Goldendale Energy Storage Hydroelectric Project (FERC No. 14861)

Klickitat County, Washington

NOTIFICATION OF INTENT

Prepared for

FFP Project 101, LLC

January 2019

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TABLE OF CONTENTS

I. Notification of Intent.....1

II. Designation as Non-Federal Representative and Authorization to Initiate Consultation.....4

III. Public Notice.....4

ATTACHMENTS

Attachment 1. Distribution List

Attachment 2. Pre-Application Document

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I. NOTIFICATION OF INTENT

The FFP Project 101, LLC hereby notifies FERC of its intent to file an application for an original license for the Goldendale Energy Storage Project No. 14861 (Project), a closed-loop system, in Washington State off the Columbia River near to the John Day Dam on the Columbia River.

The follow information is provided pursuant to 18 C.F.R. § 5.5(b).

(1) The license applicant name and address:

FFP Project 101, LLC
220 NW 8th Ave
Portland, OR 97209
Phone: 503.998.0230

(2) The project liaison for all correspondence is:

Mr. Erik Steimle
Rye Development
220 NW 8th Ave
Portland, OR 97209
Phone: 503.998.0230
E-mail: erik@ryedevelopment.com

Secondary contact:

Nathan A. Sandvig
National Grid
E-mail: nathan.sandvig@nationalgrid.com

(3) FERC project number:

Project No. P-14861

(4) Statement of intent to file:

FFP Project 101, LLC hereby unequivocally states its intent to file an application for an original license for the Goldendale Energy Storage Project No. P-14861.

(5) The type of principal project works licensed, if any, such as dam and reservoir, powerhouse, or transmission line:

The proposed Project is a closed-loop pumped storage hydropower facility located off-stream of the Columbia River at John Day Dam, located on the Washington (north) side of the Columbia River at River Mile 215.6. The Project will be located approximately 8 miles southeast of the City of Goldendale in Klickitat County, Washington.

The proposed Project will involve no river or stream impoundments, allowing for minimal potential environmental impact. Initial fill water and periodic make-up water will be purchased from Public Utility District No. 1 of Klickitat County, Washington (KPUD) using a KPUD-owned conveyance system and municipal water right.

The Project facilities include:

- An upper reservoir consisting of a rockfill embankment dam approximately170 feet high, 8,000 feet long, a surface area of about 59 acres, storage of 7,100 acre-feet (AF), at an elevation of 2,940 feet above mean sea level (AMSL);
- A lower reservoir consisting of an embankment approximately 170 feet high, 7,400 feet long, a surface area of about 62 acres, storage of 7,100 AF, and an elevation of 580 feet AMSL.
- An underground water conveyance tunnel and underground powerhouse; and
- 230-kilovolt (kV) transmission line(s).

The rated (average) gross head of the Project is 2,400 feet, and the rated total installed capacity is 1,200 megawatts (MW).

Additional Project descriptions are included in Section 3.4 of the attached Preliminary Application Document (PAD).

(6) The location of the project by state, county, nearby town, and stream:

States: Washington and Oregon
County: Klickitat County, WA and Sherman County, OR
Nearby Town: Goldendale, WA
Adjacent Body of Water: Columbia River/John Day Pool (closed-loop system)

(7) The installed plant capacity:

Total nameplate capacity 1,200 MW (3 × 400-MW reversible, adjustable speed pump/turbine motor/generator units)

(8) The names and mailing addresses of:

(i) County

Klickitat County, Washington
David McClure
Director of Economic Development and Natural Resources
127 W Court Street

Annex 5, MS-CH-26
Goldendale, WA 98620

Sherman County, Oregon
Georgia Macnab
Planning Director
P.O. Box 381
Moro, OR 97039

(ii) Cities, Towns, and Similar Political Subdivisions:

(1) In which any part of the Project or federal facility that would be used by the Project would be located:

None.

(2) With a population of 5,000 or more and is located within 15 miles of the Project facilities:

City of Goldendale
1103 S. Columbia Ave.
Goldendale, WA 98620

(iii) Irrigation districts, drainage districts, or similar special purpose political subdivisions:

(1) In which any part of the Project, and any federal facilities that would be used by the Project, would be located:

None.

(2) That owns, operates, maintains, or uses any project facilities or any federal facilities that would be used by the Project:
None.

(iv) Other political subdivisions in the general area of the Project that are likely to be interested in, or affected by, this notice of intent:

Washington State Department of Fish & Wildlife
600 Capitol Way N.
Olympia, WA 98501

State of Washington Department of Ecology
PO Box 47775
Olympia, WA 98504

U.S. Army Corps of Engineers, Portland District
PO Box 2870
Portland, OR 97208

National Oceanic and Atmospheric Administration Fisheries
West Coast Region
7600 Sand Point Way Northeast
Seattle, WA 98115

U.S. Fish and Wildlife Service
Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey, WA 98503

United States Geological Survey
Washington Water Science Center
934 Broadway, Suite 300
Tacoma, WA 98402

(v) Affected Indian tribes:

Confederated Tribes of the Yakima Nation
401 Fort Road
P.O. Box 151
Toppenish, WA 98948

II. DESIGNATION AS NON-FEDERAL REPRESENTATIVE AND AUTHORIZATION TO INITIATE CONSULTATION

Pursuant to 18 C.F.R. § 5.6(c), FFP Project 101, LLC hereby requests to be designated FERC's non-federal representative for purposes of consultation under Section 7 of the Endangered Species Act and the joint agency regulations thereunder at 50 CFR part 402, and Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and the implementing regulations at 50 CFR 600.9920. FFP Project 101, LLC also requests authorization to initiate consultation under Section 106 of the National Historic Preservation Act and the implementing regulations at 36 CFR 800.2(c)(4).

III. PUBLIC NOTICE

As required by 18 CFR 5.3(d)(2), FFP Project 101, LLC published notice of the filing of its NOI and of the PAD contemporaneously with the filing date of the NOI in the following newspapers of general circulation in the Project region: the Goldendale Sentinel and the Times-Journal (Sherman County).

ATTACHMENT 1. DISTRIBUTION LIST

January 2019 Goldendale Energy PAD Distribution List		
Agency	**Contact Name**	**Title**
Advisory Council on Historic Preservation, Old Post Office Building	Executive Director	1100 Pennsylvania Ave NW, Suite 803 Washington, DC 20004
American Canoe Association	Executive Director	503 Sophia Street, Suite 100 Fredericksburg, VA 22401
American Council On Renewable Energy	Tom Weirich	1600 K Street NW, Suite 650 Washington, D.C. 20006
American Rivers	Wendy McDermott	PO Box 1234 Bellingham, WA 98227
American Whitewater	Executive Director	P.O. Box 1540 Cullowhee, NC 28723
Argonne National Laboratory	Vladimir Koritarov	9700 S Cass Ave., B109 Lemont, IL 60439
Association of WA Business		1414 Cherry St SE Olympia, WA 98501
Attorney and Consultant	Diane Henkels	6228 SW Hood Portland, OR 97239
Audubon Society	Conservation Director	1200 18th Street NW, Suite 500 Washington, DC 20036
Bonneville Environmental Foundation	Dick Wanderscheid	240 SW 1st Avenue Portland, OR 97204
Bonneville Power Administration	Elliot Mainzer, Administrator	PO Box 3621 Portland, OR 97208-3621
Bureau of Indian Affairs, U.S. Department of the Interior	Regional Director	911 NE 11th Avenue Portland, OR 97132
Bureau of Indian Affairs, U.S. Department of the Interior	Director	1849 C Street NW, MS 2624 MIB Washington, DC 20240
Center for Environmental Law & Policy	Dan Von Seggern Staff Attorney	85 S Washington St. Suite 301 Seattle, WASHINGTON 98104 dvonseggern@celp.org
Citizens' Utility Board of Oregon	Jeff Bissonette	610 SW Broadway Portland, OR 97205
City of Goldendale	Larry Bellamy	1103 S. Columbus Ave Goldendale, WA 98620
Columbia River Gorge Commission	Executive Director	NE Wauna Ave, P.O. Box 730 White Salmon, WA 98672-0730
Columbia River Gorge Commission	Terry Cullen	NE Wauna Ave, P.O. Box 730 White Salmon, WA 98672-0730

Columbia River Inter-Tribal Fish Commission	Paul Lumley	700 NE Multnomah Street, # 1200 Portland, OR 97232
Columbia Riverkeeper	Simone Anter	111 3rd ST. Hood River, OREGON 97031 simone@columbiariverkeeper.org
ColumbiaGrid	Ed Sienkiewicz	8338 NE Alderwood Road, Suite 140 Portland, OR 97220
Confederated Tribes and Bands of the Yakima Nation	Brady Kent	P.O. Box 151 Toppenish, WA 98948-0151
Confederated Tribes of the Umatilla Indian Reservation	Chairman	P.O. Box 638 Pendleton, OR 97801-0638
Confederated Tribes of the Umatilla Indian Reservation		46411 Timíne Way Pendleton, OR 97801
Confederated Tribes of Warm Springs	Chairman	1233 Veterans Street Warm Springs, OR 97761
Congressman Greg Walden		843 E Main St, #400 Medford, OR 97504
Congresswoman Jaime Herrera Beutler		750 Anderson Street, Suite B Vancouver, WA 98661
Environmental Protection Agency (EPA), Region 10	Theo Mbabaliye, Ph.D.	1200 6th Ave, Suite 900, ETPA-202-3 Seattle, WA 98101-3140
Federal Emergency Management Agency	Director	500 C Street SW Washington, DC 20472
Federal Energy Regulatory Commission	The Honorable Kimberly D. Bose	888 First Street NE Washington, DC 20426
Federal Energy Regulatory Commission, Division of Dam Safety and Inspections	Douglas Johnson	805 SW Broadway Portland, OR 97205
Foundation for Water and Energy Education	Andy Dunau	2206 S. Sherman Spokane, WA 99203
Friends of the Columbia Gorge, Portland Office		522 SW Fifth Avenue, Suite 720 Portland, OR 97204
FRIENDS OF THE WHITE SALMON RIVER	Patricia Arnold	472 Sunnyside Road Trout Lake, WASHINGTON 98650 greenpastures@gorge.net
Goldendale Sentinel	Lou Marzeles, Editor	117 W Main St. Goldendale, WA 98620
Greater Goldendale Area Chamber of Commerce		903 E Broadway St. Goldendale, WA 98620

Hydropower Reform Coalition	National Coordinator	1101 14th St. NW, Suite 1400 Washington, DC 20005
Hydropower Reform Coalition	Northwest Coordinator	830 Reville Street Bellingham, WA 98229
Hydropower Reform Coalition	National Coordinator	1101 14th St. NW, Suite 1400 Washington, DC 20005
Kiwanis Club of Goldendale	Nancy Johnson	PO BOX 993 Goldendale, WA 98620
Klamath General Council	Chairman	P.O. Box 436 Chiloquin, OR 97624-0436
Klickitat County Clerk's Office	Renea Campbell	205 S. Columbus Ave, Room 204, MS-CH-3 Goldendale, WA 98620
Klickitat County Economic Development Association, Annex 5	Dave McLure	127 West Court Street, MS-CH-26 Goldendale, WA 98620
Klickitat County, Prosecuting Attorney's Office		205 S. Columbus Ave, Room 204, MS-CH-3 Goldendale, WA 98620
Klickitat, County of	David Quesnel	205 S. Columbus Ave. Room 106 Goldendale, WASHINGTON 98620
Klickitat, County of	Rebecca Sells	205 S. Columbus Ave. Room 106 Goldendale, WASHINGTON 98620 rebeccas@klickitatcounty.org
National Oceanic and Atmospheric Administration	Administrator	1401 Constitution Ave NW, Room 6217 Washington, DC 20230
National Oceanic and Atmospheric Administration National Marine Fisheries Service		1201 NE Lloyd Blvd, Ste 1100 Portland, OR 97232-1274
National Oceanic and Atmospheric Administration, Marine Chart Division - Nautical Data Branch	Diane Melancon	N/CS26 Station 7331, 1315 E-W Highway Silver Spring, MD 20910
National Oceanic and Atmospheric Administration, National Marine Fisheries Service		1201 NE Lloyd Blvd, Ste 1100 Portland, OR 97232-1274
National Oceanic and Atmospheric Administration, Northwest Fisheries Science Center	Director	2725 Montlake Boulevard East Seattle, WA 98112
National Oceanic and Atmospheric Administration, Regional Fisheries Office	Regional Administrator	7600 Sand Point Way NE Seattle, WA

National Park Service, One Jackson Center	Regional Director	1111 Jackson Street, Suite 700 Oakland, CA 94607
National Park Service, U.S. Department of the Interior	Director	1849 C Street NW Washington, DC 20240
National Renewable Energy Laboratory	Washington, D.C. Office	901 D. Street, S.W., Suite 930 Washington, D.C. 20024-2157
Naval Seafloor Cable Protection Office, Naval Facilities Engineering	NAVFAC-OFP/C	1322 Patterson Ave SE, Suite 1000 Washington, DC 20374-5065
Northwest & Intermountain Power Producers Coalition	Robert Kahn	P.O.BOX 504 Mercer Island, WA 98040
Northwest Environmental Business Council	Robert Grott	620 SW 5th Ave., #1008 Portland, OR 97204
Northwest Power and Conservation Council	Council Member	851 S.W. Sixth Avenue, Suite 1020 Portland, OR 97204
Northwest River Partners	Terry Flores	101 SW Main St. Portland, OR 97204
NW Energy Coalition	Jeff Bissonnette	811 1st Ave., Suite 305 Seattle, WA 98104
Office of Archeology & Historic Preservation	SHPO	P.O. Box 48343 Olympia, WA 98504-8343
Office of Environmental Affairs, U.S. Department of the Interior		1849 C Street NW, Room 2340 MIB Washington, DC 20240
Office of Environmental Policy, U.S. Department of the Interior		911 NE 11th Avenue Portland, OR 97232
Office of Senator Cantwell	U.S. Senator	511 Dirksen Senate Office Building Washington, DC 20510
Office of Senator Merkley	U.S. Senator	313 Hart Senate Office Building Washington, DC 20510
Office of Senator Murray	U.S. Senator	173 Russell Senate Office Building Washington, DC 20510
Office of Senator Wyden	U.S. Senator	221 Dirksen Senate Office Building Washington, DC 20510
Office of the Attorney General	Bob Ferguson	1125 Washington Street SE, P.O. Box 40100 Olympia, WA 98504-0100
Office of the Attorney General, Justice Building	Ellen Rosenblum	1162 Court Street NE Salem, OR 97301
Office of the Governor	Jay Inslee	P.O. Box 40002 Olympia, WA 98504-0002
Office of the Governor	Kate Brown	900 Court Street NE, Room 254 Salem, OR 97301-4047

Oregon Department of Agriculture	Bruce Pokarney	635 Capitol Street NE Salem, OR 97301-2532
Oregon Department of Energy	Rebecca O'Neil	625 Marion St. NE Salem, OR 97301-3737
Oregon Department of Environmental Quality	Director	811 SW 6th Ave Portland, OR 97204
Oregon Department of Fish and Wildlife	Elizabeth Moats Northeast Regional Hydropower	107 20th Street La Grande, OREGON 97850 Elizabeth.A.OsierMoats@state.or.us
Oregon Department of Forestry	Director	2600 State Street Salem, OR 97310
Oregon Dept. of Land Conservation and Development	Director	635 Capitol Street NE, Suite 150 Salem, OR 97310-2540
Oregon Natural Resources Council	Administrator	5825 N. Greely Avenue Portland, OR 97217
Oregon Parks & Recreation Department State Historic Preservation Office	Assistant Director, Heritage	725 Summer Street NE, Suite C Salem, OR 97301
Oregon Public Utility Commission, Administrative Hearings Division	Diane Davis	550 Capitol St NE, #215 Salem, OR 97310
Oregon State Chamber of Commerce		6075 Ulali Dr, Suite 102 Keizer, OR 97303
Oregon State Marine Board	Director	PO Box 14145 Salem, OR 97309-5065
Oregon State Parks and Recreation Department, Officer of the Director	Director	725 Summer Street NE, Suite C Salem, OR 97301
Oregon Water Resources Department, Hydroelectric Section	Mary Grainey	725 Summer Street NE, Suite A Salem, OR 97301
Oregon Wild	Conservation Director	5825 North Greeley Portland, OR 97217-4145
Pacific Coast Federation of Fishermen's Associations	Northwest Regional Director	P.O. Box 11170 Eugene, OR 97440-3370
Public Power Council	Scott Corwin	825 NE Multnomah Street Portland, OR 97232
SEPA Center, Washington Department of Natural Resources		P.O. Box 47015 Olympia, WA 98504-7015
Sherman County Clerk's Office	Jenine McDermid	PO Box 365, 500 Court Street Moro, OR 97039
The Institute for Fisheries Resources	Program Director	PO Box 11170 Eugene, OR 97440-3370

The Nature Conservancy, Washington Program	Michael Powelson	1917 First Avenue Seattle, WA 98101
The White Salmon Enterprise	Sverre Bakke, Editor	220 Jewett Blvd, PO Box 218 White Salmon, WA 98672
Trout Unlimited		227 SW Pine Street, Suite 200 Portland, OR 97204
U.S. Army Corps of Engineers, Deputy District Engineer for Project	Kevin Brice	P.O. Box 2946 Portland, OR 97208
U.S. Army Corps of Engineers, Portland District	Colonel Aguilar	P.O. Box 2946 Portland, OR 97208-2946
U.S. Army Corps of Engineers, Wetlands Regulatory Program	District Engineer	P.O. Box 2946 Portland, OR 97208
U.S. Bureau of Land Management, Lands and Minerals Adjudication	State Director	P.O. Box 2965 Portland, OR 97208
U.S. Bureau of Land Management, U.S. Department of the Interior	Director	1849 C Street NW, MIB 5655 Washington, DC 20240
U.S. Bureau of Land Management, U.S. Department of the Interior	Commissioner	1849 C Street NW Washington, DC 20240
U.S. Bureau of Reclamation, U.S. Department of the Interior	Regional Director	2800 Cottage Way Sacramento, CA 95825
U.S. Coast Guard, Navigation Standards Division	Commandant (CG-5533)	2100 2nd St. SW, Stop 7580 Washington, DC
U.S. Department of Agriculture - Forest Service	Chief	1400 Independence Ave SW Washington, DC
U.S. Department of Agriculture - Forest Service, Columbia River Gorge	Lynn Burditt	P.O. Box 3623 Portland, OR 97208-3623
U.S. Department of Agriculture - Forest Service, Federal Building	Regional Forester	200 E. Broadway, P.O. Box 7669 Missoula, MT 59807-7669
U.S. Department of Commerce, Office of the Secretary	Secretary	1401 Constitution Avenue NW Washington, DC 20230
U.S. Environmental Protection Agency	Regional Administrator	1200 Sixth Avenue, Suite 900 Seattle, WA 98101
U.S. Environmental Protection Agency	Environmental Protection Specialist	1200 Sixth Avenue, Suite 900 Seattle, WA 98101
U.S. Environmental Protection Agency, Ariel Rios Building	Administrator	1200 Pennsylvania Ave NW Washington, DC 20460
U.S. Fish and Wildlife Service	Regional Director	911 NE 11th Avenue Portland, OR 97232-4181
U.S. Fish and Wildlife Service	Regional Director	2800 Cottage Way Sacramento, CA 95825
U.S. Fish and Wildlife Service, Central Washington Field Office	Jessica Gonzales	215 Melody Lane, Suite 119 Wenatchee, WA

U.S. Fish and Wildlife Service, Oregon Field Office	Field Supervisor	2600 Southeast 98th Avenue, Suite 100, Portland, OR 97266
U.S. Fish and Wildlife Service, U.S. Department of the Interior	Director	1849 C Street NW, Room 3238 Washington, DC
U.S. Fish and Wildlife Service, Upper Columbia River Field Office	Field Supervisor	11103 East Montgomery Drive Spokane, WA 99206-4779
U.S. Fish and Wildlife Service, Western Washington Field Office	Field Supervisor	510 Desmond Drive SE, Suite 102 Lacey, WA
U.S. Forest Service, Pacific Northwest Region	Regional Forester	P.O. Box 3623 Portland, OR
United States Army	John M McHugh	101 Army Pentagon Washington, DC
United States Geological Survey	Regional Director	345 Middlefield Road Menlo Park, CA 94025
United States Geological Survey, U.S. Department of the Interior	Director	12201 Sunrise Valley Dr. Reston, VA 20192
US Army Corps of Engineers Portland District		PO Box 2946 Portland, OR 97208
USACE, Northwest Division	Brigadier General Kem, Commander	PO Box 2870 Portland, OR 97208-2870
USACE, The Dalles-John Day-Willow Creek Projects	Glen Smith, Operations Project	PO Box 564 The Dalles, OR 97058-9998
Washington Department of Ecology, Central Region Office	Tom Tebb	15 West Yakima Ave Ste. 200 Yakima, WA 98902
Washington Department of Ecology, Headquarters	Sally Toteff	PO Box 47775 Olympia, WA 98504
Washington Department of Ecology, Water 2 Resources Program	James Demay	PO Box 47706 Olympia, WA 98504
Washington Department of Natural Resources	Peter Goldmark	PO Box 47000 Olympia, WA 98504
Washington Office of Archeology and Historic Preservation State Historic Preservation Office		PO Box 48343 Olympia, WA 98504-8343
Washington Office of Attorney General	Bill Frymire Senior Counsel	PO Box 40100 Olympia, WA 98504 billf@atg.wa.gov
Washington State Department of Agriculture		1111 Washington St SE, PO Box 4256 Olympia, WA 98504-2560

Washington State Department of Commerce, State Energy Office	Tony Usibelli (forwarded to Mark)	Plum St. SE Olympia, WA 98501
Washington State Department of Fish & Wildlife, Renewable Energy Section	Patrick Verhey	600 Capitol Way N. Olympia, WA 98501
Washington State Department of Fish & Wildlife, Southwest - Region 5	Guy Norman	2108 Grand Boulevard Vancouver, WA 98661
Western Electricity Coordinating Council	James Robb	155 North 400 West, Suite 200 Salt Lake City, UT 94103
Yakima Valley Audubon Society	Denny Granstrand	PO Box 2832 Yakima, WA 98903

ATTACHMENT 2. PRE-APPLICATION DOCUMENT

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GOLDENDALE ENERGY STORAGE HYDROELECTRIC PROJECT

Federal Energy Regulatory Commission Project No. 14861

Klickitat County, Washington

PRE-APPLICATION DOCUMENT

For:

FFP Project 101, LLC

January 2019

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1
1.0 INTRODUCTION 2
1.1 Applicant's Authorized Agents 3
1.2 Background 3
1.3 Project History and Stakeholder Outreach 4
2.0 LICENSING PROCESS 6
2.1 Proposed Licensing Approach 6
2.2 Process Plan and Schedule 7
2.3 Communication and Meeting Protocols 8
2.3.1 Participant Contact List 8
2.3.2 Maintenance of the Public Reference File 8
2.3.3 Meetings 9
2.3.4 Meeting Summaries 10
2.3.5 Written Correspondence 10
2.3.6 Document Distribution 10
3.0 PROJECT LOCATION, FACILITIES, and OPERATION 11
3.1 Contact Information for Applicant's Agents 11
3.2 Project Location 11
3.2.1 Project Area and Proposed FERC Boundary 11
3.3 Existing Facilities 17
3.4 Proposed Project Facilities 18
3.4.1 General Description 18
3.4.2 New Dams and Reservoirs 18
3.4.3 Water Management 19
3.4.4 Turbines Generators and Powerhouse 20
3.4.5 Transmission Lines 21
3.4.6 Roads and Other Features 21
3.5 Proposed Project Operation 27
3.5.1 Proposed Project Capacity and Production Potential 27
3.6 Proposed Project Operation Regime 27
3.6.1 Initial Fill 27

3.6.2 Make-Up Water 27
3.6.3 Definition-Phase Activities 28
3.6.4 Construction 28
4.0 EXISTING ENVIRONMENT & RESOURCE IMPACTS 29
4.1 General Description of the River Basin 29
4.1.1 Existing Environment 29
4.1.2 Major Land Uses and Demographics 33
4.1.3 Climate 34
4.2 Geology & Soils 34
4.2.1 Existing Environment & Geology 34
4.2.2 Potential Resource Impacts and Hazards Assessment 46
4.2.3 Applicant Recommendations 57
4.3 Water Resources 58
4.3.1 Existing Environment 58
4.3.2 Potential Resource Impacts 67
4.3.3 Applicant Recommendations 69
4.4 Fish & Aquatic Resources 70
4.4.1 Existing Environment 70
4.4.2 Potential Resource Impacts 79
4.4.3 Applicant Recommendations 80
4.5 Wildlife & Botanical Resources 81
4.5.1 Existing Environment 81
4.5.2 Potential Resource Impacts 106
4.5.3 Applicant Recommendations 109
4.6 Wetlands, Riparian & Littoral Habitat 111
4.6.1 Existing Environment 111
4.6.2 Potential Resource Impacts 113
4.6.3 Applicant Recommendations 114
4.7 Rare, Threatened & Endangered Species 119
4.7.1 Existing Environment 119
4.7.2 Potential Resource Impacts 136
4.7.3 Applicant Recommendations 136
4.8 Recreation & Land Use 137

4.8.1 Existing Recreational Facilities & Use 137
4.8.2 Existing Land Uses & Management 144
4.8.3 Potential Recreation and Land Use Resource Impacts 149
4.8.4 Applicant Recommendations 150
4.9 Visual Resources 151
4.9.1 Existing Environment 151
4.9.2 Visual Resource Baseline Information 162
4.9.3 Potential Resource Impacts 168
4.9.4 Applicant Recommendations 170
4.10 Cultural and Tribal Resources 170
4.10.1 Existing Environment 171
4.10.2 Potential Resource Impacts 176
4.10.3 Applicant Recommendations 178
4.11 Socio-Economic Resources 178
4.11.1 Existing Environment 178
4.11.2 Potential Resource Impacts 181
4.11.3 Applicant Recommendations 184
5.0 Preliminary Issues and Studies List 185
5.1 Potential Resource Issues and Proposed Studies 185
5.1.1 Geology and Soils 185
5.1.2 Water Resources 186
5.1.3 Fish and Aquatic Resources 186
5.1.4 Wildlife and Botanical Resources 186
5.1.5 Wetlands, Riparian, and Littoral Habitat 187
5.1.6 Rare, Threatened, and Endangered Species 188
5.1.7 Recreation and Land Use 188
5.1.8 Visual Resources Study 188
5.1.9 Cultural and Tribal Resources 190
5.1.10 Socioeconomics 190
6.0 RELEVANT RESOURCE MANAGEMENT PLANS 191
6.1 Qualifying Comprehensive Plans Deemed Applicable 191
6.1.1 Oregon 191
6.1.2 Washington 193

6.2 Project-Specific Resource Management Plans 198
7.0 CORRESPONDENCE 199

List of Figures

Figure 3.2-1: Proposed Project Boundary 13
Figure 3.2-2: Proposed Project Boundary Regional Map 15
Figure 3.4-1: Project Plan Features 23
Figure 3.4-2: Waterway Profile 25
Figure 4.1-1: Drainage Basins in Project Vicinity 31
Figure 4.2-1: Geology 37
Figure 4.2-2: Site Stratigraphy 39
Figure 4.2-3: West Surface Impoundment and Footprint of Lower Reservoir 51
Figure 4.2-4: Groundwater Contours in the Vicinity of the Lower Reservoir 53
Figure 4.3-1A: Water Resources in Project Vicinity 59
Figure 4.3-1B: Water Resources in Project Vicinity 61
Figure 4.3-2: Flow Duration Curve for Columbia River at The Dalles USGS Gage 65
Figure 4.4-1: KPUD Water Intake Location 73
Figure 4.5-1: Golden Eagle Nests, Filed as Privileged Information 89
Figure 4.5-2: Vegetation Cover Types 101
Figure 4.6-1A: Wetlands and Waterbodies 115
Figure 4.6-1B: Wetlands and Waterbodies 117
Figure 4.7-1: Rare Plant Populations (DNR 2014a), Filed as Privileged Information 127
Figure 4.8-1: Recreation Facilities within 10 miles of the Goldendale Energy Storage Proposed Project Boundary 139
Figure 4.8-2: Klickitat County Energy Overlay Zone 145
Figure 4.8-3: Proposed Project Boundary and Adjacent Land Uses 147
Figure 4.9-1: Overhead Transmission Lines and Wind Turbines 153

Figure 4.9-2: View of the Lower Reservoir Area from State Route 14 155

Figure 4.9-3: View in the Vicinity of the Proposed Upper Reservoir 156

Figure 4.9-4: View Near the Lower Reservoir Location Looking Southwest 163

Figure 4.9-5: View Near the Upper Reservoir Location Looking Southwest 164

Figure 4.9-6: View Near the Proposed Upper Reservoir Looking Southeast 165

Figure 4.9-7: View Near the Proposed Upper Reservoir Looking Northwest 166

Figure 4.11-1: Direct and Secondary (Indirect and Induced) Jobs in Washington and Oregon During Construction in the 2015 Study 182

List of Tables

Table 2.2-1. Pre-filling Process Plan and Schedule 7

Table 3.2-1: Land Owners within the Proposed Project Boundary 12

Table 3.4-1: Project Feature Summary 18

Table 3.4-2: Dams, Reservoirs, and Embankments 19

Table 3.4-3: Underground Water Conductors and Penstock Details 21

Table 3.6-1: Estimated Project Annual Water Balance 28

Table 4.2-1 Soil Erodibility Characteristics 43

Table 4.2-2: September 2017 Groundwater Monitoring Data 49

Table 4.3-1: NHD and NWI-Mapped Perennial and Intermittent Water Features in the Project Area 63

Table 4.3-2: Reservoir Parameters 64

Table 4.3-3: Columbia River Flow at The Dalles[1] 64

Table 4.3-4: Significant Surface Water Rights of the Columbia River near the Proposed Project Area 65

Table 4.3-5: Washington 2012 303(d) Listed Impairments for the Lake Umatilla and Lake Celilo Assessment Units on the Columbia River 67

Table 4.3-6: Estimated Water Needs for the Proposed Goldendale Energy Storage Project 68

Table 4.3-7: Project Water Volume Relative to Columbia River Surface Water at The Dalles 69

Table 4.4-1: Fish Species Known to Occur in John Day Reservoir 75

Table 4.4-2: Habitat Availability for Anadromous, Resident, and Introduced Fish Species within John Day Reservoir 77

Table 4.4-3. Time Allocated to Fill Project Reservoirs Based on a 34.6 cfs Water Right..... 80

Table 4.4-4. Project Water Volume Relative to Columbia River Surface Water at The Dalles..... 80

Table 4.5-1: General Wildlife Species of Klickitat County, WA and Sherman County, OR..... 83

Table 4.5-2: Terrestrial Wildlife Species Observed in the Windy Point Project Area, Adjacent to the Goldendale Energy Storage Upper Reservoir Location..... 84

Table 4.5-3: Bird Species Observed in the Project Area and Vicinity..... 84

Table 4.5-4: 2017 Klickitat County Noxious Weeds List..... 94

Table 4.5-5: 2018 Sherman County Noxious Weeds List..... 97

Table 4.5-6. Temporary and permanent impacts on vegetation type from proposed Project infrastructure 109

Table 4.6-1: Wetland Features Assessed in 2015 Field Study and Aerial Imagery in the Currently-Proposed Project Boundary 112

Table 4.7-1: Klickitat County, Washington. 2018 List of Known Occurrences of Rare Plants 120

Table 4.7-2: Sherman County, Oregon 2016 List of Rare, Threatened and Endangered Species 123

Table 4.7-3: Klickitat County sensitive plant species potentially occurring within the Project vicinity. . 125

Table 4.7-4: Federal and State-Listed Wildlife Species for Klickitat County, Washington and Sherman County, Oregon Potentially Occurring in the Project Boundary 130

Table 4.8-1: Recreation Areas within 10 Miles of the Proposed Project Area..... 137

Table 4.9-1: Descriptions of BLM's Four VRM Classes 159

Table 4.9-2: Distance Zone Description and Boundaries 160

Table 4.9-3. Acceptable Modifications to Landscape..... 161

Table 4.10-1: Cultural Resources Surveys Conducted within the Project Vicinity..... 172

Table 4.10-2 Cultural Resources Previously Identified within the Project Vicinity..... 174

Table 4.11-1: Direct Employment by Location of Residency in the 2015 Study..... 182

Table 4.11-2: Economic Impacts from Operations and FYE jobs in the 2015 Study ($M)..... 183

Table 4.11-3: Housing and Vacancy Rates, Klickitat County, Washington; Sherman and Wasco Counties, Oregon and Select Communities 184

Table 7-1: Public and Agency Comments and Information Received Regarding the Goldendale Energy Storage Project..... 199

List of Appendices

Appendix A: Consultation

Appendix A-1: Consultation Distribution List

Appendix A-2: Sample Request for Information Letters

Appendix A-3: Consultation

Appendix B: Site Photographs

Appendix C: Wildlife Management Plan

Appendix D: Vegetation Management and Monitoring Plan

Appendix E: Historic Properties Management Plan

Acronyms and Abbreviations

°F	degrees Fahrenheit
2D	two-dimensional
3D	three-dimensional
AF	acre-foot
AFY	acre-foot per year
AMSL	above mean sea level
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
Applicant	FFP Project 101, LLC
bgs	below ground surface
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practice
BPA	Bonneville Power Administration
CA-ISO	California Independent System Operator
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGA	Columbia Gorge Aluminum
CPSG	Columbia Plateau Steppe and Grassland
CPSS	Columbia Plateau Scabland Shrubland
CRGNSA	Columbia River Gorge National Scenic Area
CRP	Cultural Resources Program
CWA	Clean Water Act
CY	cubic yard
DAHP	Washington State Department of Archaeology and Historic Preservation
DEM	digital elevation model
DEQ	Oregon Department of Environmental Quality
DLA	Draft License Application
DNR	Washington Department of Natural Resources
DO	dissolved oxygen
EA	Extensive Agriculture
Ecology	Washington State Department of Ecology
ERM	Environmental Resources Management
ESA	Endangered Species Act
EOZ	Energy Overlay Zone
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FOV	field of view
FPA	Federal Power Act
FYE	fiscal year equivalent
GIS	geographic information system
GPS	Geographic Positioning System
GWh	gigawatt-hour(s)

HPMP	Historic Properties Management Plan
HUC	Hydraulic Unit Code
IBA	important bird area
ILP	Integrated Licensing Process
IMBCC	Inter-Mountain Basins Cliff and Canyon
IMBBSS	Inter-Mountain Basins Big Sagebrush Steppe
IP	Industrial Park
IUVAG	Introduced Upland Vegetation – Annual Grassland
IUVAGRO	Introduced Upland Vegetation – Annual Grassland with Rock Outcroppings
JD Pool Project	JD Pool Pumped Storage Hydroelectric Project
KOP	key observation point
KPUD	Public Utility District No. 1 of Klickitat County, Washington
kV	kilovolt
LED	light emitting diode
LNG	liquefied natural gas
MDL	minimum detection limit
mg/L	microgram per liter
mm	millimeter
MSL	mean sea level
MW	megawatt
MWh	megawatt-hour
NA	not applicable
NEPA	The National Environmental Policy Act
NGO	non-governmental organization
NHD	National Hydrologic Database
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPS	National Park Service
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
ODFW	Oregon Department of Fish and Wildlife
OS	Open Space
PAD	Pre-Application Document
PCB	polychlorinated biphenyl
PDF	Portable Document Format
PEIS	Preliminary Environmental Impact Statement
PHS	Priority Habitats and Species
PM&E	protection, mitigation, and enhancement
Project	Goldendale Energy Storage Project No. 14861
PUD	public utility district
RCRA	Resources Conservation and Recovery Act
RCW	Revised Code of Washington
RI/FS	Remedial Investigation and Feasibility Study

RPS	renewable portfolio standards
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Office
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TCP	traditional cultural property
TDG	total dissolved gas
TLP	Traditional Licensing Process
TMDL	Total Maximum Daily Loads
UCL	Upper Confidence Limit
U.S.	United States
USC	United States Code
USDOI	United States Department of the Interior
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Department of Agriculture Forest Service
USFWS	United State Fish and Wildlife Service
USGS	United States Geological Survey
VMMP	Vegetation Management and Monitoring Plan
VRM	Visual Resource Management
VRRMP	Visual and Recreation Resource Management Plan
VOC	volatile organic compound
WAC	Washington Administrative Code
WDFW	Washington Department of Fish & Wildlife
WMP	Wildlife Management Plan
WNHP	Washington Natural Heritage Program
WSI	West Surface Impoundment
WSDOT	Washington State Department of Transportation

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EXECUTIVE SUMMARY

The proposed Goldendale Energy Project No. 14861 (Project) is a closed-loop pumped storage hydropower facility proposed by FFP Project 101, LLC (the Applicant). The proposed lower reservoir would be off-stream of the Columbia River at John Day Dam, located on the Washington (north) side of the Columbia River at River Mile 215.6. The Project will be located approximately 8 miles southeast of the City of Goldendale in Klickitat County, Washington.

The proposed Project will involve no river or stream impoundments, allowing for minimal potential environmental impact. Initial fill water and periodic make-up water will be purchased from Public Utility District No. 1 of Klickitat County, Washington (KPUD) using a KPUD-owned conveyance system and municipal water right.

The Project facilities include:

- An upper reservoir consisting of a rockfill embankment dam approximately170 feet high, 8,000 feet long, a surface area of about 59 acres, storage of 7,100 acre-feet (AF), at an elevation of 2,940 feet above mean sea level (AMSL);
- A lower reservoir consisting of an embankment approximately 170 feet high, 7,400 feet long, a surface area of about 62 acres, storage of 7,100 AF, and an elevation of 580 feet AMSL.
- An underground water conveyance tunnel and underground powerhouse; and
- 230-kilovolt (kV) transmission line(s).

The rated (average) gross head of the Project is 2,400 feet, and the rated total installed capacity is 1,200 megawatts (MW). The Project will utilize Francis-type, variable-speed, pump-turbine units 8 hours a day, 7 days a week, with an estimated annual generation of 3,500 gigawatt-hours (GWh).

Within the region, renewable energy development is growing, primarily through wind power generation. The Project would provide necessary ancillary services and energy storage to the Northwest region, and allow for more reliable management and integration of disparate renewable energy sources into the grid. The Project would provide additional ramping capacity (both up and down) as well as firming for wind energy regulation, coordination, and scheduling services, automatic generation control, and support of system integrity and security (reactive power, spinning, and operating reserves).

The information presented in this Pre-Application Document (PAD) is provided to initiate a licensing process under the Federal Energy Regulatory Commission (FERC) licensing regulations. The purpose of this PAD is to present existing, relevant, and reasonably available information about the Project area and the Applicant's proposal for how the Project would be evaluated, licensed, developed, and operated.

1.0 INTRODUCTION

On October 20, 2017, FFP Project 101, LLC (the Applicant), a Delaware Limited Liability Company, filed an application for a preliminary permit, pursuant to section 4(f) of the Federal Power Act (FPA), to study the feasibility of the proposed Goldendale Energy Storage Project No. 14861 (Project) to be located near Goldendale, Washington, in Klickitat County, Washington, and Sherman County, Oregon. The preliminary permit application was accepted by the Federal Energy Regulatory Commission (FERC) on December 15, 2017; on March 8, 2018, FERC issued an order granting priority to the Applicant to file a license application. The permit is effective for 36 months from the date on the order

The Project would provide necessary ancillary services and energy storage to the Northwest region of the United States (U.S.) and allow for more reliable management and integration of disparate renewable energy sources into the grid. Within the region, renewable energy development is growing, primarily through wind power generation. The Project would provide additional ramping capacity (both up and down) as well as firming for wind energy regulation, coordination and scheduling services, automatic generation control, and support of system integrity and security (reactive power, spinning, and operating reserves).

The Applicant has prepared this Pre-Application Document (PAD) pursuant to the requirements of 18 Code of Regulations (CFR) § 5.6. Simultaneously with filing the PAD, the Applicant filed with FERC a Notice of Intent (NOI) for an original license pursuant to 18 CFR § 5.5 and a request to utilize the Traditional Licensing Process (TLP) pursuant to 18 CFR § 5.3. The Applicant has also requested permission to be FERC's non-federal designee for purposes of consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA) and the Endangered Species Act (ESA).

In preparing this PAD, the Applicant conducted searches for relevant information about the Project and made contact with numerous local, state, and federal agencies to request information and data about the Project and nearby environmental resources. Information sources cited in this PAD are referenced, and a record has been made of contacts made with agencies and other organizations.

1.1 Applicant's Authorized Agents

The individuals authorized to act as an agent for the Applicant during the process of applying for a license are:

Name:	Mr. Erik Steimle
Position:	Vice President, Development
Business:	Rye Development
Address:	220 NW 8th Ave Portland, OR 97209
Phone:	503.998.0230
E-mail:	erik@ryedevelopment.com

Name:	Nate Sandvig
Position:	Director, Business Development
Business:	National Grid Ventures
E-mail:	nathan.sandvig@nationalgrid.com

1.2 Background

The proposed Project would consist of the following new facilities, which are described in Section 3:

- Upper and lower reservoirs
- Water conveyance system
- Underground power house and appurtenant equipment
- Transmission interconnection to Bonneville Power Administration's (BPA) John Day Substation

The Project would utilize variable-speed, pump-turbine generator units and provide critical balancing services and renewable energy flexible capacity to utilities in the Pacific Northwest and potentially California to decarbonize the electric power system cost-effectively. Reservoirs would be entirely on private land without aquatic impacts to the Columbia River or associated riparian habitats. Water for the Project would leased from Public Utility District No. 1 of Klickitat County (KPUD), who owns an existing water right and conveyance system adjacent to the proposed Project. The Project's lower reservoir area is located on lands that previously housed the Columbia Gorge Aluminum (CGA) smelter (also known as Harvey Aluminum, Martin Marietta Aluminum, Commonwealth Aluminum, or Goldendale Aluminum). This facility was a primary aluminum reduction smelter that generally operated from 1969 to 2003, with a few periods when the plant was shut down or had limited operation.

The Project area has the suitable geography for a closed-loop pumped storage facility and is strategically located at the northern terminus of the Pacific AC and DC Interties operated by BPA, Los Angeles Department of Water & Power, and the California Independent System Operator (CA-ISO). The interties allow for the bulk seasonal exchanges of power between British Columbia, Canada, the Northwest, and California and provide benefits of coordinated markets to the regions. The Project is also located in close proximity to substantial existing, abundant, high-quality, and untapped wind power generation that can be developed with relatively low environmental conflict and cost. The Project's location can also support the daily inter-regional exchanges of California massive mid-day solar oversupply and the significant power generation ramping needed by CA-ISO.

1.3 Project History and Stakeholder Outreach

A similar pumped storage project was proposed by KPUD in 2009 and discussed with stakeholders under a different FERC number: P-13333. That proposal, referred to as the JD Pool Pumped Storage Hydroelectric Project (JD Pool Project), did not advance beyond the feasibility stage and included a larger footprint and project boundary. FERC issued a preliminary permit for the JD Pool Project (P-13333) in 2009; in October 2014, KPUD submitted to FERC a PAD along with a NOI and petition to use the TLP.

Since the inception of the Project and submittal of an original PAD under the previous FERC number, there has been broad-based favorable support from surrounding Washington and Oregon counties and key stakeholders. KPUD sponsored Washington State Senate Bill 6044, which was passed and signed into law on March 30, 2012. The law expressly authorizes KPUD to supply water to a pumped storage facility within a structure anticipated to be utilized by the Project.

In general, the comments received from resource agencies for the previous project indicated potential concerns related primarily to cultural and wildlife/avian resources and the scale of the project area. These comments and concerns have carried over into design changes and protection, mitigation, and enhancement (PM&E) measures for the new Project, and are also reflected in the consultation comments section included in Appendix A.

After FERC's issuance of a preliminary permit in March 2018, timely motions to intervene were subsequently filed by the following organizations:

- Washington Department of Fish & Wildlife (WDFW)
- Klickitat County
- Columbia Riverkeeper
- Friends of the White Salmon River
- Oregon Department of Fish and Wildlife

On November 20, 2018, the Applicant sent letters to state and federal resource agencies, Tribes, non-governmental organizations (NGOs), and other stakeholders requesting existing information related to the proposed Project. A comprehensive list of these organizations is included in Appendix A. At the time of filing this PAD, the Applicant has received responses to the request for information from 12 organizations.

Substantive comments received since the issuance of the preliminary permit and request for information are summarized below. Copies of all correspondence are included in Appendix A.

- Confederated Tribes of the Umatilla Indian Reservation (January 31, 2018, and February 14, 2018) indicate general opposition to the proposed Project due to the potential for detrimental impacts to cultural resources near the Project.
- Confederated Tribes and Bands of the Yakima Nation (February 14, 2018) expressed general opposition to the proposed Project.
- U.S. Department of the Interior (February 5, 2018) has no objection to the issuance of the permit and recommends that the Applicant consult with U.S. Fish and Wildlife Service (USFWS), WDFW, and any Native American Tribes or Nations whose treaty rights may be affected. They also recommend that FERC (or designated non-federal representative) enter into informal consultation with USFWS to determine if more formal consultation may be necessary. Once National Environmental Policy Act (NEPA) scoping has been completed, they recommend that FERC obtain a current list of ESA species in the Project area to determine if formal consultation is warranted.
- Confederated Tribes of the Umatilla Indians (November 27, 2018) expressed concern that the Project would adversely affect historic property and expressed an interest in working with the Applicant and FERC to consider resolution of the adverse effects to the historic property.
- WDFW (December 4, 2018) expresses concerns similar to their comments in 2014 on the JD Pool Project (P-13333), namely the existence of an active golden eagle nest and the potential for attraction of eagles to the Project reservoirs.
- United States Hang Gliding & Paragliding (December 19, 2018) expressed concern about their group's ability to continue to use the Project vicinity once the Project is constructed.
- Oregon Department of Fish and Wildlife (ODFW) (December 20, 2018) expresses concerns similar to their comments in 2014 on the JD Pool Project (P-1333), namely general impacts to terrestrial and aquatics species.
- Oregon State Historic Preservation Office (SHPO) (December 20, 2018) indicates that there are cultural resources in the area of the Project recommending that a cultural resource survey be conducted prior to any ground disturbing activities.

On July 11, 2018, the Applicant sent letters to the Yakama Nation's Tribal Council requesting a meeting to discuss the proposed Project, as the Tribe had expressed opposition to the Project both under the previous FERC number and in comments filed with FERC regarding the current

preliminary permit. On September 4, 2018, the Yakama Nation's Tribal Council hosted a meeting in Toppenish, Washington for the Applicant to fully describe the proposed facility. The Applicant is currently working with the Tribes' cultural resources management group for the Tribe to perform cultural resource studies in the Project area.

2.0 LICENSING PROCESS

As an alternative to the default Integrated Licensing Process (ILP), the Applicant is proposing to use FERC's TLP to pursue the license for the Project. Pursuant to 18 CFR § 5.3(b) and (c). Concurrent with submittal of this PAD, the Applicant is also filing a request with FERC for authorization to use the TLP. The Applicant will provide copies of the request to all affected resource agencies and Indian Tribes (see the distribution list attached to the NOI filing in Appendix A) and publish notice of the filing in the Goldendale Sentinel, The Dalles Chronicle, and the White Salmon Enterprise. Comments on the request must be filed with FERC within 30 days, and should address, as appropriate, the following issues as they relate to the use of the TLP including the following:

- Likelihood of timely license issuance;
- Complexity of the resource issues;
- Level of anticipated controversy;
- Relative cost of the TLP compared to the ILP;
- Amount of available information and potential for significant dispute over studies; and
- Other factors considered by the commenter to be pertinent.

In accordance with 18 CFR § 5.8(a) and (b), within 60 days of the filing of a request to use the TLP, FERC would issue a notice of commencement of the licensing proceeding that includes the Director of the Office of Energy Projects' decision on the TLP request.

This PAD is being prepared in conformance with FERC requirements to provide the basis for a request to use the TLP rather than the ILP. As demonstrated herein, there is a significant amount of existing information available about resources in the Project area.

2.1 Proposed Licensing Approach

The Project is an off-channel, closed-loop system located on lands currently used for renewable energy generation (upper reservoir site), as well as lands previously used as an industrial facility (lower reservoir site) with limited potential for natural resource, cultural, or social issues. The proposed Project reservoirs will be fully lined to minimize the chance of seepage or leakage, and the main waterway, including penstocks, will be built underground, thus minimizing disturbance to the basalt cliff faces at the site.

Project facilities will be located on private lands under option to be purchased by the Applicant. Water will be supplied via a lease agreement with KPUD.

Currently, portions of the adjacent former CGA smelter facility (but not the Project lands) are undergoing site cleanup by former owners, NSC Smelter, LLC and Lockheed Martin Corporation ("Potentially Liable Persons"), under the Washington State Model Toxics Control Act, as well as under provisions of Resources Conservation and Recovery Act (RCRA). However, the Project does not interfere or overlap with the cleanup presently taking place at the site. The Applicant has consulted with Ecology, KPUD, the Washington Attorney General's Office, and BPA to ensure that any ongoing cleanup activities on NSC Smelter lands poses no hindrance to filing a successful license application for the Project. Additionally, to assist the Applicant and address FERC's concerns about previous projects proposed for the CGA smelter site, Ecology sent a letter to Rye Development on September 7, 2017, after reviewing the Project as proposed in this PAD. In the letter, Ecology outlined options for the Applicant to move forward with redevelopment of NSC Smelter lands and stated that Ecology, "is open to participating in agency to agency consultation during the anticipated forthcoming FERC licensing process for such a project." A copy of the September 7, 2017, Ecology letter is included in Appendix A.

Based on feedback received from the outreach effort with agencies and other interested stakeholders, the Applicant and its consultants have determined that the TLP is the preferred approach.

2.2 Process Plan and Schedule

In accordance with FERC regulations [18 CFR 5.6 (d)(1)], the PAD must include a plan and schedule for pre-application activity that discusses timelines for pre-filing consultation, information gathering, and resource studies. The plan and schedule must also include a proposed location and date for the required joint meeting and site visit. Table 2.2-1 presents a plan and schedule for pre-application activities.

The Applicant intends to comply with the complete three-stage consultation process, including all meetings and comments periods, established by 18 CFR § 4.38.

Table 2.2-1. Pre-filling Process Plan and Schedule

Activity	Responsibility	Time Frame	Target Completion Date
File NOI, PAD, request to use TLP	FFP Project 101, LLC		January 25, 2019
Publish Public Notice of NOI, PAD, TLP request	FFP Project 101, LLC		January 28, 2019
Comments on Request to use TLP due to FERC	Stakeholders		February 27, 2019
FERC decision on request to use TLP	FERC	Within 60 days of NOI/PAD	March 29, 2019

Activity	Responsibility	Time Frame	Target Completion Date
Consult with agencies and public re schedule and agenda for Joint Agency/Public Meeting and Site Visit	FFP Project 101, LLC		January-February 2019
Notify FERC and Stakeholders of Joint Meeting	FFP Project 101, LLC	15 days before Joint Meeting	May 3, 2019
Publish Joint Meeting arrangements	FFP Project 101, LLC	14 days prior to Joint Meeting and Site Visit	May 4, 2019
Joint Meeting and Site Visit	FFP Project 101, LLC	30-60 days from approval of TLP	April 29-May 27, 2019
Agency and public submit proposed studies	Agencies & Public	60 days from Joint Meeting	July 26, 2019
Resolve any study differences	FFP Project 101, LLC, Agencies & Public	Continuous	
Distribute Draft License Application (DLA)	FFP Project 101, LLC		September 30, 2019
Agency and public comments on DLA	Agencies & Public	90 days from issuance of DLA	December 27, 2019
Notify FERC of Joint Meeting, if any	FFP Project 101, LLC	15 days before Joint Meeting	February 3, 2020 - *IF NEEDED*
Joint Meeting to resolve any substantial differences on project proposal	FFP Project 101, LLC, Agencies & Public	within 60 days from comments on DLA	February 27, 2020 - *IF NEEDED*
File license application	FFP Project 101, LLC		April 1,2020

FERC = Federal Energy Regulatory Commission; NOI = Notice of Intent; PAD = Pre-Application Document; TLP = Traditional Licensing Process

2.3 Communication and Meeting Protocols

2.3.1 Participant Contact List

The licensing process for the Project is open to the general public, and interested individuals and organizations are encouraged to participate. A contact list compiled by the Applicant will be maintained to identify those agencies, organizations, individuals, or groups that have been identified as interested parties or who have requested to be included as licensing participants.

