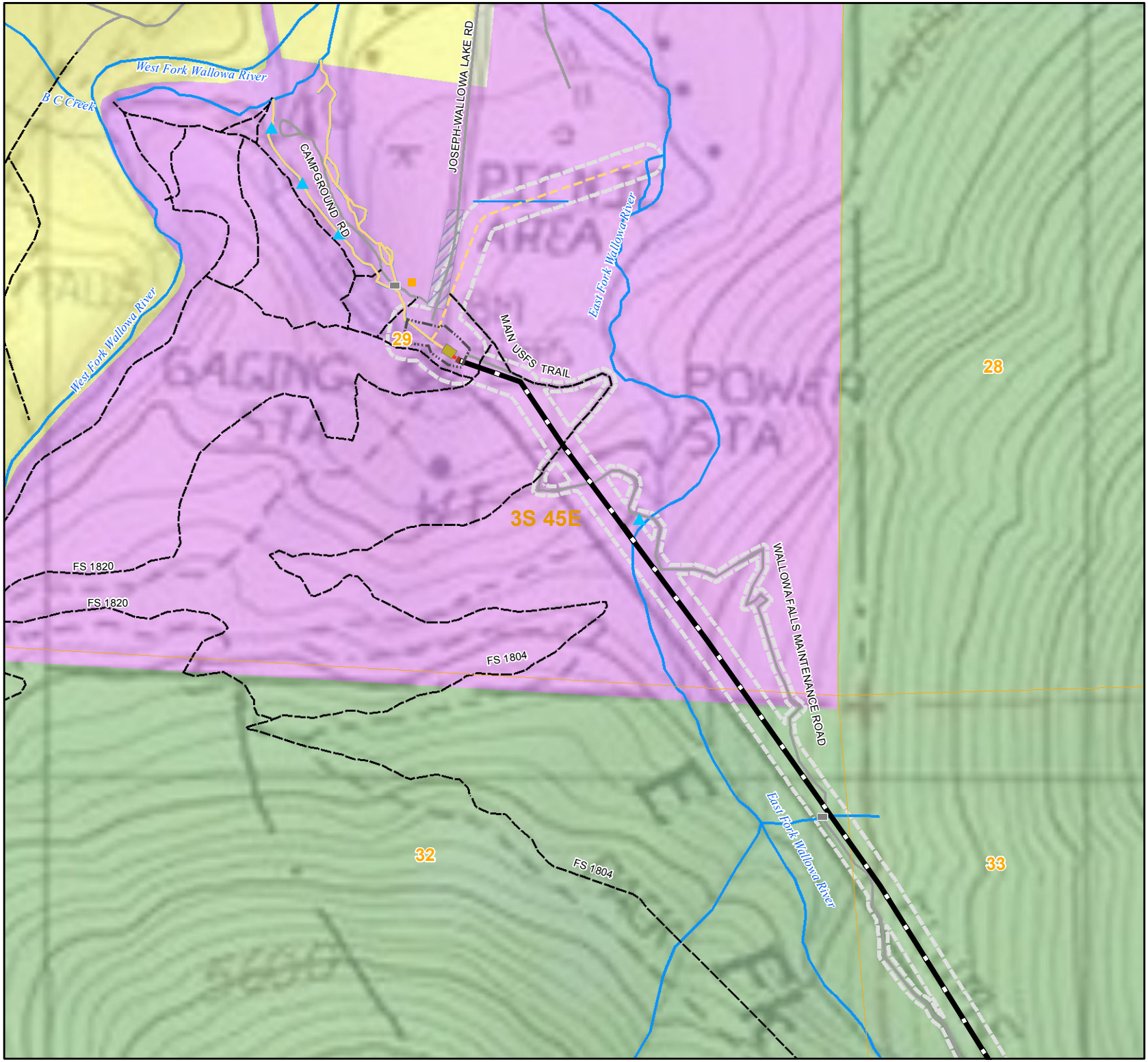
PACIFICORP ENERGY
A DIVISION OF PACIFICORP

N

Data are projected in UTM Zone 11, NAD83, meters.

Appendix A
Wallowa Falls Project and Vicinity

Page 3



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PacifiCorp Facility

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- SUBSTATION
- WALLOWA FALLS FOREBAY
- WALLOWA FALLS POWERHOUSE
- Section
- Township
- Waterbody
- Stream

Land Ownership - County Data

- Private
- PACIFICORP
- USFS

0 250 500 Feet

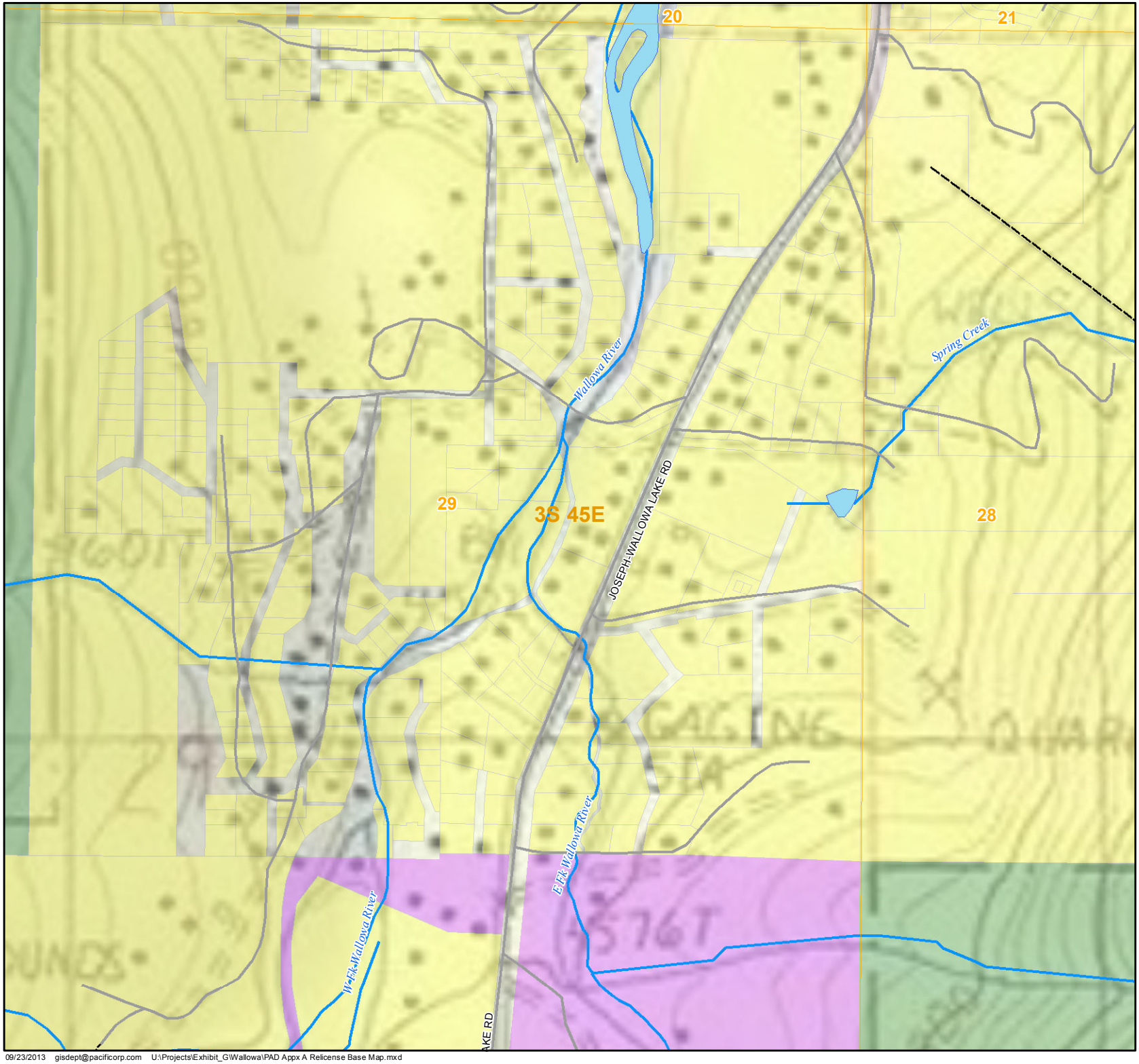
PACIFICORP ENERGY
A DIVISION OF PACIFICORP

N

Data are projected in UTM Zone 11, NAD83, meters.

Appendix A
Wallowa Falls Project and Vicinity

Page 4



Legend

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- Section
- Township
- Waterbody
- Stream

Land Ownership - County Data

- Private
- PACIFICORP
- USFS

0 250 500 Feet

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

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Data are projected in UTM Zone 11, NAD83, meters.

Appendix B
Exhibit G – Current License

PacifiCorp Wallowa Falls Hydroelectric License
FERC Project No. 308

Current License, with Subsequent Amendments Incorporated

Please Note: This document does not reflect Amendments to License Exhibits.
It treats only Amendments to the text of the license articles, citing the FERC Orders issuing them.
Amendments appear in *italics*. Deleted text has actually been deleted. "[]" denote Editor's Notes.

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UNITED STATES OF AMERICA **36 FERC ¶ 62, 250**
FEDERAL ENERGY REGULATORY COMMISSION

Pacific Power & Light Company Project No. 308—001

ORDER ISSUING NEW LICENSE
(Minor Project)
(Issued August 28, 1986)

Pacific Power & Light Company has filed a license application under Part I of the Federal Power Act (Act) to continue to operate and maintain the **Wallowa Falls Project**, located in Wallowa County, Oregon, on the East Fork Wallowa River and Royal Purple Creek. The project occupies lands of the United States within the Wallowa-Whitman National Forest.

Notice of the application has been published. No protests or motions to intervene were filed in this proceeding, and no agency objected to issuance of this license. Comments received from interested agencies and individuals have been fully considered in determining whether to issue this license, as discussed below.

Summary of Findings

An Environmental Assessment (EA) was issued for this project. Background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment are contained in the EA attached to this order. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the Safety and Design Assessment attached to this order.

The proposed project does not conflict with the applicable provisions of the Northwest Power Planning Council's Fish and Wildlife Program established under the Northwest Power Planning and Conservation Act, P.L. 96-501, 16 U.S.C. SS839b et seq.

The United States Department of Agriculture, Forest Service (FS), submitted one condition to be included in the license. The condition is an appropriate one to protect its National Forest and accordingly is included In the
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license as Article 101. It is therefore unnecessary to reach any issues as to the applicability of Section 4(e) of the Act in this proceeding.

The Director, Office of Hydropower Licensing, concludes that the project would not conflict with any planned or authorized development, and would be best adapted to comprehensive develop-merit of the waterway for beneficial public uses.

The Director orders:

(A) This license is issued to Pacific Power and Light Company (licensee), for a period of 30 years, commencing March 1, 1986, and terminating February 28, 2016, to continue to operate and maintain the Wallowa Falls Project. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provision of the Act.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands, enclosed by the project boundary shown by Exhibit G:

Exhibit G	FERC No. 308	Showing:
1	14	Project Area and Boundary (revised 8/15/85)

(2) Project works consisting of: (a) a 2-foot-high, 7-foot- long concrete diversion dam at elevation 5,838 feet on Royal Purple Creek having a 1-foot-wide spillway; (b) an 8-inch-diameter, 240-foot-long wood stave and pvc pipeline discharging flows into the Wallowa Falls forebay 200 feet upstream of the dam; (c) an 18-foot-high, 125-foot-long

(3) rock-filled log crib dam at elevation 5,795 feet having a 24-foot-wide spillway, creating; (d) a 2-acre forebay; (e) a 5,688-foot-long steel penstock varying in diameter from 18 inches to 16 inches; (f) a powerhouse containing a single generating unit with a rated capacity of 1,100 kW operating under a head of 1,168 feet producing an average annual energy output of 7 million kWh; (g) a tailrace discharging project flows into the West Fork Wallowa River; (h) 7.2-kV generator leads; and (i) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of Exhibits A and F recommended for approval in the attached Safety and Design Assessment.

(3) All of the structures, fixtures, equipment or facilities used to operate or maintain the project and located within the project boundary, all portable property that may be employed in connection with the project and located within or outside the project boundary, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) The Exhibit G described above and those sections of Exhibits A and F recommended for approval in the attached Safety and Design Assessment are approved and made part of the license.

(D) The following sections of the Act are waived and excluded from the license for this minor project:

4(b), except the second sentence; 4(e), insofar as it relates to approval of plans by the Chief of Engineers and the Secretary of the Army; 6, insofar as it relates to public notice and to the acceptance and expression in the license of terms and conditions of the Act that are waived here; 10(c), insofar as it relates to depreciation reserves; 10(d); 10(f); 14, except insofar as the power of condemnation is reserved; 15; 16; 19; 20; and 22.

(E) This license is subject to the articles set forth in Form L-16, (October 1975), entitled "Terms and Conditions of License for Constructed Minor Project Affecting Lands of the United States". The license is also subject to the following additional articles:

Article 101. Within six (6) months following the date of issuance of this license the licensee shall file with the Director, Office of Hydropower Licensing, a special-use authorization approved and enforceable by the Forest Service.

The licensee may not commence activities authorized in the license and Forest Service special-use authorization until after 60 days following the filing date, unless the Director, Office of Hydropower Licensing, instructs otherwise.

Article 201. The licensee shall pay the United States the following annual charges, effective the first day of the month in which this license is issued:

a. For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 1,470 horsepower.

b. For the purpose of recompensing the United States for the use, occupancy, and enjoyment of 12.1 acres of its lands, a reasonable annual charge as determined by the Commission in accordance with its regulations in effect from time to time.

Article 202. The Commission reserves the authority to order, upon its own motion or upon the recommendation of federal or state fish and wildlife agencies or affected Indian Tribes, alterations of project structures and operations to take into account to the fullest extent practicable the regional fish and wildlife program developed pursuant to the Pacific Northwest Electric Power Planning and Conservation Act.

Article 401. The licensee shall maintain in the bypassed reach of the East Pork Wallowa River a continuous minimum flow of 0.5 cubic feet-per second, as measured immediately downstream from the dam, or inflow to the reservoir, whichever is less, for the protection of fish and wildlife resources in the East Fork Wallowa River. This flow may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee and the Oregon Department of Fish and Wildlife.

Article 402. The licensee shall restrict project forebay flushing to the period from May 1 to August 30 of each year to protect Kokanee eggs and sac fry in the gravel areas above Wallowa Lake.

Article 403. The licensee, before starting any ground-disturbing or land-clearing activities within the project boundaries, other than that specifically authorized in this license, shall consult the Oregon State Historic Preservation Officer (SHPO) about the need for a cultural resources survey and salvage work. The licensee shall file with the Commission documentation of the management plan and a schedule to conduct the necessary investigation, together with a copy of a letter from the SHPO commenting on the plan and schedule, 60 days before starting any such ground-disturbing or land-clearing activities. The licensee shall make funds available in a reasonable amount for the required work. If the licensee discovers any previously unidentified archeological or historic sites during the course of constructing or developing project works or other facilities at the project, the licensee shall stop all construction and development activities in the vicinity of the sites and shall consult a qualified cultural resources specialist and the SHPO concerning the eligibility of the sites for listing in the National Register of Historic Places and any measures needed to avoid the sites or to mitigate effects on the sites. If the licensee and the SHPO cannot agree on the amount of money to be spent for project specific archeological and historical purposes, the Commission reserves the right to require the licensee to conduct the necessary work at the licensee's own expense.

Article 404. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests

in project lands and waters for certain other types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) noncommercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of

project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

(F) This order is issued under authority delegated to the Director and is final unless appealed under Rule 1902 to the Commission by any party within 30 days from the issuance date of this order. Filing an appeal does not stay the effective date of this order or any date specified in this order. The licensee's failure to appeal this order shall constitute acceptance of the license.

Richard T. Hunt
Director, Office of
Hydropower Licensing

APPENDIX A
ENVIRONMENTAL ASSESSMENT
DIVISION OF ENVIRONMENTAL ANALYSIS, OFFICE OF HYDROPOWER LICENSING
FEDERAL ENEREY REGULATORY COMMISSION

Date: June 26, 1986

Project name: Wallowa Falls FERC No. 308- 00l

A. APPLICATION

1. Application type: Minor relicense Date filed: 2/19/1985

2. Applicant: Pacific Power and Light Company

3. Water body: East Fork – Wallowa River River basin: Grande Ronde

4. Nearest city or town: Joseph

5. County: Wallowa State: Oregon

B. RESOURCE DEVELOPMENT

1. Purpose: The existing project provides an average 7,000,000 kilowatt-hours (kWh) of electrical energy per year to the Pacific Power and Light Company system.

2. Need for power: The existing project is in operation and is part of the applicant's existing electric generating resource base and is used in meeting the applicant's electric system load requirements.

3. Hydroelectric power and resource utilization: The existing 1,100-kilowatt (kW) power plant unit generates an average 7.0 gigawatt-hours (GWh) annually at a plant factor of 73 percent. The impulse turbine unit operates as part of a run-of-river (inflow equals outflow) scheme under a gross head of 1,168 feet and utilizes river flows up to 16 cubic feet per second (cfs). the river flows exceed the hydraulic capacity of the plant approximately 40 percent of the time, adjusted for the existing leakage rate of about 0.5 cfs from the forebay dam.

   Our initial review of the license application indicated that additional installed capacity may be required to adequately develop the power potential of the site. In response to this concern, the licensee provided an economic feasibility study based on installing an additional 400-kW impulse unit including construction of a new intake, penstock, powerhouse, and electrical appurtenances. The licensee estimated the cost of construction for the new unit to be $670,000 (1986 dollars). The project expansion would produce more energy by utilizing the Streamflow that occurs up to 75 percent of the time rather than 60 percent of the time as the existing project currently does. The additional Streamflow utilization would yield an additional average generation of 1.1 GWh annually at a levelized annual cost rate exceeding 100 mills/kWh. We concur with the licensee that the value of project power in the Northwest would not be sufficient at this time to cover the cost associated with the new unit. We conclude that the existing project is properly sized to develop the hydropower potential of the East fork Wallowa River.

   Agency comments have supported the continuance of a 0.5 cfs minimum instream flow release at the East Fork Wallowa River dam. No other pertinent comments have been received impacting upon the safety and adequacy of the project.

The Commission's Planning Status report for the Lower Snake River Basin shows that the project is not in conflict with any existing or planned developments within the basin. The project is well adapted to the comprehensive development of the East Fork Wallowa River.

C. PROPOSED PROJECT AND ALTERNATIVES

1) Description of the proposed action: The existing project consists of: (1) a 2-foot-high, 7-foot-long concrete diversion dam, having a 1-foot-wide spillway, at elevation 5,838 feet on Royal Purple Creek which is a tributary to the East Fork Wallowa River; (2) a 240-foot-long, 8-inch diameter wood stave and pvc pipeline discharging flows into the Wallowa Falls forebay, 200 feet upstream of the East Fork Wallowa River dam; (3) an 18-foot-high, 125-foot-long, rock-filled log crib dam, having a 240-foot-wide spillway, at elevation 5,795 feet on the East Fork Wallowa River; (4) a 2-acre forebay; (5) a 5,688-foot-long steel penstock varying in diameter from 18 inches to 16 inches; (6) a powerhouse containing a single generating unit with a rated capacity of 1,100 kW operating under a head of 1,168 feet producing an average annual energy output of 7.0 GWh; (7) a tailrace discharging project flows into the West Fork Wallowa River; and (8) a 20-foot-long, 7.2-kilovolt (kV) transmission line which connects to Wallowa Falls substation.

2) Applicant's proposed mitigative measures:

a) Construction: The applicant has not proposed any mitigative measures.

b) Operation: The applicant proposes to maintain a minimum flow of 0.5 cfs in the bypassed reach of the East Fork Wallowa River for the protection of aquatic and riparian resources. To protect Kokanee eggs and sac fry downstream from the project, the applicant proposes to restrict flushing of the project forebay to the period from May 1 to August 30.

3. Federal lands affected.

__ No. X Yes; agency: Forest Service (FS); acreage = 12.1 ;

X The federal land management agency has provided conditions by letter dated: 2/4/86 (Attachment 1).

__ Conditions have not been provided.

Remarks: _____

4. Alternatives to the proposed action.

a. X No other reasonable action alternatives have been found.

__ Action alternative: _____

b. Alternative of no action.

No action would prohibit the applicant from constructing the proposed project. No action would involve no alterations to the existing environment and would preclude the applicant from producing electrical power at the site.

D. AFFECTED ENVIRONMENT

1. Descriptions of the resources that would be impacted by the proposed project.

a. Geology and soils. Geo1ogy and soils would not be affected by the existing project.

b. Streamflow:

Low flow:	10.9	cfs;	Flow parameter:	Monthly mean flow (March)
High flow:	63.4	cfs;	Flow parameter:	Monthly mean flow (June)
Average flow:	22.0	cfs;	Flow parameter:	Average yearly flow

Remarks: _____

c. Water quality. The existing water quality is good. Dissolved oxygen (DO)concentration is above 75 percent saturation and meets state water quality standards for the Grande Ronde River Basin. Water samples collected in the project area in July 1985 had DO concentrations of 8.9 to 9.1 milligrams per liter.

d. Fisheries

Anadromous: X None: Species include:

Resident: None: X Species include: Kokanee salmon and brook trout

Remarks: Some Kokanee from Wallowa Lake spawn in the lower East Fork Wallowa River. Small numbers of brook trout may escape from an upstream impoundment and occur in the project area.

e. Vegetation:

Cover Type Dominant Species

Remarks: Vegetation would not be affected by the existing project.

f. Wildlife.

Species inhabiting the project area include:

Remarks: Wildlife would not be affected by the existing project.

g. Cultural.

X Description: There are properties listed on or eligible for listing on the National Register of Historic Places in the area of the project's potential environmental impact.

National Register (listed and eligible) properties have not been recorded.

Remarks: By letter dated December 13, 1984, the Oregon State Historic Preservation Officer (SHPO) stated that the project would have no effect upon the properties listed in or eligible for inclusion in the National Register of Historic Places.

h. Visual quality: Periodic forebay flushing would produce turbidity and sedimentation and visually degrade the aesthetics of the river.

i. Recreation: Periodic forebay flushing would produce turbidity and sedimentation and thereby temporarily degrade the recreational value of the river. The recreators' camping experience in the immediate vicinity of the powerhouse would continue to be affected by the audible frequency oscillations from the generator.

j. Land Use: Land use would not be affected by the existing project.

k. Socioeconomics: Socioeconomics would not be affected by the existing project.

l. Ambient noise: Audible frequency oscillations from the generator would continue to affect the visitors to the immediate vicinity of the powerhouse.

m. Ambient air quality: The ambient air quality would not be affected by the existing project.

n. Other resources: No other recourses would be affected by the existing project.

E. CONSULTATION AND COMPLIANCE

1. Fish and wildlife consultation (Fish & Wildlife Coordination Act).
   (a) Fish & Wildlife Service (FWS): X Yes __ No
   (b) State(s): X Yes __ No
   (c) National Marine Fisheries Service NMFS): __ Yes X No

2. Section 7 consultation (Endangered Species Act).
   (a) Listed species. None.

   (b) ***X*** Not required. ___ Required: completed (date): ____/____/_____

3. Section 401 certification (Clean Water Act).
   ___ Not required. X Received. 2/22/73 ___Waived. ___ Requested.

4. Cultural resource consultation (Historic Preservation Act).
   (a) Register status: None. X Potentially eligible. ___Eligible or listed.
   (b) State Historic Preservation Officer (SHPO): X Yes ___ No
   (c) National Park Service (NPS): X Yes ___ No
   (d) Council: X Not required. ___ Completed: __/__/___
   (e) Further consultation: X Not required. ___ Required.

   Remarks: _____

5. Recreation consultation [Federal Power Act, 510(a)].
   (a) U.S. Owners: X Yes __ No (b) NPS: X Yes ___ No
   (c) State(s): X Yes __ No

   Remarks: _____

6. Wild and scenic rivers (Wild and Scenic Rivers Act).
   Status: **X** None __ Listed. Determination completed: ___/___/____

Administering agency: _____

Remarks: _____

7. LWCFA lands and facilities affected (Land and Water Conservation Fund Act)
   Status: **X** None __ Listed. Determination completed: ___/___/____
   Administering agency: _____

   Remarks: _____

F. COMMENTS

1. The following entities provided comments on the application in response to the public notice dated 12/04/85.

Commenting entity:	Date of Letter
Forest Service	02/04/86
Department of the Interior	02/11/86

*Indicates a petition to intervene.

2. The applicant responded to the comments by letter dated 4 / 29 / 86.

ENVIRONMENTAL IMPACTS AND RECOMMENDATIONS

Mitigative measures recommended by the staff are in addition to those proposed by the applicant, Section C(2), and those conditions identified in Section C(3), as appropriate. There are 3 issues addressed below:

1. Issue: Future repair of the East Fork Wallowa dam would result in reduced leakage and seepage and would reduce or eliminate flow in the bypassed reach, thereby adversely affecting riparian and aquatic resources.

   (a) Comments: The Department of Interior (Interior) recommends maintenance of a continuous minimum flow of 0.5 cfs in the bypassed reach below the East Fork Wallowa dam for the protection of existing aquatic and riparian resources;

   (b) Applicant's response: The applicant agrees to maintain a continuous minimum flow of 0.5 cfs in the bypasses reach below the East Fork Wallowa dam.

   (c) Conclusions and recommendations: The existing flow in the bypassed reach should be maintained to protect riparian and aquatic resources in the East Fork Wallowa River. Therefore, the applicant should provide for a minimum flow release 0.5 cfs to the bypassed reach below East Fork in order to maintain these resources.

2. Issue: Flushing of the project forebay would increase sedimentation that would be detrimental to Kokanee eggs and sac fry in the gravel areas between the project and Wallowa Lake.

   (a) Comments: Interior recommends limiting forebay flushing to the period from May 1 to August 30 to protect Kokanee eggs and sac fry.

   (b) Applicant's response; The applicant agrees to restrict forebay flushing to the period from May 1 to August 30.

   (c) Conclusions and recommendations: Flushing of the project forebay would increase sedimentation downstream from the project. Deposition of suspended sediment can smother and kill fish eggs and larvae (Loar et al., 1980). To protect Kokanee and sac fry **,** the applicant should restrict forebay flushing to the period from May 1 to August 30, corresponding to the period when neither eggs nor sac fry are present in the East Fork Wallowa River.

3. Issue: Archeological and historic sites identified during ground-disturbing and land-clearing activities, or affected by changes in the design or location of project facilities.
   (a) Comments: None.

   (b) Applicant's response: None

   (c) Conclusions and recommendations: If the applicant encounters unidentified archeological or historic sites during the development of project works or related activities, the applicant should stop ground-disturbing and land clearing activities in the vicinity of the sites and consult the Oregon State Historical Presentation Officer (SHPO). Before starting any ground-disturbing or land clearing activities within the project, other than that specifically authorized in the license, the Applicant should consult with the SHPO. In these instances, the applicant should file a plan, including a schedule, for the necessary studies, and the SHPO' s written comments concerning the plan.

H. SUMMARY OF ENVIRONMENTAL IMPACTS

1. Assessment of adverse and beneficial impacts expected from the project as proposed by the applicant (P); the proposed project with the staff's recommended mitigation (Ps) [Section G]; and any other alternative considered (A).*

Resource	Impact			Remarks
	P	Ps	A	
a. Geology/Soils	0			
b. Streamflow	lAL	—	—	
c. Water quality:				
Temperature	0			
Dissolved oxygen	0			
Turbidity & sedimentation	lAL			c. Periodic forebay flushing would continue to cause turbidity and sedimentation
Other:				
d. Fisheries:				
Anadromous	0			d. Forebay flushing would cause turbidity and sedimentation which would have an adverse effect on Kokanee eggs and sac fry. Proposed restriction of forebay flushing to the period from May 1 to August 30 would eliminate this impact.
Resident	lAL	0		
e. Vegetation	0			
f. Wildlife	0			
g. Cultura1:				
Archeology	0			
History	0			
h. Visual quality	lAL			h. Periodic forebay flushing would produce turbidity and sedimentation that would temporarily degrade the recreational and visual quality of the river.
i. Recreation	IAL	—		i. Periodic forebay flushing would produce turbidity and sedimentation that would temporarily degrade the recreational and visual quality of the river. i. Audible frequency oscillations from the generator would continue to affect the recreators camping experience in the immediate vicinity of the powerhouse.
j. Land use	0			
k. Socioeconomics	0			
l. Ambient noise	1AL	—	—	l. Audible frequency oscillations from the generator would continue to affect the recreators camping experience in the immediate vicinity of the powerhouse.

***** The assessment reflects the adoption of any federal land management agency's conditions, in addition to the applicant's proposed mitigation. Assessment symbols indicate the following impact levels:

o= No impact; 1=Minor impact; 2=Substantial impact; = Major impact;
A=Adverse; B=Beneficial; L=Long-term Impact; S=Short-term impact

(e.g., lBL= Minor, beneficial, long-term impact)

2. Impacts of the no-action alternative

. Under the no-action alternative, there would be no construction of project facilities or changes to the existing physical, biological, or cultural components of the area. Electrical power that would be generated by the proposed hydroelectric project would have to be generated from other available sources or offset by conservation measures.

3. Recommended alternative (including proposed, required, and recommended mitigative measures):
X Proposed project. ___ Alternative action. ___ No action.

4. Reason(s) for selecting the preferred alternative.
The existing project would continue to generate electrical energy from a renewable resource without significantly affecting the existing environmental conditions of the project area.

I. SUMMARY OF UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Reduced Streamflow in the bypassed reach of the East Fork Wallowa dam would continue. Forebay flushing would result in periodic increases in sedimentation and turbidity. Audible frequency oscillation from the generator would continue.

J. CONCLUSION

X Finding of No Significant Impact. Approval of the recommended alternative (H(3)] would not constitute a major federal action significantly affecting the quality of the human environment; therefore, an environmental impact statement (EIS) will not be prepared.

___ Intent to Prepare an EIS. Approval of the recommended alternative (H (3)] would constitute a major federal action significantly affecting the quality of the human environment; therefore, an EIS will be prepared.

K. LIST OF PREPARERS

Name	Position-Title
Angelo Colianni	Soil Conservationist (Coordinator)
John P. Warner	Fishery Biologist
Ronald Kowalewski	Civil Engineer
Martin Thorpe	Electrical Engineer
Mary Nowak	Writer-Editor

L. LITERATURE CITED

1. Pacific Power and Light Company, 1985. Application for minor relicense, the Wallowa Falls Hydroelectric Project, FERC 308, Oregon: filed February 19, 1985.
2. Loar, N., L. L. Dye, R. R. Turner, and S. G. Hildebrand. 1980. Analysis of environmental issues relating to small-scale hydroelectric development.
I: Dredging. ORNL/TM-7228. publ. 1656~7228. 1565. Environmental Sciences Division, Oak Ridge National Laboratory; Oak Ridge, Tennessee. 134pp.

APPENDIX B
SAFETY AND DESIGN ASSESSMENT
WALLOWA FALLS PROJECT
FERC NO. 308-001, OREGON

DAM SAFETY

The existing Wallowa Falls Dam is a rock-filled timber-crib dam and is classified as low hazard by the Commission's San Francisco Regional Office (SFRO). The dam is 18 feet high and 125 feet long impounding less than 2 acre-feet of storage in a rural undeveloped area. The concrete diversion dam on Royal Purple Creek is 2 feet high and has no effective impoundment. Failure of the dams and appurtenant structures would not pose a hazard to downstream property and human life.

The project facilities were last inspected by SFRO on July 9, 1985. The inspection revealed continued vertical and horizontal displacement of the fore bay dam in a downstream direction as noted in previous inspection reports. No evidence was found to indicate that the dam was unstable. Generally, the project structures were in satisfactory condition.

PROJECT DESIGN

To supplement the flows of the East Fork Wallowa River, the stream flows of Royal Purple Creek, at elevation 5836 feet, are diverted into the forebay through a 8-inch-diameter, 240-foot-long wood stave and PVC pipeline. The spillway for the dam has a hydraulic capacity of 475 cfs. Power flows from the forebay are conveyed through a 24-inch gated intake, a 2800-foot-long, 18-inch-diameter and 2890-foot-long, 16-inch-diameter steel penstock to the generating unit housed in an indoor powerhouse. Flows from the powerhouse are discharged to West Fork Wallowa River via a tailrace approximately 1200 feet long.

EXHIBITS

The following parts of Exhibit A and the following Exhibit F drawings conform to the Commission's rules and regulations and should be included in the license:

Exhibit A. Sections entitled "Generator", "Turbine", "Head", and "Hydraulics/Hydrology" of the application filed February 19, 1985. The project includes 7.2-kV generator leads; a 7.2/23-kV, l000-kV transformer bank; and a 6.7-mile-long, 23-kV transmission line.

Exhibit F Drawing	**FERC No. 308-**	**Title**
F-1	11	Power House
F-2	12	Diversion Dam
F-3	13	Pipe Line Details

FERC Articles Form L-16 Oct 1975

FEDERAL POWER COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MINOR PROJECT AFFECTING LANDS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified~ inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations,. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 7. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 8. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 9. The operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and- for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Commission may prescribe for the purposes hereinbefore mentioned.

Article 10. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the

conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either
by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 11. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or ca part thereof is located, after notice and opportunity for hearing.

Article 12. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof, In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 13. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting:

Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 14. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 15. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the- clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 16. Timber on lands of the United States cut, used, or destroyed in the construction and maintenance of the project works, or in the clearing of said lands, shall be paid for, and the resulting slash and debris disposed of,

in accordance with the requirements of the agency of the United States having jurisdiction over said lands. Payment for merchantable timber shall be at current stumpage rates, and payment for young growth timber below merchantable size shall be at current damage appraisal values. However, the agency of the United States having jurisdiction may sell or dispose of the merchantable timber to others than the Licensee: Provided, That timber so sold or disposed of shall be cut and removed from the area prior to, or without undue interference with, clearing operations of the Licensee and in coordination with the Licensee's project construction schedules. Such sale or disposal to others shall not relieve the Licensee of responsibility for the clearing and disposal of all slash and debris from project lands.

Article 17. The Licensee shall do everything reasonably within its power, and shall require its employees, contractors, and employees of contractors to do everything reasonably within their power, both independently and upon the request of officers of the agency concerned, to prevent, to make advance preparations for suppression of, and to suppress fires on the lands to be occupied or used under the license. The Licensee shall be liable for and shall pay the costs incurred by the United States in suppressing fires caused from the construction, operation, or maintenance of the project works or of the works appurtenant or accessory thereto under the license.

Article 18. The Licensee shall interpose no objection to, and shall in no way prevent, the use by the agency of the United States having jurisdiction over the lands of the United States affected, or by persons or corporations occupying lands of the United States under permit, of water for fire suppression from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license, or the use by said parties of water for sanitary and domestic purposes from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license.

Article 19. The Licensee shall be liable for injury to, or destruction of, any buildings, bridges, roads, trails, lands, or other property of the United States, occasioned by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license. Arrangements to meet such liability, either by compensation for such injury or destruction, or by reconstruction or repair of damaged property, or otherwise, shall be made with the appropriate department or agency of the United States.

Article 20. The Licensee shall allow any agency of the United States, without charge, to construct or permit to be constructed on, through, and across those project lands which are lands of the United States such conduits, chutes, ditches, railroads, roads, trails, telephone and power lines, and other routes or means of transportation and communication as are not inconsistent with the enjoyment of said lands by the Licensee for the purposes of the license. This license shall not be construed as conferring upon the Licensee any right of use,~ occupancy, or enjoyment of the lands of the United States other than for the construction, operation, and maintenance of the project as stated in the license.

Article 21. In the construction and maintenance of the project, the location and standards of roads and trails on lands of the United States and other uses of lands of the United States, including the location and condition of quarries, borrow pits, and spoil disposal areas, shall be subject to the approval of the department or agency of the United States having supervision over the lands involved.

Article 22. The Licensee shall make provision, or shall bear the reasonable cost, as determined by the agency of the United States affected, of making provision for avoiding inductive interference between any project transmission line or other project facility constructed, operated, or maintained under the license, and any radio installation, telephone line, or other communication facility installed or constructed before or after construction of such project transmission line or other project facility and owned, operated, or used by such agency of the United States in administering the lands under its jurisdiction.

Article 23. The Licensee shall make use of the Commission's guidelines and other recognized guidelines for treatment of transmission line rights-of-way, and shall clear such portions of transmission line rights-of—way across lands of the United States as are designated by the officer of the United States in charge of the lands; shall keep the areas so designated clear of new growth, all refuse, and inflammable material to the satisfaction of such

officer; shall trim all branches of trees in contact with or liable to contact the transmission lines; shall cut and remove all dead or leaning trees which might fall in contact with the transmission lines; and shall take such other precautions against fire as may be required by such officer. No fires for the burning of waste material shall be set except with the prior written consent of the officer of the United States in charge of the lands as to time and place.

Article 24. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement:. or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 25. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 26. The terms and conditions expressly set forth in the License shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

Appendix C
Draft Design Drawings for Tailrace Reroute

PIPELINE PLAN

SCALE: 1"= 40'

0" 40' 80'

SHEET NOTES:

1. THE EAST FORK OF THE WALLOWA RIVER IS FULL OF GRANITE BOULDERS OF VARYING SIZE. CONTRACTOR SHALL REMOVE EXISTING BOULDERS, REGARDLESS OF THEIR SIZE, DURING PERFORMANCE OF THIS WORK. THE AVERAGE DEPTH OF THE RIVER IS 1.25 FEET AT TIME OF SURVEY.
2. THIS TOPOGRAPHIC SURVEY WAS MADE WITH A LEICA TCR 803 TOTAL STATION BY TRAVERSE SURVEY AND SIDE SHOTS. ELEVATIONS FOR PP&L COMPANY BRASS CAPS AND SURVEY CONTROL POINTS MAGNAIL #1 AND MAGNAIL #2 WERE DETERMINED BY DIFFERENTIAL LEVELS. OTHER SURVEY CONTROL POINTS WERE MEASURED BY TOTAL STATION METHODS AND TRIG LEVELS. X, Y AND Z CLOSURES WERE ALL WITHIN 0.04 FOOT.
3. THE SITE IS COVERED WITH CONIFER TREES, (DOUGLAS AND WHITE FIR, TAMARACK (WESTERN LARCH), ENGLEMANN SPRUCE AND A FEW PONDEROSA PINE). THERE ARE A FEW COTTONWOOD TREES NEAR THE EAST FORK OF THE SURVEY AND THE SPECIES AND APPROXIMATE DIAMETER OF THE TREES TIED ARE CODED AS DESCRIBED ON THE ACCOMPANYING CODE LIST.
4. THE PORTION OF THE SITE SOUTHWEST OF THE OREGON STATE PARKS MAINTENANCE BUILDING IS HEAVILY SCOURED BY CREEK FLOODING.
5. CONTRACTOR SHALL DEVELOP AN EROSION AND SEDIMENT CONTROL PLAN THAT MEETS ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS.
6. ALL WORK AND SIGNAGE SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)" FOR STREETS AND HIGHWAYS.
7. THE SITE WILL BE RECLAIMED AFTER CONSTRUCTION BY MOUNDING THE SOIL OVER THE PIPELINE, PROVIDING DRAINAGE ROUTES, SEEDING WITH NATIVE PLANTS, AND SCATTERING WOOD AND SLASH OVER DISTURBED AREAS.

DESIGN CRITERIA:

DESIGN FLOW = 16 CFS
DESIGN SLOPE = 0.0016
MANNINGS n = 0.013
PIPE DIAMETER = 30"
FLOW DEPTH = 24" (80%)
FLOW VELOCITY = 3.8 FPS

LEGEND

- SURVEY CONTROL POINT AS NOTED
- BO – WATER BLOW OFF
- W – 1 INCH PIPES, 3 FEET ABOVE GROUND LINE. BELIEVED TO BE REMAINS OF OLD ABANDONED WATER SYSTEM.
- W – WATER LINE AS NOTED
- OHP – OVERHEAD POWER LINE
- P – POWER POLE
- POLE ANCHOR
- TRAFFIC SIGN
- TRAILHEAD SIGN
- CONIFER TREE, FIR, PINE, SPRUCE OR TAMARACK, SEE POINT DESCRIPTION FOR SPECIES AND SIZE.
- DECIDUOUS TREE, COTTONWOOD. SEE POINT DESCRIPTION FOR SPECIES AND SIZE.
- FENCE
- TRAIL
- EDGE OF WATER

PRELIMINARY – NOT FOR CONSTRUCTION

McMILLEN, LLC
1401 SHORELINE DR.
BOISE, ID 83702
OFFICE: 208.342.4214
FAX: 208.342.4216

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

SAP#	
PJ#	
DATE	9/17/13
ENG C. BOYD	DES C. BOYD
DR J. LAHMON	CH D. AXNESS
APPROVAL	

WALLOWA FALLS HYDROELECTRIC PROJECT
TAILRACE REROUTE CONCEPT
OUTFALL STRUCTURE
PIPELINE PLAN

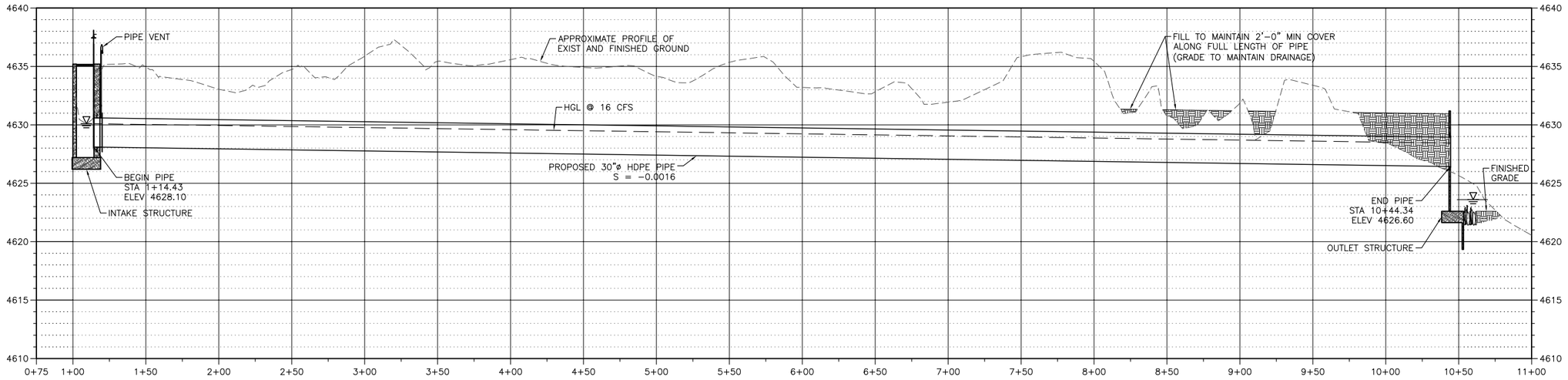
PACIFICORP ENERGY
A PACIFICORP COMPANY
HYDRO

SCALE: AS NOTED | SHEET 1 | REV. A

No.	DATE	REVISION	BY	CHK	APP
A	09/17/13	CONCEPT DESIGN	JL	CB	CB

PLOT SCALE: 1 = 1

REFERENCE DRAWINGS
DRAWING No.
REFERENCE DRAWINGS
DRAWING No.



