RECLAMATION
Managing Water in the West

Schaake Property Habitat Improvement Project

FINDING OF NO SIGNIFICANT IMPACT AND ENVIRONMENTAL ASSESSMENT

Yakima River Basin Water Enhancement Project

Yakima, Washington

PN FONSI 19-5
PN EA 19-5

Bureau of Reclamation
Columbia-Cascades Area Office
Pacific Northwest Region
Yakima, Washington\

May 2019

MISSION STATEMENTS

U.S. Department of the Interior

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Finding of No Significant Impact
Schaake Property Habitat Improvement Project
Yakima River Basin Water Enhancement Project, Washington

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PN-FONSI 19-5

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Introduction

The U.S. Department of the Interior, Bureau of Reclamation, has prepared the *Schaake Property Habitat Improvement Project Environmental Assessment* (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. The EA evaluated a proposal by Reclamation to construct this project.

Purpose and Need for Action

Reclamation is proposing to implement the Schaake Property Habitat Improvement Project (Project). The Schaake property is located along the Yakima River near the City of Ellensburg in central Washington State. The property was purchased in 2003 under the authority of Public Law (P.L.)103-434, the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994, Yakima River Basin Water Enhancement Project (YRBWEP) Act, Title XII,[1] that authorizes Reclamation, "to protect, mitigate, and enhance fish and wildlife through improved water management; improved instream flows; improved water quality; protection, creation and enhancement of wetlands; and by other appropriate means of habitat improvement."

The construction of levees in the area, including on the property itself, has confined the river and prevented connectivity between the river and the floodplain. This results in loss of side channels and accessibility to fish habitat. Side channels are critical to the existence of salmonid fish species, especially to escape high velocities during flood events and to access rearing habitat for juvenile fish throughout the year.

In 2011, Reclamation contracted with CH2M Hill to identify options to reconnect the Yakima River to its floodplain on the Schaake property. CH2M Hill prepared the Schaake Property Habitat Improvement Design, Phase 1 Report that includes the following five overall goals:

[1] Title XII was updated on March 12, 2019, via signed legislation, P.L.116-9, The John Dingell Jr. Conservation, Management, and Recreation Act.

1. Create and maintain refuge and rearing habitat for juvenile salmonids.
2. Promote natural geomorphic processes while reducing ongoing maintenance.
3. Protect existing infrastructure from inundation and erosion at the designed discharge.
4. Maintain irrigation supply to water right owners associated with Tjossem Ditch
5. Maintain or decrease the risk of flooding at downstream and adjacent properties unless increased flooding is acceptable to the landowner.

These goals were developed in conjunction with stakeholders having direct impact on, or interest in, the project. Some stakeholders include the City of Ellensburg; Kittitas County; Kittitas Public Utility District; U.S. Army Corps of Engineers (Corps); U.S. Fish and Wildlife Service (USFWS); Washington State Departments of Ecology, Transportation, and Fish and Wildlife (Ecology, WSDOT, WDFW); National Marine Fisheries Service (NMFS); Confederated Tribes and Bands of the Yakama Nation (Yakama Nation); Bonneville Power Administration (BPA); Kittitas County Conservation District (KCCD); and water users, local industry, and local landowners. The EA has a full list of stakeholders in Chapter 4.

Alternatives

The EA analyzed the No Action Alternative and the Proposed Action Alternative described below.

No Action Alternative

Under the No Action Alternative, the Project would not be implemented; therefore, it would not meet the goals and objectives of the proposed action. This alternative represents a continuation of the existing conditions and provides a comparative baseline for evaluating changes and impacts of the Proposed Action Alternative.

The Schaake property would remain in its current state as a levee-protected floodplain, and YRBWEP would continue to manage the lands as they are managed now. The following are examples of actions and conditions that would continue:

- Ongoing land management activities include integrated pest management (IPM) actions (mowing, chemical spraying, biological control, revegetation, and active IPM planning).
- In 2018, Kittitas County removed the Schaake levee from the P.L. 84-99 Program (33 USC Section 701n), which authorized the Corps to conduct rehabilitation and restoration work on the levee. Kittitas County would transfer ownership and maintenance responsibilities to Reclamation in spring 2019 and would repair approximately 500 linear feet of levee that was damaged during the winter 2015-2016 flood events. Incision at the upstream end of the project reach would continue due to levee presence.
- Fish would continue to be stranded in areas inundated by high-water because there is no perennial flow or established side channels in the project area.

- Yakima River would continue to lack the habitat complexity of perennial side channels in the Schaake reach that provide juvenile salmonids with refuge from high-velocity flows, predation, and high temperatures.
- Yakima River would continue to be disconnected from its floodplains and wetlands, resulting in sediment remaining in the mainstem.
- Riparian vegetation would continue to be degraded and would not be enhanced along the existing riparian corridor.

Proposed Action: Flood Protection Berm Alternative

The Proposed Action Alternative would be implemented over the 2019 and 2020 construction seasons, each running from June through November, and includes the following primary restoration elements:

- Reestablish hydraulic connectivity between the Yakima River and its floodplain in the Schaake reach by removing selected portions of the Schaake levee and recontouring the floodplain along proposed side channels.
- Construct a flood protection berm (averaging 3 feet high and approximately 0.7 miles long) out of the spoils from onsite floodplain contouring, levee removal, and side channel excavation.
- Create perennial side channels with hydraulic variability, improve flow connectivity and groundwater interaction of alcoves, and reinvigorate existing side channels
- Install large woody material (LWM) in select locations on the mainstem, in constructed side channels, and in wetlands to improve hydraulic function and provide habitat and cover for juvenile salmonids and other fish; also, install LWM in the floodplain at key locations to provide floodplain roughness and increase the stability of the floodplain during high water events.
- Replace one culvert with one of larger capacity; replace two parallel culverts with a vented box-culvert-type crossing; and remove two unnecessary culverts and recontour the adjacent ground to match existing profiles.
- Relocate and gravel existing access roads (some would provide access to BPA power poles), construct three new gravel pads for existing BPA power poles.
- Decommission two wells and remove the wellhouse.
- Revegetate disturbed areas and areas currently under chemical fallow with native grasses, shrubs, and trees.

Benefits created from the primary restoration elements include the following:

- Approximately 130 acres of the natural geomorphic floodplain would be reconnected to the Yakima River through removal of 0.9 miles of the Schaake levee down to the existing floodplain elevation.
- Decreased operation and maintenance (O&M) costs for the Schaake levee.
- Increased wetland functions in existing wetlands and, as a byproduct of the planned floodplain contouring and complexity, it is expected that some wetlands may form, and others may expand.
- Reduced potential for stranding juvenile salmonids by establishing perennial flow through seasonally disconnected side channels.
- Attenuate high-flow events via temporary floodplain storage.
- Reduce flood risk at I-90, the City's Waste Water Treatment Plant (WWTP), the Burlington Northern Santa Fe (BNSF) railroad, and Wilson Creek through and downstream from the Schaake property.

Prior to construction, Reclamation would acquire an 1890 term confirmation deed on 80-acres of land currently owned by the City of Ellensburg, which would be effective until December 2024. Reclamation intends to execute a land exchange contract with the City of Ellensburg for approximately 74 acres; it would include land covered by the 1890 term confirmation deed. The land exchange process involves engineering, environmental review, land survey and legal descriptions of all parcels in the exchange, title reports, appraisal, and an environmental site survey. As part of the land exchange, Reclamation would relocate a displaced farm operation. In addition, Reclamation would secure a permit from the Washington State Department of Natural Resources (WDNR) for work in the mainstem Yakima River that falls within their jurisdictional ownership.

Decision and Finding of No Significant Impact

Based upon the EA, Reclamation has determined that implementing the Proposed Action Alternative will not significantly affect the quality of the human environment. No environmental effects meet the definition of significance in context or intensity as defined at 40 CFR 1508.27; therefore, an environmental impact statement is not required for the proposed action. This finding is based on the EA analysis and consideration of the context and intensity and is summarized below.

Context

The Project is a site-specific action involving the 285-acre Schaake property and approximately 80-acres of land currently owned by the City of Ellensburg, over which Reclamation will acquire an 1890 term confirmation deed prior to construction.

Intensity

The following discussion is organized around the 10 significance criteria described in 40 CFR 1508.27. These criteria were incorporated into the resource analysis and issues considered in the EA.

1. Impacts may be both beneficial and adverse.

   The proposed action will impact resources as described in the EA and summarized below in Table 1. Best Management Practices (BMP) will be used to reduce impacts on resources and are incorporated into the design of the Proposed Action Alternative.

Table 1. Resources impacted by the Proposed Action Alternative

Resource Category	Proposed Action Alternative Impacts
Aesthetics and Visual Resources	• Temporary reduction in visual quality during construction to viewers from I-90 and Umptanum Road (moderate). • Long-term changes to visual landscape due to flood protection berm and lower surface elevation of the Schaake property, allowing vistas of Yakima River from I-90 (low). • Long-term visual improvement due to reestablishment of site's historical riparian vegetation (low). • Enhanced viewshed from more frequent inundation (low).
Air Quality	• Construction vehicles would temporarily emit pollutants including carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter. Emissions would not exceed threshold values. • Dust will be generated during construction and use of unpaved access roads but minimized by application of water (low).
Cultural Resources	• No built environment resources were found in the Project area. • No archaeological resources were found in locations where surface disturbance would occur. • Potential impacts related to inadvertent discovery of cultural resources would be low; however, ground-disturbing actions must be discontinued in the event of discovery of cultural resources (low).
Fish	• Project would increase habitat area, increase habitat diversity, improve channel complexity, improve water quality, and restore/increase access to wetland, floodplain, side channel, and stream habitat for spawning and juvenile salmonid rearing (moderate). • Short-term impacts on fish could occur as a result of turbidity or accidental spills of contaminants (low). • Short-term loss of riparian vegetation during construction could reduce cover and shading (low). • Injury or mortality of fish would be possible during work area isolation and fish salvage (low). • Completed project would provide refuge to juvenile fish during the higher peak flows that are anticipated under current and future Yakima Project Operations (moderate).

Resource Category	Proposed Action Alternative Impacts
Topography, Geology and Soils	• More natural sediment accretion processes would occur in the floodplain and floodplain wetlands due to inundation of Yakima River waters (low). • Wind impacts on the flood protection berm would be mitigated by seeding with a native seed mix (low). • Temporary erosion at levee breach locations and other work areas during construction would cause localized turbidity or surface erosion. Erosion and sediment control measures would be implemented to mitigate this impact (low). • Minor soil loss would likely occur when the side channels are initially inundated (low). • Changes to topography would occur at levees and areas of the floodplain are graded to encourage wetland creation areas (low). • Completed project would provide flood storage and attenuate higher peak flows (moderate). • Hydric soils would form over time in wetland creation areas (low).
Land Use	• Reclamation will exercise their 1890 rights for construction and right-of-entry access on City of Ellensburg property; construction may result in temporary loss of access (low). • Reclamation would continue working with the City of Ellensburg on a land exchange including relocation of a displaced farm operation.
Noise	• Impacts from noise levels during construction will be a moderate but temporary impact on individuals within 100 ft. of the construction area along I-90 (low).
Hazardous Materials	• Accidental spills of fuels, lubricants or solvents used by equipment during construction could affect water quality, plants, or animals in the vicinity (low). • Possibility of releases of herbicides during maintenance would be the same as for the no action alternative (low). • All Appropriate Inquiries will be conducted for temporary easements or land acquisition.
Public Health and Safety	• Current level of flood protection will be maintained or increased with construction of flood protection berm. Benefit of protection from Yakima River flooding would be increased for downstream landowners (moderate). • Completed project will provide flood storage and attenuate higher peak flows (moderate).

Resource Category	Proposed Action Alternative Impacts
Socioeconomics and Environmental Justice	• Some construction funds will likely be spent in the local area for equipment, supplies, and services, providing short-term stimulus for local businesses (low). • Short-term noise, dust, and traffic impacts to residents in the area will not disproportionately affect low-income populations. • Benefits to fisheries on Yakima River (moderate). • Increased level of protection from Yakima River flooding, over current levee conditions, through installation of flood protection berm (moderate).
Transportation and Infrastructure	• Traffic will be increased along Umptanum Road between June and November of 2019 and 2020 (low). • Traffic could be slowed by construction vehicles entering or leaving the construction area (low). • I-90 would experience the same level of flood protection with construction of the flood protection berm as under the existing levee (low). • Traffic on I-90 may slow during the construction window with the increase in activity adjacent to the Interstate (minor). • Tjossem Ditch headgates are expected to experience less sedimentation during the irrigation season thereby reducing operations and maintenance costs (low).
Vegetation and Wetlands	• Short-term impacts on wetland and riparian vegetation during construction (low). • Non-native plant communities in restored areas will be replaced by native species, increasing habitat diversity and native plant cover (moderate). • Potential for newly created wetlands will create additional habitat diversity (low). • Some riparian vegetation will be lost. The project will create more riparian areas than it will affect, so losses will be temporary (low). • Vented box culvert will allow connectivity between Wetland CC and Wetland Z and remove traffic crossing through “stream” under high water conditions (low).

Resource Category	Proposed Action Alternative Impacts
Water Resources	• Construction actions could lead to temporary increases in turbidity in floodplain wetlands and the Yakima River (low). • Increased exchange with the Yakima River could improve water quality within the wetlands (low). • As new wetland areas are inundated, and vegetation decomposes, short-term reduction in dissolved oxygen (DO) and changes to pH could occur (low). • Decomposing vegetation could release nutrients including phosphorous and nitrogen on a short-term basis (low). • Restored riparian areas will provide shading of surface waters and combined with restored wetlands would help to retain groundwater over a longer period (low). • Current level of flood protection will remain in place, but the level of protection from Yakima River flooding would benefit by increasing substantially (moderate).
Wildlife	• Short-term displacement of terrestrial wildlife and avian species resulting from construction and potential long-term displacement due to inundation (low). • Long-term increase in riparian habitat for wintering waterfowl and nesting birds (low). • Beneficial increase in extent and diversity of habitat for aquatic wildlife (moderate).
Indian Trust Assets (ITAs)	• Water quality, fish and wildlife habitat, and vegetation would be restored to more historic conditions (moderate).

2. The degree to which the selected alternative will affect public health or safety, or a minority or low-income population.

   The proposed action will have no significant impacts on public health or safety and action will not disproportionately (unequally) affect any low-income or minority communities within the Project area; therefore, the requirements of Executive Order 12898 do not apply.

3. Unique characteristics of the geographic area.

   No parklands, prime farmlands, wild and scenic rivers, or ecologically critical areas will be affected by the proposed action.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

The effects of the Proposed Action Alternative on the quality of the human environment are unlikely to be highly controversial, as defined in 43 CFR 46.30[2]. Landowners near the Project area have participated as stakeholders during the development of the Proposed Action Alternative.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

   There are no predicted effects on the human environment considered highly uncertain or involve unique or unknown risks. Modeling has been used to demonstrate that the Yakima River will be better connected with its floodplain and the downstream landowners will not experience more flooding with removal of the levee and construction of the flood protection berm; in fact, they will likely experience less flooding with implementation of the Proposed Action Alternative.

6. The action will not establish a precedent for future actions with significant effects, and it will not represent a decision in principle about a future consideration.

   The action is not precedent setting. Reclamation currently owns and maintains other floodplain properties under YRBWEP.

7. Whether the proposed action is related to other actions that are individually insignificant but cumulatively significant.

   Chapter 3 of the EA analyzed the impacts on resources and the degree to which cumulatively significant impacts could occur as a result of implementing the Proposed Action Alternative. Reclamation is not aware of any past, present, or reasonably foreseeable actions likely to coincide with construction of the Project, in time and proximity, such that significant cumulative impacts would occur on aesthetics and visual resources, air quality, cultural resources, fish, geology and soils, land use, noise, hazardous materials .

8. The degree to which the action may adversely affect sites, districts, buildings, structures, and objects listed, or eligible for listing, in the National Register of Historic Places.

   Reclamation consulted with the State Historic Preservation Officer (SHPO) of the Washington Department of Archaeology and Historic Preservation and the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) regarding effects of the Proposed Action Alternative on cultural resources including historic properties and Indian sacred sites.

   Applying the criteria of *adverse effect* in 36 CFR 800.5 resulted in Reclamation reaching a *finding of no adverse effect* for the proposed Project under National Historic Preservation Act (NHPA). The SHPO concurred with Reclamation's determination that the project, as proposed, would have *no adverse affect* on the National Register-eligible or listed historic and cultural resources in a letter dated November 23, 2015.

[2] Controversial refers to circumstances where a substantial dispute exists as to the environmental consequences of the proposed action and does not refer to the existence of opposition to a proposed action, the effect of which is relatively undisputed (43 CFR 46.30).

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

   For this project, Reclamation would use the *Programmatic Endangered Species Act Section 7(a)(2) Biological Opinion;* and the *Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Seattle District Corps of Engineers Permitting of Fish Passage and Restoration Action in Washington State* (FPRP III) from the USFWS and NMFS as part of Section 7 (a)(2) of the ESA.

   This project would affect Steelhead, Bull Trout, and their designated critical habitat. Short-term negative effects of the proposed action would result from inwater or near-water construction like the installation of the vented box-culvert, large wood placement, and channel construction.

   Physical and chemical changes in the environment associated with construction, especially decreased water quality (e.g., increased total suspended solids, contaminants, and temperature, and decreased dissolved oxygen) will likely affect a larger area than direct interactions between fish and construction personnel. Design criteria related to inwater work timing, sensitive area protection, fish passage, erosion and pollution control, choice of equipment, inwater use of equipment, and work area isolation have been proposed to avoid or reduce these adverse effects.

   The inwater work window has been extended from July 1 to October 31 in coordination with USFWS and NMFS biologists. The degree of instream, substrate compaction and upland soil disturbance that may occur under most of these actions is so small that significant sedimentation of spawning gravel is unlikely. If an adult fish is migrating through an action area during any phase of construction, it is likely able to avoid construction disturbances by moving laterally or stopping briefly; although, spawning could be delayed until construction was complete (Feist et al. 1996; Gregory 1988; Servizi and Martens 1991; Sigler 1988). To the extent that the proposed actions are successful at improving flow conditions and reducing sedimentation, future spawning success and embryo survival in the action area will be enhanced.

   When the proposed action is implemented, it will have beneficial long-term effects to individual fish. The amount of available habitat will promote the development of natural riparian and stream-channel conditions, improve aquatic functions, and become more productive. The newly activated floodplain and side channel habitat will increase productivity by increasing insect abundance thereby increasing prey base for rearing salmonids. In addition, the floodplain will act as a filter to improve nutrient cycling and water quality within the Yakima River. The adjacent floodplain will also moderate instream water temperature in winter and summer via hyporheic flow. Furthermore, newly created side channel habitat will provide a velocity refugia for rearing salmonids. This will allow more complete expression of essential biological behaviors related to reproduction, feeding, rearing, and migration.

If habitat abundance or quality is a limiting factor for ESA-listed fish in streams, the long-term effect of access to larger or more productive habitat is likely to increase juvenile survival and adult reproductive success. Individual response to habitat improvement will depend on factors such as the quality and quantity of newly available habitat and the abundance and nature of the predators, competitors, and prey that reside there.

10. Whether the action threatens a violation of Federal, State, local, or Tribal law, regulation or policy imposed for the protection of the environment.

    The Proposed Action Alternative will not violate any Federal, State, local, or Tribal law, regulation, or policy imposed for the protection of the environment.