The contact list will be used to provide notice of any public meetings, as well as notice of the availability of information for public review. The current contact list is included in the distribution list attached to the NOI filing (see Appendix A).

2.3.2 Maintenance of the Public Reference File

The Applicant will maintain a public reference file at Rye Development's Portland, Oregon offices. The public reference file will include copies of written correspondence, documentation

of phone conversations, meeting notices, agendas and summaries, study plans, study reports, status reports, and other documents developed during consultation or submitted for inclusion in the public reference file. The Applicant will submit all documents in the public reference file to FERC as part of the formal licensing record. If a document includes sensitive information—such as a site location for a federally listed species and/or its designated critical habitat, or for an archaeological site—the document will be clearly marked "Not for Public Disclosure" and appropriate measures will be taken to secure the sensitive material, consistent with state and federal regulations.

The Applicant will also maintain a Project website:

http://www.ryedevelopment.com/projectstor/goldendale-washington/

This website will provide access to documents developed during the course of the licensing consultation, such as this PAD and the NOI, meeting notices, meeting summaries, study plans, and study reports. The Project website will also have an information library that allows licensing participants to access other relevant information in support of the license application.

Physical location where the public reference file would be available:

Klickitat PUD
1313 S. Columbus Ave.
Goldendale, Washington 98620

2.3.3 Meetings

Meetings will be scheduled as required by FERC's regulations and as otherwise needed throughout the licensing process. The Applicant will be responsible for scheduling all consultation meetings involving licensing participants.

As required under 18 CFR § 4.38, the Applicant will hold a joint meeting with afternoon and evening sessions and a site visit between 30 and 60 days after FERC's authorization to use the TLP. Written notice of the date, time, and location of the joint meeting and site visit will be provided to FERC at least 15 days in advance of the meeting in a written agenda that includes topics of discussion. Within 14 days of the joint meeting and site visit, a notice will be published in The Goldendale Sentinel. The joint meeting will be held in the morning in Goldendale, and the site visit will be held at 1:30 p.m. (after the morning joint meeting).

For the meeting specified in 18 CFR §16.8(b)(3), the Applicant will provide the required notice in appropriate local newspapers and other forums.

The Applicant will attempt to notify licensing participants of meetings scheduled by the Applicant at least 30 days prior to the meeting date. This notification may be made in writing,

via e-mail, or by telephone conversation; when necessary, this notification may be held with less than 30 days' notice.

The Applicant will develop the meeting agenda and attempt to provide a written meeting agenda to all participants at least 2 weeks prior to a scheduled meeting. As necessary, the agenda may be modified at the start of the meeting. All participants will strive to make available all documents and other information necessary to prepare for a consultation meeting at least 2 weeks prior to the scheduled meeting. In the alternative, materials can be provided at the meeting.

2.3.4 Meeting Summaries

The Applicant will be primarily responsible for providing a written summary of meetings involving the Applicant and licensing participants. The meeting summaries will identify topics discussed, areas of agreement and/or disagreement, and action items assigned to meeting participants. The Applicant will distribute a draft meeting summary to all meeting attendees within 10 days of the meeting. Any comments to the draft meeting summary should be submitted to Applicant within 7 days of the draft distribution. The meeting summary will be summarized within 7 days after the deadline for receiving comments. Meeting summaries will be posted on the Project website once they are final.

2.3.5 Written Correspondence

Any written correspondence (including e-mails) regarding substantive matters of the Project licensing between the Applicant and licensing participants will become part of the public reference file.

All written correspondence should be sent to the Applicant at the following address:

Rye Development
Attn: Erik Steimle
220 NW 8th Ave
Portland, OR 97209
erik@ryedevelopment.com

2.3.6 Document Distribution

The Applicant will distribute, whenever possible, all documents electronically in Microsoft Word or Portable Document Format (PDF). All parties on the Project distribution list will receive notification that an electronic copy of this PAD is available on the Project website. The Applicant will also use this list to provide notice of the availability of future major licensing documents such as proposed study plans, study reports, and license application, and will provide electronic copies of these documents upon request. In addition, the Applicant will distribute

electronically (via e-mail) public meeting notices, meeting agendas, and meeting summaries upon request.

Certain Project-related documents are not available to the general public in accordance with FERC regulations. Critical Energy Infrastructure Information (CEII) (18 CFR § 388.113), which is information about the design and safety of dams and appurtenant facilities that is necessary to protect national security and public safety, is not available to the general public. Anyone seeking CEII from FERC must file a request. Additional information is available on FERC's website at: http://www.ferc.gov/legal/ceii-foia/ceii.asp.

3.0 PROJECT LOCATION, FACILITIES, AND OPERATION

3.1 Contact Information for Applicant's Agents

The individuals authorized to act as an agent for the Applicant during the process of applying for a license are:

Name:	Mr. Erik Steimle
Position:	Vice President, Development
Business:	Rye Development
Address:	745 Atlantic Ave. 8th Floor
	Boston, MA 02111
Phone:	617-701-3288
E-mail:	erik@ryedevelopment.com

Name:	Nate Sandvig
Position:	Director, Business Development
Business:	National Grid Ventures
Email:	nathan.sandvig@nationalgrid.com

3.2 Project Location

The proposed Project would be located approximately 8 miles southeast of the City of Goldendale in Klickitat County, Washington. The Project would be a closed-loop pump storage facility with the Lower Reservoir off-stream of the Columbia River near the John Day Dam, on the Washington (north) side of the Columbia River.

3.2.1 Project Area and Proposed FERC Boundary

A geographic Project area has been defined that encompasses all land necessary for access or control in order to construct and operate the Project and provide a possible Project "footprint" boundary area where environmental and engineering studies are being undertaken. The Project and its proposed FERC boundary are entirely in Klickitat County, within the state of

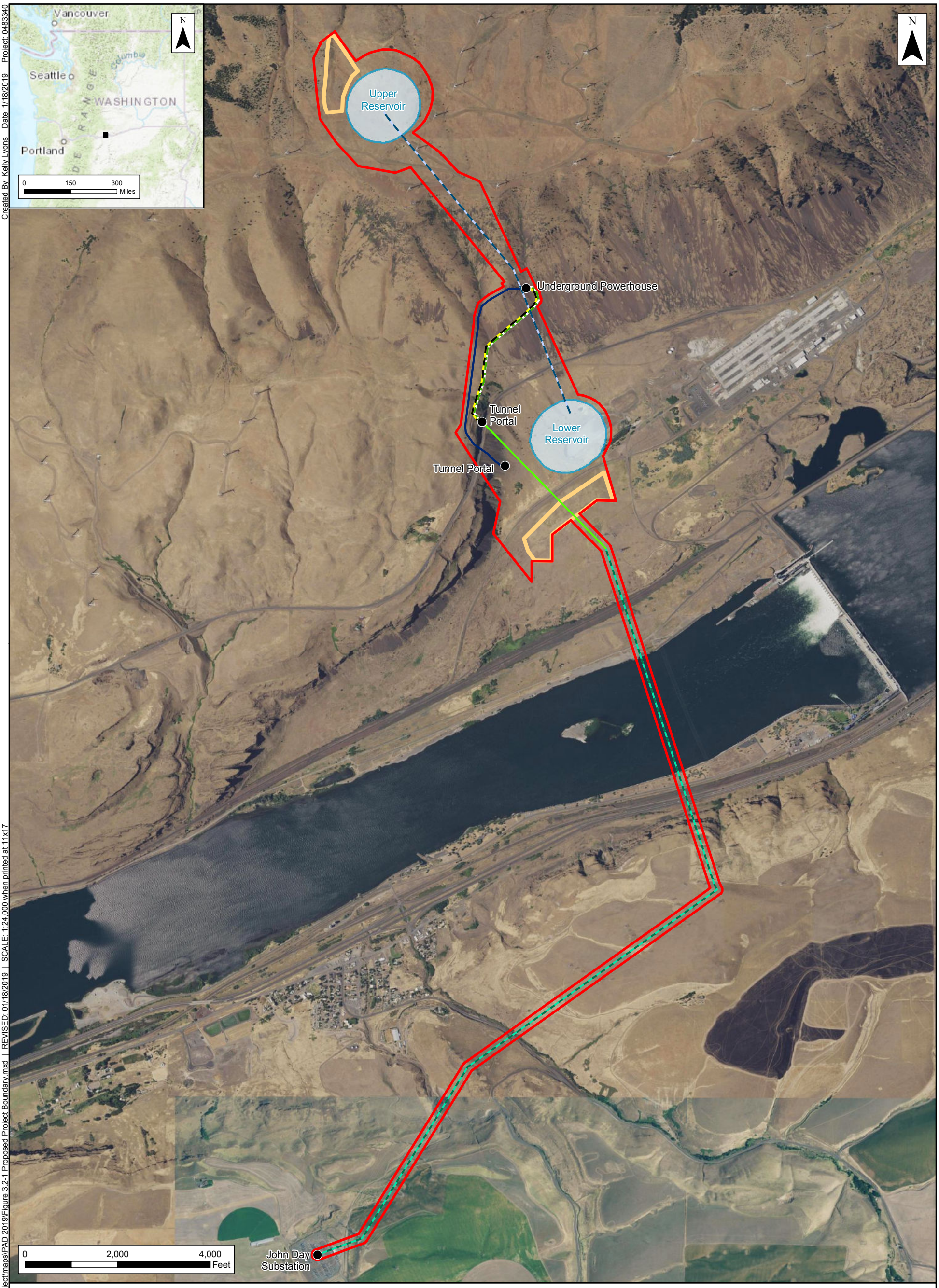
Washington, as outlined in Figures 3.2-1 and 3.2-2. Representative site photographs are provided in Appendix B.

3.2.1.1 Land Ownership

The proposed Project boundary encompasses approximately 583.4 acres of mostly private lands owned by NSC Smelter, LLC. The only public lands are associated with the BPA transmission corridor. Table 3.2-1 provides the breakdown of area within the Proposed Project boundary, by owner.

Table 3.2-1: Land Owners within the Proposed Project Boundary

Name	Area (Acres)	Area (Percent of Total)
BNSF Railway Co	1.9	<1%
Department of Transportation	25.9	4
NSC Smelter, LLC	448.3	77
U.S. Government	16.1	3
Public Utility ROW	91.2	16
Total	***583.4***	***100%***



Created By: Kelly Lyons Date: 1/18/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 3.2-1 Proposed Project Boundary.mxd | REVISED: 01/18/2019 | SCALE: 1:24,000 when printed at 11x17

Legend

- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
- Proposed Underground Access Tunnel
- Proposed Underground Penstock
- Proposed Reservoir
- Temporary Construction Staging Area
- Proposed Project Boundary

Figure 3.2-1
Proposed Project Boundary
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com
ERM

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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DRAWN BY: Kelly Lyons

Legend

Proposed Project Boundary

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Figure 3.2-2
Proposed Project Boundary Regional Map
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: Esri - World Topographic Map; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

FILE: M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 3.2-2 Proposed Project Boundary Regional Map.mxd | REVISED: 01/17/2019 | SCALE: 1:96,000 when printed at 11x17

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3.3 Existing Facilities

There are no existing hydroelectric facilities within the Project area. Other types of existing facilities near or adjacent to the Project boundary were identified so that development of the Project could proceed with minimal interference.

- Existing facilities within the proposed Project boundary include:
  - Outdated facilities associated with the former CGA aluminum smelter, most of which are in the process of being removed and demolished. The Project does not interfere with the ongoing cleanup of the NSC Smelter lands; in some cases, the Project may enhance planned cleanup efforts.
  - The lower reservoir is proposed to be located at the West Side Surface Impoundment, which is an area associated with the CGA smelter that was capped and closed in 2005 in compliance with applicable environmental laws. The impoundment has tested as having non-hazardous and non-dangerous material; however, this area will be characterized further prior to being excavated as part of the construction of the lower reservoir. Because the material is unsuitable fill, it would be excavated and properly disposed of pursuant to full characterization in collaboration with Ecology. Ecology is supportive of the removal of the West Side Surface Impoundment, as this would provide a higher level of environmental protection than the agency would likely require in the cleanup, as described in a letter from Ecology in Appendix A. Ecology further states that it is supportive of the proposed Project in general and does not expect that the Project as described in this application will hinder the cleanup process for the other portions of the site.
  - Washington State Route 14 (Lewis and Clark Highway).
- Existing facilities outside the proposed Project boundary include:
  - A total of 13 wind turbine generators owned by the Tuolumne Wind Project Authority—a California joint-powers agency formed by the Turlock Irrigation District and the Walnut Energy Center Authority. These wind turbine generators are part of the Windy Point Phase I Project, which is comprised of 62 wind turbine generators. Southern California Public Power Authority's Windy Point Phase II and Linden Wind Energy Project are also in the vicinity of the study area and include 114 and 25 wind turbine generators, respectively.
  - John Day Dam Road (public road).
  - A total of five transmission lines owned by BPA that run parallel to the Columbia River. A small section of each line (approximately one third of a mile) runs through the Project area. The lines are rated: 500 kilovolt (kV) (Rock Creek - John Day No. 1), 345 kV (McNary Ross No. 1), 230 kV (Harvalum - Big Eddy No. 1 / Horse Heaven-Harvalum No. 1), and 500 kV (McNary-John Day No. 2).

- The Columbia Gorge has railroad lines on both the Washington and Oregon side of the Columbia River. Approximately 52 to 72 trains are estimated to pass through the Columbia Gorge every day, mostly carrying cargo (Columbia Insight, April 1, 2015).

Of these, the only existing facilities that would need to be removed or relocated based on the Project concept are the West Side Surface Impoundment and distribution power lines within the Project boundary. Some of the wooden H-frame towers and distribution lines would be relocated to a route around the south side of the lower reservoir.

3.4 Proposed Project Facilities

3.4.1 General Description

The proposed Project will be a new energy storage facility in Klickitat County, Washington. As illustrated in Figures 3.4-1 and 3.4-2, the proposed Project will consist of an off-stream, closed-loop pumped-storage project with an upper and lower reservoir with over 2,400 feet of maximum gross head that involve no river or stream impoundments, allowing for relatively small water conveyances and minimal potential environmental impact. Other features include an underground water conveyance tunnel, underground powerhouse, 230-kilovolt transmission line(s), and other appurtenant facilities. Table 3.4.1 shows a summary of the basic Project features.

Initial fill water and periodic make-up water will be purchased from KPUD using a KPUD owned conveyance system and municipal water right.

Table 3.4-1: Project Feature Summary

Project Characteristics	
Approximate Installed Capacity	1,200 MW
Assumed Number of Units (Variable Speed)	3
Assumed Average Static Head	2,360 feet
Assumed Usable Storage Volume	7,100 AF
Approximate Energy Storage	14,745 MWh
Approximate Hours of Storage @ 1,200 MW	12 hours
Underground Powerhouse	
Rated Head (Gross)	Approximately 2400 feet
Max Flow Generating Mode	8,280 cfs
Max Flow Pumping Mode	6,700 cfs
Generating Capacity	Up to 1,200 MW
Number of Units	3 x 400 MW units

AF = acre-foot; cfs = cubic feet per second; MW = megawatt; MWh = megawatt-hour

3.4.2 New Dams and Reservoirs

Preliminary embankment volumes were estimated using a geographic information system (GIS). All dams were assumed to be concrete-faced rockfill structures with a crest width of 25 feet, side

slopes of 1.5H:1V,[1] 10 feet of freeboard, and 20 feet of foundation preparation (undercut). Material take-off estimates were calculated for each dam structure assuming a crest elevation 10 feet higher than the maximum reservoir elevation. Dam heights were increased by an additional 20 feet to account for foundation and abutment preparation, and other factors. Additional studies as described in Chapter 5 will be designed to confirm material availability, technically acceptable embankment types, and methods of construction. Table 3.4-2 is a summary of estimated dam, reservoir, and embankment features.

Table 3.4-2: Dams, Reservoirs, and Embankments

Lower Reservoir Embankment	
Type	Rockfill embankment ring dike
Height	Approximately 170 feet (max)
Length	Approximately 7,400 feet (max)
Crest Elevation	590 feet
Fill volume	5,600,000 cubic yards (CY)
Spoil volume	1,100,000 CY
Lower Reservoir	
Surface Area at Maximum Pool	Approximately 62 Acres
Active Storage Capacity	7,100 AF and 14,745 MWh
Maximum Normal Pool Elevation	580 feet
Upper Reservoir Embankment	
Type	Rockfill embankment ring dike
Height	Approximately 170 feet (max)
Length	Approximately 8,000 feet (max)
Crest Elevation	2,950 feet
Fill volume	7,800,000 CY
Spoil volume	1,600,000 CY
Upper Reservoir	
Surface Area at Maximum Pool	Approximately 59 acres
Active Storage Capacity	7,100 AF and 14,745 MWh
Maximum Normal Pool Elevation	2,940 feet

AF = acre-foot; cfs = cubic feet per second; CY = cubic yard; MW = megawatt; MWh = megawatt-hour

In addition to the features included Table 3.4-2 above, other features that will be evaluated during the final design include (but are not limited to) spillway size and location, low-level outlet size and location (if required), reservoir liner type, and freeboard. The final arrangement of Project features will be based on required studies of topography, geology, hydrology seismic hazard consideration, functional requirements, and appearance.

3.4.3 Water Management

A nominal (minimal) reservoir dewatering system was assumed necessary to facilitate reservoir construction. The Applicant has assumed that this system will be converted to a permanent low-level outlet facility. The reservoirs will be lined to prevent seepage/leakage.

[1] The slope ratio (H:V) formula is H:V, where HD is the horizontal distance and VD is the vertical distance.

There is no contributing drainage basin other than the reservoirs themselves, and both upper and lower reservoirs were assumed to contain identical active storage volumes. In the extremely unlikely event of an overpumping scenario, the water level in the lower reservoir will quickly result in a lack of water for the pumps, which, consequently, will shut off and limit any overpumping to very small volume. For these reasons, it is assumed that a spillway would not be required at either the upper or the lower reservoir. In addition, the lower reservoir will be sized to also contain, in addition to the active storage volume, the dead storage of the upper reservoir and the volume of water within the conveyance system.

The proposed Project will use water purchased from KPUD for the initial filling of the lower reservoir and a small amount of makeup water as needed using an existing pumping station largely in a "closed-loop" system. KPUD owns a 15,591 acre-feet (AF) per year water right from the former CGA smelter (No. S3-00845C, No. G4-01130C). This water right was gifted to KPUD by a quitclaim deed executed on December 22, 2005. After legal transfer of ownership, this water right was amended for municipal purposes. As mandated by Ecology, the water right must be put to beneficial use by 2028. Subsequently, by Washington State law passed unanimously and signed by Governor Christine Gregoire on March 30, 2012, KPUD is expressly authorized to use this water right for a pumped storage generating facility and to sell water for pumped storage projects.

Appendix A includes a letter from KPUD describing this effort and the commitment to provide water for this Project.

3.4.4 Turbines Generators and Powerhouse

The rated (average) gross head of the Project is 2,400 feet, and the estimated maximum generating discharge is 8,280 cubic feet per second (cfs). The rated total installed capacity is 1,200 megawatt (MW) (3 × 400 MW). The Project will utilize Francis-type variable-speed, pump-turbine units with an overall cycle efficiency for pumping and generating of approximately 80 percent and a power factor of 0.9. The estimated annual generation for 8 hours a day, 7 days a week is 3500 gigawatt-hours (GWh) per year. Economic modeling, cost-benefit analysis, system need, and market will determine the final optimal size and configuration.

The powerhouse will be located underground between the upper and lower reservoirs in order to minimize the rock cover needed for tunnels. The location will be largely dictated by maximum unit centerline elevation (submergence), geological characteristics, construction limits associated with tunneling, and an acceptable hydraulic layout and configuration of the water conveyance tunnels. A transformer gallery for the underground powerhouse will be in a separate cavern adjacent to the powerhouse cavern to minimize long-term energy losses associated with an externally located transformer yard. The same cavern may also house the draft tube gates. Table 3.4-3 shows estimated design features of the underground water conductors and penstock.

Table 3.4-3: Underground Water Conductors and Penstock Details

Water Conveyance Segment	Approximate Length (feet)	Assumed Finished Shape	Lining Type	Internal Diameter (feet)
Vertical Shaft	2,600	Circular	Concrete	29
High Pressure Tunnel	4,200	Circular	Concrete	29
High Pressure Manifold Tunnel	300	Circular	Concrete	22
Unit Penstocks	600	Circular	Steel/Concrete	15
Draft Tube Tunnel	200	Circular	Steel	20
Low Pressure Tunnel	300	Circular	Concrete	26
Tailrace Tunnel	2,700	Circular	Concrete	30

3.4.5 Transmission Lines

The location, number of circuits, voltage, and configuration of the proposed Project's interconnection with the regional electric utility network would be finalized in conjunction with BPAs transmission planning group. Based on BPAs 2017 Feasibility Study for the proposed Project, the John Day Substation is the preferred connection point for interconnection into BPA's transmission system. Additional details will be developed during the design phase of the proposed Project.

3.4.6 Roads and Other Features

New permanent access roads totaling approximately 18,200 feet would be constructed around the site. New roads would include access to the following:

- Upper Reservoir (10,000 feet)
- Lower Reservoir (7,000 feet)

In addition, existing public roads may need to be upgraded as necessary to facilitate construction and permanent access to the Project facilities from major roads.

The embankments forming the upper and lower reservoirs will include instrumentation such as movement monuments, extensometers, and piezometers (as well as other instrumentation) to monitor the performance of the structures at all times. Seepage into galleries would be measured by V notch weirs suitably placed.

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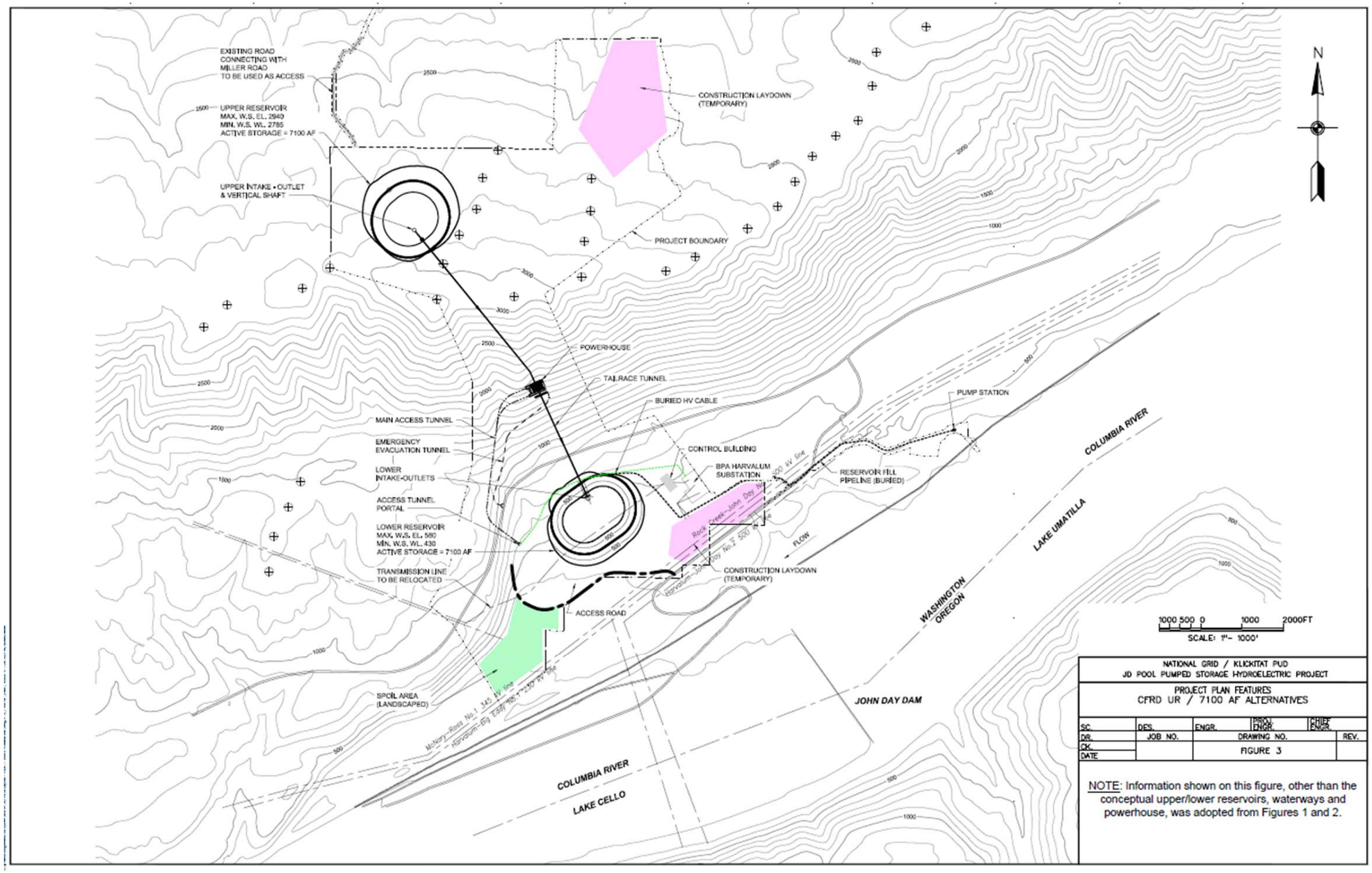

Figure 3.4-1: Project Plan Features

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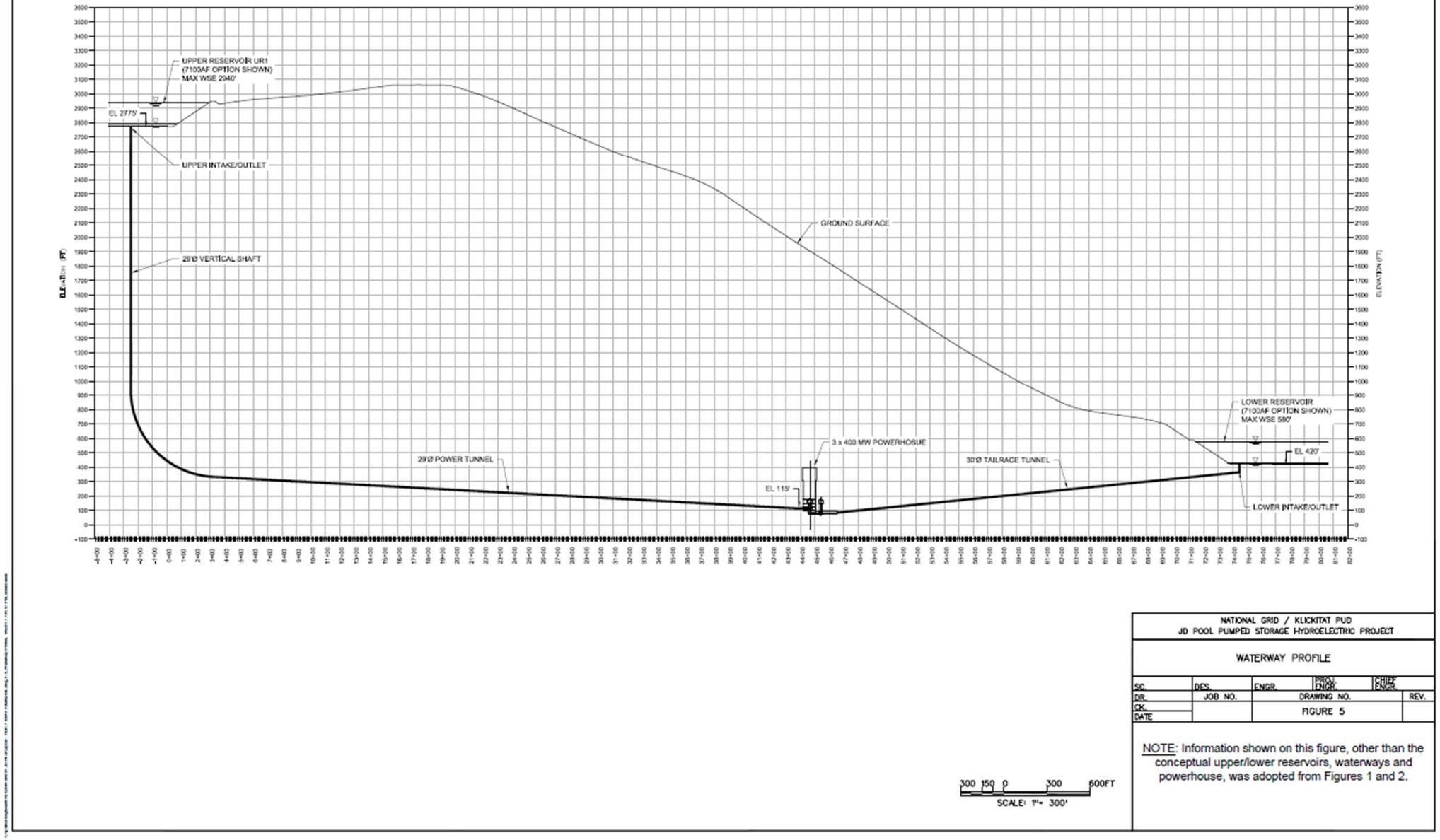

Figure 3.4-2: Waterway Profile

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3.5 Proposed Project Operation

3.5.1 Proposed Project Capacity and Production Potential

The powerhouse is planned to include three reversible, variable speed pump/turbine motor/generator units, each having a rated generating capacity of 400 MW for a total installed rated capacity of 1,200 MW. As a closed-loop pumped storage plant, the plant capacity (1,200 MW) will be dependable capacity. The upper reservoir will be capable of storing approximately 14,745 megawatt-hours (MWh) of energy. The rated (average) gross head of the Project is 2,400 feet and the estimated maximum discharge is 8,280 cfs. Economic modeling, cost-benefit analysis, system need, and market will determine the optimal size and configuration for Project operations. The estimated annual generation for 8 hours a day, 7 days a week is 3,500 GWh per year.

3.6 Proposed Project Operation Regime

3.6.1 Initial Fill

The volume of water required to initially fill the Project is estimated as 9,000 AF, equal to the sum of the active storage (7,100 AF), the combined dead storage for both reservoirs (1,700 AF), and the volume contained within the conveyance system (200 AF). It is assumed that the initial fill will be completed over 6.5 months. The timing of the initial fill will depend on the timing of construction activities–principally, the lower reservoir construction and the completion of the reservoir fill pipeline to the lower reservoir.

3.6.2 Make-Up Water

Table 3.6-1 presents the estimated water losses (evaporation and leakage) and gains (precipitation) for the Project. The estimated evaporation and precipitation were based on long term data recorded by the Goldendale, Washington, AgriMET weather station operated by the U.S. Bureau of Reclamation, which is the closest station from which long-term precipitation or evaporation data were available.

Leakage from the reservoirs and tunnels is not expected due to the inclusion of reservoir liner and concrete and steel liner of the tunnels. However, as a conservative assumption, the Applicant has assumed total annual seepage from the reservoirs and tunnels of approximately 100 AF, representing approximately 1.5 percent of the active storage. Table 3.6-1 summarizes the estimated annual Project water budget based on the estimated losses (evaporation, leakage) and gains (precipitation). The table indicates that the annual average expected Project water balance would be a loss of 275 AF (the negative number indicating a loss), which would have to be made-up by adding water. The exact schedule of the refill—whether the refill would be once per year, or over multiple, shorter withdrawals per year, along with details regarding time of year—will be established later.

Table 3.6-1: Estimated Project Annual Water Balance

	Gain(+) / Loss (-)
Estimated Evaporation (AFY)	-420
Estimated Precipitation (AFY)	150
Estimated Net Loss (-) / Estimated Net Gain (+) (AFY)	-270
Total Annual Refill Volume (AF)	***270***

AF = acre-foot; AFY = acre-foot per year

3.6.3 Definition-Phase Activities

The definition phase (pre-construction) begins after license issuance and is anticipated to take 3 years. During this phase, the licensee will conduct geotechnical investigations, transmission interconnection studies, final design engineering, and develop and execute off-taker agreements. The definition phase activities will culminate in the final Project design and construction drawings and specifications.

3.6.4 Construction

Project construction is anticipated to take 5 years. At the start of construction, various mobilization activities will take place. Site access roads will be constructed and/or improved, temporary construction power will be established, fencing will be established, laydown areas for stock piling excavated materials will be established, and staging areas for construction equipment and material handling will be established.

Excavation for the underground powerhouse, waterways, and reservoirs will begin once the site is mobilized. The construction of the powerhouse will most likely be on the critical path of the construction schedule so the tailrace conveyance tunnel and powerhouse access tunnel will start as soon as possible. As noted, the reservoir design will be optimized to balance cut and fill volumes—incorporating the effect of a potential necessity to remove unsuitable materials from the lower reservoir site. For the horizontal portions of the water conveyances, the preferred method of excavation will be determined later.

Excavated material from the reservoir construction will be tested to ensure the material is suitable for use in the embankments. If the excavated material is unsuitable for embankment fill, other sources of material would be utilized. The geotechnical program will identify potential alternative sources for material in the Project study area such that by the time the Final License Application is filed, more would be known about the availability of construction materials in the Project area. If suitable materials are not available in the Project area, an off-site location(s) for embankment fill material would be identified.

The lower reservoir would be filled when the necessary Project facilities, in addition to the lower reservoir and water supply pipeline, are also completed, such as the tailrace conveyance tunnel, powerhouse, and most of the penstocks and headrace tunnels. When the powerhouse,

conveyance tunnels, and upper reservoir are complete, the conveyances and upper reservoir would be slowly filled using small pumps sufficient to commission the plant. It is expected that the units would be commissioned during the fifth year of construction.

4.0 EXISTING ENVIRONMENT AND RESOURCE IMPACTS

4.1 General Description of the River Basin

4.1.1 Existing Environment

The proposed Project is located in Klickitat County, Washington, and Sherman County, Oregon, near the Columbia River just downstream of the John Day Dam at river mile 215.6. The Project area spans two U.S. Geological Survey (USGS) 8-digit Hydraulic Unit Code (HUC) watersheds (USGS 2019; Figure 4.1-1). The upper reservoir area is located in the 865,340 acre Klickitat River watershed (HUC 17070106), on lands that drain north then west to the Klickitat River, and to the Columbia River downstream of the Project area. The lower reservoir and the Project's transmission infrastructure are within the 1,381,073 acre Middle Columbia-Hood (HUC 17070105) watershed, which spans Washington and Oregon on both sides of the Columbia River. Both watersheds are part of a larger Middle Columbia River Watershed.

The State of Washington manages its water resources using Water Resources Inventory Areas (WRIAs), which follow watershed boundaries. The Project area is located in WRIA 30, Klickitat (Ecology 2014c).

The Columbia River is the only perennial waterbody in the Project area; the Columbia River is crossed by the BPA transmission corridor, which is proposed to be used by the Project, but no Project features are located within or terrestrially adjacent to the river. The nearest perennial waterbody to the Project area on the Washington side of the Columbia River is Rock Creek, which has its confluence with the Columbia River approximately 14 miles upstream of the Project area. On the Oregon side of the Columbia River, the nearest waterbodies are the John Day River, which has its confluence with the Columbia River approximately 3.25 miles upstream of the Project area, and the Deschutes River, with its confluence approximately 11 miles downstream (Figure 4.1-1).

Lands within and near the Project boundary are very dry, dominated by shrub-steppe habitat and grassland. The lower reservoir site is located in the Pleistocene Lake Basins ecoregion; the upper site is located in the Yakima Folds ecoregion (Clarke and Bryce 1997; Omernik 2010). The upper reservoir site is located in the area of Klickitat County that is regionally referred to as the Columbia Hills, approximately 2,000 feet above the Columbia River.

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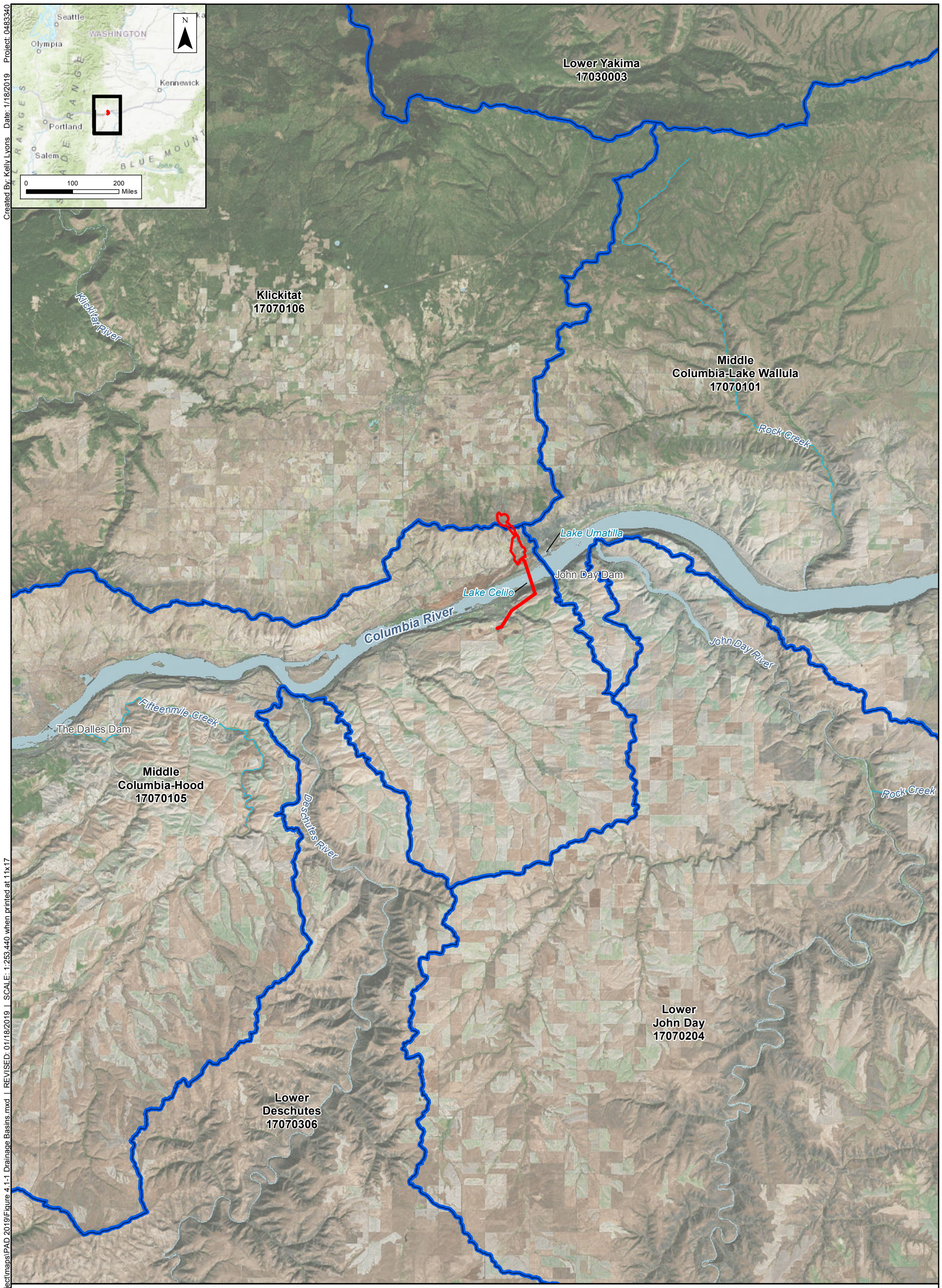

Legend

- Water Body
- Drainage Basin
- Proposed Project Boundary

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Figure 4.1-1
Drainage Basins
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: Esri - World Imagery; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Created By: Kelly Lyons Date: 1/18/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 4.1-1 Drainage Basins.mxd | REVISED: 01/18/2019 | SCALE: 1:253,440 when printed at 11x17

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4.1.2 Major Land Uses and Demographics

4.1.2.1 Local towns, cities, and population

The closest town is Goldendale, Washington, located in Klickitat County, approximately 8 miles northwest of the Project area. Goldendale has an estimated population of 3,485 residents (United States Census Bureau 2018). The next closest town is The Dalles, Oregon, 21 miles southwest and in Wasco County, which had a 2017 population of 15,646 residents.

4.1.2.2 Land Uses

The upper reservoir vicinity includes wind farms and dry-land agriculture/rangeland. The wind farm is located just east of and adjacent to the Project boundary and consists of 13 wind turbines owned by Tuolumne Wind Project Authority. These wind turbines are part of the Windy Point Phase I Project, which is comprised of 62 wind turbines.

The lower reservoir area was previously occupied by the CGA smelter (currently owned by NSC Smelter). Following construction and operation of hydroelectric dams within the Middle Columbia Basin, construction for the CGA smelter began in 1969 near the present-day John Day Dam. The site operated as an aluminum smelter from 1971 to 2003 under various owners, the most current being NSC Smelter. The smelter contributed contaminants to the surrounding soil and water, and in 1990 the site was added to Ecology's Hazardous Sites List and is currently undergoing contaminant cleanup (Ecology 2019a). The former smelter and its relationship to the proposed Project are discussed in more detail in Section 4.2, Geology and Soils. The lower reservoir vicinity includes the remainder of the CGA smelter lands, Washington State Highway 14, and the Columbia River.

Land cover in the watersheds include cropland, pastureland, orchards and vineyards, rangeland, and forest land. The majority of the irrigated orchards and pastures in these watersheds are located downstream of the John Day River in the Hood River Valley and The Dalles. Major agricultural commodities include wheat, barley, cattle, hay, pears, apples, and cherries. The Natural Resources Conservation Services (NRCS) estimated that approximately 5 percent of the Middle Columbia-Hood River Watershed is used for irrigated agriculture (a total of 37,600 acres of irrigated lands in 1997 [NRCS 2005b]).

4.1.2.3 Water Uses

From its headwaters in British Columbia to the Columbia River Delta, the Columbia River flows for 1,243 miles through a total of 14 dams, providing hydroelectricity and irrigation along its path (Lang 2008). The closest dams to the Project area are the John Day Dam just upstream and The Dalles Dam 25 miles downstream.

Groundwater and surface water rights are summarized in Sections 4.2, Geology and Soils, and Section 4.3, Water Resources, respectively; general uses are summarized in this section. The

major water uses in the Project area watersheds are agriculture and power generation. In addition, instream flow for fish and aquatic species is also a major water use in the Middle Columbia-Hood watershed. The average demand for agricultural irrigation within the Columbia River Basin is 6.3 million AFY, and Ecology projects that demand would grow 2 percent by 2030 (Ecology 2011c).

Use of groundwater resources in the Project area and vicinity is limited. Three groundwater extraction wells are present within the Project area: two industrial wells associated with the former aluminum smelter, and one domestic or irrigation well reported near the top of the ridge in the northern portion of the area (Ecology 2019a). The community of Goldendale does not use a municipal groundwater source, instead they rely on spring water originating from the permeable Simcoe Volcanics within the Simcoe Mountains for potable use (Klickitat County Planning 2004).

4.1.3 Climate

The climate is semi-arid with cool wet winters and hot dry summers (Ecology and Environment 2006). The Project area receives an average of 17 inches of precipitation annually (U.S. Climate Data 2018), primarily as rain. The temperature regime is temperate, with an average summer high of 82 degrees Fahrenheit °F (June through September) and an average winter low of 39 °F December through February (U.S. Climate Data 2018).

4.2 Geology and Soils

4.2.1 Existing Environment and Geology

The proposed Project is located in the southern margin of the Columbia Hills near the Columbia River within the Columbia Plateau physiographic province. The Columbia Plateau covers an area of approximately 63,000 square miles, within which the ground surface ranges in elevation from approximately 200 to 3,000 feet. Mountains surround the plateau on all sides: the Cascade Range to the west, the Okanogan Highlands to the north, the Clearwater Range to the east, and the Blue Mountains to the south (Shannon & Wilson, Inc. 2002) (Figure 4.2-1).

The rocks of the Columbia Plateau are primarily accumulations of successive lava flows that erupted during the Miocene epoch. These lava flows are several thousand feet thick across most of the Columbia Plateau area, including in the proposed Project boundary, and are the result of numerous massive eruptions of basaltic lavas from vents near the southeast corner of Washington State. In many places, sedimentary units of variable thickness are present between the flows, marking quiescent periods between eruptions that allowed lacustrine and fluvial sediments to accumulate as the regional surface water flow adjusted to the new topography and drainage conditions introduced by each lava flow.

From the Pliocene epoch through the present, uplift of the Columbia Plateau has introduced multiple folds and faults across the region, and has allowed stream erosion to cut across deep sections of the original rocks that were emplaced during the Miocene. Some of the most pronounced erosion of these rocks occurred during the most recent glaciation period of the Pleistocene epoch, when multiple advances of glacial ice created a massive lake in the vicinity of Missoula, Montana. The lake would eventually overtop and destroy each ice dam, creating catastrophic floods that spread across the Columbia Plateau region, scouring the landscape throughout the area and through the Columbia River Gorge west of the proposed Project. These floods (known as the "Missoula floods") not only scoured materials from upland areas, but deposited sediments in local basins and along the course of the Columbia River.

Geology at the proposed Project includes Pleistocene-Holocene sediments over Miocene basalt flows along the Columbia River and Miocene basalt flows in the upland portions of the Project boundary. The Miocene basalt flow exposures along the steep slope north of the Columbia River in the proposed Project boundary are largely obscured by locally generated talus and scree. Widespread loess is present at the surface of and in the immediate vicinity of the portion of the proposed Project boundary at the top of the steep slope. Evidence of thrust faulting, strike-slip faulting, and folding of the Miocene basalt rocks is present in the proposed Project boundary. Quaternary landslide deposits have also been mapped in the Project vicinity (Phillips and Walsh 1987).

A stratigraphic section of the Project area is included in Figure 4.2-2.

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Underground Powerhouse
Tunnel Portal
Tunnel Portal
John Day Substation

Legend

- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
- Proposed Underground Access Tunnel
- Proposed Underground Penstock
- Proposed Reservoir
- Temporary Construction Staging Area
- Proposed Project Boundary

Washington Faults & Folds

Dip-Slip Movement

- Normal fault - Identity and existence certain, location accurate.[43]
- Normal fault - Identity and existence certain, location concealed.[45]
- Thrust fault - Identity and existence certain, location accurate.[7]
- Thrust fault - Identity and existence certain, location concealed.[9]

Strike-Slip Movement

- Right-lateral strike-slip fault - Identity and existence certain, location accurate.[13]
- Right-lateral strike-slip fault - Identity and existence certain, location concealed.[15]
- Left-lateral strike-slip fault - Identity and existence certain, location accurate.[19]

Movement Unknown

- Fault, unknown offset - Identity and existence certain, location accurate [1]
- Fault, unknown offset - Identity and existence certain, location concealed [3]

Fractures

- Fracture - Identity and existence certain, location accurate [25]
- Fracture - Identity and existence certain, location concealed [27]
- Anticline - Identity and existence certain, location accurate [1]
- Anticline - Identity and existence certain, location inferred [37]
- Anticline - Identity and existence certain, location concealed [3]
- Syncline - Identity and existence certain, location accurate [13]
- Syncline - Identity and existence certain, location concealed [15]
- Monocline, anticlinal bend - Identity and existencecertain, location accurate [31]
- Monocline, synclinal bend - Identity and existence certain, location concealed [27]

Washington Geologic Units

Unconsolidated Sediments

- Quaternary alluvial fans (Qaf), beach deposits, landslides (Qls), and talus (Qta)
- Quaternary alluvium, dune sand, loess, and artificial fill (Q1)
- Pleistocene continental glacial, glacio-lacustrine, and outburst flood deposits, Fraser-age (Qfg)

Sedimentary Rocks and Deposits

- Quaternary-Miocene continental sedimentary rocks

Volcanic Rocks and Deposits

- Quaternary and Quaternary-Pliocene undifferentiated volcanic rocks
- Quaternary-Tertiary volcanic rocks
- Miocene Columbia River Basalt Group, Wanapum Basalt, MV(wpr) Priest Rapids Member, MV(wr) Roza Member, and MV(wfs) Frenchman Springs Member
- Miocene Columbia River Basalt Group, Grande Ronde Basalt: MV(gN2) Flows of normal magnetic polarity and MV(gR2) Flows of reverse magnetic polarity

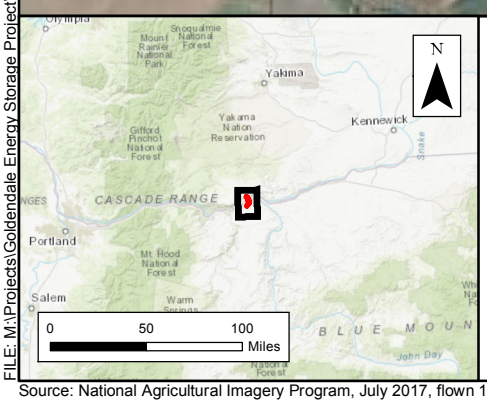

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Figure 4.2-1
Geology
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
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Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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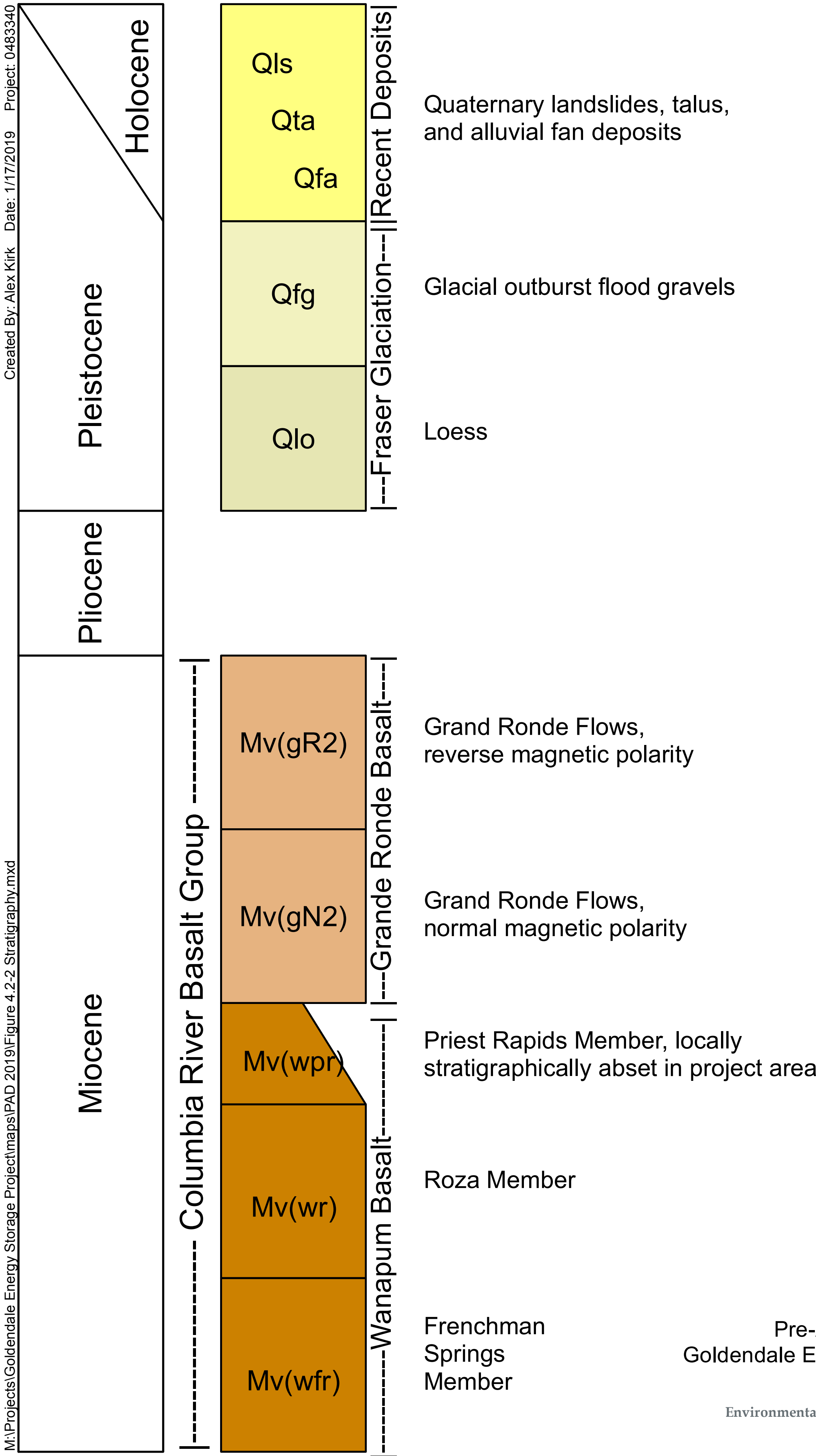

Figure 4.2-2
Site Stratigraphy
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

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4.2.1.1 Miocene Basalt

Miocene Columbia River basalt flows mapped in the vicinity of the proposed Project include the Roza, the Priest Rapids, the Frenchman Springs Members of the Wanapum Basalt, the Member of the Wanapum Basalt, and two sets of flows of the Grande Ronde Basalt.