PILELINE PROFILE

HORIZ SCALE: 1"= 40'
VERT SCALE: 1"=5'

0" 40' 80'
0" 5' 10'

PRELIMINARY – NOT FOR CONSTRUCTION

McMILLEN, LLC
1401 SHORELINE DR.
BOISE, ID 83702
OFFICE: 208.342.4214
FAX: 208.342.4216

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SAP#	
PL#	
DATE	9/17/13
ENG C. BOYD	DES C. BOYD
DR J. LAHMON	CH D. AXNESS
APPROVAL	

WALLOWA FALLS HYDROELECTRIC PROJECT
TAILRACE REROUTE CONCEPT
OUTFALL STRUCTURE
PIPELINE PROFILE

PACIFICORP ENERGY
A PACIFICORP COMPANY
HYDRO

SCALE: AS NOTED | SHEET 2 | REV. A

No.	DATE	REVISION	BY	CHK	APP
A	09/17/13	CONCEPT DESIGN	JL	CB	CB

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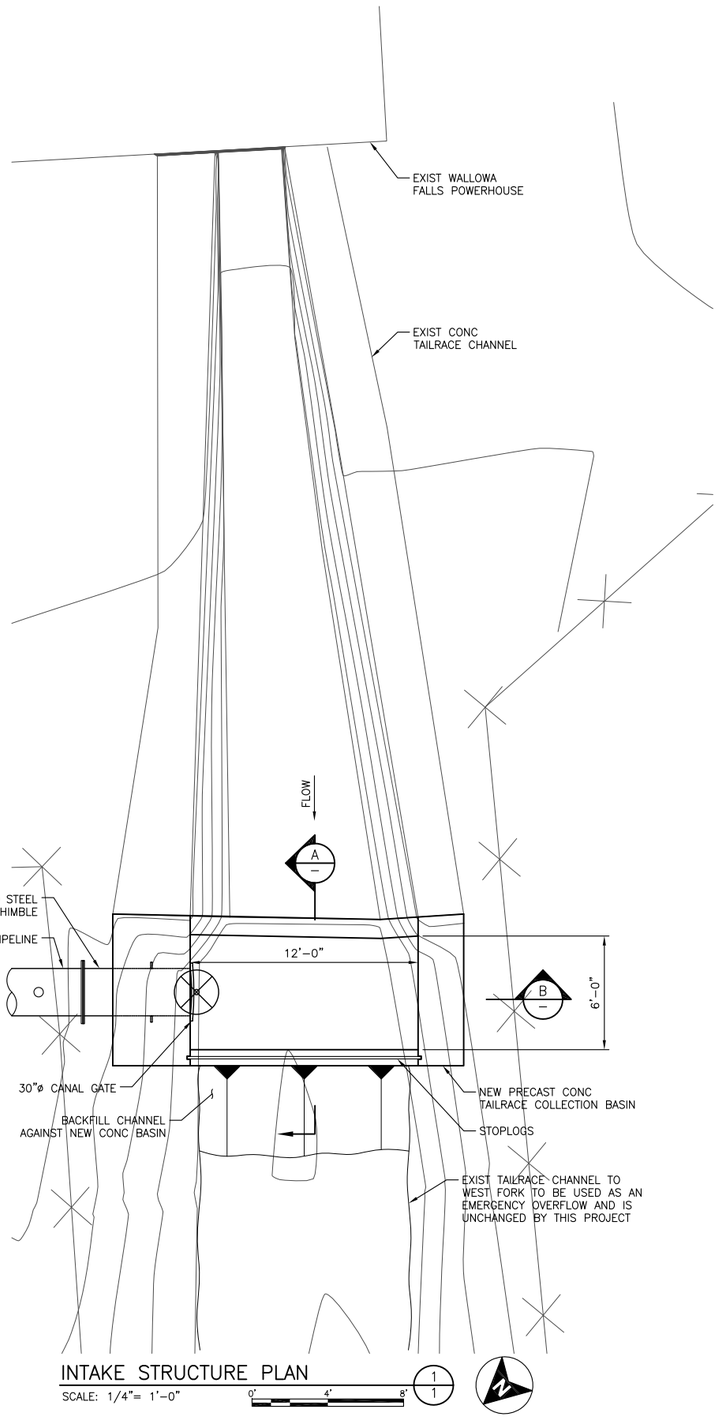
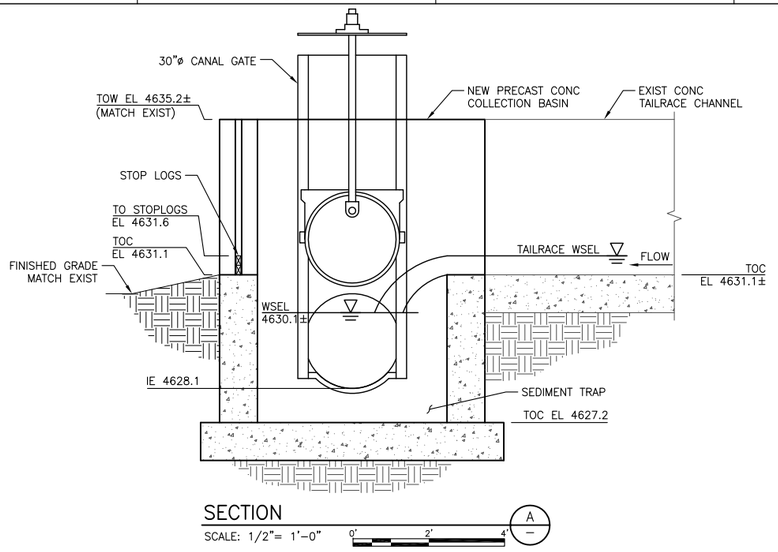
DRAWING No.
REFERENCE DRAWINGS
DRAWING No.

PLOT SCALE: 1 =



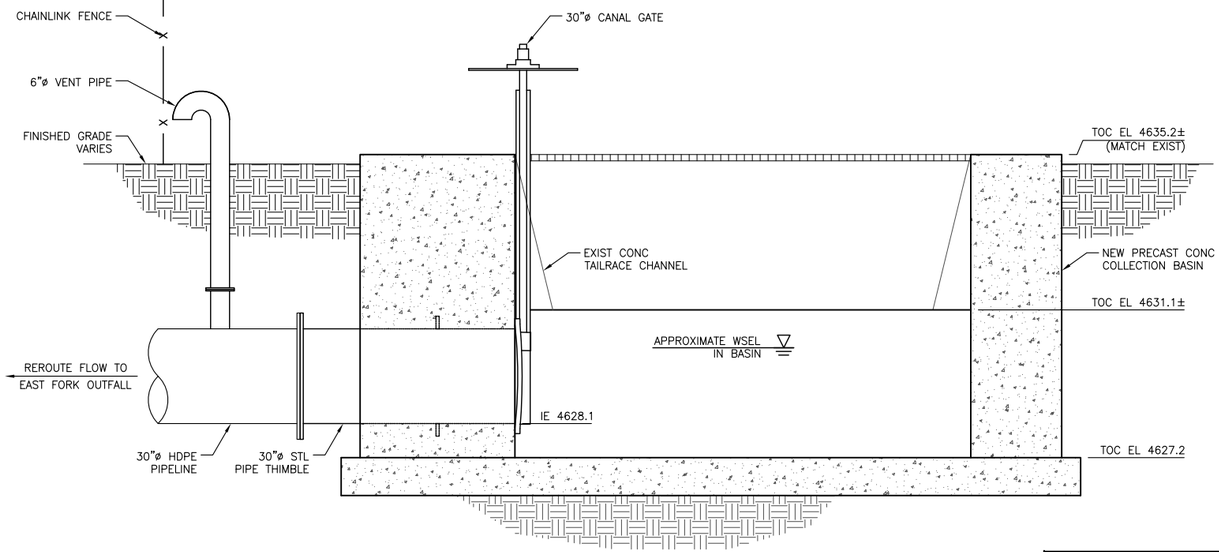
INTAKE STRUCTURE PLAN

SCALE: 1/4"= 1'-0" 0' 4' 8' — 1/1



SECTION

SCALE: 1/2"= 1'-0" 0' 2' 4' — A



SECTION

SCALE: 1/2"= 1'-0" 0' 2' 4' — B

PRELIMINARY – NOT FOR CONSTRUCTION

McMILLEN, LLC

1401 SHORELINE DR.
BOISE, ID 83702

OFFICE: 208.342.4214
FAX: 208.342.4216

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

SAP#	
PL#	
DATE	9/17/13
ENG C. BOYD	DES C. BOYD
DR J. LAHMON	CH D. AXNESS
APPROVAL	

WALLOWA FALLS HYDROELECTRIC PROJECT
TAILRACE REROUTE CONCEPT
OUTFALL STRUCTURE
PLAN AND SECTIONS

PACIFICORP ENERGY
A PACIFICORP COMPANY
HYDRO

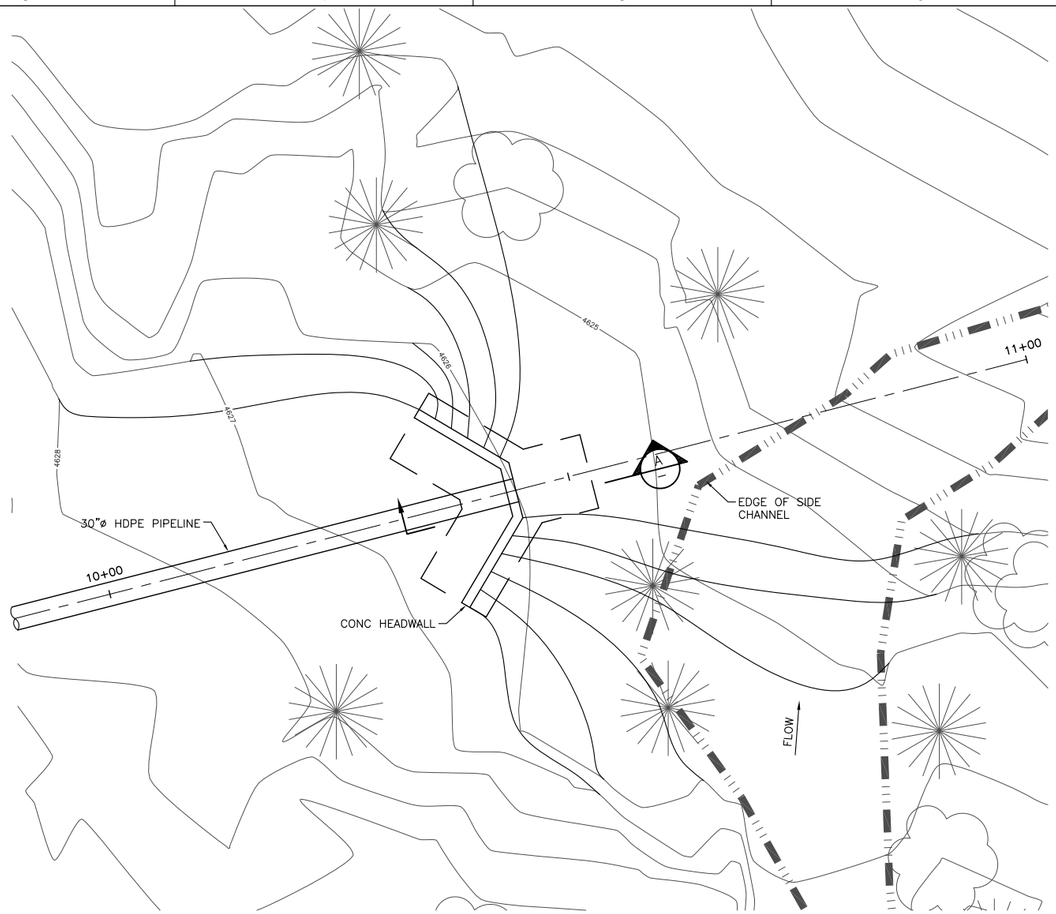
SCALE: AS NOTED | SHEET 3 | REV. A

No.	DATE	REVISION	BY	CHK	APP
A	09/17/13	CONCEPT DESIGN	JL	CB	CB

REFERENCE DRAWINGS
DRAWING No.
REFERENCE DRAWINGS
DRAWING No.

PLOT SCALE: 1 =

BORDER REVISED 10/25/06 SWJ

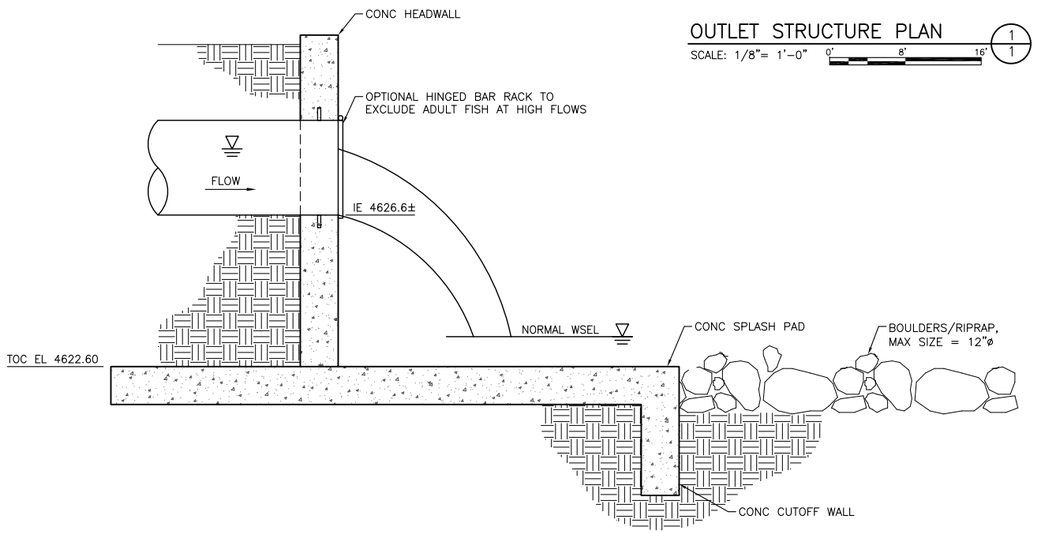


SHEET NOTE:

1. CONTRACTOR SHALL INSTALL A TEMPORARY DEWATERING SYSTEM DURING CONSTRUCTION OF THE OUTLET STRUCTURE.

OUTLET STRUCTURE PLAN (1/1)

SCALE: 1/8"= 1'-0" 0' 8' 16'



SECTION (A/–)

SCALE: 1/2"= 1'-0" 0' 2' 4'

PRELIMINARY – NOT FOR CONSTRUCTION

McMILLEN, LLC

1401 SHORELINE DR.
BOISE, ID 83702

OFFICE: 208.342.4214
FAX: 208.342.4216

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

SAP#	
PL#	
DATE	9/17/13
ENG C. BOYD	DES C. BOYD
DR J. LAHMON	CH D. AXNESS
APPROVAL	

WALLOWA FALLS HYDROELECTRIC PROJECT
TAILRACE REROUTE CONCEPT
OUTFALL STRUCTURE
PLAN AND SECTIONS

PACIFICORP ENERGY
A PACIFICORP COMPANY
HYDRO

SCALE: AS NOTED | SHEET 4 | REV. A

No.	DATE	REVISION	BY	CHK	APP
A	09/17/13	CONCEPT DESIGN	JL	CB	CB

PLOT SCALE: 1 =

No.	DATE	REVISION	BY	CHK	APP

No.	REFERENCE DRAWINGS

DRAWING No.	REFERENCE DRAWINGS

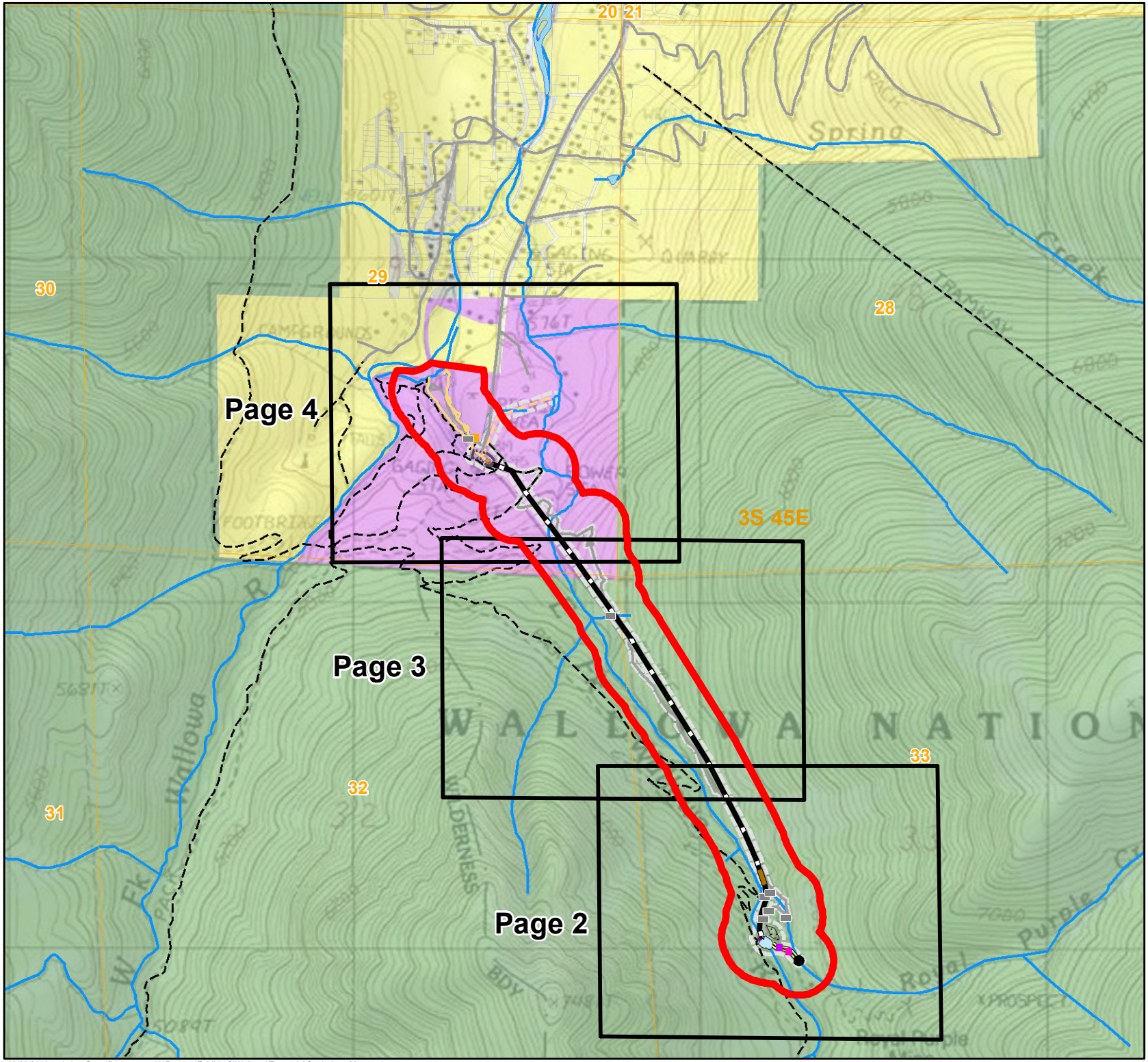
DRAWING No.	REFERENCE DRAWINGS

Appendix D
Non-Stormwater Pollution Control BMPs

Oregon Department of Environmental Quality (DEQ), Erosion and Sediment Control Manual: Appendix G , Non-Stormwater Pollution Control BMPs.

http://www.oregondeq.com/wq/stormwater/docs/escmanual/appxg.pdf

Appendix E
Terrestrial Study Area



Wallowa Falls Terrestrial Study Area

Study Area Total: 126.5 acres

Page 1

Legend

- Study Area
- Proposed Project Boundary
- Road
- Trail
- Trailhead Parking
- Culvert

PacifiCorp Facility

- Anchor Block
- Royal Purple Pipe Outlet
- Recreation Storage Shed
- Royal Purple Diverson
- WALLOWA FALLS PLANT FENCE
- 7.2 KV TRANSMISSION LINE
- ELEVATED TRESTLE
- LOW LEVEL OUTLET
- ROYAL PURPLE DIVERSION CHANNEL
- ROYAL PURPLE FLOWLINE - BURIED
- ROYAL PURPLE FLOWLINE - EXPOSED
- SPILLWAY CATWALK
- EXISTING TAILRACE
- PROPOSED TAILRACE
- WALLOWA FALLS PENSTOCK
- DAM
- INTAKE AND CONTROL STRUCTURE
- LAYDOWN AND STORAGE AREA
- SPILLWAY
- STORAGE SHED
- SUBSTATION
- WALLOWA FALLS FOREBAY
- WALLOWA FALLS POWERHOUSE
- Section
- Township
- Waterbody
- Stream

Land Ownership - County Data

- Private
- PACIFICORP
- USFS

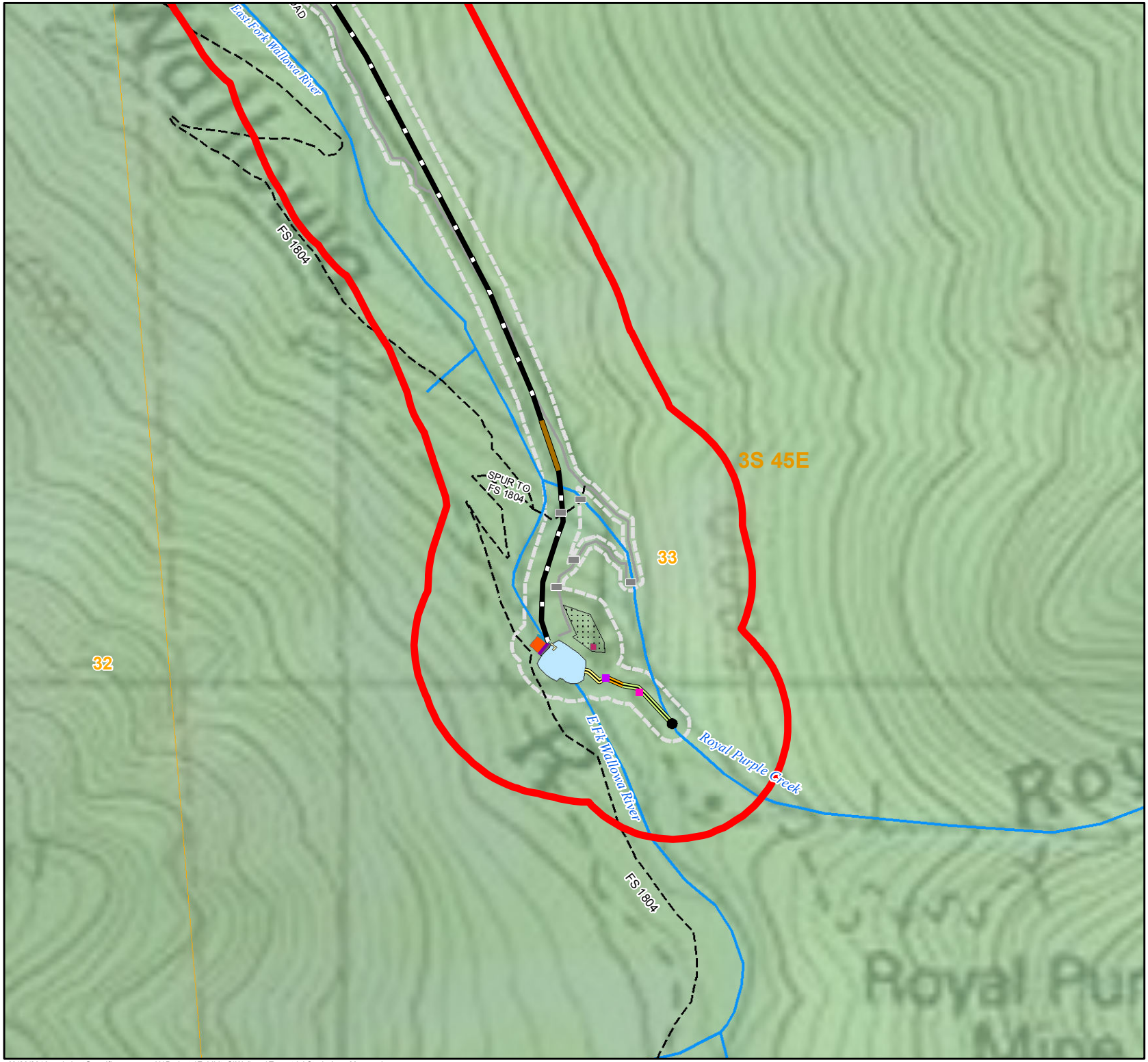
0 190 380 Meters

N

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Data are projected in UTM Zone 11, NAD83, meters.

09/23/2013 gisdept@pacificorp.com U:\Projects\Exhibit_G\Wallowa\Terrestrial Study Area Map.mxd



Wallowa Falls Terrestrial Study Area

Study Area Total: 126.5 acres

Page 2

Legend

- Study Area
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- Trail
- Trailhead Parking
- Culvert

PacifiCorp Facility

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- WALLOWA FALLS FOREBAY
- WALLOWA FALLS POWERHOUSE
- Section
- Township
- Waterbody
- Stream

Land Ownership - County Data

- Private
- PACIFICORP
- USFS

0 50 100 Meters

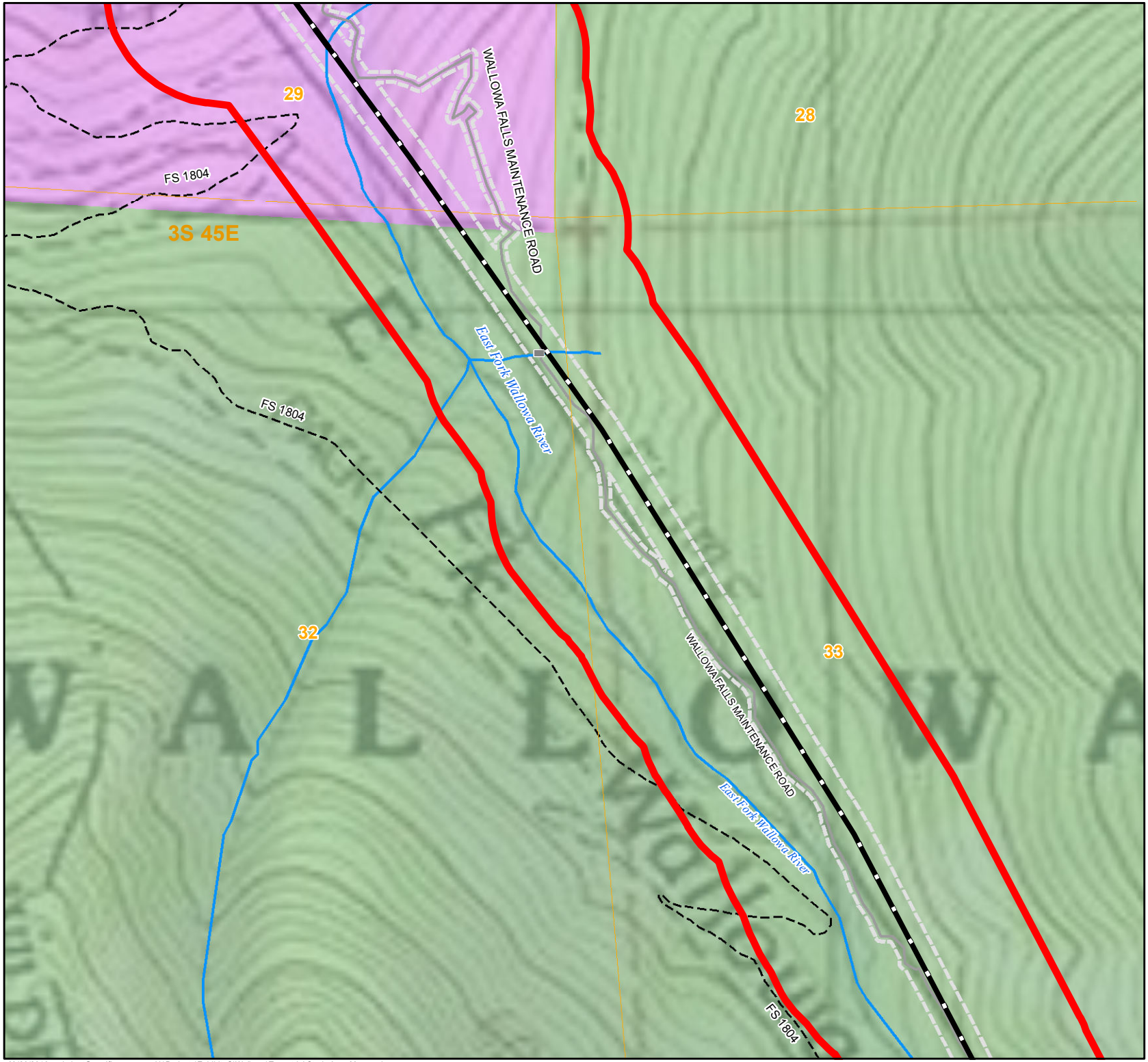
N

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Data are projected in UTM Zone 11, NAD83, meters.

Wallowa Falls Terrestrial Study Area

Study Area Total: 126.5 acres



Legend

- Study Area
- Proposed Project Boundary
- Road
- Trail
- Trailhead Parking
- Culvert

PacifiCorp Facility

- Anchor Block
- Royal Purple Pipe Outlet
- Recreation Storage Shed
- Royal Purple Diverson
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- DAM
- INTAKE AND CONTROL STRUCTURE
- LAYDOWN AND STORAGE AREA
- SPILLWAY
- STORAGE SHED
- SUBSTATION
- WALLOWA FALLS FOREBAY
- WALLOWA FALLS POWERHOUSE
- Section
- Township
- Waterbody
- Stream

Land Ownership - County Data

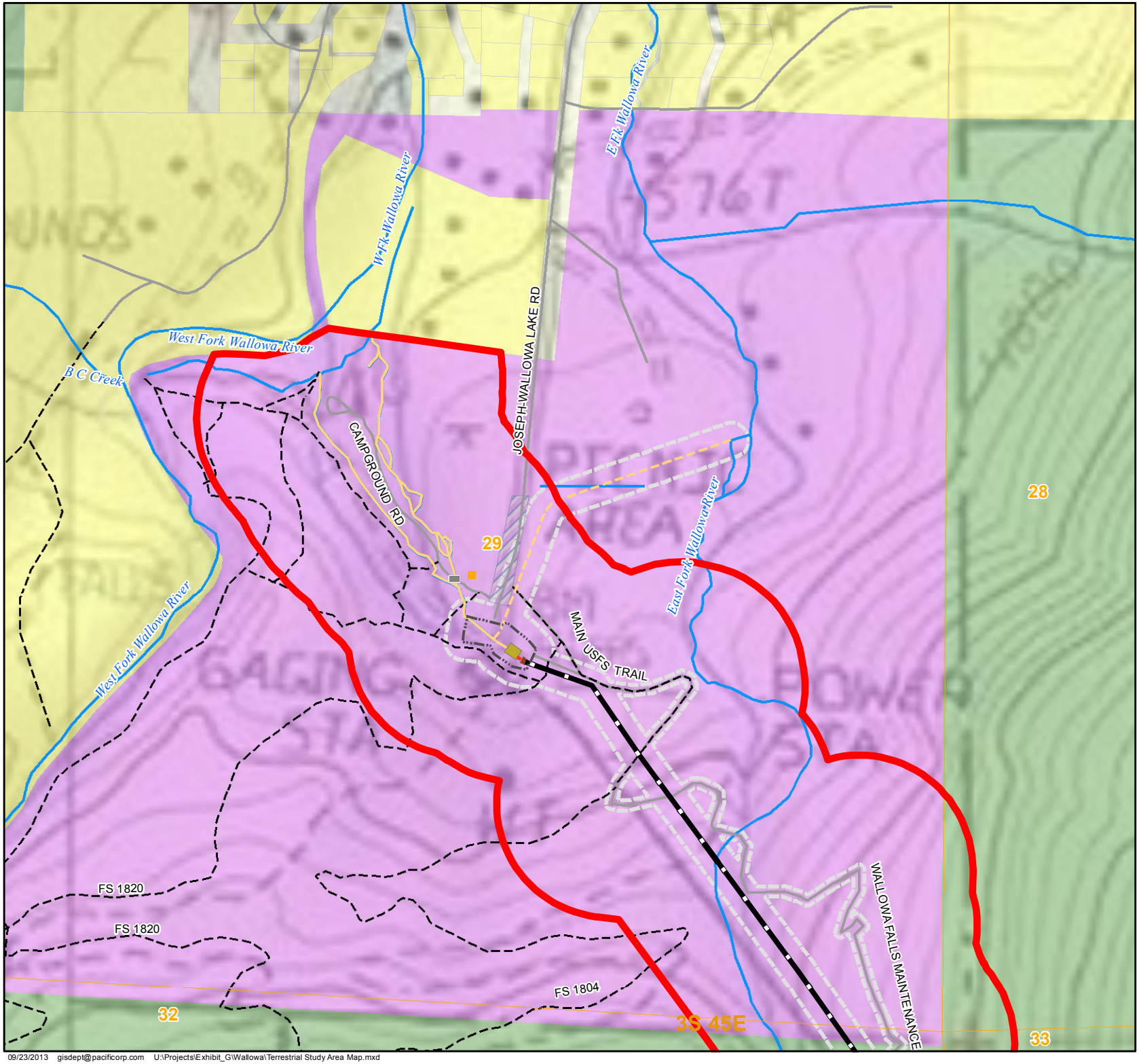
- Private
- PACIFICORP
- USFS

0 50 100 Meters

N

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Data are projected in UTM Zone 11, NAD83, meters.



Wallowa Falls Terrestrial Study Area

Study Area Total: 126.5 acres

Page 4

Legend

- Study Area
- Proposed Project Boundary
- Road
- Trail
- Trailhead Parking
- Culvert

PacifiCorp Facility

- Anchor Block
- Royal Purple Pipe Outlet
- Recreation Storage Shed
- Royal Purple Diverson
- WALLOWA FALLS PLANT FENCE
- 7.2 KV TRANSMISSION LINE
- ELEVATED TRESTLE
- LOW LEVEL OUTLET
- ROYAL PURPLE DIVERSION CHANNEL
- ROYAL PURPLE FLOWLINE - BURIED
- ROYAL PURPLE FLOWLINE - EXPOSED
- SPILLWAY CATWALK
- EXISTING TAILRACE
- PROPOSED TAILRACE
- WALLOWA FALLS PENSTOCK
- DAM
- INTAKE AND CONTROL STRUCTURE
- LAYDOWN AND STORAGE AREA
- SPILLWAY
- STORAGE SHED
- SUBSTATION
- WALLOWA FALLS FOREBAY
- WALLOWA FALLS POWERHOUSE
- Section
- Township
- Waterbody
- Stream

Land Ownership - County Data

- Private
- PACIFICORP
- USFS

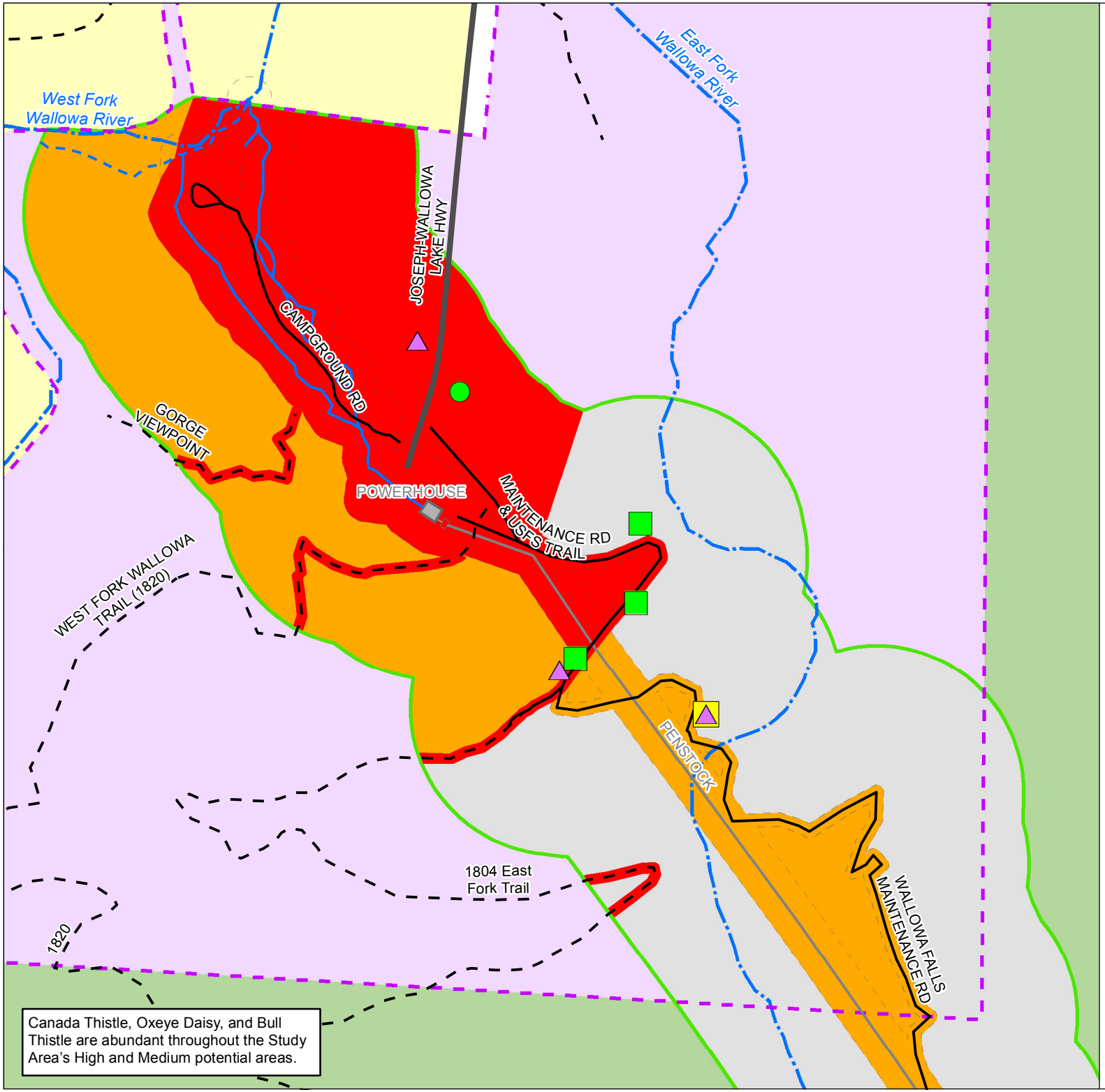
0 50 100 Meters

N

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Data are projected in UTM Zone 11, NAD83, meters.

Appendix F
Noxious Weeds Map



Wallowa Falls

Noxious Weeds

Page 1

Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- Proposed Boundary
- Study Area

Noxious Weeds

- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

Potential Weed Areas

- High
- Medium
- Low

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

0 250 500 Feet

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/06/2012 gisdept@pacificorp.com
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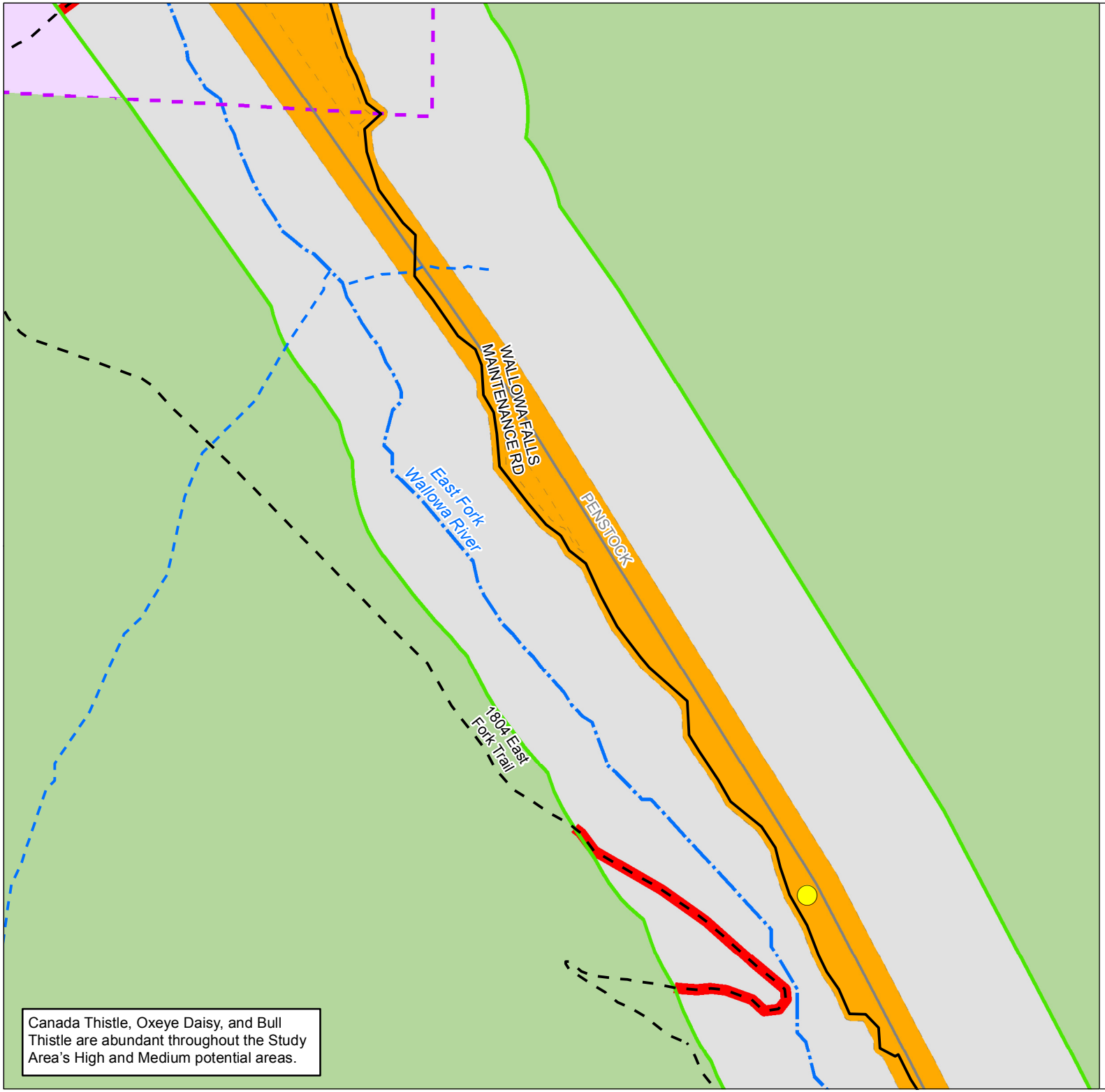

Wallowa Falls

Noxious Weeds

Page 2

Canada Thistle, Oxeye Daisy, and Bull Thistle are abundant throughout the Study Area's High and Medium potential areas.

Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- Proposed Boundary
- Study Area

Noxious Weeds

- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

Potential Weed Areas

- High
- Medium
- Low

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

N

0 250 500 Feet

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/06/2012 gisdept@pacificorp.com
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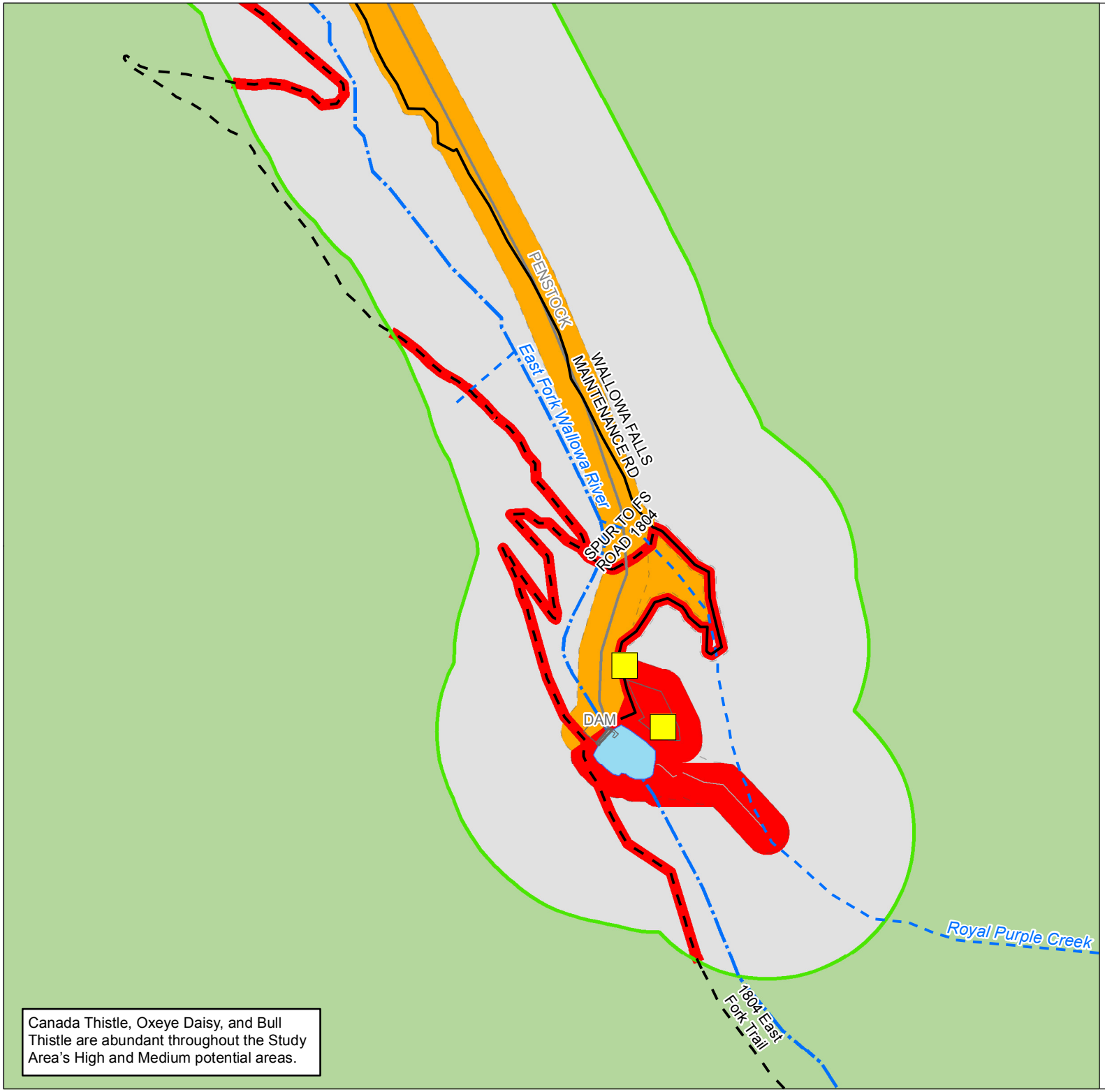

Wallowa Falls

Noxious Weeds

Page 3

Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- Proposed Boundary
- Study Area

Noxious Weeds

- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

Potential Weed Areas

- High
- Medium
- Low

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

0 250 500 Feet

Canada Thistle, Oxeye Daisy, and Bull Thistle are abundant throughout the Study Area's High and Medium potential areas.

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/06/2012 gisdept@pacificorp.com
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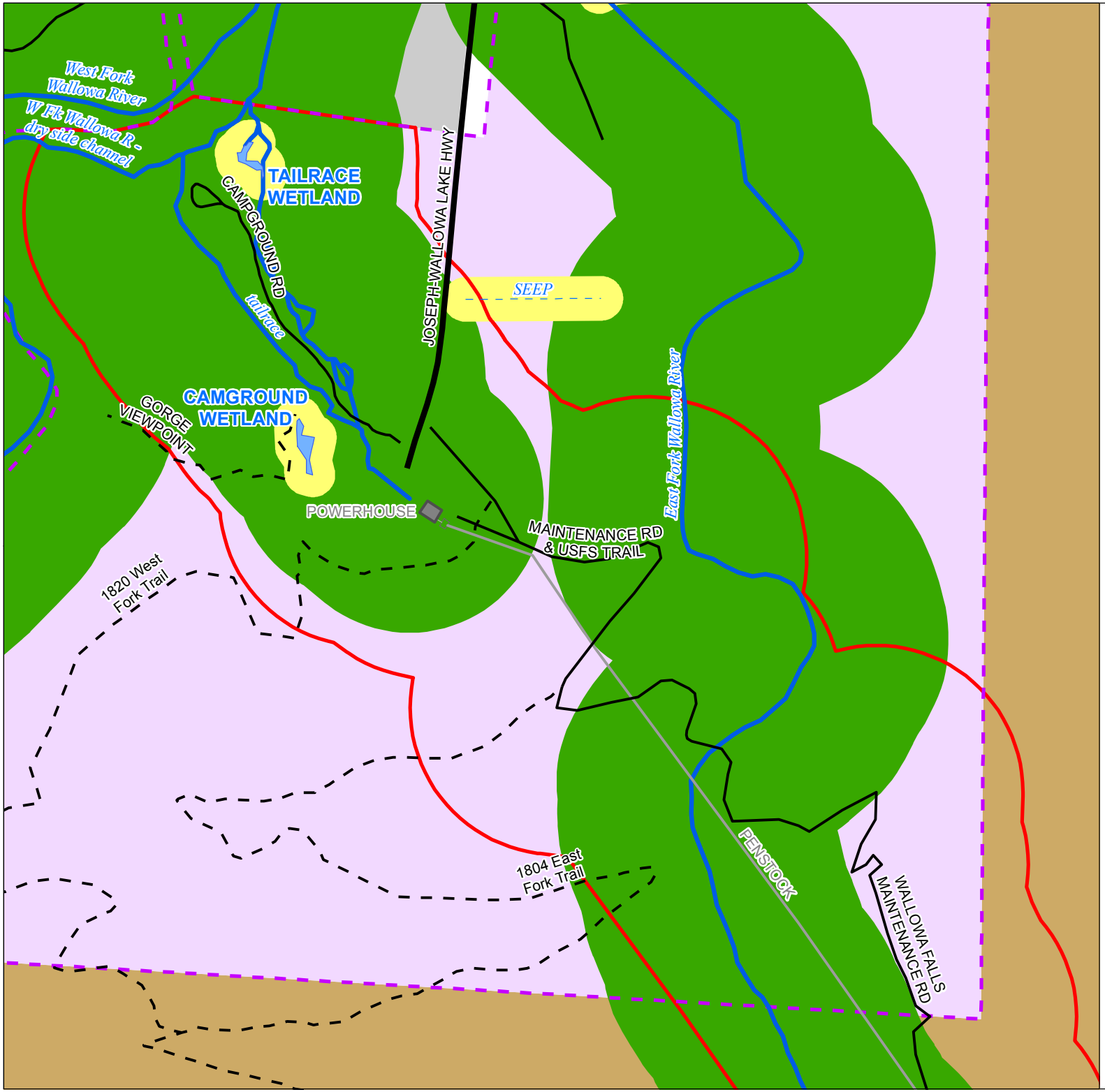
Appendix G
Riparian and Wetland Area Map



Wallowa Falls

Riparian Habitat Conservation Area

Page 1

- Trail
- Road
- Highway
- Facility
- Facility
- Penstock
- Intermittent Non-Fish
- Perennial Non-Fish
- Perennial Fish
- Wetland
- Study Area

RHCA Standard Widths

- Category 1
- Category 2
- Category 3
- Category 4

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

0 250 500

Feet

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/20/2012 gisdept@pacificorp.com
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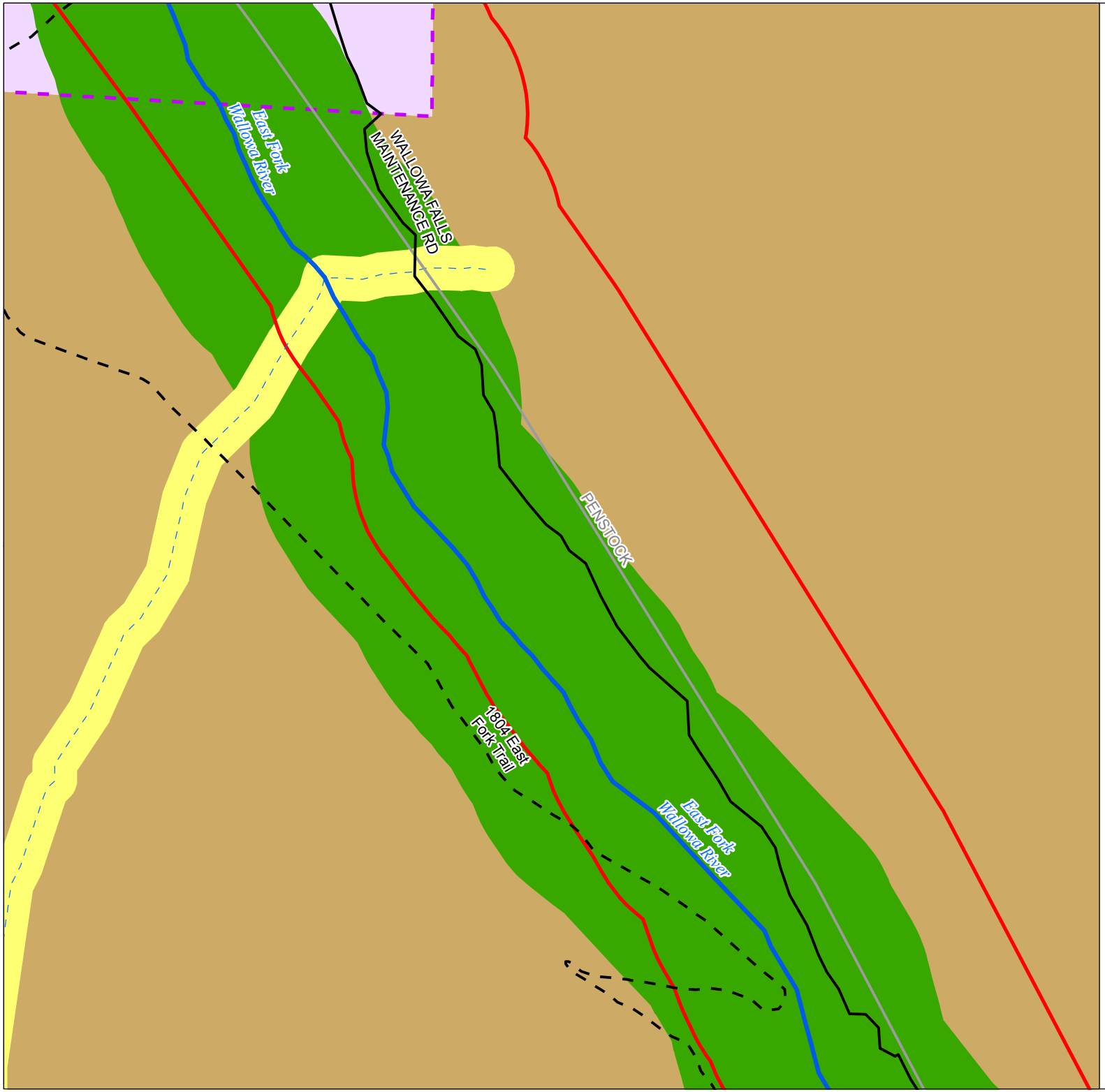

Wallowa Falls

Riparian Habitat Conservation Area

Page 2

- Trail
- Road
- Highway
- Facility
- Facility
- Penstock
- Intermittent Non-Fish
- Perennial Non-Fish
- Perennial Fish
- Wetland
- Study Area

RHCA Standard Widths

- Category 1
- Category 2
- Category 3
- Category 4

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

0 250 500

Feet

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/20/2012 gisdept@pacificorp.com
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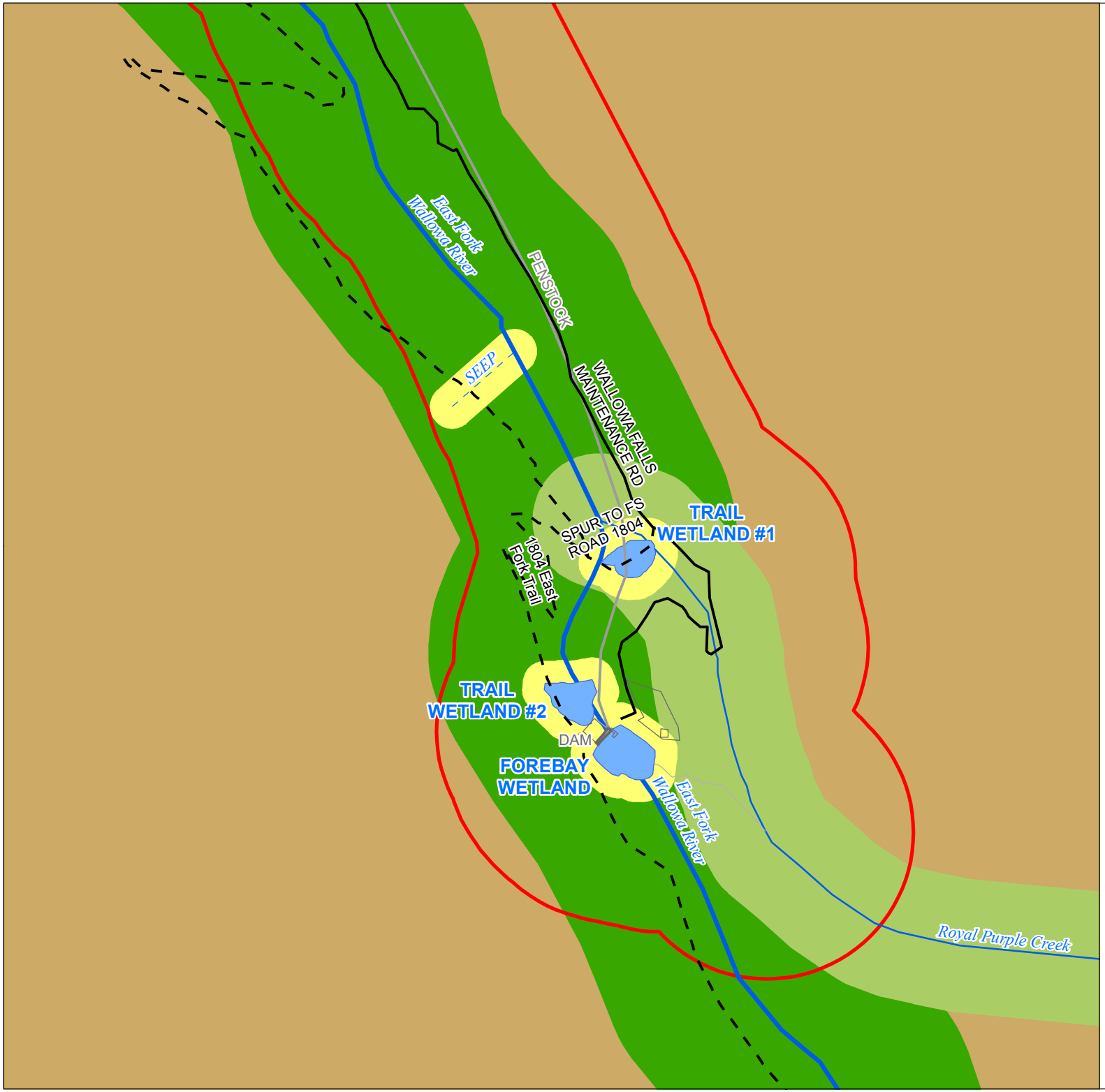

Wallowa Falls

Riparian Habitat Conservation Area

Page 3

- Trail
- Road
- Highway
- Facility
- Facility
- Penstock
- Intermittent Non-Fish
- Perennial Non-Fish
- Perennial Fish
- Wetland
- Study Area

RHCA Standard Widths

- Category 1
- Category 2
- Category 3
- Category 4

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

0 250 500

Feet

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

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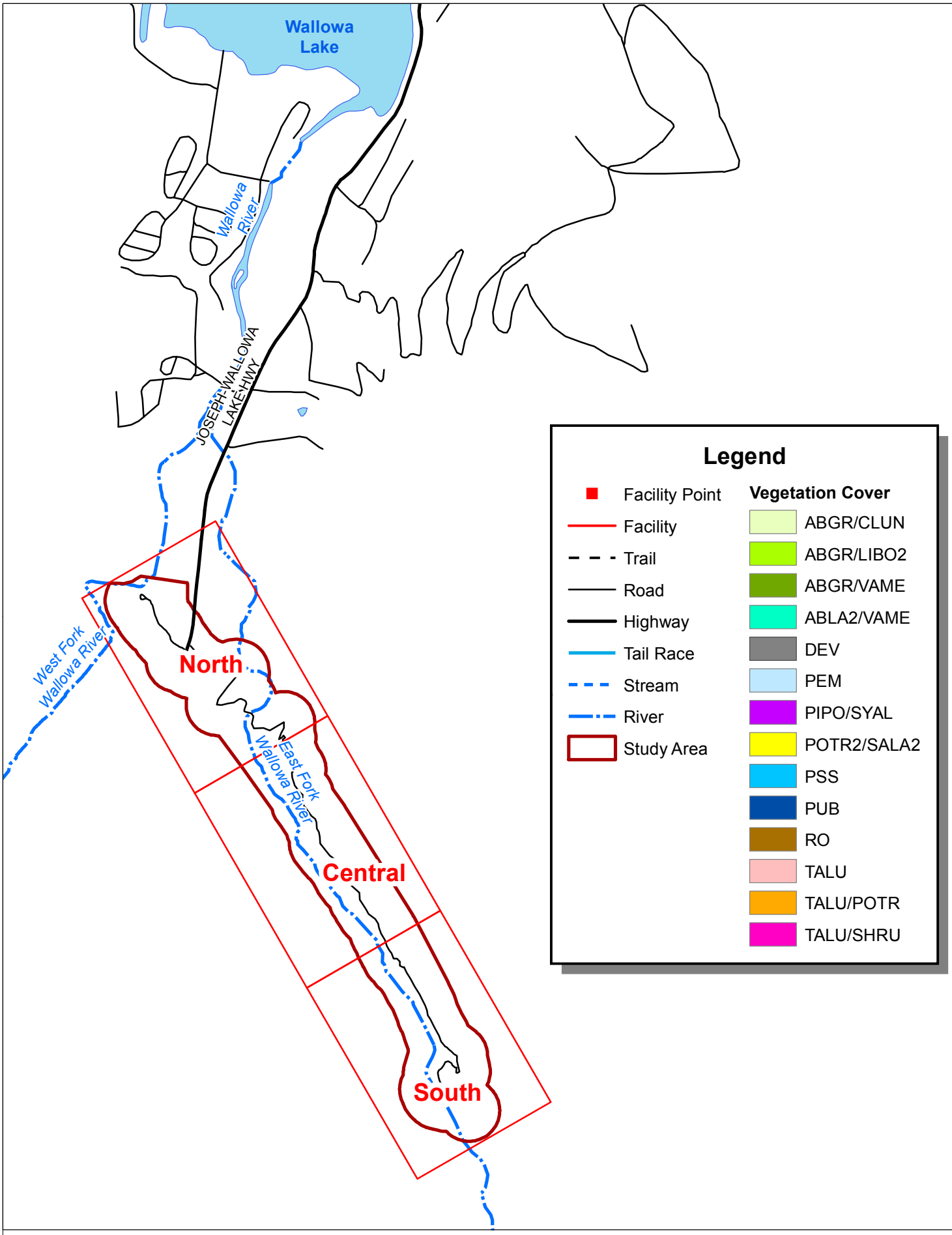
Appendix H
Vegetation Cover Map



Wallowa Falls Vegetation Cover: Index

11/07/2012 gisdept@pacificorp.com
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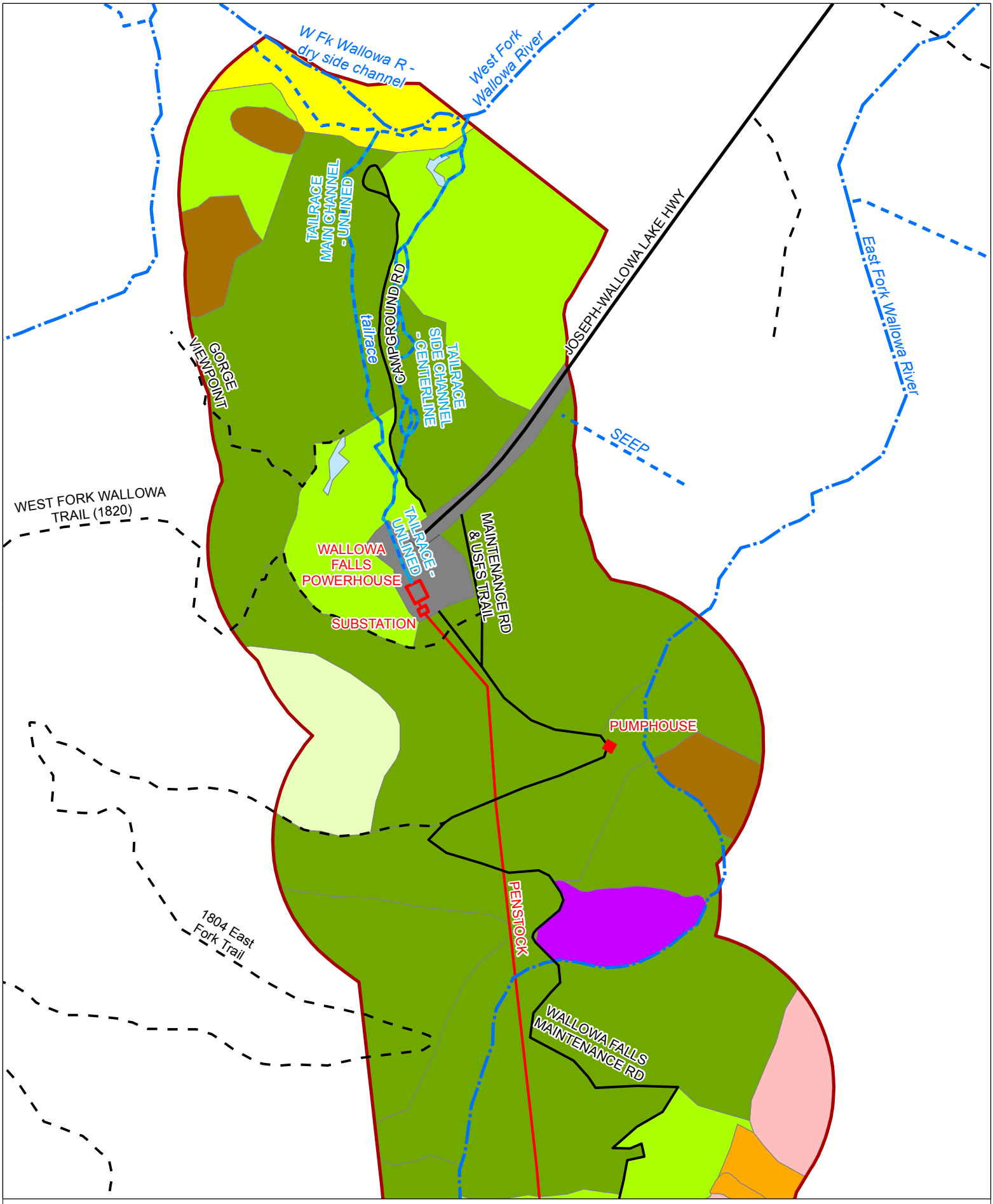
0 500 1,000
Feet

N

PACIFICORP ENERGY
A DIVISION OF PACIFICORP



Wallowa Falls Vegetation Cover: North Area

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/07/2012 gisdept@pacificorp.com
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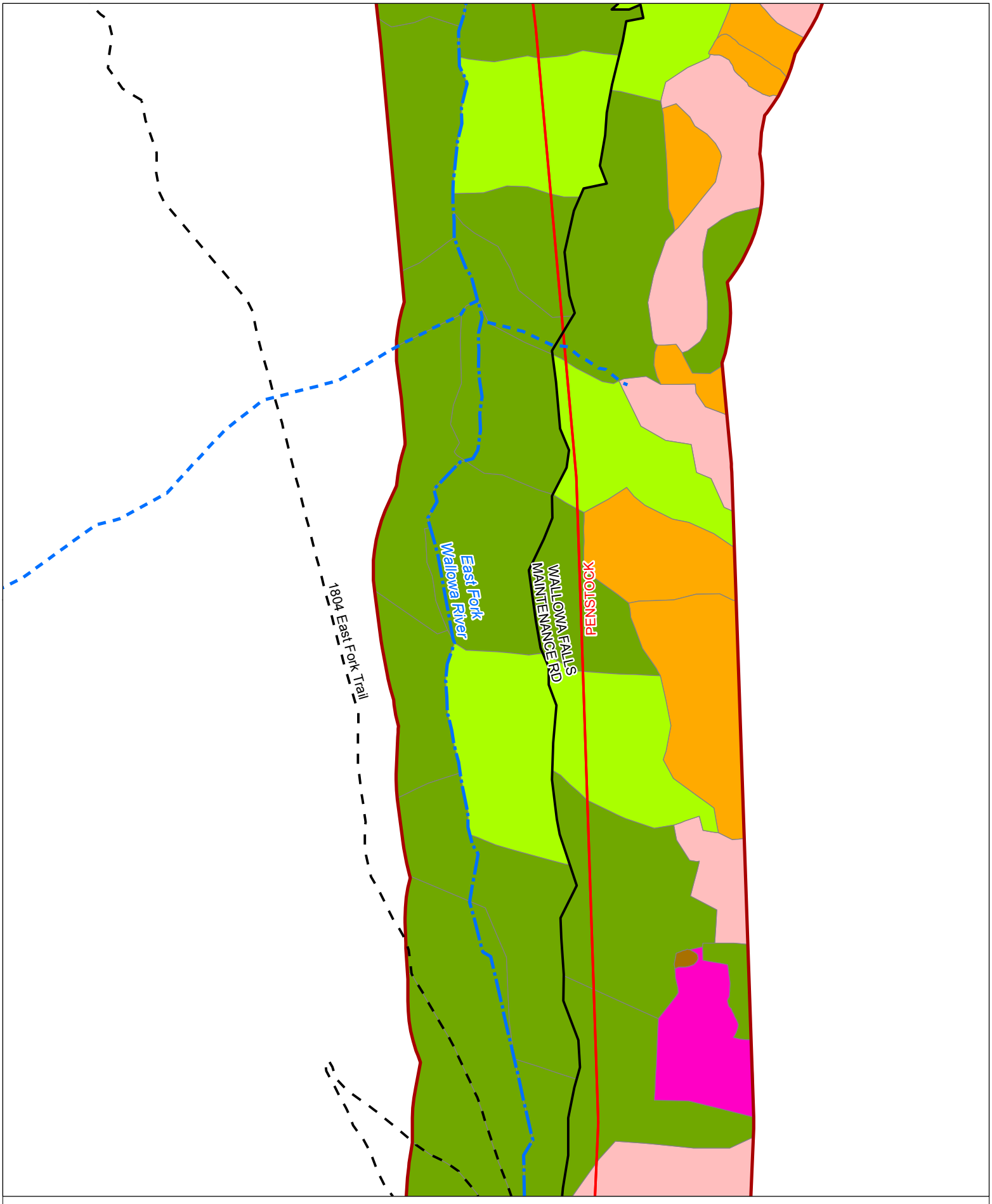
Feet



Wallowa Falls Vegetation Cover: Central Area

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

0 100 200
Feet

11/07/2012 gisdept@pacificorp.com
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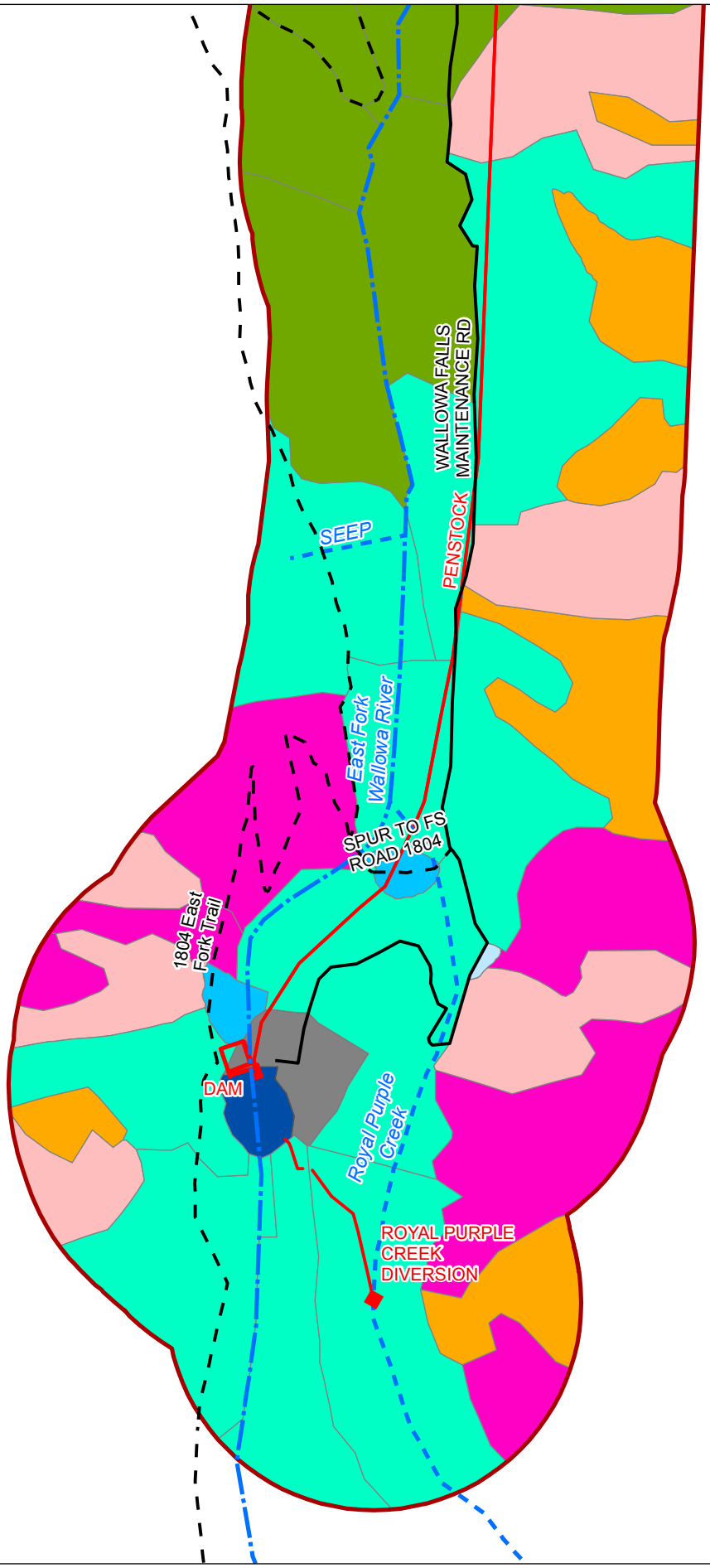


Wallowa Falls Vegetation Cover: South Area

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/07/2012 gisdept@pacificorp.com
U:\Projects\2012\12-131\Veg Cover Map Pages.mxd

0 100 200
Feet

Appendix I
Noxious Weeds Management Plan

Wallowa Falls Hydroelectric Project
Noxious Weed Management Plan

September 24, 2013

PURPOSE

Noxious weeds are increasingly becoming a threat to native plants and habitat loss. The Wallowa Falls Hydroelectric Project (Project) is at the gateway of recreational access to the Eagle Cap Wilderness Area, so noxious weed infestations left untreated promote the spread of noxious weeds into the pristine wilderness. Some of the Project lands are on United States Forest Service (USFS) Wallowa-Whitman National Forest (Forest) lands. The Wallowa-Whitman National Forest's insects and disease (pests) goal for forest management is to control pests to levels that are compatible with resource objectives. This is achieved through implementing the following standards and guidelines (USFS 1990):

> Integrated Pest Management: Use Integrated Pest Management (IPM) strategies for early detection, suppression and prevention of Forest pests and to manage pests within the constraints of laws and regulations IPM strategies include manual, mechanical, cultural, biological, chemical, prescribed fire, and regulatory means.
>
> Control of Noxious Weeds: Aggressively pursue control of identified noxious weeds on lands where such activities are not precluded by management area direction.
>
> Monitoring: Develop monitoring and enforcement plans for site-specific projects.

In 2005 all of Region 6 USFS Forest Plans were amended to add a new management direction that included an emphasis on early detection, and effective integrated treatment of invasive plants. The Wallowa-Whitman National Forest Invasive Plants Treatment Project Final Environmental Impact Statement (EIS) and an associated Record of Decision (ROD) provide control methods that are compliant with new standards and to allow for effective treatments on all sites (USFS 2010a and 2010b). Both the EIS and ROD provide specific guidelines on common control methods, project design features, herbicide use buffers, Early Detection, Rapid Response Herbicide Use Decision Process and the Annual Implementation Planning and Monitoring Step (USFS 2010b).

Because a large portion of the Project boundary is within USFS lands, this noxious weed management plan would need to comply with USFS guidelines and the Project Design Features described in both the EIS and ROD (USFS 2010a and 2010b). This document provides procedures for implementing a consistent and effective noxious weed management plan and directs to the appropriate USFS document. As this management plan is implemented it may need revisions to improve methods, best management practices, and to adapt to changes in conditions, regulations, or USFS policies and guidelines.

PROCEDURES

Noxious Weed Monitoring:

The Project boundary will have a noxious weed survey to detect and monitor noxious weed infestations and to monitor control methods effectiveness. The inspection may be conducted by a PacifiCorp employee or a designated qualified contractor. A qualified person is defined as an individual with the knowledge, training, and experience in identifying noxious weeds, can accurately describe an infestation and surrounding habitat, and recommend eradication methods.

The survey will include doing a pedestrian survey using a wide observational swath that will cover all high probability areas and have a representative cross-section of minor topographic features, plant associations, and moderate to low probability areas (USFS 2011). A map of high, medium, and low potential noxious weed areas for the Project was completed as part of relicensing and is available in Attachment A. These areas may be modified as needed to adjust for changes in the Project boundary or in public use of an area (e.g. new trails etc.). Prior to conducting a survey the current Oregon State Department of Agriculture and Wallowa County noxious weed lists will be reviewed to insure that the most current weeds and correct classification are included in the survey.

Schedule:

Surveys will be conducted annually between June 1 and July 15. If for three consecutive years no noxious weeds are detected during an annual survey, then surveys can go to biennial (every other year) surveys until a noxious weed infestation is detected.

Records:

Good record keeping is essential to effectively monitoring noxious weed infestations and the success of control methods. Documentation will use the same USFS form used by the Wallowa-Whitman National forest and protocols as described in "Field Guide Invasive Plant Inventory, Monitoring, and Mapping" (USFS 2013). Both of these documents are available in Attachment B.

Control Methods:

The Wallowa-Whitman National Forest has an EIS and an associated ROD that provides detailed control methods that are compliant with new standards and allow for effective treatments (USFS 2010a and 2010b). Both the EIS and ROD provide specific guidelines on common control methods, project design features, herbicide use buffers, Early Detection, Rapid Response Herbicide Use Decision Process and the Annual Implementation Planning and Monitoring Step (USFS 2010b). These specific guidelines are provided in Attachment C.

PREVENTION

Prevention guidelines have already been developed as part of the Wallowa-Whitman National Forest Invasive Plants Treatment Project National EIS (USFS 2010a). These guidelines provide weed prevention strategies for all ground disturbing activities. It also provides guidelines for restoring and revegetation for an area following ground disturbance activities, as well as an example for completing a site implementation plan using the Project Design Features. This document is available in Attachment D.

REFERENCES

United States Forest Service. 1990. Land and Resource Management Plan Wallowa-Whitman National Forest, as amended. United States Forest Service. URL: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5260139.pdf. (September 24, 2013).

United States Forest Service. 2010a. Wallowa-Whitman National Forest Invasive Plants Treatment Project Final Environmental Impact Statement. United States Forest Service. March 2010. URL: http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845 (September 24, 2013).

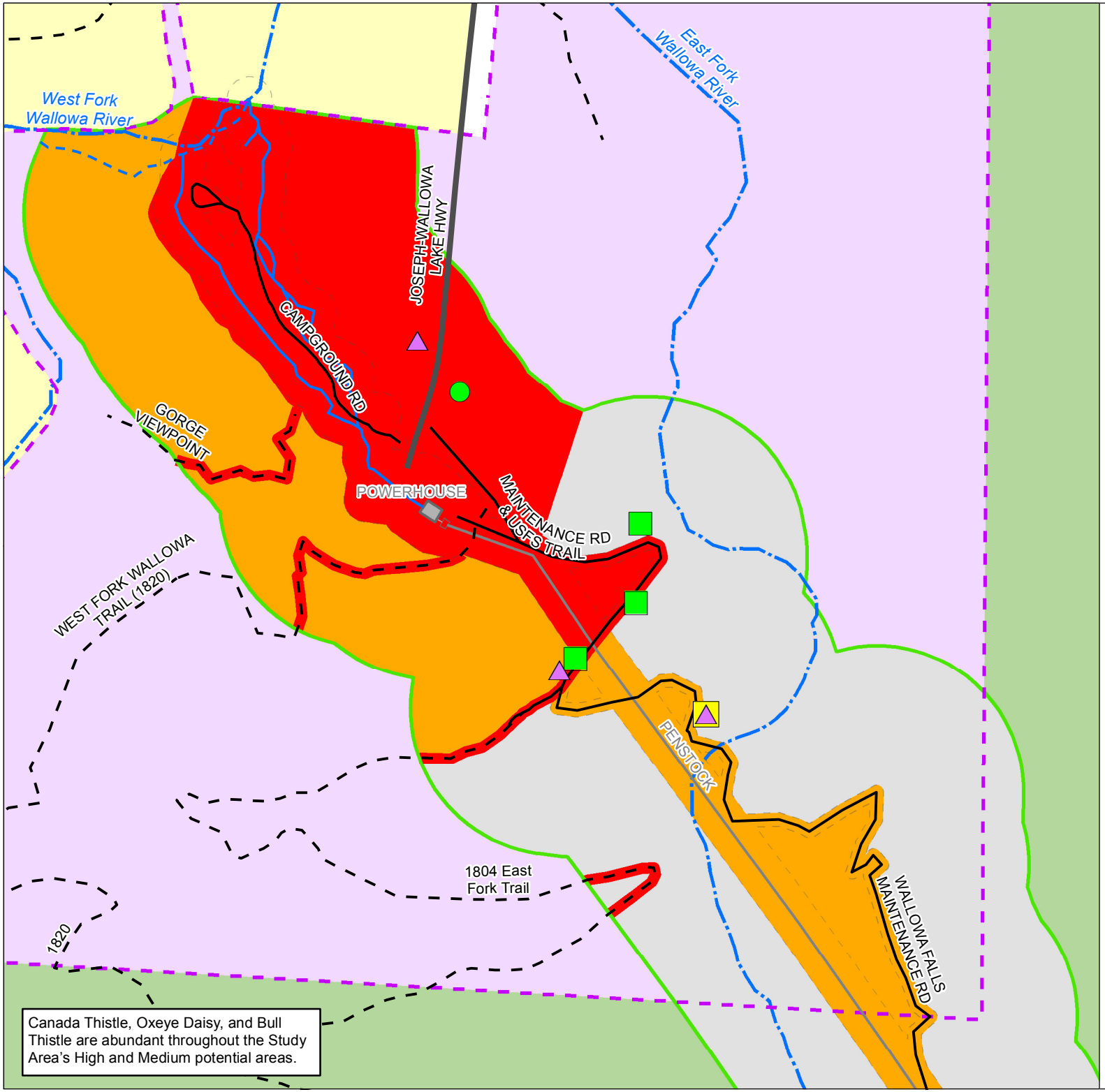
United States Forest Service. 2010b. Wallowa-Whitman National Forest Invasive Plants Treatment Project Record of Decision. United States Forest Service April 2010. URL: http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845 (September 24, 2013).