Approved:

Dawn A. Wiedmeier
Columbia-Cascades Area Manager
Yakima, Washington

5/23/19
Date

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Schaake Property Habitat Improvement Project Final Environmental Assessment

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Figure 1. Project Map 1

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Figure 2. Project Map 2

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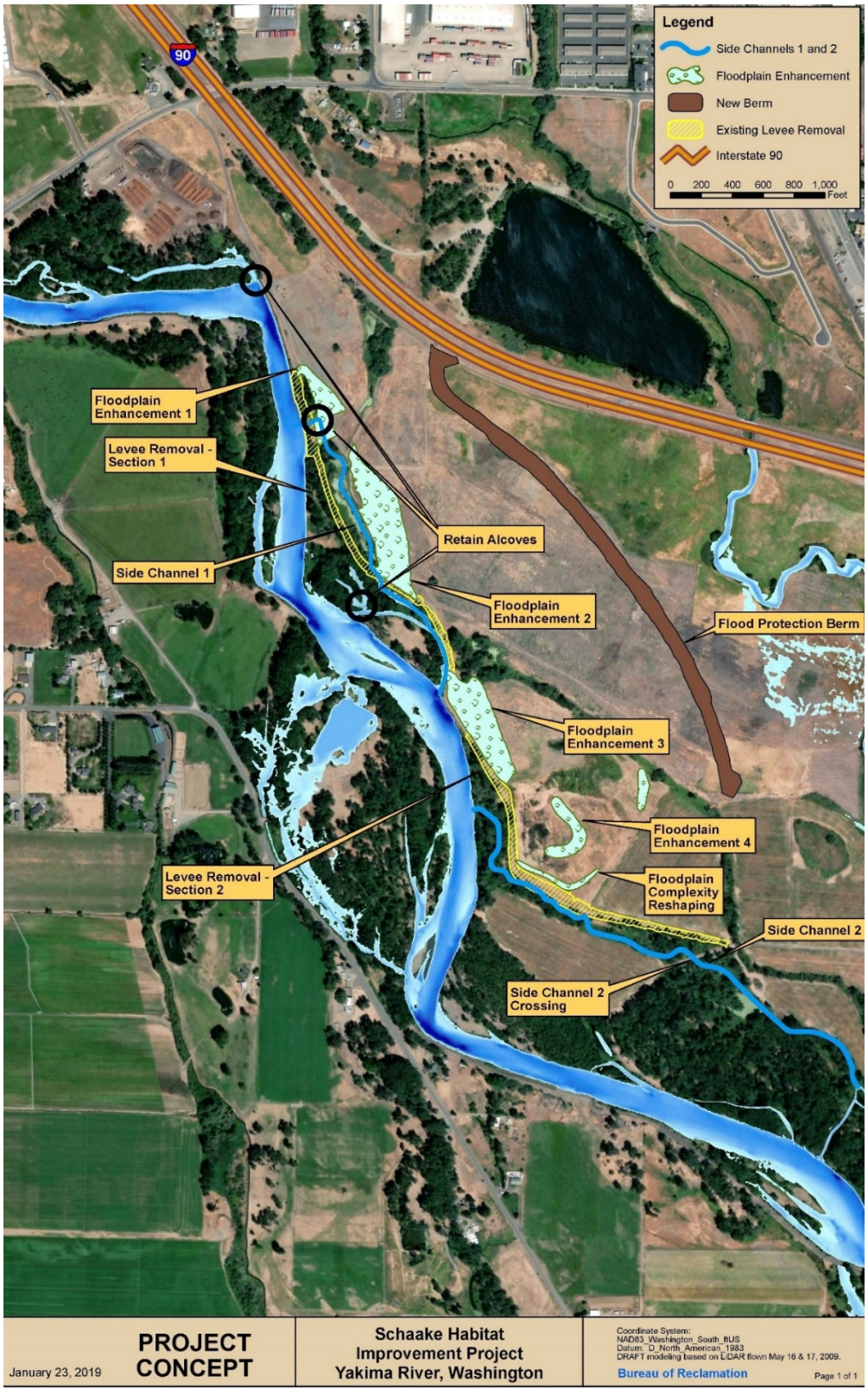

Figure 3. Project Map 3

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Acronyms and Abbreviations

BMP	best management practices
BPA	Bonneville Power Administration
cfs	cubic feet per second
CO^2	carbon dioxide
Corps	U.S. Army Corps of Engineers
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CWA	Clean Water Act
DAHP	Department of Archaeology and Historic Preservation
DMMO	Dredged Material Management Office
DO	dissolved oxygen
DOI	U.S. Department of the Interior
DPS	distinct population segments
EA	environmental assessment
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FEMA	Federal Emergency Management Agency
FONSI	finding of no significant impact
IPM	integrated pest management
ITA	Indian Trust Assets
IWWW	inwater work window
KCCD	Kittitas County Conservation District
LWM	large woody material
Mariposa	Mariposa Restoration Service
MCR	Middle Columbia River
MTCA	Model Toxics Control Act
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NFA	no further action
NO^2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NHPA	National Historic Preservation Act

NMFS	National Marine Fisheries Service
NTU	nephelometric turbidity unit
O&M	operation and maintenance
OHW	ordinary high water
pH	potential hydrogen
Reclamation	Bureau of Reclamation
SO^2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
TSC	Technical Service Center
USFWS	US Fish and Wildlife Service
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WRIA	Water Resource Inventory Act
WSE	water surface elevation
WWTP	Waste Water Treatment Plant
YRBWEP	Yakima River Basin Water Enhancement Project
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation

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Chapter 1 PURPOSE AND NEED

1.1 Introduction

The U.S. Department of the Interior, Bureau of Reclamation has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) for the proposed Schaake Property Habitat Improvement Project. NEPA requires an environmental analysis on any Federal action that may have a significant impact on the human environment. This EA analyzes the potential environmental effects of conducting various activities on the Schaake Property. Reclamation will use this EA to finalize a decision on the proposed action alternative and to determine whether to issue a finding of no significant impact (FONSI) or a notice of intent to prepare an environmental impact statement (EIS).

1.2 Purpose and Need for Action

Reclamation is proposing to implement the Schaake Property Habitat Improvement Project. The Schaake property is located along the Yakima River near the City of Ellensburg in central Washington State (Figure 1). The property was purchased in 2003 under the authority of Public Law (P. L.) 103-434, the Yavapai-Prescott Indian Tribe Water Rights Settlement Act of 1994, Yakima River Basin Water Enhancement Project (YRBWEP) Act, Title XII[1], which authorizes Reclamation, "to protect, mitigate, and enhance fish and wildlife through improved water management; improved instream flows; improved water quality; protection, creation and enhancement of wetlands; and by other appropriate means of habitat improvement."

The construction of levees in the area, including on the property itself, has confined the river and prevented connectivity between the river and the floodplain. This results in loss of side channels and accessibility to fish habitat. Side channels are critical to the existence of salmonid fish species, especially to escape high velocities during flood events and to access rearing habitat for juvenile fish throughout the year.

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1. Create and maintain refuge and rearing habitat for juvenile salmonids
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4. Maintain irrigation supply to water right owners associated with Tjossem Ditch
5. Maintain or decrease the risk of flooding at downstream and adjacent properties unless increased flooding is acceptable to the landowner.

These goals were developed in conjunction with stakeholders having direct impact on, or interest in, the project. Some stakeholders include the City of Ellensburg; Kittitas County; Kittitas Public Utility District; U.S. Army Corps of Engineers (Corps); U.S. Fish and Wildlife

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Service (USFWS); Washington State Departments of Ecology, Transportation, and Fish and Wildlife (Ecology, WSDOT, WDFW); National Marine Fisheries Service (NMFS); Confederated Tribes and Bands of the Yakama Nation (Yakama Nation); Bonneville Power Administration (BPA); Kittitas County Conservation District (KCCD); and water users, local industry, and local landowners. The full list of stakeholders can be found in Chapter 4.

1.3 Project History

Reclamation's Yakima Project provides irrigation water for a comparatively narrow strip of fertile land that extends 175 miles on both sides of the Yakima River in south-central Washington. The irrigable lands presently served is approximately 464,000 acres. Storage dams and reservoirs on the project are Bumping Lake, Clear Creek, Tieton, Cle Elum, Kachess, and Keechelus. Other project features are five major diversion dams, canals, laterals, pumping plants, drains, two powerplants, and transmission lines.

In 2003, Reclamation purchased the 285-acre Schaake property located immediately northeast of the Yakima River, south of Interstate 90 (I-90), and west of Canyon Road in unincorporated Kittitas County in Sections 11 and 14, Township 17N, and Range 18E. It is situated in the Ellensburg basin (Kittitas Valley) in the upper Yakima River basin of central Washington. The site elevation is approximately 1,480 feet. Annual precipitation is 9 to 10 inches, and the growing season is approximately March 28 through October 14.

Historically, the property supported a slaughterhouse and stockyards, which Reclamation removed after they purchased the property. The Schaake reach of the Yakima River has a series of training levees on both river banks. The Schaake levee is a 7,600 feet long non-Federal levee that provides flood protection to the agricultural land, public utilities, and transportation infrastructure in Kittitas County. The levee was constructed by local interest to protect residential and county properties prior to 1948 and has been modified repeatedly (Corps, 2016).

The Schaake levee is in a braided reach that includes wooded floodplains, irrigated hay fields, and other agriculture. The upstream end ties into high ground at Umptanum Road, and the downstream end terminates at Tjossem Ditch (Corps, 2016). As designed, the levee provides a 50-year level of protection from flooding to public infrastructure and private property.

1.4 Legal Authority

The YRBWEP was authorized in 1979 in response to adjudication that began in 1977. The various project components have evolved since then under the following Authorities:

- P. L. 96-162 Feasibility Study, December 28, 1979
- P. L. 98-381 Section 109 of Hoover Power Plant Act of 1984
- P. L. 103-434 Title XII Yakima River Basin Water Enhancement Project, Oct. 31.1994, as amended by PL 105-62, October 13, 1997, and PL 106-372, Oct. 27, 2000
- P. L. 116-9, The John Dingell Jr. Conservation, Management, and Recreation Act, March 12, 2019

Chapter 2 ALTERNATIVES

2.1 Introduction

This chapter describes in detail the alternatives analyzed in this EA. Other alternatives were identified that addressed reconnecting the property to the Yakima River, which included a setback levee and a different side-channel design. These alternatives were removed from consideration due to Category 1 wetlands impacts and because of hydraulic analysis showing the channels would not be sustainable, respectively.

2.2 Alternative Development

The NEPA requires agencies to evaluate a range of reasonable alternatives to a proposed Federal action. Alternatives should meet the purpose and need of the agency while minimizing or avoiding environmental effects. The scope of the proposed action is defined by the purpose and need as described in Chapter 1. Reclamation and stakeholders developed a No Action Alternative and the Proposed Action Alternative.

2.3 No Action Alternative

Under the No Action Alternative, the Schaake Property Habitat Improvement Project would not be implemented; therefore, it would not meet the goals and objectives of the proposed action. This alternative represents a continuation of the existing conditions and provides a comparative baseline for evaluating changes and impacts of the Proposed Action Alternative.

The Schaake property would remain in its current state as a levee-protected floodplain, and YRBWEP would continue to manage the land as it is now. The following are examples of actions and conditions that would continue:

- Ongoing land management activities include integrated pest management (IPM) actions (mowing, chemical spraying, biological control, revegetation, and active IPM planning).
- In 2018, Kittitas County removed the Schaake levee from the P. L. 84-99 Program (33 USC Section 701n) that authorized the Corps to conduct rehabilitation and restoration work on the levee. Kittitas County would transfer ownership and maintenance responsibilities to Reclamation in spring 2019 and repair approximately 500 linear feet of levee that was damaged during the winter 2015–2016 flood events.
- Incision at the upstream end of the project reach would continue due to levee presence.
- Fish would continue to be stranded in areas inundated by high-water because there is no perennial flow or established side channels in the project area.
- Yakima River would continue to lack the habitat complexity of perennial side channels in the Schaake reach that provide juvenile salmonids with refuge from high-velocity flows, predation, and high temperatures.
- Yakima River would continue to be disconnected from its floodplains and wetlands, resulting in sediment remaining in the mainstem.

- Riparian vegetation would continue to be degraded and would not be enhanced along the existing riparian corridor.

2.4 Proposed Action: Flood Protection Berm Alternative

The Flood Protection Berm Alternative includes the following primary restoration elements:

- Reestablish hydraulic connectivity between the Yakima River and its floodplain in the Schaake reach by removing selected portions of the Schaake levee and recontouring the floodplain along proposed side channels
- Construct a flood protection berm (averaging 3 feet high and approximately 0.7 miles long) out of the spoils from onsite floodplain contouring, levee removal, and side channel excavation
- Create perennial side channels with hydraulic variability, improve flow connectivity and groundwater interaction of alcoves, and reinvigorate existing side channels
- Install large woody material (LWM) in select locations on the mainstem, in constructed side channels, and in wetlands to improve hydraulic function and provide habitat and cover for juvenile salmonids and other fish; also, install LWM in the floodplain at key locations to provide floodplain roughness and increase the stability of the floodplain during high water events.
- Replace one culvert with one of larger capacity; replace two parallel culverts with a vented box-culvert-type crossing; and remove two unnecessary culverts and recontour the adjacent ground to match existing profiles.
- Relocate and gravel existing roads (that would provide access to BPA power poles), construct three new gravel pads for existing BPA power poles.
- Decommission two wells and remove the wellhouse.
- Revegetate disturbed areas and areas currently under chemical fallow with native grasses, shrubs, and trees.

Benefits created from the primary restoration elements include the following:

- Approximately 130 acres of the natural geomorphic floodplain would be reconnected to the Yakima River through removal of 0.9 miles of the Schaake levee down to the existing floodplain elevation.
- Decreased operation and maintenance (O&M) costs for the Schaake levee.
- Increased wetland functions in existing wetlands and, as a byproduct of the planned floodplain contouring and complexity, it is expected that some wetlands may form, and others may expand.
- Reduced potential for stranding juvenile salmonids by establishing perennial flow through seasonally disconnected side channels.
- Attenuate high-flow events via temporary floodplain storage.
- Reduce flood risk at I-90, the City's Waste Water Treatment Plant (WWTP), the Burlington Northern Santa Fe (BNSF) railroad, and Wilson Creek through and downstream from the Schaake property.

Prior to construction, Reclamation would acquire an 1890 term confirmation deed on 80-acres of land currently owned by the City of Ellensburg, which would be effective until December 2024. Reclamation intends to execute a land exchange contract with the City of Ellensburg for approximately 74 acres; it would include land covered by the 1890 term confirmation deed. The land exchange process involves engineering, environmental review, land survey and legal descriptions of all parcels in the exchange, title reports, appraisal, and an environmental site survey. As part of the land exchange, Reclamation would relocate a displaced farm operation. In addition, Reclamation would secure a permit from the Washington State Department of Natural Resources (WDNR) to work in the mainstem Yakima River that falls within their jurisdictional ownership.

2.4.1 Construction Phasing

Construction would be phased over two construction seasons. Phase 1 (Figure 4 and Figure 5) would occur between June and September 2019; and Phase 2 (Figure 6 and Figure 7) would occur between June and November 2020. Phase 2 would build upon work initiated in Phase 1 and involve new tasks.

Phase 1

- Construct and maintain staging areas and temporary access routes not in wetlands
- Remove metal headgate from culvert adjacent to I-90
- Place and maintain temporary erosion control
- Site clearing
- Strip, stockpile, and replace topsoil
- Earthwork to relocate permanent access roads and construct BPA utility pads
- Place and compact gravel-surfacing on roads and pads
- Install Wetland E culvert
- Excavate floodplain enhancement areas 1,2 and 3
- Earthwork to remove existing levee
- Excavate and place riprap on levee cut ends
- Place and partially bury floodplain roughness treatments and construct brush trench along the Yakima River where levee was removed at north end of Schaake property
- Earthwork to construct flood protection berm
- Reseed floodplain cuts and levee removal areas with native seed mixes for erosion control and restoration
- Riparian plantings within the 100-foot buffer on each side of Wetland I/Wilson Creek
- Implement restoration plan

Phase 2:

- Place and maintain any additional erosion control
- Selective site clearing for access and construction
- Reinvigorate existing side channels including placement of LWM
- Deepen existing alcoves via selective excavation with cofferdam placement, dewatering, and fish salvage

- Excavate and construct Side-channel 1 and 2 including connecting wetlands and placing LWM
- Connect side channels to the Yakima River including: cofferdam placement, dewatering, and fish salvage operations
- Remove three culverts
- Replace two parallel culverts with a vented box-type culvert including cofferdam placement, dewatering, and fish salvage, if needed
- Excavate and grade floodplain enhancement area 4
- Remove the small berm between Wetlands B and C
- Conduct final grading on floodplain enhancement areas 1 through 4 to promote passive wetland creation
- Selectively grade floodplain and install LWM for floodplain roughness
- Install a brush trench
- Remove a portion of asphalt roadway
- Decompact soil of original roads, temporary access roads, and other heavily compacted areas, such as staging locations and areas identified in the revegetation plan.
- Add topsoil to areas identified in the revegetation plan
- Remove remaining riprap from within wetland boundaries
- Reseed floodplain cuts, roads, and other disturbed areas and place riparian plantings within the 100-foot buffer on each side of Wetland I/Wilson Creek
- Implement the revegetation and resource management plan

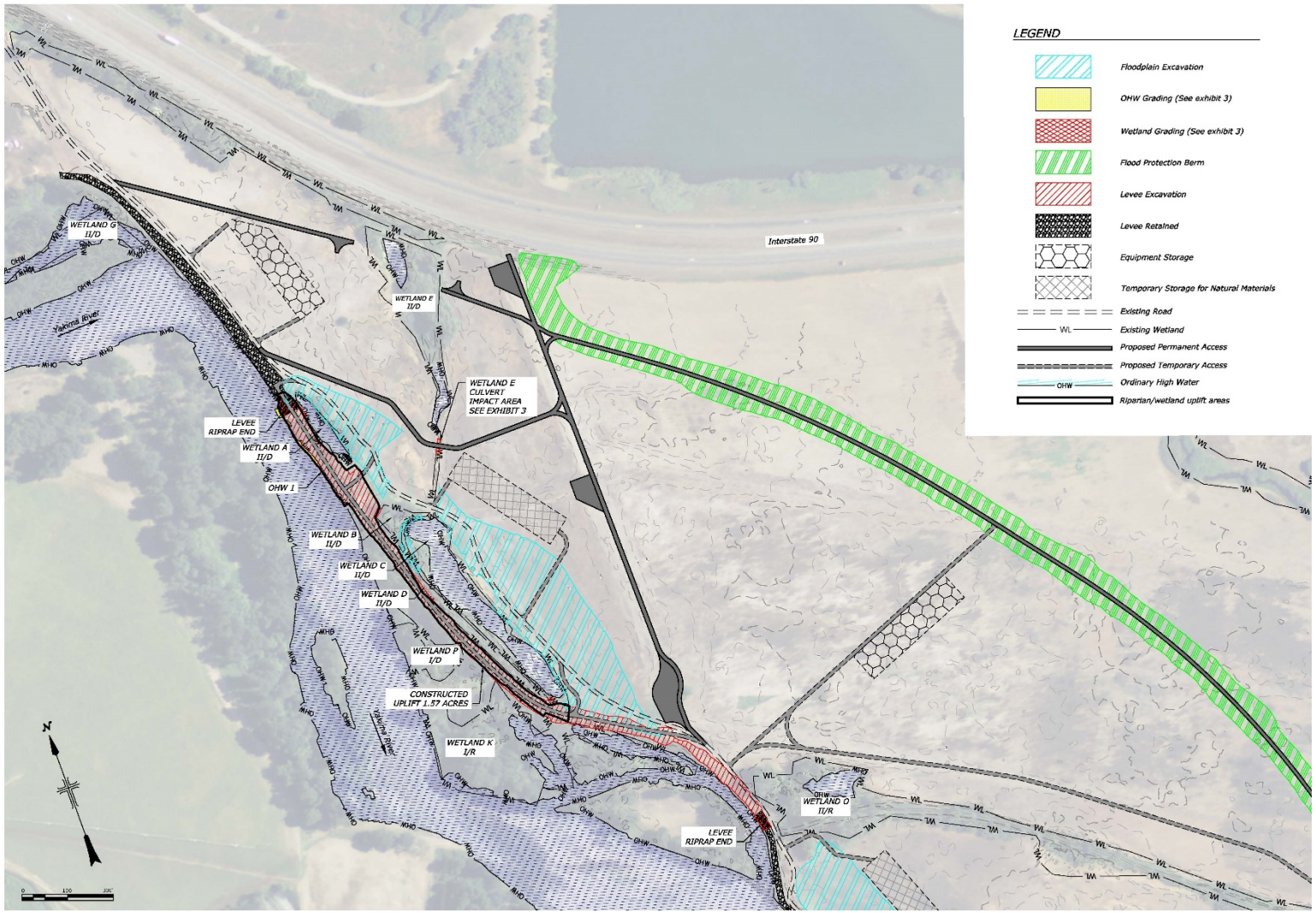

Figure 4. Overview of construction activities in Phase 1 including the first section of levee removal

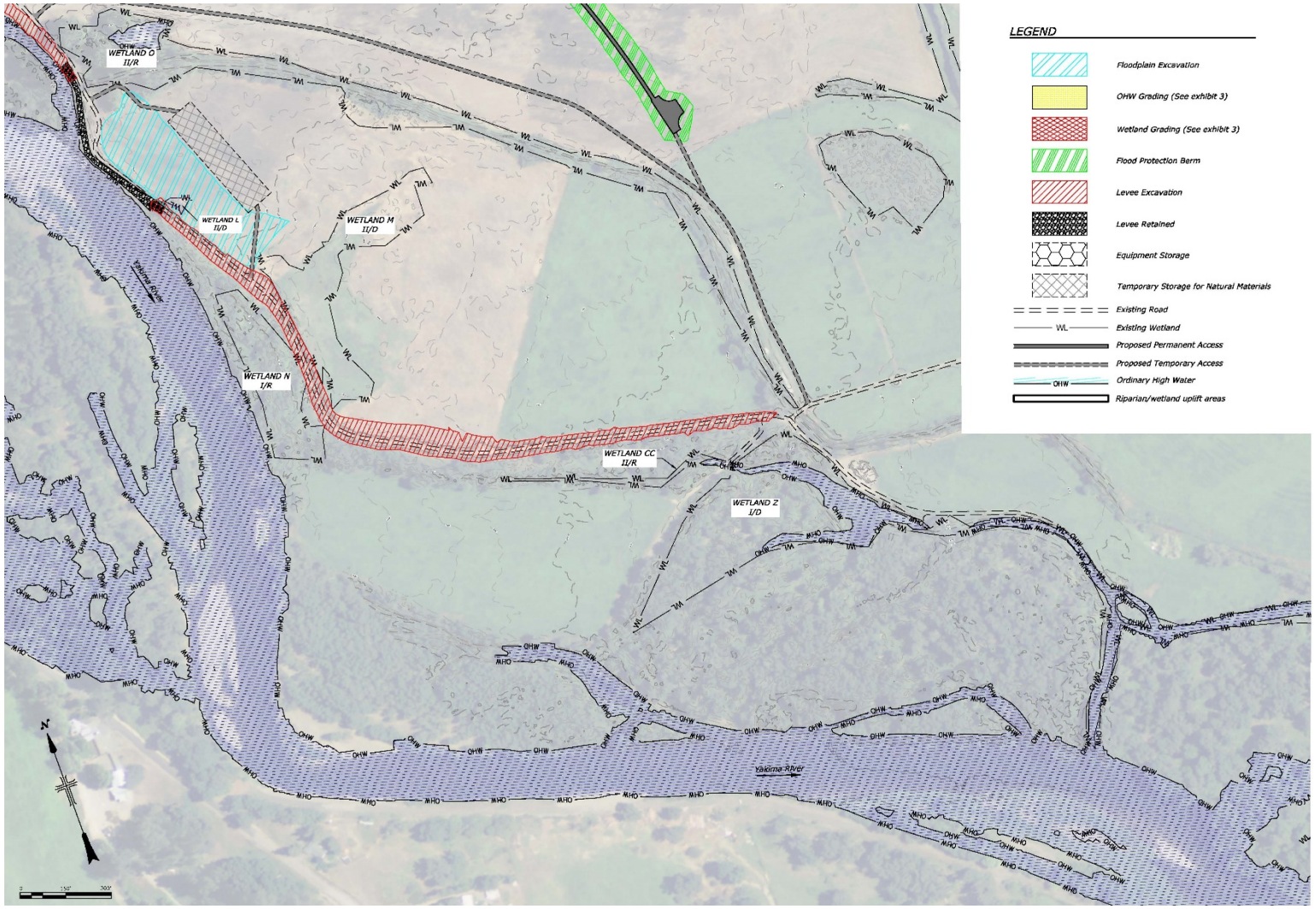

Figure 5. Overview of construction activities in Phase 1 including the second section of levee removal