The oldest flows within the proposed Project boundary are the Wanapum Basalts, which are the rocks forming the very top of the ridgeline in the upper elevation portion of the site, and are present within the steep slope portion of the proposed Project boundary in upthrown wedges along thrust faults. The Rosa and Frenchman Springs Members are present across the proposed Project boundary, but the Priest Rapids Member is laterally discontinuous in the vicinity, appearing between Rosa and Frenchman Springs Members in scattered localities within the Project boundary, most notably as a layer less than approximately 30 feet thick on the upthrown side of thrust faults exposed on the south-facing slopes immediately west of the Project boundary.

The youngest Miocene basalt flow units in the area, the Grande Ronde Basalt, are exposed as bedrock on the topographic bench immediately above the Columbia River in the proposed Project boundary, and also for most of the lithologic section exposed in the steep slope north of the river, as a relatively thin erosional remnant overlying the older Frenchman Springs Members.

Nearly all of the Miocene basalt flows in the proposed Project boundary dip somewhat steeply to the south, toward the Columbia River. This apparent dip is noted based on the angle of the depositional contacts mapped between the units as they cross slopes in the map area. Direct measurements of the dip of the individual units were not reported in the references reviewed.

No interbedded sedimentary rocks are mapped within the Miocene basalt flows in the proposed Project boundary, as is common in other areas of the Columbia River Plateau.

4.2.1.2 Quaternary Deposits

Quaternary deposits within the proposed Project boundary and in the vicinity include:

- Quaternary Missoula Flood deposits;
- Quaternary loess;
- Quaternary alluvial fan deposits;
- Quaternary landslide deposits; and
- Quaternary talus.

Each of these units is mapped within or immediately adjacent to the proposed Project boundary, as shown in Figure 4.2-1.

The Missoula Flood deposits are characterized by silt, sand, gravel, and boulders of variable and diverse composition deposited in a high-energy environment associated with approximately 40 separate glacial outburst floods (jokulhlaups) that occurred during the most recent Pleistocene glaciation stage. These deposits in the proposed Project area include a relatively thin veneer of sediments on the Miocene basalt bedrock bench immediately adjacent to the Columbia River in the western portion of the site and in terrace deposit remnants situated against the bottom of the steep slope at the northern edge of that bench.

Loess deposits are characterized by unconsolidated silt and fine sand deposits of variable thickness deposited from windblown sediments related to past continental glaciation conditions in Eastern Washington. These deposits are widespread across the surface in the upland area of the proposed Project area north of the top of the steep slope.

An alluvial fan deposit is mapped just west of the proposed Project area at the base of the steep slope north of the Columbia River. The alluvial fan deposits in the region generally consist of sand, gravel, and boulders deposited near the base of steep slopes along streams and storm water channels. Some of these deposits include evidence of debris flows, such as large boulders entrained in the deposits.

Two Quaternary landslides are mapped in the vicinity of the Project. Both landslide deposits appear to be developed from material that has collapsed from the upper portions of the steep southern slope of the Columbia Hills ridgeline. One landslide deposit covers a broad area on a break in slope approximately 0.25 mile west of the site, and one deposit is situated on the face of the steep slope approximately 1 mile northeast of the site. The landslide deposits in the area consist of large lithic blocks in a matrix of finer sediment debris and thick deposits of angular fragments of basaltic talus accumulating at the base of steep slopes. Large landslide deposits are common, originating in the slopes above the northern bank of the Columbia River, and areas of deep bedrock instability are reported in the south slopes of the Columbia Hills in the site vicinity (Sager 1989).

Accumulations of talus form a broad, irregular apron along the base of the steep slope that runs through the center of the Project area. The talus consists primarily of angular basaltic fragments that have fallen directly from the cliffs and steep slopes above.

4.2.1.3 Soils

Soils within the proposed Project boundary are characterized within three general areas:

- The former CGA smelter site and proposed lower reservoir area;
- The proposed upper reservoir area; and
- The steep slope between the proposed reservoir areas.

Soils in each of these areas are distinct. Although several soil designations may be described in each area, the general characteristics of the soils share many common traits. Soil information described in this section is derived from the U.S. Department of Agriculture (USDA 2009).

Former CGA Smelter Site and Lower Reservoir Area

Soils in the former CGA smelter site area generally consist of a mixture of Horseflat and Dallesport cobbly silty loams, Ewall loam sand, bedrock outcrops with hyploxeroll soils, and urban land associated with developed areas of the former CGA smelter site. In the Project area, Horseflat soils are typically developed in loess over basalt and on colluvium containing basalt fragments and loess on and at the base of steep slopes. Dallesport and Ewall soils are typically developed on outburst flood sediment deposits containing a mixture of cobbles, sand, and silt. The hyploxeroll soils are typically a thin alluvium cover over bedrock.

Each of these soils is described as well-drained. The moderately high to high water draining capacity of the Horeseflat, Dallesport, and Ewall soils is reflected in the low to moderate water erodibility of soils by water and wind summarized in Table 4.2-1. Wind erodibility is moderately low for Horseflat soils, low to moderately high for Dallesport soils, high for the Ewall soils, and moderately high for haploxeroll soils.

Table 4.2-1 Soil Erodibility Characteristics

Name of Primary Soils	Range of Water Erosion Factors		Wind Erodibility Group	Wind Erodibility Index
	Kw	Kf		
Lower Reservoir Area				
Ewall	0.10	0.10	2	134
Dallesport	0.02 - 0.28	0.28 - 0.43	3 - 7	38 - 56
Haploxerolls	0.15 - 0.32	0.32	3	86
Horseflat	0.10 - 0.20	0.37 - 0.43	6	48
Upper Reservoir Area				
Goldendale	0.37 - 0.43	0.37 - 0.43	5	56
Lorena	0.37 - 0.43	0.37 - 0.43	5	56
Rockly	0.10	0.37	8	0
Slope Between Reservoir Areas				
Haploxerolls	0.15 - 0.32	0.32	3	86
Horseflat	0.10 - 0.20	0.37 - 0.43	6	48
Onyx	0.15 - 0.43	0.32 - 0.43	5	56
Rockly	0.10	0.37	8	0

Water Erosion Factors: Kf = Fine fraction soil (grain size less than 2 millimeters) erosion rate of tons per acre per year
Range of Kw and Kf erosion potential factors: 0.02 - 0.15 = Low, 0.16 - 0.28 = Moderately low, 0.29 - 0.43 = Moderate, 0.44 - 0.55 = Moderately high, 0.56 - 0.69 = High
Wind Erosion Factors: Wind Erosion Group is a dimensionless score ranging from 1 (highly erodible) to 8 (not erodible)
Wind Erodibility Group scoring: 1 - 2 = High, 3 - 4 = moderately high, 5 - 6 = Moderately low, 7 - 8 = Low
Wind Erodibility Index estimates susceptibility to wind erosion in tons per acre per year
Wind Erodibility Index ranges: 0 - 62 = Low, 63 - 124 = Moderately low, 125 - 186 = Moderate, 187 - 248 = Moderately high, 249 - 310 = High

Upper Reservoir Area

Soils in the upper reservoir area primarily consist of a mixture of Lorena silt loam and Goldendale silt loam, with some areas of Rockly very gravelly loam. The Lorena and Goldendale soils are both mixtures of basalt alluvium, colluvium, and residuum; loess; and minor volcanic ash. Lorena soils are predominantly weathered basalt, and Goldendale soils are predominantly loess. Rockly soils are predominantly basalt colluvium with some loess and minor volcanic ash. Rockly soils are predominant along the top of the steep slope separating the lower reservoir area from the upper reservoir area.

Each of these soils is described as well-drained. The moderately high water draining capacity of these soils is reflected in the low to moderate water erodibility of soils summarized in Table 4.2-1. Wind erodibility is moderately low for the haploxerolls and for the Lorena and Goldendale soils, and low for the Rockly soils.

Steep Slope Between Reservoir Areas

Soils on the steep slope separating the reservoir areas primarily consist of rock outcrops and rubble with a veneer or pockets of heploxeroll soils; Horseflat sobbly silty loam and Horseflat soils complexed with other, similar soil types; Rockly very gravelly loam; and minor Onyx silt loam. Rock outcrops and colluvium with associated areas of haploxeroll soils cover much of the steep face of the slope. Horseflat soils are typically developed in loess over basalt and on colluvium containing basalt fragments and loess on and at the base of steep slopes. Rockly soils are predominantly basalt colluvium with some loess and minor volcanic ash, and are predominant along the top of the steep slope separating the lower reservoir area from the upper reservoir area. Onyx soils consist of alluvium nearly flat-lying ground.

Each of these soils is described as well-drained. The moderately high water draining capacity of these soils is reflected in the low to moderate water erodibility of soils summarized in Table 4.2-1. Wind erodibility is low for the haploxerolls, moderately low for Horseflat soils, low for Rockly soils, and moderately low for Onyx soils.

4.2.1.4 Geologic Structures

The Project is in an area of moderate folding and faulting of the underlying Miocene Columbia River basalt flows. Geologic structural details in the proposed Project vicinity are included on the geologic map in Figure 4.2-1.

The Columbia Hills Anticline, a broad east-west trending anticlinal arch that underlies the Columbia Hills, is the primary structural feature of the site vicinity. Several minor local flexures associated with the anticline are present in the site vicinity. A thrust fault associated with the southern limb of the anticline crosses the proposed Project area trending west-southwest to east-northeast, and anastomoses into two separate limbs just to the west of the site. Two generally

northwest-southeast trending faults, one the Goldendale strike-slip fault and the other a combination strike-slip and normal fault, intersect the thrust fault in the site vicinity. The latter fault passes directly through the former CGA smelter area.

The age of the folding and faulting in the area is not well understood, although there is evidence that the folding and faulting in the area was active during emplacement of the Miocene basalt flows and continues through approximately 4 million years ago (Reidel et al. 1989). To the west of the site vicinity, faults associated with the structures in the site vicinity are overlain by volcanic rocks approximately 900,000 years old, indicating that the faulting in the site vicinity is older than that date.

A geotechnical investigation completed at the site by Shannon & Wilson, Inc. (2002) indicated that primary specific seismic risks in the proposed Project area are associated with soil liquefaction and lateral spreading. Sediments present within the saturated zone beneath some areas of the site exhibit conditions that are conducive to liquefaction during earthquakes. This liquefaction potential also may contribute to increased chance of lateral spreading of soils during a seismic event. The liquefaction potential of site soils also indicates potential instability of an area near the railroad embankment in the western portion of the smelter area in the event of an earthquake.

4.2.1.5 Groundwater

In the lower elevation portions of the proposed Project area (where the lower reservoir is proposed), groundwater has been encountered during geotechnical investigation drilling at depths ranging from 2 to 25 feet below ground surface (bgs), which is about 156 to 181 feet above the normal John Day Reservoir (Lake Umatilla) pool elevation of approximately 265 feet AMSL The water is present in unconsolidated sediments overlying basaltic rocks that likely act as an aquitard that limits downward infiltration of groundwater. Because the groundwater level is significantly higher than the Lake Umatilla elevation, and because an aquitard is present at the base of the aquifer, the groundwater in the general vicinity of the proposed lower reservoir is considered perched groundwater. Season fluctuations of groundwater levels up to 2 feet have been observed in the wells in the general site vicinity (Shannon & Wilson 2002).

Several boring and well logs were identified in the area near the top of the steep slope in the northern portion of the Project area (where the upper reservoir is proposed); however, all but one of those logs were for shallow borings of less than 20 feet bgs that did not encounter groundwater (Ecology 2014a). One well log in this area was reportedly drilled to a depth of 112 feet bgs, and encountered groundwater at 80 feet bgs in fractured bedrock; however, its proximity to the Project is unknown.

Two springs just north of the top of the ridgeline and west of the proposed Project at elevations of approximately 2,750 and 2,790 feet AMSL are shown on the USGS base map used to develop the geologic map of the area in Phillips and Walsh (1987). Seven springs are also mapped south

of the ridgeline in this area at elevations ranging between 1,080 and 2,500 feet AMSL. The top of the ridge in this area ranges from approximately 2,850 to 2,920 feet AMSL. These springs appear to be primarily associated with contacts between lava flow units and fault zones, both of which are common preferential pathways for groundwater flow. No springs or other surface expressions of groundwater presence are reported within the vicinity of the proposed Project.

4.2.1.6 Seismicity

Six earthquakes with a magnitude greater than 1.0, the greatest being 2.7, were reported within 5 miles of the Project boundary between 1970 and 2017 (PNSN 2019). Two of the earthquakes, which were recorded in 2009 and 2012, were located approximately 3 to 4 miles west of the proposed Project boundary at the location of a historic landslide and were shallow (less than 1 kilometer). Four earthquakes occurred east of the proposed Project boundary between 1970 and 2017. The closest earthquake occurred approximately 2 miles east of the proposed Project in June 2017 and had a reported magnitude of 1.7 at a depth of 8.4 kilometers.

Other nearby fault zones that are considered potentially active are the Oak Flat-Luna Buttes Fault Zone (12 miles from the proposed Project boundary) and Arlington-Shutler Buttes Fault Zone (16 miles from the Project boundary). The Oak Flat-Luna Buttes fault zone is predicted to be capable of a maximum earthquake magnitude of 6.4 to 6.9, and the maximum magnitude for the Arlington-Shutler Buttes Fault Zone ranges from 6.6 to 7.1 (Wong et al. 2000). Both fault zones have been assigned a low to moderate probability of activity. The results of a 2002 liquefaction study indicated that discontinuous layers within the silty sand and sand fine grained facies of the Missoula Flood Deposits are susceptible to liquefaction near the proposed Project.

The thrust faults in the vicinity of the proposed Project are listed as seismogenically active, but the Project is located in Washington State Seismic Design Category B, which is the category representing areas with the lowest relative seismic risk.

4.2.2 Potential Resource Impacts and Hazards Assessment

Specific conditions related to geology, soils, and groundwater have been studied extensively over the years for ongoing investigation and cleanup of the former CGA smelter site, including those completed for investigations related to a pumped storage project previously proposed at the site by KPUD, and for the preliminary engineering of the proposed Project. An assessment of the potential hazards related to those conditions that could affect or arise from the construction and operation of the Project has been developed using those resources. The following conditions were evaluated in terms of potential geologic-, soil-, and groundwater-related hazards within and in the vicinity of the Project boundary:

- Former CGA smelter site (West Surface Impoundment [WSI])
- Slope stability/mass soil movement

- Water erosion and windblown dust
- Groundwater impact issues
- Seismicity

Several Solid Waste Management Units (SWMUs) are present on the CGA smelter site, one of which (i.e., WSI) includes the footprint of the proposed lower reservoir. Although the WSI has been investigated for soil and groundwater contamination and formally closed to further action, other portions of the CGA smelter site outside the proposed Project boundary are undergoing site investigation in preparation for remedial action to address soil and groundwater contamination.

Slope stability and mass soil movement is of interest in regard to ambient risk of slope instability or mass movement in the Project area. Whether slope stability may be compromised as part of the Project construction and operation resulting in mass movement is also a potential concern.

Soil erosion hazards related to both background conditions and Project effects on soil erosion conditions should be considered. Windblown dust may be a concern from both contaminated soil transport from portions of the CGA smelter site outside of the Project boundary, as well as Project operation due to accumulation of sediment in the reservoirs.

Groundwater infiltration is of particular interest because of the potential changes in contaminant fate and the transport conditions that changes in groundwater conditions may drive. Additionally, changes in groundwater conditions may factor into risk and severity of slope instability and erosion.

Shallow seismic events are known to occur in the project vicinity, although the specific project area is considered to be a lower risk for deeper events. These potential hazards in the Project area, as well as the potential for the Project to create or exacerbate existing hazards, are discussed individually in the subsections below.

4.2.2.1 Former Smelter Site

The former CGA smelter generally operated from 1969 to 2003 and generated wastes ranging from sulfur dioxide scrubber wastewater to various metals (particularly fluoride, iron, manganese, and sodium), chlorides, sulfate, cyanide, and phenols. Waste materials were disposed of off-site and on-site. Some on-site wastes (solid and/or liquid) were deposited in landfills (lined and unlined), and some were placed in piles on the ground. Various studies over the years have identified areas of concern. As part of an Agreed Order (May 1, 2014) among Ecology, the current site owner NSC Smelter, and Lockheed Martin Corporation ("Potentially Liable Persons"), a Remedial Investigation and Feasibility Study (RI/FS) was completed in August 2015. The RI/FS characterizes the contamination issues in the area, assesses human and ecological risks, and proposes measures that would be implemented to lower any risks. A

supplemental report from the cleanup project consultant (GeoPro, LLC) is scheduled to be submitted to Ecology in early 2019 to address additional data needs (if any) for the RI/FS.

Within the proposed Project boundary, the lower reservoir is located within the footprint of one of the CGA smelter SWMUs, the WSI (Figure 4.2-3). The WSI was used to concentrate emission control wastewater through evaporation and for storage and disposal of air emission control sludge. In September 2004, the WSI was closed under RCRA (Ecology 2014e). Closure was conducted through consolidation and grading of the sludges and the placement of an engineered RCRA cap consisting of a sand layer, a geosynthetic clay layer, 30-mill PVC geomembrane liner, a geotextile drainage layer, and soil cover (Ecology 2014a, 2014e). At the time of closure, about 89,000 cubic yards of material was estimated within the WSI. A Closure and Post-Closure Plan was prepared in November 2004, including provisions for long-term maintenance and groundwater monitoring (Parametrix 2004c). In November 2005, Ecology accepted certification for closure of the WSI (Ecology 2014e).

Since the WSI was closed by Ecology, continued monitoring has shown that the material in the impoundment is not designated as hazardous material, and therefore may be removed to a solid waste landfill when construction of the Project commences. The proposed Project design includes removal of all of the WSI material because it is unsuitable for reservoir construction. Additional testing, sampling, and characterization will occur to confirm proper disposal at the time of removal.

There are 11 wells on the CGA property in the vicinity of the WSI that monitor groundwater to characterize groundwater flow and migration of constituents. Six of the wells have been the focus of ongoing sampling by GeoPro LLC since 2005. The most recent monitoring report available is from September 2017. Figure 4.2-4 shows the general trend of groundwater flow off the bluffs to the north, then southwest roughly parallel to the Columbia River. Constituents of concern include fluoride, chloride, sulfate, and total cyanide. Sulfate and fluoride are generally above the lowest groundwater protection standard, and chloride and total cyanide are below those standards in downgradient wells (Table 4.2-2). In all cases, levels have decreased since closure of the WSI (GeoPro LLC 2017).

Table 4.2-2: September 2017 Groundwater Monitoring Data

	Upper Confidence Limit (mg/L)[1]			
	Sulfate	**Chloride**	**Fluoride**	**Total Cyanide**
Lowest Groundwater Protection Standard (mg/L)	250	250	0.96	0.2
Upgradient				
MW-8A	9.15	4.48	0.64	0.01
Downgradient				
MW-3B	**2272.33**	107.57	**2.31**	0.01
MW-10A	**1958.75**	66.96	**3.42**	0.03
MW-12A[1]	**1800**	150	**6**	0.01
MW-14A	**3954.35**	111.87	**20.22**	0.11
MW-18	**1496.25**	82.88	**2.84**	0.01

Source: GeoPro LLC 2017

Notes:
mg/L = microgram per liter
Upper Confidence Limit (UCL) is a tool (MTCA (WAC 173-340-920) for assessing whether data exceeds established cleanup levels by comparing data to UCLs calculated on the mean. The UCL for each parameter at each well was calculated using the post-closure data, and the calculated UCL was compared to the MTCA cleanup level and MCL for each analyte to assess whether groundwmater protections standards are being met.
[1] No UCL calculated. Well was dry during most sampling events. Value represents single measurement collected on March 13, 2007.
[2] No UCL calculated, all data was non-detect.
Bold indicates UCL exceeds lowest groundwater protection standard.

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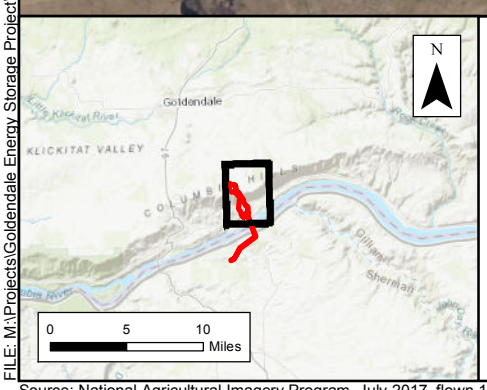
Legend

- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
- Proposed Underground Access Tunnel
- Proposed Underground Penstock
- Proposed Reservoir
- Temporary Construction Staging Area
- Proposed Project Boundary
- Solid Waste Management Unit (SWMU)
- West Surface Impoundment (WSI)

Underground Powerhouse

Tunnel Portal

Tunnel Portal



N

0 1,500 3,000 Feet

Figure 4.2-3
West Surface Impoundment and Footprint of Lower Reservoir
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
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Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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N

14

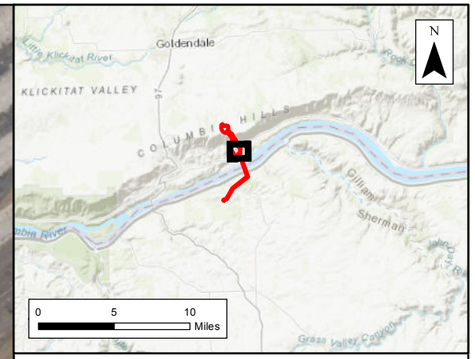
MW-8A
MW-17A
MW-16A
MW-6B
MW-15A
MW-14A
MW-10A
MW-12A
MW-3B
MW-18

460 ft
440 ft
420 ft
400 ft
380 ft
360 ft
340 ft

West Surface Impoundment

John Day Dam Rd

0 500 1,000 Feet



Legend

- GeoPro LLC Monitoring Well
- GeoPro LLC Estimated Groundwater Contours
- Proposed Reservoir
- Temporary Construction Staging Area
- Proposed Project Boundary

Solid Waste Management Unit (SWMU)

- West Surface Impoundment (WSI)

M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 4.2-4 Groundwater.mxd

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Figure 4.2-4
Groundwater Contours in the Vicinity of the Lower Reservoir
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

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4.2.2.2 Slope Stability/Mass Movement

Mass wasting events are common on the northern bank of the Columbia River due to deep bedrock instability, especially on the southern limb of the Columbia Hills Anticline. Also, freeze-thaw cycles can cause gradual movement. The Washington Department of Natural Resources (DNR) identifies two situations where landslides commonly occur in the general vicinity of the proposed Project: (1) where weak sedimentary layers between Columbia River Basalt flows cause the overlying basalt to slide along the weak, tilted sedimentary interbeds, and (2) where weathered, tilted, and clay-rich volcaniclastic rocks fail either on their own or beneath overlying younger lava flows, transporting both downslope (USACE 1989).

The Project boundary is located immediately east of an approximately 8 square mile landslide. No landslide features are identified in the Project boundary by the DNR, nor did DNR identify evidence of potential new major slides in the vicinity of the proposed Project.

General reconnaissance of the John Day (Lake Umatilla) reservoir shoreline indicate that no new major slides have developed in recent years. Large areas of deep bedrock instability are present on stability exist, likely associated with ancient thrust and normal faulting in the area. Near John Day Dam, Columbia River Basalt flows are disturbed and juxtaposed by the Columbia Hills thrust zone. The zone crosses the Project boundary at mid-slope elevations. Some of the basalt flows that make up the Wanapum and Grande Ronde Basalt formations within the Project boundary have discontinuous interbeds of saprolite, tephra, or tuff that reduce slope stability. The Priest Rapids basalt includes a 25-foot-thick tuffaceous siltstone and claystone unit that is the chief detachment plane for rotational and translational failures. The Umatilla Member has a sedimentary interbed; the Pomona Member is chiefly an intracanyon flow (but is present in a large area on the Oregon side); and the Elephant Mountain Member has a discontinuous tuffaceous interbed.

Underlying the Elephant Mountain and Pomona members is an extensive volcaniclastic deposit of poorly sorted, weakly lithified andesitic to rhyolitic detritus chiefly erupted from Cascade volcanoes. This deposit is extensively involved in slumps and flows and serves as a detachment plane for overlying bedrock slides. Interbeds combined with the Columbia Hills thrust have caused extensive mass wasting and instability along sections of the Washington shore of the Columbia River. Some minor instability, such as rock falls and slumps, also exists on the Oregon shore of the Columbia River (Sager 1989).

In addition to landslides, previous work near the Project identifies extensive talus deposits that form an apron at the base of the basalt cliffs. Talus deposits are composed of rock fragments of any size or shape derived from, and lying at the base of, a cliff or very steep, rock slope. Past work has also revealed consolidated debris flow deposits near the Project.

It is unlikely that the Project construction will significantly increase the potential for slope stability and mass movement, and Project designs will take into consideration the potential for naturally occurring events in the Project area.

4.2.2.3 Water Erosion and Windblown Dust

Erosion hazards not related to slope stability and mass movement processes described above are due to water erosion and windblown dust.

The Project area does not receive much rainfall, which generally minimizes erosion from water sources. However, over long periods these natural processes may potentially result in erosion. Hazards related to water include erosion of soils at both proposed upper and lower reservoirs and loosing of rock and soil in the bluffs above the lower reservoir, causing a potential of gradual or catastrophic movement of rock and soil. Surface and near surface flow can erode soils and weaken rock (such as during freeze thaw cycles).

Windblown dust is caused by introduction of dust into surface water by increased erosion of soils during Project construction and operation. Windblown dust accumulation in the reservoirs can cause airborne transport of impacted sediments from the WSI.

Hazards related to windblown dust include reduced air quality, respiration of dust, and transport during construction of the lower reservoir. Windblown dust accumulation in the upper and lower reservoirs was modeled using a dust accumulation model developed by Sehmel (1984). The model output indicated that approximately 104 to 167 pounds of dust per day (19 to 30.4 tons per year) would accumulate in the reservoirs, which would equate to a maximum of approximately 7.63×10^{-4} inches per year across the entire area of the reservoirs.

The accumulation rate for windblown dust in the reservoirs will not occur at a rate that will require any mitigation beyond standard maintenance to address potential damage to infrastructure. Additionally, the conservative contaminant accumulation scenario indicates that at expected contaminant concentrations and within expected solubility and natural attenuation parameters, it is very unlikely that accumulation of contaminants from windblown dust will significantly affect water quality in the reservoirs.

Management of erosion to prevent surface water and air contamination during Project construction and operation will be outlined in the Storm Water Pollution Prevention Plan and Erosion and Sediment Control Plan to be developed for construction. The Erosion and Sediment Control Plan will address practices to be established during Project construction and operation to minimize the potential for generating windblown dust from Project activities. Special focus in the Erosion and Sediment Control Plan will be given to addressing earthworks in Dallesport and Ewall soils, as well as haploxeroll soils, because these soils have the highest wind erosion risk of the soils on the Project area.

4.2.2.4 Groundwater

For the purposes of the PAD, the Applicant considered that the reservoirs, penstock, and powerhouse could to come in contact with groundwater, since many of the components will be underground or have deep foundations. It is not anticipated that groundwater will be impacted by construction given normal construction techniques and materials.

The upper and lower reservoirs will be constructed with double liner systems to prevent leakage into groundwater. This liner system will be designed to prevent reservoir water from impacting groundwater and will also prevent groundwater from coming into the reservoir. Preventing water leakage from the reservoir will diminish impacts on groundwater flow from adjacent landfills. However, the design of the reservoir (depth, location and type of the foundations, pipe runs, and other subsurface facilities) could impact groundwater flow causing it to move around those impediments. Overall flow direction is anticipated to remain to the southwest.

The apparent source of groundwater impacts (the solid waste within the WSI) will be removed when the lower reservoir is constructed. This will likely significantly decrease the concentration of sulfate and fluoride in groundwater in the lower reservoir vicinity. Additionally, it is expected that once the WSI source material is removed, the concentration of these relatively soluble groundwater constituents will rapidly decrease through natural processes.

Due to the semi-arid classification for the Project area and the short duration of construction prior to placement of an impermeable liner in each of the upper and lower reservoirs during construction, the potential for a discernible effect on the shallow aquifers at each location during construction is minimal. The impermeable liner system will be designed to prevent leakage from the reservoirs. Therefore, no significant effects to groundwater quality are expected from infiltration in the northern reservoir or penstock areas.

4.2.2.5 Seismicity

Although located in a relatively low probability risk seismic zone, there is some potential for seismic events in the vicinity of the proposed Project to cause soil liquefaction and lateral spreading, Geotechnical studies will be performed in the next phase of Project engineering design, which will evaluate the seismic hazard and liquefaction and lateral spreading potential. The results of these investigations will be presented in the Project license application. Future Project engineering designs will include measures to ensure safety of Project structures pursuant to FERC Dam Safety protocols.

4.2.3 Applicant Recommendations

Geological and geotechnical investigations for the design of the Project are recommended as described in Section 5.0. Studies will include field and office programs to characterize the

surface and subsurface geological conditions at potential areas of concern, such as dam foundations, tunnel alignments, underground caverns, and powerhouse foundation.

4.3 Water Resources

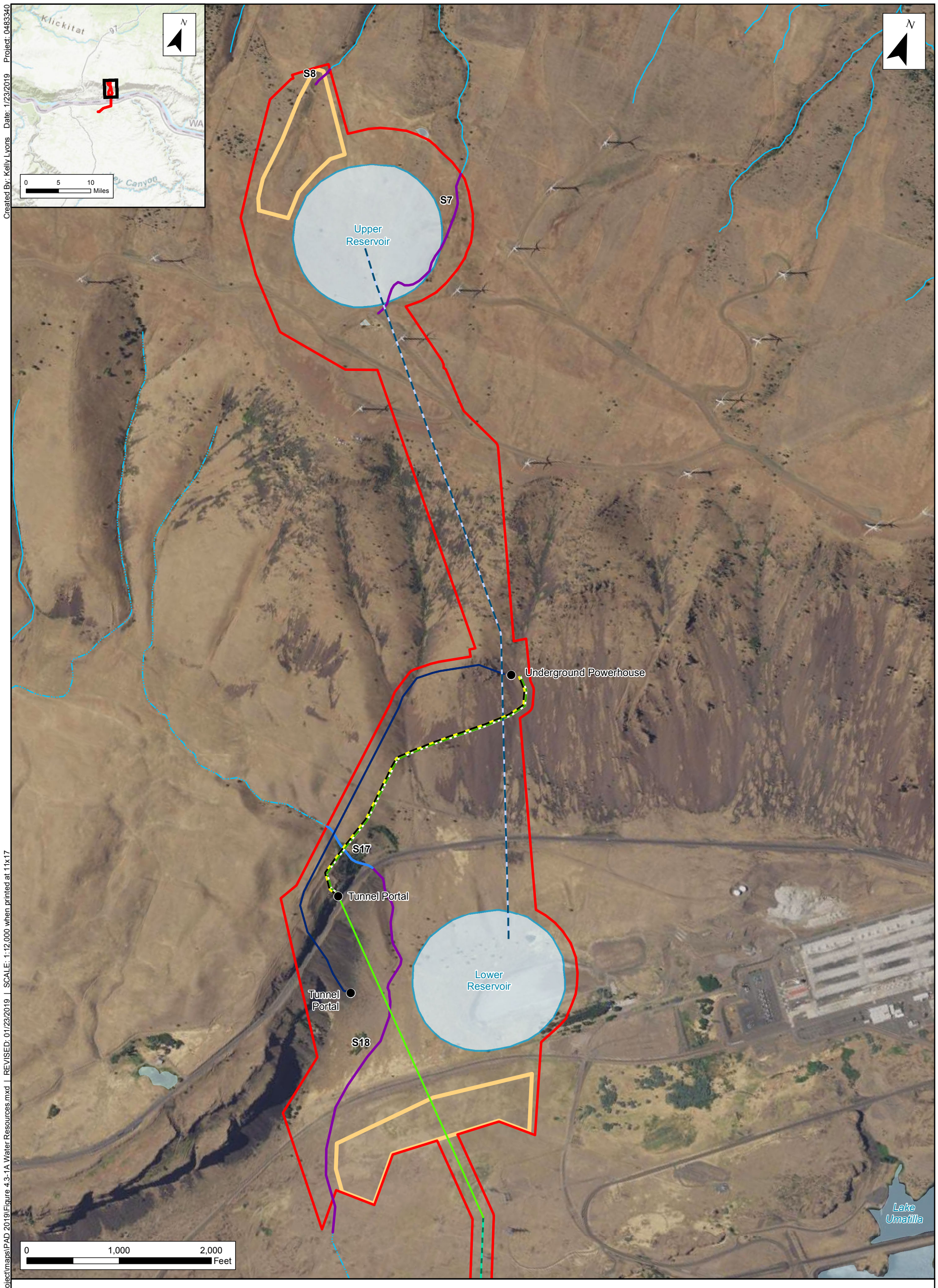
This section provides a summary of existing information on surface hydrology, water quality, and water quantity and usage that may be affected by the proposed Project and associated facilities. Because the proposed Project is relying solely on a purchase of surface water from a water right owned by KPUD as its water source, the discussions below are focused on surface water, as opposed to groundwater, sources for existing environment and potential impacts. See Section 4.2, Geology and Soils, for a discussion on groundwater resources.

4.3.1 Existing Environment

4.3.1.1 Surface Waterbodies

This section describes the surface water features identified within the Project boundary. See section 4.1, General Description of the River Basin, for a description of the watersheds.

The USGS National Hydrologic Database (NHD; USGS 2019) includes six potential waters features mapped within the proposed Project boundary (Figures 4.3-1A and B). These six features, and two additional potential water features, were also mapped as waters in the USFWS National Wetland Inventory (NWI) database (USFWS 2015). All of the NHD or NWI mapped surface water features were assessed using either field or desktop methods. Features located within the previous project study area were assessed during an April 2015 field survey completed by KPUD. Features within the Project's BPA transmission line corridor, which was not included in the 2015 study area, were assessed using desktop methods. All of the features assessed are presented in Figures 4.3-1A and B and are identified with an "S" code.



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Legend

- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
- Proposed Underground Access
- Proposed Underground Penstock

National Hydrography Dataset

- Stream: Perennial
- Stream: Intermittent
- Proposed Reservoir
- Construction Staging Area
- Proposed Project Boundary

Waterbody Status

- Water
- Potential Water(confirmation Required)
- Non-Water

Figure 4.3-1A
Water Resources in Project Vicinity
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

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Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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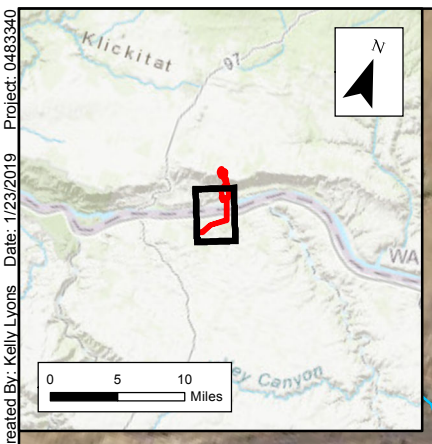

S17

Tunnel Portal

Tunnel Portal

Lower Reservoir

S18

S23

S20

Columbia River

S21

S22

John Day Substation

0
1,500
3,000
Feet

Legend

- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
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National Hydrography Dataset

- Stream: Perennial
- Stream: Intermittent
- Proposed Reservoir
- Construction Staging Area
- Proposed Project Boundary

Waterbody Status

- Water
- Potential Water(confirmation Required)
- Non-Water

Figure 4.3-1B
Water Resources in Project Vicinity
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

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Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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Three of the NHD or NWI mapped features (S17, S20, and S21; Table 4.3-1) were confirmed to be perennial or intermittent using field or desktop methods, for a total of 473 linear feet of surface waters mapped within the Project boundary. Feature S17 was confirmed in the field as a narrow (1 to 2 feet wide) spring-fed channel located above Highway 14. Feature S20 is the Columbia River, and feature S21 is a potential intermittent stream (not field verified) located in the transmission line corridor in Oregon. The remaining three potential features were determined in the 2015 field study to be ephemeral drainages or swales (unvegetated or with patchy upland vegetation) that flow only in response to storm events, and were not included as surface water features for the purpose of this assessment. No additional potential surface waters features not mapped by the NHD or NWI were identified during the field or desktop assessment.

Table 4.3-1: NHD and NWI-Mapped Perennial and Intermittent Water Features in the Project Area

ID	Assessed[1]	Assessed Status[2]	Hydrologic regime	Comment	Location	Linear Feet in Boundary[3]	Acres in Boundary
S17	Field 2015	Water	intermittent	Spring above highway 14 with narrow channel, no wetland fringe.	Lower reservoir area	693	NA[3]
S20	Field 2015	Water	perennial	Columbia River	Transmission line corridor	230	13.83
S21	Aerial	Water (potential)	intermittent	Potential intermittent stream with scrub/shrub wetland fringe.	Transmission line corridor	243	NA[3]
	Total linear feet or acres confirmed or potential surface waters					**473**	**13.83**

NA = Not applicable (feature is narrow than 10 feet hence no acreage is calculated)

[1] All features mapped in National Hydrologic Database (NHD) or National Wetland Inventory (NWI) databases were assessed using field (2015) or desktop methods (aerial imagery).

[2] Features were confirmed as waters (or potential waters) if they had an intermittent or perennial hydrologic regime.

[3] Features narrower than approximately 10 feet listed only as linear feet

The Columbia River within and downstream of the Project boundary (transmission line crossing) is approximately 2,500 feet wide with a 5 percent grade. The U.S. Army Corps of Engineers (USACE) completed construction of the John Day Dam for hydropower generation in 1968, creating the 76-mile-long Lake Umatilla, also known as the John Day Reservoir (Figures 4.3-1A and B). The project will obtain surface water through purchase of water from KPUD. KPUD's intake pool is separated from John Day Reservoir by an existing railroad berm. April 2015 field surveys indicated that at current operating levels of the John Day Dam, there is no direct surface water connection between the intake pool and John Day Reservoir of the Columbia River.

The Project will create two new surface waterbodies (upper and lower reservoirs) with no connection to other surface water or groundwater. Physical parameters for each of the proposed reservoirs is presented in Table 4.3-2. Additional details are presented in Section 3, Project Location, Facilities, and Operation.

Table 4.3-2: Reservoir Parameters

Reservoir	Surface Area	Volume	Mean Depth	Shoreline Length	Substrate
Lower Reservoir	62 acres	7,100 acre-feet	80 acre-feet	5,018 feet	Geosynthetic material
Upper Reservoir	59 acres	7,100 acre-feet	80 acre-feet	4,973 feet	Geosynthetic material

4.3.1.2 Surface Water Quantity

This section describes the surface water quantities (flow and water rights) within and adjacent to the Project boundary. The Columbia River is highly regulated for power generation and instream flow protection. Applications for surface water withdrawals from the mainstem Columbia River are subject to the Instream Resource Protection Program (Chapter 173-562 Washington Administrative Code [WAC]) for the Columbia River.

Table 4.3.3 summarizes the average monthly flows in the Columbia River flow, at the nearest USGS gage at: The Dalles, Oregon (ID #14105700), approximately 25 miles downstream, based on 140 years of record (1878 to 2018). The median average monthly flow was 144,950 cfs, which equates to 81,084,418 AFY. Discharges for the period of record ranged from a minimum average monthly flow of 42,430 cfs in 1937 to a maximum average monthly flow of 1,002,000 cfs in 1894. The flow duration curve for this data is presented in Figure 4.3-2, with the 80 percent, 50 percent, and 20 percent exceedance flows identified as 100,215 cfs, 144,740 cfs and 262,770 cfs, respectively.

Table 4.3-3: Columbia River Flow at The Dalles[1]

Water Metric	Columbia River			
	Minimum[2]	Maximum[3]	Mean	Median
Flow at The Dalles (cfs)	42,430	1,002,000	189,376	144,950
Flow as AFY	37,646,337	246,149,127	85,428,226	81,084,418

Source: USGS 2018

AFY = acre-foot per year; cfs = cubic feet per second

[1] Based on 140 years of record 1878-2018

[2] 1937

[3] 1894

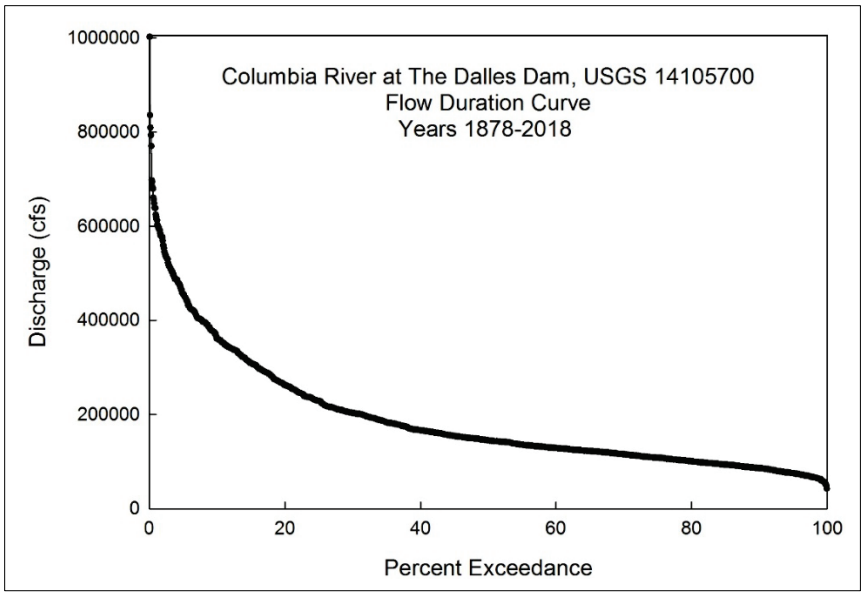

Figure 4.3-2: Flow Duration Curve for Columbia River at The Dalles USGS Gage

Water rights information in the vicinity of the Project area was reviewed using Ecology's Water Resources Program Water Resources Explorer (Ecology 2019d) and the Oregon Water Resources Department's Water Right Mapping Tool (DEQ 2014). Water rights in the Project vicinity are largely groundwater withdrawals for irrigation use. The next largest grouping is groundwater rights for stock watering and domestic use.

Table 4.3-4 presents the larger surface water rights of the Columbia River in the vicinity of the proposed Project boundary. The largest surface water right is from the Columbia River providing industrial supply the historic CGA smelter (now owned by KPUD). This water right was gifted to KPUD by a quitclaim deed executed in 2005. After legal transfer of ownership, this water right was amended for municipal purposes. As mandated by Ecology, the water right must be put to beneficial use by 2028 and totals 15,479 AFY, at 34.63 cfs, for industrial use (Table 4.3-4). The Project would purchase water from KPUD.

Table 4.3-4: Significant Surface Water Rights of the Columbia River near the Proposed Project Area

Agency Record No.	Applicant, Permittee, Certificate Holder, or Claimant	Max Instantaneous Water Diversion Requested or Allocated (cfs)	Annual Volume of Water Requested or Allocated (AFY)	Purpose
CS3-00845C@2	KPUD	35	15,479	Commercial & Industrial
S4-01230CWRIS	Harris Farms Inc.	7	1360	Irrigation
S4-27781GWRIS	Harris Farms Inc.	6	1208	Irrigation
S4-28881(B)	U.S. Army Corps of Engineers	0.44	24	Irrigation

Source: Ecology 2019d

AFY = acre-foot per year; cfs = cubic feet per second

4.3.1.3 Water Quality

The Clean Water Act (CWA) requires states to adopt water quality standards designating beneficial uses of the state's waters and setting criteria designed to protect those uses. As such, Ecology and Oregon Department of Environmental Quality (DEQ) have established water quality standards for surface waters in each respective state, which are the regulatory tools to limit pollution of the states' waters. In Washington, Ecology has identified the following designated uses for John Day Reservoir: fish and aquatic life uses (spawning/rearing); recreation use; domestic, industrial, agricultural, and stock water supply uses; wildlife habitat; harvesting; commercial/navigation; boating; and miscellaneous aesthetics uses (Ecology 2011b). In Oregon, DEQ has identified similar designated uses for John Day Reservoir, including fish and aquatic life (salmon and steelhead migration corridors); wildlife and hunting; and fishing water uses; public and private domestic, industrial, irrigation, and livestock water supply uses; and boating, water contact recreation, aesthetic quality, hydropower, and commercial navigation and miscellaneous transportation uses (DEQ 2012; Ecology 2012).

The Columbia River, which flows under the Project's proposed BPA transmission route, forms the border of Washington and Oregon and is included on the impaired waterbodies lists for both states. For Washington, there are two assessment units in the Project vicinity. The portion of the river at the transmission route crossing is part of the Lake Celilo assessment unit, which extends upstream to the John Day Dam (Ecology 2019b). The Washington Lake Umatilla assessment unit starts at the John Day Dam and extends upstream. The Washington 303(d) List was used instead of the Oregon List because the Oregon List includes larger (longer) assessment units and therefore includes additional impairments not specific to the Project vicinity.

Washington lists the Columbia River within their Lake Umatilla assessment unit on the latest (2012) 303(d) List of Impaired Waterbodies as impaired for water temperature, and pesticides and polychlorinated biphenyl (PCBs) in tissue (Table 4.3-5; Ecology 2019c). The Lake Celilo assessment unit is listed exclusively for temperature. This 2012 list for Washington waters was approved by United States Environmental Protection Agency (USEPA) in 2016. The Lake Umatilla and Lake Celilo assessment units are also included in two Columbia River total maximum daily load plans: for total dissolved gas (TDG) in water (Ecology and DEQ 2002) and dioxins in tissue (USEPA 1991). TDG and dioxin are not listed as impairments on the 2012 303(d) List.

Table 4.3-5: Washington 2012 303(d) Listed Impairments for the Lake Umatilla and Lake Celilo Assessment Units on the Columbia River

Waterbody	Medium	2012 303d List	TMDL Plan
Columbia River- Lake Umatilla	Water	Temperature	NA
	Water	NA	TDG
	Tissue	Pesticides	NA
	Tissue	PCBs	NA
	Tissue	NA	Dioxin
Columbia River- Lake Celilo	Water	Temperature	NA
	Water	NA	TDG
	Tissue	NA	Dioxin

Source: Ecology 2018

NA= not applicable
PCB = polychlorinated biphenyl; TDG = total dissolved gas; TMDL = Total Maximum Daily Load

Water quality information is not available for the two intermittent streams within the Project boundary, as these waters are intermittent and ungaged.

Water quality in KPUD's intake pool was assessed in May 2015. At two locations in the pool, vertical profiles of temperature, pH, conductivity, and dissolved oxygen (DO) were measured at depth intervals of 2 feet below the surface using a YSI600 multi-parameter water quality meter. Water samples were also collected at two locations and analyzed for the following parameters: pesticides, PCBs, priority pollutant metals, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Pesticides, PCBs, VOCs, and SVOCs were not detected at or above the minimum detection limit (MDL) for both locations. Arsenic, antimony, chromium, copper, and lead were detected above the MDL but below the reporting limit.

4.3.2 Potential Resource Impacts

This section describes the potential impacts to surface water resources, including water quantity and quality. The Applicant's objectives are to avoid or minimize all impacts from construction and operations to surface water within and near the proposed Project area. Potential impacts are expected to be minimal since the Project will operate as an off-channel, closed-loop system.

4.3.2.1 Surface Waterbodies

The proposed Project is not expected to impact any waterbodies within the proposed Project boundary (Table 4.3.1 and Figures 4.3-1A and B). Any potential impacts to the spring-fed intermittent stream (S17) above Highway 14 will be avoided. The potential intermittent stream

located in the transmission line corridor (S21) on the Oregon side of the Columbia River is spanned by an existing transmission line, and the installation of a new line on the existing poles will not require any impacts to this stream. No impacts would occur to the Columbia River (S20) due to Project construction, as the transmission line would be added to existing BPA transmission structures with no in-water work.

4.3.2.2 Water Quantity

Project waters would be purchased from KPUD. KPUD holds a certified water right for 15,479 AFY at a maximum of 34.63 cfs for industrial use (Ecology 2019d). The Project is expected to require 9,000 AF of water for the initial fill and an additional 390 AFY to offset evaporative losses (Table 4.3-6). The withdrawal of surface water from KPUD's Intake Pool, which is a surface water source hydrologically connected to the Columbia River, for the initial filling of the reservoir would decrease median discharge in the Columbia River at The Dalles by 0.01 percent (Table 4.4-7), and reduction from the estimated annual net reservoir losses would be 0.0005 percent. These amounts are less than those previously used at this withdrawal location when the CGA Smelter was active. As no additional appropriations would be required, this use would protect existing surface water resources and be consistent with other water rights for the Columbia River. The initial fill would be completed gradually over approximately 6 to 12 months, depending on the construction schedule. Additionally, reservoir recharge resulting from evaporation losses would be conducted during periods when excess water is available, so as to conform to existing water rights.

Precipitation on the reservoir water surfaces would represent the only natural reservoir inflow. The reservoirs will be lined so that the reservoirs will not leak, therefore any losses are associated with evaporation. Since the reservoirs are enclosed on all sides by an embankment, surface water runoff would not enter or be intercepted by the reservoirs.