United States Forest Service. 2011. Wallowa Falls Hydroelectric Project, FERC Project No. 308-005 Comments on Pre-Application Document, Comments on Scoping Document No. 1, and Study Requests. Site accessed on September 24, 2013 URL: http://www.pacificorp.com/wallowafalls

United States Forest Service. 2013. Field Guide Invasive Plant Inventory, Monitoring and Mapping Protocol. p. 1-39. URL: http://www.wilderness.net/toolboxes/documents/invasive/FS_Inventory%26Map_Guide.pdf. Site Accessed September 23, 2013.

Attachment A

Noxious Weed Potential Map



Wallowa Falls

Noxious Weeds

Page 1

Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- Proposed Boundary
- Study Area

Noxious Weeds

- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

Potential Weed Areas

- High
- Medium
- Low

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

0 250 500 Feet

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11/06/2012 gisdept@pacificorp.com
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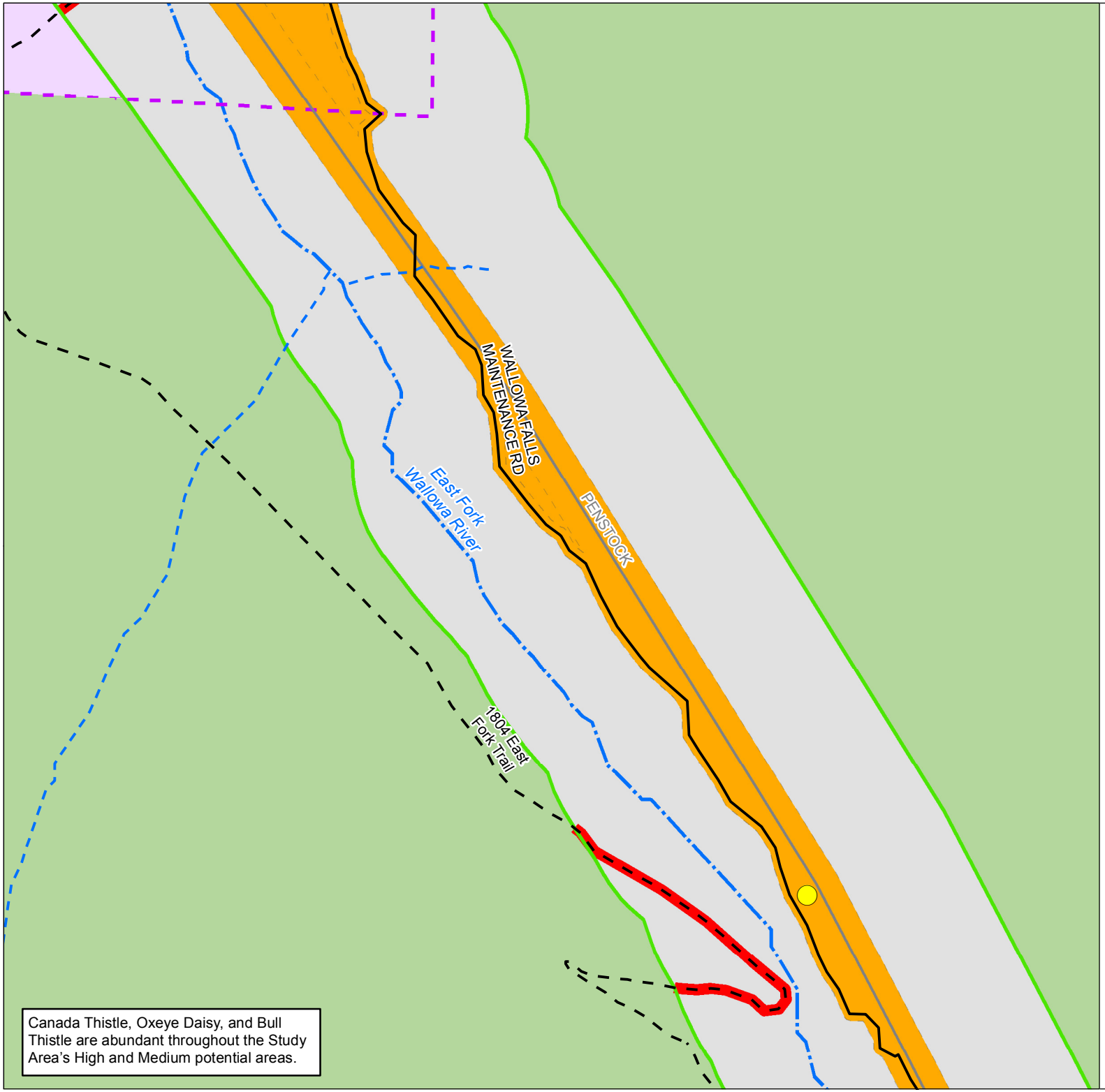

Wallowa Falls

Noxious Weeds

Page 2

Canada Thistle, Oxeye Daisy, and Bull Thistle are abundant throughout the Study Area's High and Medium potential areas.

Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- Proposed Boundary
- Study Area

Noxious Weeds

- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

Potential Weed Areas

- High
- Medium
- Low

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

N

0 250 500 Feet

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

11/06/2012 gisdept@pacificorp.com
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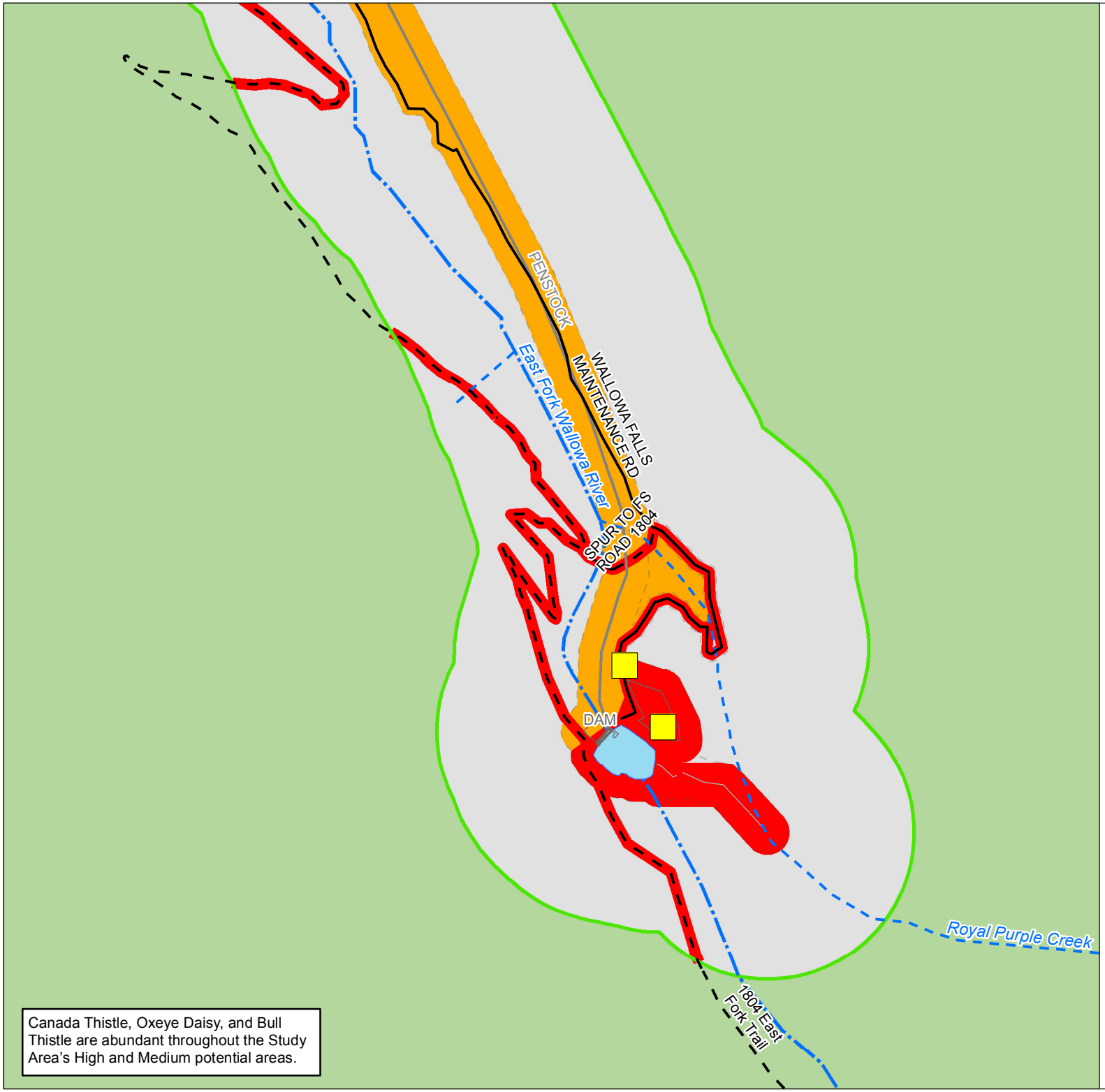

Wallowa Falls

Noxious Weeds

Page 3

Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- Proposed Boundary
- Study Area

Noxious Weeds

- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

Potential Weed Areas

- High
- Medium
- Low

Land Ownership

- Private
- USFS
- PACIFICORP

1:3,600

0 250 500 Feet

Canada Thistle, Oxeye Daisy, and Bull Thistle are abundant throughout the Study Area's High and Medium potential areas.

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

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U:\Projects\2012\12-312\Noxious Weeds.mxd

Attachment B

Noxious Weed Form and Field Guide

Invasive Plant Inventory, Monitoring, and Mapping

Field Guide

Invasive Plant Inventory, Monitoring and Mapping Protocol

Field Guide
Invasive Plant Inventory, Monitoring and Mapping Protocol

Table of Contents

General Description

This protocol is for the inventory monitoring and mapping of invasive plant populations. The Forest Service has adopted the International Data Standards for the Inventory, Mapping and, Monitoring Invasive Plants[1]. This protocol incorporates these standards. The International Data Standards were designed to be compatible with existing inventory protocols such as the Montana Mapping Strategy[2] and the mapping system described in the Guidelines for the Coordinated Management of Noxious Weeds[3]. This method records information about the distribution and relative abundance of invasive plant species. Treatment of invasive species is recorded using a separate protocol called Treatment of Invasive Plants, which can be viewed at .

Invasive plant infestations cross-jurisdictional boundaries and are seldom managed in isolation. A cornerstone of noxious weed or invasive plant management is cooperation and coordination with adjacent land ownerships and jurisdictions. This cooperation requires that information on the location and distribution of invasive species be shared. The protocol standardizes information gathering and mapping procedures, facilitates information sharing between cooperators, aids in the early detection of new invasive plant populations and meets Forest Service reporting requirements. Some of the data elements required by this method may not be essential for Forest Service use, but will facilitate data sharing with other entities.

This protocol is derived from a single species inventory where the single species has been identified as an invasive plant. A single species inventory is most commonly used to describe rare plant population such as sensitive or endangered plants. The single species protocol has been modified to accommodate the ecological characteristics of invasive plants.

The invasive species protocol includes parameters such as location, population size, and habitat information. The protocol focuses on presence, location, extent, and abundance of an invasive species population. Monitoring invasive species populations occurs through repeated observations, noting relative changes in location, extent, and density of the plant population over time. If more detailed information is needed on either the weed or the plant community in which it is found other methodologies such as line intercept, point intercept and rooted nested frequency should be used. These methodologies are described in detail at the following web site.

Areas of Use

This protocol is applicable to both aquatic and terrestrial invasive plant species and across all vegetation types. This protocol may be applied to any invasive plant species and within all ecosystems. The information gathered using this protocol will be the

[1] International Data Standards for Inventory, Monitoring and Mapping Standards of Invasive Plants. 2001.NAWMA
[2] Cooksey, D.; R.Sheley. 1998. Mapping Noxious Weeds in Montana. Montana State University, extension. Bozeman, Montana
[3] Guidelines to Coordinated Management of Noxious Weeds - Development of Weed Management Areas", formerly The Guidelines for Coordinated Management of Noxious Weeds in the Greater Yellowstone Area. 1999.

source of information for noxious weed (invasive plant) inventories, planning, analysis, monitoring, treatment, reporting and budget allocations. The information gathered will be stored in the Terra module of NRIS (National Resource Information Systems). The protocol can be applied to both Forest Service and other land ownerships. The database will accept information for both public and private lands, inventories taken on National Forest and other land ownerships.

Advantages and Limitations

The invasive plant protocol can be used on a wide variety of plants, in a wide variety of habitats. It is relatively easy methodology and can be used by individuals with a wide range of expertise in plant ecology and plant identification.

Equipment

No specialized equipment is needed for this protocol. GPS (Global Position System) can be helpful in determining locating and relocating sites. A camera and a photo of the general setting and location may be helpful but is also not required. Field data recorders and hand held computers can facilitate data gathering and data entry. Programs for these devices will be available in the fall of 2002.

Training

Examiners must be knowledgeable in invasive plant identification.

Using the Protocol

Introduction

This Invasive Plant Protocol will require the use of both the General and the Invasive Plant Forms. Use the General Form to record information on the location, site, and ecological setting, of the infestation. Directions for completing this form are located in the section of the handbook titled “Rangeland General Form Field Guide”, on the Terra Web site and the Forest and Rangeland web site. Capturing detailed information on soils, existing and potential vegetation, aspect, and elevation is recommended. This information will be useful in stratifying areas for treatment or planning and will aid in predicting the spread of weeds to other areas and other habitats. Ecological site information can be used to determine what areas may or may not be subject to future invasions.

Project Name

The General Form offers many avenues to group and sort information, ranger district, forest, allotment, state and counties to name a few. The project name allows the user to group based on an activity. The Weed Management Area (WMA) is a logical project name for invasive species. Choosing the WMA as the project name will quickly allow information about a WMA to be sorted and consolidated for sharing with partners within the WMA.

Mapping Invasive Plants

The first step is to locate and outline the weed infestation on a map. Maps of weed populations can be created by a number of methods, hand drawing on maps and aerial photos, using GPS (Global Positioning Systems) and through computerized mapping system, Geographic Information System (GIS). Whatever method you use to delineate an infestation in the field, it is highly recommended that maps be converted and stored in an electronic format, GIS.

To ensure consistency the scale for hand drawn weed populations on maps should be 1:24000. 1:24,000 is the scale of United States Geological Service (USGS) 7.5-minute Quadrangle (Quad) maps. The 1:24,000 scale is also the standard for invasive plant mapping as recommended by the International Mapping Standards for Invasive Plants. Aerial photos, ortho quads and other remote sensing can also be useful formats for delineating weed populations. Using photography at 1:24000 scales will aid in the conversion to electronic computerized format.

There is no minimum size for an infestation (polygon). Terra currently accommodates values to $1/100^{th}$ (.01) of an acre. The next update of Terra, will allow for increased accuracy, values of $1/1000^{th}$ of acre may be recorded. This increase in accuracy will allow very small, single plant infestations to be accurately depicted and located. It will also facilitate monitoring small changes in population size.

To facilitate consistency and information sharing in GIS, all invasive plant infestations will be mapped and stored as polygons. Line and point data (layers) will not be supported. This conforms to the International Data Standards (NAWMA) and agreements with states and other federal agencies on sharing invasive plant information. Infestations that could be displayed as "Points", such as a single plant or small infestations, will still be mapped as a polygon. You may enter the actual area occupied by the infestation or use the standard conversion factor. The standard conversion is $1/10^{th}$ of an acre and its equivalent in hectares[4]. The conversion factor may be useful when converting paper maps or GIS point layers to polygons. It can also be useful when the exact size of an infestation is not known (historical data), an infestation is rapidly growing or $1/10^{th}$ acre is accurate enough. Infestations that could be mapped as "lines" such as, infestations along roads and streams, will also be converted to long thin polygons, with the area corresponding the actual area in the polygon or the standard $1/10^{th}$ acre conversion factor.

Assign a unique identity, (*Site_ID*) to each polygon or map unit. The *Site_ID* can be any combination of letters and number up to 30 characters in length. It is strongly encouraged and highly recommended that the combination of Region, Forest and District numbers form the first six digits of the *Site_ID*. Each weed will be mapped separately so that each *Site_ID*, polygon, will contain a single species. The result will be polygons of different species can and will be overlapping. While this convention may seem cumbersome it

[4] International Data Standards for the Inventory, Monitoring and Mapping of Invasive Plants. 2001. NAWMA.

will greatly facilitates tracking the growth and changes in weed infestations over time and across the landscape.

The location of an infestation (polygon) must be entered in one of the location data fields (see General Form), even if the infestation is spatially located in GIS. The data based location information will assist in the transfer of information between cooperating agencies and allows the easy compilation of data. The location will correspond to the center of the infestation (polygon) or the population perimeter. The next release of Terra scheduled for fall of 2002, will allow users to enter this information automatically from GIS.

There will be two standard, default GIS map displays for invasive plants in NRIS. The first will be a map of the current infestations for all species. This map will be result of displaying the most recent information for each infestation (*Site_ID).* Not all sites may be visited each year, in this case the most recent information may be several years old. The query will search for the last update and then display that information. The second map will show the historical changes for each weed species. In this case every re-measurement including the most recent will be displayed. This map will readily show the change in a weed population over time. Each of these maps will be archived at the end of each year (January).

Plant Information

Complete definitions and explanations for all data fields can be found on page 16 in the following section called *Data Fields*. Record the invasive plant species using the species code from the NRCS, PLANTS. If appropriate enter the code for the subspecies or variety. The common name, complete genus, species, subspecies, variety and accompanying authority will be displayed automatically. Only one invasive plant species may be entered on each form or for each polygon. If you cannot identify the plant to species you can enter the code for the genus or family. Other generic codes for grasses and forbs are also available. In some instances there may be no PLANT code for the species you have identified. Enter NO-XWALK in the plant code field and then select the Unidentified/New Plant tab. Instructions for the Unidentified/New Plant screen can be found on page 27 of this guide. Use the NO-XWALK only for plants you can identify and no PLANTS code exists, this code is not for plants you cannot identify.

If more than one invasive plant is found at a given site a new form/record, a new polygon with a unique *Site_ID* must be drawn. This convention was agreed upon because of the difficulty of monitoring several species within a GIS polygon.

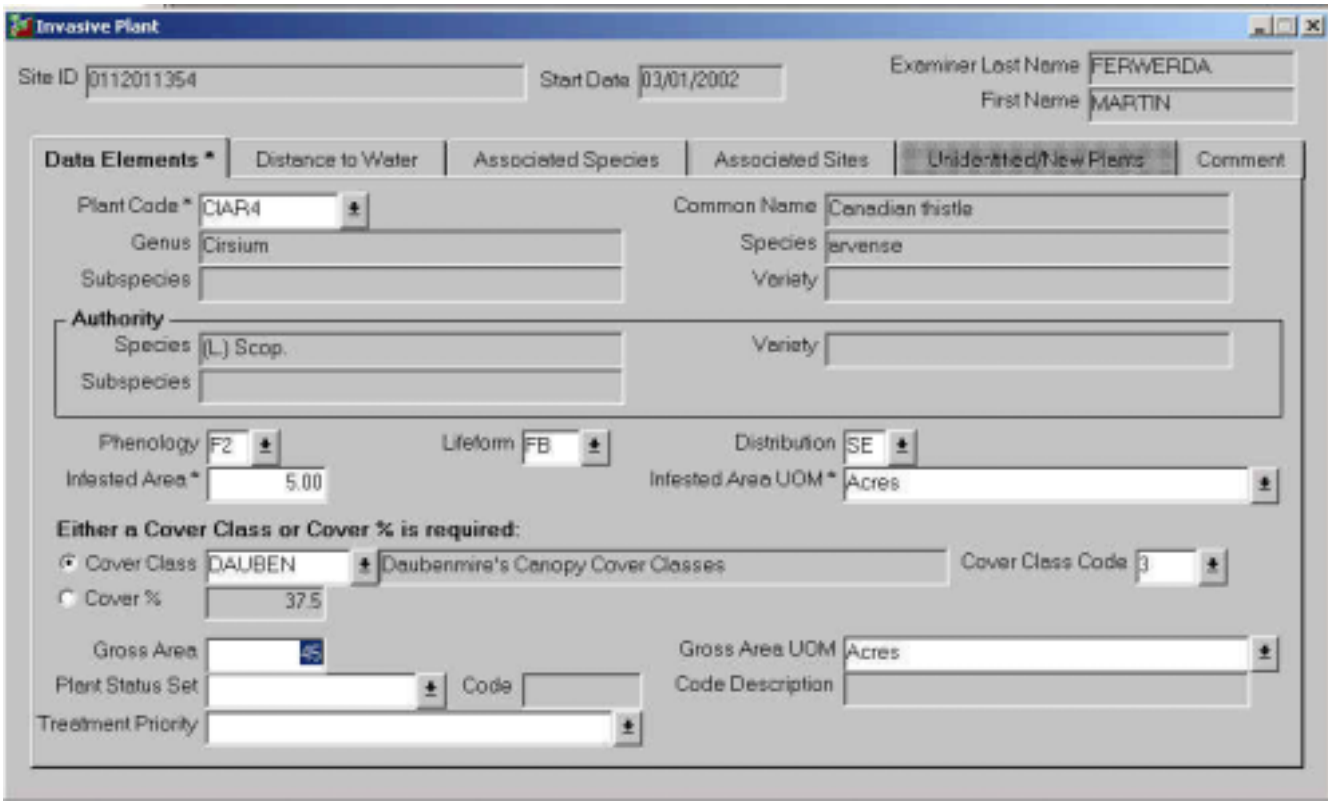


Figure 1: NRIS Terra Invasive Plant Data Entry Screen

The extent or size of the infestation is recorded in the *Infested_Area* field. This field is a critical component of this methodology and will be used to monitor changes in infestation size, report acres of invasive plants in national and regional reports and share information on invasive plants with cooperators, Weed Management Areas, counties, states, federal agencies and other entities.

> The *Infested_Area* is defined as the: "Area of land containing a single weed species. An infested area of land is defined by drawing a line around the actual perimeter of the infestation as defined by the canopy cover of the plants, excluding areas not infested. Areas containing only occasional weed plants per acre do not equal one acre infested. Generally, the smallest area of infestation mapped will be 1/10th (.10) of an acre or 0.04 hectares."

Some infestations are very large or discontinuous and it is difficult or not useful to map these larger infestations based on the canopy cover of the plants. The increase in accuracy gained by plotting individual plants may not compensate for the increase in cost or manpower. The general location on the landscape and an estimate of land area may be sufficient to meet inventory and treatment requirements. For these larger infestations draw a line around the outer perimeter of the area occupied by the plant population, this is the *Gross_Area.* *Gross_Area* is intended to show general location and population information and is defined as*:*

> " Like *Infested_Area* it is the area of land occupied by a weed species. Unlike Infested_ Area, the area is defined by drawing a line around the general perimeter of the infestation

> not the canopy cover of the plants. The gross area may contain significant parcels of land that are not occupied by weeds."

If a value for *Gross_Area* is entered a value for Infested_Area must also still be entered. The *Infested_Area* field will be used to sum and correlate data. When the question is asked "How many acres of spotted knapweed are there on the Mark Twain National Forest?", that number will come from summing all the *Infested_Area* fields for records *(Site_IDs)* where spotted knapweed is found. The value for *Infested_Area* is derived from estimating the actual land area or the percentage of land occupied by weed plants and then multiplying this estimate by the *Gross_Area*.

> For example: A large spotted knapweed infestation is located in the West Fork drainage. By driving around the area and looking at aerial photos the weed population is an approximate *Gross_Area* of 600 acres. There are significant portion of the area that are not infested. It is estimated that approximately 40% of the area is actually occupied, or an estimated 240 acres infested (600 x .40 = 240). The value entered in *Gross_Area* is 600 and value entered in *Infested_Area* is 240. In this case there was no added value or utility in mapping the smaller infestations within the gross area. Treatment options would be the same for all the individual infestation or the gross area. Only the values recorded in infested area will be used for upward reporting.

Measure or estimate the canopy cover for each species recorded. The estimate of canopy cover is made on and refers to the *Infested_Area*, the portion of the site, which is actually occupied by the weed species. Canopy cover can be estimated using any of the following three types of cover classes: Daubenmire, 10-point Classes or the Greater Yellowstone Guidelines. The numeric midpoint of these cover classes will be the number actually shared with cooperating entities. Canopy cover can also be recorded as the actual percent canopy cover observed or measured. On sites with a *Gross_Area*, canopy cover is estimated on the *infested* and not the *Gross_Area*. In the example above, the average canopy cover was estimated to be 20% on the 240 acres actually infested.

Canopy cover can change rapidly in a population of invasive plants. A few scattered plants will grow to several acres and a dense canopy in a short time, one to two years. Often surveys taken at the beginning of the season will be not accurately reflect the nature of the infestation at the end of the season. Nor will the canopy cover be uniform throughout the infestation. For this reason it is impractical and often inappropriate to spend much time measuring canopy cover, therefore canopy cover will almost always be an estimate. Only significant differences in canopy cover should be mapped as separate polygons. As a general rule, until differences are equal to one or more cover classes listed in should infestation be mapped as separate polygons.

The protocol allows further description of the infestaion such as the phenology of the weed at the time the site was visited, the lifeform of the weed and the distribution pattern of the weeds across the landscape. The protocol also offers space to hold information on mangement of the plants *Treatment_Priority* and *Plant_Status.*

The distance to water may be recorded for each species. This information is often valuable for environmental analysis or planning treatments. It allows the categorization of treatment options

and potential effects around water. For example, infestations that are greater than 100' horizontally or vertically from water have a low probability of herbicides or effects from other treatments entering water.

Aquatic Plants

This methodology can be used both on terrestrial and aquatic invasive plants. Aquatic species tend to mutiply and move rapidly creating challenges to mapping. In lakes and ponds it may be appropriate to apply the concepts of *Infested_Area* and *Gross_Area*. The *Infested_Area* would be the area that is currently occupied by the weed species. Since aquatic species mutilply rapidly and often are moved with readily with currents it is likely that other areas will be quickly infested. In this instance the *Gross_Area* could be the entire pond or a bay in larger lakes. In streams, rivers and irrigation canals aquatic species are easily transported with the currents. To facilitate and display the areas that are infested the methodogy requires that the Hydrologic Unit Code (HUC) also be included for aqauatic species. The HUC code is located on the General Form.

MONITORING INVASIVE PLANTS

An essential element of invasive plant management is observing changes in weed populations over time, monitoring. This method monitors weeds at the population and infestation level through characteristics such as expansion or contraction of a given infestation. Each observation will require the completion of a new form and creation of a new record in the database. The site or polygon identifier (*Site_ID*) will allow changes in the infestation to be traced and connected from one observation to another. Individual observation can be identified and differentiated by the date. In Terra monitoring, subsequent visits to a site, will be referred to as a re-measurement. All the site and setting information, from the General Form, and the weed information, from the Invasive Plant Form, can be automatically transferred to the new record. You can then modify the information based on the current site visit, see Figure 2.

Weed infestations can change dramatically over time. Weed populations can expand exponentially, spreading along roads and trails. Conversely, infestations can be reduced through treatment. Separate infestations can grow together to form a single, large infestation. An infestation can split forming two separate populations where one previously existed. Changes in size and shape of an infestation can be traced over time through subsequent site visits, differentaited by the *Date*. The *Site_ID* will remain with a particular infestation (polygon) unless it splits or is combined with other polygons. The Re-Measurement Wizard and the Associated Sites utility in Terra will help you track these changes through time and record display the history of any given site.

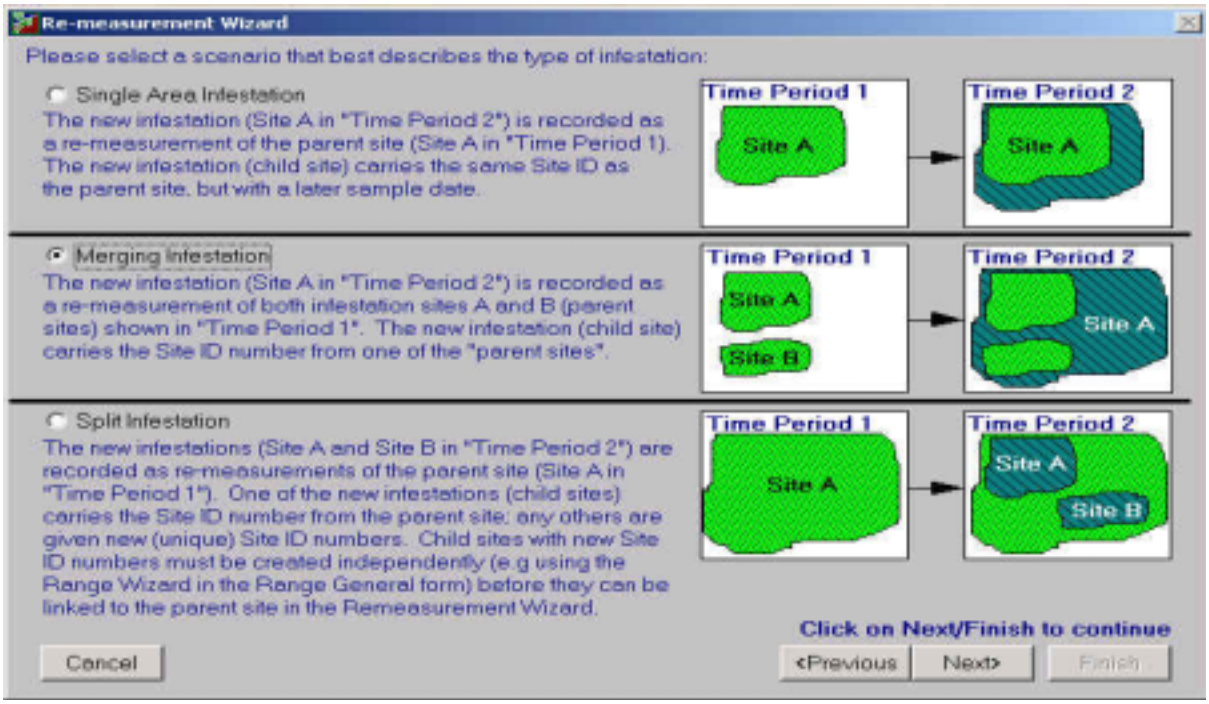


Figure 2: NRIS TERRA - Monitoring or Re-measuring a site

Monitoring/Re-measuring a Single Site

An individual infestation can expand, contract or even move across the landscape. All observations are tied together by the *Site_ID* and differentiated from each other by the date of the observation. For each observation make any needed adjustments to the information contained in the General Form, site and setting or to the invasive plant community on the Invasive Plant

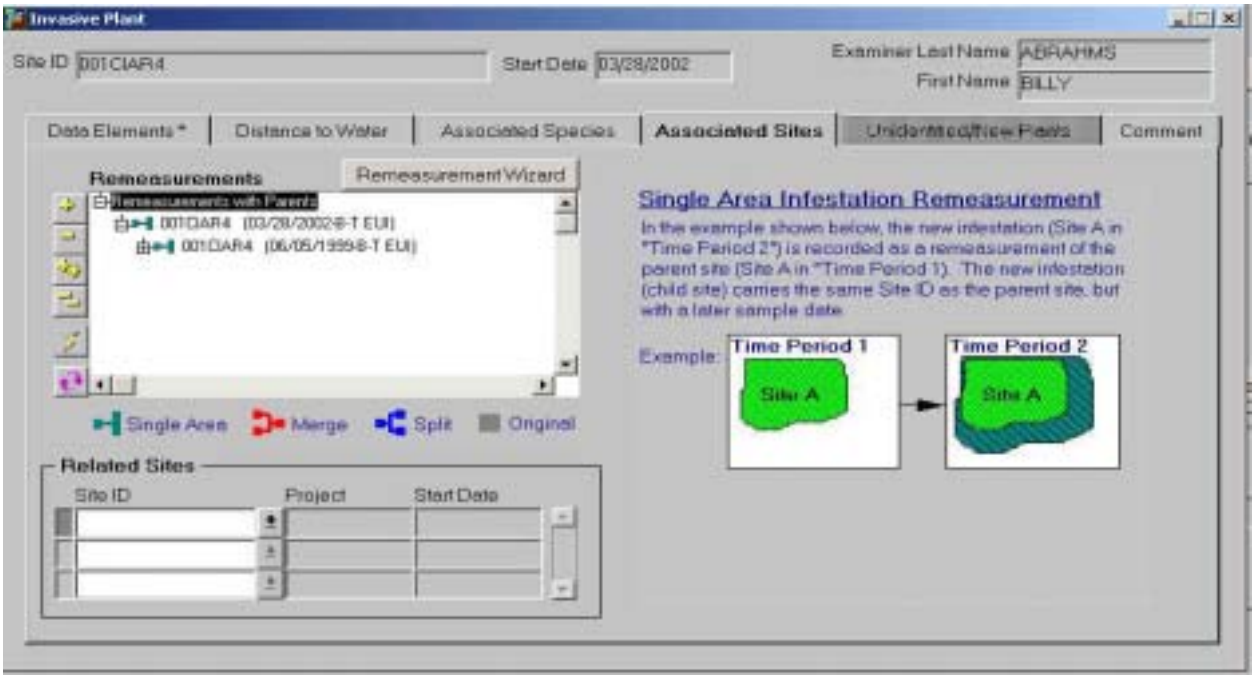


Figure 3: NRIS TERRA Re-measurement of a single site

Form. It is important to enter all observations even if there is no change in the invasive plant community. An observation of no change is an important observation. There is no limit to the number of re-measurements. Terra will display all the recorded observations to a site (Figure 3).

Merging Infestations

Weed populations can grow and expand overtime, merging into a single infestation. Two geographically separate populations can also merge. It is important to monitor and be able to recreate the weed expansion over the landscape. The Re-measurement Split Infestation Wizard, Figures 4 & 5 will assist in tracking these changes. The two "parent" sites with their *Site_ID*s will merge into a single site with one *Site_ID*. This new site is called the "child" and will retain the *Site_ID* from one of the "parents". All the previous sites and their relationships will be maintained. While there is no limit to the number of merges, the number of merged sites can be minimized by carefully drawing infestation boundaries. If sites are relatively close and will soon grow together, consider mapping these adjacent sites as a single site, using the *Gross_Area* concept. Encouraging the grouping of small infestations when it is likely that they will merge overtime will minimize the dilemma described in this section.

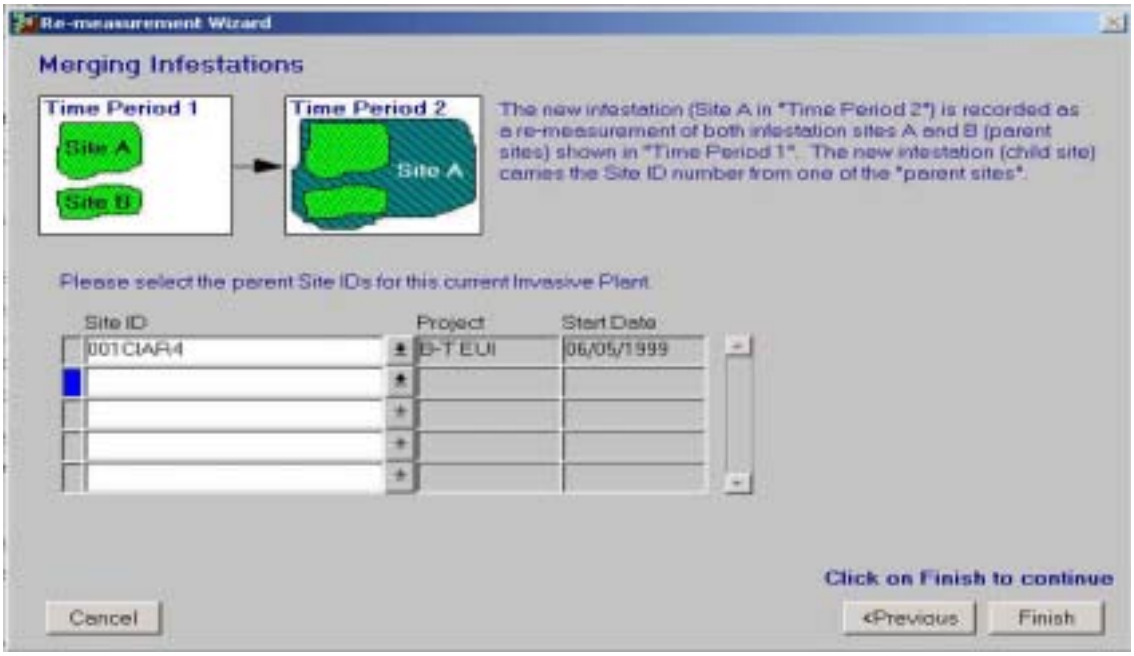


Figure 4: Merging Infestations

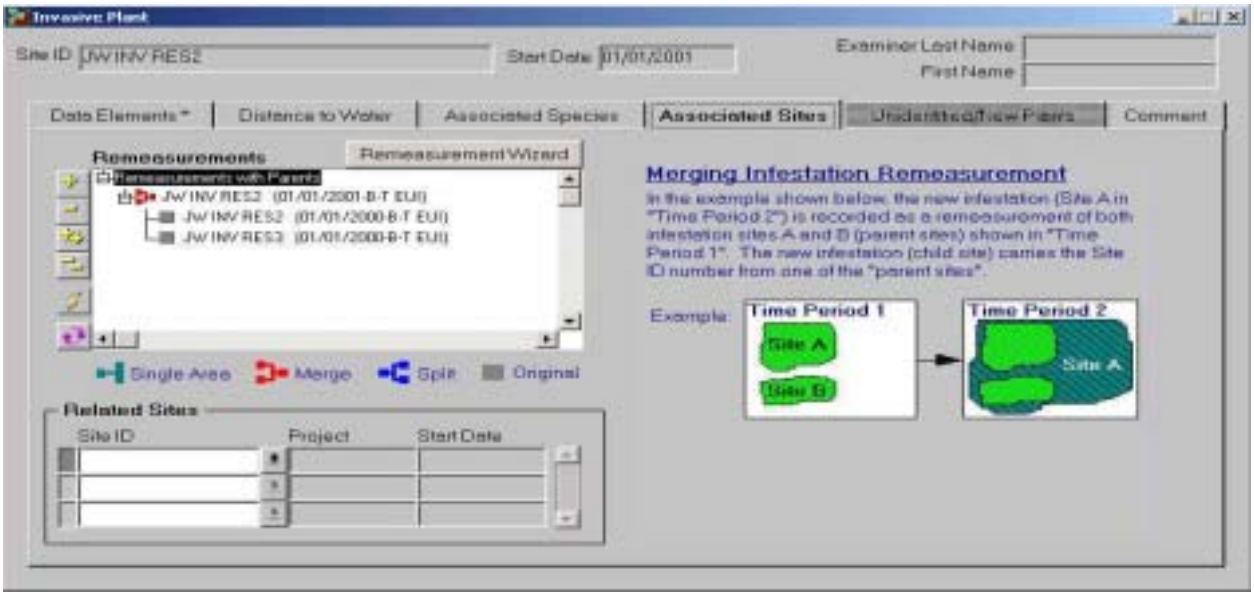


Figure 5: Merging Infestations

Split Infestations

Infestations cannot only merge but may also split and becoming two infestations over time. There are a number of factors that could lead to this split such as treating only part of an infestation. There is value is monitoring the changes in canopy cover of the weed between the treated and untreated areas. Many of the principles in polygon and *Site_ID* management discussed in the previous section are applicable here to splitting infestations. In this case a "parent" infestation will result in two "children". Only one of the infestations can carry the "parent" *Site_ID*. Use the Split Infestation Wizard, Figures 6 and 7, to assist in the naming of the sites. Naming *Site_ID* schemes that will also show this linkage; adding an A and B to the "parent" *Site_ID* where A represents the "parent" *and* B represents the new polygon or "*child*" may be useful.