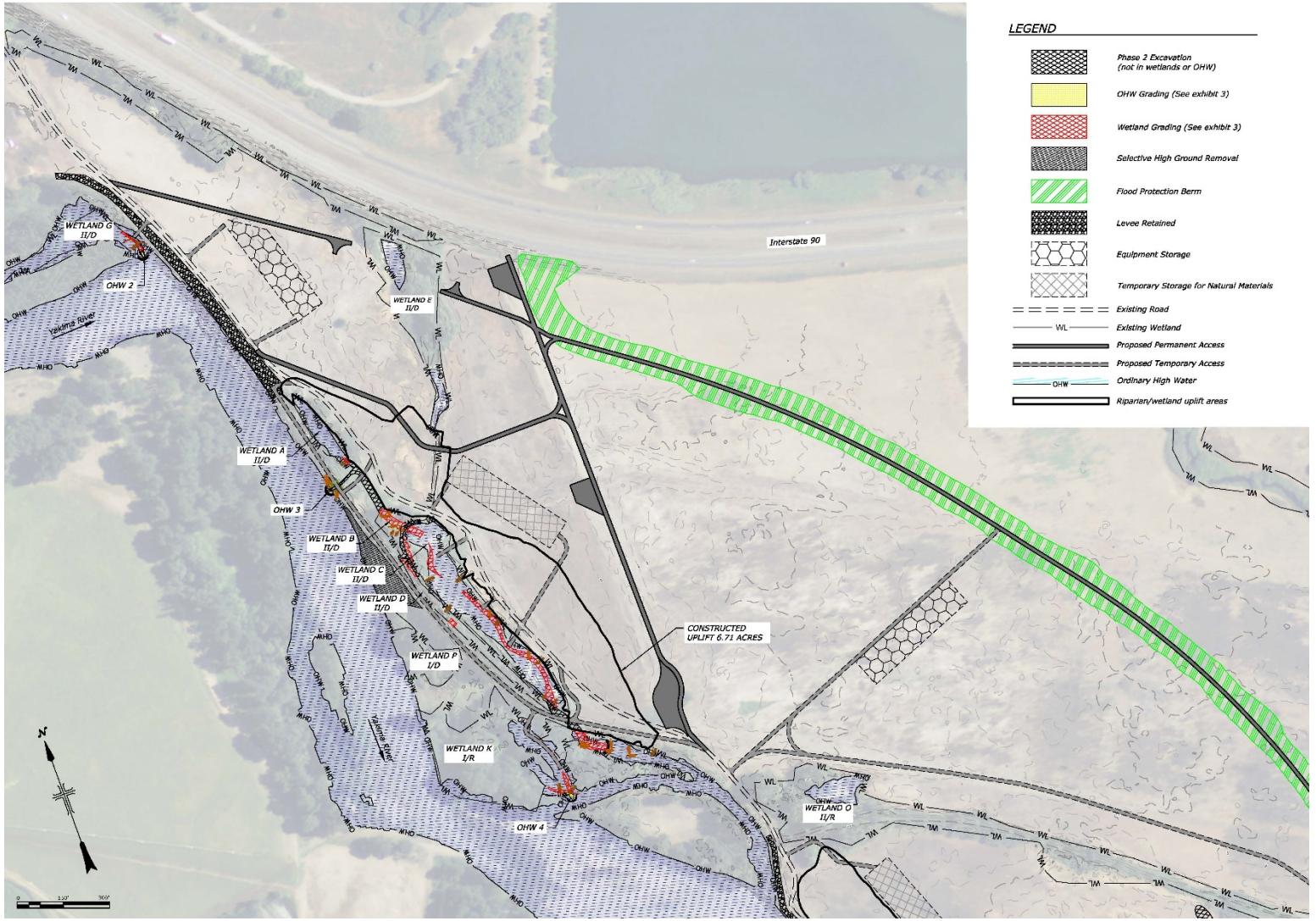

Figure 6. Overview of construction activities in Phase 2 including Side-channel 1

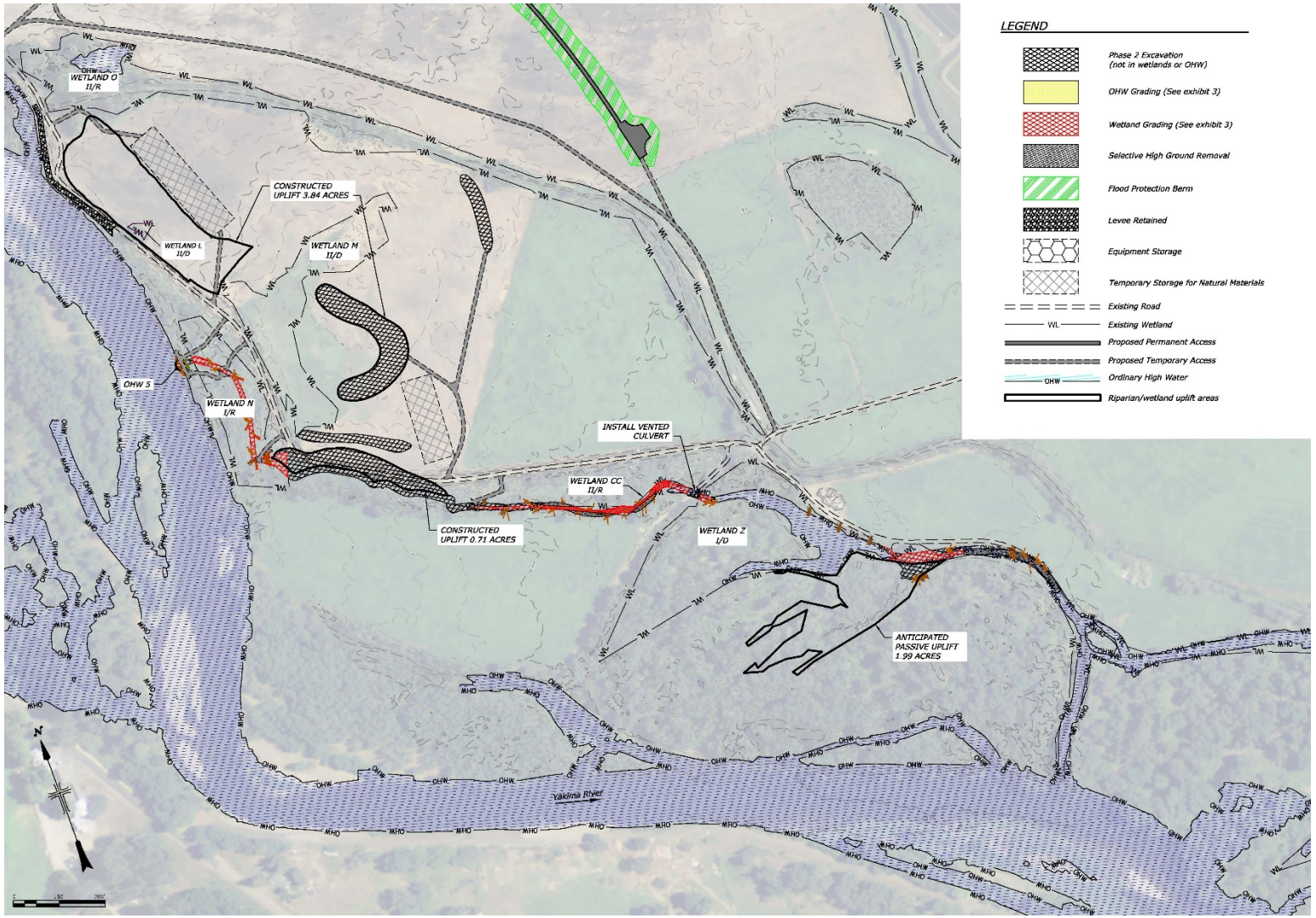

Figure 7. Overview of construction activities in Phase 2 including Side-channel 2

2.4.2 Levee Removal and Floodplain Contouring

During Phase 1, two sections of levee are proposed to be excavated to match adjacent floodplain elevations to increase hydraulic connectivity between the Yakima River and its floodplain. The existing floodplain elevation correlates to the Yakima River's 6,000 cubic feet per second (cfs) water surface elevation (WSE), which is the elevation of a 1.5-year-flood recurrence interval.

The first section of levee proposed for removal begins approximately 360 feet downstream from the 90-degree bend in the Yakima River at the north end of the Schaake property, near the opening to Alcove 1 (Figure 3) and ends upstream from the Tjossem Ditch headworks. The second section of levee proposed for removal begins approximately 500 feet downstream from the Tjossem Ditch headworks and continues to the end of the existing levee. To provide floodplain roughness and soil stabilization between the Yakima River and the floodplain, logs and slash would be incorporated into a willow brush-trench. A brush-trench is a trench with 45-degree sloped walls dug 6 inches below the water table into which live willow cuttings are placed at 12-inch centers. The cuttings lean against the sloped wall of the trench and protrude 2 to 4 inches above the trench. Six inches of previously excavated material would be placed over the cuttings, and a debris bundle of slash and wood would be placed over the fill material before the rest of the trench is backfilled.

The remaining levee (approximately 500 linear feet) would be left in place near the Tjossem Ditch headworks to reduce potential channel migration/avulsion of the Yakima River into the adjacent floodplains; thereby, protecting the integrity and functionality of the irrigation ditch. The Tjossem Ditch headworks form the Yakima River diversion structure for the privately-owned irrigation ditch that transects the Schaake property. The floodplain in this area would be excavated and replanted to establish a dense riparian forest for habitat and to allow a natural level of channel migration. The levee retained at this location would be allowed to disintegrate once the riparian community has become well established and is able to stabilize the riverbank. Maintenance may continue as needed until the riparian community is fully established, perhaps 10 to 20 years into the future.

The exposed ends of the two remaining levee sections would require revetment to prevent erosion during high flow events. Based on the riprap sizing calculations, class IV riprap was selected for the revetments. Riprap removed from the levee would be selectively chosen during construction to develop class IV riprap. To reduce the potential for undermining the revetment, the riprap would also be keyed into the toe of the bank at the end treatments.

Reclamation would continue to maintain the remaining levee at the 90-degrees bend with the existing level of protection. Because of the low river slope (0.026 feet per foot), the opening downstream from this portion of the levee allows water to access the high terrace behind the 90-degree bend at higher flows. As proposed, the terrace becomes a floodwater storage area of slow-flowing backwater such that erosion is minimal-to-non-existent during most floods.

Floodplain contouring is proposed along areas of Side-channel 1 and Side-channel 2. During Phase 1, the excavated material from floodplain enhancement areas 1, 2, and 3 (Figure 3) would be used to construct the flood protection berm. In Phase 2, floodplain enhancement

areas 1, 2, and 3 would be graded to fine tune the topography and encourage wetland development. The development of floodplain enhancement area 4 would be part of Phase 2. These areas would be excavated to match the Yakima River's 6,000 cfs peak flow WSE (approximate 1.5-year recurrence interval) to promote inundation and riparian recruitment. Areas chosen for excavation are adjacent to the proposed side channels, mostly non-vegetated, and at high elevations. Healthy, existing riparian areas would be avoided during construction to the extent practicable.

2.4.3 Flood Protection Berm

To enhance the floodplain and improve the side channels, Reclamation proposes to use the excavated levee material to construct a flood protection berm averaging 3 feet high and approximately 0.7 miles long. The berm would intercept the I-90 embankment near the existing BPA powerline on the north side of the property and end at an existing wire fence adjacent to Reclamation's property line to the south. At least 1-foot of freeboard over the 100-year-flood WSE would be installed after the berm settles (less than 0.5 feet of settling is anticipated). This level of protection was verified by hydraulic modeling (Hilldale et al., 2019).

It is anticipated that 12 inches of topsoil would be removed from the entire berm footprint to provide a suitable base. The berm would be constructed with native material, a mix of onsite floodplain fines and gravel reserved from levee and floodplain enhancement actions. Removed topsoil would be reused to facilitate revegetation of the berm.

2.4.4 Roads and Culverts

In Phase 1, earthwork to relocate the permanent access roads and construction of the BPA utility pads would occur. Construction would require placing a culvert in a road near Wetland E. Portions of existing roads would be demolished through excavating the levee and floodplain enhancement areas 1, 2, and 3. While the levee O&M road would be demolished as part of levee excavation, the area would be maintained as a temporary access route for Phase 2.

In Phase 2, a portion of an asphalt roadway would be removed, leaving a remnant of asphalt near the entrance to the Schaake property. Once the asphalt is removed, soil decompaction of the roadbed, the original roads (not demolished in Phase 1), and temporary construction access routes would occur. An excavator would be used to loosen and demolish the road prisms. The disturbed area would be reshaped to blend with the surrounding area and then revegetated with native seed mix.

In Phase 2, three culverts would be removed but not replaced. Excavated material would be reused as backfill and graded to match adjacent floodplain enhancement elevations.

Two parallel metal culverts would be removed to facilitate placement of the vented box-culvert in Side-channel 2 at the existing WWTP crossing. Side-channel 2 is a designed channel, and the vented-culvert crossing performs as a fish passage per the WDFW water-crossing design guidelines (Barnard, 2013). The bottom of the vented culvert is u-shaped, and

the top may be an upside-down u-shape or a flat cover to the bottom piece. This configuration was selected so the vented culvert could be filled with streambed material.

The inside-to-inside span of the vented culvert is 30 feet. The deck of the vented culvert would be 16 feet wide with a 14-foot-wide travel surface; and for safety, it would have a 1-foot-wide by 1.5-foot-tall curbs on each side. The proposed vented culvert uses HL-93, the current standard highway loading per *AASHTO Bridge Design Guidelines*.

2.4.5 Create Perennial Side Channels, Improve Flow Connectivity of Alcoves, and Reinvigorate Existing Channels

Phase 2 includes creation of approximately 1.8 miles of perennial side channels (Side-channel 1 and Side-channel 2) by excavating 0.8 miles of existing depressions and increasing flow connectivity to approximately 1.0 mile of existing side channels that are seasonally connected. In addition, backwater areas and existing floodplain wetlands would also be connected, and flow connectivity of an approximately 0.3 mile of existing alcoves would be improved by establishing a perennial downstream connection.

The side-channel entrances are steep relative to the main channel gradient and would connect to the Yakima River at a 90-degree angle. The channel would transport sand-sized, suspended sediment efficiently away from the inlet; this would minimize deposits of sediment and future clogging of the inlet. A narrow, steep channel with a top channel width of 20 feet and nearly vertical banks would minimize adjacent vegetation loss and the existing dense root mass would hold the nearly vertical cut. Adjacent trees would be retained to provide cover habitat (both aquatic and riparian), hardpoints for scour, and potential for undercut banks and associated habitat.

The side channels are proposed to activate at the 700 cfs WSE. During the inwater work window (IWWW, July 1–August 31) the Yakima River flows are typically around 3,500 cfs, making construction of the side channel inlets extremely difficult. The Yakima River runs high until "flip-flop" operations in mid-September, when Reclamation decreases flows out of the three storage reservoirs in the Cascade Range that feed the Yakima River to the two reservoirs in the Naches arm of the Yakima Project. To facilitate construction after "flip-flop" operations, NMFS and USFWS have approved an IWWW extension that would cover September 1 through October 31.

Side-channel 1 - Construction of Side-channel 1 (Figure 3 and Figure 6) would occur during Phase 2. Postconstruction, Side-channel 1 would be approximately 1,700 feet long and flow through existing wetlands, providing additional diversity of depth and velocity throughout the channel (Reclamation, 2018).

The inlet to Side-channel 1 is on the left bank approximately 1,000 feet downstream from the 90-degree bend in the Yakima River and would be activated when the Yakima River flows exceed 700 cfs. The connection would include engineered LWM structures that include boulder ballasting to maintain the side channel inlet banks and set the hydraulics of the side channel. Two riffles would be constructed, the first located just downstream from the inlet to

help set the slope of the channel from the inlet and the second located at the outlet of the wetland C described in the following paragraph.

Side-channel 1 includes a proposed connection to Alcove-2. Alcove-2 is proposed to connect Side-channel 1 with Wetland A, which has open water with no surface water connection under the existing condition. Side-channel 1 is also proposed to flow through Wetland C, which also has open water with no surface water connection under the existing condition.

Excavating Side-channel 1 between the Yakima River main channel and the wetlands would be in the dry without isolation; however, fish removal would be necessary before excavating to deepen the wetlands. The final connection of the side channel inlet at the Yakima River is proposed to be isolated with a cofferdam. The outlet of Side-channel 1 would be excavated in the dry apart from the final connection to an old channel that connects to the existing Tjossem access channel. If completed in the fall, all work may be in the dry. If the excavation extent continues into open water, the area would be isolated as described above and fish salvage would occur.

The alcove in Wetland K would be deepened in existing open water areas. There is an existing surface water connection from Wetland K to the Tjossem access channel. The alcove would be isolated at this point and fish removed prior to excavation.

Side-channel 2 - The inlet to proposed Side-channel 2 (Figure 3 and Figure 7) is upstream from the deposition occurring in the Yakima River, approximately 1,000 feet downstream from the outlet of the Tjossem access channel. The connection is proposed to occur at the main channel and would include LWM structures with boulder ballasting to maintain the banks of the side-channel inlet and set channel hydraulics. The new side channel would follow an existing depression through Wetland N and into Wetland CC. Adjacent to this portion, an inset floodplain is proposed that lies primarily in the footprint of the existing levee. This inset floodplain would allow the side channel to have frequent interaction with the floodplain, improving the riparian function in this portion of the side channel, which is otherwise impounded by higher ground due to the 700 cfs inlet connection.

Side-channel 2 is proposed to cross an agriculture field, and an existing access road to the City's WWTP outfall in the river. The two existing culverts at the crossing would be removed, and a vented box-culvert-type crossing would be constructed at this location to maintain access to the City's WWTP outfall, which would also connect Wetland CC to Wetland Z.

Side-channel 2 terminates in Wetland Z, which drains to an existing side channel that currently experiences seasonal surface connection (about twice per year). This reconnected side channel is approximately 3,400 feet long with an additional 1,200 feet of secondary channels (Reclamation, 2018). These reconnected and reinvigorated channels would flow perennially under the proposed condition when the Yakima River flows exceeds 700 cfs. The low areas along the proposed Side-channel 2 alignment have received sufficient water over the years to support mature cottonwoods and willows of multiple ages thereby limiting the need to vegetate the banks of this side channel to provide stability and shade (Hilldale, 2007),

if the vegetation can be protected during construction. Aside from the first 1,550 feet, there would be minor areas of contouring within the alignment of Side-channel 2.

2.4.6 Large Woody Material

Large woody material (LWM) structures would be installed throughout the project. Small woody debris (e.g., slash, branches) would be incorporated with the LWM within the side channels and alcoves to provide micro-habitat and cover along the side channels. LWM would be incorporated into the side channels to deflect hydraulic forces away from the streambank while also providing habitat for juvenile salmonids.

Willow plantings along the bank provide quick-growing riparian cover where needed and, eventually, the willows would anchor the LWM structure. As the willows mature, they would contribute additional woody material to the stream.

LWM would also be placed in the floodplain to create roughness. These structures would be one- and two-log structures anchored by small diameter, sharpened piles driven at opposing angles to, in effect, lock the key logs into place.

2.4.7 Revegetation

Approximately 151 acres would be vegetated with native grasses, shrubs, and trees. Revegetation is proposed on areas disturbed during construction, along a buffer near Wilson Creek (Wetland I), and the former hayfields that are part of the 1890 term confirmation deed. Phase 1 revegetation activities consists of site preparation for planting in Phase 2, weed control, and seeding. In Phase 1, site preparation would include the following:

- **Soil Amendments:** Approximately 9 acres would receive at least 6 inches of topsoil to offset the excessive nutrients and to supplement the rocky soils in preparation for seeding.
- **Soil Decompaction:** These 9 acres of topsoil-amended areas would be ripped 10 inches before and after topsoil has been applied. An additional 60 acres of compacted soils are within the chemical fallow boundary and could inhibit growth. These acres would be ripped to a depth of 18 inches.
- **Weed Control:** Weed control may occur on approximately 156 acres and include, as appropriate: chemical fallow, broadleaf-selective herbicide applications, and spot treatments.
- **Erosion and Sediment Control:** Hydromulch would be applied on approximately 28 acres after grading is complete and prior to revegetation.
- **Seed Bed Preparation and Seeding:** Once the sites have been decompacted and have minimal weed growth, they would be harrowed for seeding. The preferred seeding method is drill-seeding. Seed would be applied in late fall.

Phase 2 revegetation activities consists of seeding areas disturbed by construction (similar to Phase 1), planting shrubs and trees, and using broadleaf-selective herbicide applications and noxious weed spot treatments. During Phase 2, the riparian corridor along Wilson Creek would be enhanced with live stake plantings.

Vegetation would be monitored in accordance with the vegetation plan and the resource management plan. Annually, qualitative methods would be used to track progress and respond to weed and maintenance issues. Photo-monitoring would be used throughout the contract period to demonstrate success. Quantitative monitoring would be used 3 years after planting to measure successful revegetation performance.

2.4.8 Mitigation Measures

To minimize impacts on resources from the Proposed Action Alternative, the best management practices (BMPs) and mitigation measures described in Appendix A would be implemented during the construction. In addition to the mitigation measures described, the following are applicable to all actions and include guidance for reducing impacts: The *Programmatic Endangered Species Act Section 7(a)(2) Biological Opinion;* and the Magnuson-Stevens Fishery Conservation and Management Act *Essential Fish Habitat Response for the Seattle District Corps of Engineers Permitting of Fish Passage and Restoration Action in Washington State* (FPRP III).