Table 4.3-6: Estimated Water Needs for the Proposed Goldendale Energy Storage Project

Water Metric	Upper Reservoir	Lower Reservoir
Volume at Mean Sea Level (AF)	7,100	7,100
Surface Area at Max Pool (acres)	59	62
Estimated Evaporation (AFY)[1]	190	200
Estimated Precipitation (AFY)[1]	70	80
Placeholder for Losses (AFY)[2]	50	50
Estimated Net Loss / Estimated Refill (AFY)	170	170
Initial Fill Volume, total Project (AF)	9000	

AF = acre-foot; AFY = acre-foot per year

[1] Based on recorded Hydromet/AgriMet Data from gage in Goldendale, Washington, operated by U.S. Bureau of Reclamation

[2] Assumed placeholder value. To be confirmed with additional engineering studies.

Table 4.3-7: Project Water Volume Relative to Columbia River Surface Water at The Dalles

Water Metric	Volume (AFY)	% of Columbia River[1]
KPUD Water Right	15,479	0.019
Project Water Storage / Initial Fill Volume	9,000	0.01
Estimated Project Net Loss, Annual	390	0.0005
Columbia River Flow Median[1]	81,084,418	NA

AFY = acre-foot per year; NA = not applicable

[1] Based on 140 years of record measured USGS gage at The Dalles (USGS 2018)

4.3.2.3 Water Quality

The Project is not expected to cause any impacts to water quality within or adjacent to the Project area, including to intermittent streams or the Columbia River.

Residence in the proposed Project reservoirs for extended periods of time may concentrate any solutes present in source waters. However, any concentrated solutes would not impact surface waters as the Project will not discharge to any surface waters.

4.3.3 Applicant Recommendations

The Applicant is proposing to purchase water from an existing water right for all Project operations. This should protect existing surface and groundwater resources, as no additional allocations will be required. The reservoirs will include physical features to minimize the capture of surface water runoff and preserve hydrology associated with the area. Specifically, overland flow will be directed away from Project reservoirs and allow normal infiltration to occur outside of the two reservoir footprints.

Nearly all Project-related precipitation losses will be due to precipitation collected within each reservoir. Normal Project operation and maintenance will not require that the reservoirs are drained and spillage of water from the reservoir system is unlikely due to its closed nature.

The Applicant proposes the development of an operational adaptive water quality monitoring and management program to monitor the gradual process of solute concentration in the proposed reservoirs. The goals of the monitoring program would be to maintain water quality sufficient to:

- Allow for proper Project operations; and
- Protect wildlife, such as avian species, that may incidentally come in contact with Project waters.

The Applicant will develop plans to address erosion associated with all aspects of Project construction via a Soil Erosion Control Plan. Using best management practices (BMPs) endorsed by the state of Washington, the plan will describe requisite erosion control measures to ensure that impacts are minimized.

The Applicant will develop a Hazardous Substances Spill Prevention and Cleanup Plan to address potential issues resulting from spills of hazardous substances during construction, operations, or maintenance. Hazardous Substances Spill Prevention and Cleanup Plan will specify materials handling procedures and storage requirements, and identify spill cleanup procedures for areas and processes in which spills may potentially occur. The plan will standardize process operations procedures and employee training in an effort to minimize accidental pollutant releases that could contaminate surface water, groundwater, or stormwater runoff. The Hazardous Substances Spill Prevention and Cleanup Plan would be filed with FERC 1 year after license issuance and would be implemented at the start of construction.

4.4 Fish & Aquatic Resources

4.4.1 Existing Environment

This section describes fish and aquatic resources in the vicinity of the Project (John Day Reservoir and the Intake Pool), and the potential impacts of the Project on those resources. Fish and aquatic resources do not occur in the intermittent waterbodies within the proposed Project boundary. The pumped storage Project is closed-loop and off-river, and as such would not directly affect naturally occurring aquatic resources during construction or operations.

Initial fill and periodic make-up water would be purchased from KPUD, which owns a surface water right to withdrawal from the KPUD Intake Pool. The KPUD Intake Pool is hydrologically connected to the Columbia River at John Day Reservoir; however, fish cannot pass between the Columbia River and the Intake Pool because there is no passage installed in the railroad berm that separates them. Fish and aquatic resources in the Project vicinity may be indirectly affected by the proposed Project water supply during construction and operations due to the purchased water coming from KPUD. Indirect effects are associated with the distance between any land-disturbing activities and intermittent or perennial waterbodies.

The assessment of fish and aquatic resources in the John Day Reservoir of the Columbia River relied largely on syntheses of existing data and review of the extensive scientific studies available for the Columbia River system. Additional information, particularly involving fish use of KPUD's Intake Pool, was gathered from studies and field visits conducted in consultation with the USFWS and National Marine Fisheries Service (NMFS) in accordance with CFR Title 18, Part 4, Section 41.

The aquatic endangered, threatened, proposed, candidate, and federal species of concern are discussed in Section 4.7.

4.4.1.1 Project Boundary

Fish do not occur in the intermittent waterbodies within the proposed Project boundary.

4.4.1.2 Intake Pool

KPUD's Intake Pool is an off-channel, lagoon-type feature with a surface area of approximately 3.75 acres (Figure 4.4-1). The Intake Pool is separated from John Day Reservoir by an embankment for the BNSF railroad. The wetted portion of the existing railroad embankment is about 600 feet long and estimated to have an overall height of 110 feet (50+ feet below normal pool) with a base estimated to be 450 feet wide at the deepest point. It is composed of coarse substrate materials filled with fine-grained substrates of unknown gradation. The overall width of the railroad embankment coupled with the lack of interstitial spaces in the fill material precludes the movement of juvenile fish through the embankment from John Day Reservoir to the Intake Pool.

A field visit with agency staff was conducted on April 13, 2015, to assess connectivity of habitat between the Intake Pool and the Columbia River. BNSF Railroad provided archive information indicating the possible presence of two 42-inch culverts within the general area of the Intake Pool. The BNSF location data references railroad "track-miles" without any other spatial location references. However, during the April 13, 2015, field visit, the group documented only one culvert (42-inch diameter) in the railroad embankment between the Intake Pool and John Day Reservoir. This pipe slopes towards John Day Reservoir, and serves to drain water from the Intake Pool to the river. During this field visit, the culvert was 3 feet above the Intake Pool high water mark (265 feet mean sea level [MSL]). On the John Day Reservoir side of the railroad, the culvert was 1 foot, 8 inches above the existing water level in John Day Reservoir (approximately 255.2 feet MSL) based on a water level in John Day Reservoir of 253.56 feet MSL (USACE pool height observation from April 13, 2015, at 0:00 Pacific Daylight Time). Given the current normal operating levels of the John Day Dam, there is no opportunity for this culvert to be wetted and provide direct surface water connection back to the Intake Pool.

No visual indication of the reported second culvert was observed at the field visit. Subsequent investigation to locate the second reported culvert was conducted on April 30, 2015, using an underwater remotely operated vehicle along the Intake Pool side of the railroad embankment. A grid-based search beginning at the reported track location covered the full wetted surface of the embankment to the bottom of the pool without yielding any indication of the culvert or active flow path that might suggest an active buried culvert.

Pumping records, or pool drawdown data, from past operation of the pump station (60 cfs capacity) were not available. Preliminary hydraulic calculations estimating drawdown through the railroad embankment and through the intake infiltration gallery material showed that operation with the infiltration-only scenario was possible, but it is unlikely to achieve the full 60 cfs station capacity at normal river levels. Without actual pump station operational records, the calculations did not conclusively indicate the presence of, or lack thereof, a second culvert that would provide direct aquatic connectivity to the river.

Aquatic field reconnaissance studies conducted at the Intake Pool on May 4, 2015, indicated a maximum depth of 46 feet. Temperature profiles showed a surface temperature of 61.7 °F and a temperature of 51.1 °F at 46 feet. This temperature profile indicated that the Intake Pool was not thermally stratified; however, thermal stratification is likely later in the summer months. DO was relatively high, ranging from 13.8 microgram per liter (mg/L) at 14 feet to 9.5 mg/L at 46 feet depth. Such temperatures and DO levels are appropriate for a range of cool and warm water species.

In the Intake Pool, shoreline and littoral zone habitat is limited by naturally steep banks and a railway embankment surrounding the Intake Pool. Substrate in the Intake Pool is primarily large, angular basalt, with the majority approximately 4 to 8 inches in diameter. Algae and submerged aquatic vegetation is present in the narrow littoral zone, and in greatest abundance in the southwest corner of the Intake Pool.

During the aquatics reconnaissance survey of the Intake Pool on May 4, 2015, bluegill (*Lepomis macrochirus*) and smallmouth bass (*Micropterus dolomieu*) were observed in small schools within the littoral zone along southeast shoreline (i.e., railway embankment; A. Sutter, pers. comm., May 5, 2015). Walleye (*Sander vitreus*), yellow perch (*Perca flavescens*), and largemouth bass (*Micropterus salmoides*) have also been documented in the Intake Pool based upon anecdotal angling information (D. Rooney, pers. comm., April 13, 2015). Other cyprinid species (i.e., minnows) are likely found in the Intake Pool as well.

Created By: Kelly Lyons Date: 1/18/2019 Project: 0483340

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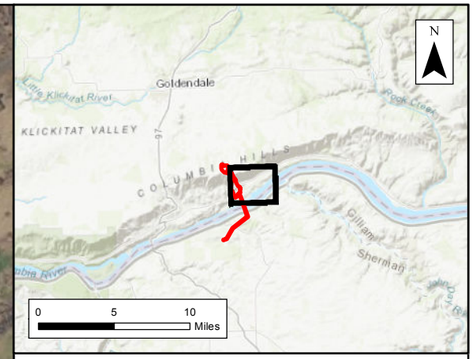

Legend

- KPUD Water Intake
- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
- Proposed Underground Access
- Proposed Underground Penstock
- Proposed Reservoir
- Temporary Construction Staging
- Proposed Project Boundary

Figure 4.4-1
KPUD Water Intake
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
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Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet

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4.4.1.3 Columbia River

The fish community in John Day Reservoir of the Columbia River includes at least 52 documented species, including those with both resident (non-anadromous), adfluvial (spawn in river and rear in lake), and anadromous (spawn in freshwater and rear in the ocean) life histories (Ward 2001; USFWS 2014), as well as introduced species. Table 4.4-1 provides a summary of fish species documented from online data sources (e.g., WDFW).

Table 4.4-1: Fish Species Known to Occur in John Day Reservoir

Species Common Name	Scientific Name	Life History			Origin	
		Anadromous	Adfluvial	Resident	Native	Invasive/ Introduced
American shad	*Alosa sapidissima*	X				X
Black bullhead	*Ameiurus melas*			X		X
Black crappie	*Pomoxis nigromaculatus*			X		X
Bluegill	*Lepomis macrochirus*			X		X
Bridgelip sucker	*Catostomus columbianus*			X	X	
Brown bullhead	*Ameiurus nebulosus*			X		X
Brown trout	*Salmo trutta*			X		X
Bull trout	*Salveliunus confluentus*		X	X	X	
Burbot	*Lota lota*			X	X	
Channel catfish	*Ictalurus punctatus*			X		X
Chinook salmon	*Oncorhynchus tshawytscha*	X			X	
		X			X	
		X			X	
Chiselmouth	*Acrocheilus alutaceus*			X	X	
Coho salmon	*Oncorhynchus kisutch*	X			X	
Common carp	*Cyprinus carpio*			X		X
Cutthroat trout	*Oncorhynchus clarki*			X	X	
Grass carp	*Ctenopharyngodon idella*			X		X
Goldfish	*Carrassius auratus*			X		X
Lake whitefish	*Coregonus clupeaformis*			X		X
Largemouth bass	*Micropterus salmoides*			X		X
Largescale sucker	*Catostomus macrocheilus*			X	X	
Leopard dace	*Rhinichthys falcatus*			X	X	
Longnose dace	*Rhinichthys cataractae*			X	X	
Longnose sucker	*Catostomus catostomus*			X	X	
Mosquitofish	*Gambusia affinis*			X		X
Mottled sculpin	*Cottus bairdi*			X	X	

Species Common Name	Scientific Name	Life History			Origin	
		Anadromous	Adfluvial	Resident	Native	Invasive/ Introduced
Mountain sucker	*Catostomus platyrhynchus*			X	X	
Mountain whitefish	*Prosopium williamsoni*			X	X	
Northern pikeminnow	*Ptychocheilus oregonensis*			X	X	
Pacific lamprey	*Entosphenus tridentata*	X			X	
Paiute sculpin	*Cottus beldingi*			X	X	
Peamouth	*Mylocheilus caurinus*			X	X	
Prickly sculpin	*Cottus asper*			X	X	
Pumpkinseed	*Lepomis gibbosus*			X		X
Rainbow trout	*Oncorhynchus mykiss*			X	X	
Redside shiner	*Richardsonius balteatus*			X	X	
Reticulate sculpin	*Cottus perplexus*			X	X	
River lamprey	*Lampetra ayresi*	X			X	
Sandroller	*Percopsis transmontana*			X	X	
Smallmouth bass	*Micropterus dolomieu*			X		X
Sockeye salmon	*Oncorhynchus nerka*	X			X	
Speckled dace	*Rhinichthy osculus*			X	X	
Steelhead	*Oncorhynchus mykiss*	X			X	
		X			X	
		X			X	
Tench	*Tinca tinca*			X		X
Three-spine stickleback	*Gasterosteus aculeatus*			X	X	
Torrent sculpin	*Cottus rhotheus*			X	X	
Walleye	*Sander vitreus*			X		X
Warmouth	*Lepomis gulosis*			X		X
Western brook lamprey	*Lampetra richardsoni*			X	X	
White crappie	*Pomoxis annularis*			X		X
White sturgeon	*Acipenser transmontanus*		X	X	X	
Yellow bullhead	*Ameiurus natalis*			X		X
Yellow perch	*Perca flavescens*			X		X

Sources: Ward (2001); McPhail (2007)

Blank cells indicate not applicable

Anadromous Fish

John Day Reservoir provides migratory habitat for anadromous Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), and sockeye salmon (*Oncorhynchus nerka*); steelhead (*Oncorhynchus mykiss*); Pacific lamprey (*Entosphenus tridentata*); river lamprey (*Lampetra ayresi*); and American shad (*Alosa sapidissima*). The amount of time each of these species spends in the John Day Reservoir varies. Habitat for other life-history stages of Chinook, coho, and sockeye salmon; steelhead; and Pacific lamprey (e.g., spawning, overwintering, egg incubation) is not found in the John Day Reservoir, so they are not considered residents.

John Day Reservoir provides habitat for all life-history stages (i.e., spawning, rearing, migration, egg incubation, and overwintering) for nearly all resident cool and warm water species, as shown in Table 4.4-2. White sturgeon (*Acipenser transmontanus*) are found in John Day Reservoir and represent an important sport fishery. White sturgeon spawning and egg incubation habitat, however, is not likely to be present due to this species requirement for lotic habitat during these life stages.

Other important resident game fish species include: American shad (*Alosa sapidissima*), bluegill, black crappie (*Pomoxis nigromaculatus*), largemouth bass, smallmouth bass, pumpkinseed (*Lepomis gibbosus*), walleye, white crappie (*Pomoxis annularis*), and yellow perch.

Introduced or Non-Native Fish

Many of the resident fish in the John Day Reservoir have been introduced from other regions and are considered non-native. Introduced resident fish in the Columbia River system include species such as American shad, bluegill, pumpkinseed, largemouth and smallmouth bass, walleye, and yellow perch.

Table 4.4-1: Habitat Availability for Anadromous, Resident, and Introduced Fish Species within John Day Reservoir

Species Common Name	Scientific Name	Habitat by Life Stage in John Day Reservoir				
		Migration	Spawning	Rearing	Incubation	Overwintering
American shad	*Alosa sapidissima*	X	X	X	X	X
Black bullhead	*Ameiurus melas*	X	X	X	X	X
Black crappie	*Pomoxis nigromaculatus*	X	X	X	X	X
Bluegill	*Lepomis macrochirus*	X	X	X	X	X
Bridgelip sucker	*Catostomus columbianus*	X	X	X	X	X
Brown bullhead	*Ameiurus nebulosus*	X	X	X	X	X
Brown trout	*Salmo trutta*	X				X
Bull trout	*Salveliunus confluentus*	X				
Burbot	*Lota*	X	X	X	X	X
Channel catfish	*Ictalurus punctatus*	X	X	X	X	X

Species Common Name	Scientific Name	Habitat by Life Stage in John Day Reservoir				
		Migration	Spawning	Rearing	Incubation	Overwintering
Chinook salmon	*Oncorhynchus tshawytscha*	X				
Chiselmouth	*Acrocheilus alutaceus*	X	X	X	X	X
Coho salmon	*Oncorhynchus kisutch*	X				
Common carp	*Cyprinus carpio*	X	X	X	X	X
Cutthroat trout	*Oncorhynchus clarki*	X	X	X	X	X
Goldfish	*Carrassius auratus*	X	X	X	X	X
Grass carp	*Ctenopharyngodon idella*	X	X	X	X	X
Lake whitefish	*Coregonus clupeaformis*	X	X	X	X	X
Largemouth bass	*Micropterus salmoides*	X	X	X	X	X
Largescale sucker	*Catostomus macrocheilus*	X	X	X	X	X
Leopard dace	*Rhinichthys falcatus*	X		X		X
Longnose dace	*Rhinichthys cataractae*	X	X	X	X	X
Longnose sucker	*Catostomus catostomus*	X	X	X	X	X
Mosquitofish	*Gambusia affinis*	X	X	X	X	X
Mottled sculpin	*Cottus bairdi*	X	X	X	X	X
Mountain sucker	*Catostomus platyrhynchus*	X	X	X	X	X
Mountain whitefish	*Prosopium williamsoni*	X				X
Northern pikeminnow	*Ptychocheilus oregonensis*	X	X	X	X	X
Pacific lamprey	*Entosphenus tridentatus*	X				
Paiute sculpin	*Cottus beldingi*	X	X	X	X	X
Peamouth	*Mylocheilus caurinus*	X	X	X	X	X
Prickly sculpin	*Cottus asper*	X	X	X	X	X
Pumpkinseed	*Lepomis gibbosus*	X	X	X	X	X
Rainbow trout	*Oncorhynchus mykiss*	X		X		X
Redside shiner	*Richardsonius balteatus*	X	X	X	X	X
Reticulate sculpin	*Cottus perplexus*	X	X	X	X	X
River lamprey	*Lampetra ayresi*	X				X
Sandroller	*Percopsis transmontana*	X	X	X	X	X
Smallmouth bass	*Micropterus dolomieu*	X	X	X	X	X
Sockeye salmon	*Oncorhynchus nerka*	X				
Speckled dace	*Rhinichthy osculus*	X	X	X	X	X
Steelhead	*Oncorhynchus mykiss*	X				
Tench	*Tinca tinca*	X	X	X	X	X
Three-spine stickleback	*Gasterosteus aculeatus*	X	X	X	X	X
Torrent sculpin	*Cottus rhotheus*	X	X	X	X	X
Walleye	*Sander vitreus*	X	X	X	X	X
Warmouth	*Lepomis gulosis*	X	X	X	X	X

Species Common Name	Scientific Name	Habitat by Life Stage in John Day Reservoir				
		Migration	Spawning	Rearing	Incubation	Overwintering
Western brook lamprey	*Lampetra richardsoni*	X				X
White crappie	*Pomoxis annularis*	X	X	X	X	X
White sturgeon	*Acipenser transmontanus*	X		X		X
Yellow bullhead	*Ameiurus natalis*	X	X	X	X	X
Yellow perch	*Perca flavescens*	X	X	X	X	X

Source: Ward (2001)

Blank cells indicate not applicable.

Amphibians

Several amphibian species may occur in the vicinity of John Day Reservoir, including the Columbia spotted frog (*Rana luteiventriz*), Pacific tree frog (*Hyla regilla*), Western toad (*Bufo boreas*), and the long-toed salamander (*Ambystoma macrodactylum*) (Titus 2019). The Oregon spotted frog is listed as endangered by Washington state (WDFW 2015a), and listed by USFWS as threatened, with proposed critical habitat (USFWS 2013) (discussed in more detail in Section 4.7).

4.4.2 Potential Resource Impacts

The Project will utilize water purchased from KPUD to be withdrawn from its Intake Pool. Based on field investigations, a viable path through where fish could pass into the Intake Pool was not identified. As a result, utilization of the Intake Pool would not interact with any ESA-listed salmonid, or any resident or migratory Columbia River fish species. Furthermore, the existing aquatic habitat in the Intake Pool lacks suitable rearing, migration, overwintering, and spawning habitat for Columbia River fish species.

Water supply to the pump station, assuming connection to the river through infiltration, will require a substantial drawdown of the Intake Pool.

Initial filling of the reservoir will occur over approximately 6 months. During Project operation, annual refilling due to net evaporative water losses will on average take the equivalent of 10.9 days (Table 4.4-3). The withdrawal of surface water will decrease flow through John Day Reservoir due to its hydrologic connection to the Intake Pool. However, Project withdrawals are predicted to have negligible impact (decrease by 0.018 percent) on the flow in the Columbia River during the initial reservoir filling (Table 4.4-4). Annual refilling to replace evaporative losses in the reservoirs is predicted to decrease the Columbia River flow by about 0.001 percent. Given these negligible flow change at John Day Reservoir, construction and operation of the intake structure is not predicted to affect any resident or migratory fish and their habitats, including any federally or state listed fish species in John Day Reservoir.

Table 4.4-3. Time Allocated to Fill Project Reservoirs Based on a 34.6 cfs Water Right

Reservoir Fill	Volume	Time Required to Fill
Project Water Storage / Initial Fill Volume	13,000 AF	6.2 months
Estimated Project Net Loss, Annual / Estimated Annual Refill	746 AFY	10.9 days

AF = acre-foot ; AFY = acre-foot per year

Table 4.4-4. Project Water Volume Relative to Columbia River Surface Water at The Dalles

Water Metric	Volume (AFY)	Percent of Columbia River
KPUD Water Right	15,479	0.021
Upper and Lower Reservoir Volume	13,000	0.018
Upper and Lower Reservoir Annual Net Loss	746	0.001
Columbia River Median[1]	73,844,629	NA

1 Based on 136 years of record measured USGS gage at The Dalles

AFY = acres-foot per year; NA = not applicable

The Project would interact with introduced resident fish and aquatic habitat in the Intake Pool as the reservoir level changes. As discussed in Section 4.4.1.2, each species documented in the Intake Pool is an introduced, resident species in the Columbia River system. However, as discussed above, because the Project will not be drawing water from the John Day Reservoir or the Columbia River, there will be no impacts to listed species of salmon and steelhead or resident Columbia River fish. As Project construction would not require work in or adjacent to waterbodies, there would be no direct effects to aquatic resources or fish from construction of the proposed Project.

4.4.3 Applicant Recommendations

The Project will adhere to fish and aquatic habitat construction BMPs. These BMPs may include, but are not limited to:

- Using water diversion structures to direct dirty water from the work zone to a sediment control area;
- Installing silt fencing, geotextile cloth, straw bales, berms, or other sediment control structures;
- Storing soil and substrate, and building materials in stable areas away from waterbodies;
- Stabilizing excavated materials and areas denuded of vegetation using temporary erosion control blankets, biodegradable mats, planted vegetation, or other erosion control techniques;
- Environmental monitoring;
- Repairing areas that are identified as potential sediment sources; and
- Adhering to appropriate construction operating windows for instream work.

By following industry standard BMPs within the *Soils Erosion Control Plan and Storm Water Pollution Prevention Plan*, the potential effects of erosion and sedimentation on waterbodies, and therefore on fish and aquatic resources, will be appropriately mitigated.

4.5 Wildlife and Botanical Resources

4.5.1 Existing Environment

4.5.1.1 Wildlife Resources

The proposed Project boundary is inhabited by a variety of common wildlife species, and provides a range of habitats between the low-lying areas of the lower reservoir and the higher-elevation sage-steppe and grassland steppe of the upper reservoir area. These habitat types are characterized with different vegetation, as described in detail in Section 4.5.1.2. Quality and availability of these habitats for wildlife use is limited within the proposed Project boundary due to the past industrial use of the lower reservoir site, current grazing, fencing, and wind generation use of the upper reservoir site, and associated prevalence of introduced and invasive weeds in much of the Project area.

The Project vicinity discussed for wildlife includes areas where wildlife could be directly or indirectly affected by adjacent Project activities, and takes into account far-ranging species such as mule deer and migratory birds that may traverse the Project boundary.

Wildlife Habitat

The proposed Project boundary is primarily composed of previously disturbed lands, including the former CGA smelter lands of the lower reservoir area and disturbed shrub steppe habitat adjacent to wind development of the upper reservoir area. Project transmission lines within the existing BPA right-of-way would be added to existing transmission structures and, therefore, would not change available habitat on the Oregon side of the proposed Project boundary.

Some habitat features found in the Project boundary and vicinity support specific wildlife species requirements and are catalogued by WDFW as Priority Habitat features (WDFW 2015b), and are mapped as part of the WDFW Priority Habitats and Species (PHS) Mapping (WDFW 2018a). These include:

- John Day Talus, described by WDFW as the talus slopes above John Day Dam (WDFW 2015b), occurs inside the Project boundary and vicinity. Approximately 60.3 acres of talus slopes occur within the Project boundary (WDFW 2018a). WDFW defines talus as homogenous areas of rock rubble ranging from 0.5 to 6.5 feet in diameter composed of basalt, andesite, and/or sedimentary rock, including riprap and mine tailings. These areas are often associated with cliffs. Talus provides habitat for species such as American pika (*Ochotona princeps*), Gapper's red-backed vole (*Clethrionyms gapperi*), yellow-bellied marmot (*Marmota flaviventris*), and others.

- John Day Cliffs, described by WDFW as the cliffs above John Day Dam (WDFW 2015b), occur in the Project vicinity, but not the Project boundary. WDFW defines cliffs as areas greater than 25 feet high and occurring below 5000 feet in elevation. Cliffs provide habitat for species that also occur in talus areas, as well as golden eagles (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), American kestrel (*Falco sparverius*), common raven (*Corvus corax*), and other cliff-nesting species.

- Oak woodland habitat—The PHS Mapper (WDFW 2018a) maps three areas of Oregon white oak woodlands within the Project boundary: near the upper reservoir, in the steep section between the upper and lower reservoirs, and in the lower reservoir area (WDFW 2018a). ERM confirmed during the 2015 field survey that these PHS-mapped areas are *not* oak woodlands, and no additional oak woodland habitat was identified in or near the Project boundary.

- The John Day Waterfowl Area, a regular winter waterfowl concentration area, is in the Project vicinity, to the south of the lower reservoir area. Species utilizing this area include Canada geese (*Branta canadensis*), diving ducks, dabbling ducks, and other waterfowl.

- On the Oregon side of the Project, the transmission line crosses over grassland Oregon strategy habitat (ODFW 2017). The ODFW defines grasslands as:

  > Grasslands generally occur on dry slopes or plateaus with well-drained sandy or loamy soils. Although dominant species vary across Oregon, perennial bunchgrasses and forbs dominate native grasslands. In some areas, grasslands are similar to wet prairies and wet meadows in structure and share some of the same prairie-associated plants and animals (wet prairies and wet meadows are included within the wetlands Oregon strategy habitat). In all but the shallowest rocky soils, grasslands are maintained through disturbances, such as periodic fire, soil upheaval by rodents, frost heave, wind, or salt spray.

- Another Oregon strategy habitat is also crossed by the transmission line, sagebrush (ODFW 2017). ODFW defines sagebrush as:

  > Sagebrush-dominated communities differ greatly in structure and species composition, depending on ecoregion, elevation, soils, moisture regimes, and fire history. In general, sagebrush habitats occur on dry flats and plains, rolling hills, rocky hill slopes, saddles, and ridges where precipitation is low.
  >
  > Sagebrush steppe is dominated by grasses and forbs (more than 25 percent of the area) with an open shrub layer. In sagebrush steppe, natural fire regimes historically maintained a patchy distribution of shrubs and predominance of grasses. In shrub-steppe habitats of the Columbia Plateau and Blue Mountains ecoregions, a soil crust (called a microbiotic or cryptogrammic crust) composed of lichens, mosses, fungi, and bacteria reduces soil erosion and moisture loss.
  >
  > Sagebrush shrublands are dominated by shrubs, with less area covered by grasses and forbs than in steppe habitats. In many, but not all, sagebrush shrublands, natural fire regimes created a mosaic of stand ages and structures.

The proposed Project boundary and vicinity is included in the Columbia Hills Important Bird Area (IBA), designated by the National Audubon Society (National Audubon Society 2015, Ecology and Environment 2006). This area covers much of southern Klickitat County, ranging from the Klickitat River east to Rock Creek. The IBA excludes developed areas along State Route 14. The National Audubon Society reports that thirteen or more raptor species have been documented in the Columbia Hills IBA, including bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), golden eagles, and Swainson's hawk (*Buteo swainsoni*). Passerine species include Lewis's woodpecker (*Melanerpes lewis*), Brewer's sparrow (*Spizella breweri*), Harris's sparrow (*Zonotrichia querula*), and long-billed curlew (*Numenius americanus*). A variety of waterfowl and water birds are also known to utilize this IBA.

Terrestrial Wildlife Species

General wildlife species documented within Klickitat County, Washington and Sherman County, Oregon are listed in Table 4.5-1 below.

Table 4.5-1: General Wildlife Species of Klickitat County, WA and Sherman County, OR

Group	Species
Mammals	Big-brown bat (*Eptesicus fuscus*), myotis bats (*Myotis lucifugus*), pallid bat (*Antrozous pallidus*), marten (genus *Martes* within the subfamily Mustelinae, in the family Mustelidae), Columbian black-tailed deer (*Odocoileus hemionus columbianus*), elk (*Cervus canadensis*), Rocky Mountain mule deer (*Odocoileus hemionus hemionus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), yellow-bellied marmot (*Marmota flaviventris*)
Birds	Breeding concentrations of grebes (*Podicipedidae*), cormorants (*Phalacrocoracidae*), and terns (Sternidae); breeding occurrences of phalaropes (*Phalaropus*), stilts, and avocets (*Recurvirostridae* sp.); black-crowned night heron (*Nycticorax nycticorax*), great blue heron (*Ardea herodias*), wood duck (*Aix sponsa*), Barrow's goldeneye (*Bucephala islandica*), bufflehead (*Bucephala albeola*), hooded merganser (*Lophodytes cucullatus*), harlequin duck (*Histrionicus histrionicus*), chukar (*Alectoris chukar*), mountain quail (*Oreortyx pictus*), ring-necked pheasant (*Phasianus colchicus*), sooty grouse (*Dendragapus fuliginosus*), wild turkey (*Meleagris gallopavo*), band-tailed pigeon (*Patagioenas fasciata*).
Amphibians and Reptiles	Columbia spotted frog (*Rana luteiventriz*), pygmy horned lizard (*Phrynosoma douglassii*), common garter snake (*Thamnopsis sirtalis*), Pacific gopher snake (*Pituophis catenifer*), Western territorial garter snake (*Thamnophis elegans*), gopher snake (*Pituophis catenfe*), night snake (*Hypsiglena torquata*), racer (*Coluber constrictor*), Western rattlesnake (*Croatus viridis*), Western skink (*Plestiodon skiltonianus*), Pacific tree frog (*Hyla regilla*), Western toad (*Bufo boreas*), long-toed salamander (*Ambystoma macrodactylum*)

Sources: WDFW 2019, Titus 2019

Habitat and wildlife studies were performed by Ecology and Environment, Inc. in 2005 in conjunction with the development of Windy Point wind farm, which included land adjacent to the proposed upper reservoir location. An environmental study was performed in 1995 for Conservation and Renewable Energy Systems (CARES) and Kenetech Windpower, Inc. (Ecology and Environment 2006). Tables 4.5-2 and 4.5-3 provides a summary of mammal, reptile, and bird species observed during the Windy Point environmental surveys in this area adjacent to the upper reservoir location, including the year(s) each species was observed.

Table 4.5-2: Terrestrial Wildlife Species Observed in the Windy Point Project Area, Adjacent to the Goldendale Energy Storage Upper Reservoir Location

Common Name	Scientific Name	Year Observed
Badger	*Taxidea taxus*	1995a
Bobcat	*Lynx rufus*	1995a
Columbian black-tailed deer	*Odocoileus hemionus columbianus*	1995a, 2002b, 2005a
Columbian ground squirrel	*Citrullus columbiana*	1995a, 2005a
Coyote	*Canis latrans*	1995a, 2005a
Deer mouse	*Peromyscus maniculatus*	1995a
Great Basin pocket mouse	*Perognathus parvus*	1995a
Northern pocket gopher	*Thomomys talpoides*	1995a
Nuttall's cottontail	*Sylvilagus nuttallii*	1995a
Porcupine	*Erethizon dorsatum*	1995a
Raccoon	*Procyon lotor*	1995a
Red fox	*Vulpes fulva*	1995a
Shrew	*Sorex* spp.	1995a
Striped skunk	*Mephitis mephitis*	1995a
Voles	*Microtis*	1995a, 2005a
Weasel	*Mustela spp.*	1995a
Yellow-bellied marmot	*Marmota flaviventris*	1995a
Reptiles		
Gopher snake	*Pituophis melanoleucus*	1995a, 2005a
Racer snake	*Coluber constrictor*	1995a
Rubber boa	*Charina bottae*	2005a
Short-horned lizard	*Phrynosoma douglassi*	1995a, 2005a
Western fence lizard	*Sceloporus occidentalis*	1995a, 2005a
Western garter snake	*Thamnophis elegans*	1995a, 2005a
Western rattlesnake	*Crotalus viridis*	1995a, 2005a

Sources:

[a] Ecology and Environment 2006—Windy Point Project Site species (1995 date undetermined; May 3 -7, July 15-17, and August 23, 2005)

[b] WEST 2006—Appendix A1; Windy Point Project Site species (February 14 and April 11, 2002)

Table 4.5-3: Bird Species Observed in the Project Area and Vicinity

Common Name	Scientific Name	Year Observed
Birds		
American crow	*Corvus brachyrhynchos*	2002a, 2002b, 2005c
American goldfinch	*Carduelis tristis*	1998e, 2002b
American kestrel	*Falco sparverius*	1998e, 2002a, 2002b,
American pipit	*Anthus spinoletta*	1998e
American robin	*Turdus migratorius*	1998e, 2002a, 2002b,
American wigeon	*Anas americana*	2002a
Ash-throated flycatcher	*Myiarchus cinerascens*	1998e, 2002b
Bald eagle	*Haliaeetus leucocephalus*	1998e, 2002a, 2008d

Common Name	Scientific Name	Year Observed
Barn swallow	*Hirundo rustica*	1998e, 2002b, 2005c
Bewick's wren	*Thryomanes bewickii*	2002a, 2002b
Black-billed magpie	*Pica pica*	1998e, 2002a, 2002b,
Brewer's blackbird	*Euphagus cyanocephalus*	2002b
Brewer's sparrow	*Spizella breweri*	2002b
Bohemian waxwing	*Bombycilla garrulus*	1998e
Brown-headed cowbird	*Molothrus ater*	1998e, 2002b
Bullock's oriole	*Icterus bullockii*	1998e, 2002b
California gull	*Larus californicus*	2002b
California quail	*Callipepla californica*	2002a, 2002b, 2005c
Canada goose	*Branta canadensis*	1998e, 2002a, 2002b,
Canyon wren	*Catherpes mexicanus*	1998e, 2002a
Cassin's finch	*Carpodacus cassinii*	1998e
Chipping sparrow	*Spizella passerina*	1998e, 2002a, 2002b
Chukar	*Alectoris chukar*	1998e, 2002a, 2008d
Clark's nutcracker	*Nucifraga columbiana*	1998e
Cliff swallow	*Petrochelidon pyrrhonota*	1998e, 2002b
Common raven	*Corvus corax*	1998e, 2002a, 2002b,
Common nighthawk	*Chordeiles minor*	2005c
Cooper's hawk	*Accipiter cooperi*	1998e
Dark-eyed junco	*Junco hyemalis*	1998e, 2002a, 2002b,
Downy woodpecker	*Picoides pubescens*	2002a
European starling	*Sturnus vulgaris*	1998e, 2002a, 2002b,
Ferruginous hawk	*Buteo regalis*	2002b
Forster's tern	*Sterna forsteri*	2002b
Golden eagle	*Aquila chrysaetos*	1998e, 2002a, 2002b,
Golden-crowned kinglet	*Regulus satrapa*	1998e, 2002a, 2002b
Golden-crowned sparrow	*Zonotrichia atricapilla*	2002a, 2002b
Grasshopper sparrow	*Ammodramus savannarum*	1998e
Gray flycatcher	*Empidonax wrightii*	1998e
Gray partridge	*Perdix perdix*	1998e, 2002a, 2002b,
Gray-crowned rosy finch	*Leucosticte tephrocotis*	1998e
Gull (unidentified species)	*Larus* sp.	1998e, 2002b
Hairy woodpecker	*Picoides villosus*	2002a
Hermit thrush	*Catharus guttatus*	1998e
Horned lark	*Eremophila alpestris*	1998e, 2002a, 2002b,
House finch	*Carpodacus mexicanus*	2002b
Killdeer	*Charadrius vociferus*	1998e, 2002a, 2002b,
Lark sparrow	*Chondestes grammacus*	1998e, 2002b
Lazuli bunting	*Passerina amoena*	1998e, 2002b
Lesser goldfinch	*Carduelis psaltria*	2002b
Lewis's woodpecker	*Melanerpes lewis*	1998e, 2002b, 2005c
Loggerhead shrike	*Lanius ludovicianus*	1998e

Common Name	Scientific Name	Year Observed
Long-billed curlew	*Numenius americanus*	2005c
Mallard	*Anas platyrhynchos*	2002a
Merlin	*Falco columbarius*	1998e, 2002b
Mountain bluebird	*Sialia currucoides*	1998e, 2002a, 2008d
Mourning dove	*Zenaida macroura*	2002b, 2005c
Nighthawk	*Chordeiles minor*	1998e
Northern flicker	*Colaptes auratus*	1998e, 2002b, 2008d
Northern harrier	*Circus cyaneus*	1998e, 2002a, 2002b,
Northern rough-winged swallows	*Stelgidopteryx serripennis*	2002b
Northern shrike	*Lanius excubitor*	1998e, 2002a, 2008d
Osprey	*Pandion haliaetus*	1998e, 2002b
Prairie falcon	*Falco mexicanus*	1998e, 2002a, 2002b,
Red-breasted nuthatch	*Sitta canadensis*	1998e
Red crossbill	*Loxia curvirosta*	1998e
Red-tailed hawk	*Buteo jamaicensis*	1998e, 2002a, 2002b,
Red-winged blackbird	*Agelaius phoeniceus*	2002a, 2002b
Ring-billed gull	*Larus delawarensis*	2002b
Ring-necked pheasant	*Phasianus colchicus*	1998e, 2002a, 2002b,
Rock wren	*Salpinctes obsoletus*	1998e, 2002b
Rough-legged hawk	*Buteo lagopus*	1998e, 2002a, 2008d
Rufous hummingbird	*Selasphorus rufus*	1998e
Savannah sparrow	*Passerculus sandwichensis*	1998e
Say's phoebe	*Sayornis saya*	1998e, 2002a, 2002b
Sharp-shinned hawk	*Accipiter striatus*	1998e, 2002a, 2008d
Song sparrow	*Melospiza melodia*	2002b
Spotted sandpiper	*Actitis macularia*	2002b
Spotted towhee	*Pipilo maculatus*	1998e, 2002b
Swainson's hawk	*Buteo swainsoni*	2002b, 2005c
Townsend's solitaire	*Myadestes townsendi*	1998e, 2002a, 2008d
Townsend's warbler	*Dendroica townsendi*	1998e
Tree swallow	*Tachycineta bicolor*	1998e, 2008d
Turkey vulture	*Cathartes aura*	1998e, 2002b, 2005c
Varied thrush	*Ixoreus naevius*	1998e
Vesper sparrow	*Pooecetes gramineus*	1998e, 2002b, 2008d
Violet-green swallow	*Tachycineta thalassina*	2002a, 2002b
Western bluebird	*Sialia mexicana*	1998e, 2008d
Western kingbird	*Tyrannus verticalis*	2002b, 2005c
Western meadowlark	*Sturnella neglecta*	1998e, 2002a, 2002b,
Western wood-pewee	*Contopus virens*	1998e, 2002b
Western tanager	*Piranga ludoviciana*	1998e
White-breasted nuthatch	*Sitta carolinensis*	1998e
White-crowned sparrow	*Zonotrichia leucophrys*	1998e, 2002a, 2002b
White-winged crossbill	*Loxia leucoptera*	1998e

Common Name	Scientific Name	Year Observed
Wilson's warbler	*Wilsonia pusilla*	2002b
Yellow-rumped warbler	*Dendroica coronata*	1998e, 2002b

Sources:

a WEST 2006—Appendix A1; Windy Point Project Site species (February 14 and April 11, 2002)
b WEST 2006—Appendix A2; Klickitat County PEIS species (April 15 and July 12, 2002)
c Ecology and Environment 2006 — Windy Point Project Site species (May 3 -7, July 15-17, and August 23, 2005)
d WEST 2008—Windy Point II Wind Resource Area species (February 1 through March 26, 2008)
e Erickson et. al. 1999—CARES Wind Plant Site species (January – December, 1998)
PEIS = Preliminary Environmental Impact Statement

The CARES, Kenetech, and Windy Point studies did not include the lower reservoir area. Additional mammalian or reptile species diversity beyond what is listed above is not likely to be found in the proposed lower reservoir location due to the presence of the CGA smelter and its associated units.

Golden eagles are known to occur within the Project area in the Project vicinity, with a known nest located to the west of the proposed lower reservoir location (Figure 4.5-1, filed as privileged information). The golden eagle nest within the Project boundary was last surveyed by WDFW in June 2013, where they noted that one hunting adult was present with an unrepaired nest (Nest #413; WDFW 2014g). Bald eagles are known to use the area around John Day Dam as migrants, although no nests are known to be located in the Project vicinity. The golden eagle is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

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Figure 4.5-1: Golden Eagle Nests, Filed as Privileged Information

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Breeding populations of golden eagles are found in eastern and western Washington, and golden eagles migrate in winter from nesting populations in Canada and Alaska. WDFW has observed non-viability, poor recruitment, low-territory occupancy, and mortality of golden eagles due to wind development in the John Day Dam area (J. Watson WDFW, personal communication, March 18, 2015). WDFW has planned surveys for golden eagles in the John Day territory, which includes the Project area, in 2019 (P. Verhey, personal communication, January 14, 2019).

The following golden eagle (*Aquila chrysaetos)* information is referenced from the USFWS Interim Golden Eagle Technical Guidance (Pagel et al. 2010). Golden eagles are an upper-trophic aerial predator, eating small to mid-sized reptiles, birds, and mammals up to the size of mule deer fawns and coyote pups. They are also known to scavenge and utilize carrion. Golden eagles nest on cliffs, in the upper one third of deciduous and coniferous trees, or on artificial structures (windmills, electricity transmission towers, artificial nesting platforms, etc.). Golden eagles use the same territory annually but may use alternate nests in different years (Watson and Whalen 2003). The critical breeding period for Washington's golden eagles begins with courtship in early January and ends with juvenile dispersal in mid- to late-August (Pagel et al. 2010; Watson and Davies 2009).

Documented flight paths of Geographic Positioning System (GPS)-tracked golden eagles in the Project vicinity indicate deer fawns, marmots, and other small mammals are main prey species (J. Watson, WDFW/Wildlife Research Scientist, personal communication, March 18, 2015).

Within the proposed Project boundary, WDFW is particularly concerned about loss of prime foraging habitat and the effects of construction disturbance and standard operations on a nest that is located on the cliff face between the reservoirs. Detailed analysis of home range use of a male golden eagle showed use largely within remaining open habits including the proposed lower reservoir Project area (WDFW 2015c). Golden eagles use the same territory annually but may use alternate nests in different years (Watson and Whalen 2003). A golden eagle nest is documented by WDFW within the Project area east of the proposed lower reservoir (Figure 4.5-1, filed as privilaged) along with a documented home range of an adult male golden eagle in and around the Project area (WDFW 2014g). The reported location of the nest is approximate at this time with a potential error of 164 feet (J. Watson, WDFW/Wildlife Research Scientist, personal communication, May 5, 2015). Further consultation with WDFW and USFWS will be conducted regarding application of an eagle take permit as discussed in Section 3.1.

The bald eagle is also protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles breed from central Alaska across Canada. Breeding populations are also found locally throughout the United States. Bald eagles are found primarily near coastlines, rivers, reservoirs, and lakes. Bald eagles principally eat fish, but also feed on carrion, waterfowl, and small mammals. They use large trees as nest sites and hunting perches. Bald eagles winter throughout much of the United States and are documented along the

Columbia River basin. There are no bald eagle nests in close proximity to the proposed Project. Bald eagles have been observed wintering near the John Day Dam in the Project vicinity.

The nest building, egg laying and incubation, hatching and rearing, and fledging period for Washington's bald eagles is January 1 through August 15 (Watson and Pierce 1998; USFWS 2007). Bald eagles roost over the winter in the Columbia River Gorge, approximately October through March (Eisner 1991).

There is no identified bald eagle communal roost or nesting site within or near the Project area; however, transient individuals have been observed in the Project vicinity during the roosting season. Only two observations of bald eagles were made during the 2008 winter bird surveys (WEST 2008), and bald eagle use of the upper reservoir area is considered minimal (J. Watson, WDFW/Wildlife Research Scientist, personal communication, March 18, 2015). Bald eagle monitoring will occur as outlined in the Wildlife Management Plan (WMP) (Appendix C).

Spatial PHS data provided by WDFW identified a prairie falcon nesting site on the steep bluffs between the upper and lower reservoirs in 1997 (WDFW 2014b). Prairie falcons were observed in the Project vicinity in 1998 (Erickson et al. 1999), 2002, and 2008 (WEST 2006, 2008). Pre-construction surveys will be conducted to determine nest location and occupancy status (see Section 3.2.1).

The John Day Waterfowl Area, a regular winter waterfowl concentration area, is in the Project vicinity, to the south of the lower reservoir area. Species using this area generally include Canada geese, diving ducks, dabbling ducks, and other waterfowl. Use of the Project area by water fowl and water birds is expected to be primarily by gulls and Canada geese (*Branta canadensis*), based on wind project studies in the Project vicinity (WEST 2006, 2008). WEST reported very little to no use of the upper reservoir area by water birds or waterfowl in the summer and fall, with use being highest in spring (gulls), followed by winter, due to use by Canada geese (WEST 2006).

Project area use by most general wildlife species, as well as by other less common species, is greatest in the spring and summer and lowest in winter, when many species hibernate or migrate elsewhere. Prominent exceptions are mule deer, and bald and golden eagles, which winter in the Project vicinity and remain active in this season (WEST 2006; P. Verhey, WDFW/Hydroelectric Mitigation Biologist, personal communication, April 2, 2015). A deceased red fox (*Vulpes vulpes*) was seen at the lower Reservoir site during the October 2014 site visit, indicating the presence of nearby permanent residents or a migratory pathway.

The ODFW reported areas of concern for terrestrial species in the vicinity of the transmission line; these areas of concern include deer and elk winter ranges, small mammal linkage priority habitat, and large mammal linkage priority habitat (ODFW 2014). ODFW also reports a peregrine falcon nesting site in the vicinity of the originally proposed transmission line (ODFW 2014; KPUD 2012). Several ODFW strategy species have summer, winter, or year-round

distributions crossed by the transmission line (ODFW 2017). Summer distribution is crossed for the hoary bat (*Lasiurus cinereus*), Brewer's sparrow, Caspian tern (*Hydroprogne caspia*), chipping sparrow (*Spizella passerina*), common nighthawk (*Chordeiles minor*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew, olive-sided flycatcher (*Contopus cooperi*), and Swainson's hawk. Winter distribution is crossed for the northern goshawk (*Accipiter gentilis*). Year-round distribution is crossed for the western toad (*Anaxyrus boreas*), acorn woodpecker (*Melanerpes formicivorus*), great gray owl (*Strix nebulosa*), Lewis's woodpecker, short-eared owl (*Asio flammeus*), California myotis (*Myotis californicus*), long-legged myotis (*Myotis volans*), pallid bat, white-tailed jackrabbit (*Lepus townsendii*), western gray squirrel (*Sciurus griseus*), silver-haired bat (*Lasionycteris noctivagans*), and the western pond turtle (*Actinemys marmorata*).

Table 4.7-2 shows the species found in Klickitat County, Washington and Sherman County, Oregon that have been assigned a state endangered, threatened, sensitive, or candidate status, and/or a federal endangered, threatened, species of concern, or candidate status. A subset of these is expected to occur in or be transient through the proposed Project boundary and is discussed further in Section 4.7, Rare, Threatened, and Endangered Species.

4.5.1.2 Botanical Resources

This section describes the vegetation types and invasive species found in the Project boundary or in the Project vicinity. It does not include a discussion of rare or sensitive plants, which are discussed in Section 4.7, Rare, Threatened, and Endangered Species.

In 2015, ERM conducted a 2015 field survey that included the proposed Project boundary in Washington, as well as areas in the Project vicinity. The 2015 study area is the area of mapped vegetation in Figure 4.5-2. Nine vegetation sample plots and several additional observation points were established to document species composition and percentage of cover.

Invasive Species

Tables 4.5-4 and 4.5-5 present noxious weeds listed in Klickitat County, Washington and Sherman County, Oregon, with their priority ranking for eradication, respectively. The focus of the 2015 vegetation field study was to map vegetation cover types within the study area. As such, the study did not include a formal comprehensive survey of noxious weeds or other invasive species, which is discussed below in Section 4.5.3. Cheatgrass (*Bromus tectorum*) and Russian olive (*Eleagnus angustifolia*) are introduced invasive species identified in the Project boundary and vicinity during the 2015 field visit but they are not listed as noxious weeds in Klickitat or Sherman Counties.