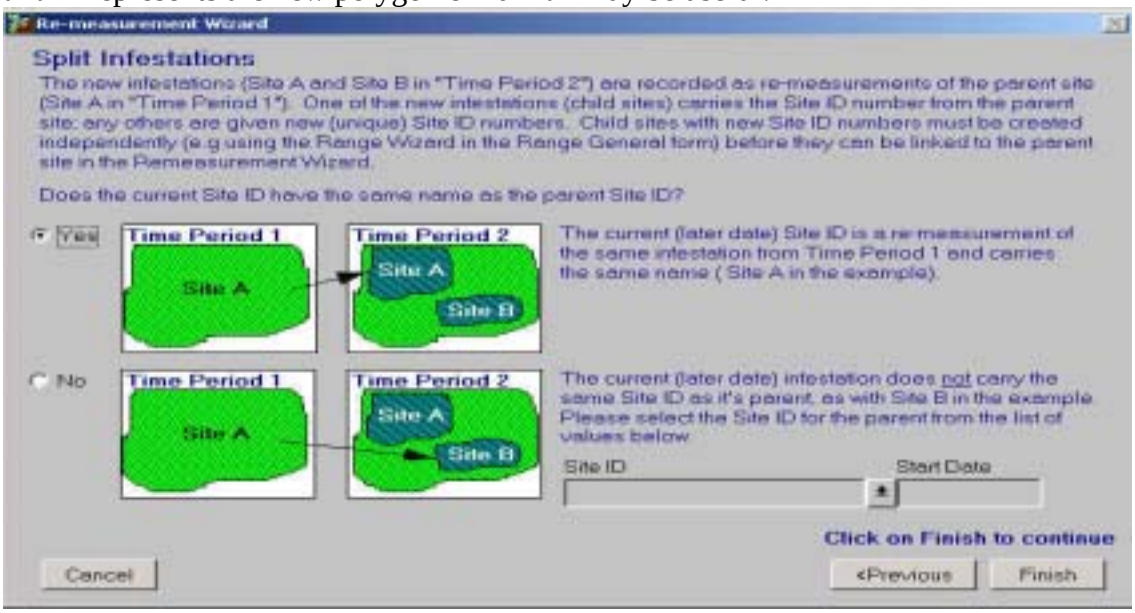


Figure 6: Split Infestations

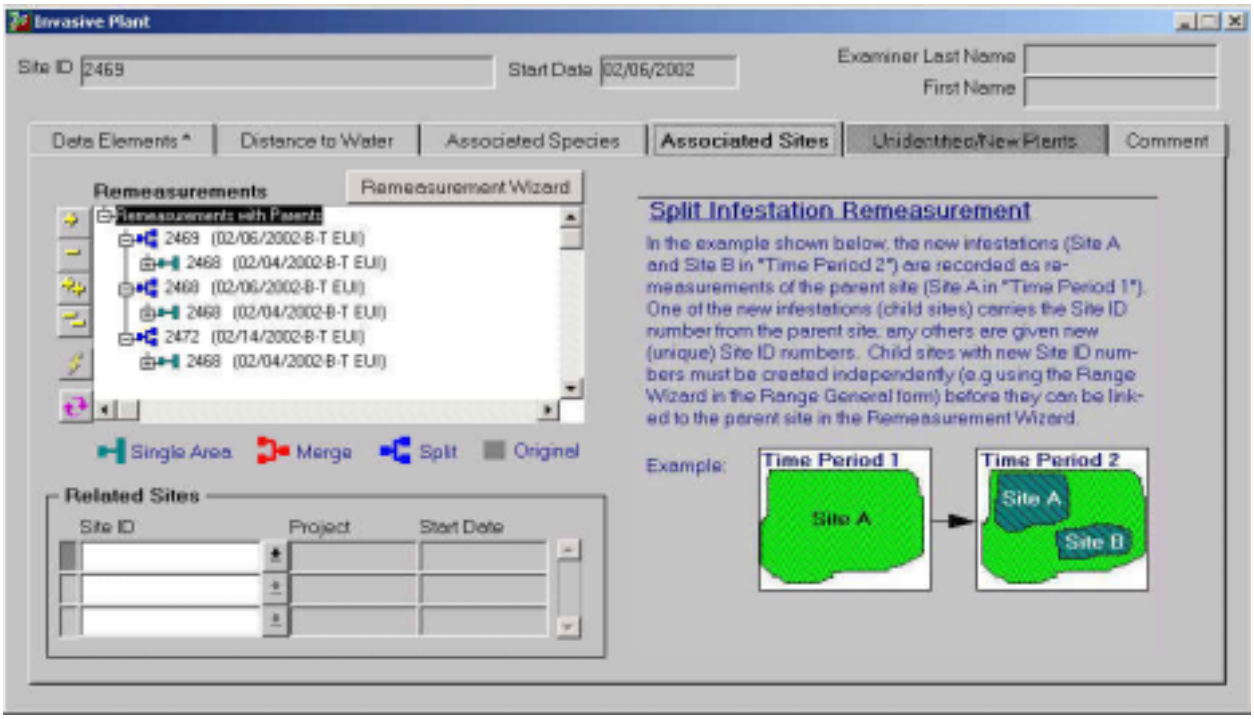


Figure 7: Split Infestations

NRIS will take a snapshot of the GIS coverage at the end of the calendar year. This is not a limitation; the user may store additional GIS overages. This will allow the tracking of historical infestations through GIS as well as through data files. The NRIS default map will be an all species map using the most recent information. The map will likely be a mixture of polygon and inventory information from several years. Some polygons may have been created or re-measured during the most recent field season and some from sites that may not have been visited in several years. The second is a group of map for each species showing changes over time.

Eradicated Infestations

All visual evidence of an infestation may disappear after treatment such as biological control or application of herbicides. Through above ground the weed may have disappeared there may be roots, stems and other plant parts that may recover and sprout. Seeds are stored in the soil profile for many years and may remain viable for 15 years or longer. For these reasons it is important to monitoring sites for many years, even after all evidence of weed has disappeared. A monitoring regime may start with annual monitoring for the first 3-5 years, decreasing the frequency of monitoring to every other year for the next 5-10 years and further decreasing the frequency to every 3 years for the next ten years, until the seed source has been exhausted. For sites that are continually vulnerable to reinfestations such as, roads, trails, recreational facilities and administrative sites, annual monitoring is encouraged.

Changes in an infestation following treatment can be monitored through reduction in canopy cover. Infestations with no visual evidence of weeds may have a canopy cover of zero (0). The map unit or polygon should remain until the seed source has been

exhausted. When an infestation has truly been eradicated reduce the acres infested to 0. This will show the infestation has been eliminated but keeps the polygon active allows monitoring of the site.

DATA ENTRY

Detailed information on data entry can be found on the Terra web site.

INTERNATIONAL MAPPING STANDARDS[5]

The International Inventory Monitoring and Mapping standards were developed by a broad group of scientists, land managers, state and local weed managers. These standards have now been adopted by most federal agencies. Most western states and provinces of Canada have also adopted these standards. Negotiations are now underway to gain acceptance in the eastern portion of the United States. The standards have been devised to facilitate the transfer of information on invasive plant species across ownerships, jurisdictions and property boundaries. These standards include not only the information on what will be collected but how it will be collected and the form or codes that will be used to record the information.

The Forest Service has accepted the standards and incorporated these standards into this protocol. In some cases the Forest Service may be collected or store information in a different form than the International Standard. In those cases the data will be converted to the accepted form before data is shared or transferred. An example is the *Date*. The Forest Service, NRIS uses the format DD/MM/YYYY while the International Standards use the format YYYY/MM/DD. This protocol relies on plant codes from the NRCS PLANTS database. To generate a report and data files, select a geographic area based on any of the location of area fields on the General Form such as: region, forest district, state, county, allotment or project. You must also select what form you would like the data in such as: a spreadsheet or ORACLE. Following is a list of the required data fields for the International Standards and the corresponding fields in the Forest Service Invasive Species Protocol.

International Standards	Forest Service Data Field
Collection Date	Date (General Form)
Country	No equivalent field, all data will be marked as located in the United States
State	State (General Form)
County	County (General Form)
National Ownership	Ownership (General Form)
Location: Use one of the following methods: Legal, metes and bounds, UTM, Lat/Long	Location (General Form): Use one of the following methods: Legal, metes and bounds, UTM, Lat/Long
HUC Code	Watershed HUC Number (General Form)
Source of Data	No equivalent field, all data will be marked as the

[5] International Standards for the Inventory, Monitoring and Mapping of Invasive Plants. 2001 NAWMA

International Standards	Forest Service Data Field
	Forest Service with the Region and Forest as the source of the data
Plant Name Genus Species	Plant Name: PLANTS code will be converted to Genus and Species name (Invasive Plant Form)
Infested Area	Infested Area (Invasive Plant Form)
Infested Area Unit of Measure	Unit of Measure (Invasive Plant Form)
Gross Area	Gross Area (Invasive Plant Form)
Gross Area Unit Of Measure	Unit of Measure (Invasive Plant Form)
Canopy cover (as a percent)	Canopy Cover (as percent or mid point of the canopy class) (Invasive Plant Form)

Figure 8: Crosswalk Forest Service to International Data Standards

Sharing Information

A key component of invasive species management is working and coordinating with others. It is vital that information on the location and extent of invasive plant populations be easily shared. The acceptance of the International Standards will facilitate this task. A standard report/application is available that will automatically gather all this information and readily transfer the information to cooperators like states, counties, Weed Management Areas and regional data bases. The report will ensure that all the required data elements are included and in the accepted format.

DOCUMENTING NEW SPECIES, NEW LOCATIONS

Distribution of invasive species over broad landscapes is held by regional and national data sets such as PLANTS or Invaders. In order for these data sets to be credible, the information they contain must be from verified plant records. Each new record for a county, a state or the country must be recorded and verified. The Forest Service can and should contribute to this information base by documenting new occurrences in counties and states with a voucher specimen. A voucher is a properly mounted and labeled specimen that has been submitted to a herbarium and verified by a qualified botanist or taxonomist. Consult your forest or regional botanist or see Appendix A for the proper procedure to collect, mount and submit a voucher specimen. These specimens can be submitted to a local, state herbarium or to the Forest Service herbarium collection at the University of Wyoming in Laramie.

DATA ELEMENTS

The invasive plant protocol requires the use of two forms, the General Form and the Invasive Plant Form discussed here. Fields 1-3 of this form/ protocol are a duplication of Fields 1-3 on the General Form. These fields are used to ensure that there is a link between the two forms. The information entered on these fields should be identical on both forms.

Site ID [Varchar 2(30)] ***Required***
Enter the 30-digit code that uniquely identifies the site. This field is the identifier for the polygon and links the General Field Form with the Invasive Plant Inventory and Monitoring Form. Although no convention for this field is mandated, it is ***highly, highly, highly*** recommended that the region, forest and district form the beginning of the *Site_ID* number. Using this convention will allow the easy sorting of information and uniquely identify infestations. During data entry into Terra this field will automatically be migrated to the Invasive Form from the General Form. In completing the paper field form enter the *Site_ID* number on both the General and Invasive forms.

Code	Description
0103101111	Region, Forest, District, Site
0310051234	Region, Forest, District, Site

Start Date [Date (12)] ***Required***
Record the calendar month, day, and year the site was visited This is the day that the information was collected in the field, ***not*** the date the data was entered into the computer . The format is MMDDYYYY. This field will also migrate autmatically from the General Form to the Invasive Form.

Code	Description
01/23/1984	January 23, 1984
12/07/1997	December 7, 1997

Examiner's Last, First Name and Middle Initial [Varchar 2(40)] ***Required***
Record the examiner's last, and first name is required. The middle initial is optional. The combination of Site ID, Start Date and Examiner's Last, First Name and Middle Initial will ensure that if the General Form can be associated with the correct Invasive Plant Form.

Last Name	First Name	Middle Initial
MacDonald	John	Q
Montoya	Juanita	

Plant Code [Varchar 2(8)] ***Required***
For vascular plant species, use the (most codes are less than 8 chars long) alpha-numeric code from the NRCS PLANTS data base. Identify plants to species and subspecies, if possible. If plants can only be identified to the genus or family enter the genus/family code from PLANTS. If a code for a species does not exist enter NO-XWALK and refer to the section on Plants Without a Crosswalk in Plants on page 27 of this field guide. The NO-XWALK should not be used for unidentified plants.

Code	Description
LIDAD	Linaria dalmatica (L.) P. Mill. ssp. dalmatica Dalmatian toadflax
CEBI2	Centaurea biebersteinii DC Spotted Knapweed

Common Name [Varchar2(60)] ***Optional***
These are the weed names most commonly used in conversation. They are often descriptive e.g., yellow star thistle. This field will autopopulate from PLANTS when the PlantCode is entered, or enter the common name on the field form.

Code	Description
Yellow Star thistle	Centaurea solstitis
Dalmatian toadflax	Linaria dalmatica (L.) P. Mill. ssp. dalmatica

Genus [Varchar 2(20)] ***Optional***
This refers to the latin, scientific name for the Genera. This field will auto populate from PLANTS when the Plant Code is entered, or enter the genus name on the field form.

Code	Description
Centaurea	Knapweed
Polygonum	Japanese knotweed

Species [Varchar 2(30)] ***Optional***
This refers to the scientific name for the species. This field will auto populate from PLANTS when the Plant Code is entered, or enter the species name on the field form.

Code	Description
Soltitialis	The species name for yellow star thistle
cuspidatum	The species name for Japanese knotweed

Subspecies [Varchar 2(30)] ***Optional***
This field is reserved for finer plant identification, to subspecies. This refers to the scientific name for the subspecies/variety. This field will auto populate from PLANTS when a Plant Code when includes a subspecies is entered.

Code	Description
LIDAD	Linaria dalmatica (L.) P. Mill. ssp. dalmatica Dalmatian toadflax
SOARU	Sonchus arvensis (L.) ssp. uliginosus (Bieb) Nyman

Variety [Varchar 2(30)] ***Optional***
This field is reserved for more pricise identification of species to the variety. This refers to the scientific name for the variety. This field will auto populate from PLANTS when the Plant Code which includes the variety is entered.

Code	Description
LIDAD	Linaria dalmatica (L.) P. Mill. ssp. dalmatica Dalmatian toadflax
SOARU	Sonchus arvensis (L.) ssp. uliginosus (Bieb) Nyman

Authority [Varchar 2(100)] ***Optional***
Enter the abbreviation for the name of the authority. The authority refers to first individual to classify and name the plant. This field will auto populate from PLANTS when the Plant Code which includes the genus, species, subspecies and variety is entered.

Code	Description
L.	Linaeus
Nutt.	Nutall

Phenology [Varchar 2(2)] ***Optional***
The stage of plant development for the invasive plant such as: buds, flowers, or fruit. Record the phenology at the time of sampling.

Graminoids/Grass like plants	
Code	**Class**
G1	Leaves partially developed; no heads
G2	Inflorescence inside the sheath (in the boot)
G3	Inflorescence partially or fully exerted from sheath
G4	Seeds maturing or mature
G5	Senescent; dormancy
RG	Regrowth

Forbs & Shrubs	
Code	**Description**
F1	Pre-flowering (includes vegetative,beginning growth stages and rosettes)
F2	Flowering
F3	Fruiting
F4	Senescent; dormancy

Life Form [Varchar 2(3)] ***Optional***
The characteristic form or appearance of a species, at maturity (e.g., tree, shrub, or herb). Use the following codes to describe the life form of the plant.

Lifeform Code	Definition
AL	Algae - A general name for the single-celled plant plankton, seaweeds, and their freshwater allies.
FB	Herbaceous forb/herb - Vascular plant without significant woody tissue above or at the ground. Forbs and herbs may be annual, biennial, or perennial but always lack significant thickening by secondary woody growth and have perennating buds borne at or below the ground surface..
FU	Fungus -A non-flowering plant of the kingdom Fungi, all lacking chlorophyll.
GR	Herbaceous graminoid - Grass or grass-like plant, including grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), arrow-grasses (Juncaginaceae), and quillworts (Isoetes)
LC	Lichen - Organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in symbiotic association. Often attached to solid objects such as rocks or living or dead wood rather than soil.
LI	Woody Liana - Climbing plant found in tropical forests with long, woody rope-like stems of anomalous anatomical structure.
NP	Nonvascular Plant - Nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts. Always herbaceous, often attached to solid objects such as rocks or living or dead wood rather than soil.
SH	Woody Shrub - Perennial, multi-stemmed woody plant that is usually less than 4 to 5 meters or 13 to 16 feet in height. Shrubs typically have several stems arising from or near the ground, but may be taller than 5 meters or single-stemmed under certain environmental conditions.
SS	Woody Subshrub/Half-shrub - Low-growing shrub usually under 0.5 m or 1.5 feet tall (never exceeding 1 meter or 3 feet tall) at maturity.
TR	Woody Tree - Perennial, woody plant with a single stem (trunk), normally greater than 4 to 5 meters or 13 to 16 feet in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 4 meters or 13 feet in height).
UN	Unknown - Growth form is unknown.
VI	Herbaceous Vine - Twining/climbing plant with relatively long stems, can be woody or herbaceous. FGDC classification considers woody vines to be shrubs and herbaceous vines to be herbs.

Distribution [Varchar 2(2)] ***Optional***

The spatial distribution of individual plants within a population and across the landscape. Record the distribution using the codes listed below.

Code	Class
Cl	Clumpy
SP	Scattered patchy
SE	Scattered even
LI	Linear

Infested Area [Numeric(9,2)] ***Required***
This is the area of land containing a single weed species. An infested area of land is defined by drawing a line around the actual perimeter of the infestation as defined by the canopy cover of the plants, excluding areas not infested. Areas containing only occasional weed plants per acre do not equal one acre infested. Generally, the smallest area of infestation mapped will be 1/10th (.10) of an acre or 0.04 hectares. This field will be expanded to accept 1/1000 of an acre in the next version of Terra. This field has been referred to as *Occupied_Area* or *Net_Area* in the past.

Code	Description
12.5	12 and a half acres of land are infested with purple loosestrife
.05	5/100 of a hectare or approximately 500 square meter (patch 5 meters by 10 meters) are infested with garlic mustard

Infested Area Unit of Measure [Varchar 2(12)] ***Required***
The convention for measuring infested area is either in acres or hectares. Enter either hectares or acres in this field.

Code	Description
Acres	Acres infested
Hectares	Hectares infested

Gross Area [Numeric(8,0)] ***Optional***
This field is intended to show general location and population information. Like *Infested Area* it is the area of land occupied by a weed species. Unlike *Infested Area,* the area is defined by drawing a line around the general perimeter of the infestation not the canopy cover of the plants. The gross area may contain significant parcels of land that are ***not*** occupied by weeds.

Gross area is used in describing large infestations. When a value is entered for gross area, the assumption is that the area within the perimeter of the weed population (area perimeter) is an estimate or the product of calculating the area within a described perimeter. It is *not* a measured value. Values in this field are rounded up to the nearest acre. If a value for *Gross_Area* is entered a value for *Infested_Area* must still be entered. The value for *Infested Area* is derived from estimating the actual or percentage of land occupied by weed plants.

Gross Area Unit of Measure [Varchar 2(12)] **Required** if a value for *Gross_Area* is entered

The convention for measuring *Gross_Area* is either in acres or hectares. Enter either hectares or acres in this field.

Code	Description
Acres	Acres Gross area
Hectares	Hectares Gross area

Computing Infested Area
This field(s) are only provided on the field form to assist in the computation of infested area.

Plant Status Set [Varchar 2(30)] ***Optional***.
This field describes the name of the set of the status codes which are developed locally.

Name of the Set	Description
Upper Crow Creek	Set of status values for the Crow Creek Weed Management Area
No Knapweed WMA	Set of status codes for The No Knapweed Weed Management Area
Bear Creek District	Set of status codes for the Beaver Creek Ranger District from the Beaver Creek Weed Control Environmental Impact Statement
California	Set of status codes from the California Noxious Weed List

Plant Status Code [Varchar 2(5)] ***Required*** when a value for *Plant_Status_Set* is entered.
This field is intended to hold information on the status of plants, such as those species that are listed as noxious by counties, states or are on the federal list. There are no national standards for this field as states and counties use varying systems for designating plants as noxious. In those areas where noxious weed lists do not exist or are incomplete this field can be used to identify species of concern. The field is not limted to officialy disignated staus, it could contain status ssytems generated by a WMA, a forest, a districtor through an environmental analysis. This field is reserved for local use, with locally generated codes and definitions. Coding conventions for this field can be entered into the data base by the local NRIS data base steward. Codes can be from one to five characters in length and can be either numbers, characters or a combination of both. This field can be automated with the help of a local data steward. Within a given set each weed species will be associated with a code. There is no limit to the number of *Plant Status_Sets* for a region, forest or district. Following is an example of possible codes from a state weed law.

Code	Description
A	Noxious – Mandatory Control
B	Noxious Control and Contain
C	Noxious No control required

Treatment Priority [Varchar 2(8)] ***Optional***.
This field is intended to hold information on management of invasive plants. In some cases is could refer to the state priorities such as category A, B or C weeds. It could also be used to identify priorities from Weed Management Area, a county and environmental analysis, EA, EIS or from an annual plan of work. This field is reserved for local use and therefore there are no national standards. Codes and definitions will be developed locally, with the agreed to coding conventions entered into the database by the local NRIS data base steward. Codes can be from one to eight characters in length and can be either numbers, characters or a combination of both. Following is an example of sample codes.

Priority	Description
PR1	Priority One, potential Invaders
PR2	Priority II, new Invaders
PR3	Priority III, established Infestations

Canopy Cover is a required data element for invasive plant protocol. You can describe canopy cover by either entering the actual percent (*Cover_Percent*) or by entering a *Canopy_Cover_Class* and *Cover_Class_Code.*

Canopy Cover Set [Varchar2(6)] ***Optional***
The name of the cover class set you are using to describe canopy cover. Only three classess, Daubemire (6 Point), Ten Point Cover Class or the Greater Yellowstone Area are available.

Canopy Cover Set	Description
NRMCOV	Ten Point Cover Class
DAUBEN	Daubemire Cover Classes
GYA	Greater Yelllowstone Area Cover Classes

Cover Class Code [Varchar 2(1)] ***Required*** if using *Canopy_Cover_CLass*
The percent of a fixed area occupied by the plant species, life form, or ground cover type. Percent cover is obtained by projecting the outline of the foliage or surface feature to a horizontal plane and determining what percent of the fixed area it covers. This field is used for measured or estimated percent cover. Some measurement of canopy cover is required but this infomration can be entered in this field or by cover classes.

Ten Point Cover Classes

Class Code	CoverClass	Mid Point
T	0-1.0%	0.5%
0	1.1-5.0%	3.0%
1	5.1-15.0%	10.0%

2	15.1-25.0%	20.0%
3	25.1-35.0%	30.0%
4	35.1-45.0%	40.0%
5	45.1-55.0%	50.0%
6	55.1-65.0%	60.0%
7	65.1-75.0%	70.0%
8	75.1-85.0%	80.0%
9	85.1-95.0%	90.0%
A	91.1-99.0%	97.0%
X	99.1-100%	99.5%

Daubenmire Classes

Class Code	**Cover Class**	**Mid Point**
T	0 - 1.0%	0.5%
1	1.1 - 5.0%	3.0%
2	5.1 - 25.0%	15.0%
3	25.1 - 50.0%	37.5%
4	50.1 - 75.0%	62.5%
5	75.1 - 95.0%	85.0%
6	95.1 – 100%	97.5%

Greater Yellowstone Area Cover Classes[6]
Guidelines for Coordinated Management of Noxious Weeds

Cover Code Class	**Cover**	**Mid Point**
T – Trace	0-1%	0.5%
L – Low	1.1 – 5.0%	2.5%
M – Moderate	5.1 – 25%	15%
H- High	25.1 – 100%	63%

Canopy Cover Percent [Numeric (5,10] ***Optional***
Canopy cover is the percent of the ground, covered by foliage of a particular weed species. Percent cover is obtained by projecting the outline of the foliage or surface feature to a horizontal plane and then determining what percent of the fixed areas covered. This field is used to measure or estimate percent cover. In some cases canopy cover could exceed 100% when multiple layers of weed plants are present such as plants in the rosette and mature stages. Some

[6] Guidelines to Coordinated Management of Noxious Weeds - Development of Weed Management Areas", formerly The Guidelines for Coordinated Management of Noxious Weeds in the Greater Yellowstone Area. 1999.

measurement of canopy cover is required but this information can be entered in this field or by using a combination of *Canopy_Cover_Set* and *Cover_Class_Code.*

Code	Description
18	Canopy cover was estimated at 18%
32	Canopy cover was measured using line interspet as 32%

Horizontal Distance to Water [Numeric (8,2)]**.** ***Optional***.
Enter the measured or estimated distance to water. The distance is measured as a direct line from the edge of the infestation to the nearest surface water. This is often described "as the crow flies". It is often useful to separate sites by the distance to water. This information is helpful in grouping or classifying weed sites into management or treatment zones. These may be areas where it is likely or possible that surface runoff will result in herbicides entering the water systems. Conversely this field could be used to group sites where it is highly unlikely or improbable that herbicides could enter the water. Groupings based on distance to water can be useful for environmental analysis and discussions of potential effects within NEPA.

Code	Description
145	The distance to Deep Creek from the infestation was measured at 145 feet.
32	The distance from the spotted knapweed infestation was estimated to be 32 meters

Horizontal Distance to Water Unit of Measure [Varchar 2(34)] ***Required*** if a value for *Horizontal_Distance_to_Water* is entered a value for *Unit_of_Measure* must also be entered. Enter the appropriate unit of measure. The unit of measure is limited to the following options.

Code	Description
Feet	The distance was estimated in feet
Meters	The distance was measured in meters

Vertical Distance to Water [Numeric (8,2)]**.** ***Optional***.
Enter the measured or estimated vertical horizontal distance to water. Distance is measured in a direct line from the site of the infestation to the nearest subsurface water. This is useful information in grouping or classifying weed sites into management or treatment zones. It would identify areas where it is likely or possible that water movement through the soil profile could result in herbicides entering groundwater or other subsurface water systems. Conversely it could be used for grouping sites where it is highly unlikely or improbable that herbicides could enter groundwater systems.

Code	Description
25	The distance was water table was estimated as 25 feet.

130	A well was located in the immediate vicinity of the infestation. Water was found at 130 meters.

Vertical Distance Unit of Measure [Varchar 2(34)] ***Required*** if a value for Verticle Distance to Water is entered.

Enter the appropriate unit of measure: feet, yards or meters.

Code	Description
Feet	The distance was estimated in feet
Meters	The distance was measured in meters

Associated Species

The remaining data fields all refer to associated species, you may enter up to three (3) plant species. An Associated Species is defined as any plant species that occurs, is associated with or commonly found growing with the invasive plant species.

Associated Species Code [Varchar2(8)] ***Optional***.
For vascular plant species, use the alpha-numeric code from the NRCS PLANTS data base. Identify plants to species and subspecies, if possible. For genus identification, enter the appropriate genus code, and enter subspecies code.

Code	Description
ARTRV2	Artemesia tridentata var. vaseyana

Associated Genus [Varchar 2(20)] ***Optional***
This refer to the latin, scientific name for the Genera. This field will auto populate from PLANTS when the Plant Code is entered, or you may enter the genus name on the field form.

Code	Description
Artemesia	Sagebrush

Associated Species. [Varchar 2(30)] ***Optional***
This refer to the scientific name for the species. This field will auto populate from PLANTS when the Plant Code is entered, or enter the species name on the field form.

Code	Description
tridentata	Species name for big sagebrush

Associated Subspecies [Varchar 2(30)] ***Optional***
This field is reserved for finer delinations of species, the scientific name for the subspecies. This field will auto populate from PLANTS when the Plant Code is entered, or enter the subspecies name on the field form.

Code	Description
vaseyana	Subspecies name for mountain big sagebrush

Associated Variety [Varchar 2(30)] ***Optional***
This field is reserved for finer delinations of species variety, the scientific name for the variety. This field will auto populate from PLANTS when the Plant Code is entered, or enter the variety name on the field form.

Code	Description
vaseyana	Subspecies name for mountain big sagebrush

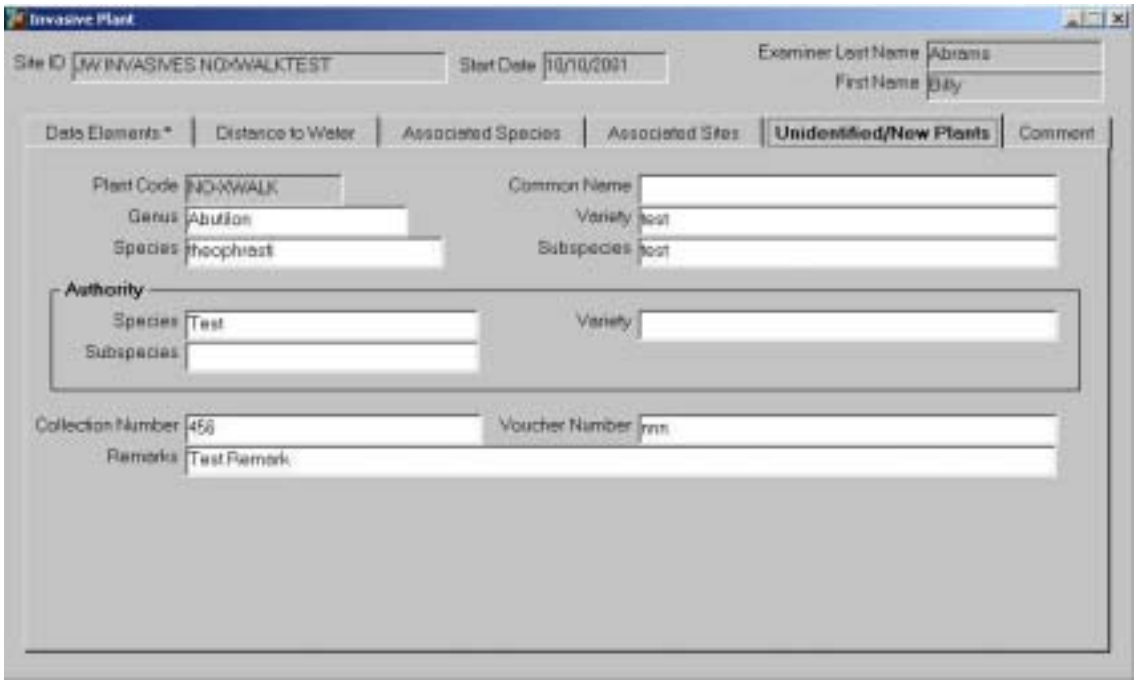
Comment Field [Varchar 2(2000)] Optional
This field is available to the user to enter any relevant information on the weed infestation. There is also a comment field associated with the General Form. Use the comment field on the General Form to describe the site and setting for the weed infestation. Use this comment field to describe the weed infestation

Map

This box is available to draw a map showing directions to the site, map of the general location or display the location of the infestation on the landscape. This sketch map can be scanned and stored in under the "photo information" on the General Form.

PLANTS WITHOUT A CROSSWALK IN PLANTS

Terra uses codes from the PLANTS database to enter plant information. Terra will only allow a *Plant_Code* to be entered it will not allow the user to enter a name in the *Genus, Species, Common_Name* or any of the plant fields. Because of this constraint a plant code from PLANTS must exist for a plant name to be entered. Sometimes a plant will be identified, where a code in PLANTS does not yet exist. This can be the result of new taxonomy, new nomenclature and in the case of invasives new species to North America. It may take up to two years for a new species to be added to PLANTS. This group of fields allow you to record and data base this information in the interim period until PLANTS establishes a code. This field will also be used by regional botanists to alert PLANTS, that a new code is needed. To use these fields enter NO-XWALK in the *Plant_Code* field and then select the Unidentified/New Plants tab. Do not use these fields for plants that you cannot identify. There are a number of codes that allow you to enter identified plants such as codes for genera, family and life form.



NO-XWALK Plant Code 2(8)] ***Required***
This field will autopopulate from the Data Elements screen when NO-XWALK has been entered in the *Plant_Code* field.

Code	Description
NO-XWALK	Centaurea horibilis (Funk.)
NO-XWALK	Euphorpbia godzillipus Swg.

NO-XWALK Common Name [Varchar2(60)} ***Optional***
These are the weed names most commonly used in conversation. They are often descriptive e.g., yellow star thistle.

Code	Description
Evenworse Star thistle	Centaurea horibilis (Funk.)
Godzilla's spurge	Euphorpbia godzillipus Swg.

NO-XWALK Genus [Varchar 2(20)] ***Required***
This refer to the scientific name for the Genera.

Code	Description
Centaurea	Knapweed
Euphorpbia	Spurge

NO-XWALK Species [Varchar 2(30)] ***Required***
This refer to the scientific name for the species

Code	Description
horibilis	The species name for evenworse thistle
godzillipus	The species name for Godzilla's spurge

NO-XWALK Subspecies [Varchar 2(30)] ***Optional***
This field is reserved for finer delinations of species such as subspecies and refers to the scientific name for the subspecies.

Subspecies	Description
Elongatum	Large evenworse thistle
Japonicus	Godzilla Godzilla's spurge

NO-XWALK Variety [Varchar 2(30)] ***Optional***
This field is reserved for finer delinations of species, the variety name.

Code	Description

NO-XWALK Authority [Varchar 2(100)] ***Optional***
Enter the abbreviation for the name of the authority. The authority refers to first individual to classify the plant into this name.

Code	Description
Funk.	J.W. Funkadelic
Swg.	S.W. Guild

Collection Number [Varchar 2(20)] ***Optional***
Enter the collection number from the specimen label. This field can be up to 20 charactrers in length and any combination of numbers and letters.

Collection Number	Description
FS19663783	The collection number
1267902G	The collection number

Voucher Number [Varchar 2(6)] ***Optional***
Enter the voucher number from the voucher label. This field can be up to six (6) characters in length and any combination of numbers and letters. The *Voucher_Number* is usually assigned by the herbarium that verifies the identification.

Collection Number	Description
FS19663783	The collection number
1267902G	The collection number

Remarks [Varchar 2(240)] ***Optional***
This is a comment field. Enter any relevant information up to 240 characters in length.

APPENDIX A

COLLECTION, PREPARATION, AND PRESERVATION OF HERBARIUM SPECIMENS

Introduction: Herbarium specimens are permanent records of plant species or populations. Such specimens are becoming increasingly valuable documentation of native flora, rare plants (TES), rare populations, exotic and invasive species. Herbarium specimens document the existence of species and also provide valuable information on geographic distribution of species across the landscape, region and continent. Computers allow the graphic display of a species occurrence, allowing predictive modeling on likely habitat for other populations and expansion of existing populations. For invasive species predicting and racking expansion into new states and new areas is vitally important. This information is now being housed in such databases as the PLANTS, National Heritage Rare Plant program, Invaders plus state and national floras. For plant data to be included in these large data sets or published floras the existence of the plant must be substantiated. The traditional and current avenue is through peer reviewed publication and herbarium specimens. A herbarium specimen verifies the sighting of new species at a county, state, district, forest, or region. Specimens are also important in documenting ecological and inventory studies for scientific research, publication and environmental impact statements.

The value of a specimen depends upon the care taken by the collector in selecting and preparing the specimen, and providing data to accompany it. Following are directions for collecting, mounting and submitting herbarium specimens with appropriate label data.

1. Specimens should be representative of the plant population, not simply that that fit nicely in the plant press. Plants should be collected in flower and/or fruit stage. Plants that are smaller than a herbarium page (11” x 16”) should be collected in their entirety. For very large plants, such as shrubs and trees, branches with leaves, stems, flowers, fruits should be collected. Underground parts of herbaceous plants are often diagnostic and should be collected where feasible (using a strong trowel, brick hammer, screwdriver, etc.).

2. Avoid collecting specimens from very small populations, less than twenty or so individuals. Collection from small isolated populations may not be represent the species adequately and/or may damage these populations. Documentation of small populations of rare plants may have to rely on photographs or non-vouchered report. In contrast, small populations of invasive or undesirable plants, control of the population is desirable.

3. Site records should be made in the field at the time of collection. Describe the site in sufficient detail to gain an understanding of the plant setting. When multiple specimens are collected at a given site, link the appropriate site information to each specimen.
    a. Use a bound, waterproof notebook or prepared field sheets for records.
    b. Notes should be taken in pencil or indelible ink; ballpoint and fiber pens will run with rain or even moisture from the specimen.
    c. Record the collection number and date.
    d. Some form of location information is essential; country, state, county, legal description or longitude/latitude, GPS.

e. Recording direction from a locatable landmark may provide useful information.
f. Record information on the ecological setting of the plant. Include such information as: habitat type, associated species, elevation, aspect, soils and any other relevant information.
g. Record plant features that may be lost or reduced during the drying and collection process such as: petal color, glaucescence, height and dbh. Some flowers may turn from blue to brown when dried; if no record of flower color has been made, identification may be hampered.

4. Plants should be pressed as soon as possible. If a field press is not available, the material can be placed in a tagged plastic bag. Pressing can be delayed if bagged samples are not exposed to heat or sunlight by keeping bags cold, but not allowing them to freeze (ice chest with ice; refrigerator).

5. Old newspapers are commonly used for pressing plants, but plain newsprint or other porous paper can also be used. Specimens should be prepared for pressing by removing all soil from roots and judicious pruning of superfluous leaves. Care should be taken not to destroy plant parts necessary for identification. Plants that are longer than a folded half sheet of newspaper should be bent accordion-style (V-, N-, or W-shaped, etc.). Arrange the material as naturally as possible and avoid excessive overlapping of parts. Leaves should be arranged to expose both sides in for a dried, mounted specimen. Spread out inflorescences and flowers to show as many details as possible. Extra flowers and/or fruits should be included where possible, so they can be dissected for verification of the specimen. Parts too bulky for pressing, (e.g. cones or large dried fruits) should be labeled and kept in paper bags. Number the newspaper prominently with the collection number, corresponding to the number in the collection notebook.

6. After the plant is positioned on the folded newspaper, place the newspaper between two felt blotters or driers and then between corrugated cardboard. The blotters should be exchanged every day until the specimen is dry. If an artificial heat source is used for drying blotters are not necessary. A portable plant dryer frame can be constructed from an electrical cord with 4 or 5 sockets and 150 watt light bulbs, hot plate, or kerosene or gas lanterns). For instructions on building a press see Appendix A.

7. The dried specimens should be kept stored in the numbered newspapers until identified and mounted.

8. A label is prepared for each specimen, following identification. The label should be printed on high quality rag paper, 25-100% rag content, to assure labels will not deteriorate with age. The label should be 4 x 2.5 in. or larger. The label contains the following information: scientific name with authority, location, habitat, associated species, notes on plant features, date of collection, and the collector's name with collection number. A sample and blank herbarium labels are located on Appendix B. The sample is printer ready and can be reproduced on any printer.

9. If the specimen is to be mounted, it should be attached to a sheet of 100% rag herbarium paper (11.5 x 16.5 in.?). Mounting paper may be obtained from biological supply house

(as with the corrugates, blotters, and other supplies; see addresses below). The label is attached to the lower right-hand corner of the sheet. The specimen may be attached with linen straps, thread, or glue (such as Elmers or Nicobond B), or a combination of these methods. If glue is used, it is spread in a thin layer over a sheet of glass or Plexiglass (14 x 20 in. or larger) with a paintbrush. The specimen, face up, is placed firmly, but without smearing, on the glue, lifted with forceps, and carefully dropped in the desired position on the mounting paper. A piece of wax paper (12 x 18 in.) is then placed over it and moderately weighted until the glue is completely dry. Twigs and other heavy parts of the specimen should be taped or sewed to the sheet for added reinforcement or glued if feasible.

10. The mounted specimen should be stored in standard genus covers in insect- or dust-proof herbarium cabinets, which are housed in a dry place. The sheets should be protected from insect attack by including a small container of paradichlorobenzene (PDB) in the case or by occasional fumigation (with chemicals by specially trained individuals or by placing the plants in a deep-freezer for several days). The climate throughout much of the west may be sufficiently dry that fumigation is not necessary.

At least one specimen from a site should be sent to a recognized herbarium. It is from these herbaria that plant distribution records are compiled. Most State land grant universities maintain a herbarium or specimens can also be sent to the Rocky Mountain Herbarium, which houses the Forest Service plant collection, at the University of Wyoming in Laramie. The Forest Service contracts with the University of Wyoming for maintenance of the Forest Service collection and to provide assistance with plant identification. To send specimens to the herbarium or for assistance in identification contact:

Ronald L. Hartman, Curator
Or
B. Ernie Nelson, Herbarium Manager

Rocky Mountain Herbarium
P. O. Box 3165 University Station
University of Wyoming
Laramie, WY 82071-3165
(307-766-2236

Additional Sources on Field and Herbarium Techniques:

1. Benson, L, 1979. Plant Classification. Heath and Co., pp. 423-444.
2. Jones, S. B., Jr., and A. E. Luchsinger. 1979. Plant Systematics, McGraw-Hill Book Co., pp. 138-156.
3. Lawrence, G. 1951. Taxonomy of Vascular Plants. Macmillan Co., pp. 234-262.
4. Savile, D. B. O. 1962. Collection and Care of Botanical Specimens. Publ. 1113, Research Branch, Canada Department of Agriculture.
5. Smith, C. E., Jr. 1971. Preparing Herbarium Specimens of Vascular Plants. Agric. Information Bull. 348, USDA, Superintendent of Documents, U. S. Govt. Printing Office, Washington, D. C. 20402 (stock no. 001-000-01159-6).

Collection and Herbarium Supplies:

1. Herbarium Supply Company, 955 West Catching Inlet, Coos Bay, OR 97420; John and Sandy Ayers (503/269-2350)
2. St. Louis Paper and Box Company, P. O. Box 8260, St. Louis, MO 63156; 314/531-7900; 800/444-0891)
3. Carolina Biological Supply Company, Powell Laboratories Division, Gladstone, OR 97027 (503/656-1641; 800/547-1733)

APPENDIX B - PLANT PRESS

Constructing a Field Plant Press

1. A press typically consists of 2 hardwood frames
2. Cut 9 strips of wood as follows:
    a. 4 wood strips, 18" long, ¼" to ¾" wide
    b. 5 wood strips, 12" long, ¼" to ¾" wide
3. The 5 short strips are spaced equally at right angles to the 4 long strips. The strips are nailed, riveted or stapled together at the intersection of the strips. The completed frame should measure 12 x 18 inches.
4. A press can also be made from two (2) 12-x 18-inch pieces of 3/8" or 1/2" plywood. A plywood press is not as durable as one constructed from wood strips.

Plant presses can be purchased from herbarium supply houses or hobby stores. Presses are available in a variety of sizes. Make sure when ordering a press make sure the frame measures 12" x18", the required size for herbarium specimens.

Putting the Press Together

Cardboard Spacers – Corrugated cardboard sheets are used to space specimens, provide stability and aid in drying. Regular, used, cardboard boxes can be cut to the required 12 x 18 inches. Cardboard spacers should be place next to the press frame and scattered through the blotters and specimens. A good rule of thumb is cardboard spacer for every two to five specimens.