FPRP III also includes conservation measures that apply to specific elements of the Proposed Action Alternative (e.g., fish passage and installation of inwater habitat structures and streambank stabilization features). General conservation measures from FPRP III guidance are included in Appendix B. Action-specific conservation measures from FPRP III that may be applicable are included in Appendix C. General measures described in the construction drawings and the guidance document include BMPs associated with site layout and flagging, temporary access and stream crossings, staging and stockpiling areas, equipment use, erosion control, dust abatement, timing of inwater work and worksite isolation, and spill prevention and control.

2.5 Comparison of the Alternatives

Appendix D provides a summary comparing the environmental impacts of the Proposed Action Alternative to the No Action Alternative. A detailed analysis of environmental consequences is provided in Chapter 3.

2.6 Alternatives Considered but Eliminated

2.6.1 Setback Levee Alternatives

The Setback Levee Alternative included all designs leading up to the Proposed Action Alternative. Various alignments of the setback levee were considered but were eliminated from further analysis. The evolution of the alternatives considered but eliminated are presented in Appendix E.

Chapter 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The following sections discuss the existing conditions by resource and the potential effects of the Proposed Action Alternative on the resources. For each topic or resource category, the impact analysis follows the same general approach. First, the existing conditions are established for the affected areas, and then the impacts of the No Action Alternative and the Proposed Action Alternative are disclosed. The degree of impact intensity was based on quantifiable impacts, a review of relevant scientific literature, previously prepared environmental documents, and the best professional judgment of the EA team resource specialists.

Impacts are described for both construction and operations. Impact levels are characterized as high, moderate, low, or no impact. High impacts are considered significant impacts; whereas, moderate and low impacts are not. The impact levels are based on the analysis provided, which incorporates the considerations of context and intensity defined in the Council of Environmental Quality Regulations (40 Code of Federal Regulations [CFR] 1508.27).

Impacts are described in general terms and qualified as short term and long term, adverse or beneficial, as appropriate. Impacts may also be described as direct or indirect. Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by an action and occur later or are farther removed from the area but reasonably foreseeable. Cumulative impacts are also discussed per NEPA requirements.

Impact duration definitions:

Short-term effect: Recovers in less than 3 years and contributes to a beneficial effect or has no adverse effect.

Long-term effect: Takes more than 3 years to recover and does not contribute to the long-term beneficial effect.

Long-term beneficial effect: Takes more than three years to recover and contributes to the long-term beneficial effect.

3.1 Aesthetic and Visual Resources

Visual resources consist of natural and human-made features that give an environment its aesthetic qualities. To determine whether a proposed action would appear compatible with existing features or would contrast noticeably within the setting, the landscape character needs to be evaluated. Views are considered sensitive when they have high scenic quality and are potentially subject to degradation through environmental processes or human uses.

Scenic quality is a measure of the overall impression or appeal of an area created by the physical features of the landscape, such as natural features (landforms, vegetation, water, color, adjacent scenery, and scarcity) and human-made features (roads, buildings, railroads, other built elements, and agricultural patterns).

Visual resources represent the aesthetic quality of the environment as perceived through the subjective visual sense only. As such, many people have differing definitions of what constitutes an aesthetically pleasing environment, and there are different methodologies for assessing the visual quality of a landscape and potential visual impacts on it.

Sections 101 (42 USC §4331) and 202 (42 USC §4342) of NEPA mandate that Federal agencies recognize the importance of visual resources and include a visual or aesthetic assessment and impact analysis of projects proposed on Federal lands or projects supported by Federal funds.

3.1.1 Affected Environment

The Schaake property occupies most of a large, undeveloped floodplain that can be seen from a major interstate, I-90, and a local surface road, Umptanum Road. The project area also includes property owned by the City of Ellensburg. In the Ellensburg area, I-90 and Umptanum Road pass through agriculture fields, some areas of commerce, and very few areas with native plant communities unaltered by agriculture or other disturbances.

In 2018, portions of the Schaake property were in chemical fallow (approximately 82 acres). Portions along the Yakima River and Tjossem Ditch have matured, riparian vegetation, and other portions of the property have been replanted with a mix of native grasses. A concrete wellhouse and two overhead, electrical transmission lines dot the landscape. Some farm equipment may be parked nearby. The property has a mix of paved and graveled roads.

3.1.2 Environmental Consequences

No Action Alternative: There would be no short-term or long-term effects to visual resources as construction would not occur. Maintenance activities would be ongoing, but the viewshed would not undergo substantial change.

Proposed Action Alternative: The impact on visual resources during construction would be temporary and moderate. Upon completion of construction, the floodplain, side channels, wetland areas, and the flood protection berm would be visible depending on your view and proximity to the project. Planting native vegetation is included as a construction activity, both in disturbed areas and along Wilson Creek. Over time, as vegetation matures, and natural recruitment occurs, these areas would resemble natural features that occur along large, undisturbed river floodplains. The flood protection berm is 3,600-feet-long, and at the crest is 30-feet-wide. It would initially cause a substantial change to the view from I-90 but overtime, the site would achieve a more natural state; therefore, the long-term impacts on visual resources would be low.

Impacts on visual resources would be moderate in the short term for viewers and residents near the restoration sites during construction. The staging area would be noticeable during weekend travel on both I-90 and Umptanum Road because equipment would be stationary and grouped together.

Construction activities would be visible from the I-90 and surrounding areas during the construction seasons. Phase 1 and Phase 2 would occur June through November of 2019 and

2020, respectively. The view would include construction vehicles; construction materials (e.g., decks of LWM) and fencing; and disturbed areas where construction is occurring. The impact on visual resources during construction would be temporary and moderate.

Long-term impacts on visual resources would occur by modifying, relocating, or removing infrastructure and completing project elements described in the Proposed Action Alternative. Removing most of the levee would alter the physical landscape. This action would result in frequent inundation and would help change the character of this site from a human-altered landscape to a more natural landscape. These changes would enhance the viewshed and make the site more consistent with the natural, undisturbed landscape downstream. Designers of the project used the condition of the downstream site to mimic naturally occurring conditions.

3.1.3 Cumulative Impacts

Past actions that have occurred on the property include levee construction, powerline installation, feedlot operations, and the WWTP operations. Reclamation is working with the City and the local business on a potential land exchange that would relocate the agricultural fields outside the floodplain. Reclamation does not anticipate this undertaking (in combination with the proposed action) to cause a high impact on visual resources. By restoring an aquatic connection to the Yakima River, these undertakings would be visually consistent with the undisturbed reach downstream and would restore the site's floodplain to a more natural condition. Therefore, cumulative impacts on visual resources from the proposed action would be moderate and beneficial.

3.2 Air Quality

This section describes air quality and climate change and discusses potential impacts the proposed action could have on these resources. The air quality area of analysis is the air basin administered by the Ecology's Central Regional Office and includes Kittitas, Chelan, Douglas, and Okanogan counties.

3.2.1 Affected Environment

Under the Clean Air Act (CAA), 42 USC §§ 7401 et seq., the U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) to protect air quality and prevent air pollution from reaching levels harmful to public health and the environment. These standards identify six criteria pollutants of concern for human health and the environment including carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

Ecology maintains a monitoring network that measures the levels of these pollutants. If an area's monitoring results do not exceed the NAAQS, the EPA designates this area an "attainment area." According to Ecology, the project area and Kittitas County are designated as "unclassifiable/attainment areas" for all six criteria pollutants.

The air quality monitoring station nearest to the project is on Ruby Street in the City of Ellensburg, approximately 1.7 miles from the entrance to the Schaake property and monitors for particulate matter year-round.

3.2.2 Environmental Consequences

No Action Alternative. Under the No Action Alternative, emissions of criteria pollutants would not occur, but minor emissions from maintenance vehicles would continue. Impacts on air quality would be low.

Proposed Action Alternative. Ecology does not expect the proposed action to result in violations of regional or Federal air quality standards when adhering to BMPs (Appendix A) for dust abatement (Heether, 2019). Conservation measures in Appendices B and C would also be followed to minimize impacts on air quality; therefore, the impacts of fugitive dust would be low.

In some cases, excavating wetland soils may release objectionable sulfidic odors. Due to the rural location of the Schaake property, this would not occur near residences or places of commerce; therefore, this impact would be low. Dust would likely be generated during excavation and transport of soils. Excavated soils would likely be moist; therefore, dust from excavation would be minimal. Fugitive dust from construction vehicle movement would be minimized by using a water truck to apply water, as needed.

Postconstruction, stationary sources of pollutant emissions would not exist. Emissions from employee vehicles and maintenance equipment would be relatively minimal and the impact would be low.

3.2.3 Cumulative Impacts

Reclamation is not aware of any past, present or reasonably foreseeable actions likely to involve construction and land management activities that would include a stationary source of long-term emissions. Although the short-term construction emissions may combine with emissions from other sources (e.g., industrial or vehicular traffic), the areas' status of "unclassifiable/attainment areas" for all criteria pollutants would not change if the proposed action was implemented. Therefore, the cumulative impact on air quality would be low.

3.3 Cultural Resources

This section provides a summary of cultural resource identification completed for the proposed action, including anticipated impacts on cultural resources under NEPA. Cultural resources are locations of human activity, occupation, or use. They include expressions of human culture and history in the physical environment, such as precontact or historic archaeological sites, buildings, structures, objects, districts, or other places. Cultural resources can also include natural features, plants, and animals that are considered important to a culture, subculture, or community or that allow the group to continue traditional lifeways and spiritual practices.

Historic properties as defined by 36 CFR 800, the implementing regulations of Section 106 of the National Historic Preservation Act (NHPA; 54 USC § 300101 et seq.), are cultural resources eligible for inclusion in the National Register of Historic Places (National Register). Historic properties may be districts, sites, buildings, structures, artifacts, ruins, objects, works

of art, natural features important in human history at the National, state, or local level or properties of traditional religious and cultural importance to an Indian Tribe.

3.3.1 Affected Environment

Two archaeological inventories of the Schaake property were conducted in 2010 and 2012. Archaeologist from the Central Washington Anthropological Survey conducted a pedestrian survey and subsurface reconnaissance in the project area on both occasions. The first survey was a 100 percent survey of an approximately 20-acre area located in Section 11 of Township 17 North, Range 18 East. The second survey was conducted in the cross-hashed area in Figure 8, which indicates the extent of the pedestrian survey efforts over most of the Schaake property. Two small inaccessible areas on the western margin of the project area were not surveyed. Washington State's Department of Archaeology and Historic Preservation (DAHP), concurred with Reclamation's determination of "no historic properties affected" in a letter dated January 27, 2014.

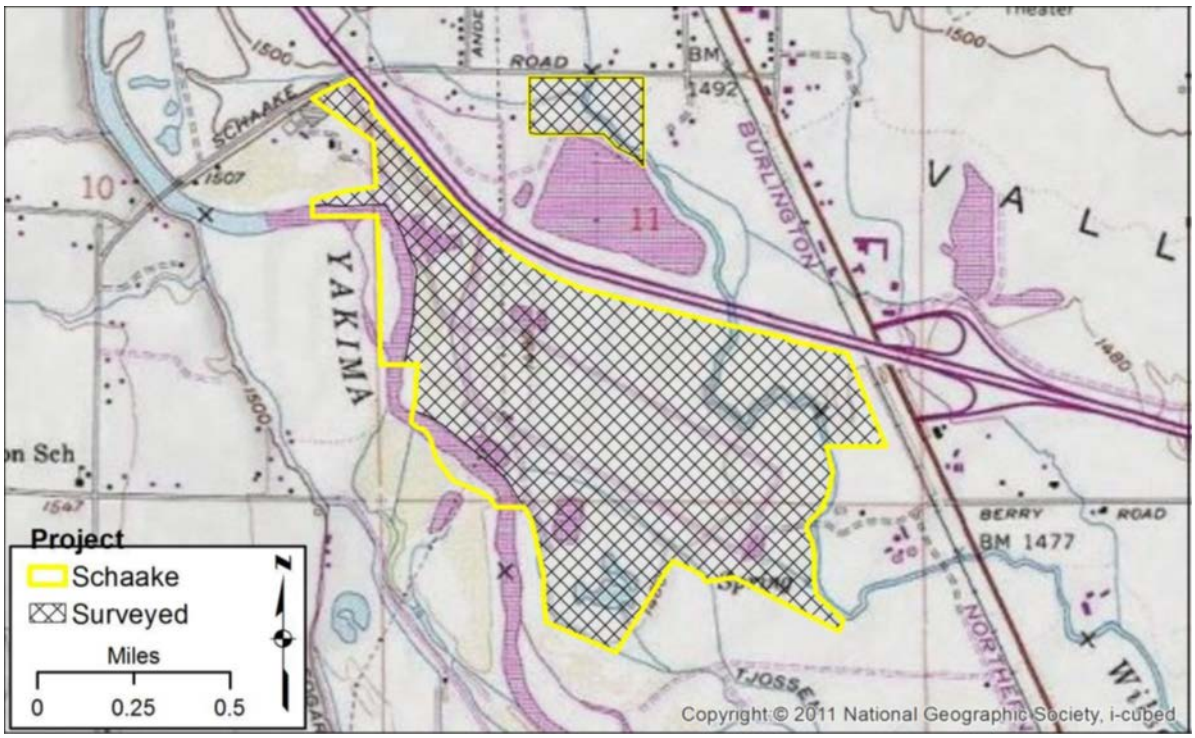

Figure 8. Surveyed portions of the Schaake project area in 2012 (Vaughn and Schroeder, 2012).

In 2015, a cultural resource review and archaeological inventory for the non-Reclamation owned portions of the project took place, which included portions of property owned by the City of Ellensburg. The DAHP concurred with Reclamation's determination that the project, as proposed, would have "no adverse affect" on the National Register-eligible or listed historic and cultural resources in a letter dated November 23, 2015.

In addition, the Corps completed a cultural survey of the Schaake levee in 2016. The levee was recommended as not eligible for listing in the National Register. The levee has been periodically repaired and rebuilt and did not retain enough integrity to demonstrate its connection to the 1930s. Despite being named for residents and its association with the Schaake meat packing operations, the levee was not considered associated with significant persons. In addition, the levee did not represent a unique engineering feature and is unlikely to yield any information important to history.

3.3.2 Environmental Consequences

No Action: Under the No Action Alternative, there would be no construction, direct excavation, or deposition of materials; therefore, there would be no impacts on cultural resources. However, natural river-channel movement could reveal cultural resources through deposition or erosion; this scenario is unlikely, so a low impact on cultural resources would be expected.

Proposed Action: The Proposed Action Alternative would have "no adverse affect" to historic properties. However, if cultural resources are discovered during construction, all ground-disturbing activities in the areas of the archeological resource would cease, and Reclamation's archaeologist would be contacted. Construction would not resume until all mitigated measures developed in consultation with the State Historic Preservation Officer have been completed. If human remains are encountered, work would cease immediately, and Reclamation's archaeologist would be notified. Treatment of human remains would comply with applicable State and Federal laws concerning inadvertent discovery of human remains.

3.3.3 Cumulative Impacts

Reclamation is not aware of any past, present or reasonably foreseeable actions likely to involve construction and land management activities that would have cumulative effects on cultural resources if implemented.

3.4 Fish

Numerous ESA-listed and non-listed fish species occur in the Yakima River adjacent to the project site. No formal inventory of fish has been completed for the Schaake reach, but it can be inferred that the same species that reside in or use this reach are also present in adjacent reaches of the river. Downriver from the Schaake property, the Yakima River supports a blue-ribbon trout fishery frequently used by recreational fly fishermen.

3.4.1 Affected Environment

The Schaake reach has a series of levees on both sides of the Yakima River. These levees have confined the river and caused incision of the river channel and coarsening of the bed material (Hilldale and Klinger, 2003); prevented regular interaction between the river and the floodplain; and inhibited the development of instream complexity and sinuosity and a normative riparian corridor. These factors have contributed to the degradation of salmonid habitat through the reduction or elimination of juvenile and refuge fish habitats. The Yakama

Nation has interest in the reintroduction or persistence of several culturally important salmonid species.

The disconnection of the river from its floodplain has significantly decreased the ability of the river to build and maintain side-channel habitat critical to the existence of salmonid fish species in the Yakima River basin (Ring and Watson, 1999; Stanford et al., 2002). Side-channel habitat helps fish escape high velocities during flood events and provides rearing habitat for juveniles throughout the year. These side channels may also provide spawning habitat. Food is typically more abundant in side channels because of increased vegetative cover and reduced flow velocities. Fish have limited access to side channels at high flow events, as the river must be high enough to overtop the sedimentation berm along the river.

The existing side channels are discontinuous (no defined outlets) and fish can become stranded. There are areas of backwater that form small sections of side channels. While these are more perennial in nature, the risk of stranding is possible during high flow events. Reclamation has observed fish in some wetland areas, but species, quantity, or distribution is unknown. Lack of trees also means a lack of shade, cover, and food sources (insects) for fish.

Threatened and Endangered Species: Two ESA-listed species use the Yakima River adjacent to the Schaake property: Middle Columbia River (MCR) Steelhead (*Oncorhynchus mykiss*) and Columbia River Bull Trout (*Salvelinus confluentus*).

Middle Columbia Steelhead. The MCR evolutionarily significant unit (ESU) of inland steelhead was listed as threatened by NMFS on March 25, 1999. The MCR ESU includes all naturally spawned populations of steelhead in streams above Wind River, Washington, and Hood River, Oregon (exclusive), upstream to and including the Yakima River, Washington (64 *Federal Register* (FR) 14517). Critical habitat for the MCR Steelhead DPS was designated on September 2, 2005 (70 FR 52630).

Bull Trout. All populations of Bull Trout within the coterminous United States were listed as a threatened species pursuant to the ESA of 1973, as amended (64 FR 58910; November 1, 1999). The 1999 final listing created one DPS of Bull Trout within the coterminous United States by adding Bull Trout in the Coastal-Puget Sound populations (Olympic Peninsula and Puget Sound regions) and Saint Mary-Belly River populations (east of the Continental Divide in Montana) to the previous listings of three separate DPS of Bull Trout in the Columbia River, Klamath River, and Jarbidge River basins (63 FR 31647, June 10, 1998; 64 FR 17110, April 8, 1999). Critical habitat for the Klamath River and Columbia River Bull Trout populations was initially designated on October 6, 2004 (69 FR 59995). This designation was subsequently revised with the final rule effective on November 17, 2010.

Non-listed Species. Three stocks of anadromous salmonids not federally listed migrate through this reach of the Yakima River. These include Coho Salmon (*O. kisutch*), spring Chinook Salmon (*O. tshawytscha*), and Sockeye Salmon (*O. nerka*). Other native fishes that use the river in this area are Cutthroat Trout (*O. clarkii*), Sand Roller (*Percopsis transmontana*), Speckled Dace (*Rhinichthys osculus*), Longnose Dace (*Rhinichthys cataractae*), Redside Shiner (*Richardsonius balteaus*), Largescale Sucker (*Catastomus macrocheilus*), Bridgelip Sucker (*C. columbianus*), Northern Pikeminnow (*Ptychocheilus*

oregonensis), Mountain Whitefish (*Prosopium williamsoni*), Pacific Lamprey (*Lampetra tridentata*), and Sculpins (*Cottus sp.*). Within the disconnected waterbodies, the Three-spine Stickleback (*Gasterosteus aculeatus*) is likely present.

Non-native or introduced fishes may also occur within this reach. These include Brook Trout (*Salvelinus fontinalis*) and Smallmouth Bass (*Micropterus dolomeiu*). Both have a negative impact on ESA-listed species that use the reach. Within the disconnected waterbodies, other non-native fishes such as Sunfishes (*Lempomis sp.*) and Largemouth Bass (*Micropterus salmoides*) are likely present.

3.4.2 Environmental Consequences

No Action: The environmental consequences of the No Action Alternative have been evaluated as they relate to ESA-listed fish. Effects to non-listed fish species are expected to be similar in nature to ESA-listed fish. Under no action, there would be no construction; therefore, the levee would persist and require ongoing maintenance by Reclamation.

There would be limited access to disconnected side-channel habitats; access would occur during seasonal high-water events (moderate), but the high risk of stranding occurs as the water recedes, because the side channels are not perennial and terminate inland. Areas of backwater along the mainstem provide a perennial source of habitat, and under high-water events, some disconnected side channels become accessible (moderate); however, stranding occurs as the high-water recedes causing moderate, long-term impacts.

Proposed Action: The Proposed Action Alternative would have beneficial impacts on all fish species. Effects to non-listed fish species are expected to be similar in nature to ESA-listed fish. There would be localized negative short-term effects but, ultimately, there would be long-term beneficial effects by increasing and improving available fish habitat. All mitigation measures in Appendix A and conservation measures in Appendices B and C would be adhered to during construction to minimize impacts.

Large woody material (LWM) is an important part of river and creek ecosystems and is critical to the survival of juvenile salmonids. In many watersheds, LWM is a primary factor controlling the shape of the stream channel (Opperman et al., 2006). The central role of LWM in creating and maintaining diverse and critical instream fish habitat is well established; therefore, NMFS considers the installation of LWM an acceptable technique to create habitat uplift thereby making it a common conservation measure for mitigating impacts on freshwater environments.

High-quality salmonid habitat is largely a product of the hydraulics that develop around LWM during high-flow events. During high and fast flows, the LWM protruding into the flow causes local acceleration of the flow around the wood, which scours pools into the channel bed. The bed sediments are then deposited downstream leading to diverse patterns in bed topography and bed sediment sizes that together provide habitat options for various life stages of fish and a wide range of flows. At low flows, the scour pools created around the LWM structures are deep and slow moving, and the LWM creates refugia (cover) that is ideal for

juvenile salmonids. The LWM also traps and stores organic matter, forming the base of the food pyramid for aquatic insects, which are the main food sources of the fish.