Table 4.5-4: 2017 Klickitat County Noxious Weeds List

Common Name	Scientific Name
Class A Weeds	
broom, French	*Genista monspessulana*
broom, Spanish	*Spartium junceum*
common crupina	*Crupina vulgaris*
cordgrass, common	*Spartina anglica*
cordgrass, dense flower	*Spartina densiflora*
cordgrass, salt meadow	*Spartina patens*
cordgrass, smooth	*Spartina alterniflora*
dyers woad	*Isatis tinctoria*
eggleaf spurge *	*Euphorbia oblongata*
false brome	*Brachypodium sylvaticum*
floating primrose-willow	*Ludwigia peploides*
flowering rush	*Butomus umbellatus*
garlic mustard	*Alliaria petiolata*
giant hogweed *	*Heracleum mantegazzianum*
goatsrue	*Galega officinalis*
hydrilla	*Hydrilla verticillata*
johnsongrass *	*Sorghum halepense*
knapweed, bighead *	*Centaurea macrocephala*
knapweed, Vochin *	*Centaurea nigrescens*
kudzu	*Pueraria montana* var. *lobata*
meadow clary	*Salvia pratensis*
oriental clematis	*Clematis orientalis*
purple starthistle	*Centaurea calcitrapa*
reed sweetgrass	*Glyceria maxima*
ricefield bulrush	*Schoenoplectus mucronatus*
sage, clary	*Salvia sclarea*
sage, Mediterranean *	*Salvia aethiopis*
silverleaf nightshade	*Solanum elaeagnifolium*
spurge flax	*Thymelaea passerina*
Syrian bean-caper	*Zygophyllum fabago*
Texas blueweed	*Helianthus ciliaris*
thistle, Italian	*Carduus pycnocephalus*
thistle, milk	*Silybum marianum*
thistle, slenderflower	*Carduus tenuiflorus*
variable-leaf milfoil	*Myriophyllum heterophyllum*
wild four o'clock	*Mirabilis nyctaginea*
Class B-Designate Weeds	
blueweed	*Echium vulgare*
Brazilian elodea	*Egeria densa*
bugloss, annual	*Anchusa arvensis*
bugloss, common	*Anchusa officinalis*
camelthorn	*Alhagi maurorum*
common fennel	*Foeniculum vulgare*

Common Name	Scientific Name
common reed, nonnative	*Phragmites australis*
fanwort	*Cabomba caroliniana*
gorse	*Ulex europaeus*
grass-leaved arrowhead	*Sagittaria graminea*
hawkweed oxtongue	*Picris hieracioides*
hawkweed, orange	*Hieracium aurantiacum*
herb-Robert *	*Geranium robertianum*
knapweed, black	*Centaurea nigra*
knapweed, brown	*Centaurea jacea*
knotweed, Bohemian *	*Polygonuym* x *bohemicum*
knotweed, giant *	*Polygonum sachalinense*
knotweed, Himalayan	*Polygonum polystachyum*
knotweed, Japanese *	*Polygonum cuspidatum*
loosestrife, garden	*Lysimachia vulgaris*
loosestrife, purple *	*Lythrum salicaria*
loosestrife, wand	*Lythrum virgatum*
Nonnative hawkweed species and hybrids of WALL subgenus	*Hieracium* subgenus, *Hieracium*
parrotfeather	*Myriophyllum aquaticum*
policeman's helmet	*Impatiens glandulifera*
saltcedar * *(unless intentionally planted prior to 2004)*	*Tamarix ramosissima*
shiny geranium	*Geranium lucidum*
spurge laurel	*Daphne laureola*
spurge, leafy *	*Euphorbia esula*
spurge, myrtle *	*Euphorbia myrsinites L*
thistle, musk	*Carduus nutans*
thistle, plumeless	*Carduus acanthoides*
thistle, Scotch *	*Onopordum acanthium*
velvetleaf	*Abutilon theophrasti*
water primrose	*Ludwigia hexapetala*
white bryony	*Bryonia alba*
wild chervil	*Anthriscus sylvestris*
yellow archangel *	*Lamiastrum galeobdolon*
yellow floating heart	*Nymphoides peltata*
Class B-Weeds	
butterfly bush *	*Buddleia davidii*
Dalmatian toadflax *	*Linaria dalmatica ssp. dalmatica*
Eurasian watermilfoil *	*Myriophyllum spicatum*
hairy willow-herb *	*Epilobium hirsutum*
hoary alyssum *	*Berteroa incana*
houndstongue *	*Cynoglossum officinale*
indigobush *	*Amorpha fruticosa*
knapweed, diffuse *	*Centaurea diffusa*
knapweed, meadow *	*Centaurea x moncktonii*
knapweed, Russian *	*Acroptilon repens*
knapweed, spotted *	*Centaurea stoebe*

Common Name	Scientific Name
kochia *	*Kochia scoparia*
lesser celandine	*Ficaria verna*
Nonnative hawkweed species and hybrids of MEADOW subgenus	*Hieracium subgenus, Pilosella*
perennial pepperweed *	*Lepidium latifolium*
poison hemlock *	*Conium maculatum*
puncturevine *	*Tribulus terrestris*
Ravenna grass	*Saccharum ravennae*
rush skeletonweed *	*Chondrilla juncea*
Scotch broom *	*Cytisus scoparius*
sulfur cinquefoil *	*Potentilla recta*
tansy ragwort *	*Senecio jacobaea*
yellow nutsedge*	*Cyperus esculentus*
yellow starthistle *	*Centaurea solstitialis*
Class C Weeds	
Austrian fieldcress *	*Rorippa austriaca*
black henbane	*Hyoscyamus niger*
buffalobur *	*Solanum rostratum*
hairy whitetop *	*Cardaria pubescens*
hoary cress *	*Cardaria draba*
Italian arum	*Arum italicum*
jubata grass	*Cortaderia jubata*
longspine sandbur *	*Cenchrus longispinus*
Nonnative cattails and hybrids (does not include native *Typha latifolia*)	*Typha* species
pampas grass	*Cordaderia selloana*
spikeweed *	*Hemizonia pungens*
spiny cocklebur *	*Xanthium spinosum*
Swainsonpea *	*Sphaerophysa salsula*
thistle, Canada *	*Cirsium arvense*
yellow flag iris *	*Iris pseudacorus*
yellow toadflax	*Linaria vulgaris*
Weeds of Local Concern	
common St. Johnswort *	*Hypericum perforatum*
jointed goatgrass *	*Aegilops cylindrica*
wild carrot *	*Daucus carota*

Source: 2017 Klickitat County Noxious Weed List, Washington State Noxious Weed Control Board < https://www.klickitatcounty.org/575/Klickitat-County-Weed-List-PDF>

* indicates known population in Klickitat County.

Class A: The State of Washington through RCW 17.10 has listed the following Class A weeds for eradication statewide. Class A consists of those noxious weeds not native to state that are of limited distribution or are unrecorded in the state and that pose a serious threat to the state. (RCW 17.10.010.2.(a))

Class B-Designate: The State of Washington through RCW 17.10 has listed the following Class B weeds as designated for control in Klickitat County. Class B consists of those noxious weeds not native to the state that are of limited distribution or are unrecorded in a region of the state and that pose a serious threat to that region. (RCW 17.10.010.2(b))

Class B: The Klickitat County Noxious Weed Control Board through RCW 17.10 has listed the following Class B weeds, not designated by the State, to be on the county noxious weed list. Class B consists of those noxious weeds not native to the state

that are of limited distribution or are unrecorded in a region of the state and that pose a serious threat to that region. (RCW 17.10.010.2(b))
Class C: The Klickitat County Noxious Weed Control Board through RCW 17.10 has listed the following Class C weeds to be designated for control on the county noxious weed list. Class C consists of any other noxious weeds. (RCW 17.10.010.2(c))
Weeds of Local Concern: These are additional non-native, invasive plant species that are of concern in Klickitat County. The Board encourages and recommends control and containment of existing populations, but control is not required.

Table 4.5-5: 2018 Sherman County Noxious Weeds List

Common Name	Scientific Name
"A" Class – High Priority	
Canada thistle	*Cirsium arvense*
Houndstongue	*Cynoglossum officinale*
Jimsonweed	*Datura stramonium*
Kochia	*Kochia scoparia*
Leafy spurge	*Euphorbia esula*
Knapweed complex	*Centaurea sp.*
Rush skeletonweed	*Chondrilla juncea*
Spikeweed	*Hemizonia pungens*
Yellow starthistle	*Centaurea solstitialis*
"B" Class - Moderate Priority	
Canada thistle	*Cirsium arvense*
Dalmation toadflax	*Linaria dalmatica*
Field bindweed	*Convolvulus arvensis*
Knapweed complex	*Centaurea sp.*
Perennial sowthistle	*Sonchus arvensis*
Scotch thistle	*Onopordum acanthium*
Scouring rush	*Equisetum laevigatum*
Showy milkweed	*Asclepias speciosa*
Whitetop (hoary cress)	*Cardaria draba*
Wild oats	*Avena fatua*
Yellow starthisle	*Centaurea solstitialis*
"C" Class – Low Priority	
Bull Thistle	*Cirsium vulgare*
Common Rye	*Secale cereale*
Field Dodder	*Cuscuta campestris*
Jointed Goatgrass	*Aegilops cylindrical*
Klamath Weed (St. Johnswort)	*Hypericum perforatum*
Little Bur (Bur Buttercup)	*Ranunculus testiculatus*
Marestail	*Contza Canadensis*
Medusahead Rye	*Taeniatherum caput-medusae*
Perennial pepperweed	*Lepidium latifolium*
Poison hemlock	*Conium maculatum*
Prickly lettuce	*Lactuca serriola*
Puncturevine	*Tribulus terrestris*
Quackgrass	*Elymus repens*
Russian thistle	*Salsola iberica*
Spiney cocklebur	*Xanthium spinosum*

Common Name	Scientific Name
Western water hemlock	*Cicuta douglasii*
Wavyleaf thistle	*Cirsium undulatum*
"Q" Class – Questionable List	
Hairy willow-herb	*Epilobium hirsutum*
"T" Class – Targeted List	
Canada thistle	*Cirsium arvense*
Dalmation toadflax	*Linaria dalmatica*
Jimsonweed	*Datura stramonium*
Knapweed complex	*Centaurea sp.*
Kochia	*Kochia scoparia*
Leafy spurge	*Euphorbia esula*
Rush skeletonweed	*Chondrilla juncea*
Scotch thistle	*Onopordum acanthium*
Spikeweed	*Hemizonia pungens*
Whitetop (hoary cress)	*Cardaria draba*
Yellow starthisle	*Centaurea solstitialis*
"W" Class – Watch List	
Blessed Milkthistle	*Silybum marianum*
Camelthorn	*Alhagi pseudalhagi*
Common Crupina	*Crupina vulgaris*
Gorse	*Ulex europaeus*
Halogeton	*Halogeton glomeratus*
Iberian Starthistle	*Centaurea iberica*
Italian Thistle	*Carduus pycnocephalus*
Mediterranean sage	*Salvia aethiopis*
Musk Thistle	*Carduus nutans*
Scotch Broom	*Cytisus scoparius*
Tansy Ragwort	*Senecio jacobaea*
Wild – Prosso Millet	*Panicum miliaceum*

Source: Sherman County. 2018. Weed District Sherman County Noxious Weeds. Available online at https://www.co.sherman.or.us/noxious-weeds-sherman-county/ Accessed January 2019.

"A" Class – High Priority. Any noxious weed which greatly endangers the overall economic well – being of the County and has a small enough distribution where eradication is possible.
"B" Class – Moderate Priority. A noxious weed which is well established in the County and has known negative impacts, but due to its distribution, eradication is not feasible.
"C" Class – Low Priority. A noxious weed which is wide spread throughout the County and has known economic impacts.
"Q" Class - Questionable List. A newly detected weed which may have some importance, but more information is needed to determine its impact on agriculture.
"T" Class - Targeted List. A noxious weed from any Class that the Weed Advisory Board wishes to focus efforts and resources on. This List will be reviewed annually.
"W" Class - Watch List. Any noxious weed that may occur in neighboring counties, the State or similar environments as the County, and could potentially endanger the overall economic well – being of the County. Once detected, these weeds shall be moved to the appropriate List.

Vegetation Types

The field data collected during the 2015 survey was used to classify vegetation in the study area using classes established by the Washington Natural Heritage Program (WNHP) Field Guide to Washington's Ecological Systems (referred to as the WNHP Classification; WNHP 2015). The Ecological Systems units were developed by NatureServe to provide temporal and spatial scale landscape data for use in ecological mapping, and conservation and biological assessments. Vegetation types were mapped in GIS using aerial imagery, and 2015 observation points are presented in Figure 4.5-2.

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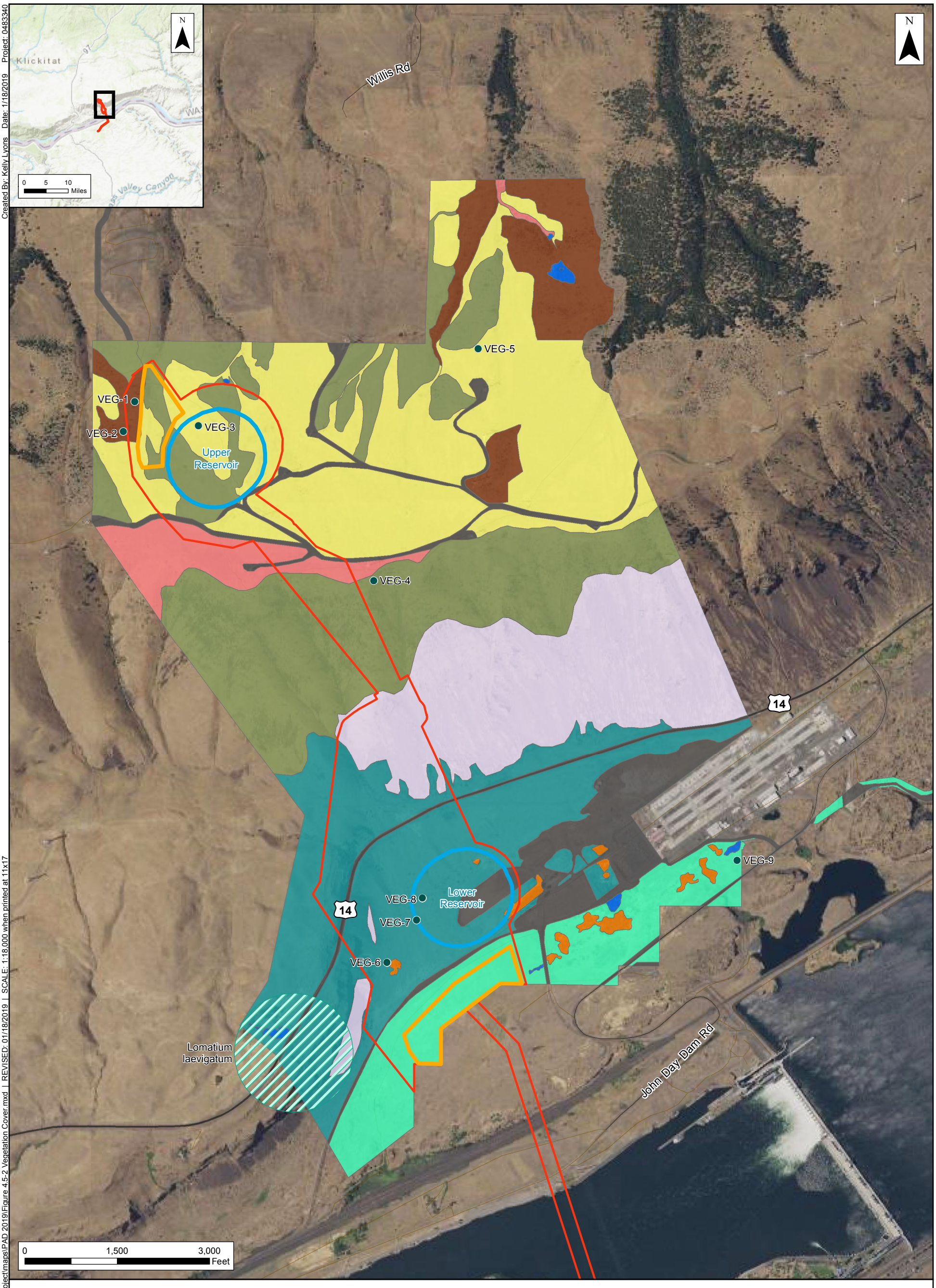

Legend

- 2015 Observation Point
- Rare & Imperiled Species and Plant Communities (WNHP)

Vegetation Cover Types (Field-Mapped 2015)

- Columbia Plateau Scabland Shrubland
- Columbia Plateau Steppe and Grassland
- Columbia Plateau Western Juniper Woodland and Savanna
- Inter-Mountain Basins Big-Sagebrush Steppe
- Inter-Mountain Basins Cliff and Canyon
- Introduced Upland Vegetation – Annual Grassland
- Introduced Upland Vegetation – Annual Grassland with Rock Outcroppings
- Introduced/Invasive Wooded
- Wetland
- Developed/Disturbed
- Temporary Construction Staging Area
- Proposed Reservoir
- Proposed Project Boundary

Figure 4.5-2
Vegetation Cover Types
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 StatePlane Washington South FIPS 4602 Feet

Created By: Kelly Lyons Date: 1/18/2019 Project: 0483340

FILE: M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 4.5-2 Vegetation Cover.mxd | REVISED: 01/18/2019 | SCALE: 1:18,000 when printed at 11x17

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The following sections provide brief descriptions of vegetation types mapped during the 2015 field study. In summary, the upper reservoir area consists of a mix of grassland and shrub habitat (much of which is currently or historically grazed), with some juniper woodlands in the draws. The middle of the Project area is characterized by sagebrush steppe and cliff habitat, while the lower reservoir area is primarily developed, or disturbed grassland. Note that three areas of oak woodlands are mapped in the PHS Mapper (WDFW 2018a) within the Project boundary, but these areas were confirmed to *not* be oak woodlands during the 2015 field survey.

Columbia Plateau Steppe and Grassland

Columbia Plateau Steppe and Grassland (CPSG) cover type is found exclusively in the upper portion of the study area. It is dominated by perennial bunchgrasses and forbs, with a sparse shrub layer. According to the WNHP classification, forbs typically average 25 percent cover, and shrubs average approximately 10 percent cover. Soils vary from deep and well-drained to shallow with a microphytic crust. The land cover type supports a variety of grasses and forbs, while disturbed stands may contain rabbitbrush, sagebrush, and other disturbance-tolerant shrubs (WNHP 2015).

ERM established two sampling plots (VEG-3 and VEG-5) within the CPSG land cover type . This land cover type forms a mosaic with the Columbia Plateau Scabland Shrubland, but mosaic features are small within the larger cover CPSG cover type and are being referred to as CPSG. The herb layer consisted of Hood River milk-vetch (*Astragalus hoodianus*), nine-leaf biscuitroot (*Lomatium triturnatum*), spiny phlox (*Phlox hoodii*), curly blue grass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), bulbous blue grass (*Poa bulbosa*), spring draba (*Draba verna*), springbeauty (*Claytonia* sp.), and bluebunch wheatgrass (*Pseudoroegneria spicata*). The shrub layer consisted of woody buckwheat species (*Eriogonum* spp.), rose (*Rosa* spp.), and rubber rabbitbrush (*Ericameria nauseosa*). Graminoids made up 60 to 80 percent of overall absolute cover, shrubs contributed to approximately 10 to 15 percent, and forbs contributed 25 to 30 percent cover.

Inter-Mountain Basins Cliff and Canyon

Inter-Mountain Basins Cliff and Canyon (IMBCC) cover type occurs as a band along the cliff faces across the center of the study area. ERM verified the IMBCC land cover type through visual assessment from above and below the cliffs, as all IMBCC present at the site is very steep and cannot be accessed safely. IMBCC occurs where steep cliff faces, narrow canyons, unstable scree and talus slopes, and rock outcroppings result in very sparse vegetation. Some denser vegetation areas on unstable scree and talus slopes directly below cliff faces are also included in this cover type. IMBCC supports a variety of trees, shrubs, and forbs despite the steep, unstable environment, including serviceberry (*Amelanchier alnifolia*), netleaf hackberry (*Celtis reticulata*), smooth sumac (*Rhus glabra*), western juniper (*Juniperus occidentalis*), big sagebrush

(*Artemisia tridentate*), antelope bitterbrush (*Purshia tridentate*), curl-leaf mountain-mahogany (*Cercocarpus ledifolius*), and ocean-spray (*Holodiscus discolor*) (WDFW 2018a).

Inter-Mountain Basins Big Sagebrush Steppe

Inter-Mountain Basins Big Sagebrush Steppe (IMBBSS) cover type is found in the upper portion and across the steep middle of the study area . According to the WNHP classification, IMBBSS is grassland with an open to moderately dense shrub cover, varying from 5 to 50 percent. One sampling plot (VEG-4) was established within the IMBBSS cover type (Figure 4.5-2). The plot was established on a steep slope to the south of the upper reservoir site. The herb layer consisted of arrow-leaf balsamroot (*Balsamorhiza sagittata*), bluebunch wheatgrass, lupine species (*Lupinus* spp.), fern-leaf biscuitroot (*Lomatium dissectum*), bulbous blue grass, and brome species (*Bromus* spp.). The shrub layer was made up of rubber rabbitbrush, buckwheat species, and stiff sagebrush (*Artemisia rigida*). Graminoids made up approximately 80 percent of absolute cover, shrubs consisted of approximately 20 percent, and forbs contributed to 15 percent. Exposed rock and dirt was present at approximately 30 percent.

Columbia Plateau Scabland Shrubland

Columbia Plateau Scabland Shrubland (CPSS) is found as a band just above the cliffs across the central portion of the Project boundary. According to the WNHP classification, CPSS consists of low, xeric shrubs and grasses on sites with little soil development and extensive exposed rock, gravel, or compacted soils. The CPSS cover type forms a matrix or mosaic with CPSG. Total vegetation cover is typically less than 50 percent. The shrub layer is comprised of stiff sagebrush and shrubby buckwheat species, with scattered forb species in the genuses *Allium*, *Balsamorhiza*, *Lomatium*, *Phlox*, and *Sedum*. Undisturbed areas within this cover type may have up to 60 percent moss and lichen cover (Rocchio and Crawford 2009). ERM confirmed the CPSS cover type near the southern edge of the upper reservoir. Plant genuses observed included *Sedum*, *Phlox*, and *Eriogonum*, with a high percentage of rock and lichen.

Columbia Plateau Western Juniper Woodland and Savanna

Columbia Plateau Western Juniper Woodland and Savanna is found in draws in the upper portion of the study area. According to the WNHP classification, this cover type is comprised of short trees which persist in basins, canyons, slopes, and valley margins. Western juniper is often the only tree species, though they may be interspersed with Ponderosa pine (*Pinus ponderosa*).

Two quadrat-sampling plots were established within the Columbia Plateau Western Juniper Woodland and Savanna cover type (VEG-1 and VEG-2). The herb layer included nine-leaf biscuitroot, Hood River milk-vetch, brome species, bulbous blue grass, curly blue grass, yellow rabbitbrush (*Chrysothamnus viscidiflorus*), yarrow (*Achillea* spp.), and sunflower (*Eriophyllum* spp.). The shrub layer consisted of rubber rabbitbrush and woody buckwheat species, with ponderosa pine and western juniper trees. Graminoids contributed 50 to 80 percent of absolute

cover, the herb layer contributed 10 to 15 percent, and shrubs contributed approximately 35 to 60 percent cover. Trees comprise approximately 20 to 25 percent cover within the total polygon, with trees becoming scarcer on the slopes and denser in the valleys and draws. Ponderosa pine comprised approximately 80 percent of total tree cover on the slopes, with western juniper making up the remaining 20 percent.

Introduced Upland Vegetation—Annual Grassland

The Introduced Upland Vegetation—Annual Grassland (IUVAG) cover type was found exclusively in the lower portion of the study area where impacts have been high due to industrial activity and other development. The area shows evidence that it was formerly CPSG, which has been invaded by cheatgrass and other non-native or invasive species. Rubber rabbitbrush is present in large areas, and other native shrubs and forbs are present throughout this cover type.

Three quadrat-sampling locations were established within the IUVAG cover type (VEG-6, VEG-7, and VEG-8). The herb layer primarily consisted of cheatgrass, needle-and-thread grass (*Hesperostipa comata*), bulbous blue grass, buckwheat species, Menzies' fiddleneck (*Amsinckia menziesii*), fern-leaf biscuitroot, and groundsel (*Senecio* sp.). The shrub layer consisted primarily of rubber rabbitbrush, with some woody buckwheat species, both in varying densities throughout the cover type. The grassland areas closer to the bluffs at the lower site contained up to 20 percent talus rocks within the meadow. Over all quadrat locations, graminoids contributed 70 to 90 percent absolute cover, herbaceous species contributed approximately 5 to 10 percent, and shrubs contributed approximately 5 to 30 percent.

Introduced/Invasive Wooded

Introduced/Invasive Wooded cover type is found exclusively as patches within in the disturbed and developed lower portion of the study area. The trees include Russian olive, ornamental pea-family trees, black cottonwood (*Populus trichocarpa*), smooth sumac, with scattered sweet almond (*Prunus dulcis*) and netleaf hackberry trees. Black cottonwood, netleaf hackberry, and smooth sumac are native, but are assumed to be planted given the development of the area.

Introduced Upland Vegetation—Annual Grassland with Rock Outcroppings

The Introduced Upland Vegetation—Annual Grassland with Rock Outcroppings (IUVAGRO) cover type is found in a band along the southern portion of the study area. This cover type is similar to IUVAG, but closer to the Columbia River and with prominent rock outcroppings throughout. Rabbitbrush is still present, but not as prevalent as in IUVAG.

One quadrat-sampling location was established to represent the IUVAGRO cover type (VEG-9). The herbaceous layer consisted of cheatgrass, yarrow, brome species, and quackgrass (*Elymus repens*). A woody buckwheat species was present in the shrub layer. Other species observed in the vicinity were fern-leaf bicuitroot, Menzies' fiddleneck, rubber rabbitbrush and Canada thistle

(*Cirsium arvense*). Graminoids contributed to approximately 75 percent of absolute cover, forbs to approximately 10 percent, and shrubs to approximately 5 percent. Approximately 25 percent of this cover type is attributed to rock or scree.

4.5.2 Potential Resource Impacts

4.5.2.1 Wildlife

The Applicant's goals are to minimize disturbance to wildlife and habitats, and protect sensitive species in the proposed Project area. The Applicant is committed to working with state and federal resource agencies to define construction methods, a construction timeline, and operational guidelines that would minimize impacts on local wildlife. To minimize alterations of habitats, the proposed Project would utilize existing access roads and previously developed lands for the majority of Project features. The Project transmission line would utilize an available space on an existing BPA transmission corridor for the Columbia River crossing and the connection to the John Day substation in Oregon, thereby preventing any new permanent impacts from transmission infrastructure across the Columbia River and into Oregon. Impacts on priority habitats of talus and cliffs would be largely avoided since the penstock, access tunnel, and emergency evacuation tunnel would be constructed underground, using directional drilling techniques. Temporary and permanent impacts on habitat are shown in Table 4.5-6.

During construction, the primary impacts on terrestrial wildlife would be noise and human activity associated with Project construction. Construction noise is expected to result from the use of equipment such as industrial trucks, drilling equipment, and blasting to remove bedrock for the reservoirs. Construction of Project features could adversely affect small mammals and reptiles on site through loss of habitat and mortality of individuals in construction zones. Ground-dwelling animals could be killed during excavation activities and would lose the use of permanently impacted areas such as the proposed reservoirs. Small mammal, reptile, or ground bird fatalities could occur from vehicle activity. Key measures to reduce road fatalities are to limit speeds on all roads through the development of appropriate PM&E measures, as described in the WMP.

Visual and noise disturbance may displace wildlife into less suitable habitat and thus reduce survival and reproduction. Tolerance levels to disturbance can be species-specific. During construction, it is expected that mule deer will be displaced. Impacts are expected to be minimal because no portion of the Project area is classified as mule and black-tailed deer winter range (WDFW 2018a).

The removal and loss of vegetation can affect avian species directly by loss of nesting, foraging, and cover habitat. To minimize loss of habitat the proposed Project will utilize existing access roads and previously developed lands for the majority of Project features. Additional mitigations for the removal of vegetation can be found in the Vegetation Management and Monitoring Plan (VMMP, Appendix D).

Impacts due to Project construction and operations could include abandonment of the area and nests due to disturbance. Disturbance (visual and noise) may displace birds into less suitable habitat and thus reduce survival and reproduction. Avian tolerance levels to disturbance can be species-specific and are described in the WMP. The impact to bird species from disturbance or displacement from construction activities is likely to be short-term. Key measures include minimizing disturbance impacts within predefined buffers around special status bird nests where practicable during the breeding season (see WMP, Appendix C).

Avian mortalities can occur from vehicle activity during construction and operations. Key measures to reduce road fatalities include limiting speeds on all roads and the development of a Traffic Management Plan.

Light pollution can affect migrating and nocturnal birds through disorientation, as well as breeding behavior and reproduction of songbirds (Kempenaers et al. 2010). Artificial light will be managed through PM&E measures developed in the Visual and Recreation Resources Management Plan (VRRMP).

The creation of reservoirs may impact waterfowl and water birds by providing open water habitat thus increasing resting and foraging use of the area. The increased presence of these birds adjacent to existing wind turbines may increase the likelihood of mortality events. Although the Project reservoirs would not provide wildlife habitat due to their industrial use, flow cycling between reservoirs, lack of substrate, and shape, the Applicant would employ methods to reduce the risk of avian species attraction to the reservoirs. Waterfowl or water birds would be deterred by installation of fencing or plastic shade balls on the open water area, or other methods to prevent resting or foraging as will be further developed through consultation with resource agencies and described in the WMP. The Applicant would also develop measures to maintain herbaceous cover around reservoirs as outlined in the VMMP, rather than overhanging riparian vegetation that provides forage and brooding habitat. These measures are targeted specifically at waterfowl or water birds and are further discussed in Section 4.5.3 below. Ample water habitat is available in the Columbia River near the Project area.

Raptors

Raptor tolerance levels to disturbance can be species- and individual-specific. Golden eagles exhibit lower tolerance to disturbance compared to bald eagles (USFWS 2008). The potential impacts on the golden eagle are the removal of foraging habitat, potential impact on the nesting pair, and potentially forcing confrontation between pairs. Other raptors in the area such as red-tailed hawk, rough-legged hawk, and prairie falcon could experience a reduction in terrestrial foraging habitat and noise disturbance during construction.

Golden eagle disturbance or displacement is possible during construction or operation of the Project. Project construction may disturb golden eagles if they are nesting within line-of-sight of the Project or if the areas under active construction are preferred foraging areas. Golden eagles

have been documented to continue to use the same focal areas of ranges before and after turbine construction and this may be the case for the proposed Project construction activities (Madders and Whitfield 2006). Monitoring of golden eagles during construction of a dam and reservoir over a four-year period found no significant change in occupation or productivity in response to construction activities, particularly those associated with loud noise (Ecosphere Environmental Services 2007). Nests were located approximately 0.5 miles from the construction site and most construction activity occurred outside of view from the nest. Season (i.e., breeding vs. non-breeding) and breeding status influence intensity of range use surrounding nests (Haworth et al. 2010; Watson et al. 2014). Key measures to reduce impacts on golden eagles are seasonal construction restrictions and construction buffer zones, as discussed in Section 3. Prior to construction, all areas will be surveyed and buffers will be in place to protect occupied nests. Where buffers are not feasible, the Applicant will consult with USFWS and WDFW on necessary permits. The creation of the open water reservoirs may attract small to medium sized mammals, increase prey availability, and subsequently increase golden eagle use of the turbine area. Key measures to mitigate potential increase in prey availability are the use of deterrents (e.g., physical barriers, low-current shocking wire and strips, or modified-edge habitat such as fencing, rip-rap, or cement) around the reservoirs and implementation of a VMMP to reduce the introduction and spread of potential forage species surrounding reservoirs.

In a 2014 letter, the WDFW expressed concern about the loss of golden eagle foraging habitat from the reservoir footprints (WDFW 2014f). The total Project footprint would eliminate approximately 81 acres of vegetated habitat, primarily IUVAG, IMBBSS, and CPSG, which is plentiful in this region. Golden eagles are expected to utilize nearby available foraging habitat during and after Project construction.

Bald eagles primarily forage along the Columbia River and its associated riparian habitats. Bald eagle use of the upper reservoir area is minimal (J. Watson, WDFW/Wildlife Research Scientist, personal communication, March 18, 2015), but the creation of the two open water reservoirs may increase prey availability (small mammals, waterfowl, and water birds) and subsequently increase eagle use in the turbine area. Key measures to mitigate for potential increase in eagle prey availability are the use of bird deterrents around reservoirs and the management and monitoring of vegetation surrounding reservoirs outlined in the WMP and VMMP so as to not increase preferred waterfowl habitat. Fencing and/or covering of reservoirs is proposed to prevent resting and foraging of the area by avian species, as further discussed in the WMP, to minimize attractants to bald and golden eagles. The project's reservoirs could increase bald eagle foraging activity, which could adversely impact the golden eagles during nesting through increased stress and energy expenditures related to territory defense (WDFW 2014h). However, PM&E measures have been proposed to reduce the risk of bird attraction to the Project reservoirs (see Section 4.5.3 and the WMP in Appendix C).

Any increased presence of birds adjacent to existing wind turbines may increase the likelihood of mortality events; however, deterrents have been proposed and will be monitored as to their effectiveness.

Transmission lines pose an electrocution risk to large birds, such as eagles, if multiple lines can be touched by a bird at one time (i.e., if their wingspan can reach between two lines). Electrocution could cause injury or mortality to a large bird.

4.5.2.2 Botanical Resources

The Applicant's objectives are to minimize impacts on vegetation, and prevent the spread of noxious weeds. Permanent and temporary impacts on the landscape based on the proposed Project design are outlined in Table 4.5-6.

Table 4.5-6. Temporary and permanent impacts on vegetation type from proposed Project infrastructure

Vegetation Type[1]	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Columbia Plateau Scabland Shrubland (CPSS)	0	0
Columbia Plateau Steppe and Grassland (CPSG)	7.5	20.8
Columbia Plateau Western Juniper Woodland and Savanna (CPWJWS)	0.8	0.0
Inter-Mountain Basins Big-Sagebrush Steppe (IMBBSS)	8.1	24.1
Inter-Mountain Basins Cliff and Canyon (IMBCC)	0.1	0.0
Introduced Upland Vegetation & Annual Grassland (IUVAG)	10.6	35.9
Introduced Upland Vegetation & Annual Grassland w/Rock Outcroppings (IUVAGRO)	26.5	0.0
Introduced/Invasive Wooded	0	0.4
Developed/Disturbed	0.8	9.3

[1] Vegetation types mapped based on 2015 field survey and classified using WNHP (2015) classifications

[2] This table has different totals than the Table 3.2-1 because it excludes the Oregon portion.

4.5.3 Applicant Recommendations

The Applicant aims to minimize the potential effect of the Project on wildlife and botanical resources through the implementation of the PM&E measures described in the sections below.

4.5.3.1 Wildlife

To reduce impacts to wildlife resources, the Applicant proposes to implement the following PM&E measures, which are further discussed in the WMP:

- Continued and adaptive wildlife protection and eagle conservation including refining this WMP and consulting with agencies throughout Project construction and operation;
- Monitoring studies including pre-construction raptor nest surveys, monitoring of golden eagle use, and bald eagle monitoring ;

- Risk assessment of activity and timeline to determine the impacts of the Project during breeding and non-breeding seasons;
- Develop nest protection measures with agencies, if necessary;
- Construction timing and scheduling limits (e.g., only allowing construction between 8 am and 6 pm) to minimize impacts to crepuscular foraging and nocturnal activity;
- Raptor-safe transmission construction (i.e., ensure that the transmission line installation complies with Avian Power Line Interaction Committee [APLIC] guidelines for avian protection [APLIC and USFWS 2005] and the Suggested Practices for Avian Protection on Power Lines, The State of the Art in 2006 [APLIC 2006] to protect avian species from electrocution as a result of landing or perching on transmission and distribution lines [WDFW 2014f]);
- Noise minimization by avoiding blasting within 0.5 miles of active nests;
- Biological construction monitoring to ensure construction is avoiding protected/sensitive areas;
- Biological training program to inform employees of the sensitive biological resources;
- Minimize habitat loss by utilizing mostly existing access roads;
- Manage traffic by implementing a speed limit to reduce wildlife injury due to collisions;
- Carcass removal program to limit attraction of scavenging wildlife;
- Reduce attraction for migratory birds by using bird deterrents, vegetation management, and/or exploring the use of plastic shade balls to cover reservoirs;
- Reduce attraction for mammals (prey species) by using deterrents;
- Implement a wildlife incident reporting system to disclose issues to agencies;
- Dust pallatives may be applied to unpaved roads to reduce dust; and
- Manage light pollution to reduce impacts on migrating and nocturnal birds.

Once operational, the proposed Project facilities will be operated in a manner that minimizes disturbance to wildlife populations.

4.5.3.2 Botanical

To reduce impacts to botanical resources, the Applicant proposes to implement the following PM&E measures:

- Prior to project construction, the Applicant has proposed a formal invasive plant survey to establish baseline environmental conditions. The survey would develop a list of target invasive species to be surveyed, and identify the location and extent of any target species.

This information would be used to aid in the development of a comprehensive plan to control the spread of invasive plants within the Project boundary and that would maximize the effectiveness of restoration efforts following ground disturbance. The survey will be more fully described in the VMMP (Appendix D) as it is further developed.

- Prior to construction, the Applicant will identify any sensitive plants within areas to be disturbed and either prevent or mitigate adverse effects on these species.
- Construction and operations activities will be planned and implemented to avoid disturbance to existing native and/or sensitive plant communities and prevent the spread of noxious weeds as described in the VMMP.
- All temporarily disturbed areas will be revegetated as outlined in the VMMP.

Once operational, the proposed Project facilities will be operated in a manner that minimizes disturbance to plant communities.

4.6 Wetlands, Riparian, and Littoral Habitat

4.6.1 Existing Environment

This section describes the wetland, floodplain/riparian, and littoral habitats within the proposed Project boundary, which make up only a small portion of the Project area in this semi-arid landscape. For the purpose of this document, wetland habitats were defined using the USFWS NWI database (USFWS 2015) criteria for wetlands, in that they were considered a wetland if they exhibited either wetland hydrology or were dominated by hydrophytic vegetation (as defined by the USACE protocol). Wetland habitat was included regardless of its potential jurisdictional status as a Waters of the U.S. per USEPA and USACE regulations. Floodplain and riparian habitats are used synonymously here and include any wetlands adjacent to a river or stream where the vegetation relies on supplemental hydrology from the waterbody, delivered through seasonal or periodic flooding, and/or subsurface flow. Littoral habitats are wetlands located in the shallows near the shore of a lake or river.

A preliminary field assessment was completed by KPUD in April of 2015 within the 2015 Project study area. The 2015 study area was larger than and inclusive of the current proposed Project boundary but did not include the transmission line corridor crossing the Columbia River. Wetland habitat mapping and acreage results were updated for this document to include the area within the current Project boundary, and are presented in Table 4.6-1. Potential wetland features were assessed if they were either mapped in the NWI; or were identified as potential wetlands in the field or using aerial imagery (desktop assessment). Based on the desktop and field assessments, all potential wetland features were identified using a "W" code, and classified into one of three categories: (1) "non-wetland" (no wetland hydrology or hydrophytic vegetation); (2) "wetland" (confirmed wetland hydrology or hydrophytic vegetation), or (3) "potential wetland" (wetland or non-wetland was not determined).

Six potential wetland features were assessed within the currently-proposed Project boundary, of which four were determined to be non-wetland. These four features are also mapped by the NWI (W2, W6, W23, W25; Figures 4.6-1A and B) and are described in Table 4.6-1. Note that feature W2 is actually a stock pond with a wetland fringe, but the portion of the feature that NWI maps within the current Project area boundary is the pond impoundment berm, which is non-wetland.

Two additional potential wetlands (W24 and W26; Figures 4.6-1A and B) not mapped by NWI were identified in the field and on the aerial imagery. One is a potential narrow scrub/shrub wetland located along NHD-mapped stream feature S3 which crosses the proposed transmission line on the Oregon side of the river. The other is a potential herbaceous wetland associated with a narrow NHD-mapped ephemeral swale feature S7 near the proposed upper reservoir (see the Water Resources section 4.3 for waters feature descriptions). Additional NWI-mapped features adjacent to the current Project boundary assessed in 2015 are also presented in Figures 4.6-1A and B, but are not listed in Table 4.6-1.

Table 4.6-1: Wetland Features Assessed in 2015 Field Study and Aerial Imagery in the Currently-Proposed Project Boundary

ID	NWI Code	Assessed Status[1]	Assessed[2]	NWI mapped	Comment	Acres in Boundary
W24	PEM1C	Wetland (potential)	Field 2015	No	Potential herbaceous wetland in swale feature S7 (non-water; see Water Resources section) near proposed upper reservoir.	1.17
W26	PSS1C	Wetland (potential)	Aerial	No	Potential scrub/shrub wetland along potential stream S21 in transmission line corridor (see Water Resources section).	0.11
		Total confirmed and potential wetlands in proposed Project boundary				**1.17**
W2	/	Non-wetland	Field 2015	Yes	The NWI-mapped feature is a stock pond with wetland fringe, near the upper reservoir. It was confirmed as wetland in the field 2015. However, the 5-foot portion that extends inside the Project boundary is *not* within the true wetland boundary.	NA
W6	/	Non-wetland	Field 2015	Yes	No hydrophytic vegetation or wetland hydrology. Above Highway 14, associated with S17.	NA
W23	/	Non-wetland	Field 2015	Yes	Associated with swale feature S8 (non-water) near proposed upper reservoir. No hydrophytic vegetation or wetland hydrology	NA
W25	/	Non-wetland	Aerial	Yes	Appears to be ephemeral swale vegetated with non-wetland vegetation. Located along NHD-mapped S22 (non-water) in transmission line corridor.	NA

NA = not applicable (acres were calculated only for potential wetlands); NHD = National Hydrologic Database; NWI = National Wetlands Inventory

[1] Features were confirmed as potential wetlands if they exhibited wetland hydrology or hydrophytic vegetation based on field assessment or aerial imagery

[2] All features mapped in NHD or NWI databases were assessed using field (2015) or desktop methods (aerial imagery).

Examples of common wildlife species that may utilize these two potential wetland habitats include raccoon (*Procyon lotor*), marten (*genus Martes*), red-winged blackbird (*Agelaius phoeniceus*), Columbia spotted frog (*Rana luteiventriz*), and common garter snake (*Thamnopsis sirtalis*). Federally and/or state listed wildlife species that may be found in the Project area's wetlands include fisher (*Martes pennanti*), Columbia Oregonian snail (Cryptomastix hendersoni), striped whipsnake (Masticophis taeniatus), western toad (Anaxyrus boreas), and Oregon spotted frog (Rana pretiosa). See Section 4.5, Wildlife and Botanical Resources, for an extensive list of wildlife species that have been observed in the Project area. Vegetation could include rushes (*Juncus* spp.*)*; sedges (*Carex* spp.*);* reed grasses (*Phalaris* spp.*)*; dock (*Rumex* spp.*)*; and non-native grasses such as smooth brome (*Bromus inermis)*, quackgrass (*Elymus repens)*, and invasive cheatgrass (*Bromus tectorum);* Russian olive (*Elaeagnus angustifolia);* and tree and shrub willows (*Salix* spp.*).*

No other wetland, floodplain/riparian, or littoral habitat was identified in the Project area. Based on a desktop review of the aerial imagery, the Columbia River appears too deep to support littoral habitat where the transmission line crosses the river. Further, no floodplain or riparian habitats exist along the Columbia River at the proposed transmission line crossing due to the river's geomorphology and the upstream dams, both which preclude development of floodplain and riparian habitats.

4.6.2 Potential Resource Impacts

This section discusses potential impacts to the two wetland features identified within the Project area during Project construction and operation. A small area of potential wetland feature W24 (Table 4.6-1; Figure 4.6-1A) could be permanently or temporarily impacted by the placement of fill due to construction of the upper reservoir. This feature is a narrow swale that has not been confirmed as wetland habitat. Prior to construction, this feature would be assessed in the field to confirm or deny its status as a jurisdictional wetland per USACE protocol using the 1987 wetland delineation manual (Environmental Laboratory 1987). If the feature is confirmed to be a jurisdictional wetland, the Project would first attempt to adjust fill locations to avoid the wetland impact. If the placement of fill in the wetland is unavoidable, all required regulatory permitting would be completed, including application for fill authorization (Section 404 permit). The functions and values of the feature would also be assessed using *Washington State Rating System for Eastern Washington, Update – 2014* (Hruby 2014). Any unavoidable impacts to this wetland would be minimized through construction BMPs, and mitigated if compensatory mitigation is required.

Potential wetland feature W26 (Table 4.6-1) is a narrow swale feature crossed by the existing transmission line on the Oregon side of the Columbia River (Figure 4.6-1B). The Project would install an additional transmission line on the exiting poles using standard methods. All temporary construction impacts to this potential wetland feature would be avoided during line installation by keeping a set distance from the swale.

For both of these features, the Project would use standard construction BMPs to ensure that there were no further impacts to wetlands caused by erosion or sedimentation, vegetation removal, or grading. The Project will not alter the hydrology of these two potential wetland features, as water would be sourced from an existing water right and not from a source connected to wetland habitat.

4.6.3 Applicant Recommendations

The Applicant is proposing to avoid impacts to wetlands to the extent practicable. Any unavoidable impacts to wetlands would be minimized through the implementation of BMPs; mitigation would be provided if necessary. Additional information necessary to assess potential impacts and plan avoidance will be gathered during the wetland study proposed in Section 5.0.

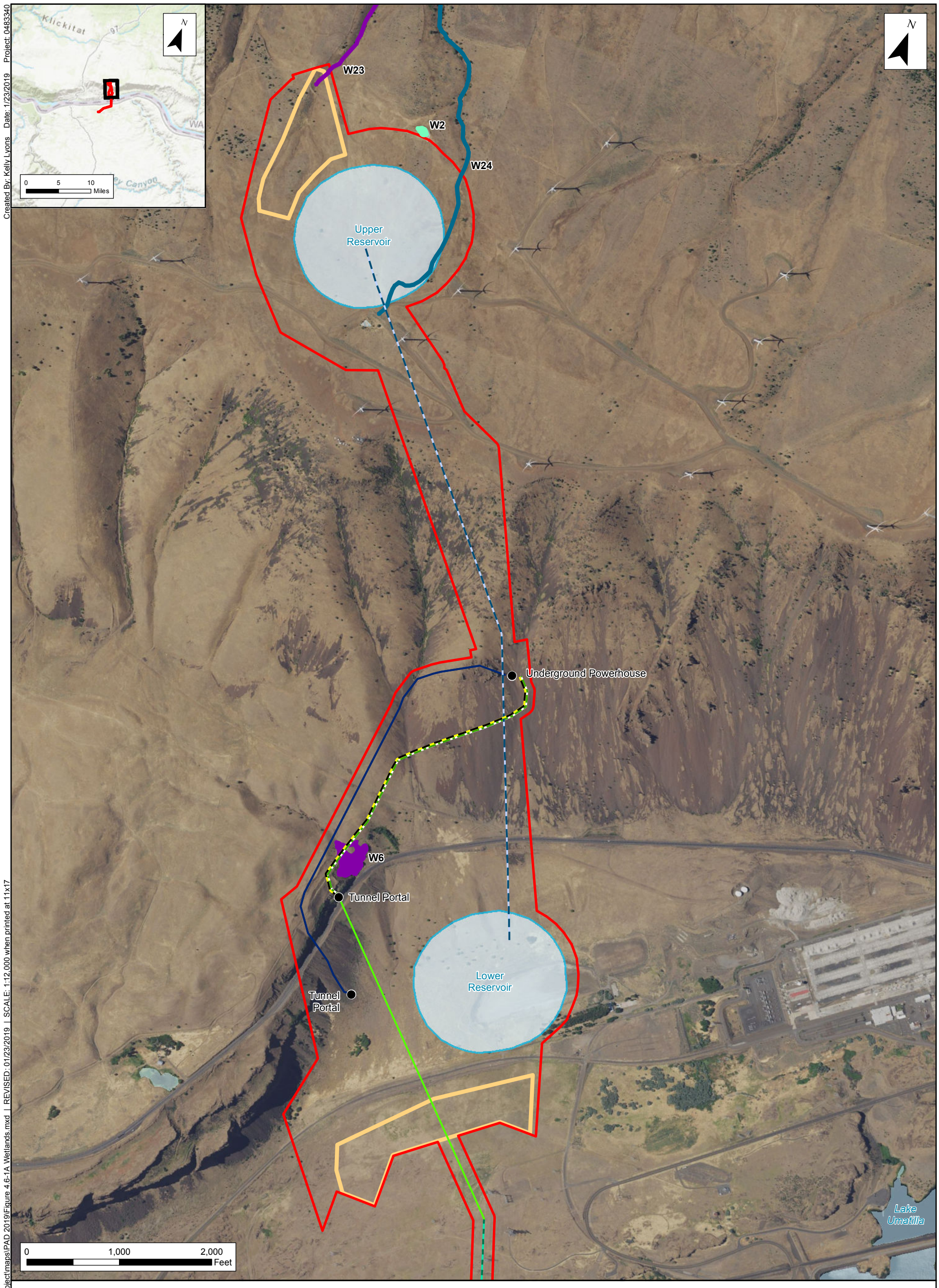

Figure 4.6-1A
Wetlands
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Created By: Kelly Lyons Date: 1/23/2019 Project: 0483340

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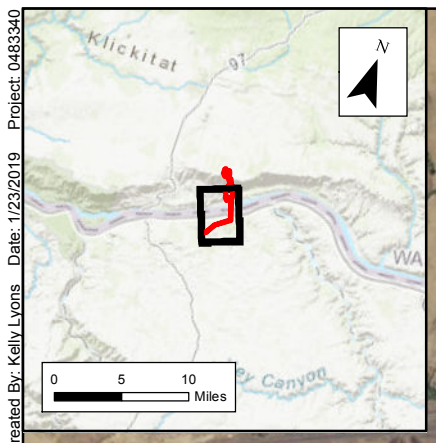

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Legend

- Proposed Project Boundary
- Temporary Construction Staging Area
- Proposed Reservoir
- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
- Proposed Underground Access Tunnel
- Proposed Underground Penstock

Wetland Status

- Potential Wetland (Confrimation Required)
- Non-Wetland

Figure 4.6-1B
Wetlands
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com
ERM

Source: National Agricultural Imagery Program, July 2017, flown 1m per pixel; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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4.7 Rare, Threatened & Endangered Species

4.7.1 Existing Environment

This section provides a description of the rare, threatened, and endangered species in Klickitat County, Washington and Sherman County, Oregon.

4.7.1.1 Fish and Aquatic Resources

WDFW lists species of fish as either federally endangered, threatened, species of concern, or candidate; or state endangered, threatened, sensitive, or candidate within Klickitat County, Washington (WDFW 2018a, USFWS 2018a, WDFW 2018b, WDFW 2018c). Additionally, the Oregon spotted frog (*Rana luteiventriz*) is state listed as endangered and federally listed as threatened; this species is discussed in Section 4.7.1.3. Section 4.5 includes a detailed summary of fish and aquatic resources in the proposed Project study area.

Federally Listed Species

Federally listed species that WDFW indicates occur in Klickitat County include the bull trout/Dolly Varden (*Salvelinus confluentus*), Chinook salmon (*Oncorhynchus tshawytscha*), chum salmon (*Oncorhynchus keta*), coho salmon (*Oncorhynchus kisutch*), steelhead (*Oncorhynchus mykiss*), and sockeye salmon (*Oncorhynchus nerka*) (WDFW 2018a, USFWS 2018a, WDFW 2018b, WDFW 2018c). Fish species are often federally listed by specific evolutionarily significant unit.

The river lamprey (*Lampetra ayresii*) is reported to occur in the Columbia River and is a federal species of concern. All species are reported by WDFW to occur in the Columbia River, near the proposed Project study area (WDFW 2018b). None of the federally listed fish are present in the Project's Intake Pool. This can be explained by the lack of connection between the Intake Pool and John Day Reservoir. Furthermore, the existing aquatic habitat in the Intake Pool is not suitable for rearing, migration, overwintering, or spawning for species with cold-water habitat requirements and/or lotic habitat requirements for spawning and egg incubation.

State Listed Species

State listed species that WDFW PHS indicates occur in Klickitat County include the river lamprey , leopard dace (*Rhinichthys falcatus*), mountain sucker (*Catostomus platyrhynchus*), bull trout/Dolly Varden, Chinook salmon, chum salmon, coho salmon, Pacific lamprey (*Entosphenus tridentatus*), cutthroat trout (*Oncorhynchus clarkii*), pink salmon (*Oncorhynchus gorbuscha*), white sturgeon (*Acipenser transmontanus*), steelhead, and sockeye salmon (WDFW 2018b).