Blotters or Driers – Blotters are used to absorb or wick moisture from pressed, drying specimens. Blotters can be made from light weight builder's deadening felt, from heavy blotting paper or can be acquired from any herbarium supply store. The driers should measure 12 x 18 inches. When specimens are air dried, a blotter should be placed between each specimen. For very succulent plants or in wetter environments blotters may have to be changed daily until specimens are dry. For occasional pressing, one may substitute several thicknesses of newspaper for the driers, but care should be taken to change these frequently to avoid mildew and inadequate drying

Specimen sheets - The sheets are used to hold and dry the specimens. Newspaper is the most common material, but blank newsprint or other thin absorbent paper can also be used. Sheets should be 24" x 36" folded lengthwise in half or folded 1/3 from the right 1/3 from the left to join at the middle. The finished folded paper should measure 12 x 18.

The order of materials in a press:

Press
Cardboard
Blotter
Newsprint
Blotter
Cardboard
Press

APPENDIX C – LABELS

The following pages are blank printer ready labels. It is best to print label on a high quality rag paper and cut to 3 x 4 inches. The first set of lined labels is intended for field use or hand lettering. The second set of labels, without lines is intended for entering information on screen and then printing out a completed label.

U.S.D.A Forest Service
Collection Date: 06/23/1998 Number: 125
Collector: Harvey Crankshaw
Scientific Name: *Artemesia ludoviciana* Nuttall
Subsp. *mexicana* (Willdenow) Keck.
Family:
State: CO County: Elevation: 4,500’
Location:
Habitat: Grassland site,

Flower Color: Height:
Comments:

U.S.D.A Forest Service
Collection Date: _____ Number: _____
Collector: _____
Genus: _____ Species: _____
Subsp./Var.: _____ Authority: _____
Family: _____
State: ____ County: _____ Elevation: _____
Location: _____
Habitat: _____
_____
_____
Flower Color:_____ Height: _____
Comments: _____
_____
_____

U.S.D.A Forest Service
Collection Date: _____ Number: _____
Collector: _____
Genus: _____ Species: _____
Subsp./Var.: _____ Authority: _____
Family: _____
State: ____ County: _____ Elevation: _____
Location: _____
Habitat: _____
_____
_____
Flower Color:_____ Height: _____
Comments: _____
_____
_____

U.S.D.A Forest Service
Collection Date: Number:
Collector:
Scientific Name:

Family:
State: County: Elevation:
Location:
Habitat:

Flower Color: Height:
Comments:

U.S.D.A Forest Service
Collection Date: Number:
Collector:
Scientific Name:

Family:
State: County: Elevation:
Location:
Habitat:

Flower Color: Height:
Comments:

NOXIOUS WEED PLANT OCCURRENCE RECORD
WALLOWA-WHITMAN NATIONAL FOREST

Noxious Weed:
Listed:
Category:

SCIENTIFIC NAME: _____ COMMON NAME: _____

PROJECT: _____ DISCOVERY DATE: _____

LOCATION
RANGER DISTRICT: _____ COUNTY: _____

QUAD(S):

LEGAL SUBDIVISION:

GPS-datum/lat&long (decimal,degree)

LOCATION (directions, landmarks, etc): Land

Owner:

DATES OF FIELDWORK: BY:

INFESTATION

SIZE OF SITE: _____ NUMBER OF PLANTS: _____

DESCRIPTION (phenology, age class, density, etc.):

VOUCHER (collector and number, where stored):

SUITABILITY FOR MONITORING:

HABITAT

ELEVATION:_____ ASPECT:_____ SLOPE:_____

Riparian:_____ Upland:_____ Site Composition:_____

DESCRIPTION (microhabitat, timber type, plant associates, soil type, etc.):

NATURE OF DISTURBANCE (if any):

MONITORING STATUS:

ERADICATION

METHODS USED (if any):

RECOMMENDATIONS (for further control efforts):

REPORTER:_____ JOB TITLE:_____ DATE:_____

Photos: _____

Attachment C

Record of Decision Wallowa Whitman National Forest Invasive Plants Treatment Project Appendix 1 Common Control Methods, Project Design Features, Herbicide Use Buffers, Early Detection, Rapid Response Herbicide Use Decision Process and the Annual Implementation Planning and Monitoring Step.

Appendix 1. Record of Decision Wallowa-Whitman National Forest Invasive Plants Treatment Project

The information for this appendix has been taken from the FEIS for this project and repeated here for emphasis. Table numbers, figure numbers and other indication to areas of information have been retained for ease of cross referencing.

Common Control Measures

Table 5, Common Control Measures Summary, shows species-specific integrated control measures that will be applied to known invasive species on the Wallowa-Whitman National Forest. The table shows known acreages infested with each species, the range of effective treatment options, and site-specific considerations important to the final prescription. The priority and intensity of treatment needed varies widely based on site conditions, values at risk from invasion, and the range and aggressiveness of individual target species.

The Common Control Measures summary table is a distillation of detailed work shown in Appendix B prepared by Linda Mazzu (R6 2005 FEIS), and updated by Vicky Erickson (Invasive Weed Specialist), Julie Laufmann (TEAMS Botanist), Gene Yates (Forest Botanist), with incorporated comments from Mark Porter (Wallowa Resources, Enterprise, OR) Dan Sharratt (Oregon Department of Agriculture), *Pacific Northwest's Least Wanted List: Invasive Weed Identification and Management*, Oregon State University Extension Service, EC1563, 2003), and Nature Serve (www.natureserve.org).

Table 5. Common Control Measures Summary - Range of Effective Treatment Options and Site-Specific Considerations by Target Species

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Bugloss (ANOF) *Anchusa officinalis*) *Perennial*	5813 ac 1 site	Herbicide in combination with manual and mechanical. Manual/mechanical alone will not eradicate. Use surfactants for herbicide use to penetrate the hairy leaves on the plant 1.Metsulfuron methyl 2. Picloram 3.Clopyralid 4.Chlorsulfuron + Metsulfuron	Cannot aerially spray sulfonylurea herbicides(as per Standard 16), picloram and clopyralid have mobility and soils restrictions Large site that will not be treated aerially due to lack of acceptable, effective herbicide
Canada Thistle (CIAR) *Cirsium arvense*	3395 ac 154 sites	Herbicide treatment is most effective. The only manual technique would be hand cutting of flower heads, which only suppresses seed production. Manual Disposal: bag and remove flower heads form site. Mowing may be effective in rare cases if done monthly (this intensity would damage native species). Covering with a plastic tarp may also work for small infestations, but smothers all plants covered. Yearly revisits would be necessary; the number of which is dependent on the chemical used and the seedbank. Revegetate with desirable species in accordance with the Restoration Plan.	Cannot aerially spray sulfonylurea herbicides (as per Standard 16). Picloram and clopyralid have mobility and soils restrictions. Many sites have well drained or shallow soils where alternative herbicides or methods may be necessary (see Appendix D).

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
		1. Clopyralid 2. Picloram 3. Chlorsulfuron 4. Aquatic labeled Glyphosate (best in fall) Biocontrols proposed for some sites.	
Clary Sage (SASC2) **and Mediterranean sage** (SAAE) *Salvia aethiopis* *Biennial*	22 acres 1 site	Manual or mechanical removal of individual plants can be effective. Mowing several times during the growing season will prevent seed production, but the rosettes are low enough to the ground to escape most damage. Biocontrol available and somewhat effective. 1 Metsulfuron methyl 2. Chlorsulfuron 3. Picloram 4. Glyphosate	Cannot aerially spray sulfonylureas, (as per Standard 16). No known shallow or well drained soil sites.
Common Crupina	284 ac 1 site	Manual/Mechanical - handpulling is effective on small infestations prior to seed set (WA DNR) 1.Clopyralid (0.13 lb ae/A) Sequential fall and spring applications provide >95 % control1 2.Triclopyr (.25 lb ae/A) Sequential fall and spring applications provide >95 % control[1] 3. Spring application of picloram	Biological – none[1]
Dalmatian Toadflax (LIDA) *Linaria dalmatica* **And other Linaria sp.**	783 ac 141 sites	Hand-pull or dig if populations are small Manual Disposal: Plants can be left on site, but may reduce germination of desirable species due to mulching effect. If plants have flower heads with seeds (immature as well), bag and remove them from site. -Cutting stems in spring or early summer would eliminate plant reproduction, but not the infestation. - These treatments may take up to ten years due to long term seed viability. - Revegetate with desirable species in accordance with the Restoration Plan. Plant communities in good condition may recover without replanting. Biocontrols available. 1. Metsulfuron methyl (forested sites) 2. Imazapic (in native grasses) 3. Aquatic labeled Glyphosate 4. Picloram	Biocontrols proposed for some sites. Aquatic Glyphosate may be only option for sites near streams (some riparian sites exist). Picloram may be restricted in well drained, clayey and/or shallow soils at some sites.
Dodder *Cuscuta sp.*	10 acres 2 sites	Mechanical control by roughing out host sagebrush	
Field bindweed (COAR) *Convolvulus arvensis*	3 acres 1 sites	Manual/mechanical –is not effective 1. Picloram apply early bud to full bloom for best control[2] 2. Glyphosate,full bloom – early seed[2] 3. Metsulfuron actively growing plants in bloom stage [2]	**B**iocontrol available[1]
Himalayan blackberry (RUDI) *Rubus discolor*	15 acres 3 sites	Manual or mechanical removal is effective only in combination with herbicides and is best used as a first step to reduce above ground biomass before root crown removal. Fall herbicide treatments alone or on regrowth follwing cane removal is effective. Glyphosate, Picloram, Imazapyr or Triclopyr	

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Hounds tongue (CYOF) (*Cynoglossum officinale*) *Biennial*	980 ac 64 sites	Herbicide in combination with manual treatments. Re-vegetate with desirable species. 1. Metsulfuron methyl 2. Chlorsulfuron 3. Picloram 4. Imazapic or Glyphosate	Some known sites are in riparian areas. Several areas of well drained soils where herbicide selection may be restricted (see Appendix D). Six known sites are proposed for manual only.
Japanese knotweed (POCU6) *Polygonum cuspidatum* *Perennial*	78 acres 2 sites	Mechanical treatment is ineffective alone. Cutting in combination with herbicide is most effective since the manual/mechanical treatments will encourage the plant to send up new shoots. The more shoots per linear foot of root, the more likely you will be able to physically pull them out, exhaust their reserves or kill them with herbicide. Manual treatments alone are not effective. Stem injection is labor intensive and less effective than a canopy foliar spray Glyphosate, Triclopyr, or Imazapyr	Not in treatment database.
Leafy Spurge (EUES) *Euphorbia esula* *Rhizomatous perennial*	102 ac 12 sites	Herbicide treatments are most effective. Manual and mechanical methods must be used in combination with herbicides for successful control. Repeat treatments are usually required. 1. Picloram 2. Glyphosate or Imazapic Biocontrols available	All but one known site is riparian. Several well drained, excessively well drained, and shallow water table sites. Use of picloram may be limited in some areas.
Medusahead (TACA8) (*Taeniatherum caputmedusae*) *Annual grass*	921 ac 22 sites	Repeated cutting/mowing with herbicide treatment is effective. Manual removal can be effective with small populations. A combination of herbicide application and reseeding with native or desirable non-native grasses is considered highly effective. Follow-up seeding of a competitive desirable non-native perennial grass may be necessary prior to returning the site to native perennial grasses Herbicide treatment should be done before seed formation or during the fall through early winter. Repeated treatments may be needed. 1. Imazapic 2. Sulfometuron methyl +Chlorsulfuron 3. Sulfometuron methyl 4. Sethoxydim 5. Glyphosate	No known riparian sites. Several sites are well drained.
Musk thistle (CANU4) (*Carduus nutans*) Biennial **Bull Thistle (**CIVU) *Cirsium vulgare*	27 acres 6 sites	Use manual, mechanical or herbicide control or a combination. Biological controls may be helpful to suppress populations in combination with other methods (see Appendix E). 1. Picloram or Clopyralid 2. Metsulfuron methyl 3. Glyphosate 4. Chlorsulfuron	Biocontrols proposed for some sites. No known riparian sites proposed for herbicide use. No sites are known to be well drained or shallow to ground water.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Pepper weed (LELA2) *(Lepedium latifolium)* Perennial	1 acre 1 site	1. Chlorsulfuron, 2. Metsulfuron, 3. Glyphosate 4. Imazapic 5. Triclopyr may only kill top plant and capable of resprouting use after mowing to increase efficacy	Not a riparian site or known to be well drained or shallow to ground water.
Poison Hemlock	7 acres 3 sites	Manual/Mechanical: Handpulling when soils are wet can be effective on small infestations. Mowing at flowering stage can provide some control.[3] Biocontrol available. 1.Glyphosate 0.75 ae/acre at pre-bolt stage2; 2.Metsulfuron 0.6 oz ai/acre to actively growing plants2;;	Biological: None[3]
Puncture vine (TRTE) (*Tribulus terrestris*) *Annual*	12 acres 1 site	Manual and Mechanical control effective if collected prior to seed set. Biocontrol available 1. Chlorsulfuron 2. Sulfometuron methyl 3. Metsulfuron methyl 4. Glyphosate or Picloram	Not on known shallow or well drained soils.
Purple loosestrife (LYSA2) (*Lythrum salicaria*) *Perennial*	3 acres 3 sites	Biocontrols available. Otherwise, combination of herbicide and manual/mechanical treatments. Glyphosate	
Rush Skeletonweed (CHJU) (*Chondrilla juncea*) *Perennial*	390 ac 36 sites	Since any mechanical damage to plants stimulates new growth resulting in satellite plants, such methods are not recommended. Rush skeletonweed is a deep rooted, rhizomatous perennial considered tolerant to herbicides. Therefore, an aggressive follow up program with repeated applications will be necessary. Difficult to apply because of small leaves. Biocontrols proposed for two sites. 1. Clopyralid 2. Picloram	No known riparian sites. No known shallow or well drained soil sites
Russian Knapweed (ACRE3) (*Acroptilon repens*) *Perennial with adventitious shoots*	26 acres 4 sites	Lasting control requires an integration of techniques: mechanical, manual, herbicide and competitive plantings. 1. Chlorsulfuron 2. Clopyralid 3. Clopyralid + Triclopyr (Redeem) 4. Glyphosate, Imazapic, or Metsulfuron Methyl	No known riparian sites.
Russian thistle (SATR12 or SAIB) (*Salsola tragus*) *Annual*	10 acres 1 site	Manual or mechanical removal of plant prior to seed set can be effective in small populations. Repeat visits to areas previously infested likely required. Spot or hand broadcast with backpack sprayer whenever possible. Boom spray larger areas of	No known riparian sites. No known shallow or well drained soil sites.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
		dense cover, where dominant plant community is non-native invasives 1. Chlorsulfuron 2. Metsulfuron methyl 3. Glyphosate	
Scotch Broom (CYSC4) (*Cytisus scoparius*) *Perennial woody shrub*	115 ac 4 sites	Manual treatments can be effective but are labor intensive. -If herbicides are used, manual treatments could be used for follow-up. -Re-vegetate with desirable species. 1. Hand application of Triclopyr 2. Picloram 3. Glyphosate	No known riparian sites. No known shallow or well drained soil sites Biocontrols are untested in eastern Oregon.
Scotch Thistle (ONAC) *Onopordum acanthium* *Biennial*	1844 ac 157 sites	Cutting and mowing can be effective when combined with revegetation of native species. Repeated mowing, in combination with other management methods, often is necessary for long-term control. Manual removal is effective when entire aboveground plant growth is removed. Herbicide treatment is the most effective control. 1. Picloram or Clopyralid 2. Chlorsulfuron 3. Metsulfuron	Some riparian sites and sites with shallow water table or well drained soils. Buffers and PDFs may reduce the herbicides and/or methods available. Manual treatment proposed for some sites
Slender meadow foxtail (ALMY) (*Alopercurus myosuroides*) *Annual*	.3 acres 1 site	Combination of manual, mechanical and herbicide. Glyphosate or Sethoxydim	
Silverleaf nightshade (SOEL) (*Solanum elaeagnifolium*) *Perennial*	11 acres 2 sites	Manual control can be effective in small areas. Shade from crop canopies (60-90% cover) or mulching may also be an effective control tool. Revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. Usually required multiple applications. 1. Picloram 2. Triclopyr or Glyphosate	
Spotted knapweed (CEBI2, CEMA4) (*Centaurea biebersteinii*) **Diffuse knapweed** (CEDI) (*Centaurea diffusa*) **Meadow knapweed** (CEPR2, CEDE5, CENI3) (*Centaurea debeauxii)*	907 qc 169 sites 4150 ac 384 sites 0 acres 1 site	Biocontrols available for some knapweed species (see Appendix H R6 2005 FEIS Appendix H and White Paper-Spiegel, 2006) Herbicide with manual and mechanical treatment. Revegetate with desirable species, at high priority sites when possible. 1. Clopyralid, or Picloram 2. Glyphosate	Several sites are within riparian areas or areas that have shallow or well drained soils. This influences the herbicide and method available. Biocontrols proposed for several sites.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Squarrose knapweed (CEVIS2) (*Centaurea virgata*) **Knapweed species** (CENTA) *Tap rooted Biennials, or Perennials*	7 acres 2 sites 119 ac 25 sites		
St John's Wort (HYPE) *Hypericum perforatum*	603 ac 56 sites	Hand pulling or digging of young plants in small, isolated infestations may be effective. Repeated treatments will be necessary because lateral roots can give rise to new plants. Pulled or dug plants must be removed from the area and burned to prevent vegetative regrowth. Mowing is ineffective, but may discourage the spread of the plant if done before seeds form. Burning may increase the density and vigor of this species. Biocontrols available. 1. Metsulfuron methyl 2. Picloram 3. Glyphosate	Biocontrols proposed for some sites. Some sites are within riparian areas or areas that have shallow or well drained soils. This influences the herbicide and method available.
Sulphur cinquefoil (PORE5) (*Potentilla recta*) *Perennial*	187 ac 34 sites	Hand-pulling is effective on small infested provided the entire root is removed. Repeated applications are needed for the first couple of years to ensure re-establishment does not occur. 1. Picloram 2. Metsulfuron methyl (by itself not a particularly effective treatment)	Several sites are within riparian areas or areas that have well drained soils. This influences the herbicide and method available. Manual treatment proposed for some sites.
Tansy ragwort (SEJA) (*Senecio jacobaea*) And other *Senecio* spp. *Biennial or short-lived perennial*	78 acres 49 sites	Hand pulling usually results in numerous new rosettes forming from the root fragments. Hand pulling is most effective after the population has been brought under control. Mowing is the most common technique and is effective if done prior to flowering. These treatments may take up to ten years due to long term seed viability. Biocontrols available (Appendix E). Ensure biological controls are present nearby or request their introduction. Revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. 1. Clopyralid 2. Chlorsulfuron 3. Picloram 4. Glyphosate	Biocontrols are available in Western Oregon. ODA has made releases of a Swiss strain of the ragwort flea beetle on private land infestations in Umatilla and Union County in the last two years. Results of those releases are not yet known. Some riparian sites. No sites are known to be in sensitive soil areas.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Teasel (DIFU2 or DISY) (Dipsascus fullonum) *Biennial*	30 acres 2 sites	Manual and Mechanical can be effective alone and in combination with herbicides. 1. Metsulfuron methyl 2. Chlorsulfuron 3. Clopyralid or Triclopyr	All sites are riparian, No known sites in areas with sensitive soils.
Whitetop (CADR) (*Cardaria draba)* *Perennia*l	1489 ac 179 sites	Herbicide with manual treatment as a follow up. Revegetate with desirable species. 1. Chlorsulfuron 2. Imazapic or Metsulfuron methyl Also: Sulfometuron methyl (not ranked)	Several sites are within riparian areas or areas that have well drained soils. This influences the herbicide and method available.
Meadow Hawkweed (HIPR) *(Hieracium caespitosum)*	16 acres 29 sites	Herbicide treatment is most effective. - Some manual removal possible for small infestations. - Manual Disposal: All plant parts should be removed, as new plants can bud from root, stolon, and rhizome fragments. -Covering with a plastic tarp may also work for small infestations but smothers all plants covered. - Nitrogen fertilization after treatment would encourage native plant growth if done in the spring. - Revegetate with desirable species in accordance with the Restoration Plan 1. Clopyralid 2. Picloram 3. Aquatic labeled Glyphosate	All sites are riparian, Aquatic. No known sites in areas with sensitive soils.
Yellow starthistle (CESO3) *(Centaurea solstitialis)* *Annual*	1966 ac 181 sites	Hand-pull small patches or maintenance programs where plants are sporadically located. Otherwise, mechanical treatment to contain and herbicides in combination with other methods to control or eradicate. -Biocontrol available (see Appendix E). - Revegetate high priority sites if needed with desirable species. Aerial proposed for large, remote sites. 1. Clopyralid or Picloram 2. Glyphosate	Some riparian sites. , No known sites in areas with sensitive soils. Biocontrols prescribed for many sites.

Chemical Methods

Chemical methods are the use of herbicide formulations approved under the R-6 2005 ROD with the following active ingredients: chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr.

Ground-based or aerial application of herbicides will be used based on accessibility, topography, size of the treatment area, and the expected efficiency and effectiveness of the method selected. The following methods of application may be used depending on the site, applicable PDFs and buffers:

Spot spraying – This method targets individual plants and is usually applied with a backpack sprayer. Spot Spraying can also be applied using a hose off a truck-mounted or ATV-mounted tank, or tanks mounted on pack animals.

Wicking – This hand method involves wiping a sponge or cloth that is saturated with chemical over the plant. This is used in sensitive areas, such as near water, to avoid getting any chemical on the soil or in contact with non-target vegetation.

Stem injection – A hand application technique currently is being used on Japanese knotweed in western OR & WA.

Approximately 9,000 inventoried acres are subject to be treated with spot or selective methods.

Hand broadcast – Herbicide applied by hand using a backpack or hand spreader to cover an area of ground rather than individual plants.

Boom broadcast – Application of herbicide using a hose and nozzle from a tank mounted on a truck, or ATV. Herbicide is applied to cover an area of ground rather than individual plants. This method is used in areas where invasive plants occupy a large percentage of cover on the site and the area to be treated makes spot spraying impractical.

Approximately 16,600 inventoried acres are subject to be treated by ground-based broadcast applications. Most of this acreage is expected to be treated using hand broadcast application.

Aerial applications – Broadcast application of herbicide using aircraft, such as a helicopter. Aerial application of the herbicides would occur in the HCNRA and La Grande District covering 875 acres (see Figure 9). Appendix B includes maps detailing aerial application sites.

Herbicide application will be done in accordance with USDA Forest Service policies, regulations, Forest Plan Standards, product label requirements, PDFs, and Herbicide Use Buffers. Project Design Features are listed in the following section of this appendix.

The application rates and method depend on the presence of the target species, condition of non-target vegetation, soil type, depth to the water table, the distance to open water sources, riparian areas, special status plants, and requirements of the herbicide label. Applications will be scheduled and designed to minimize the potential impacts to non-target plants and animals (R6 2005 FEIS, Appendix 1-5, 1-6) by applying Project Design Features. Monitoring of treated sites will determine if follow-up treatments will be needed and whether treatment methods should be changed.

Table 4 displays 10 herbicides approved for use. The range of application rates for each chemical was derived from the SERA Risk Assessments, which are the basis for the herbicides analyzed in the R6 2005 FEIS. Most of the time application rates will not exceed the typical rate; however, the actual effective rate may vary depending on application method, target species, and PDFs (site-specific measures of protection). Broadcast applications will not exceed typical label rates shown in Table 4. Non-broadcast methods such as spot spraying, wicking, wiping or stem injection may be applied at rates greater than typical, but that is expected to happen infrequently and only where necessary to be effective.

Table 4. High, Typical, and Low Application Rates for Herbicides

Herbicide	Highest Application Rate Lbs. a.i./acre	Typical Application Rate Lbs. a.i./acre	Lowest Application Rate Lbs. a.i./acre
Chlorsulfuron	0.25	0.056	0.0059
Clopyralid	0.50	0.35	0.10
Glyphosate	7.00	2.00	0.50
Imazapic	0.19	0.130	0.031
Imazapyr	1.25	0.45	0.03
Metsulfuron Methyl	0.15	0.03	0.013
Picloram	1.00	0.35	0.10
Sethoxydim	0.38	0.30	0.094
Sulfometuron Methyl	0.38	0.045	0.03
Triclopyr	6.00	1.00	0.10

Maximum rates reflect the annual cumulative maximum application rate per acre. Some formulations have one-time maximum application rates which can be substantially lower than the annual maximum rate.

Manual Control Methods

These include non-mechanized approaches, such as hand pulling or using hand tools (e.g., grubbing), to remove plants or cut off seed heads. Manual treatments are effective for only relatively small, accessible sites, and often need to be repeated several times, depending on the species, throughout the growing season. Manual treatments can be effective for annual and tap-rooted weeds, but are not effective against perennial weeds with deep underground stems, roots or rhizomes that cannot be entirely removed.

Manual treatments are typically used to treat selected plants, small infestations, and sensitive areas to avoid potential toxic impacts to non-target species or water quality. Where sites are small or there are few individual target species, handsaws, axes, shovel, rakes, machetes, grubbing hoes, mattocks, brush hooks, and hand clippers may all be used to remove invasive plant species. Axes, shovels, grubbing hoes, and mattocks are also used to dig up and cut below the surface to remove the main root of plants. To meet control objectives or reduce the risk of activities spreading invasive plants, seed heads and flowers are removed and disposed of properly. Other manual methods could include solarization techniques such as using black plastic to cover invasive plants to shade out and kill pieces of roots (i.e. rhizomes). These techniques may be used where minimizing herbicide use is desirable such as areas with an abundance of sensitive wildlife or plant species.

Mechanical Control Methods

This method uses power tools and includes such actions as mowing, weed whipping, road brushing, root tilling methods, or foaming, steaming, infrared and other techniques using heat to reduce plant cover and root vigor. Choosing the appropriate treatment depends on the characteristics of undesired species present (for example, density, stem size, brittleness, and sprouting ability); the size of the treatment area, seedbed preparation and revegetation; the site location (inside or outside a riparian area); and soil or topographic considerations. These activities would typically occur along roadsides, rock sources, or other confined disturbed areas and dispersed use areas.

Mowing and cutting would be used to reduce or remove above ground biomass. Seed heads and cut fragments of species capable of re-sprouting from stem or root segments would be collected and properly disposed of to prevent them from spreading into non-infested areas.

Biological Methods

Animal and Plant Health Inspection Service (APHIS) and State approved insects or plant pathogens that are proven natural control agents of specific weed species will be released to selectively suppress, inhibit, or control herbaceous and woody target species. Biological controls will be used on remote sites where the target species occupies extensive portions of the landscape, and other methods of control are

prohibitive based on cost and location. In some situations, a suite of biological control agents may be needed to reduce weed density to a desirable level. As an example, a mixture of five or more biological control agents may be needed to attack flower or seed heads, foliage, stems, crowns and roots all at the same time or during the plant's life cycle. Typically 5 to 20 years are needed to bring about an economic control level.

Biological control activities include collection of beetles/insects, development of colonies for collection, transporting, and transplanting parasitic beetles/insects, and supplemental stocking of populations.

The treated areas will continue to be inventoried and monitored to determine the success of the treatments and when the released bio-control agents have reached equilibrium with the target species. Repeat visits may need to be made several times a season, and over a series of years to determine if additional releases are needed or if a different agent needs to be released.

Cultural Treatment Methods/Restoration

Cultural controls are defined in the R6 2005 FEIS as: "The establishment or maintenance of competitive vegetation, use of fertilizing, mulching, prescribed burning, or grazing animals to control or eliminate invasive plants" (page 10). Any of these methods except prescribed burning and grazing animals may be used under this project.

Cultural treatment methods would be used in the context of encouraging native vegetation to out-compete invasive plants. Some infestations can be treated once and some require multiple treatments to be effective. Mulching, seeding, planting and fertilizing the cultural treatments may be integrated with chemical, physical or biological methods to encourage native plant growth and spread. Native seed would be used to help native species re-establish, enhance competition over invasive plants, and provide erosion protection. In other areas, where 30 percent or more of the desirable vegetation exists, it may naturally replace target invasive plant species that have been removed.

Typical circumstances for applying cultural/restoration treatments include:

- Seeding will likely apply where herbicide treatments cause openings in native vegetation greater than:
    - 0.1 acres in uplands
    - 0.01 acres in riparian areas
- Approved mulch may be applied where concerns exist over seed predation or soil moisture retention.
- Fertilization would typically accompany seeding unless a concern exists that fertilization will stimulate invasive plants growth and dominance of a site.

Project Design Features (Group P) address restoration for areas that are highly disturbed within the dry grassland habitat in Hells Canyon National Recreation Area, and for areas where potential re-infestation by new or nearby invasive plants threatens the introduction of, or existing, native vegetation as well as soils. Treatment Restoration Standards from the R6 2005 FEIS and guidelines and techniques outlined in *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003) are addressed.

Project Design Features

The following Project Design Features (PDFs) reduce the potential adverse impacts of invasive plants treatment and provide sideboards for EDRR. The PDFs have been developed to respond to the site-specific resource conditions within the treatment areas, including (but not limited to) the current invasive plant inventory, the presence of special interest species and their habitats, potential for herbicide delivery

to water, and the social environment. Implementation of the PDFs is mandatory. The purpose and source of each PDF is provided in the list below.

These PDFs were developed for application to new detections, as well as known sites, to ensure that the effects of treating new sites are similar to the effects of treating existing sites.

A-Pre-Project Planning

A-1: Prior to treatment, confirm species/habitats of local interest, sensitive areas (e.g. streams, lakes, roadside treatment areas with higher potential to deliver herbicide to water, municipal watersheds, domestic water sources, shallow water table), recreation and administrative sites, and range allotments. Apply appropriate PDFs described in the following text and all that apply from the Regional EIS/Forest Plan.

For EDRR sites follow the decision process (see figure 12) to determine the type and method of treatment and apply applicable PDFs.

- Purpose: Ensure project is implemented appropriately.
- Source: This approach follows several previous NEPA documents. Pre-project planning also discussed in the previous section.

B-Coordination with Other Landowners and Agencies

B-1: Work with owners and managers of neighboring lands to respond to invasive plants that straddle multiple ownerships. Coordinate treatments within appropriate distances based on invasive plant species reproductive characteristics, and current use of area.

- Purpose: To ensure that neighbors are fully informed about nearby herbicide use and to increase the effectiveness of treatments on multiple ownerships
- Source: A variable distance based on site and species specific characteristics was chosen because it adjusts for various conditions that exist in these areas. All PDFs related to riparian areas and buffer distances will be followed.

C-To Prevent the Spread of Invasive Plants during Treatment Activities

C-1: Ensure vehicles and equipment (including personal protective clothing) do not transport invasive plant materials.

- Purpose: To meet Standards
- Source: Wallowa-Whitman LRMP as amended by the R6 2005 ROD Standard #1

D-Wilderness Areas[2]

D-1: For EDRR in wilderness and Research Natural Areas (RNAs), invasive plants could be treated using non-mechanical hand methods or herbicides. Herbicide treatments may use application methods such as wicking, stem injection, spray bottle, hand pressurized pumps, battery or solar powered pumps and propellant based systems such as those that use pressurized carbon dioxide.

- Purpose: To reduce the effects of invasive plant treatments on the untrammeled quality of wilderness character

[2] Invasive plant eradication within Wilderness meets the “no impact” intent of the Wilderness Act and associated land use policies

E-Non-herbicide Treatment Methods

E-1: Limit the numbers of workers on any one site at any one time while treating areas within 150 feet of creeks.

- Purpose: To minimize trampling, protect riparian and aquatic habitats, and prevent potential invasive plant spread via waterway dispersal
- Source: The distance of 150 feet was selected because it incorporates the Aquatic Influence Zone for fish bearing streams

E-2: Fueling of gas-powered equipment with tanks larger than 5 gallons will not occur inside the RHCA unless there is no other alternative.

- Purpose: To protect riparian and aquatic habitats
- Source: The distance of 150 feet was selected because it incorporates the Aquatic Influence Zone for fish bearing streams

F-Herbicide Application

F-1: Herbicides will be used in accordance with label instructions, except where more restrictive measures are required as described below. Herbicide applications will treat only the minimum area necessary to meet site objectives. Herbicide formulations will be limited to those containing one or more of the following 10 active ingredients: chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr. Additional chemical formulations may be added only when a formal risk assessment shows them to be less hazardous than existing chemicals that would otherwise be used on the same site. Furthermore, an analysis supplemental to this EIS will be completed to show predicted effects of adding the formulation considered. Herbicide application methods include wicking, wiping, injection, spot, and broadcast, as permitted by the product label and these Project Design Features. The use of triclopyr is limited to spot and hand/selective methods. R-6 2005 ROD Standard 18 permits only the use of adjuvants reviewed in Forest Service risk assessment documents.

- Purpose: To limit potential adverse effects on people and the environment
- Source: W-W LRMP as amended by the R6 2005 ROD Standard 16, Pesticide Use Handbook 2109.14

F-2: Herbicide use will comply with standards in the Forest Plan as amended by the R6 2005 ROD, including standards on herbicide selection, restrictions on broadcast use, tank mixing, licensed applicators, and use of adjuvants, surfactants and other additives.

- Purpose: To limit potential adverse effects on people and the environment
- Source: W-W LRMP as amended by the R6 2005 ROD Treatment Standards (see Chapter 1)

F-3: POEA surfactants, urea ammonium nitrate or ammonium sulfate will not be used in applications within 150 feet of surface water, wetlands or on roadside treatment areas having high potential to deliver herbicide.

- Purpose: To protect aquatic ecosystems
- Source: The distance of 150 feet was selected because it is wider than the largest buffer and incorporates the Aquatic Influence Zone for fish bearing streams. This distance is sufficient to avoid harm to the aquatic environment, based on risk assessments, previous monitoring, and studies related to chemical behavior in the environment (see Chapter 3).

F4: Lowest effective label rates will be used. No broadcast applications of herbicide or surfactant will exceed typical label rates. NPE surfactant will not be ground-based broadcast at a rate greater than 0.5 lbs. a.i./ac (pounds of active ingredient per acre). Favor other classes of surfactants wherever they are expected to be effective.

- Purpose: To eliminate possible herbicide or surfactant exposures of concern to human health, wildlife, and aquatic organisms
- Source: Based on SERA Risk Assessment for imazapyr there would be no exposure concerns

F-5: Herbicide applications will occur when wind velocity is between two and eight miles per hour to reduce the chance of drift. (Appendix F) During application, weather conditions will be monitored periodically by trained personnel.

- Purpose: To ensure proper application of herbicide and reduce drift
- Source: These restrictions are typical so that herbicide use is avoided during inversions or windy conditions

F-6: To minimize herbicide application drift during broadcast operations, use low nozzle pressure; apply as a coarse spray, and use nozzles designed for herbicide application that do not produce a fine droplet spray, e.g., nozzle diameter to produce a median droplet diameter of 500-800 microns.

- Purpose: To ensure proper application of herbicide and reduce drift
- Source: These are typical measures to reduce drift. The minimum droplet size of 500 microns was selected because this size is modeled to eliminate adverse effects to non-target vegetation 100 feet or further from broadcast sites (see Chapter 3 for details).

F-7: Use of sulfonylurea herbicides (Chlorsulfuron, Sulfometuron methyl and Metsulfuron methyl), will require soils on site to be evaluated prior to treatment. Treatment of powdery, ashy dry soil, or light sandy soil can be treated only if rainfall is expected within 24 hours of treatment.

- Purpose: To avoid herbicide drift caused by wind erosion of dry soils containing sulfonylurea chemical residue
- Source: Label advisory

F-8 - Additional design features specific to aerial application corresponding to Appendix F-Aerial Spray Guidelines:

F-8a: Aerial application of herbicide will not be used for treatment of EDRR sites.

- Purpose: To reduce potential adverse effects to non-target species

F-8b: Chlorsulfuron, metsulfuron methyl, sulfometuron methyl and triclopyr will not be applied aerially.

- Purpose: To reduce potential adverse effects to non-target species
- Source: W-W LRMP as amended by the R6 2005 ROD

F-8c: Provide a minimum buffer of 300 feet for aerial application of herbicides near developed campgrounds, recreation residences and private land (unless otherwise authorized by adjacent private landowners).

- Purpose: To minimize impacts to human health
- Source: W-W LRMP as amended by the R6 2005 ROD

F-8d: Prohibit aerial application of herbicides within congressionally designated municipal watersheds. See B2 for other developed water sources.

- Purpose: To protect water supplies
- Source: W-W LRMP as amended by the R6 2005 ROD

F-8e: Effectiveness monitoring is required for "a representative sample" of treatments involving aerial application of herbicide.

- Purpose: To insure impacts to non-target species are within tolerance
- Source: Appendix I, R6 2005 FEIS

F-8f: Herbicide buffers have been established for perennial and wet intermittent streams, dry streams and lakes and wetlands. These buffers are shown in the tables below.

- Purpose: To reduce the likelihood that herbicides could enter surface water in levels of concern
- Source: Buffers based on SERA risk assessments, label advice., and Berg's 2004 study of broadcast drift and run off to streams; monitoring data from other herbicide application project

F-8g: Buffer distances for federally listed SOLIs will follow Recovery Plan recommendations. No aerial application will occur within 300 feet of non-federally listed SOLIs. Spray cards to monitor drift can be used in conjunction with monitoring and adaptive management to adjust buffers if needed.

- Purpose: To protect SOLIs and reduce non-target effects. To comply with W-W LRMP as amended by the R6 2005 ROD Standards 19 & 20
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

F-8h: Aerial spraying of invasive species will not occur in areas with 30 percent or more live tree canopy cover. For live tree canopy cover between 10-29 percent an on-site decision whether or not to aerial spray will be based on factors such as target invasive species, herbicides (specificity) proposed for treatment, and potential impacts to non-target tree species.

- Purpose: To reduce potential adverse effects to non-target species
- Source: Common measure

F-8i: Aerial spray units (and perennial seeps, ponds, springs, and wetlands in proposed aerial units) will be ground-checked, flagged and marked using GPS prior to spraying to ensure only appropriate portions of the unit are aerially treated. A GPS system will be used in spray helicopters and each treatment unit mapped before the flight to ensure that only areas marked for treatment are treated. Plastic spray cards will be placed out to 350 feet from and perpendicular to perennial creeks to monitor herbicide presence.

- Purpose: To reduce potential adverse effects to non-target species
- Source: Common measure

F-8j: Press releases will be submitted to local newspapers indicating potential windows of treatment for specific areas. Signing and on-site layout will be performed one to two weeks prior to actual aerial treatment.

- Purpose: To meet Standard #23
- Source: W-W LRMP as amended by the R6 2005 ROD Standard #23

F-8k: Grazing permittees will be notified at annual permittee meeting that aerial application will be conducted. The permittee will also be notified of specific time frames in which treatment would occur to ensure grazing animals are removed from the area.

- Purpose: To ensure grazing animals are not exposed to aerial herbicide applications

F-8l: Enforceable temporary area, trail, and road closures will be used to ensure public safety during aerial spray operations.

- Purpose: To meet Standard #23
- Source: W-W LRMP as amended by the R6 2005 ROD Standard #23

F-8m: Constant communications will be maintained between the helicopter and the project leader during spraying operations. Ground observers will have communication with the project leader. Observers will be located at various locations adjacent to the treatment area to monitor wind direction and speed as well as to visually monitor drift and deposition of herbicide.

- Purpose: To prevent effects to non-target species

F-8n: Aerial swath displacement buffers will be applied as needed as described in Table 10 below

- Purpose: To protect resources in the worst case scenario

F-8o: Aerial application rates for picloram will not exceed (0.25lb/ai/acre), and for clopyralid will not exceed typical application rates (0.35lb ai/acre)

- Purpose: To prevent effects to non-target species
- Source: SERA Risk Assessments, aerial drift modeling (See Appendix B)

G-Herbicide Transportation and Handling Safety/Spill Prevention and Containment

Design Features for G: An Herbicide Transportation and Handling Safety/Spill Response Plan will be the responsibility of the herbicide applicator. At a minimum the plan will:

-Address spill prevention and containment.

-Estimate and limit the daily quantity of herbicides to be transported to treatment sites.

-Require that impervious material be placed beneath mixing areas in such a manner as to contain small spills associated with mixing/refilling.

-Require a spill cleanup kit be readily available for herbicide transportation, storage and application (minimum FOSS Spill Tote Universal or equivalent).

-Outline reporting procedures, including reporting spills to the appropriate regulatory agency.

-Ensure applicators are trained in safe handling and transportation procedures and spill cleanup.

-Require that equipment used in herbicide storage, transportation and handling are maintained in a leak proof condition.

-Select transportation routes to minimize exposure to traffic, domestic water sources, and adjacent water sources

-Specify conditions under which guide vehicles would be required.

-Specify mixing and loading locations away from water bodies so that accidental spills do not contaminate surface waters.

-Require that spray tanks be mixed or washed further than 150 feet of surface water.

-Ensure safe disposal of herbicide containers.

-Identify sites that may only be reached by water travel and limit the amount of herbicide that may be transported by watercraft (see H12).

- Purpose: To reduce likelihood of spills and contain any spills.
- Source: FSH 2109.14

H- Soils, Water and Aquatic Ecosystems

H-1: Herbicide use buffers have been established for perennial and wet intermittent steams; dry streams; and lakes and wetlands. These buffers are depicted in Table 7, Table 8, and Table 9 below. Buffers vary by herbicide ingredient and application method. Tank mixtures will apply the largest buffer as indicated for any of the herbicides in the mixture.

- Purpose: To reduce likelihood that herbicides could enter surface waters in concentrations of concern
- Source: Treatments within RHCAs are allowed if they meet Riparian Management Objectives (RMOs) including minimizing adverse effects to listed fish; therefore, buffers are based on label advisories, SERA risk assessments and Berg's 2004 study of broadcast drift and run off to streams. Buffers are intended to demonstrate compliance with WAW LRMP as amended by the R6 2005 ROD Standards 19 and 20.

H-2: No broadcast of high aquatic risk herbicides on roads that have a high risk of delivery to water (generally roads in RHCAs). These herbicides are picloram or non-aquatic triclopyr (Garlon 4), non-aquatic glyphosate, and sethoxidim.