Pools are especially important as rearing habitat for juvenile salmonids. Juvenile salmonids need to survive instream for one summer and one winter before they migrate to the ocean. In areas such as the Yakima River where dry, hot summers are the norm, deep pools may provide the only habitat for salmonids, or any fish, as the streams begin to dry. LWM can increase the survival rate of fish by providing cover and shade for these pools; elevated water temperatures are fatal to juvenile salmonids, and fish without cover are very vulnerable to predation. While pools are critical to juvenile rearing during the summer, they are also critical during high-water events in winter. LWM interrupts high-velocity flows and creates a secure refuge for juvenile salmonids during their first winter.

The construction of the LWM structures would result in the following immediate, juvenile salmonid habitat formation:

- Pool formation to provide slower, deeper water as an insulator to high water temperatures from direct solar radiation and to provide areas of rest
- Overhead cover for protection against predation and to provide shade
- Refugia from high-velocity flows as the LWM would slow the flows around and through the structure
- Sorting of gravel, including the deposition of spawning gravel, would increase and develop a more complex habitat

Threatened and Endangered Species. For this project, Reclamation would use the FPRP III programmatic documents from USFWS and NMFS as part of Section 7 (a)(2) of the ESA. The FPRP III documents are incorporated by reference.

This project would affect Steelhead, Bull Trout, and their designated critical habitat. Short-term negative effects of the proposed action would result from inwater or near-water construction like the installation of the vented box-culvert, large wood placement, and channel construction.

Physical and chemical changes in the environment associated with construction, especially decreased water quality (e.g., increased total suspended solids, contaminants, and temperature, and decreased dissolved oxygen) likely affect a larger area than direct interactions between fish and construction personnel. Design criteria related to inwater work timing, sensitive area protection, fish passage, erosion and pollution control, choice of equipment, inwater use of equipment, and work area isolation have been proposed to avoid or reduce these adverse effects.

The inwater work window has been extended from July 1 to October 31 in coordination with USFWS and NMFS biologists. The degree of instream substrate compaction and upland soil disturbance likely to occur under most of these actions is so small that significant sedimentation of spawning gravel is unlikely. If an adult fish is migrating through an action area during any phase of construction, it is likely able to avoid construction disturbances by

moving laterally or stopping briefly; although, spawning could be delayed until construction was complete (Feist et al. 1996; Gregory 1988; Servizi and Martens 1991; Sigler 1988). To the extent that the proposed actions are successful at improving flow conditions and reducing sedimentation, future spawning success and embryo survival in the action area would be enhanced.

If the proposed action is implemented, it would have beneficial long-term effects to individual fish. The amount of available habitat would promote the development of natural riparian and stream-channel conditions, improve aquatic functions, and become more productive. The newly activated floodplain and side channel habitat would increase productivity by increasing insect abundance thereby increasing prey base for rearing salmonids. In addition, the floodplain would act as a filter to improve nutrient cycling and water quality within the Yakima River. The adjacent floodplain would also moderate instream water temperature in winter and summer via hyporheic flow. Furthermore, newly created side channel habitat would provide a velocity refugia for rearing salmonids.

This would allow more complete expression of essential biological behaviors related to reproduction, feeding, rearing, and migration. If habitat abundance or quality is a limiting factor for ESA-listed fish in streams, the long-term effect of access to larger or more productive habitat is likely to increase juvenile survival and adult reproductive success. Individual response to habitat improvement would also depend on factors such as the quality and quantity of newly available habitat, and the abundance and nature of the predators, competitors, and prey that reside there.

3.4.3 Cumulative Impacts

The past and future actions of breaching the Jensen and Jefferies levees (Figure 2) combined with this project contribute to the cumulative impact of connecting the Yakima River to its floodplain. These projects would provide off-channel habitat and the ecological function would be very beneficial to listed and unlisted fish in the Yakima River.

3.5 Topography, Geology, and Soils

3.5.1 Affected Environment

The project site elevation is approximately 1,480 feet, generally flat, and slopes gradually south toward the Yakima River and then northeast toward Wilson Creek. Most of the study area is located within the geomorphic and 100-year floodplain as defined by the Kittitas County Flood Insurance Rate Map.

Because of past land uses (cattle feedlots, slaughterhouse operation, and land application of vegetable processing effluent on agricultural fields), soils are highly enriched with phosphorus at multiple locations on the Schaake property. Phosphorus levels were characterized in 2007 by Land Profile, Inc., which showed concentrations ranging from 8 to 1,210 milligrams of phosphorus per kilogram (mg/kg) of soil (Land Profile Inc., 2007).

3.5.2 Environmental Consequences

No Action. Under the No Action Alternative, no construction would occur. The Yakima River would remain disconnected from its floodplain except in high-flow events that overtop the levee, limiting natural river processes. The levee would continue to incur damage during high-flow events, and Reclamation would be responsible for fixing the levee, since it is not being maintained under the Corps' P. L. 84-99 program. Tjossem Ditch diversion would require ongoing dredging during the irrigation season to maintain flows to the ditch. When low flows occur in the Yakima River after "flip flop" operations, the Tjossem Ditch diversion does not receive enough water to make irrigation deliveries.

Proposed Action. Once construction is complete, the newly restored Schaake property would result in long-term beneficial effects as follows:

- Localized changes in waterflows, velocity, and circulation patterns
- More natural sediment accretion process in the floodplain and floodplain wetlands
- Alterations of natural sedimentation and erosion processes
- Topographical changes could result in formation of additional wetlands
- Increased groundwater exchange that could change soil properties
- Potential negligible rise in in phosphorus levels in the Yakima River until vegetation is established (Rayforth, 2007).

During construction, materials excavated at the site would be used for construction of the flood protection berm. The following activities would be constructed on dry land and could result in temporary increases in erosion at exposed sites: clearing and grubbing, relocating roads, constructing the flood protection berm, and placing LWM in the floodplain. Mitigation measures in Appendix A and implementation of the Stormwater Pollution Prevention Plan (SWPPP) would ensure that the erosion impacts associated with these actions would be low. Relocation of soils throughout the property would not substantially change the soil conditions in the project area; therefore, impacts on soil composition would be low.

With construction of Side-channel 1, Reclamation expects less sedimentation issues at the Tjossem Ditch diversion; therefore, less maintenance would be required.

3.5.3 Cumulative Impacts

When the Proposed Action Alternative is combined with past, present, and reasonably foreseeable future habitat restoration projects in the area, the cumulative impact would result in a more natural hydrologic connection of the Yakima River to its floodplain.

3.6 Land Use

This section describes land use within the project footprint and the possible impacts of the Proposed Action Alternative on this resource.

3.6.1 Affected Environment

Reclamation's Schaake property is the largest portion of the project site; however, the project extends onto four parcels owned by the City of Ellensburg. Portions of the City-owned

property are leased to a local business to apply their vegetable processing effluent to hay crops, and contain infrastructure associated with the City's WWTP (e.g., access roads and the outfall pipe to the Yakima River). None of the properties are managed for public use or recreation.

3.6.2 Environmental Consequences

No Action. The proposed project would not be built, and current land management practices would continue on all properties. Ongoing conversations about a potential land exchange between Reclamation and the City of Ellensburg would continue; the exchange would allow Reclamation to own five parcels adjacent to the Yakima River, and the City of Ellensburg would own land farther away from the Yakima River that could be leased as agricultural fields. If the land exchange advances, Reclamation would conduct an All Appropriate Inquiry (process of evaluating a property's environmental conditions to obtain certain protections from liability under the Federal Superfund Law (CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act) prior to obtaining the land interest. No negative impacts would be expected.

Proposed Action. Under the Proposed Action Alternative, Reclamation would exercise their 1890 rights for construction and right-of-entry access on 80-acres of City of Ellensburg property. Negotiations are ongoing for a proposed land exchange with the City of Ellensburg. If the land exchange advances, Reclamation would conduct an All Appropriate Inquiry prior to obtaining the land interest.

Reclamation would obtain a 5-year right-of-entry from WDNR for the two, side-channel inlet locations. The 5-year right-of-entry would facilitate monitoring of LWM structures at the side-channel inlets.

3.6.3 Cumulative Impacts

Past, current, and reasonably foreseeable projects that may impact land use include Reclamation working with stakeholders to develop public-use opportunities, such as a pedestrian trail with interpretive signs explaining the transformation of the Schaake property from a former feedlot to a functioning floodplain with healthy aquatic, wetland, and riparian habitat. If the land exchange conversations advance, Reclamation would have additional land for restoring to natural, sustaining processes.

3.7 Noise

This section describes baseline conditions and impacts related to noise within the analysis area.

3.7.1 Affected Environment

The traditional definition of noise is "unwanted or disturbing sound." Sound becomes unwanted when it interferes with normal activities such as sleeping, conversation, or when it disrupts or diminishes one's quality of life (EPA, 2019a). For this assessment, noise is the intrusion of a new sound inconsistent with and above background sound levels.

The existing soundscape in the project area is a mix of natural sounds such as flowing water, wildlife such as birds, and wind blowing through the vegetation. The project area is proximal to I-90 and Umptanum Road, and traffic noise can be heard throughout the project footprint. Other sounds may come from river recreators and agricultural activity.

The project area is rural, and the few residences nearby are not considered sensitive receptors. The nearest residence is 0.06 mile from the Schaake property entrance. Construction noise is regulated by Kittitas County for the project area, since the site is outside the City limits. Sounds created by construction may occur between 6:00 a.m. and 10:00 p.m. (Kittitas County Code, Title 9, Chapter 9.45).

3.7.2 Environmental Consequences

No Action. Under the No Action Alternative, the project would not be implemented, and noise levels would be unchanged from present conditions. Traffic noise from I-90 and Umptanum Road would remain audible in the project area. Reclamation land management actions such as mowing would continue, and impacts would be low.

Proposed Action. Under the Proposed Action Alternative, construction would temporarily increase noise in the project area. Noise associated with construction equipment would have temporary, low impacts on residences near the project area since they are a quarter-mile from areas with the heaviest equipment use. Restricted construction hours of 6:00 a.m. to 10:00 p.m. (per Kittitas County requirements) and mitigation measures in Appendix A would be implemented.

Most heavy equipment would operate in the central part of the project footprint and concentrate on removing the levee and constructing the flood protection berm. A constant noise level is likely to blend with the ambient noise of I-90; therefore, the impact would be low and short term.

Wildlife may be impacted by increased noise and activity during the primary construction window of June through November. The impact would be low and short term.

Postconstruction noise levels would match current conditions including land management activities such as mowing. The impact of these activities is low.

3.7.3 Cumulative Impacts

The primary action contributing to ongoing cumulative noise impact is traffic on I-90. Other contributions to noise come from local traffic along Umptanum Road. The temporarily elevated noise level would likely blend with the traffic noise of I-90 resulting in a low impact from June through November. There are other restoration projects planned nearby; while these are reasonably foreseeable, it is not likely that construction under Proposed Action Alternative would coincide with another project in time and physical proximity; therefore, the impact would be low.

3.8 Hazardous Materials

This section describes baseline conditions related to hazardous substances including hazardous materials and hazardous waste. This section also discusses potential impacts related to hazardous materials within the analysis area.

3.8.1 Affected Environment

Ecology works to clean up contaminated properties throughout the State under Washington State's cleanup law, the Model Toxics Control Act (MTCA). MTCA funds and directs the investigation, cleanup, and prevention of sites contaminated with hazardous substances. (Ecology, 2019a). The Schaake property went through Ecology's cleanup process under the MTCA Facility Site ID #83128522. Ecology considers this site as remediated and has issued a *no further action* status.

The Schaake property formerly included the following: a cattle slaughter, packing, and cold-storage warehouse building; truck scales and fueling facilities; cattle feedlot facilities; and irrigated farmland used for disposal of food processing effluent. The site also had five unlined wastewater lagoons associated with the packing plant and feedlot activities. The Schaake Packing Company discontinued the cattle feeding, slaughter, and packing operations in 1998. Prior to 1943, the northwest corner of the property was a landfill operated by the City of Ellensburg.

In July 1996, roughly 400 gallons of diesel fuel were released at the end of a fuel delivery to the Schaake Packing Company's fueling site. Analytical results in August 1996 indicated that diesel of 27,000 parts per billion (ppb) was present in Pond A—above MCTA Method A groundwater cleanup level of 1,000 ppb. Water samples collected in October 1996 indicated that the residual concentration of diesel was 695 ppb in Pond A and 436 ppb in Pond B—less than the cleanup level (Schmidt, 1996). Ecology issued an *no further action* letter dated July 25, 2001.

In 1997, Ecology issued a National Pollution Discharge Elimination System (NPDES) Permit to Schaake Corporation for discharges to all lagoons except the plant lagoon. As part of the NPDES permit, a hydrogeologic investigation was conducted that included sediment samples from the ditch which extended from the truck-wash pad to the packing plant lagoon. The results indicated the presence of cadmium (1.3mg/kg) and lead (420 mg/kg) exceeded MCTA Method A cleanup levels of those elements. Remediation occurred, and Ecology issued an *no further action* letter dated July 25, 2001.

In October 1998, Schaake detected impacted soil from the former truck shop and aboveground-storage tank for waste oil and verbally notified Ecology; the notice was formalized with a report in November 1998. Remediation occurred, and Ecology issued an *no further action* letter dated July 21, 2005.

In October 1998, Schaake verbally notified Ecology of petroleum-contaminated soil near the equipment garage and cattle processing area at the former Schaake feedlot. Schaake followed-up with a formal report submission in November 1998. Remediation occurred, and Ecology issued an *no further action* letter dated March 22, 2001.

3.8.2 Environmental Consequences

No Action. Under the No Action Alternative, construction related release of hazardous materials would not occur. Current uses of petroleum products and hazardous materials during O&M would be unchanged. These practices include use of herbicides for control of pest plant populations, which could allow for inadvertent releases of such substances into sensitive wetland areas. Ongoing BMPs are designed to reduce the potential for inadvertent releases, to the extent possible; therefore, this impact would be low. With the issuance of *no further action* letters from Ecology, impacts from past hazardous substance releases would be low and unchanged from present status.

Proposed Action. Under the Proposed Action Alternative, the handling and use of common hazardous materials and petroleum products would be done in compliance with regulatory requirements. During construction, petroleum products and hazardous materials such as fuels, oils, and lubricants would be present on site, primarily in vehicles and construction equipment. Leakage of hydraulic fluids, fuels, and solvents could occur during construction in or near aquatic areas. However, these impacts would be reduced to low by implementing a Spill Prevention and Control Countermeasures Plan (SPCC) as well as using standard construction BMPs. These BMPs are contained within the FPRP III conservation measures found in Appendices B and C.

In the unlikely event that contamination of soil or water is suspected, work would stop in the area, and the project manager would be contacted. Work would not resume until appropriate actions were taken to minimize risks. Reclamation has discussed the proposed project with Ecology and the Corps' Seattle District's Dredged Material Management Office (DMMO) and received confirmation to proceed from both; after issuance of the *no further action* status, the property is no longer considered contaminated. Impacts from implementation of the Proposed Action Alternative are low.

Under the Proposed Action Alternative, Reclamation would conduct an All Appropriate Inquiry (process of evaluating a property's environmental conditions to obtain certain protections from liability under the Federal Superfund Law (CERCLA) prior to completing the land exchange with the City of Ellensburg.

Land management activities would involve the use of herbicides following label instructions for mixing and application, so impacts would be low. The chance of spill and incidental releases of herbicides with proper handling is low.

3.8.3 Cumulative Impacts

Reclamation is not aware of any past, present, or reasonably foreseeable actions likely to involve construction and land management activities that would use hazardous materials and products that could generate waste. Under the Proposed Action Alternative, construction would make a low, if any, contribution to cumulative impacts on hazardous materials and waste. It is unlikely that construction of the project would coincide with another project in time and proximity such that cumulative impacts would occur.

3.9 Public Health and Safety

This section describes baseline conditions related to public health and safety and the potential impacts on public health and safety within the analysis area.

3.9.1 Affected Environment

The landward-side of the project area currently does not have public access and is not used for recreational opportunities, so there are nominal risks to public health and safety on the project site. The Schaake levee typically provides flood protection for 50-year floods for I-90, the WWTP, and residences downstream from and adjacent to Tjossem Ditch. Based on the Corps' 2016 assessment, the Schaake levee in its current, damaged condition would provide a 5-year level of protection to infrastructure.

3.9.2 Environmental Consequences

No Action. Under the No Action Alternative, the project would not be implemented. Reclamation would be responsible for fixing the levee, since it is not being maintained under the Corps' P. L. 84-99 program. In addition, risk of Yakima River activities would remain the same (low), and the wetlands may harbor mosquitoes (low).

Proposed Action. Based on modeling, the flood protection berm would provide the same level of flood protection or better to I-90 and to a downstream landowner off Tjossem Ditch. Reclamation would monitor conditions of the flood protection berm and the extent of flooding into the future and would work with stakeholders to address concerns as they arise.

3.9.3 Cumulative Impacts

Reclamation is not aware of any past, present, or reasonably foreseeable actions likely to involve construction and land management activities that would affect public health and safety.

3.10 Socioeconomics and Environmental Justice

In August 1994, the Secretary of the Interior established an environmental justice policy based on Executive Order 12898, dated February 11, 1994. This policy requires departmental agencies to identify and address any disproportionate environmental impacts of their proposed actions on minority and low-income populations and communities, as well as the equity of the distribution of benefits and risks of their decisions. Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group should bear a disproportionate share of negative impacts. Socioeconomics evaluates how population, employment, housing, and public services might be affected by the No Action Alternative and the Proposed Action Alternative.

3.10.1 Affected Environment

The Schaake project is in Kittitas County outside the city limits of Ellensburg but within the Urban Growth Area Boundary (City of Ellensburg, 2015). The county was selected as the local study area. Table 1 provides the number and percentage of population for seven racial

categories: White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian, and Other Pacific Islander, Two or More Races, and Hispanic or Latino (U.S. Census Bureau QuickFacts).

Table 1. Race and Hispanic origin for Kittitas County and Washington State

Race and Hispanic Origin	Percent in Kittitas County	Percent in Washington State
White alone, percent [a]	91.8	79.5
Black or African American alone, percent [a]	1.1	4.2
American Indian and Alaska Native alone, percent [a]	1.3	1.9
Asian alone, percent [a]	2.3	8.9
Native Hawaiian and Other Pacific Islander alone, percent [a]	0.2	0.8
Two or More Races, percent	3.3	4.7
Hispanic or Latino, percent [b]	8.9	12.7
White alone, not Hispanic or Latino, percent	84.0	68.7

Data from https://www.census.gov/quickfacts/fact/table/wa,kittitascountywashington/PST045218
a Includes persons reporting only one race
b Hispanics may be of any race, so also are included in applicable race categories.

Low-income populations are identified by several socioeconomic characteristics. Specific characteristics include income (median family and per capita), percentage of the population below poverty (families and individuals), unemployment rates, and substandard housing. Table 2 provides median household income, per capita income, and persons below the poverty level for Kittitas County and the State (U.S. Census Bureau QuickFacts). The additional criteria of unemployment and substandard housing information was not available in the summary of census information.

Table 2. Socioeconomic Characteristics of Kittitas County and Washington State (2013-2017)

Socioeconomic Characteristic	Kittitas County	Washington State
Median household income	$53,163	$66,174
Per capita income in past 12 months	$26,698	$34,869
Percentage Individuals below poverty level	14.2%	11.0%

3.10.2 Environmental Consequences

No Action. Under the No Action Alternative, there would be no construction; therefore, no construction-related socioeconomic or environmental justice impacts.

Proposed Action. Implementation of the Proposed Action Alternative would not disproportionately (unequally) affect any low-income or minority communities within the

project area. The proposed project would not involve major facility construction, population relocation, health hazards, hazardous waste, or substantial economic impacts.

The Proposed Action Alternative could have both short-term and long-term socioeconomic impacts. Short-term, low intensity impacts would be related to construction, including increased demand for construction materials and patronage of local restaurants, hotels, and other types of services. The operations of the restored area would not change substantially from current conditions; therefore, long-term beneficial impacts would be primarily related to support for recreational fisheries.

3.10.3 Cumulative Impact

No other projects in the study area have been identified that would cause a substantial cumulative impact on socioeconomics or environmental justice in combination with the proposed project. However, this project, in combination with other fish habitat restoration projects in the upper Yakima River basin would likely have a moderate beneficial cumulative impact on populations of anadromous fish, which would have an indirect but beneficial cumulative impact on recreational and subsistence fisheries.

3.11 Transportation and Infrastructure

This section briefly discusses traffic, transportation facilities, rights-of-way, utilities, and other infrastructure in the project area, and it identifies potential impacts that could occur from implementing the alternatives.

3.11.1 Affected Environment

The primary transportation features in the area are I-90, Umptanum Road, and other connecting rural roads. Within the property, there is a small amount of paved road near the main entrance off Umptanum Road and then a network of roads used for maintenance of the levee and powerlines. The Yakima River to the south is not a source of primary transportation.

The City of Ellensburg's WWTP is located east of the construction area. The access road to the WWTP's outfall pipe is within the project footprint, and is a hardened road crossing between Wetland CC and Wetland Z.

The Schaake levee runs predominately east to west within the property and near the Yakima River. The levee access road sits atop the levee. The property is not currently served by public utilities such as natural gas or sanitary sewer; however, an abandoned gas line lies in the northwest portion.

BPA power poles transect the property and are accessible by unimproved roadways within the project area. There is no power drop to the wellhouse. The wellhouse is a concrete box that houses the wellhead and pump. The pump has not been used since Reclamation purchased the property.

3.11.2 Environmental Consequences

No Action. Under the No Action Alternative, no construction would occur. Transportation conditions and infrastructure would be unchanged; therefore, there would be no impacts.

Proposed Action. Project mobilization and construction would have temporary moderate impacts directly on Umptanum Road and indirectly on other rural roads in the project vicinity. Impacts may include increased traffic and temporary traffic delays along Umptanum Road and connecting surface roads that would be primarily limited to mobilization in April and the primary construction window of May 1 through October 31. Revegetation actions in November would have low impacts on traffic or roads nearby.