All aquatic species that have a federally listed status are listed as state candidate. Several species—the leopard dace, mountain sucker, Pacific lamprey, white sturgeon, cutthroat trout, and

pink salmon—are state candidate species but do not have federal status (WDFW 2018a, USFWS 2018a, WDFW 2018b, WDFW 2018c).

No additional aquatic species were included for the Oregon side of the Project (i.e., the transmission line) because the Project would not have any interactions with surface or ground water on the Oregon side.

4.7.1.2 Botanical Resources

Tables 4.7-1 and 4.7-2 present plant species of special concern with documented occurrences in Klickitat County, Washington and Sherman County, Oregon, respectively. For Washington, species ranking and status follow the 2018 Washington Vascular Plant Species of Special Concern prepared by the WNHP (WNHP 2018). For Oregon, species ranking and status follow the Rare, Threatened and Endangered Species of Oregon prepared by the Oregon Biodiversity Information Center (OBIC 2016), and the USFWS Federally Listed, Proposed, Candidate, Delisted Species and Species of Concern Under USFWS Jurisdiction which may occur in Oregon (USFWS 2018b). None of the species documented in either county are federally designated as threatened, endangered, or candidate species (WNHP 2018, OBIC 2016, USFWS 2018b).

In Klickitat County there are 68 special status species with documented occurrences, of which eight are listed as state endangered, 30 are listed as state threatened, and 25 are listed as state sensitive (WNHP 2018). The remaining 5 are listed as extirpated from Washington State. Known occurrences of Klickitat County special status species in the Project vicinity (from the WNHP database as of 2014) are presented in Figure 4.7-1, filed as privileged (DNR 2014a).

In Sherman County there are 27 special status species with documented occurrences, of which one is listed as state endangered (but also considered extirpated), one is listed as state threatened, and two are listed as state candidate species (OBIC 2016). The remainder of the Sherman County species do not have a state status but are still considered special status species by the Oregon government agencies and the Oregon Biodiversity Information Center (OBIC 2016).

Table 4.7-1: Klickitat County, Washington. 2018 List of Known Occurrences of Rare Plants

Scientific Name	Common Name	State Status	State Rank	Federal Status
Agoseris elata	tall agoseris	S	S3?	-
Ammannia robusta	grand redstem	T	S1	-
Artemisia campestris var. wormskioldii	Wormskiold's northern wormwood	E	S1	-
Astragalus arrectus	Palouse milk-vetch	T	S2	-
Astragalus diaphanus	transparent milkvetch	X	SX	-
Astragalus misellus var. pauper	pauper milk-vetch	S	S2	-
Astragalus pulsiferae var. suksdorfii	Ames' milkvetch	E	S1	-

Scientific Name	Common Name	State Status	State Rank	Federal Status
Bergia texana	Texas bergia	X	SX	-
Bolandra oregana	Oregon bolandra	T	S2	-
Calochortus longebarbatus var. longebarbatus	long-bearded sego lily	S	S3	-
Cirsium remotifolium var. remotifolium	weak thistle	S	S1	-
Collinsia sparsiflora var. bruceae	few-flowered collinsia	T	S1	-
Corispermum villosum	hairy bugseed	S	S2	-
Cryptantha rostellata	beaked cryptantha	T	S2	-
Cryptantha spiculifera	Snake River cryptantha	S	S2S3	-
Cusickiella douglasii	Douglas' draba	T	S1	-
Damasonium californicum	fringed water-plantain	T	S1	-
Diplacus cusickioides	Cusick's monkeyflower	T	S1	-
Eremothera minor (Camissonia minor)	Small-flower evening-primrose	S	S2	-
Eryngium petiolatum	Oregon coyote-thistle	T	S2	-
Erythranthe jungermannioides	liverwort monkeyflower	X	SH	-
Erythranthe pulsiferae	Pulsifer's monkeyflower	S	S2	-
Erythranthe suksdorfii	Suksdorf's monkeyflower	S	S2S3	-
Erythranthe washingtonensis	Washington monkeyflower	X	SH	-
Githopsis specularioides	common bluecup	S	S2S3	-
Hackelia diffusa var. diffusa	diffuse stickseed	T	S2	-
Isoetes nuttallii	Nuttall's quillwort	S	S2	-
Juncus hemiendytus var. hemiendytus	dwarf rush	T	S1	-
Juncus kelloggii	Kellogg's rush	E	S1	-
Juncus uncialis	inch-high rush	T	S2	-
Lasthenia glaberrima	smooth goldfields	T	S1	-
Leptosiphon bolanderi	Baker's linanthus	S	S2	-
Leymus flavescens (Elymus flavescens)	yellow wildrye	S	S1	-
Liparis loeselii	bog twayblade	E	S1	-
Lipocarpha aristulata	halfchaff awned sedge	T	S1S2	-
Lomatium laevigatum	smooth desert-parsley	T	S2S3	-
Lomatium suksdorfii	Suksdorf's desert-parsley	S	S3	-
Lomatium tamanitchii	ribseed biscuitroot	S	S2	-
Meconella oregana	white meconella	E	S1	-
Mimetanthe pilosa	false monkeyflower	S	S1	-
Minuartia pusilla	annual sandwort	T	S1	-
Montia diffusa	branching montia	S	S2	-
Myosurus clavicaulis	Mousetail	T	S2	-
Navarretia tagetina	marigold navarretia	T	S1	-
Nicotiana attenuata	coyote tobacco	S	S2	-
Oenothera cespitosa ssp. cespitosa	caespitose evening-primrose	S	S2	-
Oenothera cespitosa ssp. marginata	tufted evening-primrose	T	S1	-
Ophioglossum pusillum	Adder's-tongue	S	S2	-
Orobanche californica ssp. grayana	California broomrape	E	S1	-
Orthocarpus bracteosus	rosy owl-clover	T	S2	-
Oxalis suksdorfii	western yellow oxalis	T	S1	-
Penstemon barrettiae	Barrett's beardtongue	T	S2	-

Scientific Name	Common Name	State Status	State Rank	Federal Status
Penstemon deustus var. variabilis	hot-rock penstemon	T	S1	-
Penstemon eriantherus var. whitedii	Fuzzy tongue penstemon	T	S2	-
Polygonum parryi	Parry's knotweed	T	S1	-
Potentilla newberryi	Newberry's cinquefoil	X	SH	-
Ranunculus hebecarpus	downy butter-cup	T	S1	-
Ranunculus triternatus	obscure buttercup	E	S1S2	-
Rorippa columbiae	Persistent sepal yellowcress	T	S1S2	-
Rotala ramosior	lowland toothcup	S	S2	-
Salix sessilifolia	soft-leaved willow	S	S2	-
Scribneria bolanderi	Scribner's grass	T	S1	-
Sisyrinchium sarmentosum	pale blue-eyed grass	T	S2	-
Spiranthes porrifolia	western ladies' tresses	S	S2	-
Utricularia intermedia	flat-leaved bladderwort	S	S2S3	-
Veratrum insolitum	Siskiyou false hellebore	E	S1	-
Wyethia angustifolia	California compassplant	S	S1	-
Zeltnera muehlenbergii	Monterey centaury	T	S1	-

Source: Washington State Department of Natural Resources Natural Heritage Program. 2018. 2018 Washington Vascular Plant Species of Special Concern. <https://www.dnr.wa.gov/publications/amp_nh_vascular_ets.pdf?57fgnc >. Accessed 11 December 2018.

- = No listing

State Status

State Status of plant species is determined by the Washington Natural Heritage Program. Factors considered include abundance, occurrence patterns, vulnerability, threats, existing protection, and taxonomic distinctness. Values include:

E = Endangered. In danger of becoming extinct or extirpated from Washington.

T = Threatened. Likely to become Endangered in Washington.

S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state.

X = Possibly extinct or Extirpated from Washington.

R1 = Review group 1. Of potential concern but needs more field work to assign another rank.

R2 = Review group 2. Of potential concern but with unresolved taxonomic questions.

State Rank

Washington State Department of Natural Resources Natural Heritage Program uses the ranking system developed by NatureServe to assess global and state conservation status of each plant species, subspecies, and variety.

S1 = Critically Imperiled – at very high risk of extirpation due to very restricted range, very few occurrences, very steep declines, very severe threats, or other factors

S2 = Imperiled – at high risk of extirpation due to restricted range, few occurrences, steep declines, severe threats, or other factors

S3 = Vulnerable – at moderate risk of extirpation due to a fairly restricted range, relatively few occurrences, recent and widespread declines, threats, or other factors

S4 = Apparently secure – at fairly low risk of extirpation due to an extensive range or many occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors

S5 = Secure – at very low risk of extirpation due to a very extensive range, abundant occurrences, and little to no concern from decline or threats

SH = Historical– known from only historical occurrences (prior to 1978) but still with some hope of rediscovery

SX = Presumed Extirpated – not relocated since 1978 despite intensive searches and virtually no likelihood of rediscovery

U = Unrankable – lack of information or substantially conflicting information about status
NR = Not Ranked – rank not assessed yet
Q = Questionable - questions exist about the taxonomic validity of a species, subspecies, or variety
? = Questionable – questions exist about the assigned G, T, or S rank of a taxon

Federal Status
Federal Status under the U.S. Endangered Species Act (USESA) as published in the Federal Register:
LE = Listed Endangered. In danger of extinction.
LT = Listed Threatened. Likely to become endangered.
PE = Proposed Endangered.
PT = Proposed Threatened.
C = Candidate species. Sufficient information exists to support listing as Endangered or Threatened.
SC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

Table 4.7-2: Sherman County, Oregon 2016 List of Rare, Threatened and Endangered Species

Scientific Name	Common Name	State Status	State Rank	Federal Status
Abronia mellifera	White sandverbena	-	SNR	-
Achnatherum hendersonii	Henderson ricegrass	C	S2	SOC
Allium robinsonii	Robinson's onion	-	SX	SOC
Ammannia robusta	An ammannia	-	SNR	-
Artemisia campestris var. wormskioldii	Northern wormwood	E	SX	-
Astragalus collinus var. laurentii	Laurence's milk-vetch	T	S1	SOC
Astragalus conjunctus var. conjunctus	Idaho milk-vetch	-	SNR	-
Astragalus conjunctus var. rickardii	Rickard's milk-vetch	-	SNR	-
Astragalus reventiformis	Long-leaved milk-vetch	-	SNR	-
Astragalus sclerocarpus	Stalked-pod milk-vetch	-	SNR	-
Cryptantha rostellata	Beaked cryptantha	-	SNR	-
Elymus lanceolatus ssp. psammophilus	Sand-dune wild-rye	-	SNR	-
Eriogonum thymoides	Thyme-leaved buckwheat	-	SNR	-
Erythranthe jungermannioides	Hepatic monkeyflower	C	S3	-
Hackelia diffusa var. cottonii	Creamy stickseed	-	S3	-
Heliotropium curassavicum	Salt heliotrope	-	S2	-
Juncus mexicanus	Mexican rush	-	SNR	-
Lomatium laevigatum	Smooth desert parsley	-	S3	-
Marsilea vestita	Hairy water-fern	-	SNR	-
Navarretia leucocephala ssp. leucocephala	White-flowered navarretia	-	S4	-
Orobanche ludoviciana ssp. ludoviciana	Louisiana broomrape	-	SNR	-
Pediocactus nigrispinus	Snowball cactus	-	S4	-
Penstemon acuminatus var. acuminatus	Sand dune penstemon	-	SNR	-
Penstemon deustus var. variabilis	Hot-rock penstemon	-	S1S2	-
Physaria douglasii ssp. douglasii	Columbia bladderpod	-	SNR	-
Spartina pectinata	Prairie cordgrass	-	SNR	-
Triglochin scilloides	Flowering quillwort	-	S3?	-

Sources:

OBIC 2016; USFWS 2018b

- = No listing

State Status
State status of plant species as determined by the Oregon Department of Agriculture
E = Endangered. Any native plant species determined by the director to be in danger of extinction throughout all or any significant portion of its range; or any plant species listed as an endangered species pursuant to the federal Endangered Species Act of 1973.
T = Threatened. Any native plant species the director determines is likely to become endangered within the foreseeable future throughout all or any significant portion of its range; or any plant species listed as a threatened species pursuant to the federal Endangered Species Act of 1973.
C= Candidate. Any plant species designated for study by the director whose numbers are believed low or declining, or whose habitat is sufficiently threatened and declining in quantity and quality, so as to potentially qualify for listing as a threatened or endangered species in the foreseeable future

State Rank
The most widely used NatureServe rank in the United States are the State Ranks, which describe the rarity of a species within each state's boundary.
S1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences.
S2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.
S3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences.
S4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.
S5 = Demonstrably widespread, abundant, and secure.
SH = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered.
SX = Presumed extirpated or extinct.
SU = Unknown rank.
SNR = Not yet ranked or assigned rank is uncertain.

Federal Status
Federal Status under the U.S. Endangered Species Act (USESA) as published in the Federal Register:
LE = Listed Endangered. In danger of extinction.
LT = Listed Threatened. Likely to become endangered.
PE = Proposed Endangered.
PT = Proposed Threatened.
C = Candidate species. Sufficient information exists to support listing as Endangered or Threatened.
SOC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

Special Status Species within the Project Vicinity

The Applicant performed an analysis of suitable habitat and known occurrences for the Klickitat County species listed in Table 4.7-1 and determined that 14 of the Klickitat County species have the potential to occur in the Project vicinity. Suitable habitat in Sherman County was not assessed during the 2015 vegetation study, but it could be assessed as needed for the transmission portion of the project.

Table 4.7-3 provides details on the 14 federal- and state-listed endangered, threatened, and sensitive species with the potential to occur in the vicinity of the study area. Of these, Wormskiold's northern wormwood (*Artemisia campestris* var. *wormskioldii*), California broomrape (*Orobanche californica* ssp. *grayana*), and obscure buttercup (*Ranunculus triternatus*) are listed as state endangered; few-flowered collinsia (*Collinsia sparsiflora* var. *bruceae*), inch-high rush (*Juncus uncialis*), Douglas' draba (*Cusickiella douglasii*), smooth desert-parsley (*Lomatium laevigatum*), smooth goldfields *(Lasthenia glaberrima),* and hot-rock penstemon (*Penstemon deustus* var. *variabilis*) are listed as state threatened; and common bluecup (*Githopsis specularioides*), Baker's linanthus (*Leptosiphon bolanderi),* Nuttall's quillwort (*Isoetes nuttallii*), and western ladies' tresses (*Spiranthes porrifolia*) are listed as state sensitive.

Within 3 miles of the potential Project study area, the WNHP has recorded two occurrences of smooth desert-parsley, as shown on Figure 4.7-1, filed as privileged. The plants are located on steep, rocky talus slopes to the west of the study area and are unlikely to be impacted by potential Project activities. ERM confirmed the presence of smooth desert-parsley during the 2015 area visit, as described below.

Table 4.7-3: Klickitat County sensitive plant species potentially occurring within the Project vicinity.

Common Name	Scientific Name	Federal Status	State Status	Habitat Requirements
Baker's linanthus	*Leptosiphon bolanderi*	--	Sensitive	Dry, rocky, partially vegetated slopes, scattered basalt rocks, bare mineral soil; elevations 260-550 meters; associated with Oregon white oak (DNR 2014b).
California broomrape	*Orobanche californica ssp. grayana*	--	Endangered	Vernally moist meadows and lower montane meadows, parasitic on sagebrush, elevations sea level to 450 meters (DNR 2014b).
Common bluecup	*Githopsis specularioides*	--	Sensitive	Dry open thin soils over bedrock outcrops, grassy balds, talus slopes, and gravelly prairies at low elevations; adjacent to forest; can be associated with Oregon white oak (WNDR 2014).
Douglas' draba	*Cusickiella douglasii*	--	Threatened	Open rocky ridges on thin, sandy to gravelly soil over basalt, elevations 790-860 meters (DNR 2014b).
Few-flowered collinsia	*Collinsia sparsiflora var. bruceae*	--	Threatened	Thin soils over basalt on south-facing slopes; moist in spring, dry in summer; elevations 60–730 meters (DNR 2014b).
Hot-rock penstemon	*Penstemon deustus var. variabilis*	--	Threatened	Dry foothills and lowlands, open dry thin soils over basalt, elevations 500–1000 meters (DNR 2014b).
Inch-high rush	*Juncus uncialis*	--	Threatened	Vernal pools and pond edges, channeled scablands, and biscuit-swale topography; elevations 90–760 meters (DNR 2014b).

Common Name	Scientific Name	Federal Status	State Status	Habitat Requirements
Nuttall's quillwort	*Isoetes nuttallii*	--	Sensitive	Seasonally wet ground, seepages, temporary streams, mud near vernal pools; elevations 60–405 meters (DNR 2014b).
Obscure buttercup	*Ranunculus triternatus*	--	Endangered	Meadow steppe, north-facing slopes, and basalt ridges in loess deposited soil; elevations 580–1220 meters (DNR 2014b).
Smooth goldfields	*Lasthenia glaberrima*	----	Threatened	Vernal ponds on basalt tablelands where the area is wet in winter and dry by late spring (DNR 2014b).
Smooth desert-parsley	*Lomatium laevigatum*	--	Threatened	Ledges and crevices of basalt cliffs on Columbia River, adjacent rocky slopes of sagebrush steppe; elevations 50–300 meters (DNR 2014b).
Suksdorf's desert-parsley	*Lomatium suksdorfii*	--	Sensitive	Open dry rocky hillsides on slopes; elevation 90–1100 meters; associated with Oregon white oak (DNR 2014b).
Western ladies' tresses	*Spiranthes porrifolia*	--	Sensitive	Wet meadows, bogs, streams, and seepage slopes; elevations 3–2075 meters (DNR 2014b).
Wormskiold's northern wormwood	*Artemisia campestris var. wormskioldii*	-	Endangered	Arid shrub steppe on basalt, usually flat terrain, floodplain of Columbia River (DNR 2014b).

Source: WNHP 2018

Note:

-- = not listed

Figure 4.7-1: Rare Plant Populations (DNR 2014a), Filed as Privileged Information

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4.7.1.3 Wildlife Resources

USFWS maintains a list of wildlife species protected or considered for protection under the ESA that may occur in Klickitat County, Washington and Sherman County, Oregon (USFWS 2018a, b). WDFW maintains lists of priority species that require protective measures for their survival due to their population status, sensitivity to habitat alteration, and/or recreational commercial, or tribal importance. Priority species include state threatened, endangered, or candidates for listing, as well as animal aggregations considered vulnerable, and vulnerable species of commercial, recreational, or tribal importance. ODFW lists their strategy species, which are species of greatest conservation need. Federal species of concern are identified by USFWS but do not receive protection under the ESA. These species have potentially declining populations and could require additional management or protection in the future. Additionally, native birds in the United States are protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

WDFW and ODFW list four species of amphibians, seven species of reptiles, 30 species of birds and raptors, 19 mammals (including bats) and four invertebrates as either federally-listed (endangered, threatened, species of concern, or candidate) and/or state-listed (endangered, threatened, sensitive or candidate) within Klickitat County, Washington and Sherman County, Oregon (Table 4.7-4; WDFW 2018a, USFWS 2018a, WDFW 2018b, WDFW 2018c, ODFW 2018, OBIC 2016, USFWS 2018b).

Federally Listed Species

Of the species federally listed for the counties, only one is listed as federally endangered: the gray wolf (*Canis lupus*). Four species are federally listed as threatened: the northern spotted owl (*Strix occidentalis*), yellow-billed cuckoo (*Coccyzus americanus*), Canada lynx (*Lynx canadensis*), and Oregon spotted frog (*Rana pretiosa*). The northern spotted owl, yellow-billed cuckoo, Canada lynx, and Oregon spotted frog are unlikely to occur in the Project boundary because their habitat is not present. The gray wolf could be present in the Project vicinity because they are habitat generalists. All others species are listed as federal candidate species or federal species of concern. Of these candidate species and species of concern, several have potential habitat within the Project vicinity or have been observed in the study area (see Table 4.7-4).

State-Listed Species

Of the state listed species for the counties, 7 species are listed as state endangered, 5 are listed as state threatened, 30 are listed as state candidate, and 42 are listed as state sensitive; however, many of the species are counted multiple times here because they are listed differently in Washington versus Oregon (see Table 4.7-4).

Table 4.7-4: Federal and State-Listed Wildlife Species for Klickitat County, Washington and Sherman County, Oregon Potentially Occurring in the Project Boundary

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Potential to Occur in the Project Boundary
Birds						
American peregrine falcon	*Falco peregrinus anatum*	Co	--	S	Historic populations have been reported along the Columbia River basin in the Project boundary. The species has been observed in the Project vicinity.	Yes
Bald eagle	*Haliaeetus leucocephalus*	Co	--	S	Bald eagles breed from central Alaska across Canada. Breeding populations are also found locally throughout the United States. Bald eagles are found primarily near coastlines, rivers, reservoirs, and lakes. Bald eagles principally eat fish, but also feed on carrion, waterfowl, and small mammals. They use large trees as nest sites and hunting perches. Bald eagles winter throughout much of the United States and are documented along the Columbia River basin. They have been observed in the Project vicinity.	Yes
Black-backed woodpecker	*Picoides arcticus*	--	C	S	They prefer boreal and montane coniferous forests with burned trees (Cornell 2015).	No
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	Co*	--	S	Potential habitat present in the Project boundary; bunchgrass prairies with deciduous shrubs and trees (ODFW 2019)	Yes
Common nighthawk	*Chordeiles minor*	--*	--	S	Potential habitat present in the Project boundary; sagebrush, prairies, plains, grasslands, and open forests (Cornell 2015)	Yes
Ferruginous hawk	*Buteo regalis*	Co*	T	S	Breed in grasslands, sagebrush, shrublands, edges of pinyon-juniper forests (Cornell 2015). The species has been observed in the Project area or vicinity.	Yes
Flammulated owl	*Otus flammeolus*	--	C	S	The species breeds in open pine forests in mountains, and prefers ponderosa pine (Cornell 2015).	Yes
Golden eagle	*Aquila chrysaetos*	--	C	--	Breeding populations are found in eastern and western Washington, and golden eagles migrate in winter from nesting populations in Canada and Alaska. Golden eagles are known to occur within or near the Project boundary, with a known nest located to the west of the proposed lower reservoir location.	Yes
Grasshopper sparrow	*Ammodramus savannarum*	--*	--	S	Potential habitat present in the Project boundary; grasslands, prairies, little to no shrub cover (Cornell 2015)	Yes
Greater sage-grouse	*Centrocercus urophasianus*	C	T	S	They occur in sagebrush steppe (Cornell 2015); however, there are only a few isolated populations and they only occur in Grant and Kittitas counties, WA.	No
Lewis' woodpecker	*Melanerpes lewis*	Co	C	S	They breed in ponderosa pine forests or oak/pinyon-juniper woodlands. When not breeding, they occur in cottonwoods near streams, orchards, and oak woodlands (Cornell 2015). They have been observed in the Project vicinity.	Yes

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Potential to Occur in the Project Boundary
Loggerhead shrike	*Lanius ludovicianus*	--	C	S	A breeding resident of shrub-steppe ecosystems; this species has been observed in the Project vicinity.	Yes
Long-billed curlew	*Numenius americanus*	--*	--	S	Potential habitat present in Project boundary; summer in sparse short grasses, prairies (Cornell 2015)	Yes
Mountain quail	*Oreortyx pictus*	Co*	--	S	Potential habitat present in Project boundary; shrubby mountainous areas (Cornell 2015).	Yes
Northern goshawk	*Accipiter gentilis*	Co	C	S	They nest in mature and old-growth forests with >60% closed canopy; they may hunt in more open habitat such as sagebrush steppe (Cornell 2015)	No
Northern spotted owl	*Strix occidentalis caurina*	T	E	T	They prefer old growth forest with abundant logs, standing snags, and live trees with broken tops; these forests are typically 150-200 years old (USFWS 2018c). These habitats do not occur in the Project area (WDFW 2018a).	No
Olive-sided flycatcher	*Contopus cooperi*	Co	--	S	They occur in montane and northern coniferous forests (Cornell 2015).	No
Pileated woodpecker	*Dryocopus pileatus*	--	C	S	They occur in nearly every type of woodland and can be found in suburban areas (Cornell 2015).	Yes
Sage thrasher	*Oreoscoptes montanus*	--	C	--	Breed exclusively in shrub-steppe habitats, generally dominated by big sagebrush; require dense ground cover (Cornell 2015)	Yes
Sagebrush sparrow	*Artemisiospiza nevadensis*	--	C	--	Breed in shrub-steppe of shrubs up to 6-feet tall, can nest in sagebrush-juniper habitat bordering sagebrush steppe; in winter migration use dry shrublands or grasslands (Cornell 2015)	Yes
Sandhill crane	*Grus canandensis*	--	E	--	Breed in open wetland habitats, nest in marshes/bogs, non-breeders prefer open grassy areas (Cornell 2015)	No
Swainson's hawk	*Buteo swainsoni*	--*	--	S	Potential habitat present in Project boundary; open areas for foraging, prairie, grassland (Cornell 2015)	Yes
Vaux's swift	*Chaetura vauxi*	--	C	--	They nest in coniferous or mixed forest and forage in forest openings near streams (Cornell 2015).	No
Western bluebird	*Sialia mexicana*	--*	--	S	Potential habitat present in Project boundary; open woodlands, edges of woods, disturbed areas (Cornell 2015)	Yes
Western burrowing owl	*Athene cunicularia hypugaea*	Co*	C	S	Open treeless areas with low sparse vegetation, grasslands, deserts, steppe environments (Cornell 2015)	Yes
Western grebe	*Aechmophorus occidentalis*	--	C	--	Breed on freshwater lakes and marshes; in winter move to saltwater bays or estuaries (Cornell 2015)	No
Western meadowlark	*Sturnella neglecta*	--*	--	S	Potential habitat present in Project boundary; open grasslands, prairies, meadows (Cornell 2015)	Yes

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Potential to Occur in the Project Boundary
White-headed woodpecker	*Picoides albolarvatus*	Co*	C	S	They occur in montane coniferous forests dominated by pine (Cornell 2015) and are known to associate with ponderosa pine.	Yes
Yellow-billed cuckoo	*Coccyzus americanus*	T	C	S	Wooded habitat with dense cover and nearby water (Cornell 2015).	No
Yellow-breasted chat	*Icteria virens*	Co*	--	S	Potential habitat present in Project boundary; dense shrubbery like blackberry bushes, shrub-steppe (Cornell 2015)	Yes
Mammals						
Black-tailed jackrabbit	*Lepus californicus*	--	C	S	Shrubsteppe and grassland habitats of the semi-arid Columbia Plateau, extending into Oregon (WDFW 2012)	Yes
Canada lynx	*Lynx canadensis*	T	--	--	Boreal forests, rarely dry lowland forests (WDFW 2012)	No
Cascade red fox	*Vulpes cascadensis*	--	C	--	Subalpine and alpine habitat (WDFW 2012)	No
Fisher	*Martes pennanti*	C	E	S	This species only occurs on the Olympic Peninsula; it was reintroduced there after being extirpated from Washington (WDFW 2012).	No
Gray wolf	*Canis lupus*	E	E	--	They are habitat generalists and can occur all over Washington (WDFW 2012).	Yes
Hoary bat	*Lasiurus cinereus*	Co	--	S	Mostly forest associated, can occur in open areas like grasslands (WDFW 2013)	Yes
Long-legged myotis	*Myotis volans*	Co	--	S	Mostly occur in coniferous forests, moist or dry, but also occur in riparian forests and dry rangeland (WDFW 2013)	Yes
Pacific Townsend's big-eared bat	*Corynorhinus townsendii*	--	C	S	Broad range of arid to moist habitats, lowland conifer-hardwood forest, montane conifer forest, ponderosa pine forest/woodland, shrub-steppe, riparian areas, and open fields (WDFW 2012)	Yes
Pallid bat	*Antrozous pallidus*	Co	--	S	Prefers drier areas like shrub-steppe, deserts, canyons, and dry coniferous forest, can occur in oak woodland; commonly associated with cliffs, rock outcrops and water sources (WDFW 2013)	Yes
Pallid Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	--	C	S	Unknown—little data available	Unknown
Preble's shrew	*Sorex preblei*	--	C	--	Open areas, woodlands, and forests; occurs in southwest Washington (UW 2018)	Yes
Silver-haired bat	*Lasionycteris noctivagans*	Co	--	S	Forests and riparian zones; may occur in shrub-steppe areas during migration (WDFW 2013)	Yes
Spotted bat	*Euderma maculatum*	Co*	--	S	Dry climates, roost in high cliffs; occur in eastern Oregon, Columbia Plateau, east Cascades (ODFW 2019)	Yes

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Potential to Occur in the Project Boundary
Townsend's ground squirrel	*Spermophilis townsendii*	--	C	--	Shrub-steppe, grasslands, pastures; found in eastern Klickitat County (WDFW 2012)	Yes
Western grey squirrel	*Sciurus griseus*	--	T	S	They have a distribution that is closely correlated with Oregon white oak habitat in Washington, probably due to squirrels' dependence on acorns as a winter food source. Known populations of western gray squirrel exist in the oak woodlands to the northeast of the study area (WDFW 2014b). This is a WDFW priority species that could occur within the Project area because its habitat is present.	Yes
Western small-footed myotis	*Myotis ciliolabrum*	Co*	--	--	Dry climates, cliffs and rocks, forage along cliff faces; occur east of the Cascades in Oregon (ODFW 2019)	Yes
White-tailed jackrabbit	*Lepus townsendii*	--	C	S	Prairies and the semi-arid portions of the Columbia Plateau (WDFW 2012)	Yes
Wolverine	*Gulo*	C	C	T	Arctic, alpine, subalpine habitats (WDFW 2012)	No
Yuma myotis	*Myotis yumanensis*	Co*	--	--	Associated with water but occurs all over Oregon (ODFW 2019)	Yes
Invertebrates						
Columbia Oregonian (snail)	*Cryptomastix hendersoni*	--	C	--	Seeps, spring-fed streams, east portion of Columbia River Gorge, under rocks and vegetation, can occur in hemlock forests and upland locations (Duncan 2005)	Yes
Juniper hairstreak	*Mitoura grynea barryi*	--	C	--	Old fields, bluffs, barrens, juniper and pinyon-juniper woodlands, and cedar breaks (Butterflies and Moths of North America 2018)	Yes
Mardon skipper	*Polites mardon*	Co	E	--	Historic records come from Thurston, Klickitat, and Yakima counties in Washington. Its range is recently reported to be increasing. In 2011, a total of 111 sites were recorded in Washington State, with six sites in the Goldendale area. Depends on prairie grassland habitat (WDFW 2014c). This is a WDFW priority species that could occur within the Project area because its potential habitat is present.	Yes
Oregon snail (Dalles sideband)	*Monadenia fidelis minor*	Co*	C	--	Talus habitat, seasonally moist rocky areas around seeps and springs, rocky areas, under bluffs around springs and riparian areas (Jordan and Black 2014)	No
Reptiles						
California mountain kingsnake	*Lampropeltis zonata*	--	C	--	Pine forests, oak woodlands, chaparral (ODFW 2019)	Yes
Northern sagebrush lizard	*Sceloporus graciosus*	Co*	C	S	Sagebrush, chaparral, juniper woodlands, coniferous forests (ODFW 2019)	Yes

Common Name	Scientific Name	Federal Status	WA State Status	OR State Status	Habitat Description	Potential to Occur in the Project Boundary
Painted turtle	*Chrysemys picta*	--*	--	S	Marshy ponds, small lakes, slow moving streams (ODFW 2019)	No
Sharptail snake	*Contia tenius*	--	C	--	Moist areas in coniferous forests, deciduous woodlands, chaparral, grasslands (ODFW 2019)	No
Striped whipsnake	*Masticophis taeniatus*	--	C	--	Shrub-steppe habitat; however, it is limited to the driest areas of the Central Columbia Basin (WDFW 2012)	Yes
Western pond turtle	*Actinemys marmorata*	Co	E	S	Slow moving streams, lakes, ponds, wetlands (WDFW 2012)	No
Western rattlesnake	*Crotalus oreganus*	--*	--	S	Deserts and chaparral to open forests in Oregon (ODFW 2019)	Yes
Amphibians						
Larch Mountain salamander	*Plethodon larselli*	--	S	S	Dependent on late-seral forest conditions, rocky substrate, moist microhabitats; they have been recorded in western Klickitat County (WDFW 2012).	No
Northern red-legged frog	*Rana aurora*	Co*	--	S	Cool damp forests, forested wetlands (ODFW 2019)	No
Oregon spotted frog	*Rana pretiosa*	T	E	S	They are very dependent on water bodies. They are almost always observed near a perennial water body with shallow water and emergent or floating aquatic vegetation (USFWS 2018d). These habitats do not occur in the Project area or Intake Pool as the surrounding perimeter of the Intake Pool is xeric habitat, lacking riparian cover and semi-aquatic habitat for amphibians	No
Western toad	*Anaxyrus boreas*	--	C	S	Potential habitat present in Project boundary; wide range of habitat, forests, mountain meadows, desert flats (ODFW 2019).	Yes

Sources: Butterflies and Moths of North America 2018; Cornell 2015; Duncan 2005; Jordan and Black 2014; OBIC 2016; ODFW 2018; ODFW 2019; USFWS 2018a; USFWS 2018b; USFWS 2018c; USFWS 2018d; UW 2018; WDFW 2012; WDFW 2013; WDFW 2014b; WDFW 2014c; WDFW 2018a; WDFW 2018c; WDFW 2018b

C = candidate; Co = species of concern; E = endangered; T = threatened; S = sensitive; -- = not listed

Notes:

Fully aquatic species such as fish and some invertebrates were not included in this table because no aquatic habitat will be disturbed as a result of this Project.

Species that Oregon considers conservation strategy species (but are not federally listed or Washington state-listed) were not included in this table; these include: Brewer's sparrow (*Spizella breweri breweri*), Caspian tern (*Hydroprogne caspia*), chipping sparrow (*Spizella passerina*), short-eared owl (*Asio flammeus flammeus*), American pika (*Ochotona princeps*), Columbia Gorge hesperian (snail) (*Vespericola depressa*), Dalles mountain snail (*Oreohelix variabilis variabilis*), monarch (*Danaus plexippus*), shortface lanx (*Fisherola nuttallii*).

*Species in the federal status column noted with asterisks were added to the table due to an Oregon state listing (OBIC 2016). However, the current federal statuses were not confirmed through online USFWS sources because of the timing of this PAD and the government shutdown; the USFWS website is down.

Note from PHS List (WDFW 2018a):

These are the species and habitats identified for Klickitat County. This list of species and habitats was developed using the distribution maps found in the PHS List (see http://wdfw.wa.gov/conservation/phs/). Species distribution maps depict counties where each priority species is known to occur as well as other counties where habitat primarily associated with the species exists. Two assumptions were made when developing distribution maps for each species:

1) There is a high likelihood a species is present in a county, even if it has not been directly observed, if the habitat with which it is primarily associated exists.

2) Over time, species can naturally change their distribution and move to new counties where usable habitat exists.

Distribution maps in the PHS List were developed using the best information available. As new information becomes available, known distribution for some species may expand or contract. WDFW will periodically review and update the distribution maps in PHS list.

4.7.2 Potential Resource Impacts

4.7.2.1 Fish and Aquatic Resources

There would be no impacts on special status fish species since none occur in surface waters potentially affected by Project construction or operations (intermittent waterbodies within the Project boundary and the Intake Pool).

4.7.2.2 Botanical

The Applicant's objectives are to minimize disturbance to wildlife and habitats and protect sensitive species in the Project area. Construction timing and methods would be planned in accordance with these goals. The Applicant would work closely with state and federal resource agencies to ensure that operation of the facility is also in accordance with these objectives. A draft comprehensive VMMP is included as Appendix D.

4.7.2.3 Wildlife

The Applicant's objectives are to minimize disturbance to wildlife and habitats and protect sensitive species in the Project area. Construction timing and methods would be planned in accordance with these goals. The Applicant would work closely with state and federal resource agencies to ensure that operation of the facility is also in accordance with these objectives. A comprehensive revegetation and wildlife habitat protection plan would be included with the License Application.

The western gray squirrel has been documented within oak habitats in the Project vicinity (WDFW 2015a). These habitats will not be directly affected by the proposed Project. The potential exists for dispersing individuals to experience road fatalities from maintenance or construction vehicle traffic. However, dispersal events are rare, and the presence of western gray squirrels is not expected within the Project area. Additionally, impacts on dispersing gray squirrels will be minimized by posting speed limits for construction and maintenance vehicles.

A draft comprehensive VMMP and WMP are included as Appendix D and C, respectively.

4.7.3 Applicant Recommendations

PM&E measures proposed for general wildlife and botanical resources (Section 4.5) would support protection and enhancement of special status species. These PM&E measures are further discussed in the draft VMMP (Appendix D) and WMP (Appendix C) and will be further developed in consultation with resource agencies during development of the license application.

4.8 Recreation and Land Use

The following section discusses recreation, land use, and land ownership in the proposed Project area that may be affected by the proposed Pumped Storage Project and associated facilities.

4.8.1 Existing Recreational Facilities and Use

As the Project would be on private lands, there are no public recreational opportunities in the Project area. Additionally, recreational opportunities in the Project area are limited by past and ongoing industrial uses, including the historical CGA smelter in the lower reservoir area and operational wind turbines in the upper reservoir area.

The nearest recreational opportunities to the Project are associated with scenic travel (State Route 14, which is a scenic highway, and the Columbia River, which is part of the National Historic Lewis and Clark Trail). Other nearby recreation opportunities are associated with the USACE's John Day Dam, and include facilities on both the Oregon and Washington sides of the river. These facilities provide for interpretation, fishing, primitive camping, picnicking, and boating.

Within a 10 mile radius of the Project, private lands are dominant; because of all of the private land, recreation opportunities are relatively limited. There are several parks (i.e., Goldendale Observatory, Goldendale Hatchery, Maryhill State Park, Railroad Island Park, Cliffs Park, LePage Park, and Giles French Park) within a 10 mile radius of the Project. Recreation facilities within 10 miles of the Project Area are listed in Table 4.8-1, displayed on Figure 4.8-1, and further discussed in this section. The nearest wild and scenic designated river in Washington to the Project is the Klickitat River, which is more than 30 miles. The wild and scenic designation for two rivers in Oregon, the Deschutes and John Day, are further than 10 miles from the Project area.

Table 4.8-1: Recreation Areas within 10 Miles of the Proposed Project Area

Name	Primary Activity	Operator	Comments
SR 14, Lewis and Clark Trail Highway	Viewing scenic, cultural, and historic landscapes	WSDOT	Scenic and Recreational Highway
National Historic Lewis and Clark Trail	Viewing scenic, cultural, and historic landscapes	National Park Service	Columbia River, no facilities
John Day Dam Recreation Facilities	Camping, fishing, and boating	USACE	
Cliffs Park, WA	Primitive camping, fishing	USACE	No fees, 14 day use limit
Railroad Island Park, WA	Boating, picnicking, fishing, wildlife viewing	USACE	
Giles French / John Day Dam Park, Oregon[1]	Primitive camping, fishing, boating, hiking	USACE	No fees, 14 day use limit
Lepage Park, Oregon	Camping, boating, fishing, beach access	USACE	Open April 1 – October 31, use fees
Philippi Park, Oregon	Boating, camping	USACE	Closed 2014 and 2015

Name	Primary Activity	Operator	Comments
Maryhill State Park	Camping, picnicking, boating, fishing, water sports, interpretive opportunities	DNR	Fees, reservations, open year-round
Goldendale Observatory State Park	Astronomy	Washington State Parks	
Oregon Trail	Viewing scenic, cultural, and historic landscapes	BLM	On public roads, no facilities
Goldendale Hatchery	Fishing, hunting, wildlife viewing	WDFW	Only street parking available

Sources: NPS 2015; NPS 2014a; Oregon State Parks 2014; USACE 2014; DNR 2014a; USACE 2018

BLM = Bureau of Land Management; DNR = Washington Department of Natural Resources; SR = State Route; USACE = U.S. Army Corps of Engineers; WDFW = Washington Department of Fish & Wildlife; WSDOT = Washington State Department of Transportation

Project: 0483340
Date: 1/18/2019
Created By: Kelly Lyons

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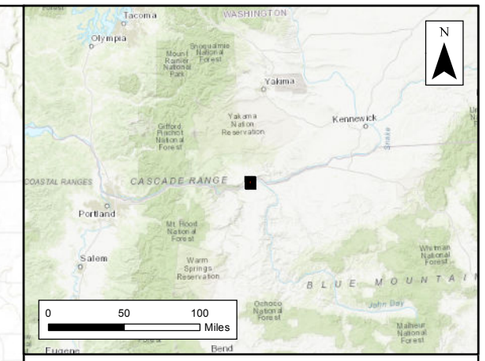
Soda Springs Wildlife Area
Mineral Springs Wildlife Area
Goldendale Trout Hatchery
Goldendale Observatory State Park
Brooks Memorial State Park
Klickitat Wildlife Area
Swale Creek Wildlife Area
Columbia Hills State Park
Gifford Pinchot National Forest
Mount Hood National Forest
Deschutes River State Recreation Area
Deschutes River State Scenic Waterway
Cliffs Park and Railroad Island Park
Le Page Park
Albert Philippi Park
Giles French / John Day Dam Park and Visitors Center
Maryhill State Park
John Day, Hilderbrand
Cottonwood Canyon State Park

MUNSON PRAIRIE
HORSESHOE BEND
KLICKITAT VALLEY
PLEASANT VALLEY
LUNA GULCH
HARRISON RIDGE
GLASS CANYON
COLUMBIA HILLS
THE BURN
SWALE CANYON
GORDON RIDGE
Centerville
Wasco
Rufus
Mill Creek
Blockhouse Creek
White Klickitat River
Little Klickitat River
Swale Creek
Rock Creek
China Hollow Creek
Columbia River Hwy
WASHINGTON
OREGON

0 3 6 Miles



Legend

- Paragliding Location
- Park
- State Hwy 14 - National Scenic Highway

National Historic Trails

- Oregon Trail
- Lewis and Clark Trail
- Wild and Scenic River
- Wild and Scenic Rivers Corridor (BLM)
- Army Corps of Engineers
- WA Dept of Fish and Wildlife
- WA State Parks and Rec. Com.
- WA Dept. of Natural Resources
- Forest Service
- Oregon State Park
- Proposed Project Boundary Vicinity (10 Miles)
- Proposed Project Boundary

Figure 4.8-1
Recreation Facilities Within 10 Miles of the Proposed Project Boundary
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
www.erm.com

M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 4.8-1 Recreation.mxd

Source: Esri - World Topographic Map; NAD 1983 StatePlane Washington South FIPS 4602 Feet

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4.8.1.1 Fishing and Hunting

Fishing is available in the Columbia River above and below John Day Dam. WDFW's website lists river access points, as well as, low- and high-elevation lakes for fishing by county. Within 10 miles of the Project area, no river access points or high-elevation lakes are listed, and John Day Reservoir (Lake Umatilla) is listed as a lowland lake with fishing opportunities (WDFW 2015d). WDFW lists typical species fished above the dam, including smallmouth bass, walleye, and other warm water species, as well as sturgeon, steelhead, American shad, and salmon (WDFW 2015d). Fishing is available on the Columbia River below John Day Dam as well, with access provided by USACE's recreational facilities associated with John Day Dam and Maryhill State Park. Additional fishing opportunities occur in the vicinity on the John Day and Deschutes River, and on other waterbodies accessed via private property.

Hunting is available on public and private lands within 10 miles of the Project area, and generally includes hunting for deer, waterfowl, small game, and game birds. One public hunting area managed by WDFW is within 10 miles of the Project area: a 240-acre wildlife unit adjacent to Goldendale Hatchery that is cultivated under a sharecrop agreement. Natural production of pheasants in District 9 is minimal, but approximately 400 pheasants are released at three sites in Klickitat County each year. The Goldendale Hatchery area is one such site (listed above in Table 4.8-1) approximately 9 miles east of the Project study area. A portion of the wheat produced is left in the fields to supplement upland game birds, and pen-reared pheasants are released for fall hunting. This area is also used for waterfowl hunting and trout fishing. Other hunting opportunities may exist on Bureau of Land Management (BLM) land in the areas surrounding the proposed Project footprint.

4.8.1.2 Boating and Watersports

As indicated in Table 4.8-1, plentiful boating opportunities are associated with the Columbia River near the proposed Project area. Opportunities for boating and water sports in the Project vicinity are mainly associated with the Columbia, John Day, and Deschutes Rivers. On the Columbia River, many of the recreational facilities associated with John Day Dam, as well as Maryhill State Park, provide boat launch and/or mooring facilities to facilitate fishing, boating, and various other water sports such as water skiing and sailboarding.

4.8.1.3 Astronomy

Goldendale Observatory State Park is located approximately 5 miles northwest of the proposed Project area and is situated on a 2,100-foot-elevation hilltop. This 5-acre facility is a certified Dark Sky Park and offers educational opportunities for viewing astronomical events. The interpretive center also offers programs about telescopes and star-gazing (Washington State Parks 2014b).

4.8.1.4 Paragliding

A private paragliding launch site, called "Cliffside Launch", is in the vicinity of the Project (shown on Figure 4.8-1). Private paragliders launching from this location would not land in the Project boundary. The Applicant met with Kelly Kellar the President of the Cascades Paragliding Association in December of 2018 to better understand paragliders use of the Cliffside Launch. The Project as proposed will not interfere with the use of Cliffside Launch nor will it interfere with local flyers. A summary of the correspondence is included in Appendix A.

4.8.1.5 Wild and Scenic Rivers

The John Day River's confluence with the Columbia River is less than 3 miles up-river from the John Day Dam, in Oregon, southeast from the proposed Project area. Its confluence with the Columbia River is less than 3 miles up-river from the John Day Dam. The John Day River system has designations under two river preservation programs: the National Wild and Scenic Rivers Act and the Oregon Scenic Rivers Act. Recreation activities on the John Day River and in the surrounding area include fishing, boating, swimming, hiking, and camping. This river is nationally known for its smallmouth bass and steelhead fishery (BLM 2014c).

The Deschutes River, also located in Oregon, is approximately 10 miles southwest of the proposed Project area. Upstream of the Project vicinity, the Lower Deschutes River is designated as a Wild and Scenic River, and the Deschutes River State Recreation Area offers visitors numerous opportunities for camping, hiking, horseback riding, wildlife viewing, and fishing. In addition, the river drops a quarter mile in elevation in its final 100 miles, which makes it a popular destination for those interested in whitewater rafting, kayaking, and inner-tubing (Oregon State Parks 2014).

4.8.1.6 National Historic Trails

The Oregon Trail is designated as a National Historic Trail (NHT) by the National Park Service (NPS). At its nearest distance from the proposed Project area, the Oregon Trail is approximately 7 miles away. Within this area, the trail generally runs east-west within privately-owned agricultural lands, south of the Columbia River in Oregon. At various points along the trail, visitors can learn about the history and culture of early American settlers that used the trail on their trek west (NPS 2014a).

The Lewis and Clark Trail consists of a loosely defined route along the Columbia River just south of the footprint of the proposed Project area (NPS 2015). This trail was designated as an NHT by Congress as part of the national trails system in 1978. In total, 330 miles of the 3,700 mile multi-state route are managed as part of BLM's National Conservation Lands. The portion of the trail near the proposed Project area is managed by BLM (BLM 2014d). It should be noted that the Lewis and Clark Trail is not generally defined by physical trail remains. The only tangible elements of the Lewis and Clark Trail near the proposed Project area are defined by the

Columbia River and river banks that the Lewis and Clark route followed. As such, agencies that work together to support the trail, including the NPS, attempt to provide recreationists with the historic setting of this route along the river way—comparable to the natural descriptions found in expedition journals.

4.8.1.7 State Scenic and Recreational Highway

State Route 14 (Lewis and Clark Trail Highway) is designated by the State of Washington as a Scenic and Recreational Highway. This designation reflects the importance of the scenic, cultural, and historic landscapes along this route as it relates to Lewis and Clark's trek along the Columbia River (WDOT 2014). The highway crosses the Project footprint between the proposed upper and lower reservoirs.

4.8.1.8 National Forest Land

A portion of the 1,312,000-acre Gifford Pinchot National Forest is located approximately 8 miles southwest of the proposed Project area. This National Forest land offers a variety of opportunities for wildlife viewing, hiking, boating, camping, fishing, and hunting, among others (USFS 2014a).

4.8.1.9 Other Federal and State Lands

Additional developed recreation facilities near the proposed Project area consist of various federally or state owned and operated parks (see Table 4.8-1). The primary recreational activities associated with these areas consist of camping, picnicking, boating, and fishing. Among these facilities, Maryhill State Park and Goldendale Observatory State Park offer some unique recreation opportunities.

Maryhill State Park, approximately 5 miles southwest of the proposed Project area, is a 99-acre camping park with 4,700 feet of waterfront on the Columbia River. Along with opportunities for picnicking, boating, fishing, and various other water sports, the area also provides interpretive opportunities with an art museum and a full-scale replica of Stonehenge in Wiltshire, England (Washington State Parks 2014a). Camping is also available at the USACE's recreational facilities at John Day Dam within 1 mile of the Project area.

Goldendale Observatory State Park is located approximately 5 miles northwest of the proposed Project area and is situated on a 2,100-foot-elevation hilltop. This 5-acre facility is a certified Dark Sky Park and offers educational opportunities for viewing astronomical events. The interpretive center also offers programs about telescopes and star-gazing (Washington State Parks 2014b).