- Purpose: To ensure high risk herbicides are not delivered to streams in concentrations that exceed levels of concern
- Source: SERA Risk Assessments, R6 2005 FEIS Fisheries Biological Assessment

H-3: In riparian and aquatic settings, vehicles (including all terrain vehicles) used to access invasive plant sites for invasive plants treatment, apply foam, or for broadcast spraying will remain on roadways, trails, parking areas to prevent damage to riparian vegetation, soil, water quality and aquatic habitat.

- Purpose: To protect riparian and aquatic habitats
- Source: Common measure

H-4: Avoid use of clopyralid on high-porosity soils (coarser than loamy sand).

- Purpose: To avoid leaching/ground water contamination
- Source: Label advisory

H-5: Avoid use of chlorsulfuron on soils with high clay content (finer than loam).

- Purpose: To avoid excessive herbicide runoff
- Source: Label advisory

H-6: Avoid use of picloram on shallow or coarse soils (coarser than loam.) according to herbicide labels. No more than one application of picloram will be made within a two-year period.

- Purpose: To reduce the potential for picloram to enter surface and/or ground water and/or accumulate in the soil. Picloram has the highest potential to impact organisms in soil and water, and tends to be more persistent than the other herbicides.
- Source: SERA Risk Assessment. Based on quantitative estimate of risk from worst-case scenario and uncertainty

H-7: Avoid use of sulfometuron methyl on shallow or coarse soils (coarser than loam.) No more than one application of sulfometuron methyl will be made within a one-year period.

- Purpose: To reduce the potential for sulfometuron methyl accumulation in the soil; sulfometuron methyl has some potential to impact soil and water organisms and is second most persistent.
- Source: SERA Risk Assessments: Based on quantitative estimate of risk from worst-case scenario and uncertainty

H-8: Lakes and Ponds – No more than half the perimeter or 50 percent of the vegetative cover within established buffers or 10 contiguous acres around a lake or pond will be treated with herbicides in any 30-day period. This limits area treated within riparian areas to keep refugia habitat for reptiles and amphibians.

- Purpose: To reduce exposure to herbicides by providing some untreated areas for some organisms to use
- Source: SERA Risk Assessments: Based on quantitative estimate of risk from worst-case scenario and uncertainty regarding effects to reptiles and amphibians

H-9: Wetlands – Wetlands will be treated when soils are driest. If herbicide treatment is necessary when soils are wet, use aquatic labeled herbicides. Favor hand/selective treatment methods where effective and practical. No more than 10 contiguous acres or fifty percent individual wetland areas will be treated in any 30-day period.

- Purpose: To reduce exposure to herbicides by providing some untreated areas for some organisms to use
- Source: SERA Risk Assessments. Based on quantitative estimate of risk from worst-case scenario, uncertainty in effects to some organisms, and label advisories

H-10: Foaming will only be used on invasive plants that are further than 150 feet from streams and other water bodies.

- Purpose: To limit the amount of foam that may be delivered to streams and other water bodies
- Source: No label regulations are associated with this naturally occurring organic compound. The distance of 150 feet was selected because it incorporates the Aquatic Influence Zone for fish bearing streams

H-11: Herbicide use will not occur within 100 feet of wells or 200 feet of spring developments. For stock tanks located outside of riparian areas, use wicking, wiping or spot treatments within 100 feet of the watering source.

- Purpose: Safe drinking water. Also to reduce the potential chance of herbicide delivery to watering systems used for grazing animals
- Source: Label advisories and state drinking water regulations

H-12: When chemicals need to be carried over water by boat, raft or other watercraft, herbicides will be carried in water tight, floatable containers.

- Purpose: Lower the risk of herbicide being delivered to streams in concentrations that exceed levels of concern

H-13: In aquatic settings, herbicide applications from water's edge to bank-full width will be limited to 2 acres for every 1.6 miles of stream length per 6th field HUC. Treatments above bankfull, within the aquatic influence zone (riparian area), will not exceed 10 acres along any 1.6 mile of stream length per 6th field HUC.

- Purpose: Limits the extent of treatment from the water's edge through the aquatic influence zone so that adverse effects are within the scope of analysis
- Source: Analyses based on SERA risk assessment worksheets. Ten acres is based on GLEAM model factors.

I - Vascular and Non-Vascular Plant and Fungi Species of Local Interest (SOLI)

I-1: Botanical surveys may be necessary prior to treatment applications to identify vascular and non-vascular SOLI occurrence in or near areas proposed for invasive plant treatments. Lists of target SOLI to include in each treatment area will be developed by qualified botanical personnel based on the range and distribution of SOLI species and the presence of suitable SOLI habitat. If surveys are deemed necessary, they will be conducted within the proposed treatment area and immediately adjacent to the treatment area as follows: 300 to1000 feet of planned aerial treatments (see I-7), 100 feet of planned broadcast treatments, and 10 feet of planned spot treatments and/or 5 feet of planned hand herbicide treatments.

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

I-2: If circumstances will not permit surveys prior to treatment then all suitable SOLI habitat identified to occur within and around the treatment area will be managed as if the habitat were occupied by SOLI species. In absence of botanical surveys: no aerial herbicide treatment will occur within 300 to 1000 feet of SOLI habitat (see section I6), and no ground based broadcast, spot, or hand treatments will occur within 100 feet of SOLI habitat.

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

I-3: Modify treatments to protect SOLI occurrences based on their distance from the treatment area:

Greater than 100 feet: All ground based treatments are permitted (see I-6 and aerial section for additional buffer restrictions) 100 to 10 feet: Manual and mechanical methods permitted. Broadcast herbicide methods permitted if SOLIs can be completely protected using a protective cover, otherwise use other protective measures such as low-pressure spot-spray, directed spray applications or hand application methods to eliminate any potential for drift.

Less than 10 feet: No broadcast spraying is permitted. Spot treatment using hand application methods is permitted. For saturated or wet soils see I-6. Manual treatment methods are permitted. Precautions must be taken to avoid any contact with individual SOLI.

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

I-4: Picloram will not be used within 50 feet of the threatened plant species *Silene spaldingii* and *Mirabilis macfarlanei.*

- Purpose: To ensure protection of emerging seedlings and potential non-target plant root uptake due to herbicide soil persistence
- Source: US FWS Conservation Strategy (2004).

I-5: In the vicinity of *S. spaldingii, M. mirabilis* and all other SOLI, restoration and cultural treatments, including seeding and/or use of fertilizer, will be under the direct supervision of the district or forest botanist to ensure that plant communities are restored to their desired condition without negative impacts to existing SOLI populations or individuals. The vicinity areas will be evaluated on a case by case basis.

- Purpose: To ensure soil chemistry/biology is not negatively impacted which can potentially alter the subsequent establishment of resident seedbank species.
- Source: Professional judgment

I-6: When vascular or non-vascular SOLI plant species are within 10 feet of saturated or wet soils at the time of herbicide application, only hand methods (wiping, stem injection, etc.) will be used. Avoid the use of picloram and imazapyr in this situation, and use aquatic triclopyr with caution as typical application rates can result in concentrations greater than estimated or measured "no observable effect concentration" to aquatic plants (R6 2005 FEIS, Table 4-47).

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans. Aerial drift buffers were derived from various scientific publications (See aerial application methods)

I-7: Aerial herbicide applications will follow Recovery Plan recommendations for listed species (FWS). Presently, two federally listed species (*Silene spaldingii and Mirabilis macfarlanei*) are documented on the forest. Recovery plan recommend no aerial herbicide within 1000 feet of occurrence for S. spaldingii and not adjacent to M. macfarlanei. A 1000 foot buffer for aerial application will be used for both species. For non-federally listed SOLI, no aerial herbicide applications will occur within 300 feet of known location of SOLI and spray cards to monitor drift will be used to monitor drift and adjust buffers if needed (See I-8 and section F8-Aerial PDFs).

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans. Aerial drift buffers were derived from various scientific publications (See aerial application methods Appendix F)

I-8: A USDA Forest Service botanist will use monitoring results to refine buffers in order to adequately protect vascular and nonvascular plant species of local interest.

- Purpose: To prevent any repeated effects to SOLI populations, thereby mitigating any long term effects
- Source: Broadcast buffer sizes are based on Marrs, 1989 based on tests on vascular plants. Spot and hand/select buffer distances are based on reports from experienced applicators. Uncertainty about effects on non vascular plants will be addressed through monitoring (See I-9)

I-9: The impacts of herbicide use on plant Species of Local Interest (SOLI) are uncertain, especially regarding lichen and bryophytes. The potential for variances in aerial drift due to uncontrolled weather conditions during treatment may also be uncertain. To manage this uncertainty, representative samples of herbicide treatment sites adjacent to vascular and non-vascular plant SOLIs will be monitored. Non-target vegetation within 1000 feet of aerial treatment sites, 500 feet of herbicide broadcast treatment sites and 20 feet of herbicide spot and hand treatment sites will be evaluated before treatment, immediately after treatment, and two to three months later as appropriate. Treatment buffers will be expanded if damage is

found as indicated by: (1) Decrease in the size of the SOLI plant population, or (2) Leaf discoloration or chlorophyll change

- Purpose: To prevent any repeated effects to SOLI populations, thereby mitigating any long term effects

I-10: Compliance monitoring will occur before implementation to ensure that prescriptions, contracts and agreements integrate appropriate Project Design Features. This will be done via a pre-work review.

I-11: Implementation monitoring will occur during implementation to ensure Project Design Features are implemented as planned. An implementation monitoring form will be used to document daily field conditions, activities, accomplishments and/or difficulties. Contract administration mechanisms will be used to correct deficiencies. Herbicide use will be reported as required by the Forest Service Health Pesticide Use Handbook (FSH 2109.14)

I-12: Effectiveness monitoring will occur before, during and after treatment to determine whether invasive plants are being effectively controlled and to ensure non-target vegetation, especially native vascular and non-vascular species of local interest are adequately protected.

- Source: PNW 2005 ROD and FEIS Appendix M: Inventory and Monitoring Plan Framework

J - Wildlife Species of Local Interest

J-1: Bald Eagle

J-1a: Treatment of areas within 0.25 mile, or 0.50 mile line-of-sight, of bald eagle nests will be timed to occur outside the nesting/fledging season of January 1 to August 31, unless treatment activity is within ambient levels of noise and human presence (as determined by a local specialist). Occupancy of nest sites (i.e. whether it is active or not) will be determined each year prior to treatments.

- Purpose: To minimize disturbance to nesting bald eagles and protect eggs and nestlings
- Source: Bald Eagle Management Guidelines for OR-WA (Anonymous); U.S. Fish and Wildlife Service 2003, p. 9

J-1b: Noise-producing activity above ambient levels will not occur between October 31 and March 31 during early morning or late afternoon near known winter roosts and concentrated foraging areas. Disturbance to daytime winter foraging areas will be avoided.

- Purpose: To minimize disturbance and reduce energy demands during stressful winter season
- Source: Bald Eagle Management Guidelines for OR-WA (Anonymous); t Programmatic BO (U.S. Fish and Wildlife Service 2003, p. 9)

J-2: Grey Wolf

J-2a: Treatments within 1 mile of active wolf dens will be timed to occur outside the season of occupancy (April 1 through June 30)

- Purpose: To minimize disturbance and reduce energy demands on denning wolves
- Source: Federal Register, Vol, 68, No, 62 4(d)

J-2b: Treatments within 0.50 mile or 0.50 mile line-of-sight of occupied rendezvous sites will be timed to occur outside the season of occupancy unless treatment activity is within acceptable ambient noise levels and human presence will not cause wolves to abandon the site (as determine by a local specialist)

- Purpose: To minimize disturbance/impacts to wolves at rendezvous sights.
- Source: Buffer is based on expected range of disturbance

J-2c: Consultation with FWS will be reinitiated (unless determined otherwise by FWS) if/when wolf dens or rendezvous sites are discovered in the vicinity of treatment sites.

J-3 Peregrine Falcon

J-3a: Seasonal restrictions (J3-c to g) will be applied based on the spatial and temporal factors listed in J3-b. Restrictions will apply to all known peregrine falcon nest sites for the periods listed below based on the following elevations:

Low elevation sites (1000-2000 ft 01 Jan - 01 July

Medium elevation sites (2001 - 4000 ft) 15 Jan - 31 July

Upper elevation sites (4001+ ft) 01 Feb - 15 Aug

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006.

J-3b: Seasonal restrictions will be waived if the site is unoccupied or if nesting efforts fail and monitoring indicates no further nesting behavior. Seasonal restrictions will be extended if monitoring indicates late season nesting, asynchronous hatching leading to late fledging, or recycle behavior which indicates that late nesting and fledging will occur. The nest zones associated with those nest sites are described below:

(1) Primary: average of 0.5-mile radius from the nest site. Site-specific primary nest zones will be determined and mapped by a local Biologist for each known nest site.

(2) Secondary: average of 1.5- mile radius from the nest site. Site-specific secondary nest zones will be determined and mapped for each known nest site.

(3) Tertiary: a three-mile radius from the nest site including all zones. The tertiary nest zones are not mapped; they apply to a circular area based on the three-mile radius.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3c: Protection of nest sites will be provided until at least two weeks after all young have fledged.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3d: Invasive plant activities within the secondary nest zone requiring the use of machinery will be seasonally restricted. This may include activities such as mulching, chainsaws, vehicles (with or without boom spray equipment) or other mechanically based invasive plant treatment.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3e: Non-mechanized or low disturbance invasive plant activities (such as spot spray, hand pull, etc.) within the secondary nest zone will be coordinated with the wildlife biologist on a case-by-case basis to

determine potential disturbance to nesting falcons and identify mitigating measures, if necessary. Non-mechanized invasive plant activities such as back pack spray, burning, hand-pulling, lopping, and/or re-vegetation planting may be allowed within the secondary nest zone during the seasonal restriction period.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3f: All foot and vehicle entries into Primary nest zones will be seasonally prohibited except for the following reasons:

1. (1) Biologists performing monitoring in association with the eyrie and coordinated with the District Biologist.
2. (2) Law enforcement specialists performing associated duties with notice to the District Ranger.
3. (3) Access for fire, search/rescue, and medical emergencies under appropriate authority (Forest Service line officer or designee).
4. (4) Trail access, when determined by a biologist to be non-disturbing.
5. (5) Other exceptions on a case-by-case basis as determined by the Deciding Official

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3g: Picloram and clopyralid will not be used within 1.5 miles of peregrine nest more than once per year.

- Purpose: To reduce exposure to hexachlorobenze, which has been found in peregrine falcon eggs
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-4 Painted Turtle

J-4a: The local Forest Service Biologist will review treatment locations, timing, and methods to minimize adverse impacts to painted turtles PDF H10 defines herbicide treatment limitations to protect amphibian habitat.

- Purpose: To minimize disturbance, trampling, and herbicide exposure to painted turtles
- Source: David Anderson, WA Dept. of Fish and Wildlife, personal communication, 2005

J-5 Greater Sage Grouse (If discovered and documented on the W-WNF)

J-5a: Do not use NPE-based surfactants in areas where sage grouse may forage.

- Purpose: To minimize exposure to disturbance, herbicides and surfactants that could pose a risk

J-5b: Human activities within 0.3 mile of leks will be prohibited from the period of one hour before sunrise until four hours after sunrise and one hour before sunset until one hour after sunset from February 15 – May 15.

- Purpose: To minimize exposure to disturbance, herbicides and surfactants that could pose a risk

J-5c: Do not conduct any vegetation treatments or improvement project in breeding habitats from February 15 – June 30.

- Purpose: To minimize exposure to disturbance, herbicides and surfactants that could pose a risk

K-Public Notification

K-1: The public will be notified about upcoming herbicide treatments via the local newspaper or individual notification, fliers, and posting signs. Forest Service and other websites may also be used for public notification.

- Purpose: To reduce the risk of inadvertent public contact with herbicide
- Source: W-W LRMP as amended by the R6 2005 ROD Standard 23

L-Special Forest Products

L-1: Triclopyr will not be applied to foliage in areas of known special forest products or other wild food collection areas.

- Purpose: To reduce the chance that people might be exposed to harmful doses of triclopyr
- Source: Appendix Q of the R6 2005 FEIS

L-2: Special forest product gatherers will be notified about herbicide treatment areas when applying for their permits. Flyers indicating treatment areas may be included with the permits.

- Purpose: To reduce the risk of inadvertent public contact with herbicide
- Source: W-W LRMP as amended by the R6 2005 ROD Standard 23

M- American Indian Tribal and Treaty Rights

M-1: American Indian tribes will be notified annually as treatments are scheduled so that tribal members may provide input and/or be notified prior to gathering cultural plants.

- Purpose: To ensure that no inadvertent public contact with herbicide occurs and that cultural plants are fully protected.
- Source: Government to government agreements between American Indian tribes and the Wallowa-Whitman National Forest

M-2: The Forest Archaeologist will annually assess areas where mechanical treatment that could cause damage to cultural resources is proposed. Weed wrenching and grubbing techniques will not be used in known archaeological sites. Instead, treatment methods that have no potential to affect cultural resources will be used.

- Purpose: To avoid adverse impacts to cultural resources
- Source: Common practice

N-Rangeland Resources

N-1: Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of administrative mechanisms include, but are not limited to, revising permits and grazing allotment plans, providing annual operating instructions, and adaptive management. Plan and implement practices in cooperation with grazing permit holder.

- Purpose: To ensure proactive adaptive measures are taken to eliminate future spread of invasive plants
- Source: R6 2005 FEIS Standard 6

N-2: Permittees will be notified of annual treatment actions at the annual permittee operating plan meeting, and/or notified within two weeks of planned treatments of infestations greater than one acre in size. See PDF section K.

- Purpose: To ensure permittee has knowledge of activities occurring within the allotment
- Source: Common practice

N-3: Follow most current EPA herbicide label for grazing restrictions

- Purpose: To ensure grazing animals are not exposed to chemicals
- Source: EPA labeling requirements

O-Human Health (See R6 2005 FEIS, Appendix Q for more information)

O-1: Backpack application rate for Sulfometuron methyl will not exceed 0.2 lb a.i./ac., and for NPE surfactant it will not exceed 1.67 lb a.i./ac

- Purpose: To reduce the potential of adverse effects to human health

O-2: Spot spray application rate for Picloram will not exceed 0.35 lb a.i./ac., and for Sulfometuron methyl it will not exceed 0.12 lb a.i./ac

- Purpose: To reduce the potential of adverse effects to human health

O-3: Triclopyr application rate will not exceed 1.0 lbs a.i./ac. Use spot spraying techniques to further reduce dermal exposure. Favor other herbicides wherever they are expected to be effective

- Purpose: To reduce the potential for adverse effects to human health from dermal contact or consumption of contaminated vegetation

P-Restoration

P-1: Long-term site strategy for highly disturbed areas that have high potential for weed invasion such as old fields or old homesteads, follow guidelines and techniques outlined in *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al.2003)

- Purpose: To ensure highly invisible/disturbed sites are successfully restored or revegetated with desirable vegetation
- Source: Treatment Restoration Standard 12 (RFEIS)

P-2: On dry grassland habitat below 3000 feet in the Hells Canyon National Recreation Area and other highly disturbed areas where live vegetative groundcover will be reduced by 70 percent of existing vegetation by herbicide treatment, restoration and/or revegetation will occur following *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al.2003) and R6 2005 FEIS standards

- Purpose: To ensure highly invasible/disturbed sites are successfully restored or revegetated with desirable vegetation
- Source: Treatment Restoration Standard 3, 12 (RFEIS), *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003), Water Erosion Prediction Project (WEPP) erosion data, and Goodwin et al. 2002
-

P-3: In areas where broadcast herbicide is used to treat highly infested areas, evaluation of potential re-infestation by new or nearby invasives will be considered and restoration and/or revegetation measures will be implemented to ensure protection of native vegetation and soils. Also see Treatment Restoration Standard #12 in the R6 2005 FEIS and ROD.

- Purpose: To ensure those sites are successfully restored with desirable vegetation

- Source: Treatment Restoration Standard 3, 12 (RFEIS), and *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003)

Herbicide Use Buffers

Herbicide treatments are more restrictive nearer water bodies. PDFs and herbicide use buffers within the aquatic influence zone were developed based on label restrictions; SERA risk assessments, and various studies of drift and runoff to streams, such as Berg 2004. The scientific basis for establishing no treatment buffer widths is based on research on the inherent risk of chemical contamination due to herbicide application (Moore 1975, Norris, Lorz and Gregory 1991, Bissin, Ice, Perrin and Bilby 1992). Research has demonstrated that the risk of aquatic organism exposure to chemical herbicides is dependent on three key factors: chemical behavior, the rate and methods of application, and site characteristics.

Tables 7, 8 and 9 prescribe buffer widths according to treatment methods, herbicides used, risk, and type of aquatic environment. Table 10 addresses buffer widths used for aerial application. Buffers identify distances from various water bodies where treatment activities are not allowed.

Ephemeral streams exist in the project area. Label direction and PDFs will be followed for treatments along ephemeral streams. These areas flow rarely during very high water events when herbicide use is not likely occur.

Table 7-Herbicide Use Buffers in Feet -Perennial and Wet Intermittent Streams -Proposed Action

Herbicide	Perennial and Wet Intermittent Stream			
	Aerial	Broadcast	Spot	Hand/Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	Not proposed	100	Water's edge	Water's edge
Aquatic Triclopyr-TEA	None Allowed	None Allowed	15	Water's edge
Aquatic Imazapyr*	Not proposed	100	Water's edge	Water's edge
Low Risk to Aquatic Organisms				
Imazapic	Not proposed	100	15	Bankfull
Clopyralid	300	100	15	Bankfull
Metsulfuron Methyl	None Allowed	100	15	Bankfull
Moderate Risk to Aquatic Organisms				
Imazapyr	Not proposed	100	50	Bankfull
Sulfometuron Methyl	Not proposed	100	50	5
Chlorsulfuron	Not proposed	100	50	Bankfull
High Risk to Aquatic Organisms				
Triclopyr-BEE	None Allowed	None Allowed	150	150
Picloram	300	100	50	50
Sethoxydim	Not proposed	100	50	50
Glyphosate	Not proposed	100	50	50

Table 8-Herbicide Use Buffers in Feet -Dry Intermittent Streams -Proposed Action

Herbicide	Dry Intermittent Stream			
	Aerial	Broadcast	Spot	Hand/ Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	Not proposed	50	0	0
Aquatic Triclopyr-TEA	None Allowed	None Allowed	0	0
Aquatic Imazapyr*	Not proposed	50	0	0
Low Risk to Aquatic Organisms				
Imazapic	Not proposed	50	0	0
Clopyralid	100	50	0	0
Metsulfuron Methyl	None Allowed	50	0	0
Moderate Risk to Aquatic Organisms				
Imazapyr	Not proposed	50	15	Bankfull
Sulfometuron Methyl	None Allowed	50	15	Bankfull
Chlorsulfuron	None Allowed	50	15	Bankfull
High Risk to Aquatic Organisms				
Triclopyr-BEE	None Allowed	None Allowed	150	150
Picloram	100	100	50	50
Sethoxydim	Not proposed	100	50	50
Glyphosate	Not proposed	100	50	50

Table 9-Herbicide Use Buffers in Feet – Lakes and Wetlands

Herbicide	Wetlands			
	Aerial	Broadcast	Spot	Hand/ Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	Not proposed	100**	Water's edge	Water's edge
Aquatic Triclopyr-TEA	None Allowed	None Allowed	15	Water's edge
Aquatic Imazapyr*	Not proposed	100**	Water's edge	Water's edge
Low Aquatic Hazard Rating				
Imazapic	Not proposed	100	15	High water mark
Clopyralid	300	100	15	High water mark
Metsulfuron Methyl	Not proposed	100	15	High water mark
Moderate Aquatic Hazard Rating				
Imazapyr	Not proposed	100	50	High water mark
Sulfometuron Methyl	None Allowed	100	50	5
Chlorsulfuron	None Allowed	100	50	High water mark
Greater Aquatic Hazard Rating				
Triclopyr-BEE	None Allowed	None Allowed	150	150
Picloram	300	100	50	50
Sethoxydim	Not proposed	100	50	50
Glyphosate	Not proposed	100	50	50

** If wetland, pond or lake is dry, there is no buffer.

Table 10-Buffer widths required for aerial applications

Buffer width for a 25 foot release height, 7-8 mph winds	Buffer width for a 35 foot release height, 7-8 mph winds	Buffer width for a 50 foot release height, 7-8 mph winds
Designated buffer	Add 1 swath width to buffer	Add 2 swath widths to buffer

Ensure little to no drift by applying these buffers and low drift technology (i.e. nozzle design and/or additives), as directed in PDFs

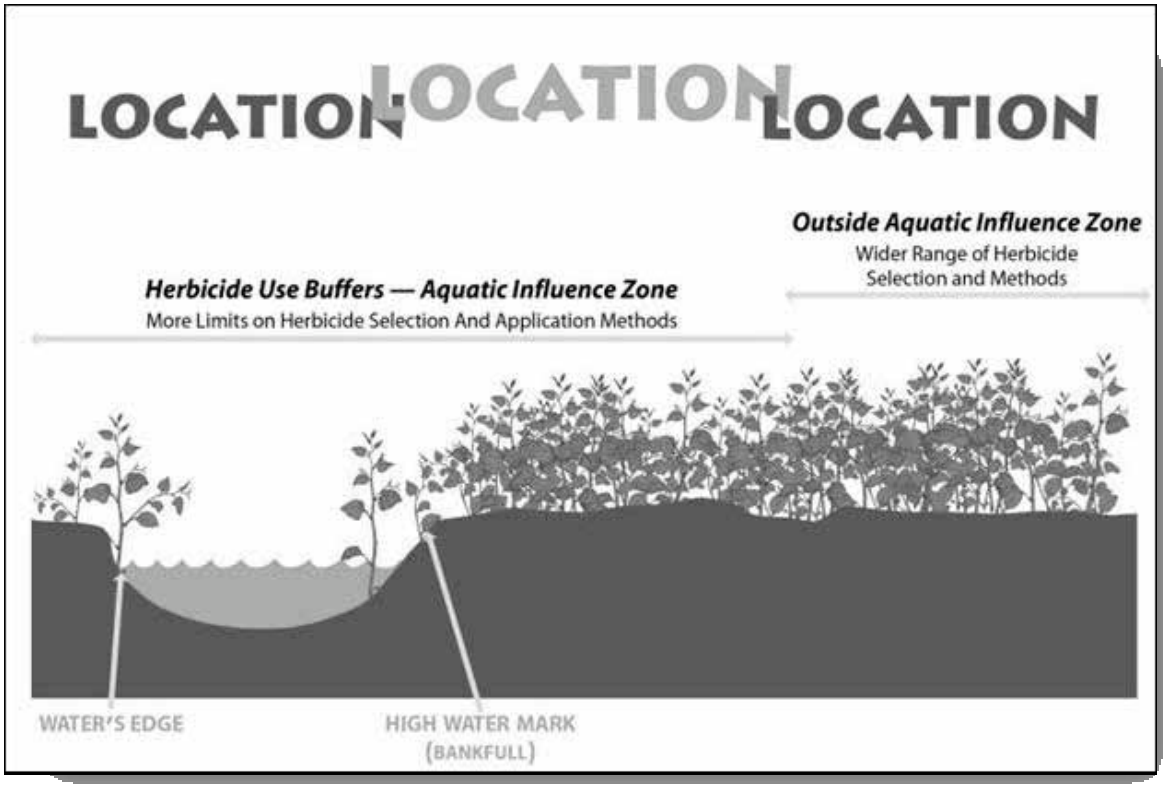


Figure 11 – Illustration of how herbicide selection and application methods in the established buffer widths are more limited in Aquatic Influence Zones

Figure 11 illustrates how the Aquatic Influence Zone restricts application methods and herbicides only to those approved for use in aquatic areas. "Aquatic Influence Zone" is not synonymous with "buffer widths" listed in the tables above. The Aquatic Influence Zone is defined by the innermost half of the Riparian Habitat Conservation Area (RHCA). For instance, a 300-foot RHCA will have an Aquatic Influence Zone of 150 feet. Establishing buffer widths reduces the potential for herbicides to come in contact with water via drift, leaching, and runoff at or near concentrations of concern.

Early Detection, Rapid Response Herbicide Use Decision Process

Early Detection, Rapid Response (EDRR) is aimed at controlling new infestations that are small in size, thus decreasing cost and the need for repeated applications. It is also advantageous because: 1) the precise location of individual target plants is subject to rapid or unpredictable change, and 2) presently known infestations may grow during the time it typically takes to complete the NEPA process. The selected alternative allows the treatment of new invasive plant detections, as long as the treatment method is

within the scope of this EIS. Project Design Features will apply to EDRR treatments. Invasive plant sites discovered subsequent to the current invasive plant inventory may be treated following the steps outlined below in the EDRR Decision Use Tree.

1. Is the target population associated with a size, phenology, density or distribution that warrants herbicide use (alone or in combination with other methods)? Consider whether or not herbicides are required for treatment effectiveness and/or whether or not the use of herbicides substantially increases cost-effectiveness of treatment? Consult common control measures. Consider whether volunteers may be available to reduce the cost of manual treatments.

Yes (use herbicides): List potential herbicide choices and integrated prescription. Review label directions and project design criteria. Consider non-target vegetation surrounding treatment sites and use selective herbicides as appropriate. Consider soil conditions at the treatment site. Consider previous treatments that have occurred on the site. Were they effective? Would another herbicide or combination of methods be more effective? Also note that triclopyr may not be used in areas of known special forest product or subsistence collection. Go to 2.
No: Use non-herbicide methods.

2. Do the size, density and/or distribution of invasive plants warrant the broadcast application method? Would another herbicide besides triclopyr be effective? (Please note that triclopyr may not be broadcast)

Yes: Is the treatment site within the aquatic influence zone and/or on a road that has high potential to deliver herbicide to surface waters? Is the site in a wildlife habitat that has specific restrictions to broadcasting? Go to 3a.
No: Go to 3b.

3a. Apply surface water buffers as appropriate. Is this site within an area where broadcasting is prohibited?

Yes: Do not broadcast. Go to 4.
No: Go to 3b.

3b. Are there botanical species of local interest/suitable habitat within 100 feet of the proposed broadcast site?

Yes: Survey as needed within suitable habitats. Apply botanical buffers as appropriate (see table 25). Broadcast may still be acceptable if botanical species of local interest are covered by barrier. Go to 4.
No: Broadcasting is an acceptable treatment method for herbicides except triclopyr. Use lowest effective label rates for each given situation. Do not exceed typical label rates. Favor other surfactants besides NPE and do not broadcast NPE at a rate exceeding 0.5 lbs. active ingredient per acre. Do not broadcast spray NPE in animal habitats (see table 35). Do not broadcast imazapyr at a rate greater than 0.7 lbs per acre. Consider wildlife habitats in the area and implement seasonal restrictions if required.

4. Will spot and/or selective methods be reasonably effective in this situation?

Yes: Apply spot/selective buffers and use aquatic labeled herbicides as appropriate.
No: Seek approval for treatment through additional decision process (NEPA Section 18 or a new NEPA process).

Figure 12 – EDRR Herbicide Use Decision Tree Process

Annual Implementation Planning and Monitoring

This section outlines the process for making sure the selected alternative is properly implemented. The method follows Integrated Weed Management principles (R6 2005 FEIS, 3-3) and satisfies pesticide planning requirements at FSH 2109.14. It applies to currently known and new sites found during ongoing monitoring (EDRR).

1. Characterize the invasive plant infestation to be treated. This includes:

- Map and describe the target species, density, extent, treatment strategy, and site conditions.
- List any resource of concerns and determine if additional surveys are needed. Coordinate with resource specialists to get additional information or new information about specific locations. Identify and perform pre-treatment surveys for species of local interest and/or their habitats.

2. Develop site prescriptions

- Use Integrated Weed Management principles to identify possible effective methods of treatment. Non-herbicide treatments should be considered when sites are small or target plant densities are low, particularly after several years of herbicide treatments. Prescribe herbicides as needed based on the biology of the target species and size of the infestation (for instance, manual treatment alone cannot effectively eradicate rhizomatous species). Determine that the prescribed treatment is within the scope of those analyzed in the EIS. If treatments would not be effective once Project Design Features are applied, further NEPA would also be required to authorize the effective treatment.
- Apply appropriate Project Design Features. Consider the soil texture and type and potential for ground water contamination to ensure that label guidance and PDFs related to soils are followed. Consider the presences of small unmapped small wetlands and ensure PDFs are appropriately applied.
- Determine that the prescribed treatment is consistent with the ESA consultation.
- Review compliance criteria for the Forest Plan and any other environmental standards indicated by the label or state regulations. Develop an Invasive Plant Prevention Plan, a public notification plan, and coordinate with local Tribes.
- Complete Form FS-2100-2, Pesticide Use Proposal. This form lists treatment objectives, specific herbicide(s) that will be used, the rate and method of application, and Project Design Features that apply. Apply for any herbicide application permits when needed for treatments in Riparian Areas.
- Confirm that acceptable plant or mulch materials are available for cultural treatments/restoration. If the prescription includes extensive site preparation, additional NEPA is required.
- Coordinate with adjacent landowners, water users, agencies, and partners.
- Apply annual caps Forest-wide, a cap for the life of the project, and an annual cap for riparian areas including individual watersheds. (Cap acreages refer to first-time treatment acres and do not count retreatment of those same acres). The Caps include:
    - A maximum of 8,000 acres per year Forest-wide
    - A maximum for the life of the project of 40,000 acres (combined treatment acreage of known, presently undetected, and future new infestations)
    - A maximum of 4,000 acres of riparian treatment per year

3. Accomplishment and Compliance Monitoring

- Develop a project work plan for herbicide use as described in FSH 2109.14.3. This plan presents organizational and operational details including treatment objectives, the equipment, materials, and supplies needed; the herbicide application method and rate; field crew organization and lines of responsibility, and a description of interagency coordination. The plan will also include a job hazard analysis to assure applicator safety.
- Ensure contracts and agreements include appropriate prescriptions and that herbicide ingredients and application rates meet label requirements, Standards 16 and 18, and site specific Project Design Features.
- Document and report herbicide use and certify applicator information in the National Pesticide Use Database, via the Forest Service Activity Tracking System (FACTS) to determine the amount, type and location of herbicide use annually, and also whether the goal of reducing herbicide use over time is achieved.
- Document the implementation of the public notification plan.

4. Post Treatment Monitoring

- Post-treatment reviews will occur on a sample basis or when required by a Project Design Feature to determine whether treatments were effective, if damage to non-target species occurred, or whether or not passive restoration occurred as expected.
- Post-treatment monitoring will also be used to detect whether Project Design Features were appropriately applied and effective. Contract administration and other existing mechanisms will be used to correct deficiencies.
- Additional monitoring may be done consistent with the R6 2005 ROD.

Attachment D

Wallowa Whitman Weed Prevention Practices and Analysis Guidelines

Wallowa-Whitman National Forest

Weed Prevention Practices and Analysis Guidelines

A. Prevention Strategies and Tactics from the Forest Integrated Noxious Weed Management Plan (1992)

Project Planning

1. Noxious weed management is to be treated as a mandatory issue or concern within ALL NEPA planning activities where ground disturbance is likely. Prevention will be addressed as a part of the management constraints or requirements as well as being an evaluation criterion where appropriate.

2. NEPA analyses must consider the costs associated with preventing the occurrence or spread of noxious weeds

3. Project level personnel should be able to recognize noxious weeds occurring on or adjacent to their Districts and should be able to recognize potential invaders.

Vegetation Management

4. To the extent practical and feasible, with full consideration of other silvicultural and resource objectives, silvicultural prescriptions should strive to maintain as much shade as possible on site and to limit the amount of soil disturbance.

5. Logging systems should consider the objectives of maintaining ground cover, maintaining shade providing features, and minimizing ground disturbance when designing logging systems for a particular stand.

6. Stand exams, botanical inventories, range analyses, and other resource inventories will include a process for inventorying noxious weed occurrences by stand, species, size of infestation and location as a minimum.

7. Project or contract maps will show currently inventoried, high priority noxious weed infestations as a means of aiding in avoidance or monitoring.

8. Commensurate with anticipated risk of invasion or spread of noxious weeds, ground disturbing activities may need to include both a pre and one or more post project surveys to document pre-existing infestations and to evaluate the effects of the project on noxious weeds. The intensity and frequency of this survey should vary according to the risk/probability of the project affecting or being affected by noxious weed infestations. This risk should be evaluated during initial or periodic project planning and should be coordinated with the District noxious weed coordinator. Where monitoring is needed, it should be planned to continue for at least five years.

9. Where existing inventories or pre-project inventories indicate that an infestation occurs on or near a ground disturbing project, the project will be designed, in coordination with the District noxious weed coordinator, to plan for the long term management of the infestation and to prevent the spread of the infestation off site.

Depending on an assessment of the potential risk for introduction or spread of noxious weeds, this will often involve designing projects (including the implementing contracts, permits, etc.) so that the operator will not be working on high risk areas during the time when the weeds are capable of being spread by the operation. In the timber sale contract, C5.12 (Use of Roads by Purchaser), C5.4 (General and Special Maintenance Requirements, and C6.315 (Sale Operation Schedule) give the Districts the flexibility to keep contract vehicles out of high risk areas during the high risk times of the season These type of requirements can also be incorporated in Federal Acquisition Regulation contracts in Section H – Special Contract Requirements.

10. Contract clause language will be developed along the following general lines. These clauses will be submitted to the Regional Office for review and final approval. Implementation will not occur until such time as the clauses have received Regional Office approval.

If an assessment of risk conducted by the Forest Officer in charge of a project, and in full coordination with the District noxious weed coordinator, indicates a high risk of introduction or spread of noxious weeds through transport by logging, road construction, or other ground disturbing equipment, and unless otherwise agreed to in writing, all equipment to be operated on a project area will be cleaned in a manner sufficient to prevent noxious weeds from being carried on to the project area. This requirement does not apply to passenger vehicles or other equipment used exclusively on roads. Cleaning, if needed, will occur in a site to be established by the District Ranger, in coordination with the equipment owners or operators and the County Weed Board. Cleaning will be inspected and approved by the Forest Officer in charge of the specific project.

Where log trucks or other large equipment make delivery to or haul from purchaser's/contractor's yards infested by noxious weeds, the yard owner will be required to eradicate the noxious weeds from the yard/scaling site through an amendment to the yard scaling agreement or other contract provision as appropriate.

11. Where timber purchaser' log yards or other contractors equipment yards are known or suspected to be infested by noxious weeds, encourage their cleanup through working with the purchaser/contractor and the County Weed board.

Revegetation/Restoration

12. Ensure that all disturbed ground is revegetated as soon as possible after disturbance. Consider regeneration or other resource objective needs in planning for species to be seeded to be seeded, timing rates, etc. Rehabilitate bare ground unless it can be documented that natural or artificial regeneration can accomplish the same prevention objectives as seeding within a reasonable time frame.

13. Favor the use of native species (or domestic varieties of native species) in preference to introduced species for seeding for site protection when the native species can accomplish the site objectives in a reasonable timeframe and costs are not excessive.

14. Within the constraints of meeting other resource objectives, use the species and mixes that will most rapidly occupy a site. Consider seeding a fast germinating annual in the mix to provide a suitable ground cover as rapidly as possible.

15. Where there are no other multiple resource constraints, such as along road cuts and fills, consider use of sod-forming species as a major part of the mix.

16. All seed purchased or otherwise designated or accepted for use on National Forest System Lands will be required to be tested for "all states noxious weeds" according to AOSA (Association of Official Seed Analysts) standards and will be certified in writing a Registered Seed Technologist or Seed Analyst as meeting the requirements of the Federal Seed Act and the appropriate State Seed Law for the state in which application is planned to occur, regarding the testing, labeling, sale and transport of prohibited and restricted noxious weeds.

Prior to acceptance of purchased seed, or use of seed by a purchaser, contractor, subcontractor, cooperator, or by the Forest Service, a sample meeting the AOSA standards for sample size and method of acquisition (see Appendix O) will be submitted to either the Oregon State University Seed Testing Laboratory or another seed testing facility for testing by a Registered Seed Technologist or Seed Analyst (as certified through either the AOSA for State and Federal analysts/technologists of the Society of Commercial Seed Technologists) for "all states noxious weeds." Only after a finding and documentation in writing of no weed seeds on the "all states noxious weeds" listing in excess of state limitations for prohibited and restricted weed seed will the seed be accepted and used.

17. When hay or straw is to be used for mulching, for erosion control, fire rehabilitation or other uses, it should be noxious weed free. Until a Regional or State process can be developed to ensure certification of hay or straw, the following process will be followed:

Contact the local County Extension Agent to determine which farmers in the area are participating in the certified grass seed or grain programs. The County Agent may also be able to aid in determining which of the certified growers may also be baling the straw. To the extent possible, use only straw obtained from fields participating in the certification program.

Monitor the applications site on a scheduled basis for a minimum of five years after use of the straw. This program will not ensure that the straw is totally weed free but is the best option available at this time.

Range Management

18. In the development of Allotment Management Plans and Annual Operating Plans, consider the potential for introduction of noxious weed seed through animal transport. 19. Where the livestock are entering the Forest from a known noxious weed infested area, consider requiring the feeding of the animals (at permittee expense) weed free hay (or other weed free forage or feeds) for 9 to 10 days prior to permitting ingress on to the general area of the National Forest allotment. The feeding area will, if at all possible, be on non-National Forest System lands. If this is not practical, confine the animals in as small a pasture as feasible for the 9-10 day period. This pasture will then require annual monitoring for the occurrence of noxious weeds (and management as appropriate). Under no circumstances will this strategy be applied in a manner inconsistent with Forest Plan standards nor in a manner which will result in resource degradation.

19. Consider the exclusion of livestock (and wildlife where feasible) from high priority noxious weed sites where the animals are likely to cause a spread of the weed off site.

20. In the AMP's to the extent possible, provide for the use of livestock as a tool in preventing palatable, non-poisonous noxious weeds from setting seed (e.g.: sheep grazing of leafy spurge).