Eastbound I-90 would not experience direct impacts from the construction project; however, construction activities could be viewed from I-90, which may inadvertently slow traffic. These impacts would be expected low and last throughout construction including mobilization and revegetation, April 1 through November 30.

Road access would be maintained to the WWTP's outflow pipe; however, the channel crossing would be improved. Use of a vented box-culvert would allow access to the outfall pipe without driving through Side-channel 2. The impact would be low with long-term beneficial effects.

The BPA powerline infrastructure would be protected as part of the Proposed Action Alternative, and no service interruptions would result from implementation of the project; new road access and pad construction are included. There would be long-term benefits to BPA and their customers by protecting the infrastructure.

Decommissioning the well and removing the pump and pumphouse would have long-term benefits, because this unused infrastructure would no longer need monitoring for maintenance and inhabitation issues. It would also open land for replanting native vegetation.

Existing roads throughout the property would be either relocated or decommissioned by ripping the roadbed to loosen and aerate soil, and then revegetating with native seed and plant materials, resulting in a long-term benefit (low). Relocated roads would be constructed and minimized throughout the project footprint (low).

3.11.3 Cumulative Impacts

Cumulative impacts of past, present, and reasonably foreseeable actions are not anticipated. No other large construction projects are foreseen during the construction of the proposed project; therefore, it would be unlikely the project would coincide with another project in time and physical proximity that substantial cumulative impacts would occur. Likewise, construction activities on the property would be physically separate from other areas so that cumulative impacts would be low to nonexistent.

3.12 Vegetation and Wetlands

Vegetation in the study area includes a variety of wetland, riparian, and upland plant communities.

3.12.1 Affected Environment

The project area lies within the shrub-steppe vegetation zone of the Columbia Basin Province, a vegetative complex that occupies the foothills of the eastern Cascade Mountains. Native plant communities not altered by agriculture or other disturbance normally consist of sagebrush (*Artemisia tridentata*) and perennial bunchgrasses (e.g., *Agropyron spicatum* and *Festuca idahoensis*) as well as non-native cheatgrass (*Bromus tectorum*). Within this vegetative zone, riparian and wetland plant communities are typically dominated by gray alder (*Alnus incana*, facultative wetland [FACW]), black cottonwood (*Populus balsamifera ssp. trichocarpa*, facultative [FAC]), red osier dogwood (*Cornus sericea*, FACW), snowberry (*Symphoricarpos albus*, facultative upland [FACU]), rose (*Rosa sp.*), narrowleaf (coyote) willow (*Salix exigua*, FACW), and Pacific willow (*Salix lasiandra*, FACW).

The following information is a result of Mariposa Restoration Service's (Mariposa) contract to evaluate existing vegetation conditions within the project footprint. Additional information can be found in the *Schaake Habitat Improvement Project Revegetation Plan Site Assessment and Evaluation Report* (Mariposa, 2019). Mariposa conducted three plant surveys throughout the 2018 growing season and recorded 117 species, 56 of which were non-native; of the non-native species, 17 are listed as Class A noxious weeds, 7 as Class B, 9 as Class C, and 1 Class D (County listing).

Plant surveys did not reveal any plants State or federally listed as a threatened, endangered, or sensitive species within the project footprint. Numerous culturally sensitive plants such as aspen, Wood's rose, red osier dogwood, chokecherry and service berry occur within the project site, and Mariposa has recommended these in the project revegetation, plant materials list (Mariposa, 2019).

Since removing the former feedlot infrastructure in the early 2000s, plants have colonized naturally from surrounding populations. Upland areas have been colonized with non-native species such as Russian thistle and pigweed, along with scattered patches of noxious weeds such as field morning-glory and kochia. To prepare the area for revegetation, Reclamation currently uses herbicide treatments to control these species under a chemical fallow program on approximately 82 acres of the project site.

Wetland and moist-site areas have been colonized with a combination of native and non-native species. Common non-natives include reed canarygrass and meadow foxtail, along with natives such as cattails, spike rush, and water-plantain. Noxious weeds such as kochia are also common, and Canada thistle occurs in scattered patches. Crack willow populations (a non-native species) were mapped throughout the project site along the Yakima River, Wilson Creek, and Tjossem Ditch.

Proposed agricultural fields included in the project are currently dominated by non-native rhizomatous grasses that allow repeated haying throughout the season. Species composition varies within the three fields but appears to be predominantly reed canarygrass and spreading bentgrass. Baseline wetland conditions are described in the following reports and are incorporated by reference: Delineation of wetlands on the Schaake property and adjacent properties are documented in the *Schaake Property Habitat Enhancement Project, Wetland Delineation Report* (ICF International, 2010), and the *Schaake Property Habitat Improvement Project, Wetland Delineation Report, Adjacent Properties* (CH2M HILL, 2015).

3.12.2 Environmental Consequences

No Action. Under the No Action Alternative, there would be no construction activities; therefore, the likelihood of full site restoration would be low because the presence of the levee is a limiting factor that would continue to separate the Yakima River from its floodplain. The water resources that would benefit from levee removal would be unrealized.

Vegetation. Under the No Action Alternative, Reclamation would continue with land management actions, including treatment of invasive species.

Wetlands. Under the No Action Alternative, Reclamation would continue with land management actions including treatment of invasive species.

Proposed Action:

Revegetation. Reclamation contracted with Mariposa to develop a long-term restoration strategy that is reflected in their 2019 report discussed above. Reclamation is incorporating the Mariposa restoration plan by reference. The revegetation goal for this project is to restore and enhance salmonid, riparian and upland habitat by initiating native vegetation succession. The objective is to increase native plant cover by 40 percent within 5 years. Treatments include restoration and preservation of existing native plant species; control of invasive species (to the extent practical) including measures to control existing non-native woody vegetation (i.e., crack willow/*Salix fragilis*); erosion control; and measures to address degraded soil conditions, as necessary.

To accomplish the revegetation objective, the overall approach is to establish an understory of native grasses that would outcompete weed populations. Once grasses are established, trees, shrubs, and herbaceous species would be installed, where appropriate, to create an overstory.

Some areas would be augmented with trees and shrubs to enhance the riparian habitat buffer and would not be seeded with native grass. These areas would not undergo a full chemical fallow process but would be augmented with native live plantings. These plantings would increase the rate at which desired species become established and in-turn reduce reed canarygrass populations present on site.

While jump-starting the side channels, alcoves, and edges of wetlands with LWM structures, it is important that a healthy river system can replace these structures naturally. Therefore, a healthy riparian forest is necessary. Wood falling into the channel is dependent on having varying ages of trees in the riparian forest to ensure future wood supply for the channel. Trees with strong, decay-resistant wood provide more durable woody debris than trees with weak or easily decayed wood. Trees in the willow family fix nitrogen in a form available to organisms in the forest and the stream, whereas other tree species lack this capacity. For this reason, willows are a dominant tree species in the revegetation plan.

Wetlands. The goal for wetlands in the project area is to establish functioning riverine and depressional wetland systems. Most current depressional wetlands were artificially created by inadvertently ponding water on the floodplain after the construction of the existing levee or by excavation for use in the Schaake cattle operation. The creation of side channels would convert many artificial depressional wetlands to more site-appropriate riverine wetlands and would enhance the remaining depressional wetlands. Figure 9 **s**hows anticipated, passive wetland areas created.

- Hydrologic Function - This project would result in functional uplift in hydrologic function for the Yakima River and wetlands on the Schaake property. The levee removal would reconnect the Yakima River and its wetlands to more than 129 acres of floodplain in the project area. In addition, the side channels would result in more frequent and larger areas of inundation in the floodplain. Hydraulic modeling of the area post-project shows an increase of wetland area caused by frequent inundation at lower flows. Over 2.7 acres of passive wetland creation is expected to occur over time. Please refer to associated restoration plans and their hydrology section for details.
- Water Quality - While there may be negative water quality effects to ordinary high water (OWH) and wetland areas, these effects are expected to be localized and temporary. Demolishing roads adjacent to existing wetlands are expected to be beneficial to water quality in the long term. There is less potential for sediment to reach wetlands and the river with fewer sections of adjacent roads to contribute; although, this would be difficult to measure. Revegetation and large wood placement in the project area are expected to decrease any potential sediment and nutrient entry in the wetlands and Yakima River. Vegetation and LWM would provide protection from erosion in disturbed areas. The water velocity is expected to be low on the floodplain during high-flow events. Vegetation would filter sediments, and water may inundate the soils rather than returning to the river or wetlands as surface flows. Please refer to the Water Resources section for details.
- Habitat - This project would benefit numerous species. More frequent inundation of the floodplain along with seeding of native species would encourage increased riparian and upland vegetation growth, resulting in increased structural complexity. In addition, large wood placement in the side channels and floodplain would provide additional habitat complexity. This complexity would increase the availability of cover, breeding areas, and forage habitat for nearly every species found on site. Any increase in wetland size and inundation areas would benefit species like amphibians and waterfowl. The creation of the side channels would provide slow velocity areas for fish and other aquatic species. Please refer to the Fish section and the Wildlife section for detailed information on effects to these species.
- Executive Order 11990 - Each agency shall provide leadership and act to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities (42 FR 2696). This project would not result in the destruction, loss or degradation of wetlands. Several designs were considered, and the Proposed Action Alternative results in fewer direct impacts on wetlands while providing opportunity to enhance existing wetlands, passively create new wetlands, and reestablish floodplain connectivity to 129 acres. Mitigation measures and BMPs (Appendix A) would be used to further reduce potential impacts on wetlands.

3.12.3 Cumulative Impacts

Restoration measures implemented under this project and other planned projects (e.g., the reconnecting the Yakima River to its floodplain behind the Jensen and Jefferies levees shown in Figure 2) would reduce populations of non-native vegetation and increase populations of native wetland, riparian, and upland vegetation communities. These measures would have an

overall beneficial impact by increasing native floodplain habitat communities. The cumulative impact of restoring numerous native habitats and ecological functions would ultimately be high, and beneficial to ESA-listed fish in the Yakima River.

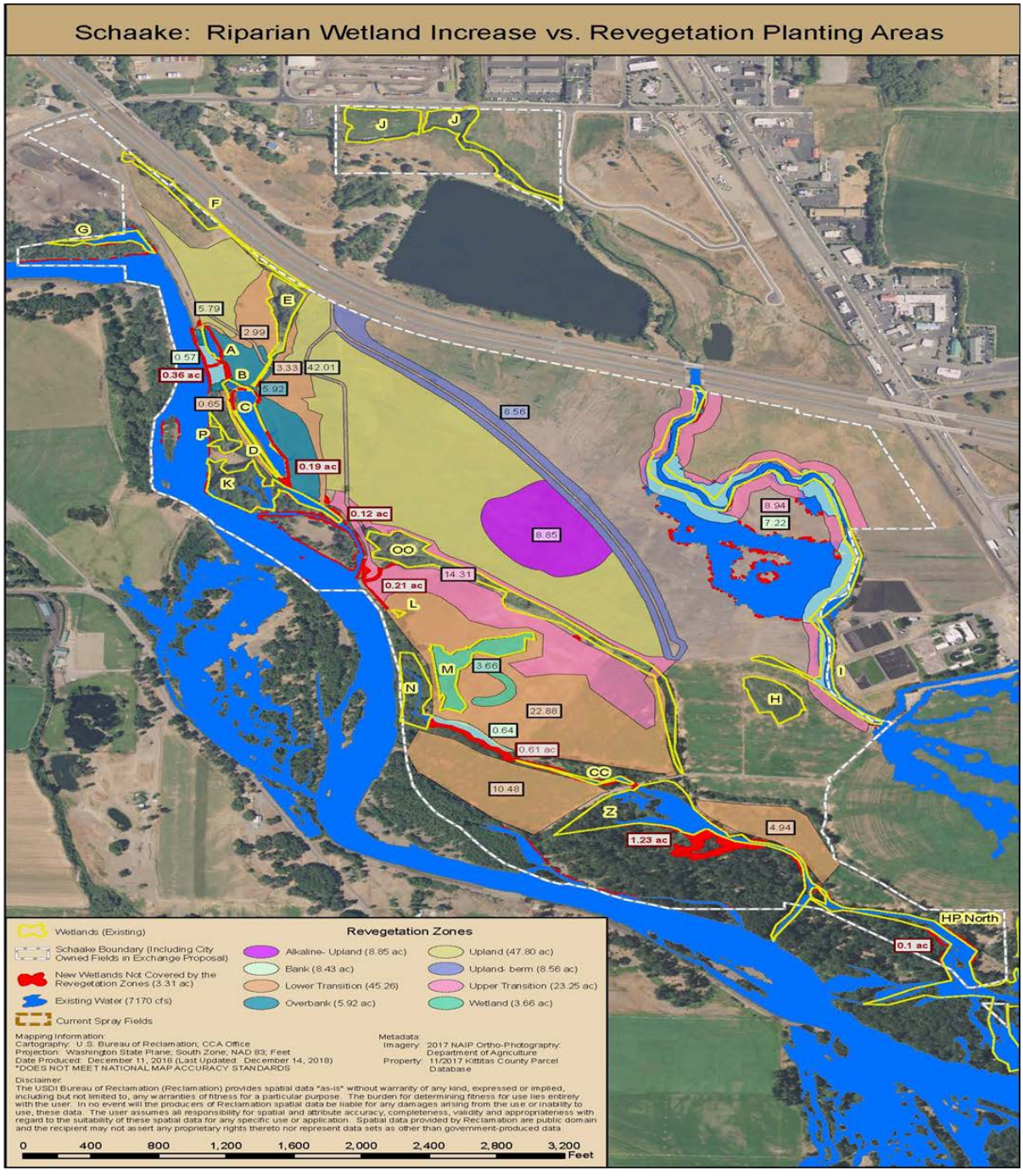

Figure 9. Schaake project area map showing anticipated, passive wetland creation

3.13 Water Resources

This section describes water resources and water quality in the project area and nearby areas where the Proposed Action Alternative could affect hydrology or water quality. It also discusses the potential impacts the project could have on water resources. The area of analysis includes the project footprint, Schaake reach of the Yakima River.

3.13.1 Affected Environment

Hydrologic Characteristics. Surface water is prevalent on the property and includes Wilson Creek, an irrigation ditch, ponds, and wetlands. Most of the property is within the 100-year floodplain of the Yakima River.

Floodplain. The largest floodplains of the Yakima basin were extensively altered and disconnected by flood control operations and by construction of levees to the extent that salmon and steelhead habitat has been substantially diminished in quantity and quality. Salmon recovery requires not only the protection of existing high-quality habitats but also the restoration of degraded habitats, particularly shallow water environments such as side channels which primarily exist within the large floodplain reaches (Reclamation, 2018).

The Schaake Levee was constructed in 1930 and is approximately 7,600 feet long. The levee provides a 50-year level of protection to public infrastructure and residential properties along the left bank of the Yakima River.

Groundwater. Based on water level measurements from wells on the property, the inferred direction of groundwater flow fluctuates from south to east with gradient ranging from 0.003 feet to 0.010 feet. Depth to groundwater is shallow, fluctuates about 5 feet per year, and may be as little as 1 foot below surface during high-water conditions (Landau Associate, 2001).

Groundwater measurements taken in September 2018 (the driest period of the growing season) averaged 61 inches deep and ranged from 37 inches deep just south of Wilson Creek to 81 inches deep near the eastern edge of the project area. Depth to groundwater measurements taken during the geology investigation in December 2017 averaged 65 inches deep and ranged from 54 to 90 inches (Mariposa, 2019).

Aquatic Life Criteria. The State developed aquatic life criteria to protect designated beneficial uses. Table 3 shows criterial for temperature, DO, and pH for salmonid spawning, rearing, and migration in fresh waters of the State (Ecology 2019b).

Table 3. Criteria for temperature, DO, and pH for salmonid spawning, rearing and migration in fresh surface waters of the State.

Parameter	Description	Criteria
Temperature September 16 to June 14	Measured as the 7-day average of the daily maximum temperatures (7-DADMax)	63.5°F (17.5 degrees Celsius [°C])
Dissolved Oxygen (DO)	Measured as the 1-day minimum DO	8.0 milligrams per liter (mg/L)
Turbidity	Sampling locations and frequency based on project activities	Shall not exceed: 5 NTU over background when the background is 50 NTU or less; or A 10% increase in turbidity when the background turbidity is more than 50 NTU
pH	Within the range of 6.5 to 8.5	Human-caused variation shall be less than 0.5 units, and maintain pH values within the range of 6.5 to 8.5

Clean Water Act (CWA). The Yakima River within WRIA 39 and Kittitas County is on Washington's 303(d) lists for two, Category 5 water pollutants: temperature and dissolved oxygen (Ecology, 2019c). The EPA has approved a TMDL for temperature. As required in Section 303(d) of the CWA, Ecology identifies waters that do not meet water quality standards. Waterbodies listed as Category 5 impaired on the 303(d) list require that a total maximum daily load (TMDL) be developed. A TMDL is a numerical value that represents the highest amount of pollutant a designated surface water can receive while meeting State and National water quality standards.

Water Quality Parameters. Ecology lists the 7-day average daily maximum water temperature aquatic life criteria as 63.5° F (17.5°C). Year-round water temperature is a concern in the Yakima River below the Cle Elum River. The Yakima River has a designated use for salmonid spawning and rearing.

Water temperature data taken from the water quality monitoring Station 39A090, which is on the Yakima River near Cle Elum, is the closest Yakima River upstream monitoring station to the Schaake reach. The Yakima River has had varying temperature criterion over the years; however, since October 2005, the Yakima River has only exceeded the temperature criterion 13 times with an average exceedance of 8.8 percent. Temperature conditions of the Schaake reach, Wilson Creek, and the wetlands is unknown. For the Schaake reach, the next water quality monitoring station on the Yakima River is downstream at Harrison Bridge. Data from Station 39A050 has not been collected since 2009, and no temperature exceedances were reported.

A waterbody's pH indicates the hydrogen ion concentration in the water and ranges from zero to 14 (less than 7 being considered acidic). The pH determines the solubility of chemicals and nutrients (e.g., phosphorus, ammonia, nitrogen) in the water. Low pH values result in increased solubility of pollutants and nutrients. The solubility of these parameters determines their bioavailability for plants and animals.

The Washington Administrative Code (WAC) 173-201A-200 established two different turbidity criteria to protect six different categories of aquatic communities. For the reach of the upper Yakima River where the project is located, the turbidity requirement for one standard applies. The Yakima River is used for salmonid spawning and rearing (WAC-173-201A-602); however, the freshwater designated uses and criteria found in WAC 173-201A-200 include salmonid spawning, rearing, and migration.

The effects of suspended solids on fish and other aquatic life can be divided into four categories (Ecology, 2008):

1. Acting directly on the fish swimming in the water and either killing them or reducing their growth rate, resistance to disease, and the like
2. Preventing the successful development of fish eggs and larvae
3. Modifying natural movements and migrations
4. Reducing the supply of available food

Water in the upper Yakima basin is managed for irrigation and flood control. The months of greatest concern for human-caused turbidity, suspended sediment loading, and pesticide transport are April through October (Ecology, 2002) and coincide with a critical time when several beneficial uses are potentially impaired by suspended sediment and pesticide transport. March through October, several salmonid species in various life stages are migrating upstream or downstream, holding in side-channels and tributaries, or spawning in the mainstem and upper tributaries. The period of highest risk from exposure to suspended sediment and turbidity appears to be April through June. This is when the suspended sediment concentrations are high enough and long enough to potentially affect emerging Chinook fry and incubating Steelhead eggs. Other factors that contribute to sediment loads include irrigation return drains; creeks and streams without adequate bank protection; or riparian areas, machinery, livestock, and residential development (Ecology, 2002). Based on Ecology's 2002 report, elevated levels of suspended sediment from storm and snowmelt events do not appear to raise background sediment to a level of concern.

3.13.2 Environmental Consequences

No Action. Under the No Action Alternative, no construction would occur, and current water quality management practices would remain in effect. Moderate warming of surface waters likely occurs in shallow areas where there is minimal inflow due to the presence of the levee; these conditions would persist under this alternative, and the impact would be low

Proposed Action. Channel excavation, levee removal, floodplain contouring, flood protection berm construction, wetland enhancement, and riparian habitat restoration could result in short-term impacts on hydrology and the surrounding floodplain. The greatest effect on hydrology and the floodplain is removing the Schaake levee in order to restore the floodplain; additionally, connecting the side channels to the Yakima River when its flows exceed 700 cfs would provide long-term benefits to the floodplain and hydrology, including groundwater recharge.

Stormwater runoff from temporarily-disturbed construction and staging areas could contribute sediment-laden water to the river and increase turbidity; however, rain is not likely, and if rain

occurs during construction, mitigation measures (Appendix A) and conservation measures of the FPRP III would be implemented (Appendices B and C). Most excavation would occur in the dry. Inwater work on the Yakima River would be limited to excavation of the mouths of the floodplain channels. These areas would be isolated from the river to the degree possible by cofferdams. River flows for construction of the inlets and work in the Side-channel 1 outlet would occur after mid-September, and it is desirable for flows to be around 700 cfs when the connections to the mainstem are made. Because of the high flow in the river, turbidity levels would be expected to return to background levels within 300 feet downstream from the excavation areas due to dilution.

Since work in the floodplain wetlands would occur when there is no flow through these wetlands, turbidity would be unlikely to move out of the construction area, and downstream turbidity impacts are unlikely.

Existing channel excavation involves disturbing inundated or saturated sediments. Turbidity increases would be short term, and measures to control erosion and limit the duration of inwater work would keep turbidity to moderate levels. Turbidity-related impacts would be low.

Changes to DO and pH would be expected to occur as new areas are inundated and vegetation decomposed. Plant decomposition requires oxygen for microbes and, in turn, processes result in increased CO^2 in the water which lowers pH. The impacts on DO and pH would be expected to be low and short term (within a season) and would not result in long-term impacts on water quality. Although decomposition of organic matter could result in the release of nutrients such as phosphorus and nitrogen, concentrations would be diluted by upstream waters, and downstream impacts would be low.