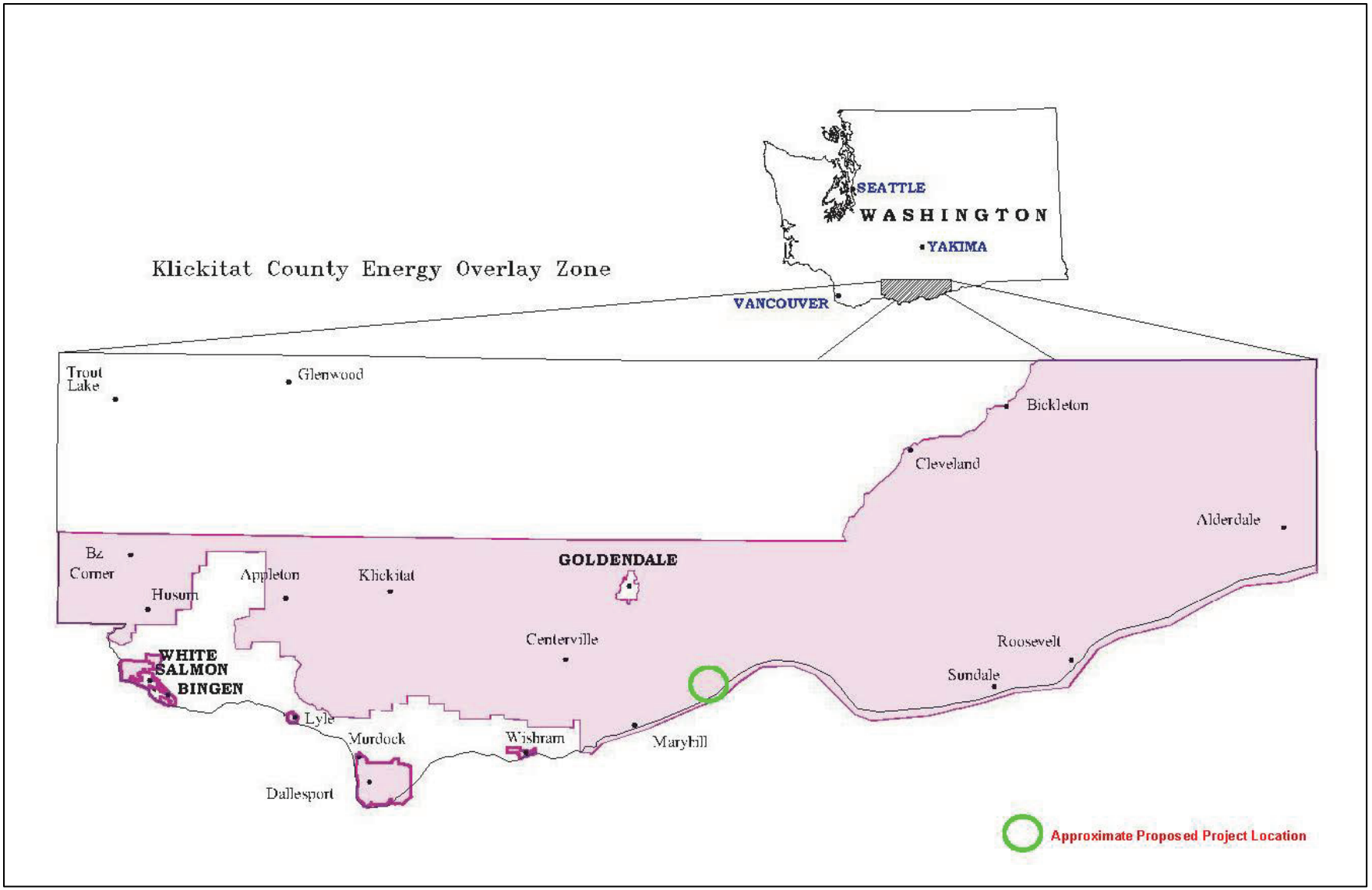
4.8.2 Existing Land Uses & Management

4.8.2.1 Zoning

Lands in the proposed Project area are primarily privately owned; however, USACE and Washington Department of Transportation also own land in the vicinity of the Project. Planning, zoning, land use, and development are regulated by the Klickitat County code (Klickitat County 2013). Three different zoning types exist within the proposed Project area:

- The lower reservoir area, including the CGA smelter lands, is classified as Industrial Park (IP). IP areas are areas suitable for the manufacture, distribution, and assembly of finished products that have relatively light impact on adjacent uses and districts.
- The upper reservoir area is primarily classified as Extensive Agriculture (EA). Lands zoned EA encourage the continued practice of farming on lands best suited for agriculture, and prevent or minimize conflicts between common agricultural practices and nonfarm uses.
- Lands between the upper reservoir and lower reservoir are classified as Open Space (OS). The OS classification is intended to conserve the open character of land, and to safeguard the health and safety of people by limiting the development in areas where safe conditions (ability of first responders to respond, protection against flooding or erosion, etc.) are not possible without excessive costs to the community.

The Project area falls within Klickitat County Energy Overlay Zone (EOZ) (Chapter 19.39 Klickitat County Code; Figure 4.8-2). The EOZ was established to designate areas suitable for the establishment of energy resource operations based on the availability of energy resources, existing infrastructure, and locations where energy projects can be sensitively sited and mitigated. Under this ordinance, siting criteria were established for the utilization of wind and solar energy resources. Each energy resource project would be subjected to individualized review and the imposition of conditions based on site-specific information, which would be tailored to address project impacts in accordance with the siting criteria. Although proposed energy projects can be sited within the EOZ without a conditional use process, project proponents are required to obtain all necessary local, state, and federal permits and approvals before starting construction. The renewable energy storage capabilities of the proposed Project are consistent with the intent of the EOZ and compatible with other uses of lands in this overlay zone.



Source: Klickitat County 2004

Figure 4.8-2: Klickitat County Energy Overlay Zone

4.8.2.2 Floodplains and Wetlands

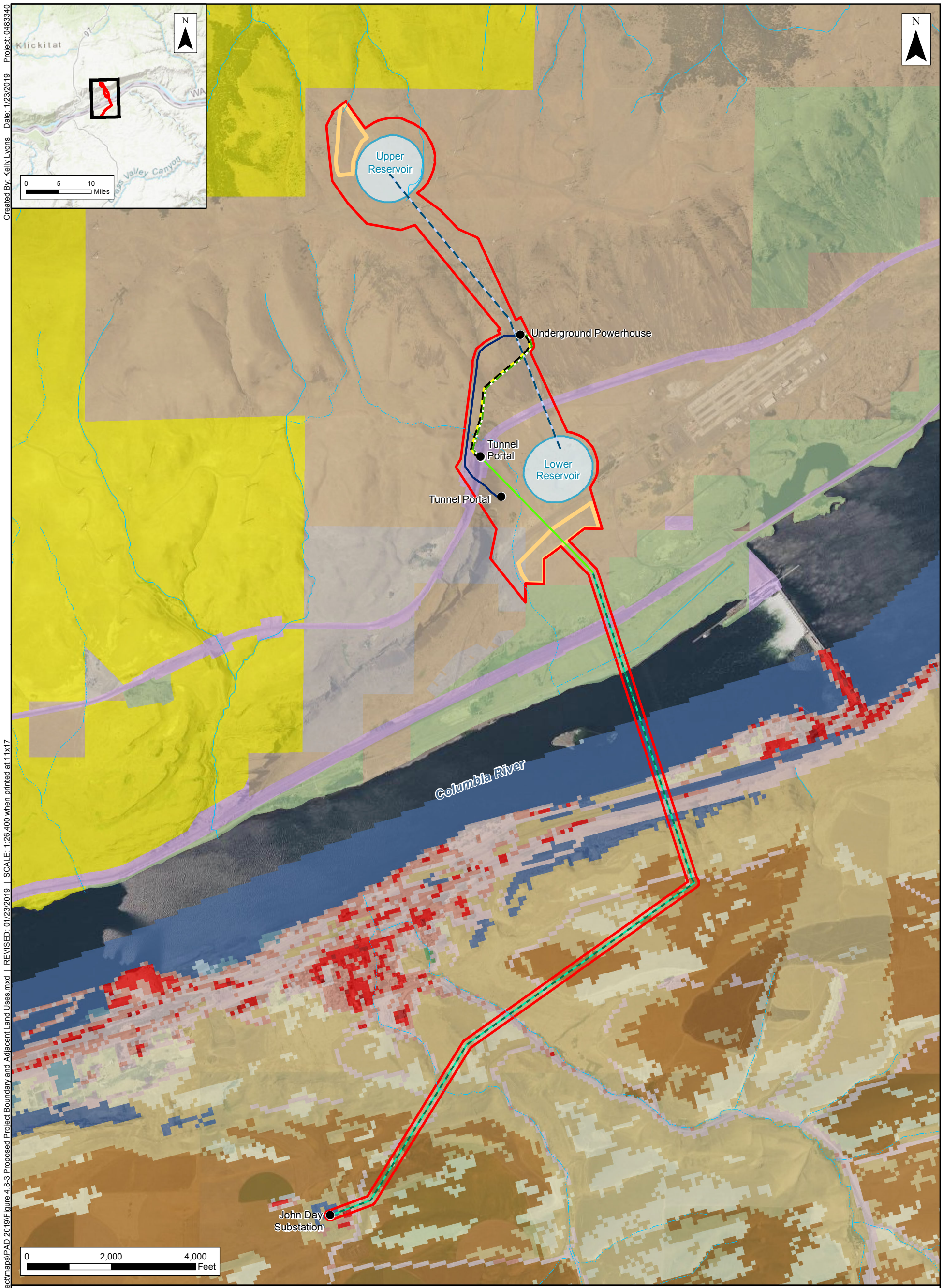
Based on a review of Federal Emergency Management Agency (FEMA) Q3 digital flood data for Klickitat County (FEMA 1998), the Project would be located in uplands, outside of FEMA floodplains.

Project area wetlands are discussed in Section 4.6.

4.8.2.3 Farmlands

Use of Project lands for cultivated agriculture is limited by soil types. A small portion of the Project area, to the west side of the lower reservoir, is classified as prime farmland if irrigated; however, cultivated agricultural values are otherwise limited (Ecology 2008). No other lands in the Project area are classified as farmlands. Agricultural uses of non-irrigated pasture lands occur in sage-steppe shrub and grasslands in the upper reservoir area.

Created By: Kelly Lyons Date: 1/23/2019 Project: 0483340



Legend

- Proposed Emergency Evacuation Tunnel
- Proposed High Voltage Transmission Line
- Proposed High Voltage Transmission Line (Underground)
- Proposed High Voltage Transmission Line Along Existing BPA Right-of-Way
- Proposed Underground Access Tunnel
- Proposed Underground Penstock
- Proposed Reservoir
- Temporary Construction Staging Area
- Proposed Project Boundary

Landuse (WA Ecology 2010)
- Single Family
- Utility-Trans
- Agriculture-classified
- Undeveloped
- Open Space

National Landcover Dataset (2011)
- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Deciduous Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Figure 4.8-3
Proposed Project Boundary and Adjacent Land Uses
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

Environmental Resources Management
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FILE: M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 4.8-3 Proposed Project Boundary and Adjacent Land Uses.mxd | REVISED: 01/23/2019 | SCALE: 1:26,400 when printed at 11x17

Source: ESRI World Topographic Web Mapping Service; NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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4.8.3 Potential Recreation and Land Use Resource Impacts

The Applicant's objectives are to minimize disturbances to and protect recreational resources and land use practices in the proposed Project area. Construction timing and methods would be planned in accordance with these objectives to the extent practicable. The Applicant would work closely with federal, state, and local agencies to ensure that construction activities and facility operation are in accordance with these objectives and are consistent with any associated management plans. In cases where temporary disturbance to identified recreational resources are significant and unavoidable, mitigation measures would be identified and implemented to reduce significant effects. If needed, recreation management measures will be developed and included in a VRRMP, which will be provided as a component of the license application.

The Project's location was selected due to the Project's compatibility with existing land uses and zoning, and it was designed to minimize greenfield development and disturbance to current and adjacent land use of the site. As public recreation facilities are not available inside the Project area, there would be no impacts to existing or future recreation inside the Project area during construction or operations. Furthermore, public access will not be provided to the Project area during construction and operations. Although land uses in the entire Project area are currently classified as undeveloped by the County, the lower reservoir area maintains remnant facilities from the CGA smelter, and the upper reservoir site is utilized for wind energy and non-irrigated agriculture (grazing). Project area and adjacent land uses are shown in Figure 4.8-3. After Project construction, the lower reservoir area would maintain its current industrial land uses. Land use in the upper reservoir area would change where the reservoir and associated facilities are constructed, but adjacent grazing uses would not change. In the area of the penstock where the Project would be constructed underground, the current land surface would not change due to Project construction.

Impacts to land use are minimized at the proposed Project location due to the following:

- The Project is compatible with the County's zoning designations. With its location inside the County's EOZ, the Project is consistent with the regulation's purpose of siting energy projects in areas with existing infrastructure and locations that can be sensitively managed. The Project supports generation of renewable energy resources, consistent with the purpose of the overlay zone and nearby wind and hydroelectric energy projects.
- Reuse of a brownfield site is preferred over the development of a greenfield area due to the relatively reduced potential for impacts to environmental and social resources.
- The Project is compatible with adjacent land uses (wind energy development and John Day Lock and Dam). Further, adjacent land uses including energy generation, agriculture, transportation, and undeveloped land would not be impacted by the proposed Project's construction or operations.

Water rights to be utilized for the proposed Project had past industrial use, which is consistent with their intended future use with the proposed Project. Impacts to recreation in the Project vicinity would be limited to construction traffic delays or noise affecting traveling recreationists due to Project use of public roads. The nearest recreational facility to the Project is USACE's Cliffs Park, a fishing access site with vault toilets and 14-day use permitted (primitive camping). The most direct vehicle access to the park is via John Day Dam Road between mileposts 108 and 109, which travels through the Project area. The increased use of John Day Dam Road by construction vehicles could temporarily impact recreation users and create travel delays or disturbances.

Additionally, recreational traffic on State Route 14, a scenic highway, could experience travel delays or disturbances during construction. Construction activities will cause moderate visual effects to observers from the Highway 97, Highway 14, and Interstate 84. These visual effects are further discussed in Section 4.9, Aesthetic Resources. Traffic during operations will not be at a level to impact other travelers.

All other existing recreation sites are several miles from the proposed Project area and, as a result, temporary or intermittent indirect impacts are expected to be minimal.

4.8.4 Applicant Recommendations

The Applicant aims to minimize the potential land use and recreation impacts of the Project and maintain the surrounding quality of the landscape. The Project's location within an EOZ is intentional and provides that the Project will be consistent with adjacent land use and intended use of the site.

An interpretive sign will be placed in an area near the Project that is accessible to the public and from where the Project can be viewed. The interpretive sign will display a map of the Project and provide information on pumped storage. Subject to further consultation with USACE, the interpretive sign could be placed on USACE-managed recreation lands in the proximity of the project.

The Applicant will coordinate construction schedules and any associated road closures with Washington State Department of Transportation and Klickitat County in order to prevent interruption to recreational traffic. Further, access to and from the construction site will be closed to the public.

A fencing plan and/or a public health and safety plan will be developed to protect public health and safety, safeguard the security of the hydropower generating facility, and prevent wildlife from entering the Project reservoirs and other features and becoming entrained or otherwise harmed. All of these objectives would be addressed together in this plan to provide a coherent presentation of the Applicant's plans for fencing and other restraints that will control public and wildlife access to the Project area. This plan would include the following components:

- Fencing around Project components;
- Signs warning the public of high voltage and other hazards, placed on the appropriate fence locations; and
- Locked gates and/or rock barricades may be installed to limit vehicle access by recreational users.

4.9 Visual Resources

4.9.1 Existing Environment

The proposed Project boundary and vicinity consists of the rolling terraces and rangeland in the hills above the Columbia River. The upper and lower reservoir areas have distinctly different visual settings. In the vicinity of the lower reservoir, the visual setting is dominated by current and historic industrial activities related to John Day Dam, BPA transmission corridors, and the former CGA smelter. The vicinity of the area associated with the upper reservoir is a mix of large areas of grasslands interspersed with wind turbine generators and an associated road network, as well as limited areas of oak woodlands (Figures 4.9-1, 4.9-2, and 4.9-3).

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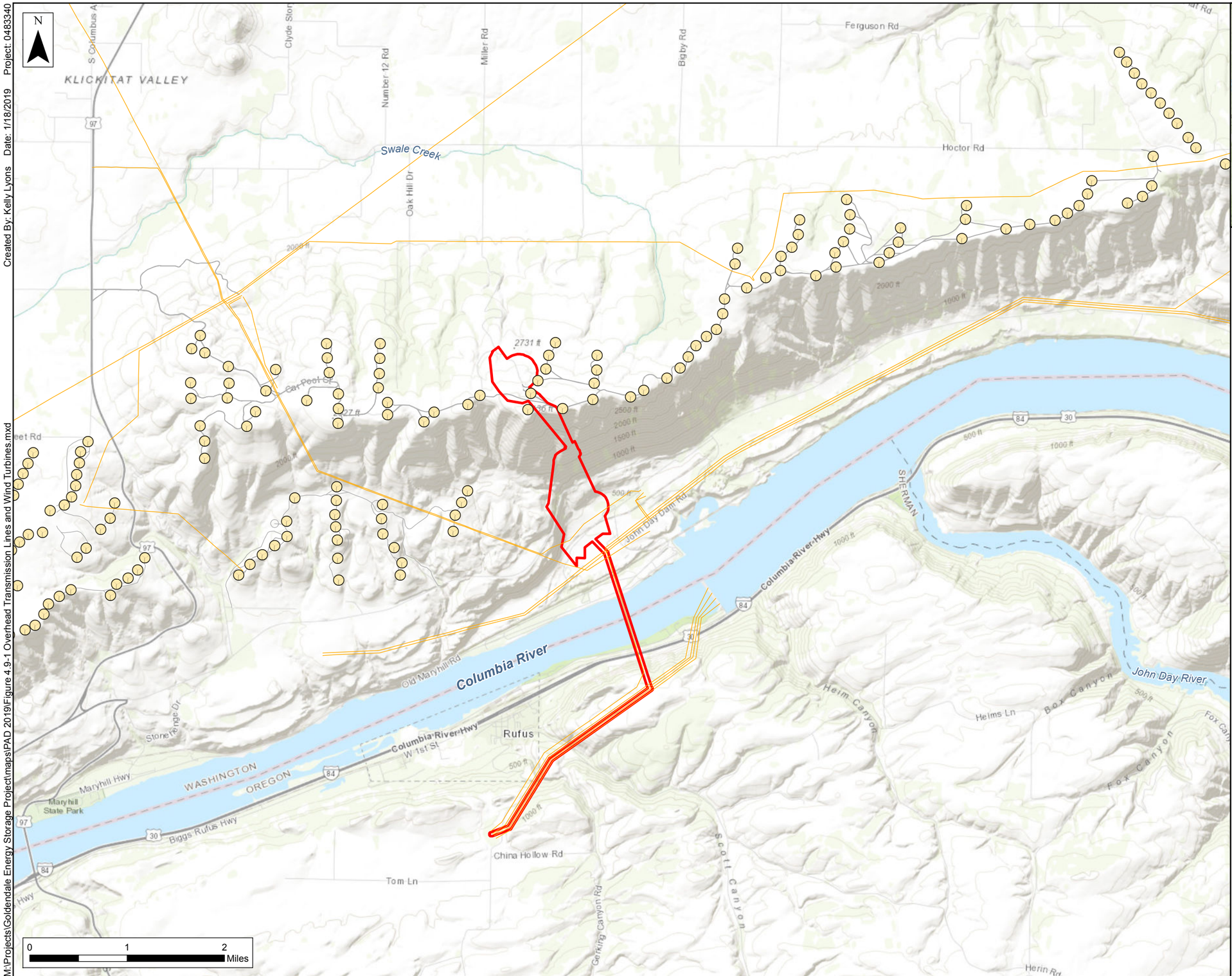
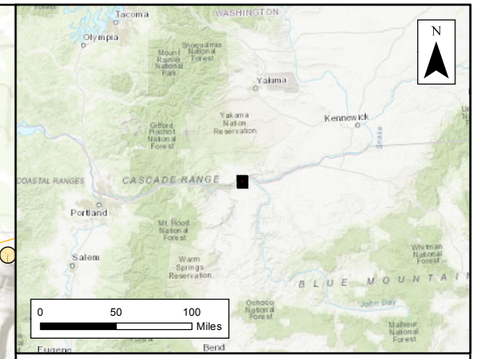
Created By: Kelly Lyons Date: 1/18/2019 Project: 0483340

M:\Projects\Goldendale Energy Storage Project\maps\PAD 2019\Figure 4.9-1 Overhead Transmission Lines and Wind Turbines.mxd





Legend

- Proposed Project Boundary
- Transmission Lines
- Wind Turbines

CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION (CEII) MATERIAL UNDER 18 CFR §388.113(c). DO NOT DISTRIBUTE.

Figure 4.9-1
Overhead Transmission Lines & Wind Turbines
Pre-Application Document
Goldendale Energy Storage Project
Goldendale, WA

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Source: ESRI World Topographic Web Mapping Service; NAD 1983 StatePlane Washington South FIPS 4602 Feet

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Figure 4.9-2: View of the Lower Reservoir Area from State Route 14

Figure 4.9-3: View in the Vicinity of the Proposed Upper Reservoir

Scenic designations in Klickitat County include two scenic roadways (State Route 14 and U.S. Highway 97) and the Columbia River Gorge National Scenic Area (CRGNSA). The CRGNSA is located approximately 10 miles west of the Project area. The 1986 CRGNSA Act assigned the U.S. Department of Agriculture Forest Service (USFS) and the Columbia River Gorge Commission management responsibility of the lands in the CRGNSA to protect and enhance the natural resources in the area (USFS 2014b). U.S. Highway 97 is approximately 8 miles west of the proposed Project area, with an average traffic count of 5,297 vehicles per day near its intersection with State Route 142 (WSDOT 2016). State Route 14, also referred to as the Lewis and Clark Highway, runs through the Project study area at the base of the Columbia Hills below the upper reservoir and adjacent to the lower plateau and the lower reservoir. Average daily traffic counts on State Route 14 east of its intersection with U.S. Highway 97 are 2,177 vehicles per day (WSDOT 2016). In addition to these scenic routes, approximately 15,500 vehicles per day travel along Interstate 84 (I-84) just south of the Columbia River, in the vicinity of the interchange with Oregon Highway 206 (ODOT 2018). The proposed Project area lies within the Klickitat County EOZ, and is subject to EOZ aesthetic ordinances, including:

- Minimizing security lighting;
- Directing lighting fixtures away from adjacent properties;

- Keeping facilities free of debris;
- Storing unused or damaged equipment offsite;
- Color restrictions/coordination; and
- Using non-reflective paint.

Washington State Department of Transportation (WSDOT) regulates scenic byways under the Scenic and Recreational Highway Act of 1967 (Revised Code of Washington [RCW] Chapter 47.39), with a focus on recognition, not regulation. Washington implements outdoor advertising controls, thus preserving the scenic quality of the roadside. The Federal Highway Administration's (FHWA) National Scenic Byway Program will only award transportation dollars to projects along routes that adhere to the Federal Highway Beautification Act of 1965. Federal law 23 United States Code [USC] 131 bans billboards along Federal Interstate and Federal-aid Primary routes designated as scenic byways. Locally, Washington's law is the Scenic Vista's Act enacted in 1971, RCW 47.42.

4.9.1.1 Visual Resource Assessment Overview

KPUD completed a visual resource assessment, including a review of the visual resources inventory process and a preliminary assessment of the visual impact of a potential pumped storage at the proposed Project location in 2015. Much of that information is relevant to the currently proposed Project. The features assessed included upper and lower reservoirs, a buried powerhouse, a buried transmission line, and a tunnel portal. The assessment was conducted in accordance with the BLM Visual Resource Management (VRM) Inventory and Contrast Rating System. The visual resource inventory and evaluation is relevant to the current stage of planning and design, which is still preliminary at this time. This 2015 study provides some of the baseline information needed to assess the visual impacts of the proposed Project.

4.9.1.2 Resource Issues and Receptors

An initial assessment of issues regarding potential impacts to visual resources within the Project vicinity are discussed in detail in Section 4.9.3. Long-term impacts are anticipated where portions of the Project infrastructure and features are visible from communities or residences, from recreation areas, or from culturally significant or sensitive viewpoints. Potential short-term construction and longer-term operation impacts from the Project include:

- Visibility from communities and individual residences;
- Visibility from recreation areas, preservation areas, and parks;
- Visibility from culturally significant sites;
- Visibility from transportation corridors;

- VRM impacts/compatibility with visual management designations; and
- Scenic or aesthetic quality impacts to the surrounding landscape.

Project infrastructure and features have the potential to alter the visual characteristics of the local landscape. Specifically, six groups of observers have been identified that could be affected by the construction and operation of the Project:

- Motorists on State Route 14;
- Motorists on Interstate Highway 84;
- Motorists on Interstate Highway 97;
- Motorists on Hoctor Road;
- Residents and landowners within the viewshed of the Project; and
- Temporary visitors to areas near or adjacent to the Project, including John Day Dam.

4.9.1.3 Inventory Methods

There are no prescribed methodologies for completing visual resource assessments in the Project area. As such, the 2015 visual resources inventory relied on methodologies promulgated by other management agencies, and by professional experience with aesthetic studies for hydropower projects. These same methods are proposed to be used in the 2019 visual resources study (Chapter 5). The most widely used methodologies in the United States for aesthetic resource studies have been developed by the BLM and the USFS. The BLM developed the VRM system (BLM 1984) as a way to characterize existing landscapes on lands under their jurisdiction, identify and evaluate scenic values, determine visual impacts from projects, and ultimately determine the appropriate level of management of visual resources on BLM lands.

The Project is not located on or near lands managed by the USFS or the BLM, but it is located near areas of land managed by the BLM in the Prineville District of Oregon State. Since no prescribed methodology exists for assessing visual resources within the Project viewshed, the BLM's system will continue to be used to assess visual resources in the Project area because (1) the nearest managed land is under BLM's jurisdiction and (2) the methodology is used for documenting visual resources in similar landscapes.

The following steps will be used to analyze the visual resources inventory on private and public lands in the Project viewshed. Steps that were completed in the 2015 study, and for which the data collected in 2015 is proposed to be utilized in 2019 are noted as complete:

- Review relevant agency management objectives and guidelines (complete).
- Complete a desktop viewshed analysis with field verification (to be updated in 2019).

- Collect photographs to document regional setting and landscape characteristics (complete).
- Develop visual simulations of proposed Project features (to be updated in 2019).
- Complete the visual resource assessment (to be updated in 2019).

4.9.1.4 Visual Resource Management Objectives and Guidelines

Visual Resource Management Classes

The BLM visual management objectives are the result of merging visual sensitivity, scenic quality, and Project visibility from viewpoints. The BLM divides lands into four VRM Classes for managing visual resources. These classifications delineate the amount of visual impact allowed in the preexisting landscape. VRM Classes have not been defined within the Project viewshed; however, the BLM's system is used for this assessment because the nearest managed land is under BLM's jurisdiction, as described above. Descriptions of BLM's four VRM Classes are provided in Table 4.9-1.

Table 4.9-1: Descriptions of BLM's Four VRM Classes

Class	Description of Acceptable Modifications to Landscape
Class I	The objective of this class is to preserve the existing character of the landscape. Very limited activities may occur. Level of change to landscape must be very low and not attract attention. Any changes should repeat predominant features found in the area's natural landscape.
Class II	The objective of this class is to retain the existing character of the landscape. Low levels of changes to the landscape are permitted. Changes should not attract attention to a casual observer. Any changes should repeat predominant features found in the area's natural landscape.
Class III	The objective of this class is to partially retain the existing character of the landscape. Moderate levels of changes to the landscape are permitted. Changes may attract attention but should not dominate the view to a casual observer. Any changes should repeat predominant features found in the area's natural landscape.
Class IV	The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape. High levels of changes to the landscape are permitted. Changes may dominate the view and be the focus of attention; however, attempts to minimize visual effects should be made. Examples of minimizing effects include careful location, minimal disturbance, and repetition of basic elements in the area's natural landscape.

Source: BLM 2019

Distance Zones

The BLM VRM system divides lands into three distance zones: foreground-middle ground, background, and seldom-seen. These zones are built on the scale and nature of the landscape being viewed, perception thresholds, and the viewing environment. Table 4.9-2 describes these zones and the boundaries between them.

Table 4.9-2: Distance Zone Description and Boundaries

Zone	Description of Acceptable Modifications to Landscape
Foreground/middle ground	These areas can be seen from a travel route and generally extend between 0 and 5 miles. The boundary between this distance zone and background is typically the point where form and texture details are no longer apparent.
Background	These areas can be seen from a travel route generally up to 15 miles. Distant lands only visible by form and outline should not be included in the background. Vegetation should be visible and at list distinguishable and light and dark patterns.
Seldom seen	These areas are not visible within the other two zones and includes areas beyond the background.

Source: BLM 2019

Visual Contrast

The BLM VRM system starts the visual contrast rating process by dividing landscapes into three groups: landform/water, vegetative, and structural. Typical landform/water features include geologic landforms, existing roads, mining facilities, landfills, water impounds, and gravel pits. Vegetative features include vegetative manipulations, grazing systems, agricultural fields, and timber harvests. Structural features include the buildings, transmission lines, water tanks, and recreation facilities. These groups are then described and analyzed based on form, line, color, and texture. Views from each of five Key Observation Points (KOPs) will be rated based on current landscape conditions and simulations of what the view would look like if the Project were to be built.

- **Form**: Mass and shape are used to describe form for the purposes of visual contrast. Mass is an object with volume that is contrasted against the surrounding landscape. An example of mass would be a large hill in an otherwise flat landscape. Shape is the contrast (in texture or color) of one area against an adjacent area, which creates a 2D shape to the viewer. An example of shape contrast would be a river flowing through a valley. Other elements are involved in analyzing form contrast including complexity, geometry, and orientation.

- **Line**: Edge is the most commonly used element to describe line contrast. There are many descriptive types of edge including butt edge, transitional edge, band, and diffuse edge. Complexity, boldness, and orientation are other elements involved in analyzing line contrast.

- **Color**: Hue, chroma, and value are the key elements used in describing color contrast. Hue is the color of the landscape, chroma is the deepness or brilliance of color, and value is the level of light or dark in a color. Variable effects play a role in all contrast elements but are more noticeable with color. Variable effects include distance direction of lighting, weather, and time of day.

- **Texture**: Light-shade and color combinations are used to describe texture contrast. Light-shade is the contrast created by variances in lighting on a surface or forms. Color combinations are small-scale color contrasts that give the appearance of texture. Density, grain, contrast, and regularity are other elements used to analyze texture contrast.

Visual Contrast Levels

The BLM VRM system designates four levels of visual contrast ratings: none, weak, moderate, and strong (Table 4.9-3). A score from 0 to 3 is applied to each level of visual contrast, which will be applied to each element of the group for a total contrast rating score.

Table 4.9-3. Acceptable Modifications to Landscape.

Level	Description of Acceptable Modifications to Landscape	Score
None	Contrast is not visible or perceived	0
Weak	Contrast can be seen however it does not attract attention to the viewer	1
Moderate	Contrast starts to attract attention to the viewer and starts to dominate the landscape character	2
Strong	Contrast attracts attention to the degree that it cannot be overlooked and also dominates the landscape character	3

Source: BLM 2019

Contrast Rating of Project Features

Engineering controls will be included during the design process, where practicable, to reduce contrasts visible between the existing landscape and the proposed Project from sensitive viewing areas.

During the 2015 visual resources study, a spring field survey was conducted to photograph existing conditions and fill out contrast rating worksheets for each KOP. These worksheets will be updated with the Goldendale Energy Storage Project design details in 2019 as a part of the visual resources study proposed in Chapter 5.

4.9.1.5 Viewshed Analysis

A viewshed analysis was completed by KPUD in 2015 to determine sensitive viewing areas where Project features may be able to be seen by individuals. Culturally significant and/or sensitive areas were field-verified by professionals with experience completing hydropower viewshed analyses to determine if Project features in the previous project design could actually be viewed from these locations. KOP locations were selected based on the following criteria:

- The location provides the most representative view of the Project for a given area and portion of the Project;
- The location provides the greatest potential number of receptors (i.e., potential viewers) that will be able to actually see the Project;
- The location is a relatively common and/or sensitive view within the study area that could be affected by the Project; and
- It is a relatively good location that can be used to measure anticipated change in visual resources resulting from the Project.

KOP locations differ by landscape analysis factors (i.e., distance from the Project, predominant angle of observation, dominant use, duration of view, and common or sensitive receptors).

An updated viewshed analysis is proposed as a part of the 2019 visual resources study.

4.9.1.6 Photograph and Video Documentation

Still photographs and live videos were collected in the field as a part of the 2015 study using a combination of Nikon D7100, an integrated Nikon Geographic Positioning System (GPS) unit, Nikon 24- to 70-millimeter (mm) zoom lens, Rode Stereo VideoMic Shotgun on-camera microphone, and a tripod with a swivel mount. The Nikon D7100 is a full-frame camera with a 1.5 crop factor.

Photo and video documentation was completed for each KOP by setting the tripod at the designated location for the particular KOP, and taking photographs in a minimum of three sweeping panoramas from left to right (top, middle, and lower) to cover the complete field of view (FOV) of the Project infrastructure and features visible from that particular vantage point. Images were recorded at a focal length of 34 mm (51 mm with 1.5 crop factor). The images were recorded in high resolution to allow large poster-size images to be printed later if required. Videos were collected at the 34 mm focal length (51 mm with crop factor of 1.5) in a locked position (lock-shot) to document conditions including sound at each KOP location. Additional landscape photographs were collected at various locations to capture views of the broader landscape, including mountains. The latter images are not intended to document the human eye FOV for the respective KOP locations, but rather to provide context to the broader background landscape surrounding the focus point of the KOP.

Field locations for each KOP were recorded using a hand-held GPS unit Garmin GPSMAP 62s and a combination of GPS-enabled digital camera (Nikon D7100). The integrated Nikon GPS unit was used to record the precise location of the KOP and direction of view for each photograph. Location data from the integrated GPS was used to correlate each photograph with the location from the handheld GPS unit, as well as site features identified on the maps and in the tables. Field data were also hand drawn on paper maps and recorded in a field notebook during the field event.

4.9.2 Visual Resource Baseline Information

4.9.2.1 Regional Setting

The Project visual resources study area contains many existing human modifications, including rural residences and communities, agricultural fields and structures, highways and other roads, substations, transmission lines, wind turbines, a large hydroelectric dam, and a liquefied natural gas (LNG) pipeline. Communities within a few miles of the Project viewshed include Rufus, Oregon (population 249), and Goldendale, Washington (population 3,485) (United States Census

Bureau 2018). The majority of the Project viewshed is privately owned by individuals and NSC Smelter, and it is characterized by wind farms, agricultural activities including irrigated crops, and range land used for grazing (United States Census Bureau 2010).

4.9.2.2 Landscape Character Types

The 2015 study included a review of landforms in the study area via aerial photographs, topographic maps, and field visits. These landforms were then categorized into landscape character types. Landscape character is defined as the distinct, constant, and identifiable configuration of elements in a landscape that make one landscape differ from another. These configurations of elements can be natural (e.g., landform, soil type, waterbodies) or manmade (e.g., cities and rural communities).

The aesthetic character of the lands that would be directly affected by the Project (both the previous and current Project proposal) is currently made up of the following landscape character types: river valley landscape, plateau, waterbody, and developed area. See Figures 4.9-4 through 4.9-7 for examples of each landscape character type.

Landscape photograph showing the river valley, plateau, waterbody, and developed area from lower plateau near the proposed location of the lower reservoir looking southwest toward the town of Rufus.

Figure 4.9-4: View Near the Lower Reservoir Location Looking Southwest

Landscape photograph showing the river valley, plateau, waterbody, and developed area from Juniper Point near the proposed location of the upper reservoir looking southwest.

Figure 4.9-5: View Near the Upper Reservoir Location Looking Southwest

Landscape photograph showing the river valley, plateau, waterbody, and developed area from Juniper Point near the proposed location of the upper reservoir looking southeast.

Figure 4.9-6: View Near the Proposed Upper Reservoir Looking Southeast

Landscape photograph showing the upper plateau and developed area from the Columbia Hills near the proposed location of the upper reservoir looking northwest toward the town of Goldendale.

Figure 4.9-7: View Near the Proposed Upper Reservoir Looking Northwest

4.9.2.3 Key Observation Points – Existing Character

In April 2015, a total of five KOPs were selected from a list of potential vantage points along roadways and accessible locations with public and private access within the 2015 study Project viewshed. These five KOPs were selected based on criteria consisting primarily of the level of traffic, angle of view, distance, and duration for those areas with representative views of Project infrastructure and features within the Project viewshed. If needed, the KOPs will be updated after the 2019 viewshed analysis is complete.

KOP 1

KOP 1 is located in a grassy median west of the intersection of Hoctor Road and Highway 97 (Figure 4.9-2). This KOP was selected because it represents potential views of the upper reservoir available to the public from a segment of the heavily travelled Highway 97 (traffic count of 5,297 vehicles per day, WSDOT 2016) south of Goldendale at the intersection of Hoctor Road (Figure 4.9-2). The landscape consists of a flat plateau and rolling/undulating Columbia Hills to the south. Irrigated agricultural fields dominate the foreground in the

immediate area, with grassland, shrub steppe, and oak woodlands dominating middle-ground along the hills near the Project. The land in the immediate vicinity of this KOP is predominantly private land on either side of Highway 97. Human activity visible from the KOP includes agriculture, wind farms, and a major transportation corridor. Existing visible structures include wind turbines, power poles, transmission lines, Old Highway 97, New Highway 97, Hoctor Road, a small Northwest Pipeline Corporation facility, and residential structures including farm houses and barns. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 1.

KOP 2

KOP 2 is located along the side of road at the intersection of Willis Road and Hoctor Road facing south (Figure 4.9-2). This KOP was selected because it represents potentially prominent views of the location for the upper reservoir for residents and the general public that travel along Hoctor Road. Views of the landscape at this location are primarily the rolling/undulating Columbia Hills, with the beginning of a flat plateau adjacent and to the south of KOP 2. Land use visible from KOP 2 includes primarily privately owned farmlands used for agricultural and power generation from wind turbines. Irrigated agricultural fields dominate the area adjacent to the KOP, and the hills in the foreground are vegetated by grassland, shrub steppe, and oak woodlands. Existing visible structures from this KOP include wind turbines, power poles, transmission lines, irrigation lines, Hoctor Road, Willis Road, and residential structures including farm houses and barns. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 2.

KOP 3

KOP 3 is located at the top of the Columbia Hills at Juniper Point looking south at the proposed location of the lower reservoir. The KOP is located approximately 300 feet on the downslope side from the radio tower. The KOP is on NSC Smelter property and is currently not accessible to the general public. This location was selected because it provides a good vantage point overlooking the proposed location of the lower reservoir from Juniper Point, which has been identified by as a sensitive cultural location for tribes in the area (see Section 4.10). At an elevation of 3,000 feet AMSL, the location of the KOP is approximately 2,500 feet higher than the site for the lower reservoir. The landscape consists of the Columbia Gorge with a view of the Columbia River below basalt cliffs, the mouth of the John Day River, and an expansive plateau spreading out above the river. Land use includes a mixture of publicly managed land (BLM, DNR, USACE, and WSDOT) and privately owned land (NSC Smelter and individual properties), as well as agricultural lands on the flat plateau. Existing visible structures include the town of Rufus, The John Day Dam, Highway 84, Highway 14, the former CGA smelter, wind turbines, and transmission lines. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 3

KOP 4

KOP 4 is located on a gravel pullout adjacent to the southeast side of Highway 14 above the proposed location of the lower reservoir. The location is on public land associated with Highway 14. It was selected for the ease of public access, close proximity to the Project, and for cultural significance of the Lewis and Clark Trail Highway and as a Scenic and Recreational Highway. KOP 4 provides a close-up vantage point for the scale and size of the Project facilities associated with the lower reservoir and powerhouse. The landscape consists of talus slopes associated with the Columbia Hills to the east, basalt cliffs that abruptly transition into the Columbia River to the South, and the flat floodplain adjacent to the river. Land use in the surrounding area consists of a mixture of private NSC Smelter and individual properties) and publicly managed land (BLM, USACE, and WSDOT) currently used for power generation, transportation, and recreation, with evidence of historic industrial use associated with the former CGA smelter. Existing visible structures at this location include Highway 14 and 84, the former CGA smelter, the John Day Dam, transmission lines, wind turbines, railroad tracks, campers and other evidence of recreational use by the public along the bank of the river. No VRM Class has been designated by the BLM for lands within the vicinity of KOP 4.

KOP 5

KOP 5 is located near the town of Rufus along the bank of the Columbia River in Giles French/John Day Dam Park facing north across the river toward the lower plateau and the location of the lower reservoir. This location was selected because it is publically accessible and it represents the views from the public park along the banks of the Columbia River as well as similar views from the town of Rufus and Highway 84. The landscape consists of large talus slopes associated with the Columbia Hills on the north side of the Columbia River and prominent basalt cliffs that abruptly transition into the Columbia River. The surrounding land use consists of a mixture of private NSC Smelter and individual properties) and publicly managed land (BLM, DNR, USACE, and WSDOT) currently used for power generation, transportation, and recreation, with some evidence of historic industrial use associated with the former CGA smelter. Existing visible structures include commercial and residential buildings in the town of Rufus, Highway 84 and 14, the John Day Dam, transmission lines, structures associated with the former CGA smelter, wind turbines, and campers along with other evidence of recreation on both banks of the river.

4.9.3 Potential Resource Impacts

Project infrastructure and features have the potential to alter the visual characteristics of the existing landscape within the vicinity of the Project. Specifically, five groups of observers could be affected by the construction and operation of the Project:

- Motorists on Interstate Highway 84;

- Motorists on State Route 14;
- Motorists on Hoctor Road;
- Residents and landowners adjacent to the Project area; and
- Temporary visitors to areas adjacent to the Project including the John Day Dam (Giles French / John Day Dam Park, Oregon).

4.9.3.1 Viewshed Analysis

Visibility of the Project infrastructure and features on the lower plateau extend east and west along both the north and south banks of the Columbia River. The distance and locations from which the Project would be visible after construction will be assessed as a component of the proposed visual resources study, further discussed in Chapter 5.

4.9.3.2 Construction Impacts

Visual impacts that are the direct result of construction of the Project are considered temporary, would be restored to pre-existing conditions where practicable, and would include the application of mitigation measures planned to reduce impacts to the visual aesthetic landscape during both construction of the Project and following construction activities where necessary.

During construction, equipment such as transmission tower components, large trucks, drilling and grading equipment, cranes, and equipment for stringing the transmission line on BPA's existing structures will be present in the Project area. Construction activities, including clearing, grading, and staging of Project areas, are all considered to be short-term impacts to visual resources. Staging and construction areas may need temporary construction lighting supplied by light buggies or trailers.

Temporary visual impacts would include two construction laydown areas and increased clutter and activity during construction of the Project. The first would be located to the northwest of the upper reservoir on the upper plateau, and the second would be located to the south of the lower reservoir on the lower plateau. Temporary visual impacts on the upper and lower plateaus would be minimal due to the natural topography, viewing distances, and the visual impacts of existing land use.

4.9.3.3 Operations and Maintenance Impacts

Operation and maintenance of the Project has the potential to impact visual resources in the vicinity of the project (i.e., within the Project viewshed). Operation and maintenance impacts for each of the KOPs will be described in the license application based on the updated 2019 visual resource assessment for each of the five KOPs.

4.9.4 Applicant Recommendations

The Applicant aims to minimize the potential visual impacts of the Project and maintain the surrounding aesthetic quality of the landscape. PM&E measures proposed to minimize impacts to visual resources will be further developed in the Project's draft VRRMP, which will be provided as a component of the license application. Major Project features are located in areas with existing industrial infrastructure, but all efforts will be taken to mitigate visual impacts. The Project design is preliminary and will consider the need to include engineering controls and mitigation measures to blend in with current visual elements in the area and reduce visual impacts from the Project. The amount of modification upon visual resources is dependent upon the blending of Project features with existing landscape features within the Project viewshed. The Applicant will work with agencies and stakeholders to minimize visual impacts through the refinement and design of Project features.

Proposed PM&E measures to reduce visual impact include the following:

- Minimize footprints or aboveground features to the furthest extent possible.
- Ensure facilities are free of debris and store unused or damaged equipment off site pursuant to the requirements of Klickitat County's EOZ. During construction, the Licensee will monitor the Project area for construction related debris. Where practical, designated locations will be established for the temporary storage of debris from construction.
- Minimize contrast through natural paint colors and surfacing materials that match the surrounding landscape and dulling reflective surfaces that cannot be painted.
- Native vegetation and/or trees could be planted to break up the lines of roads and facilities and soften the visual effect on the landscape.
- Design, install, and maintain facility lighting to prevent casting of light into adjacent native habitat. Incorporate directional lighting; light hoods, low pressure sodium bulbs or light emitting diode (LED) lighting; and operational devices in final design to allow surface night-lighting in the central Project area to be turned on as needed for safety.
- Install fully shielded low pressure sodium lighting to reduce lighting impacts to protect the current dark sky conditions from light pollution.

Minimize lighting to the extent possible through the use of lamp types, covers, timers, motion sensors, or other means. Class II lamp source and shielding requirements will be used where outdoor lighting is necessary.

4.10 Cultural and Tribal Resources

This section provides a summary of known cultural or historic resources within the Project vicinity, as well as a description of tribes, tribal lands, and tribal interests.

The term "cultural resources" is used to collectively include archaeological sites and objects, historic architectural properties, and traditional cultural properties (TCPs). Examples of these resources include prehistoric and historic archaeological sites, Indian religious sites, and historical structures or buildings.

4.10.1 Existing Environment

The Project is not expected to directly affect Tribal reservation lands; however, the area in the vicinity of the proposed Project has been identified as having been associated with use by several Indian Tribes. According to the U.S. Department of the Interior (USDOI), NPS, and Bureau of Indian Affairs (BIA), the following Tribes are associated with the region surrounding the Project (NPS 2014b):

- Confederated Tribes and Bands of the Yakama Nation, Washington;
- Confederated Tribes of the Colville Reservation, Washington;
- Confederated Tribes of the Warm Springs Reservation of Oregon; and
- Confederated Tribes of the Umatilla Indian Reservation.

Environmental Resources Management (ERM) conducted a review of pertinent literature in order to establish the ethnographic, archaeological, environmental, and land use history of the Project vicinity. The goal of these investigations was not only to gather an appropriate prehistoric land use history, but also to determine whether any historic land use resulted in alterations to the landscape that may have affected the integrity of cultural resources present. Washington State Department of Archaeology and Historic Preservation (DAHP) maintains a list of previous cultural resources studies and inventories and previously recorded cultural resource properties for Washington State. ERM reviewed pertinent forms and reports available through the DAHP GIS database, topographic maps, soil surveys, aerial photographs, historical maps, and other resources to obtain historical information about the Project boundary and vicinity and its potential to contain cultural resources.

Several cultural resources studies and inventories have been completed in and around the Project area, as described briefly below, and in more detail in a draft Historic Properties Management Plan (HPMP) provided in Appendix E. These cultural resources surveys have identified various cultural resources properties in and around the Project area. Although the proposed Project boundary has not received a specific comprehensive cultural resources survey, the existing documentation suggests that the area could include sensitive cultural resources.

Cultural resource surveys typically have been conducted in response to particular federal- or state-permitted projects, or on lands managed by federal agencies. Thus, many areas may have never been systematically surveyed for the presence of cultural resources. As a consequence, the

spatial patterns of cultural resource properties are often more reflective of the locations of permitted projects than locations where cultural resources properties are likely to occur.

The Columbia River has been the dominant natural feature affecting the social and cultural patterns of the region encompassing the proposed Project boundary and has been the subject of archaeological investigations since the 1920s. Early archaeological excavations conducted along the Columbia River have shown human occupation of the area to span at least the last 10,000 years. The general area in and around the Project boundary has been occupied by prehistoric, historic, and current Indian groups, historic Euroamerican period settlements, and recent historic and modern populations. More detailed cultural context information is provided in the Draft HPMP (Appendix E).

4.10.1.1 Previous Cultural Resources Studies

Cultural resources surveys have been conducted in the region since the early 1900s. Although this early work was important to the understanding of the cultural context of the region, early identification of undisturbed archaeological sites, and the development of archaeological method, the surveys generally lacked the systematic nature of modern survey techniques and common reporting standards. Some of these earlier cultural resources surveys were noted on DAHP site forms, but the survey reports were not available in the DAHP survey database. These surveys remain valuable for the identification of potential cultural resources within the Project area.

Beginning in the 1990s, relevant cultural resources investigations within the vicinity of the Project consisted of federal and state compliance surveys and testing. As presented in Table 4.10-1, these surveys largely pertain to pipeline, electrical transmission, hydroelectric, wind energy, and telecommunications projects.

Table 4.10-1: Cultural Resources Surveys Conducted within the Project Vicinity

DAHP Inventory No.	Project	Year	Entity	Description
1341648	Conservation and Renewable Energy Systems' (CARES) Columbia Wind Farm #1	1994	Eastern Washington University (EWU)	800 acres of pedestrian survey and limited subsurface excavation; 86 cultural resources identified
1340444	Northwest Pipeline Corporation's Columbia Meter Station	2001	Archaeological Investigations, Inc. (AINW)	0.2 acre of subsurface excavation; no cultural resources identified
1341471/1341473/1341481	GNA Energy LLC's Cliffs Energy Natural Gas Pipeline	2001	Applied Archaeological Research (AAR)	Subsurface excavation at sites 45KL0466, 45KL0467, and 45KL0775
1341470	Calpine Energy Company's Goldendale Energy Plant	2002	URS	Subsurface excavation at site 45KL0746
1686109	U.S. Army Corps of Engineers' John Day Reservoir Project	2004/ 2005	Confederated Tribes of the Umatilla Indian Reservation Cultural Resources	6900 acres of pedestrian survey (in WA and OR); 106 cultural resources identified (in WA)

DAHP Inventory No.	Project	Year	Entity	Description
			Protection Program (CRPP)	
1347493/1351381/1351382/ 1351651/1351873/1351923	Windy Point Partners, LLC's Windy Point Wind Energy Project	2005/ 2007/ 2008	AINW/Historical Research Associates, Inc. (HRA)	1024.8 acres of pedestrian survey and subsurface excavation at various sites; 64 cultural resources identified
1352565	Lockheed Martin Corporation's Goldendale NPDES Ponds Remediation Project	2008	AINW	7.2 acres of pedestrian survey; no cultural resources identified
1680108	Northwest Pipeline GP and Puget Sound Energy's Blue Bridge Pipeline Project	2008/ 2009	AINW	3,642 acres of pedestrian survey and subsurface excavation; 103 cultural resources identified
1685871	Windy Flats Partners, LLC's Windy Point II Wind Energy Project	2008/ 2009	AINW	414 acres of pedestrian survey; 29 cultural resources identified
N/A[1]	Golden Northwest Binging Site Plan	2010	Plateau Archaeological Investigations, LLC (Plateau)	
1681201/1681751/1681752	Oregon Wireless Interoperability Network's (OWIN) Juniper #OW-01-0057 Communications Tower Project	2011	Plateau /Archaeological Services of Clark County, LLC (ASCC)	0.3 acres of pedestrian survey, site evaluation, and archaeological valuation of site 45KL2026
1682437/1683858/1684658	Klickitat County Emergency Management's Juniper Point New Tower Project	2012/ 2013	Lower Columbia Research and Archaeology, LLC (Lower Columbia)/ Yakama Nation Cultural Resources Program (Yakama Nation CRP)	0.1 acres of pedestrian survey and construction monitoring of site 45KL2026

[1] Although not shown in the Washington State Department of Archaeology and Historic Preservation (DAHP) database, this survey was identified as part of the review of DAHP site forms. Additional information will be identified for this and any other additional surveys within the area of potential effect during the cultural resources survey effort.

4.10.1.2 Previously Identified Cultural Resources

The density of documented archaeological sites is reported to be greatest in the lower reaches of streams, particularly near confluences with other streams. Large, dense archaeological village sites are most likely to be present in these locations. Confluences of any salmonid streams or any easily accessible areas along such streams are areas of high probability for archaeological sites. In upland locations, archaeological sites are more dispersed and associated with a greater variety of resources. Such sites are often lithic scatters, which are the stone-chip remnants of stone tool-

making activities and stacked stone features on ridgelines. These can be observed anywhere that hunting, gathering, or camping may have taken place.

Forty-one cultural resources have been documented within the vicinity of the proposed Project (Table 4.10-2). Thirty-three cultural resources consist of precontact archaeological sites, including isolated artifacts, lithic and artifact scatters, rock features, and a petroglyph. Five cultural resources consist of historic period archaeological sites, including an artifact scatter, residential features, and farmstead ruins. Lastly, one architectural history property was documented and consists of BPA's Horse Heaven-Harvalum No. 1 transmission line. Of these cultural resources, 9 are considered eligible for inclusion in the National Register of Historic Places (NRHP), 10 are considered not eligible, and the remaining 22 are undetermined, unevaluated, or require further work/additional information to make a formal eligibility determination.