21. In the Annual Operating Plans, provide information to the permittees regarding noxious weed infestations. To the extent possible after seed set, encourage livestock to avoid sites where the seeds are likely to be transmitted by the livestock (i.e., either through ingestion and excretion or through attachment to the animal and then dropping off).

22. In the Annual Operating Plans, provide information to the permittees regarding noxious weed identification, methods of spread and prevention measures.

Mining

23. Review Mineral Operating Plans to ensure that proper actions are taken to prevent the establishment of new infestations or the spread of existing ones. Ensure that disturbed sites are rehabilitated and revegetated as soon after disturbance as possible. Consider the use of annual cover crops where an area will be left in a disturbed condition for period of time prior to being re-worked.

Recreation

24. For recreational livestock use authorized under permit (such as outfitter-guide permits), permit only the use of feeds with a high probability of being free of noxious weeds (such as heat treated and pressurized pelletized feed).

25. For recreational and other livestock use not required to be under a permit, develop a process to prohibit the use of feeds on National Forest System lands unless they are accompanied a certification insuring their weed free status or are such that they have a high probability of being free of noxious weeds (such as heat treated and pressurized pelletized feed).

26. Where feasible, cooperate with the County Weed Boards and other cooperators to provide a hay exchange program during hunting seasons (e.g., Wallowa County).

27. Where recreational vehicle activity such as off road vehicle (ORV) use is occurring in an area where noxious weeds are present or are resulting in a ground disturbing activity such that potential invasion sites are available for noxious weeds, consider closing the area to motorized vehicle use and/or conducting revegetation efforts to minimize sites available for weed spread or invasion.

> Where ORV use is restricted to a specified area, that area, because of the extensive disturbance to the soil and vegetative cover, will need to be closely monitored for noxious weeds. Planning for the ORV area must consider prevention as a high priority.

28. By District or Zone, conduct a Forest-wide inventory for noxious weeds. Concentrate on high priority species (e.g., potential and new invaders) and on areas where ground disturbing activities are common.

Travel and Access Management

29. Road management objectives should consider the benefits and costs associated with allowing or encouraging desirable herbaceous vegetation growth on shoulders, cuts and fills versus the potential for invasion by noxious weeds and the long term costs associated with treatments and off site effects.

30. Road maintenance planning will address practices to prevent the spread of noxious weeds.

31. Where shoulders or drainage ditches are covered by desirable herbaceous cover, consider leaving it in place rather than blading it off if such a practice can be done without causing excessive damage to the road surface or significant public safety hazards.

32. When blading, brushing, rock raking, or otherwise maintaining a road surface where a noxious weed infestation is located the COR/ER (or road maintenance foreman) will work with the District noxious weed coordinator to ensure that appropriate inventory and treatment measures are applied. The following are suggested practices:

Ensure that the contractor notifies the COR/ER in timely enough manner so that the road can be checked for the current status of noxious weeds prior to any work occurring. Weed sites should be managed as follows:

- if the weed is not in flower, or will not reproduce through damaged plant parts (e.g., vegetatively) proceed with maintenance,
- if the weed has flowered, either hand pull or cut all topes, bag in a plastic bag, then proceed with maintenance; or flag the site for avoidance by the contractor until the District can properly treat the infestation (dispose of weed seed heads by burning),
- if the weed is known or suspected to sprout vegetatively from cut parts, flag the site to ensure avoidance by the contractor until the weed can be treated by proper means.

To the extent possible, in full consideration of road maintenance and public safety objectives as well as silvicultural needs, do not remove trees or brush from adjacent to the road. The objective is to provide as much shade as possible on the unvegetated or sparsely vegetated road surface, cuts and fills.

33. Pit/Quarry plans will consider noxious weeds in the development of long-term plans and will develop plans to prevent introduction or to prevent the spread of existing infestations. Minerals materials procured from non-Forest Service pits will also be checked to be sure the material is not infested with noxious weed seed.

34. In planning for Access and Travel management ensure that management of noxious weeds will be a consideration. If a road is to be closed, coordination with the District noxious weed coordinator should occur to ensure that if noxious weeds exist within the closed portion of the road, the sites are inventoried, IWM decisions are made regarding their management, and provisions are made for access as needed to implement the IWM treatments and monitoring. Roads to be closed should be seeded (with tested and certified weed free seed) to minimize potential invasion sites.

Intergovernmental Cooperation

35. Each District/Zone will coordinate closely with the associated County Weed Board to ensure sharing of information regarding infestations, treatments, etc.

36. Coordinate with adjacent Districts, Forests and BLM Areas to ensure that animals or equipment moving from the adjacent lands onto the District are either moving from weed free areas or are treated/Quarantined as appropriate. Encourage coordinated policies between adjacent lands.

Wildfire Suppression

37. To the extent possible, do not sue noxious weed infested sites for fire crew bases. Where emergency situations dictate that the base must be located on a site infested by noxious weeds, ensure that noxious weeds on the site are prevented from going to seed and that appropriate short and long term inventory, mitigation and management measure are applied to rehabilitate the site and to manage the infestation. Do not use noxious weed infested sites as a helibase unless appropriate long-term actions are taken to prevent seed production and to ensure eradication of the weeds and rehabilitation of the site.

See Appendix A – Hells Canyon National Recreation Area, for further direction regarding weed prevention practices within HCNRA.

Site Implementation Guide Example

The purpose of this exercise is to demonstrate how the implementation planning process would work to ensure individual treatments are within the scope of the EIS analysis. The example location was not a known site in the 2006 inventory used for the Invasive Plant Treatment EIS, thus the prescription followed the Early Detection Rapid Response (EDRR) Herbicide Use Decision Tree associated with the action alternatives.

The Wallowa Whitman FEIS describes a process for characterizing the infestation, developing site prescriptions, and monitoring. Using the process, the following prescription was developed:

This site is proposed for herbicide treatment. The distance from a road and size of the infestation, along with the deep rooted, aggressive nature of the invasives, render manual and mechanical treatments ineffective (see common control measures in the FEIS). No biological control agents are available for these species. Based on the phenology of the plants, applications are most effective in the spring and fall. Due to Project Design Features that apply to this treatment, treatment would occur during times of the year when wetter areas are driest.

Passive restoration is prescribed at this time. The site will continue to be part of a sheep grazing allotment and the timing that sheep are turned out there will be affected by herbicide use and label requirements and the presence of invasive plants. The FS will coordinate invasive plant treatment and prevention strategies with the permittees.

No wildlife or botanical SOLI would be affected and consultation with biologists revealed no additional survey needs. The 4 acres is mostly more than 100 feet from the Grande Ronde River. Soil type on the site is silt/clay mix with organic matter so glyphosate used within 50 feet zone adjacent to water is very unlikely to reach the river. Picloram will not move through this vegetated buffer with these soil types. The amount of glyphosate that could possibly enter the river from herbicide use at this site would be very small and instantly diluted in the large river. The predicted herbicide exposure would be within the scope of analysis in the R6 2005 FEIS and the 2009 W-W FEIS/Biological Opinions.

A map of the area follows.

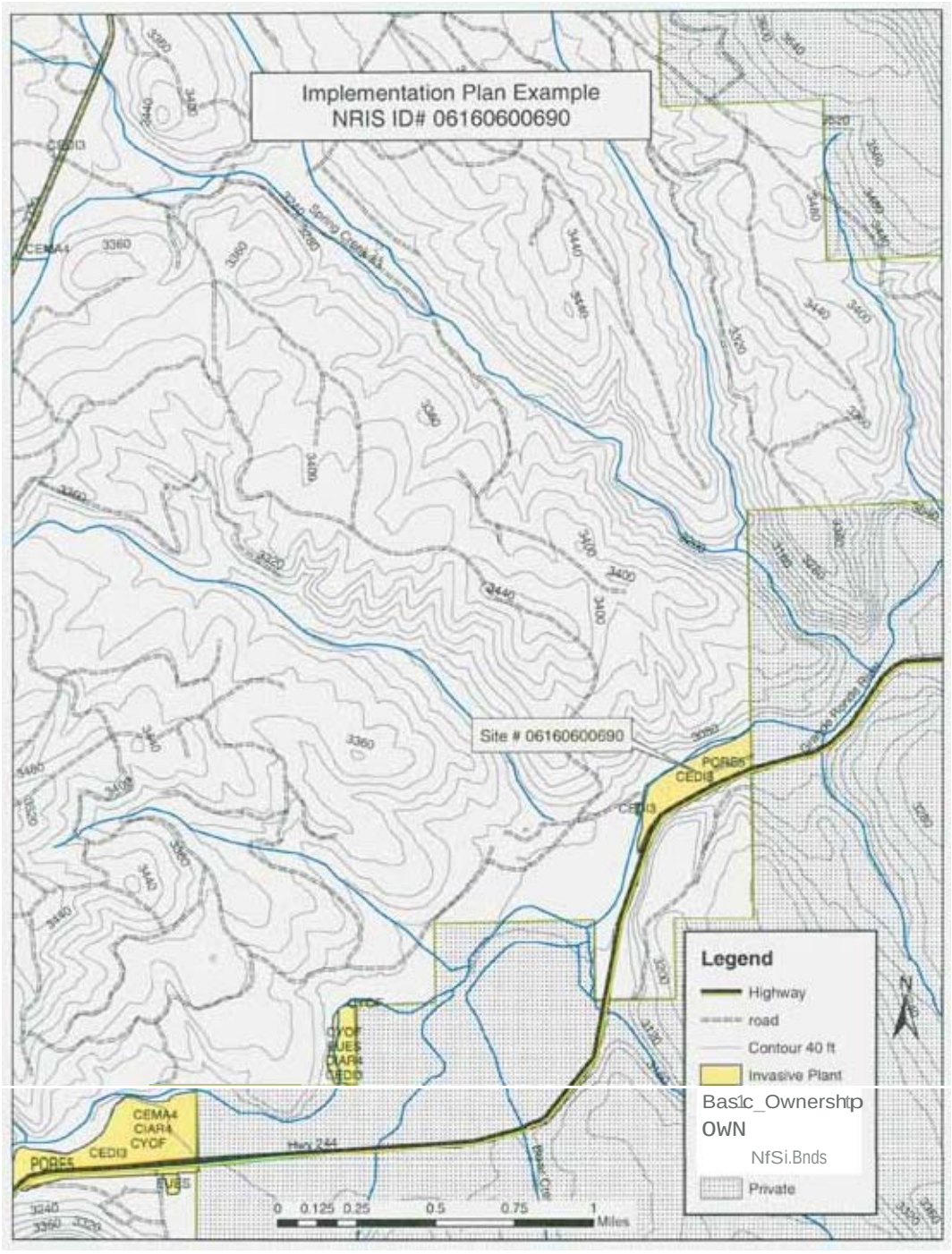


Figure B-L hqllementationPianE:r.aliJlle

1. Characterize the Infestation

A: Map and describe the target species, density, extent, treatment strategy, and site conditions:

- Sulfur Cinquefoil (*Potentilla recta*) - PORE5; NRIS ID 06160600690;
    - Extent: E2.5 acres in patches across a 27.7 acre area.
    - Density: in patches, Daubenmire cover class 4 (50-75% crown cover).
    - Diffuse knapweed -.
- Diffuse Knapweed (*Centaurea diffusa*); NRIS ID 06160600389
    - Extent: 1.5 acres; spotty throughout the 27.7 acre area
    - Density: Daubenmire cover class 1 (0-5%)
- Treatment Strategy: Control and reduce cover. Control means to prevent the species from reproducing or spreading off site.
- Site Conditions: Open meadow with scattered pines; rangeland, active sheep allotment; Invasive plants are not nearer than 50 feet to the Grande Ronde River. Some sulfur cinquefoil may be within 50 feet of a small wetland area. Site is adjacent major road (OR 244) but invasive plants are not near the roadside. Site consists of riparian vegetation, scattered pines, annual grasses, bunch grass, and forbs. Site is adjacent private property. Invasive plants are not known to occur on the adjacent private parcel.
- Soils: vary from loam to finer than loam with a silt/clay mix (North Dakota Department of Water quality, non-point source pollution program). http://www.ndhealth.gov/wq/sw/z1_nps/pdf_files/soil_texture_feel_test.pdf)
- See attached Early Detection Rapid Response (EDRR) Herbicide Use Decision Process Example

B: Resource Concerns:

- The Grande Ronde River is habitat for migratory bull trout, summer steelhead and spring/summer Chinook salmon. No T&E plants or wildlife species nearby, and no plant or wildlife species of local concern (SOLI) habitat; additional SOLI surveys are not needed. Invasive plant dispersal vectors include the river, road, permitted sheep, wind, and wildlife). Sulfur cinquefoil and diffuse knapweed are degrading rangeland/grassland condition.

2. Develop Site Prescriptions

A. Treatment Methods Options

- Manual – not effective because site is too large; deep rooted
- Bio/Cultural –biological agents are available for diffuse knapweed, but not sulfur cinquefoil.
- Chemical – effective chemicals exist and applicable to site conditions (picloram (both species), clopyralid (diffuse knapweed), aquatic labeled glyphosate (both species).

B. Apply Appropriate Project Design Features

A - Pre-Project Planning

A-1: Documented in #1 above.

B - Coordination with Other Landowners and Agencies

B-1: Coordination: Site on Forest lands; contact range permittee at annual meeting.

C - Prevent the Spread of Invasive Plants during Treatment Activities

C-1: Prevention: Educate crews and permittees; sign roads.

D - Wilderness Areas

D-1: Wilderness: Not applicable (NA) – site is not in a wilderness area.

E - Non-Herbicide Treatment Methods

E-1: Will limit crew size working on site within 150 feet of streams.

E-2: Fueling will not occur within the RHCA.

F - Herbicide Application

F-1: Labels: All label restrictions will be followed. Selected herbicides, picloram and glyphosate comply with this PDF.

F-2: Forest Plan standards will be followed.

F-3: Surfactants: POEA surfactants, urea ammonium nitrate or ammonium sulfate will not be used.

F-4: Lowest Effective Label Rates: Infestation will be treated prior to bloom stage with picloram at 1% solution, and with Aquatic Glyphosate at a 3% rate, the lowest effective label rates.

F-5: Wind: Guideline will be followed.

F-6: Nozzle: Guideline will be followed.

F-7: NA - sulfonylurea herbicides are not proposed for this site.

F-8 Aerial: NA, treatment ground based.

G - Develop Herbicide Transportation and Handling Safety/Spill Prevention and Containment Plan ¬– The transportation and handling/safety will be developed as outlined.

H - Soils, Water and Aquatic Ecosystems

H-1: Buffers- will broadcast spray picloram beyond 100 ft. from the water's edge; spot spray picloram from 100 ft. to 50 ft. from river; and spot spray aquatic labeled glyphosate within 50' of wetland.

H-2: Broadcast on roads – NA, highway roadside not proposed for treatment.

H-3: Riparian vehicle use– will spot spray with backpack in riparian areas.

H-4: Clopyralid on porous soils – NA, not using clopyralid.

H-5: Chlorsulfuron on clay soils- NA, not using chlorsulfuron.

H-6: Picloram on shallow or coarse soils - NA, soils finer than loam

H-7: Sulfometuron methyl on shallow or coarse soils - NA, not using chlorsulfuron.

H-8: Lakes and Ponds – NA, no lakes or ponds present.

H-9: Wetlands – will implement treatment when soils are driest.

H-10: Foam – NA

H-11: Wells – NA, no such developments

H-12: Boat transport – NA – not needed

H-13: Aquatic influence zone- not treating between water's edge and bank full line; will treat much less than 1 acre within the aquatic influence zone along any 1.6 mile length including this site.

I - Vascular and Non-Vascular Plant and Fungi Species of Local Interest

I-1: Consultation with district botanist revealed no need for additional surveys in the area of the infestation. Species of Local Interest (SOLI) or their habitats are not present.

I-2: Habitat – NA, no documented sites

I-3: SOLI – No SOLI identified in treatment area

I-4: T&E - no habitat or sites for Mirabilis macfarlanei and Silene spaldingii

I-5: T&E - no habitat or sites for Mirabilis macfarlanei and Silene spaldingii

I-6: Nonvascular SOLI - no documented sites or habitat

I-7: Aerial Application – NA

I-8: Monitoring to refine SOLI Buffers - NA

I-9: SOLI monitoring - NA, no known SOLI sites or habitat

I-10: Compliance Monitoring – this implementation plan documents compliance with PDFs, etc.

I-11: Implementation Monitoring - The treatment form will be used to document compliance during implementation

I-12: Effectiveness Monitoring: Results of effectiveness monitoring will be reported in FACTS the Forest Service corporate database of record.

J - Wildlife Species of Local Interest

J-1: Wildlife: consultation with the district Wildlife Biologist revealed no areas of special concern or additional surveys needed.

K - Public Notification

K-1: The treatment site will be posted and the public will be notified via the press through an annual notification.

L - Special Forest Products

L-1: Special Forest Products – NA and triclopyr is not the preferred herbicide

M - American Indian Tribal and Treaty Rights

M-1: Indian Tribes will be notified annually

N - Rangeland Resources

N-1: Not applicable

N-2: Permittee will be notified during annual operating meeting

N-3: EPA labels will be followed for grazing – GF

O - Human Health

O-1: Not applicable; sulfometuron methyl will not be applied

O-2: Picloram rate will not exceed 0.35lb/acre

O-3: Not applicable; triclopyr will not be applied

P - Restoration

P-1: will monitor to determine potential restoration opportunities

P-2: Not applicable, not highly disturbed

P-3: Will monitor site following treatment to determine need for further restorative actions.

3: ESA Consultation (Biological Opinion consistency)

The prescribed treatment to spot spray aquatic glyphosate within 50 feet of the wetland and spot spray picloram from 50 feet – 100 feet of the river and wetland, and broadcast spray with picloram beyond the 100-foot stream buffer is consistent with the PDFs and ESA consultation.

4: Forest Plan Compliance Review

Because the project is consistent with all applicable PDFs, it is consistent with the Forest Plan, label guidelines, public notification requirements, and coordination with American Indian Tribes.

5: Pesticide Use Proposal

Site is to be included in annual pesticide use proposal form FSM 2150.

6: Restoration

No immediate restoration is anticipated; however, as invasive plant cover decreases, the site will be evaluated for restoration opportunities.

7: Coordination

Will coordinate treatment with the grazing permittee via the annual operating plan and per PDF N-2.

8: FS Caps

Project will be included among acreages tallied for annual treatment caps.

Treatment strategy

Because of the proximity of this site to vectors like the highway and the river, and because it is adjacent to private land, immediate action to control this site is warranted. The site will be treated with herbicides. Biological controls will not be used on diffuse knapweed because of the time lag required for control. Although clopyralid is effective in controlling diffuse knapweed, picloram is the sole herbicide to be used. Using one herbicide increases efficiency (cost-effectiveness) and eliminates the need to mix additional herbicides. This reduces the opportunity for accidental spills and worker exposure. In the areas beyond the 100-foot buffer from the edge of the river and the wetland, the site will be treated using ATV broadcast techniques with Picloram (at 1% sol.). Between 50 and 100 feet from the river and wetland, invasive plants will be spot sprayed via backpack with picloram (1% sol.). Plants nearer than 50 feet to the wetland will be treated by spot spraying aquatic labeled glyphosate at 3 percent solution. The recommended timing for application is early fall during low flow of the river. The site will be monitored for treatment efficacy and need for revegetation following treatment.

Early Detection Rapid Response (EDRR) Herbicide Use Decision Tree Example

1. Is the target population of the size, phenology, density or distribution that warrants herbicide use?

YES, Target Population: The site is infested with two species: diffuse knapweed (*Centaurea diffusa)* and sulfur cinquefoil (*Potentilla recta*). Diffuse knapweed grows in numerous small spots totaling 1.5 infested acres spotted throughout the 28-acre area. Sulfur cinquefoil grows in fewer, larger, dense patches totaling 2.5 infested acres throughout the 28-acre area.

The site consists of an open meadow with scattered pines. The desired native plant community consists of riparian vegetation, annual grasses, bunch grasses, and forbs. The area is used as rangeland and is within an active sheep allotment. A small wetland lies within the mapped area but is 100 feet away from invasive plants. The site is 1000 feet from a major road (OR 244) and is adjacent to private property. No infestations noted on the private property at this time. Soils vary from loam to finer than loam with a silt/clay mix.

The long term desired condition for this area is control of the invasive species to the point that desirable forbs and grasses can reestablished and. Control would mean that this area would no longer provide a source for spread of invasive plants off site.

Treatment Options: Biological controls exist for diffuse knapweed but not for sulfur cinquefoil. Manual treatment is not effective in controlling sulfur cinquefoil, nor for diffuse knapweed at this site because it is large and would be too costly to treat. Volunteers are not available. Herbicides that are effective for both invasive plants are available.

YES use herbicides due to the high potential for spread via travel vectors and to adjacent private land. (Go to step 2)

Herbicide Choices:

- Diffuse knapweed: Common Control Measures lists picloram and clopyralid as most effective herbicides and glyphosate as a secondary option.
- Sulfur Cinquefoil: Picloram is considered the most effective herbicide. Metsulfuron methyl is a secondary choice.

2. Do the size, density and distribution of invasive plants warrant broadcast application?

YES, sulfur cinquefoil is in large dense patches that warrant broadcast application. Portions of the infestation are within the aquatic influence zone, but not along the nearby road. (Go to step 3a)

NO, diffuse knapweed infestation is too scattered with light density to warrant broadcast application. (Go to step 3b)

3a. Apply surface water buffers.

In the areas beyond the 100-foot buffer from the edge of the river and the wetland, the site will be treated using ATV broadcast techniques with Picloram (at 1% sol.). Between 50 and 100 feet from the river and wetland, invasive plants will be spot sprayed via backpack with picloram (1% sol.). Plants growing nearer than 50 feet to the wetland will be treated by spot spraying aquatic labeled glyphosate at 3 percent solution.

Is the site within an area where broadcasting is prohibited?

YES, portions of the infestation are nearer than the 100-foot broadcast buffer. (Go to step 4)

3b. Are there botanical species of interest (SOLI) or suitable habitat within 100 feet of the proposed broadcast site?

NO, botanical SOLI or suitable habitat are not present. (Go to step 4)

4.Will spot or selective methods be reasonably effective in this situation?

YES, backpack treatment of sulfur cinquefoil and diffuse knapweed is possible at this location. Between 50 and 100 feet from the river and wetland, invasive plants will be spot sprayed via backpack with picloram (1% sol.). Plants growing nearer than 50 feet to the wetland will be treated by spot spraying aquatic labeled glyphosate at 3 percent solution.

Appendix J
Vegetation Management Plan

Wallowa Falls Hydroelectric Project Vegetation Management Plan

September 18, 2013

PURPOSE

The Wallowa Falls Hydroelectric Project boundary is in a mountainous region that is heavily forested with trees of variable species, age, height, diameter, and density. The lands in the Project boundary are largely open to the public and are used extensively for year round recreation (hiking, skiing, camping, horseback riding). A dead, dying, or unstable tree may pose a serious risk to people and/or facilities. In addition to unstable trees, vegetation growing near or on hydroelectric facility (e.g. dam, spillway, and penstock) may be a potential hazard by increasing the threat of fire, roots penetrating or uplifting structures. In addition vegetation growing on or near dams or other facilities may prevent inspections or maintenance. This document provides the procedures for implementing a consistent hazard tree and vegetation inspection and best management practices to reduce the risk of fatalities, injuries, and facility damage due to vegetation. As this management plan is implemented it may need to be revised to improve methods, best management practices, and to adapt to conditions/regulations over time.

PROCEDURE

Hazard Tree and Vegetation Inspection:

The Project boundary and all PacifiCorp owned lands will have a hazard tree and vegetation inspection. The inspection will be conducted by a PacifiCorp employee or a designated contractor that is qualified to identify and assess hazards trees and other vegetation that is a risk to facilities. A qualified person is defined as an individual that has the knowledge, training, and experience in identifying risk associated from hazard trees and/or vegetation near facilities. The inspection will include a walk-through inspection to visually assess all PacifiCorp owned lands and lands within the Project boundary that have public use, parked vehicles, structures, or facilities, which include but are not limited to:

- Access road
- Campground
- Dam and spillway
- Forebay
- Leased land that have structures
- Parking area along Joseph-Wallowa Lake Highway
- Penstock
- Powerhouse
- Royal purple diversion and flow line
- Storage shed
- Substation
- Tailrace

- Trails
- Transmission line

Inspection Schedule:

These inspections will occur at a minimum of every other year and may occur more frequently if needed to reduce and manage hazards. Inspections should occur during the growing season; however, additional inspections may be needed to assess risks following catastrophic events (e.g. major storms, avalanche, landslides, floods) and these can occur anytime of the year.

Inspection Records:

It is essential that inspections consistently record the same information for each hazard. This is because hazards with low risk rating may only require monitoring for several years to insure that the risk doesn't progress. Also consistent and proper records will provide rational for implementing remedial actions. Documentation should include the following items**:**

- Area that is being assessed. This may be specific Project facility (e.g. penstock, dam), structure (e.g. trail, bathroom), or general area (e.g., campgrounds, forebay).
- Describe the areas overall condition (e.g. vegetation, soil disturbance etc.)
- Inspection date
- Weather during inspection
- Note if the inspection is a routine biennial inspection or additional inspection following a catastrophic event.
- Assign a unique 6 digit number for each hazard for tracking purposes. This number should be used for each inspection that the hazard is assessed. The first two numbers should be the year the hazard was first identified and the last four numbers are unique. For example all hazard trees identified in 2013 would be number 130001, 130002 etc. The following information should be collected:

    - describe exact location or provide GPS coordinates
    - vegetation type (tree, shrub etc.)
    - species
    - height
    - tree diameter at breast height in inches (if applicable)
    - describe defect (see definition below)
    - describe target (see definition below)
    - determine risk rating for each hazard from tables below
    - prescribe a recommended remedial action and schedule
    - provide photograph of the hazard

Risk Assessment:

Each hazard will have a risk assessment completed during each inspection. This will require identifying the hazard and rating its risk potential using the tables below

Hazard Rating	
Risk Potential	**Extent of Defect**
High	Dead tree; severe or extensive decay; leaning, up-rooted trees; large (4" or greater) hanging branches, i.e., widow makers; broken, hanging tops; severe root rot. Highly defective trees; trees with root anchorage limited by erosion, excavation or undermining; trees with heavy lean; root rot; split crotches; decay; multiple deadwood 4" and greater. Fruiting bodies on butt or on the ground. Multiple fruiting bodies along length of stem. Co-dominant branches with included bark.
Medium	Trees or vegetation that show declining vigor due to one or more of defects, trees exposed to saturated soils and/or strong winds; shallow rooted trees or growing in shallow soils. Moderate lean.
Low	Healthy trees or vegetation with only minor defects and are not exposed to regular weather extremes. Healthy trees or vegetation with recent signs of damage.

For each hazard the potential target will need to be assessed for damage potential using the table below.

Damage Rating	
Damage Potential	**Description of Damage**
High	Damage to property would be severe and/or area is frequently occupied by people
Moderate	Damage to property would be moderate and/or area is occasionally occupied by people
Low	Damage to property would be low and/or area rarely is occupied with people

Once the damage and hazard ratings have been identified the risk rating can be determined using the risk assessment table below.

Risk Assessment			
Risk Rating	**Hazard Rating**	**Damage Rating**	**Action Schedule**
1	High	High	Immediate
2	High	Medium	Within 1 year
3	High	Low	Within 2 years
2	Medium	High	Within 1 year
3	Medium	Medium	Within 2 years
4	Medium	Low	To be determined
3	Low	High	Within 2 years
4	Low	Medium	To be determined
5	Low	Low	To be determined

Remedial Action:

For each hazard a recommended remedial action and proposed schedule for the action needs to be documented. The proposed schedule should correspond to the Risk Assessment Action Schedule (see table above); if not then rationale for deviating from the schedule should be documented. Schedules for hazards with a risk rating of 4 or 5 should be based on the assigned remedial action. For example, if the remedial action is to monitor then the schedule would be to reevaluate in 2 years or following any catastrophic event.

The two ways to remove or reduce a risk is to remove the hazard or to remove the target. Target removal is not always achievable, but some examples include closing a parking area, closing trails, moving picnic structures, posting signs to keep people out of an area, or removing a structure. More often managing the hazard is the easiest solution for removing or reducing a risk. Some recommended actions for removing the hazard may include:

- **Tree Removal**: It may be necessary to remove a tree to reduce risk. A careful analysis of the risk rating and other management alternatives should be considered before recommending the removal of live trees. Tree removal must be conducted in a method that minimizes damage to residual vegetation.

- **Topping:** Removing the top of a hazard tree to a height that no longer poses a risk may be an option under some circumstances, and may be a more desirable option because it can enhance wildlife habitat within the Project boundary.

- **Pruning:** Pruning can be an effective method for removing hazards when branches, dead tops or multiple tops are the primary reasons for rating the vegetation as a hazard. Pruning when done properly may improve the overall the health of the tree.

- **Control Methods:** Control methods may include mechanical, chemical, and cultural and usually a combination of these methods may be needed to successfully reduce risk or to prevent risk in the future (PacifiCorp 2012).
    - Mechanical methods include mowing or using other hand tools to remove vegetation from an area.
    - Chemical methods are the use of herbicides or tree growth regulators to kill, reduce, or regulate growth in vegetation. It can be quite effective, but must be administered in accordance to their label and by a licensed applicator.
    - Cultural methods modify habitat to discourage incomparable vegetation. This can be achieved by cover type conversion which provides a competitive advantage to short-growing, early successional plants, allowing them to thrive and eventually out-compete unwanted tree species.

BEST MANAGEMENT PRACTICES

The following best management practices should be applied when removing or modifying vegetation.

- When feasible schedule all tree removal outside of the active nesting period (March 1 to July 30)
- PacifiCorp has a special use permit with the United States Forest Service (USFS) for Project facilities that are on USFS land that expires on December 31, 2016. The current permit requires that all trees and shrubbery that is removed or destroyed on USFS lands needs to have prior approval from the forest officer in charge.
- Debris piles should be reduced to the extent possible and spaced apart to not impede big game travel across the transmission line right-of-way
- Avoid dropping any portion of a tree into the creek, river, or wetland

DEFINITIONS

Defects – Any feature, fault, or flaw that lowers the strength, integrity, or utility of an affected part:

- dead tree
- dead top or large dead branches (> 5 inches in diameter)
- fire-damaged trees
- bole wounds, mistletoe cankers, conks, or fungal cankers
- leaning and/or root sprung trees
- undermined or severed root systems

The Field Guide for Danger Tree Identification and Response (Toupin et al, 2008) and Long-Range Planning for Develop Sites in the Pacific Northwest (Harvey and Hessburg 1992) provide guidelines for identifying disease and defects.

Hazard: For the purposes of this document it is vegetation that is one of the following:

- Vegetation, such as a tree, with an identifiable structural defect or other condition that predisposes it or part of it to failure and will potentially injure people or cause property damage in the event of its failure.

- Vegetation that is growing on or near a facility and poses a significant hazard to that facilities operation.

Target: The person, structure, or facility that may be damaged by the vegetation that is identified as a risk.

REFERENCES

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PacifiCorp. 2012. Transmission & Distribution Vegetation Management Program Specification Manual. June 15, 2012

Toupin, Richard, and Michael Barger. 2005. Field Guide for Danger Tree Identification and Response. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region and U.S. Department of Interior Bureau of Land Management. Forest Health Protection Technical Report Technical Paper R6-NR-FP-03-05. 56 p.

Appendix K
Draft Unanticipated Discovery Plan for Cultural Resources and Human Remains

APPENDIX K

Protocols for the Unanticipated Discovery of Historic Properties, Treatment of Human Remains, Response to Vandalism, and Emergency Response

Prepared for

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PROTOCOL FOR THE UNANTICIPATED DISCOVERY OF HISTORIC PROPERTIES

Despite efforts to identify cultural materials within the APE, it is possible for unknown cultural resources, particularly archaeological resources, to be uncovered or located during routine maintenance and construction activities. If any cultural resources that appear to be older than 50 years are encountered by PacifiCorp staff during routine maintenance and construction activities the following protocols will be implemented:

- If any member of a construction, maintenance, or other field crew believes that he or she has discovered cultural resources, all work within 100 feet of the discovery will stop, and the work supervisor will be immediately notified. The area of work stoppage may be expanded based on consultation with PacifiCorp's work supervisor and cultural resources coordinator and will be adequate to provide for the security, protection, and integrity of the cultural materials.

- The work supervisor and/or cultural resources coordinator will take appropriate steps to protect the discovery site. At a minimum, the immediate area and/or within 100 feet of the discovery site will be secured. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not be re-started until treatment of the discovery has been completed.

- The cultural resources coordinator will be responsible for conducting a review by a qualified professional of the discovery and consider whether the discovery is potentially eligible for listing in the NRHP.

- If the discovery appears to be eligible for listing in the NRHP, the cultural resources coordinator will immediately consult with the Federal Energy Regulatory Commission (FERC), affected Indian tribes, and the SHPO and/or USFS regarding significance. If the consulting parties determine that the discovery is an eligible prehistoric or historic Native American deposit, then PacifiCorp will further consult with the SHPO and/or USFS and affected Indian tribes to determine potential cultural heritage significance and the appropriate treatment of the find. Treatment measures may include mapping, photography, limited probing and sample collection, or other activity.

- The cultural resources coordinator will prepare a report on the methods and results of the treatment measures within 1 month of completion of the measures. The report will be addressed to the FERC, affected Indian Tribes, SHPO and/or USFS for review and comment. After a 30-day review period, PacifiCorp will make revisions that take into account review comments and will provide a copy of the final report to each of these parties.

PROTOCOL FOR TREATMENT OF HUMAN REMAINS

The possibility of preserved human skeletal material, or conclusive material evidence of burial sites, cannot be disregarded. In the event that human remains are encountered within the Project boundary, whether during planned maintenance and construction activities, authorized archaeological excavations, or as a result of natural processes, the following protocol will be strictly followed:

- All ground disturbing activity within 100 feet of the remains will be halted immediately.

- The cultural resources coordinator will be immediately contacted and will assume responsibility for assuring that this protocol is followed.

- Compliance with federal and state laws including the Native American Graves Protection Act (NAGPRA) [25 U.S.C. 2001 et. seq.] and it's implementing regulations, 43 C.F.R. Part 10, the Oregon Revised Statute 97.745(4), and the Advisory Council on Historic Preservation's (ACHP) Policy Statement on the Treatment of Burial Sites, Human Remains, and Funerary Objects (February 23, 2007) will be required depending on the location at where the discovery was made.

- All skeletal material will be left in place until a designated professional archaeologist or medical examiner directs its removal.

- If the discovery is located on USFS lands, the cultural resources coordinator will contact the USFS immediately. The USFS will notify the Wallowa County Medical Examiner, Wallowa County Sheriff, State Police, SHPO, Legislative Commission on Indian Services (CIS), and all appropriate Indian tribes within forty-eight (48) hours of the discovery.

    - The Medical Examiner will determine whether the remains are part of a potential crime scene. A forensic anthropologist may be required to determine whether the remains are of Native American ancestry.

    - Within seventy-two (72) hours after notification, the USFS shall determine the treatment, including mitigation and disposition of the unmarked human burial or unregistered grave following the Archaeological Resources Protection Act (ARPA) [16 U.S.C. 470aa-470mm] and its implementing regulations 43 C.F.R. Part 7. The USFS shall implement a culturally sensitive plan for reburial. The human remains and any associated funerary objects will not be manipulated, or transported from the original location until a plan is developed in consultation with the Medical Examiner, SHPO, and affected tribes. These actions will help ensure compliance with NAGPRA, which prohibits any person willfully removing human remains and/or objects of cultural significance from its original location. All parties shall regard the find and reburial as confidential unless all parties prepare and sign an information release agreement.

- If the discovery is located on state or private lands, the cultural resources coordinator will notify the Wallowa County Medical Examiner, Wallowa County Sheriff, State Police, SHPO, USFS, CIS, all appropriate Indian tribes, and the landowner within forty-eight (48) hours of the discovery.

    - The Medical Examiner will determine whether the remains are part of a potential crime scene. A forensic anthropologist may be required to determine whether the remains are of Native American ancestry.

    - Within seventy-two (72) hours after notification, the State Police will determine jurisdiction. If the State Police refers the matter to the SHPO, the SHPO, in consultation with the CIS and applicable Indian tribes, shall determine the treatment, including mitigation and disposition of the unmarked human burial or unregistered grave and shall implement a culturally sensitive plan for reburial. The human remains and any associated funerary objects should not be manipulated, or transported from the original location until a plan is developed in consultation with the above named parties. These actions will help ensure compliance with ORS 97.745, which prohibits any person willfully removing human remains and/or objects of cultural significance from its original location. All parties shall regard the find and reburial as confidential unless all parties prepare and sign an information release agreement.

- If the Medical Examiner determines the remains to be historical and Indian, the interests of the Tribes become paramount.

- If the remains are determined to be Indian, no analyses beyond inventory will be performed without written consent of the Tribes.

- The remains will not be transported off site, except to protect them from imminent damage.

- The remains will not be transported beyond the borders of the state of Oregon without written consent from the SHPO and the Tribes.

- PacifiCorp will allow reburial on utility property if the Tribes desire that action. Selection of a PacifiCorp-managed reburial location will take into account foreseeable future uses of the location.

- If the Medical Examiner determines the remains to be historical and non-Indian, PacifiCorp will use historic documentation in an attempt to locate familial descendants. If descendants are located, PacifiCorp will allow reburial on utility property if that is requested.

- The location of reburials will be noted on planning maps to prevent future disturbance. These maps will be kept confidential and will not be available to the public.

- PacifiCorp will treat areas of known burials; both *in-situ* and reburials, with the respect accorded any cemetery.

- PacifiCorp shall resume activities in the area of the discovery upon receipt of written authorization from the Wallowa County Sheriff, State Police, SHPO, or CIS (whoever has jurisdiction under state law).

PROTOCOL FOR RESPONSE TO VANDALISM

Vandalism consists of disturbance to historic properties, including unauthorized digging into archaeological sites or collection of artifacts. The probability for vandalism within the project is low; however, if at any time, PacifiCorp employees or contractors encounter unauthorized visitors who appear to be digging or collecting materials from the ground surface, or are in possession of excavation equipment, or if a PacifiCorp representative encounters evidence of recent unauthorized excavations or abandoned digging equipment (such as screens or shovels), the following protocol will be implemented.

- If a possible vandal or looter is present, the PacifiCorp representative will note information about the person, their equipment, and their vehicle and immediately relay the information to the work supervisor, who will confirm the information and notify the Wallowa County Sheriff's Office and/or USFS.

- If the PacifiCorp representative notes abandoned excavations or digging equipment, they will notify within 24 hours the cultural resources coordinator, who will notify the Wallowa County Sheriff's Office and/or USFS and the SHPO. The cultural resources coordinator will visit the site as soon as possible to assess any damage.

- If a hunter-fisher-gatherer site has been vandalized, the cultural resources coordinator will notify representatives of the federally recognized Indian tribes and the SHPO about this assessment and will invite them to attend the site inspection.

- The assessment of impact will be described in a formal letter report from PacifiCorp to the FERC, affected Indian tribes, SHPO, and USFS, if applicable.

- In consultation with the FERC, affected Indian tribes, SHPO, and USFS (if applicable), PacifiCorp will identify what actions, if any, should be taken to mitigate damage to an affected site and/or prevent further damage.

- Any act of vandalism or looting that involves human remains will also trigger the protocol for the treatment of human remains outlined above.

- All acts of vandalism or looting will be referred to the Wallowa County Sheriff and/or USFS for investigation and possible prosecution.

PROTOCOL FOR EMERGENCY RESPONSE

A number of events can occur within the Project that require a rapid response in order to safeguard facilities, provide for protection of wildlife habitat, protect public and private property, and prevent serious injury or loss of human life. These include, but are not limited to; forest fire, wind and electrical storms, mass wasting events (erosion), flood, earthquake, and dam or other Project facility failure. The emergency response protocol is designed to be implemented after such events have occurred.

- The supervisor of response will notify the cultural resources coordinator of the location and nature of the emergency activities.

- The cultural resources coordinator will check relevant databases for historic properties in the vicinity of the emergency.

- If historic properties are in the area of the emergency or the response (for example, both the area of the forest fire and the location of the construction of a fire line), then the cultural resources coordinator will be responsible for conducting a professional review by a qualified person of the condition of those properties.

- The cultural resources coordinator will use existing documentation as a comparison to a field visit to determine if historic properties and/or cultural resources have been destroyed, damaged, or endangered by the emergency event or the response. If any of these conditions exist, then the cultural resources coordinator will document them in the field with mapping, photographs, and, in the case of imminent loss, collection of artifacts. The cultural resources coordinator will prepare a report documenting the nature and location of the emergency event, the nature of the response, the impact on the historic properties and/or cultural resources, and any proposals to prevent further damage to the properties and to mitigate for the loss. This report will be submitted to the FERC, affected Indian tribes, SHPO and/or USFS within 4 months of the event for review and comment. After a 30-day comment period, the comments of all of the consulting parties will be incorporated into a final report and copies will be sent to all of the participating parties.

- If no alteration to the condition of the properties has occurred, a letter to that effect noting the date(s) of the field visit(s) will be placed on file in lieu of the formal report.

AGENCY CONTACTS

Wallowa Whitman National Forest, USFS

Primary Contact: Eric Harvey
(office: 541-523-6391)

Wallowa County Medical Examiner

Primary Contact: Lowell E. Euhus, MD
(office: 541-426-4502)

Wallow County Sheriff

Primary Contact: Steve Rodgers
(office: 541-426-3131 or 911)

State Police

Primary Contact: Lt. Steven R. Lane, Department of State Police
(office: 503-378-3387 x242) (cell: 503-931-7273)

State Historic Preservation Office

Primary Contact: Dr. Dennis Griffin, State Archaeologist
(office: 503-986-0674) (cell: 503-881-5038)

Secondary Contact: John Pouley, Assistant State Archaeologist
(office: 503-986-0675) (cell: 503-480-9164)

Legislative Commission on Indian Services:

Primary Contact: Karen Quigley, Director (office: 503-986-1067)