Beneficial effects on water resources resulting from implementation of the project would include the following:

- Improved hydrologic connectivity
- Improved floodplain wetland habitat
- Improvement to designated beneficial uses
- Improved water quality

Floodplain habitat would be increased by allowing for backwatering (inflow/outflow) of Yakima River water into the floodplain during the spring freshet, irrigation season, and winter flow events. Additionally, by diverting flow from the Yakima River through the side channels, there would be improved wetland habitat in Wetlands C, K, CC, and Z throughout the year. These restoration activities would be expected to result in improvement to designated beneficial uses, specifically rearing of aquatic life, and wildlife habitat, which would likely result in greater groundwater recharge and retention than occurs under current conditions. Since the groundwater table is relatively high in this area due to its proximity to the Yakima River, this impact would be low.

Nutrient-rich soils may be mobilized from the Schaake property to the Yakima River, increasing phosphorus levels within the Yakima River. At the August 29, 2007, stakeholder meeting, Ecology stated that the amount of soil and phosphorus entering the river would be negligible, and the best course of action may be to remove the phosphorus slowly through native vegetation (Rayforth, 2007), as would occur via revegetation of the site. In addition, as stated in WAC 173-

201A-300 (Antidegradation), release of phosphorus is allowable with the removal of the levee to return Yakima River its natural physical structure (for example, floodplain connectivity).

Although mobilization of phosphorous is allowed, reasonable actions were taken during the design process to reduce the potential for phosphorous mobilization by selecting the side channel alignments to avoid areas of the highest phosphorus concentrations, reducing the potential to release phosphorous side channel evolution. Disturbed areas would be revegetated to reduce erosion potential (see Revegetation section), further reducing the potential to mobilize phosphorous.

The Yakima River within the project area is included in Washington's 303(d) list for temperature and DO. Increased shade-cover from riparian plantings, and the dilution and flushing that would occur when there is perennial side channel connectivity would ameliorate impacts. Conversely, water leaving the project area would not be expected to further impact the previously described parameters that have 303(d) listings for the Yakima River.

In comparison to flowing water in the Yakima River, there would be a potential for a slight increase in water temperature and decrease in DO in shallow wetlands during the summer. However, these changes would be expected to occur outside the timeframe for salmonid rearing. It is expected there would be an overall improvement to water quality due to restored riparian areas, improved instream flows, floodplain connectivity, and invasive species (e.g., reed canarygrass) management. The impact on water quality would be low.

Hydraulic modeling was used to evaluate specific flows for habitat (frequent, moderate discharges) and flooding (infrequent, high discharges). The *Hydraulic Modeling: Schaake Restoration – Final Design* report is incorporated by reference.

At and below the 2-year return discharge, the differences between the proposed and existing conditions are limited to the constructed side channels that are inundated under the proposed action. The side channels were designed to be self-sustaining, considering sediment transport and habitat needs. Both side channels have existing ponds within their alignment as well as multiple riffles. They both provide ample diversity in depth, velocity, and wetted width. In-channel log placements would further increase diversity and are planned in the design; however, these features have not been included in this modeling. Some overbank log placements have been included in the model near the upstream half of Side-channel 1.

For the 100-year flood event, the main channel velocities are generally reduced or remain the same throughout the Schaake reach. The exception is near the upstream portion of the remaining Schaake levee. Just downstream from the localized increased velocity at the Schaake levee, the water surface elevation is reduced, which limits the backwater effect and allows for an increase in velocity. In addition, there is less inundation of Wilson Creek near I-90. The flood protection berm prevents the comingling of the Yakima River and Wilson Creek in this area.

Based on coordination with Kittitas County, once Phase 2 construction is complete, they would work with Reclamation to complete a letter of map revision. A letter of map revision is used to document changes in floodplain inundation for the FEMA Flood Insurance Rate Map.

3.13.3 Cumulative Impacts

Previously described past, present, and reasonably foreseeable future actions have resulted in detrimental impacts on water resources along the Yakima River, including 303(d) listings for temperature and DO. Considerable effort has been invested by the State as well as numerous Federal, State, Tribal, non-profit, and volunteer organizations to improve water quality in the Yakima River. Results of these efforts indicate improvement in some pollutant concentrations and eliminated the need for additional TMDLs in WRIA 39 in Kittitas County.

Other floodplain restoration projects are underway in the project vicinity. The Jensen levee, upstream from the Schaake levee has been breached, and a side channel has been reconnected to the Yakima River. The downstream Jefferies levee is in the planning phases to be breeched, resulting in another section of Yakima River connecting with its floodplain.

When combined with the past, present, and reasonably foreseeable actions, the proposed action would result in long-term, moderate, beneficial cumulative impacts on water resources by restoring hydrologic connectivity between the Yakima River and its floodplain. Expanded floodplain, wetland area and revegetation over most of the open spaces with native plants would improve water quality by ameliorating nutrients and other pollutants.

3.14 Wildlife

The project area is not actively managed for wildlife. Reclamation's resource management policy is to provide a broad level of stewardship to ensure and encourage resource protection, conservation, and multiple uses, as appropriate. Land management practices are in accordance with existing Federal laws, regulations, and policies to provide protection of fish, wildlife, and other natural resources; cultural resources; public health and safety; and applicable uses of Reclamation lands and water areas, public access, and outdoor recreation.

3.14.1 Affected Environment

Wildlife habitat in the action area is limited and has been shaped by hydrology and disturbance, which work together to determine the distribution of vegetation (see Vegetation and Wetlands section for details). Historical use of the Schaake property resulted in high human disturbances to the floodplain and riparian areas. The area surrounding the project site is largely agricultural land, which may offer habitat for a variety of wildlife.

A formal inventory of fish and wildlife has not been completed for the property; fish are discussed separately in Fish section. The site supports many other wildlife species including mule deer, Rocky Mountain elk, yellow-bellied marmots, a variety of raptors and birds, and amphibians and reptiles. Given the proximity to agricultural land, small rodents, skunks, raccoons, coyotes, and other wildlife are likely to be present occasionally.

3.14.2 Environmental Consequences

No Action. Under the No Action Alternative, construction would not occur, current land management practices would continue, and the site would not be restored. Actions would be taken to reduce invasive vegetation, but the site would not undergo large-scale native seeding and revegetation efforts. As such, the area would continue to provide minimal habitat for wildlife use.

Proposed Action. Terrestrial wildlife would be exposed to short-term increases in noise during construction; however, the project area is adjacent to I-90 and consequently experiences steady vehicle associated noise. The noise effects from the Proposed Action Alternative would only occur during active construction, and it is expected that any affected wildlife would disperse to adjacent habitat, if possible.

The proposed project would likely displace mammals during construction. Confining work to the existing levee footprint and staging and access routes in developed areas would minimize potential for impacts on mammals, birds, reptiles, and amphibians. These project impacts on wildlife are expected to be minor, local, and of short duration.

Short-term effects would occur from removing vegetation for access or excavation. However, the project area would be planted with a variety of native plants; grasses, wetland species, forbs and trees (See Vegetation and Wetlands section). After the revegetation takes place, there would be an increase in quality habitat available various terrestrial species. Wetland and riparian areas would also be expected to increase resulting in additional forage, cover, and nesting areas. These project impacts would be beneficial and long term.

3.14.3 Cumulative Impacts

Past, present, and reasonably foreseeable, future actions include other restoration projects in the area as previously described. The cumulative impact of restoring floodplain wetland habitats and ecological function for wildlife would ultimately be high and beneficial to the Yakima River basin

3.15 Indian Trust Assets

Indian Trust Assets (ITAs) under Secretarial Order 3175 are legal interests in property held in trust by the United States for federally recognized Indian Tribes or individual Indians. An Indian trust has three components: (1) the trustee, (2) the beneficiary, and (3) the trust asset. ITAs can include land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, and instream flows associated with trust land. Beneficiaries of the Indian trust relationship are federally recognized Indian Tribes with trust land; the United States is the trustee. ITAs cannot be sold, leased, or otherwise encumbered without approval of the United States. The characterization and application of the United States trust relationship have been defined by case law that interprets Congressional acts, executive orders, and historic treaty provisions.

3.15.1 Affected Environment

The Yakama Nation has treaty and cultural and historical rights and interests in the area. These may include but are not limited to hunting, fishing, gathering, and other traditional activities: however, the project does not lie within these Tribe's reservation boundaries. No ITAs have been identified.

3.15.2 Environmental Consequences

No Action. There would be no effect to ITAs under No Action Alternative since construction would not occur.

Proposed Action. Reclamation used its Tessel mapping database to determine the presence of ITAs in the project area. This database includes all known instances of trust land, reservation land, and village and community sites. The database is updated frequently by the Bureau of Indian Affairs. No ITAs were identified within a 25-mile radius of the project area.

Some Tribes may include other aspects of the environment in their definition of trust assets. These may include water rights, water quality, fish, hunting, and gathering activities. Please see the following sections of the EA that discuss effects of the project on these resources: Water Resources, Fish, Wildlife, and Vegetation and Wetlands.

3.15.3 Cumulative Impacts

Past, present, and reasonably foreseeable future actions include other restoration projects in the area. The cumulative impact of restoring numerous habitats and resources to more natural conditions would ultimately be high and beneficial to the Yakima River basin.

Chapter 4 CONSULTATION AND COORDINATION

4.1 ESA Section 7 Consultation

For this project, Reclamation would use the *Programmatic Endangered Species Act Section 7(a)(2) Biological Opinion* and the *Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Seattle District Corps of Engineers Permitting of Fish Passage and Restoration Action in Washington State* (FPRP III) from the USFWS and the NMFS as part of Section 7 (a)(2) of the ESA.

4.2 Tribal Consultation

The Yakama Nation would be notified when the final EA is released as part of Tribal outreach by Reclamation. The Yakama Nation has been consulted under Section 106 and has participated as a stakeholder.

4.3 Coordination

Reclamation prepared this EA with an interdisciplinary approach to comply with the NEPA mandate to, "…. utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment" (40 CFR 1501.2(a)). The following resource specialists and principal disciplines were involved with preparation of this EA or supporting documents:

Elizabeth Heether, Environmental Protection Specialist; Reclamation

Warren Hurley, Archaeologist; Reclamation

Shannon Archuleta, Fisheries Biologist; Reclamation

Kelsey Doncaster, Historian; Reclamation

Carron Helberg, Realty Specialist; Reclamation

Christopher Cuhaciyan, PhD, P.E., River Engineer; Reclamation

Tim DeWeese, EIT, Civil Hydraulic Engineer; Reclamation

Jeanne Demorest, YRBWEP Floodplain Properties Manager; Reclamation

Robert Hilldale, M.S., P.E., Hydraulic Engineer; Reclamation

Ed Young, IT Specialist; Reclamation

Reclamation worked with the following partners and stakeholders during alternative development:

John Akers, City Manager; City of Ellensburg

Ryan Lyyski, Public Works Director; City of Ellensburg

Brad Case, Parks & Recreation Director; City of Ellensburg

Lori White, Environmental Specialist; Ecology

James Leier, Technical Unit Manager; Ecology

Laura Inouye, Toxicologist; Ecology

Matt Durkee, Hydrogeologist: Ecology

Mark Cook, Public Works Director; Kittitas County

Karen Hodges, Planner III; Kittitas County

Lindsey Osbolt, Planning Official: Kittitas County

Anna Lael, District Manager; Kittitas County Conservation District

Sean Gross, Yakima Basin Lead; NOAA Fisheries

Jen Nelson, Habitat Biologist; WDFW

Josh Rogala, Biologist; WDFW

Scott Nicolai, Habitat Biologist; Yakama Nation

Julie Heilman, Hydraulic Engineer; WSDOT

Jacob Prilucik, Planning Specialist; WSDOT

Matt Boast, General Manager; Kittitas County Public Utility District

David Moore, Soil Scientist; U.S. Army Corps of Engineers

Cindy Preston, Aquatic Property & Acquisition Specialist; WDNR

Arden Thomas, Project Manager; Washington Water Trust

Robert Haltner, Endangered Species Biologist; USFWS

Robert Stewart, Private landowner (downstream, left bank)

Mike & Betty Moeur (Kelly), Private landowner (downstream, left bank)

Ed Stroh, Private landowner (downstream, left bank)

Skip Mynar, Private landowner (downstream, left bank)

John Eaton, Private landowner (downstream, left bank)

Mark Anderson, Private landowner (right bank)

Mac Wilson, Private landowner (downstream, left bank)

Steve Lervick, Vice President of Operations; Twin City Foods

Virgil Roehl, Vice President of Finance; Twin City Foods

Charlie Hiatt, Plant Manager; Twin City Foods

Tony Bruketta, Field Representative, Organic & Conventional; Twin City Foods

Tom Foster, Corporate Production Manager; Twin City Foods

Grant Craig, Ellensburg Division Manager; Twin City Foods

Ted Pooler, Consultant; HLA/Twin City Foods

Alex Conley, Executive Director; Yakima Basin Fish and Wildlife Recovery Board

Leslie Olson, Right-of-Way Agent; BPA

Todd Nicholson, Supervisor, Civil Design; BPA

Mirislova Rivera, Realty Specialist; BPA

Ann Welz, Project Manager; Trust for Public Lands

Justin Bezold, Yakima Project Manager; Trout Unlimited

David Child, Biologist; Yakima Basin Joint Board

Jeff & Jackie Brunson, Managers of Bull Ditch

Todd Thayer, Private landowner (downstream right bank)

4.4 Permits and Authorizations Needed

Reclamation or its contractor would obtain all necessary Federal, State, and local exemptions prior to implementation of the proposed action. These permits, authorizations, reviews, or exemptions may include items displayed in Table 4.

Table 4. Permits, authorization, review, or exemptions that may be needed

Authority	Permit & Authorizations Needed or Submitted	Responsible Agency
Endangered Species Act of 1973	Pre-construction Notification to National	Bureau of Reclamation
Endangered Species Act of 1973	Pre-construction Notification to U.S. Fish	Bureau of Reclamation
Clean Water Act	Section 404-Nationwide Permit 27 for Phase I	U.S. Army Corps of Engineers Regulatory Division
Clean Water Act	Section 404-Individual Permit for Phase 2	U.S. Army Corps of Engineers Regulatory Division
Clean Water Act	Section 401c-Individual Permit Water Quality	Washington State Department of Ecology
Clean Water Act	Construction General Stormwater NPDES Permit	Washington State Department of Ecology
	Aquatic Resource Use Authorization	Washington Department of Natural Resources
Hydraulic Code Chap. 77.55 RCW	Hydraulic Project Approval	Washington State Department of Fish and Wildlife
Shoreline Management Act	Shoreline Substantial Development and Critical	Kittitas County Planning and Building Department
National Flood Insurance Act of	Floodplain Development Permit	Kittitas County
	Fill and Grade Permit	Kittitas County
	Break in Access Permit Exemption	Washington Department of Transportation
	Consent to Use	Bonneville Power Administration
	Consent to Use	Trout Unlimited

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APPENDIX A - BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

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Best Management Practices and Mitigation Measures to Minimize the Proposed Action Alternative Impacts on Resources

Resources	Mitigation Measures
Aesthetics/Visual Resources	• Reseed and plant disturbed areas with appropriate native species and control weeds immediately following construction. • Use water trucks to apply water, as needed, to the construction area for dust control. • Protect and retain native riparian/wetland vegetation, to the extent practicable, by avoiding construction activities in these areas. • Minimize the size of the disturbance area, to the extent practicable. • Clean-up site and remove equipment, as practical, during construction periods and at the end of construction.
Air Quality	• Apply water from trucks to excavation areas, access and haul roads, and staging areas as needed to control fugitive dust. • Set a low speed limit on access roads to reduce dust generation. • Restrict idling of construction vehicles and machinery to a maximum of 5 minutes.
Cultural Resources	• Protect any unanticipated cultural resources discovered during construction as follows: • Stop all work; cover and protect the 'find' in place. • Notify Project Manager and Reclamation's Archaeologist and/or Environmental Program Manager immediately. • Implement mitigation or other measures as instructed by Reclamation's Archaeologist.

Resources	Mitigation Measures
Fish	• In fish-bearing waters, construct only during in-water work windows specified by WDFW (July 1- August 31), and in the in-water work window variance of September 1- October 31 that was approved by NMFS and USFWS. • When conducting in-water work or bank work, equipment hydraulic lines would be filled with vegetable oil to minimize impacts of potential spills or leaks. If this is not practical, a minor project modification would need to be approved by the Corps and NMFS. • Clean and inspect equipment for leaks before use in and around water; if a leak is detected, fix and then clean equipment before use. • Seine all in-water work areas on the Yakima River prior to excavating or isolating work areas. • A qualified fish biologist would oversee isolation of in-water work areas. • All fish would be handled according to NMFS protocols for handling listed fish. • Grade channels for positive drainage to avoid fish stranding. • Operate machinery used for in-water work from top of bank to the extent possible. • Preserve riparian vegetation to the extent possible during construction. • Implement all conservation measures relevant to listed anadromous fish and bull trout from FPRP III.
Geology and Soils	• Prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) and an erosion control plan, consistent with National Pollutant Discharge Elimination System (NPDES) requirements and Section 401 consultation. • Create a Sediment Control Plan, include daily monitoring during inwater construction, regular inspection, and recording control measures.* • Use sediment barriers, such as silt fences, straw matting, and straw wattles. • Minimize the area of disturbance, use minimum areas for staging, clearing, and grubbing. • Use water trucks to apply water to control dust, as needed. • Apply mulch or straw or reseed exposed soil areas to reduce erosion and dust after completing work within a given area. • Sequence construction to minimize soil exposure and erosion potential. • Decompact staging areas and decommissioned access roads through ripping and replanting. • Continue monitoring channel formation and levee breaches, in particular, to ensure that functioning channels are experiencing sustainable levels of accretion and erosion.* • Use adaptive management measures to respond to unexpected erosion or accretion.*

Resources	Mitigation Measures
Land Use	• Maintain access for City of Ellensburg to reach the Waste Water Treatment Plant outfall pipe as possible during construction. • Install signs to inform the public of the construction project.
Noise, Hazardous Materials, Public Health and Safety	• Construction would be limited to the hours between 6:00 a.m. and 10:00 p.m. • When not in use, vehicles and equipment containing oil, fuel, and/or chemicals would be stored in a staging area at least 150 feet from wetlands and waterbodies. • Spill containment kits for cleanup and disposal adequate for the types and quantities of materials used at the site would be available at the work site. * • Herbicides would be mixed and applied per label instructions.* • All waste (solid waste, hazardous materials, etc.) would be disposed off-site as regulated by the state.
Socioeconomics/ Environmental Justice	• Apply water to dirt surfaces as needed to control fugitive dust.
Transportation and Infrastructure	• If needed, use traffic controls such as flagging, reduced speed limits, signage, and barriers to manage traffic through and at truck entry/exit points.
Vegetation and Wetlands	• Staging and refueling areas would be established at least 150 ft. away from wetlands and other waterbodies to the extent possible, and they would include containment measures. • To control spread of non-native species, construction equipment would be washed before it was mobilized to the Project area. • Replanting with native seed mix would occur as rapidly as possible following the completion of construction. • Work would include developing a plan to monitor and maintain native plant communities and control non-native and invasive plants. It would include mechanical and chemical treatment methods for non-native species.*

Resources	Mitigation Measures
Water Resources	• Water and sediment quality would be sampled during project planning to establish the environmental baseline and identify any pollutants that could be released during construction or operations. • Sediments for restoration activities would be obtained on-site to the degree possible. • Staging areas, storage sites (fuel, chemical, equipment, and materials), and potentially polluting activities would be identified and secured using methods identified in the SWPPP and would be located 150 feet or more away from any natural water body or wetland, or on an adjacent, established road area in a location and manner that would preclude erosion into or contamination of the stream or floodplain. • A Spill Prevention Control and Countermeasures Plan would be developed, if needed. • Only use hydraulic fluids approved for work in aquatic environments. • Heavy equipment would be washed before delivery to project site to remove oils, fluids, grease, weed seeds, etc. • Heavy equipment would be regularly inspected and cleaned. • Pollution and control measures identified in the SWPPP would be implemented. • All non-emergency maintenance of equipment would be performed off-site. • All equipment, materials, supplies, and waste would be removed from project site when complete. • Activities would be scheduled, and waterflow levels would be managed to provide dry working conditions as much as possible. • Prepare and implement a SWPPP and an erosion control plan, consistent with NPDES requirements and Section 401 consultation. • CWA permit-specific protection measures would be applied. • Erosion control measures would be applied to construction, staging, and access areas (e.g., silt fence or straw wattle along the entire length of levee removal along the Yakima River, turbidity curtains installed at the channel connections to the Yakima River). • BMPs for erosion and sediment control would be applied during operations. • In-water work areas would be isolated from the active river channel. • Levee breeching would be timed with Yakima River flows to minimize erosion. • Stockpiled soils would be covered if they would be inactive for more than a few days. • Machinery for in-water work would be operated from atop levees or within adjacent out of water areas as much as possible.

Resources	Mitigation Measures
Wildlife	• Trees (only two anticipated) would be removed between April 1 and September 1 and would be surveyed for active nests. Trees with active nests would be avoided to the degree possible.
ITAs	• Mitigation measures listed above for fish, wildlife, water resources and vegetation would protect ITAs.

* Measures that are intended to address potential long-term impacts, and which would be implemented during both construction and operations

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APPENDIX B - GENERAL CONSERVATION MEASURES

General Conservation Measures that Apply to all Restoration Actions

Extracted from National Marine Fisheries Service June 21, 2017 Programmatic Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Seattle District Corps of Engineers Permitting of Fish Passage and Restoration Action in Washington State (FPRP III).

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General Conservation Measures that Apply to all Restoration Actions

To minimize effects on ESA-protected species and their critical habitat, as well as MSA essential fish habitat, all projects proposing to use the opinion will comply with the general conservation measures (GCMs) listed below.