Table 4.10-2 Cultural Resources Previously Identified within the Project Vicinity

DAHP Site No.	Site Type	Description	NRHP Eligibility
45KL0466	Precontact Artifact Scatter	Lithic flakes, cores, and bifaces	Undetermined
45KL0467	Precontact Artifact Scatter	Lithic cores, tested and untested raw material, scraper, and biface	Undetermined
45KL0566	Precontact Artifact Scatter	Lithic flakes, cores, tested raw material, bifaces, and hammerstones	Not eligible
45KL0567	Precontact Lithic Scatter	Lithic flakes and cores	Undetermined
45KL0568	Precontact Lithic Scatter and Features	Lithic flakes and basalt rock features	Undetermined
45KL0569	Precontact Artifact Scatter	Lithic flakes and uniface	Undetermined
45KL0570	Precontact Lithic Scatter	Lithic flakes, cores, and biface	Undetermined
45KL0571	Precontact Lithic Scatter	Lithic flakes	Undetermined
45KL0745	Historic Artifact Scatter	Milled lumber, wire nails, iron pipe, and other historic materials	Undetermined
45KL0746	Precontact Lithic Scatter	Lithic flakes, cores, and FCR	Undetermined
45KL0765	Precontact Lithic Isolate	Isolated flake	Not eligible
45KL0766	Precontact Lithic Isolate	Isolated core	Not eligible
45KL0767	Precontact Artifact Scatter	Lithic flakes, cores, bifaces, tested raw material, and hammerstones	Undetermined
45KL0768	Precontact Artifact Scatter	Lithic flakes, cores, and tested raw material	Undetermined
45KL0769	Historic Farmstead	Foundation, standing structures, equipment pond, and refuse dumps	Undetermined
45KL0770	Historic Feature	Probable well	Undetermined
45KL0772	Precontact Lithic Scatter	Lithic flakes	Not eligible
45KL0774	Historic Features	Pond, wooden water line, and wooden wagon	Undetermined
45KL0811	Precontact Artifact Scatter	Lithic flakes and animal bone	Undetermined

DAHP Site No.	Site Type	Description	NRHP Eligibility
45KL0812	Precontact Lithic Scatter	Lithic flakes	Undetermined
45KL0835	Historic Farmstead	Wood frame cabin, earthern dam and pond, and can dump	Undetermined
45KL1140	Precontact Artifact Scatter	Lithic flakes, core, drill, and projectile points	Not eligible
45KL1141	Precontact Artifact Scatter and Rock Features	Lithic flakes, core, projectile points, and basalt rock features	Eligible
45KL1142	Precontact Lithic Scatter	Lithic flakes	Not eligible
45KL1146	Precontact Artifact Scatter	Lithic flakes, cores, hammerstone, bifaces, and projectile points	Not eligible
45KL1296	Precontact Lithic Isolate	Isolated flake	Not eligible
45KL1297	Precontact Lithic Isolate	Isolated flake	Not eligible
45KL1298	Precontact Lithic Scatter	Lithic flakes	Undetermined
45KL1407	Precontact Lithic Isolate	Isolated flake	Not eligible
45KL1711	Precontact Lithic Scatter	Lithic flakes and core	Undetermined
45KL1712	Precontact Artifact Scatter	Lithic flakes and uniface	Undetermined
45KL2026	Precontact Artifact Scatter	Lithic flakes and tested raw material	Eligible
45KL2126	Precontact Lithic Scatter	Lithic flakes	Undetermined
45KL2188	Precontact Petroglyph	Petroglyph	Eligible
45KL2189	Precontact Features	Basalt rock alignments	Eligible
45KL2194	Precontact Features	Basalt rock alignments	Eligible
45KL2195	Precontact Lithic Scatter	Lithic flakes	Undetermined
45KL2202	Precontact Features	Basalt rock alignments	Eligible
45KL2203	Multicomponent Artifact Scatter and Features	Basalt rock alignments, depression, lithic flakes, and historic metal artifacts	Eligible
45DT0241	Multicomponent Archaeological District	Columbia Hills Archaeological District; Interrelated precontact and historic archaeological sites	Eligible
NA	Historic Transmission Line	BPA Horse Heaven-Harvalum No. 1 Transmission Line	Eligible

NRHP = National Register of Historic Places; NA = not applicable

4.10.1.3 Future Identification of Cultural Resources

As part of the survey and licensing process, the Applicant will consult with DAHP, Tribes, and other interested parties under Section 106 of the NHPA throughout the licensing process regarding inventory needs as well as appropriate measures for protection and/or mitigation of identified cultural resources.

The Applicant is currently in the process of contracting with the Yakama Nation Cultural Resources Program (CRP) to perform the cultural resources identification survey. Yakama Nation CRP will conduct a cultural resources survey intended to meet the Secretary of the Interior's Standards and Guidelines for Identification as well as pertinent aspects of DAHP's standards for cultural resources reporting. This will include TCPs and/or sacred sites and sites of

religious or cultural importance to the Tribes. Yakama Nation CRP, in consultation with the Tribes, will attempt to identify such locations and their spatial relationship to the recommended area of potential effect (APE). The study plan is described in more detail in Chapter 5 of this PAD. The Applicant's draft HPMP will be updated after the cultural resources identification survey is complete.

4.10.2 Potential Resource Impacts

General impacts to known and previously unidentified cultural resources could include damage during construction activities and/or permanent loss through land use conversion (e.g., constructing permanent structures over cultural resources). The scale and potential for impact depends on presence of eligible cultural sites, location of the Project component, type of construction, and size of the footprint. Indirect effects (i.e., visual, auditory, vibrational, or atmospheric) caused by construction and/or operation activities could affect certain types of sensitive cultural resources. Additionally, historic structures and buildings located outside the direct Project footprint could also be affected indirectly by the proposed Project, as visual, auditory, vibrational, or atmospheric impacts could compromise the properties' historic sense of setting, feeling, or character.

Construction and/or operation activities could have the potential to disrupt (via visual or auditory effects) traditional cultural use associated with cultural resources within the Project boundary. The potential for impacts to cultural resources will be further defined during the licensing process and Tribal consultation.

4.10.2.1 Methodology and Evaluation Criteria

In consultation with the DHPA and Tribes, FERC must apply the criteria of adverse effects to historic properties within the APE to evaluate the potential effect of the proposed Project on the historic properties, as codified in 36 CFR 800.5.

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects that occur later in time, are farther removed, or are cumulative. Although it may be the case that TCPs may or may not be eligible for the NRHP, a similar analysis would be applied to TCPs given the criteria articulated in National Register Bulletin 38 (NPS n.d.) and in consultation with the Tribes. All other cultural resources identified as part of the proposed Project (i.e., those not eligible for the NRHP or not TCPs) would not receive further consideration under Section 106 during review of the proposed Project.

4.10.2.2 Potential Impacts to Cultural Resources

Direct effects caused by the Project occur at the same time and place. Indirect effects caused by the Project are later in time or further removed in distance but are still reasonably foreseeable. FERC will confer with consulting parties to determine the Project's effects on historic properties, resolve adverse effects, and develop mitigation measures as necessary. For the proposed Project, the following effect types have the potential to occur:

- Physical disturbance or damage to all or part of the property caused by ground disturbance (e.g., digging);
- Introduction of visual, atmospheric, or audible elements that could diminish the integrity of the property's significant historic features during short-term construction and operation of aboveground facilities and roads, as well as long-term effects from operation; and
- Change in the character of the use or of physical features within the property's setting that contribute to its significance.

Effects determinations have the following three possible outcomes:

- Finding of no historic property affected–The Project does not have the potential to cause effects on historic properties that may be present.
- Finding of no adverse effect–The historic property would be affected; however, the effects of the Project do not meet the criteria of adverse effect, or measures have been taken to avoid or minimize adverse effects.
- Finding of adverse effect–The Project may affect the integrity, which would alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the NRHP. If an adverse effect is found, FERC would consult further to resolve the adverse effect.

The potential for the proposed Project to affect a historic property may depend on the Project stage and the development and use of the proposed Project boundary. Potential effects that may occur during the construction and operations of the proposed Project are discussed in the following subsections.

4.10.2.3 Construction

The proposed Project construction activities could affect cultural resources in a variety of ways, including the following:

- Possible direct damage to cultural resources within the construction footprint;
- Possible indirect damage to cultural resources through vibrations caused by earth-moving and heavy equipment;
- Temporary loss of community access to cultural resources, such as TCPs;

- Potential permanent visual effects that alter the viewshed to or from a cultural resource as it pertains to the cultural resource's setting and feeling;
- Potential temporary visual effects on cultural resources while heavy equipment and numerous personnel are present;
- Increased dust and noise that may affect historic structures or TCPs near the construction area; and
- Discovery of previously unknown cultural resources within the construction footprint.

The duration of the construction phase would affect the degree of effects on cultural resources. Potential indirect effects during construction—such as noise, dust, vibrations, heavy equipment traffic, and changes in viewshed—could be temporary and would be expected to last for the duration of construction in specific areas and for discrete periods of time.

4.10.2.4 Operations

During operations of the proposed Project, only previously surveyed and assessed areas would be expected to require periodic disturbance; therefore, the potential for additional direct effects to cultural resources would be limited.

Indirect effects during operations could consist of a permanent change in viewshed to historic structures or TCPs near Project facilities, as well as a periodic increase in noise, vibration, and dust created by vehicular traffic conducting operation and maintenance activities.

4.10.3 Applicant Recommendations

If archeological resources are discovered in the Project boundary during the survey studies or construction, analysis and appropriate avoidance measures will be implemented pursuant to the Project's HPMP (Appendix E).

4.11 Socio-Economic Resources

4.11.1 Existing Environment

4.11.1.1 County Work Force Summary

Klickitat County has an economic history rich in agriculture, including cattle and sheep ranching, wheat, orchards, mining, and timber. These industries supply the majority of jobs, along with educational, health, and social services; local government; retail trade; manufacturing; and wood processing (City-data 2015). The recent increase in wind-powered energy, development of the Roosevelt Regional Landfill, and evolving leisure and hospitality industry have contributed to the region's economic diversity and new jobs. The Klickitat County unemployment rate decreased from 11 to 9 percent between 2011 and 2013 (Bailey 2013). The 2017 annual average unemployment rate in Klickitat County was 5.3 percent (Bureau of Labor Statistics 2018).

4.11.1.2 Households and Income

In 2017, the Klickitat County population was estimated at 21,811 with 10,432 housing units and an average household size of 2.54 people (United States Census Bureau 2018). In 2017, the median household income was $51,258, compared to $66,174 for the state of Washington, and 22.5 percent below the national average (United States Census Bureau 2018). Approximately 14.5 percent of Klickitat County residents earned an income below the poverty level in 2017 (United States Census Bureau 2018).

4.11.1.3 Geographic Mobility

From 2010 to 2011, 3.12 percent of Klickitat County residents moved into Klickitat from other counties within Washington State, and 5.41 percent relocated from another state (City-Data 2018). Ten or fewer residents moved to Klickitat from a foreign country (City-Data 2018). During the same timeframe, 2.89 percent of Klickitat county residents moved out of Klickitat County to other counties within Washington State, 4.06 percent relocated to other states, and 10 or fewer moved to foreign countries (City-Data 2018). In 2005, 92 percent of the population of Klickitat County lived in the same house as they had 1 year ago (City-data 2018).

4.11.1.4 Education

In 2017, of the residents 25 years of age or older in Klickitat County, 87.5 percent have earned a high school diploma, while 25.8 percent have earned at least a bachelor's degree (United States Census Bureau 2018). In Washington State, 90.8 percent of residents 25 years of age or older have earned a high school diploma, while 34.5 percent have earned at least a bachelor's degree (United States Census Bureau 2018).

4.11.1.5 Industries

Agriculture, farming, and timber industries provide many jobs for Klickitat County residents, along with the rapidly growing leisure and hospitality industry. Currently, the largest private employer in Klickitat County is Roosevelt Regional Landfill, which is operated by Republic Services and KPUD. Roosevelt Regional Landfill not only provides 170 family-wage jobs, it produces enough energy to power 15,000 homes by converting methane gas produced by decaying garbage into electricity (Judd 2012). The largest wood products manufacturer in the County is SDS Lumber Company. The company markets softwood, plywood, and dimension lumber nationwide. Agricultural activity within the County includes a variety of fruit, vegetables, berries, and cattle. Another major source of income to the County is the production of alfalfa hay, and there is new growth in the winery and grape growing industry.

In Klickitat County, the healthcare and social assistance industry employs approximately 880 people (Data USA 2016). Two main hospitals employ the majority of these: Skyline Hospital in White Salmon and Klickitat Valley Hospital in Goldendale.

Recreation and tourism also contribute to the local economy, including destination areas for fishing, camping, hunting, hiking, windsurfing, white water river rafting, biking, sailboarding, horseback riding, cycling, as well as snow and water skiing.

There are several dams located in the County, including the John Day Dam and The Dalles Dam, both of which are located on the Columbia River and have hydroelectric facilities with public interpretative centers.

Wind power generation in the Pacific Northwest has expanded from a few minor projects in the late 1990s to more than 7,500 MW of installed capacity in 2014. An EOZ Ordinance process was developed by the Klickitat County Planning Commission in response to the need for organized growth in alternative energy production. The EOZ, Washington renewable portfolio standards (RPS), and other incentives fueled the development of a number of new wind power projects in Klickitat County (McClure 2011). Washington currently ranks 10th in the nation in for installed wind capacity with the total capital investment of $6.1 billion in wind projects (AWEA 2017), resulting in $141.3 million dollars cumulative public revenue, 2,150 temporary construction jobs, and 215 permanent onsite jobs (Renewable Northwest 2018). Local wind power projects employ a range technicians and specialists who travel to Klickitat County for their work, providing a substantial source of income for Goldendale restaurants, hotels, and other retailers (Ross 2014).

4.11.1.6 Occupation and type of Employer

In 2016, the Washington State Employment Security Department found the jobs in Klickitat County fit into nine categories (WAESD 2017). The number of jobs provided by occupation type includes seasonal, part-time, full-time, permanent and temporary jobs.

- Government – 24 percent;
- Agriculture - 23 percent;
- Manufacturing – 18 percent;
- All other – 15 percent;
- Retail trade – 5 percent;
- Health care and social assistance – 5 percent;
- Accommodation and food services – 4 percent;
- Administrative and waste services – 4 percent; and
- Transportation and warehousing – 2 percent.

4.11.1.7 Travel to work

In 2011, approximately 39 percent of employed Klickitat County residents worked outside of the county (City-Data 2012). Of the people employed in Klickitat County, 73.5 percent live in Klickitat County (City-Data 2018). The mean commute travel time is approximately 21.9 minutes (City-data 2018).

4.11.1.8 Housing

While two-thirds of the residents live in unincorporated areas, the majority of the population of the County is located in or near Goldendale, Bingen, or White Salmon. In 2016, the mean price for a detached home within Klickitat County was $277,638, compared to $193,363 in 2009, an increase of $84,275 in 7 years (City-Data 2018). The mean price for a home in Washington State was $404,096 in 2016 (City-Data 2018). The median monthly cost of renting an apartment in Klickitat County was $699 in 2016, while the monthly cost in Washington State for an apartment rental was $999 (City-data 2018).

4.11.2 Potential Resource Impacts

The proposed Project is a multi-billion-dollar infrastructure investment that will provide numerous temporary construction jobs, permanent maintenance and operation positions, and further contribute to the region's economic diversity and tax base. Project costs include engineering, equipment procurement, permitting, and construction over the Project development schedule from pre-construction through construction and start-up. Pre-construction spending will go primarily to licensing, engineering, and design services.

In 2015, KPUD proposed a similar pumped storage project at this site and completed a study of its economic impacts. This study is proposed to be updated for the Project in 2019 (see Chapter 5). The impacts described in the following sections are the results of the 2015 KPUD study and were estimated based on an assumed Project cost of $2.2 billion, and will be revised as a part of the 2019 study.

4.11.2.1 Employment and Wage Impacts

Project direct employment and wages estimated in the 2015 study by location of residency are show in Table 4.11-1 below.

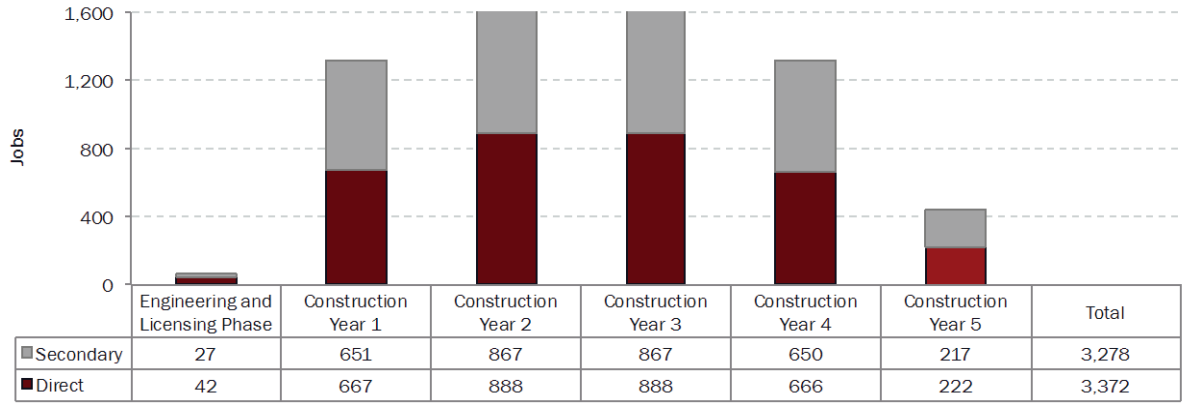
Table 4.11-1: Direct Employment by Location of Residency in the 2015 Study

Location of Residency	Direct Jobs (Full-Year Equivalents)	Direct Wages ($M)	Types of Jobs
Klickitat County	340	$18.0	These are direct jobs for Klickitat County workers. This figure includes construction jobs and other jobs supported by spending in Klickitat County.
Rest of Washington and Oregon	2,824	$172.4	Jobs for workers from the rest of Washington. This figure includes construction jobs accruing to rest of Washington and Oregon workers and other jobs for vendors in the rest of Washington and Oregon.
Total Washington	3,164	$190.3	These are direct jobs for Washingtonians and Oregonians. Other jobs include manufacturing, engineering, management, and other services in Washington and Oregon.

Sources: Washington State Department of Labor and Industries 2015, EcoNorthwest 2015
$M = million dollars

The 2015 analysis used the prevailing wage for construction workers in Washington State, averaging $40 per hour, to estimate construction worker jobs and income (Washington Department of Labor and Industries 2015). In addition to the prevailing wage, it was conservatively assumed that only out-of-state workers will receive per diem payments while working on site.

Job impacts from construction spending over the course of the Project timeline from the 2015 study are shown in Figure 4.11-1.



	Engineering and Licensing Phase	Construction Year 1	Construction Year 2	Construction Year 3	Construction Year 4	Construction Year 5	Total
Secondary	27	651	867	867	650	217	3,278
Direct	42	667	888	888	666	222	3,372

Source: EcoNorthwest 2015

Figure 4.11-1: Direct and Secondary (Indirect and Induced) Jobs in Washington and Oregon During Construction in the 2015 Study

The total annual cost of operating and maintaining the Project was estimated in the 2015 study to be $8.48 million. About $3.86 million of that would be spent on compensation for 32.4 full-time employees.

The 2015 study estimated that the Project facility was estimated to generate a total of 71.8 jobs in Washington and Oregon that would remain throughout the duration of operations. Of these jobs, about 32 would be direct employment in Klickitat County, with additional indirect and induced employment in the county and throughout Oregon and Washington (see Table 4.11-2 below).

Table 4.11-2: Economic Impacts from Operations and FYE jobs in the 2015 Study ($M)

Study Area / Impact Measure	Direct	Indirect	Induced	Total
Klickitat County				
Output	$8.48	$2.47	$1.24	$12.19
Labor Income	$3.86	$0.31	$0.26	$4.43
Jobs	32.4	5.8	8.8	47.0
Washington and Oregon				
Output	$8.48	$6.11	$2.26	$16.85
Labor Income	$3.86	$1.40	$0.59	$5.85
Jobs	32.4	23.5	15.9	71.8

Source: ECONorthwest 2015

$M = million dollars; FYE = fiscal year equivalent

The average wage (excluding benefits) used for the above calculations was $91,700, which was based on the average wage of a Washington State utility worker. The results indicated that about 72 percent of the total operating output on the region's economy will occur in Klickitat County.

By definition, all on-site jobs associated with construction would be direct jobs in Klickitat County. These workers include craftspeople, engineers, project managers, and others who provide on-site support services. Direct jobs associated with the proposed Project will also benefit employees in other parts of Washington, Oregon, and elsewhere in the United States. Klickitat County residents are estimated to hold 340 of the construction jobs. This averages 85 workers at any given time. Workers from elsewhere in Washington and Oregon, who would either commute or occupy temporary housing in the county, were estimated in 2015 to fill an additional 2,824 fiscal year equivalent (FYE) jobs.

4.11.2.2 In-Migration to the Project Area

While it is anticipated that there will be a temporary influx of construction workers during the Project construction phase, there is no indication that the permanent in-migration to the area would have a significant impact on the area's government facilities and services. The 2015 economic study concluded that Project operations would employ a total of about 32 people, with about an additional 14 indirect and induced jobs created, some of whom would be hired from within the county. Some workers who relocate to the area would be expected to move to Goldendale, Washington, while others may choose to live in nearby communities such as The Dalles, Oregon, and Klickitat, Sherman, or Wasco County communities. Because some workers would be local and would not need to relocate, and others would disperse throughout the area,

the permanent migration to the Project area due to the Project is not anticipated to strain existing government facilities and services.

4.11.2.3 Housing Impacts

The closest town to the Project is the City of Goldendale, Washington. Other nearby communities expected to provide potential housing to Project workers are Centerville and Wishram, Washington and Rufus and The Dalles, Oregon. Housing and housing vacancy rates are provided in Table 4.11-3 below. Rental vacancy rates are anticipated to be adequate to accommodate the in-migration of permanent project personnel. Since the majority of construction personnel would be relocating temporarily, some would be expected to travel and stay in their recreational vehicle, as is common practice for construction projects in remote areas. Others would be anticipated to find temporary housing from the available rental units in nearby communities or would commute.

There would be no residences or business establishments displaced by the proposed project.

Table 4.11-3: Housing and Vacancy Rates, Klickitat County, Washington; Sherman and Wasco Counties, Oregon and Select Communities

	Total Housing Units (number)	Total Vacancies (number)	Vacant Housing Units (%)
Klickitat County	9,797	1,778	18.1
Goldendale	1,598	133	8.3
Wishram	208	44	21.2
Sherman County	938	111	11.8
Rufus	122	19	15.6
Wasco	248	36	14.5
Wasco County	11,438	1,826	16.0
The Dalles	6,582	526	7.6

Source: United States Census Bureau 2015

4.11.2.4 Effects on Local Government and Services

Development of the Project would result in benefits to local taxing districts beginning in the first year of operations. Without any property or sales tax abatement agreements, the 2015 study indicated that the Project could generate approximately $15.1 million in property tax revenues for Klickitat County. Almost half of the tax revenue will go towards local and state school districts ($6.7 million). Another large portion of tax proceeds will support county roads ($2.3 million) and the county general fund ($1.9 million). The remaining revenue will go towards the local fire, hospital, parks, and library districts. An additional $1.2 million in sales as well as business and occupation tax revenue will accrue to the state.

4.11.3 Applicant Recommendations

An updated socioeconomic analysis of the economic impacts of the proposed Project will be completed as described in 5.1.10.

5.0 PRELIMINARY ISSUES AND STUDIES LIST

This chapter presents a summary of potential studies and analyses that could be used to address data gaps associated with the evaluation of potential impacts of the proposed Project. FERC content requirements for this section are specified in 18 CFR § 5.6(d)(4). Relevant comprehensive plans are discussed in Section 6.0.

Potential resource issues associated with the Project were identified from:

- Review of existing information (Section 4.0, Existing Environment and Resource Impacts); and
- Review of responses to the PAD request for information from interested parties (Appendix A) and previous agency communication on the formerly-proposed JD Pool Project (P-13333).

Potential resource issues include those that could result from Project-induced effects or have a potential effect related to Project construction, operations, or maintenance activities. As the data and findings from field and technical studies conducted previously in portions of the Project area available to the Applicant and will be utilized during this licensing process, the need for additional data and studies is minimal. This chapter presents data gaps and issues for which additional data gathering or studies are needed to finalize a license application. Licensing participants will have an opportunity to discuss or comment on potential Project-related issues and studies included, or not included, in this PAD during the joint agency meeting and as comments to the PAD.

5.1 Potential Resource Issues and Proposed Studies

The following list of potential studies is based upon a review of existing information relevant to the proposed Project, potential resource impacts (Section 4.0), and the pre-PAD consultation to date. Additional studies and/or changes to studies may be required based upon additional further consultation with interested parties. Information gathered from studies will be presented in the Project license application. If needed, separate study reports will be compiled as appendices to the license application.

5.1.1 Geology and Soils

The Project area has been studied and sampled extensively over the years in conjunction with activities related to the former CGA smelter and to determine feasibility for the proposed Project. New studies will be for the purpose of determining final design criteria as well as proper characterization of unsuitable fill materials in reservoir areas for disposal.

The geological and geotechnical investigations needed for the design and construction of the project will include field and desktop programs to characterize the surface and subsurface

geological conditions at potential areas of concern. These include dam foundations, tunnel alignments, underground caverns, and powerhouse foundation, and are expected to include, but not be limited to:

- Detailed geologic mapping;
- Identification of fault zones;
- Mapping of potential and existing geologic hazards such as landslides and areas subject to potential for liquefaction;
- Subsurface borings, sampling, and testing to determine rock quality for underground facilities; seismic refraction surveys; exploratory trenching;
- Description of seismicity; mapping of soils within the Project boundary; and
- Evaluation of potential borrow sources and suitability of materials for construction.

The results of these investigations will be presented in the Project's license application.

5.1.2 Water Resources

The potential extent of intermittent streams in the Project area would be confirmed during the wetland delineation described below and presented in the license application. No additional water resources studies are proposed at this time. As part of the licensing process, the applicant would consult with Ecology, DEQ, and other appropriate agencies to determine permit application needs and appropriate monitoring and mitigation measures in accordance with the requirements of the CWA and associated regulations.

5.1.3 Fish and Aquatic Resources

No studies related to fish or aquatic resources are proposed at this time.

5.1.4 Wildlife and Botanical Resources

5.1.4.1 Sensitive Habitats

A sensitive habitat assessment is proposed to ground-truth desktop data available from WDFW and ODFW regarding the location of sensitive habitats in and near the Project boundary. This assessment would consist of a field visit to confirm the features within the Project vicinity listed in the WDFW PHS Mapping (WDFW 2018a) and Oregon strategy habitat mapper, as presented in Section 4.5.1.1, Wildlife Resources. Information gathered from the sensitive habitat assessment would be presented in the Project's license application.

5.1.4.2 Invasive Plant Survey

In 2015, ERM documented invasive plants (including plants listed on the County noxious weed lists) observed incidentally as part of the vegetation survey and wetland assessment. No additional invasive plant field information is necessary prior to Project licensing.

5.1.5 Wetlands, Riparian, and Littoral Habitat

5.1.5.1 Wetlands and Waters of the U.S. Delineation

During the 2015 field studies, the field team conducted a preliminary assessment of wetlands and waters to provide information to project engineers on the locations of to potentially jurisdictional wetlands or waters, and to assist in focusing the field study locations for the wetlands and waters field delineation. Areas that require a formal wetland delineation using USACE protocol (USACE 1987) were identified (e.g., areas where wetland vegetation was observed but no wetland hydrology was observed, potential waters, or pond fringe wetlands). Thirteen wetland polygons were determined to be potential wetlands and require a formal delineation. All of the other wetland and water features may require formal delineation as well and should be revisited in the field in 2019.

The objective of the formal wetland and water delineation is to document the location and extent of jurisdictional wetlands/waters of the US within the Project study area including all areas that may be temporarily or permanently displaced during construction and/or operation, using USACE protocol (USACE 1987). All jurisdictional wetlands within the United States are regulated by USACE and the USEPA. Completion of wetland surveys would aid the applicant in designing Project features that would minimize impacts on jurisdictional wetlands/waters of the US and inform the design of appropriate mitigation if necessary. Routine wetland determination methods described in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coasts, and the Arid West Region would be applied throughout the survey area. Functions and values would be assessed using the *Washington State Rating System for Eastern Washington, Update – 2014* (Hruby 2014). Waters would be mapped using a combination of desktop and field methods, similar to those described above for wetland mapping. All waters (e.g., streams) will be mapped based on the location of the ordinary high water mark using the guidance provided in USACE (2005). All wetlands and waters will be classified using two classification systems: 1) the NWI classification (Cowardin et al 1979), which describes vegetation type, structure, and hydrologic regime and 2) hydrogeomorphic position (Brinson 1993), which describes water source and landscape position.

Information gathered during the formal Wetland Delineation study would be reported in a Wetland Study Report and used as a reference in the Project's license application.

5.1.6 Rare, Threatened, and Endangered Species

5.1.6.1 Sensitive Plant Surveys

Potential habitat for 14 special status plant species was identified within the 2015 plant survey study area. Of these, one species, smooth desert parsley (*Lomatium lavaegatum),* was verified within the study area during the 2015 assessment by surveying the area of known occurrence documented in the Washington Natural Heritage Program records. An additional sensitive plant survey would be undertaken as part of the vegetation characterization study to document any of the remaining 13 special status plants that may occur in the currently proposed Project boundary so that appropriate protection and mitigation measures can be implemented. This study would be coordinated with the ethnobotanist from the Yakama Nation and the cultural resources studies discussed below. Survey methods would follow standard methods for sensitive plant surveys, including surveying all areas of suitable habitat for the 13 target species.

5.1.7 Recreation and Land Use

No studies related to recreation resources or land use are proposed at this time.

5.1.8 Visual Resources Study

A visual resources study is proposed to build upon information gathered during the visual resources studies completed by KPUD in 2015. The objective of the visual resources study is to evaluate the visual compatibility of the proposed Project with the existing landscape at established KOPs in the Project study area.

Using the BLM VRM methodology, the visual resources study will include an inventory and classification of existing Project facilities and surrounding landscape features; an assessment of Project impacts from KOPs; and a list of proposed PM&E measures for aesthetic resources. During the 2015 visual resources study, KOPs were established and the visual characteristics of the affected environment were described. The established KOPs and any unchanged information regarding visual characteristics will be utilized in the 2019 study.

The visual resources study will include a viewshed analysis, that will be completed using a combination of field data and desktop GIS analysis. The field component includes field verification of the initial viewshed analysis results and confirmation that the 2015 KOP locations can be utilized for the 2019 visual resources study. The extent of the Project viewshed will be determined by extending a 6-mile buffer from the Project area to include all areas with a line-of-sight view of Project infrastructure and features that would be classified as foreground-middleground, based on the BLM Distance Zone methodology. The boundary between the foreground and background distance of 6 miles will be field verified, as well as the visual characteristics of the views from each KOP. Where needed, updated field data will be imported into the GIS to complete the viewshed analysis.

The viewshed model will be built in GIS using a bare-earth digital elevation model (DEM) of the Project Facilities Area, 3D models of Project infrastructure and features, and landforms and observations made during the field event. The process will begin by developing a DEM of terrain features (bare-earth model) in GIS, importing field data and 3D Project model data, and reviewing inputs to ensure consistency and accuracy. Then a bare-earth viewshed analysis will be run for Project infrastructure and features to generate a baseline output for zones of theoretical visibility. Final bare-earth outputs will be manually adjusted based on field notes, with areas of no visibility removed where appropriate. The resulting viewshed maps will illustrate those areas with views of Project infrastructure or features, taking into account the screening effects of intervening terrain features and structures in the existing landscape.

Specific objectives of the 2019 visual resources study are:

- Confirm the visual characteristics of the affected environment;
- Determine the potential impacts of the proposed Project on local visual resources; and
- Document engineering efforts and mitigation measures to reduce impacts to visual resources.

The proposed methods for this study are consistent with professional practices and have been employed at other hydroelectric projects throughout the United States. The established KOPs are consistent with these practices. Five KOPs were established at locations currently available to routine observers in the vicinity of proposed Project study area. These locations are described in detail in Section 4.9.2.3 of this PAD.

- KOP 1: In a grassy medium West of the intersection of Hoctor Road and Highway 97.
- KOP 2: Along the side of road at the intersection of Willis Road and Hoctor Road facing south.
- KOP 3: The top of the Columbia Hills at Juniper Point looking south at the proposed location of the lower reservoir; approximately 300 feet on the downslope side from the radio tower.
- KOP 4: A gravel pullout adjacent to the southeast side of Highway 14 above the proposed location of the lower reservoir.
- KOP 5: Near the town of Rufus along the bank of the Columbia River in Giles French/John Day Dam Park facing north across the river toward the lower plateau and the location of the lower reservoir.

Photographs have been taken to represent the existing conditions from each of these KOPs. As a part of the visual resources study, these photographs will be modified to include simulations of the proposed Project infrastructure to evaluate the effect the Project would have on the visual resources within the viewshed of the Project following development (photomontage).

Common factors considered when evaluating the character of the existing landscape would include visual quality, viewer concern, and viewer exposure. Visual quality measures the overall scenic value or attractiveness of the landscape by considering the landform, vegetation, rock form, water features, cultural features, and built structures of the area. Viewer concern accounts for the relative importance placed on visual resources by viewers of an area, based on management goals, existing land uses, and available information about viewer interests and concerns. Viewer exposure assesses the visibility of the landscape or proposed Project infrastructure, relative distance from the observer, number of viewers, and duration of view of the landscape and Project infrastructure by viewers in the area. These three factors will be evaluated based on available information and professional judgment to make a determination about the sensitivity of the existing landscape to visual change.

Results of the visual resources study, including photomontages and an assessment of impacts to visual resources, will be included in the license application. The information gained through the visual resources study will describe potential visual impacts of the proposed Project and will be used to establish any PM&E measures needed to protect visual resources. These PM&E measures will be further described in a VRRMP, a draft of which will be provided in the Project's license application.

5.1.9 Cultural and Tribal Resources

As part of the licensing process, the Applicant is consulting with DAHP and appropriate Tribal interests in accordance with requirements of Section 106 of the NHPA. DAHP has indicated that there are recorded archaeological sites in the general area, and the area's landforms and environment are sensitive for archaeological resources. They also requested that an archaeological survey be completed in areas proposed for disturbance.

The Applicant is currently working with the Yakama Indian Nation to have Yakama Nation archeologists perform a cultural resource study pursuant to Section 106. The Applicant would consult with DAHP and the other interested Tribes throughout the licensing process regarding inventory needs as well as appropriate measures for protection and/or mitigation of identified cultural resources.

5.1.10 Socioeconomics

The Applicant intends to complete a socioeconomic analysis of the economic impacts resulting from the construction and operations of the proposed Project. This study would update the study that was completed by KPUD for a pumped storage project at this location in 2015. The analysis would utilize the IMPLAN (for IMpact Analysis for PLANning) economic impact model (or similar) to accurately measure the economic and fiscal impacts of construction and operation of the proposed project. IMPLAN type economic modeling is widely respected and used by thousands of public and private agencies to analyze economic impacts. The USDA recognizes

the IMPLAN modeling framework as "one of the most credible regional impact models used for regional economic impact analysis." It selected IMPLAN as its analysis framework to monitor job creation associated with the American Recovery and Reinvestment Act of 2009.

6.0 RELEVANT RESOURCE MANAGEMENT PLANS

As stipulated in Section 10(a)(2)(A) of the Federal Power Act, 16 USC § 803 (a)(2)(A) requires FERC to consider the extent to which a proposed Project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the Project.

FERC will accord Federal Power Act §10(a)(2)(A) comprehensive plan status to any federal or state plan that:

- Is a comprehensive study of one or more of the beneficial uses of a waterway or waterways;
- Specifies the standards, data, and methodology used; and
- Is filed with the Secretary of the Commission.

The applicant has reviewed the filed documents for the state of Washington and adjoining Oregon waterways, as well as plans of Federal agencies listed in FERC's Revised List of Comprehensive Plans, 2018, in order to explain how and why the proposed Project would, would not, or should not comply with the qualifying comprehensive plans as defined in 18 CFR § 4.38.

Upon careful and deliberate scrutiny of the listed qualifying comprehensive plans, justification for the Applicant's decisions with regard to each of the plans listed relative to the proposed Project area is provided below.

6.1 Qualifying Comprehensive Plans Deemed Applicable

The qualifying plans listed below have been deemed potentially applicable. Each plan is listed separately with a brief explanation for its inclusion as an applicable qualifying comprehensive plan.

6.1.1 Oregon

- Department of the Army, Corps of Engineers. Portland District. 1993. Water resources development in Oregon. Portland, Oregon.

  Potentially applicable because:

  The proposed Project is located upstream from the Portland District near to the Columbia River and this plan would be used to evaluate the proposed Project's consistency with the Oregon water resources development goals set forth by the Amy, Corps of Engineers.

- Hydro Task Force and Strategic Water Management Group. 1988. Oregon comprehensive waterway management plan. Salem, Oregon.

  Potentially applicable because:

  The proposed Project is located on the Columbia River, an Oregon waterway, and is a pool-pumped storage hydroelectric Project and therefore falls under the Oregon comprehensive waterway management plan. This plan would be used to evaluate the proposed Project's consistency with the Oregon comprehensive waterway management goals set forth by the Hydro Task Force and Strategic Water Management Group.

- Northwest Power and Conservation Council. 2014. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2014-12. October 2014.

  Potentially applicable because:

  The proposed Project is located near the Columbia River and the John Day Dam and this plan would be used to evaluate the proposed Project's consistency with the Columbia River Basin fish and wildlife program set forth by the Northwest Power and Conservation Council.

- Northwest Power and Conservation Council. 2016. The Seventh Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2016-02. February 2016.

  Potentially applicable because:

  The proposed Project is located near the Columbia River and the John Day Hydroelectric Dam and this plan would be used to evaluate the proposed Project's consistency with The Sixth Northwest conservation and electric power plan set forth by the Northwest Power and Conservation Council.

- Oregon Department of Energy. 1987. Oregon final summary report for the Pacific Northwest rivers study. Salem, Oregon. November 1987.

  Potentially applicable because:

  The proposed Project is located near the Columbia River and the John Day Dam and this plan would be used to evaluate the proposed Project's consistency with the Oregon final summary report for the Pacific Northwest rivers study set forth by the Oregon Department of Energy.

- Oregon Department of Environmental Quality. 1978. Statewide water quality management plan. Salem, Oregon. November 1978. Seven volumes.

  Potentially applicable because:

  The proposed Project is located near the Columbia River, a waterway with concurrent Washington and Oregon jurisdiction for regulating, protecting, and preserving fisheries resources. This plan would be used to evaluate the proposed Project's consistency with

the Oregon Statewide water quality management plan set forth by the Oregon Department of Environmental Quality.

- Oregon Water Resources Board. 1973. Surface area of lakes and reservoirs. Salem, Oregon.

  Potentially applicable because:

  The proposed Project is located near the Columbia River, a waterway with concurrent Washington and Oregon jurisdiction for regulating, protecting, and preserving fisheries resources. This plan would be used to evaluate the proposed Project's consistency with the relevant water-related rules and regulations.

- State of Oregon water use programs Oregon Water Resources Commission. 1987.

  Potentially applicable because:

  The proposed Project is located near the Columbia River that runs between Washington State and Oregon State. The proposed Project would use water from the Columbia River. This plan would be used to evaluate consistency with the State of Oregon water use programs set forth by Oregon Water Resources Commission.

- Oregon Water Resources Department. 1988. Oregon water laws. Salem, Oregon.

  Applicable because:

  The proposed Project is located near the Columbia River that runs between Washington State and Oregon State. The proposed Project would use water from the Columbia River. This plan would be evaluated for consistency with the Oregon water laws set forth by Oregon Water Resources Department.

6.1.2 Washington

- Bureau of Land Management. 1987. Spokane resource area management plan. Department of the Interior, Spokane, Washington. May 1987.

  Potentially applicable because:
  The proposed Project is located within the Spokane resource area. The BLM maintains records of subsurface mineral rights. This plan would be used to evaluate the Project's consistency with the Spokane resource area management plan goals set forth by the BLM.

- National Marine Fisheries Service. 2004. Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan. Washington. December 15, 2004.

  Potentially applicable because:
  The proposed Project is located in the Lower Middle Columbia River Subbasin, near the Columbia River and the John Day Dam. This plan would be used to evaluate the

proposed Project's consistency with the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan set forth by the National Marine Fisheries Service.

- Northwest Power and Conservation Council. 2014. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2014-12.

  Potentially applicable because:
  The proposed Project is located near the Columbia River and the John Day Dam and this plan would be used to evaluate the proposed Project's consistency with the Columbia River Basin fish and wildlife program set forth by the Northwest Power and Conservation Council.

- Northwest Power and Conservation Council. 2016. The Seventh Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2016-02. February 2016.

  Potentially applicable because:
  The proposed Project is located near the Columbia River and the John Day Hydroelectric Dam and this plan would be used to evaluate the proposed Project's consistency with the Sixth Northwest conservation and electric power plan set forth by the Northwest Power and Conservation Council.

- State of Idaho. State of Oregon. State of Washington. Confederated Tribes of the Warm Springs Reservation of Oregon. Confederated Tribes of the Umatilla Indian Reservation. Nez Perce Tribe. Confederated Tribes and Bands of the Yakima Indian Nation. 1987. Settlement Agreement pursuant to the September 1, 1983, Order of the U.S. District Court for the District of Oregon in Case No. 68-5113. Columbia River fish management plan. Portland, Oregon. November 1987.

  Potentially applicable because:
  The proposed Project is located near the Columbia River that runs between Washington State and Oregon State. The proposed Project would use water from the Columbia River. This plan would be used to evaluate the proposed Project's consistency with the Columbia River fish management plan set forth by State of Idaho. State of Oregon, State of Washington, Confederated Tribes of the Warm Springs Reservation of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Confederated Tribes and Bands of the Yakima Indian Nation.

- State of Washington. 1977. Statute establishing the State scenic river system, Chapter 79.72 RCW. Olympia, Washington.

  Potentially applicable because:
  The proposed Project is located in Klickitat County, Washington, near the Columbia River, a water resource and scenic river.

- Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. A resource protection planning process identification of prehistoric archaeological resources in the lower Columbia study unit. Olympia, Washington.

  Potentially applicable because:
  The proposed Project is located in the Lower Middle Columbia Basin and near the Columbia River in Washington State. This plan would be used to evaluate the proposed Project's consistency with the resource protection planning process identification of prehistoric archaeological resources in the lower Columbia study unit set forth by the Washington Department of Community Development and Office of Archaeology and Historic Preservation.

- Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. Resource protection planning process—Paleoindian study unit. Olympia, Washington.

  Potentially applicable because:
  The proposed Project is located in the Lower Middle Columbia Basin and near the Columbia River in Washington State. This plan would be used to evaluate the proposed Project's consistency with the Resource protection planning process—Paleoindian study unit set forth by the Washington Department of Community Development and Office of Archaeology and Historic Preservation.

- Washington Department of Community Development. Office of Archaeology and Historic Preservation. 1987. Resource protection planning process—mid-Columbia study unit. Olympia, Washington.

  Potentially applicable because:
  The proposed Project is located in the Lower Middle Columbia Basin and near the Columbia River in Washington State. This plan would be used to evaluate the proposed Project's consistency with the resource protection planning process—mid-Columbia study unit set forth by the Washington Department of Community Development.

- Washington Department of Ecology. 1978. Water resources management program: Columbia River John Day and McNary pools. Olympia, Washington. October 1978.

  Potentially applicable because:
  The proposed Project is located near the John Day Hydroelectric Dam on the Columbia River and is an addition to the current John Day Hydroelectric Dam system. The proposed Project is downstream from the McNary Hydroelectric Dam. This plan would be used to evaluate the proposed Project's consistency with the water resources management program: Columbia River John Day and McNary pools set forth by the Washington Department of Ecology.

- Washington Department of Ecology. 1986. Application of shoreline management to hydroelectric developments. Olympia, Washington. September 1986.

  Potentially applicable because:
  The proposed Project is located near the John Day Hydroelectric Dam on the Columbia River and is an addition to the current John Day Hydroelectric Dam system. This plan would be used to evaluate the proposed Project's consistency with the application of shoreline management to hydroelectric developments set forth by the Washington Department of Ecology.

- Washington Department of Ecology. 1982. Instream resource protection program for the main stem Columbia River in Washington State. Olympia, Washington.

  Potentially applicable because:
  The proposed Project is located near the Columbia River, the largest river system in Washington and the Pacific Northwest. This plan would be used to evaluate the proposed Project's consistency with the instream resource protection program for the main stem Columbia River in Washington State set forth by the Washington Department of Ecology.

- Washington Department of Fisheries. 1987. Hydroelectric Project assessment guidelines. Olympia, Washington.

  Potentially applicable because:
  The proposed Project is located near the John Day Hydroelectric Dam on the Columbia River and is an addition to the current John Day Hydroelectric Dam system. This plan would be used to evaluate the proposed Project's consistency with hydroelectric Project assessment guidelines set forth by the Washington Department of Fisheries.

- Washington Department of Fish and Wildlife. 1997. Management recommendations for Washington's priority habitats: Riparian. Olympia, Washington. December 1997.

  Potentially applicable because:
  The proposed Project is located within rural Washington State. This plan would be used to evaluate the proposed Project's consistency with management recommendations for Washington's priority habitats: Riparian, set forth by the Washington Department of Fish and Wildlife.

- Washington Department of Fish and Wildlife. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Olympia, Washington. May 2004.

  Potentially applicable because:
  The proposed Project is located within rural Washington State. This plan would be used to evaluate the proposed Project's consistency with management recommendations for

Washington's priority species, Volume IV: Birds, set forth by the Washington Department of Fish and Wildlife.

- Washington Department of Fish and Wildlife. 2005. Washington's comprehensive wildlife conservation strategy. Olympia, Washington. September 19, 2005.

  Potentially applicable because:
  The proposed Project is located within rural Washington State. This plan would be used to evaluate the proposed Project's consistency with Washington's comprehensive wildlife conservation strategy set forth by the Washington Department of Fish and Wildlife.

- Washington Department of Game. 1987. Strategies for Washington's wildlife. Olympia, Washington. May 1987.

  Potentially applicable because:
  The proposed Project is located within Washington State. This plan would be used to evaluate the proposed Project's consistency with strategies for Washington's wildlife goals set forth by the Washington Department of Game.

- Washington Department of Natural Resources. 1987. State of Washington natural heritage plan. Olympia, Washington.

  Potentially applicable because:
  The proposed Project is located within Washington State. This plan would be used to evaluate the proposed Project's consistency with State of Washington natural heritage plan goals set forth by the Washington Department of Game.

- Washington Department of Natural Resources. 1997. Final habitat conservation plan. Olympia, Washington. September 1997.

  Potentially applicable because:
  The proposed Project lies within the Klickitat County which is included in the final habitat conservation plan. This plan would be used to evaluate the proposed Project's consistency with final habitat conservation plan goals set forth by the DNR.

- Washington State Energy Office. 1992. Washington State hydropower development/resource protection plan. Olympia, Washington. December 1992.

  Potentially applicable because:
  The proposed Project is located near the John Day Hydroelectric Dam on the Columbia River. This plan would be used to evaluate the proposed Project's consistency with Washington State hydropower development/resource protection plan set forth by the Washington State Energy Office.

- Washington State Parks and Recreation Commission. 1988. Washington State scenic river assessment. Olympia, Washington. September 1988.

Potentially applicable because:
The Columbia River, the largest river in the Pacific Northwest region including Washington, is included in the Scenic Rivers program report by Washington State Parks and Recreation Commission. The proposed Project is located near the Columbia River.

- Washington State Parks and Recreation Commission. 1988. Scenic rivers program: report. Olympia, Washington. January 29, 1988.

  Potentially applicable because:
  The Columbia River, the largest river in the Pacific Northwest region including Washington, is included in the Scenic Rivers program report by Washington State Parks and Recreation Commission. The proposed Project is located near the Columbia River.

6.2 Project-Specific Resource Management Plans

The Applicant has developed a number of draft Project-specific Resource Management Plans based on initial consultation with stakeholders, as well as results of field studies and literature research. Draft plans are included in the Appendices, as follows:

- Wildlife Management Plan (WMP, Appendix C)
- Vegetation Management and Monitoring Plan (VMMP, Appendix D)
- Historic Properties Management Plan (HPMP, Appendix E)

Additional plans will be developed for the License Application or prior to construction based on consultation, study results, design plans, and construction schedules. These may include (but are not limited to):

- Visual Resources Management Plan
- Stormwater Pollution Prevention Plan
- Erosion and Sediment Control Plan
- Traffic Management Plan
- Safety During Construction Plan
- Soil and Erosion Control Plan
- Contaminated Materials Management Plan (if needed)

7.0 CORRESPONDENCE

On November 21, 2018, the Applicant sent letters to state and federal resource agencies, Tribes, NGOs, and other stakeholders requesting existing information related to the proposed Project. The Applicant requested that any information be provided within 30 days of the request. Public comments and information have been received from organizations and individuals as listed below in Table 7-1. The Project mailing list, an example Request for Information letter, and full text of the letters is available in Appendix A.

Table 7-1: Public and Agency Comments and Information Received Regarding the Goldendale Energy Storage Project

No	Agency	Name	Date Received	Type of Response	Responding to
1	Washington Department Fish & Wildlife	Patrick Verhey	01/14/2019	Email	RFI
2	U.S. Geological Survey Washington Water Science Center	Rick Dinicola	12/21/2018	Email	RFI
3	Oregon Department of Fish & Wildlife	Elizabeth AO Moats	12/20/2018	Email	RFI
4	Oregon State Historic Preservation	Jamie French	12/20/2018	Email	RFI
5	US Hang Gliding & Paragliding	Kelly Kellar	12/19/2018	Email	RFI
6	Oregon Public Utility Condition	Diane Davis	12/13/2018	Email	RFI
7	National Oceanic and Atmospheric Administration Marine Branch Division	Diane Melancon	11/30/2018	Email	RFI
8	Oregon Department of Justice	Patrick Rowe	11/30/2018	Email	RFI
9	Washington Department Fish & Wildlife	Patrick Verhey	11/30/2018	Email	RFI
10	Washington Department of Ecology	Garin Schrieve	11/29/2018	Email	RFI
11	Bureau of Land Management	Lenore Heppler	11/28/2018	Email	RFI
12	Confederated Tribes of the Umatilla	Shawn Steinmetz	11/27/2018	Email	RFI
13	Sherman County	Jenine McDermid	11/26/2018	Email	RFI
14	Confederated Tribes of the Yakima Indians	Lonnie Selam	02/14/2018	FERC Elibrary	PPA
15	U.S. Department of the Interior	Allison O'Brian	02/05/2018	FERC Elibrary	PPA
16	Confederated Tribes of the Umatilla	Kristen Tiede	01/31/2018	FERC Elibrary	PPA

PPA = Preliminary Permit Application; RFI = Request for Information

8.0 COMPREHENSIVE REFERENCE LIST

American Wind Energy Association. 2017. State Fact Sheets. Accessed January 25, 2018. https://www.awea.org/resources/fact-sheets/state-facts-sheets.

APLIC (Avian Power Line Interaction Committee). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC.

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