GCM 1 Pre-Construction Activities

1. All native, non-invasive organic material (large and small wood) cleared from the action area for access will remain on site.
2. The removal of riparian vegetation for access will be minimized.
3. The number of temporary access roads will be minimized and roads will be designed to avoid adverse effects like creating excessive erosion.
4. Temporary roads and trails across slopes greater than 30 percent will be avoided when feasible. If temporary access needs to cross slopes greater than 30 percent it will be indicated in the Project Information Form.
5. No permanent roads and trails will be built. All temporary access will be removed (including gravel surfaces) and planted after project completion.
6. New temporary stream crossings will avoid potential spawning habitat (i.e,. pool tailouts) and pools to the maximum extent possible. They will minimize sedimentation impacts by using BMPs like mats and boards to cross a stream. After project completion temporary stream crossings will be removed and the stream channel restored where necessary.
7. Boundaries of clearing limits associated with site access and construction will be marked to avoid or minimize disturbance of riparian vegetation, wetlands, and other sensitive sites.
8. A Temporary Erosion and Sediment Control plan and a Spill Prevention Control and Containment plan, commensurate with the size of the project, must be prepared and carried out to prevent pollution caused by surveying or construction operations. The plan will be available to the Corps and NMFS by request.
9. A supply of emergency erosion control materials will be on hand and temporary erosion controls will be installed and maintained in place until site restoration is complete.
10. Prepare a Work Area Isolation plan for all work below the bankfull elevation requiring flow diversion or isolation. Include the sequencing and schedule of dewatering and rewatering activities, plan view of all isolation elements, as well as a list of equipment and materials to adequately provide appropriate redundancy of all key plan functions (e.g., an operational, properly sized backup pump and/or generator). The work area isolation plan does not need to be submitted with a Project Information Form. However, it needs to be available to the Corps and NMFS at their request.
11. A Spill Prevention, Control, and Clean-Up plan will be prepared prior to construction for every project that utilizes motorized equipment or vehicles. The plan will be available to the Corps and NMFS by request.

GCM 2 Construction Requirements

1. Work windows will be applied to avoid and minimize impacts to listed salmonids and forage fish. Please work with local WDFW biologist or see latest work windows on the Corps' website.
2. Electrofishing for fish relocation/work area isolation must follow the most recent NMFS guidelines.
3. Sandbags may be placed to temporarily keep fish out of work areas. Sandbags will be removed after completion of the project.
4. Temporary roads in wet or flooded areas will be abandoned and restored by the end of the in-water work period.
5. Existing roadways or travel paths will be used whenever possible.
6. If listed fish are likely to be present, the applicant will assess which is less impacting to fish: isolation of the in-water work area or work in-water (see GCM 6, Isolation of Work Site).
7. Any water intakes used for the project, including pumps used to dewater the work isolation area, will have a fish screen installed, operated and maintained according to NMFS' fish screen criteria.
8. The site will be stabilized during any significant break in work.
9. Project operations will cease under high flow conditions that could inundate the project area, except as necessary to avoid or minimize resource damage.
10. All discharge water created by construction (e.g. concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) will be treated to avoid negative water quality and quantity impacts. Removal of fines may be accomplished with bioswales; concrete washout water with an altered pH, may be infiltrated.

GCM 3 Equipment and Barge Use

1. Heavy equipment will be limited to that with the least adverse effects on the environment (e.g. minimally-sized, low ground pressure equipment, use of matting, etc.).
2. When not in use, vehicles and equipment containing oil, fuel, and/or chemicals will be stored in a staging area located at least 150 feet from the Corps' jurisdictional boundary of wetlands and waterbodies. If possible, staging will be located at least 300 feet away from the Corps' jurisdictional boundary of wetlands and waterbodies, and on impervious surfaces to prevent spills from reaching ground water. When moving equipment daily at least 150 feet of waterbodies would create unacceptable levels of disturbance (multiple stream crossings, multiple passes over sensitive vegetation) a closer staging location with an adequate spill prevention plan may be proposed and approved as described in Minor Project Modifications as described below.
3. When conducting in-water or bank work, machine hydraulic lines will be filled with vegetable oil for the duration of the project to minimize impacts of potential spills and leaks. If this conservation measure is not practicable, the applicant will propose alternative BMPs in the to avoid the discharge of hydraulic fluids to the aquatic

environment as described in Minor Project Modifications as described below. If this conservation measure is not practical the applicant will use low-hour machinery.

4. Spill prevention and clean-up kits will be on site when heavy equipment is operating within 25 feet of the water.
5. To the extent feasible, work requiring use of heavy equipment will be completed by working from the top of the bank (i.e. landward of the OHWM or extreme high tide line).
6. Equipment shall be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities around the water.
    A. Equipment will cross the stream in-water only under the following conditions:
    B. Equipment is free of external petroleum-based products, soil and debris has been removed from the drive mechanisms and undercarriage; and
    C. The substrate is bedrock or coarse rock and gravel; or
    D. Mats or logs are used in soft bottom situations to minimize compaction while driving across streams; and
    E. Stream crossings will be performed at right angles (90 degrees) to the bank if possible; and
    F. No stream crossings will be performed at spawning sites when spawners of ESA-listed fishes are present or eggs or alevins could be in the gravel; and
    G. The number of crossings will be minimized.
7. If a construction barge is to be used, a preconstruction vegetation survey must be conducted to determine presence and extent of aquatic vegetation, and the barge shall not ground or rest on the substrate at any time or anchor over submerged aquatic vegetation such as eelgrass.

GCM 4 Planting and Erosion Control

1. Within 7 calendar days from project completion, any disturbed bank and riparian areas shall be protected using native vegetation or other erosion control measures as appropriate. For erosion control, sterile grasses may be used in lieu of native seed mixes. Alternative methods (e.g. spreading timber harvest slash) may be used for erosion control if approved by the Corps.
2. If native riparian vegetation is disturbed it will be replanted with native herbaceous and/or woody vegetation after project completion. Planting will be completed between October 1 and April 15 of the year following construction. Plantings will be maintained as necessary for 3 years to ensure 50 percent herbaceous and/or 70 percent woody cover in year 3, whatever is applicable. For riparian impact areas greater than 0.5 acre, a final monitoring report will be submitted to the Corps in year 3. Failure to achieve the 50 percent herbaceous and 70 percent woody cover in year 3 will require the permitee to submit a plan with contingency measures to achieve standards or reasons to modify standards.
3. Fencing will be installed as necessary to prevent access to revegetated sites by livestock, beavers or unauthorized persons. Beaver fencing will be installed around individual plants where necessary.

GCM 5 Water Quality

1. Landward erosion control methods shall be used to prevent silt-laden water from entering waters of the U.S. These may include, but are not limited to, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas.
2. Wastewater from project activities and water removed from within the work area shall be routed to an upland disposal site (landward of the OHWM or extreme high tide line) to allow removal of fine sediment and other contaminants prior to being discharged to the waters of the U.S.
3. All waste material such as construction debris, silt, excess dirt or overburden resulting from this project will generally be deposited above the limits of flood water in an upland disposal site. However, material from pushup dikes may be used to restore microtopography (e.g., filling drainage channels).
4. If high flow or high tide conditions that may cause siltation are encountered during a project, work shall stop until the flow subsides or the tide falls.
5. Measures shall be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into waters of the United States.
6. Where practicable, a turbidity and/or debris containment device shall be installed prior to commencing in-water work.

GCM 6 Turbidity Monitoring

1. When working in-water, some turbidity monitoring may be required, subject to potential the Corps permit requirements or CWA section 401 certification. Turbidity monitoring generally is required when working in streams with more than 40 percent fines (silt/clay) in the substrate. Turbidity will be monitored only when turbidity generating work takes place, for example, installation of coffer dams, pulling the culvert in-water, reintroducing water. The applicant will measure the duration and extent of the turbidity plume (visible turbidity above background) generated. The data will be submitted to the Corps and NMFS immediately following project construction. Turbidity measurements will be taken in NTUs and are used by project proponents to develop procedures to minimize turbidity and estimate take for future projects.

GCM 7 Piling

1. In-water pile driving:
2. Steel round or H piles to be installed shall not exceed 12 inches in diameter/width unless the piles to be driven are in uplands adjacent to the waterbody.
3. Only vibratory installation is allowed for steel round or H piles.
4. If a bubble curtain is proposed it will meet or exceed NMFS design recommendations (NMFS and USFWS 2006).
5. Prior to submittal to the Corps, applicants proposing projects in marine waters must coordinate with NMFS to determine whether a marine mammal monitoring plan will be

required. If NMFS requires a monitoring plan it must be appended to the Project Information Form. In addition, the applicant must include in the Project Information Form the following information regarding the coordination:

6. NMFS biologist with whom the coordination took place.
7. Outcome of the coordination.
8. Installation of treated wood pilings for the construction of temporary structures needed to remove debris or derelict structures is not proposed.

GCM 8 Treated Wood

1. All extracted piling, piling fragments, treated wood debris, and adhering sediment will be placed in a temporary containment area. The containment area will be of sufficient size and durability (e.g. impervious plastic sheeting with sidewalls) to prevent contaminated materials from entering a waterbody. Discharge from the containment basin may be returned to surface waters following sufficient filtration (e.g. through filter fabric or other media) to remove suspended sediment and contaminated wood fragments.
2. Treated wood will be disposed of at an approved upland facility.

GCM 9 Listed Species Considerations

1. Effects on all ESA listed species, their designated critical habitat, and their prey must be considered when proposing a restoration project.

GCM 10 Minor Project Modifications

1. Minor modification to the proposed actions will be approved by the Corps and NMFS when the effects from those modifications are consistent with all effects considered in this opinion. Modification will be limited to the following:
    A. Modification to the inwater work window
    B. Location of staging area
    C. Use of substances other than vegetable oil in hydraulic lines
    D. Implementation Process
2. For each project carried-out under this restoration program, the Corps will fill out a Project Information Form.
3. The Corps will review each project to ensure that the project meets the description and any other criteria of the proposed action category such that any adverse effects on ESA-listed species and their designated critical habitats are within the range of effects considered in the Opinion.
4. The Corps will forward all Project Information Forms to the appropriate NMFS field office for review and/or certification using the fprp-wa.wcr@noaa.gov email box.
5. The NMFS will review and certify a Project Information Form electronically, if warranted.

APPENDIX C - CONSERVATION MEASURES FOR SPECIFIC ELEMENTS

Conservation Measures that Apply to Specific Elements of the Schaake Habitat Improvement Project – Flood Protection Berm Alternative

Compiled from National Marine Fisheries Service June 21, 2017 Programmatic Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Seattle District Corps of Engineers Permitting of Fish Passage and Restoration Action in Washington State (FPRP III)

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Fish Passage

Conservation Measures

1. Projects must comply with the GCMs listed in the General Conservation Measures section of this FPRP as well as the following conservation measures.
2. When a series of barriers in one drainage is scheduled to be addressed within the same project year, work will start at the most upstream barrier. This way, the work at the upstream sites can be done without listed fish in the action area. If these barriers will be addressed over several years, the work will be conducted from downstream to upstream.
3. All designs will demonstrate that ecological functions including bedload movement, large wood and other debris movement, and flood flows, including anticipated flows into the future for the design life of the culvert can occur as appropriate to the site.
4. Road crossings will be designed to provide upstream and downstream passage for juvenile and adult salmonids and downstream movement of sediment and woody debris using the design criteria set forth in the most current version of the NMFS Anadromous Salmonid Fish Facility design manual (NMFS 2011a or subsequent version) or the WDFW technical guidance manual Design of Road Culverts for Fish Passage (Barnard et al. 2013).
5. Grade control structures will provide fish passage for juvenile and adult salmonids and other applicable ESA-listed fishes and will be designed to the most current version of the NMFS Anadromous Salmonid Fish Facility design manual (NMFS 2011a or subsequent version) or WDFW's fish passage criteria for salmon and trout (Barnard et al. 2013). See action subcategory: Channel Reconstruction and Grade Control for additional requirements related to grade control actions.
6. Stream Simulation Design: This design can be achieved with either a bridge or culvert as the crossing structure (see potential exclusion parameters for culverts in the Exclusion section of this action). Projects are defined by a bankfull width that is less than 20 feet. Project designs for stream simulation will meet the WDFW (Barnard et al. 2013) design standards for width (for confined to moderately confined channels: width of the crossing bed to equal 1.2 * bankfull width + 2 feet. Minimum embedment depth for closed bottom pipes is 3 feet. All other design criteria can be found in chapter 3 of Barnard et al. (2013) or NMFS Anadromous Salmonid Fish Facility design manual (NMFS 2011a or subsequent version). Stream simulation culverts longer than 150 feet require NMFS engineering review and certification.
7. Hydraulic Design Method: A design process that matches the hydraulic performance of a culvert with the swimming abilities of a target species and age class of fish. Hydraulic design shall only be used where stream simulation or no-slope designs are not feasible or applicable. Professional engineering justification for a hydraulic design must be provide in writing to NMFS. NMFS engineering will certify that hydraulic designs actions meet the conditions of this programmatic consultation. This design method may be applied to the design of new and replacement culverts and may be used to evaluate the effectiveness of retrofits of existing culverts. Design criteria can be found in chapter 6 of Barnard et al. (2013).
8. No-Slope Design Method: This method provides a simplified design methodology that is intended to provide a culvert of sufficient size and embedment to allow the natural movement of bedload and the formation of a stable bed inside the culvert. It is intended for use only at low risk sites in low gradient streams where the bankfull width less than 10 feet (Barnard et

al. 2013). This design shall only be used where a stream simulation design is not feasible or applicable. Professional engineering justification for a no-slope design must be provide in writing to NMFS and may be subject to NMFS engineering review and certification. Applicable design criteria can be found in chapter 2 of Barnard et al. (2013).

9. For any design, the proponent will demonstrate that the design condition can be maintained over the expected life of the culvert. This includes maintaining placed bed material in, above and downstream from the culvert.
10. All sites will have a maintenance plan appended to the Project Information Form that assures the culvert will be in design condition prior to each fish passage season.
11. Bridge footings will be located outside of the ordinary high water mark (OHWM).
12. Hard bank stabilization at crossing structures will be minimized and limited to the amount necessary to avoid erosion at the new culvert.

Installation of In-Water Habitat Structures and Streambank Stabilization Features

Placement of Woody Material

Description

Large woody material (LWM) may be placed in the channel, estuary, or marine environment either unanchored or anchored in place using rock, rebar or piles. The amount of rock used will be limited to that needed to ballast the LWM. Metal cables and chains will be used sparingly and only situations where other techniques are impractical or would be more harmful to fish and their habitat than cable or chain. Chains can be used in lieu of cable.

Exclusions

1. Projects must comply with all other exclusions for this action category (as listed above).
2. Piles may be driven with hand-held drivers or machine- or barge-mounted vibratory drivers. Use of machine- or barge-mounted pneumatic pile drivers or drop-hammer impact drivers are not permitted.
3. This programmatic cannot be used in areas where pile driving may result in a taking, as defined by the Marine Mammal Protection Act, of dolphins, porpoises, sea lions, seals, sea otters, or whales without prior MMPA authorizations.

Conservation Measures

1. Projects must comply with the GCMs listed in the General Conservation Measures section of this FPRP as well as the following conservation measures.
2. LWM may be either unanchored or anchored in place using rock, rebar pins, wooden piles of any size, round steel piles 10 inches in diameter or less, steel H-piles 10 inches wide or less, and/or cables and chains. Use of steel piles, H-piles and cable should be considered only in unique situations.
3. Rock placement will be limited to no more than the amount needed to ballast the LWM. The use of metal cables and chains will be limited to situations where no other technique will work, and this must be explained by an engineer in the Project Information Form.
4. Large trees may be dislodged or felled for constructing LWM features provided that the following criteria are met:

    A. Lack of instream LWM has been identified as a limiting factor for the subject

reach by a watershed analysis, reach assessment or similar document;

B. The surrounding riparian forest is adequately stocked with healthy mature vegetation;
C. Felling/tipping of existing trees will not significantly impact stream shading;
D. Sufficient natural recruitment of native woody vegetation is expected, and the threat of invasive vegetation filling created gaps is minimal or replanting with native woody species is planned;
E. The placed LWM will provide several years of in-stream/floodplain habitat benefits.

Channel Reconstruction and Grade Control

Description

Full channel-spanning structures may be installed to enhance or provide fish habitat or passage, while also providing grade control elements to the project. Structures within this category can be designed using rock and wood, or as a limited application, concrete sills. The exact form and function of designs in this category should be based on mimicking as closely as possible the natural morphology of the adjacent upstream and downstream channel.

Examples of morphology-based designs include; constructed or engineered riffles for riffle- pool morphologies, rough constructed riffles/ramps for plane bed morphologies, debris or wood jams, rock bands, and boulder steps for step-pool morphologies, large wood placements for forced-step-pool morphologies, and roughened channels for cascade morphologies.

Exclusions

1. Projects must comply with all other exclusions for this action category.
2. Use of rock dominated structures in wood dominated systems is not covered under this programmatic.
3. Use of concrete sills at road crossing retrofits, or within a 20-foot buffer of the road prism of a crossing, are not covered under this programmatic.

Conservation Measures

1. Projects must comply with the GCMs listed in the General Conservation Measures section of this FPRP as well as the following conservation measures.
2. Form and roughness of grade control must show clear design ties to the adjacent channel roughness and form.
3. Where extensive grade control is required to stabilize the re-constructed channel, there may be unforeseen adverse effects on passage conditions. This would include projects where the grade of more than three vertical feet of stream bed is controlled within the project footprint. Where more than three vertical feet of stream bed is grade controlled, or where concrete sills are used (see measure #3 below), NMFS engineering review and certification is required.
4. Concrete sills shall only be used where rock or wood designs are not feasible or applicable. Examples include where discrete water surface elevations must be provided for upstream diversions or fishways. Professional engineering justification for a concrete sill design must

be provide in writing to NMFS. Concrete sill designs will be reviewed and certified by NMFS engineering.

5. Designs mimicking step-pool morphologies should be wary of traditional rock weir designs consisting of a single "header" and a single "footer" rock. This design method does not mimic the natural roughness and lack the structural stability of natural step-pool morphologies and are prone to failure. Structures mimicking step-pool morphologies should incorporate as much structural redundancy as possible through the increased presence of large rock within the steps, and in the adjacent bed and banks. It should also be noted that step-pool morphologies typically produce a short steep cascade vs. discrete drops. Designs which produce well defined hydraulic drops should be avoided. Additional critical engineering design info for rock weirs can be found in USBR Rock Weir Design Guidance (2016), USBR Qualitative evaluation of rock weir field performance and failure mechanisms, (2009), and USBR Quantitative investigation of the field performance of rock weirs (2007). See measure #10 below for more information on rock weir designs.
6. As much as possible grade control structures should facilitate swim through migration. Even many natural step-pool morphologies facilitate swim thru passage and this mode of passage should be the goal of each project requiring grade control.
7. Designs will be constructed to allow upstream and downstream passage of native aquatic species that occur in the stream at all flows.
8. The project shall be designed and inspected by a multidisciplinary team (including a salmon or trout biologist) that has experience with these types of structures.
9. Designs will be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of LWM to the maximum extent possible. This includes projects where concrete sills are used.
10. Structures will be designed to standards contained in the most current version of the NMFS Anadromous Salmonid Passage Facility design manual or WDFW's fish passage criteria for salmon and trout (Barnard et al. 2013).
11. Rock weirs will only be approved when the design incorporates the following:
    A. Footings are designed using wedge-based footer design found in section 7.4.2 Footer Design (USBR 2015).
    B. Locations where a salmonid recovery plan identifies channel spanning boulder weirs as a priority restoration technique (e.g. lower Entiat River).

Levee Removal, Levee Modification, and Public Access Facilities

Description

Levee modification or removal serves many purposes including floodplain habitat restoration, erosion reduction, water quality improvement, reduction in high flow velocity, groundwater recharge, and flood reduction in other sections of the river. Proposed actions covered by this proposed action must have the purpose of restoring floodplain function and/or enhancing fish habitat.

When proposing levee setback to restore habitat and the original levee has tidegates and/or floodgates, tidegates/floodgates may be re-installed in the setback levee, if necessary, to protect infrastructure or private property behind the setback levee (see action subcategory:

Removal of Non-Functioning Tidegates/Floodgates; Replacement of Tidegates/Floodgates in Setback Levees). New tidegates/floodgates are not allowed under this programmatic.

The following types of actions are covered in freshwater, estuarine, and marine areas:

1. Full and partial removal of levees, dikes, berms, and jetties
2. Breaching of levees, dikes, and berms
3. Lowering of levees, dikes, and berms
4. Setback of levees, dikes, and berms

Exclusions

Raising or extending existing levees to provide increased flood capacity is not covered under this programmatic.

Conservation Measures

1. Projects must comply with the GCMs listed in the General Conservation Measures section of this FPRP as well as the following conservation measures.
2. Non-native dike and levee material will be hauled to an upland site to the greatest degree practicable.
3. Native sediment may be spread across the floodplain in a manner that does not restrict floodplain capacity, fill wetlands, and/or minimize juvenile stranding. If the material is used to create/alter small floodplain features (microtopography) it must be done in a manner to minimize juvenile stranding. This can be achieved by sloping side channels to the main channel or water body and by designing access channels for depressional areas. These restrictions on microtopography in the floodplain only apply, if the project contains elements of altering/designing floodplain microtopography like side channels and depressions.
4. If ditches previously constructed behind levees will be filled, they will preferably be filled with native material, otherwise with clean imported material of similar substrate to the adjacent/native banks.
5. Care should be taken to avoid the spread of invasive plant species through redistributing seeds or roots in the soils.
6. In setback dikes/levees the amount of rock will be kept to a minimum.
7. Explosives may be used to remove levees only when other means are demonstrated to be ineffective and as long as the explosives are sequenced (not one large explosion) and not placed underwater.
8. Explosives may only be used in levee removal where the ground is too wet and soggy to allow effective use of excavators, dump trucks and similar machinery. Charges must not be placed below the elevation of the streambed.

Channel Restoration and Reconnection

Description

Naturally flowing rivers, tributary streams and side channels are important habitat for freshwater aquatic species. Native species have adapted to the riverine conditions that existed prior to human modification of the riverine environment. Efforts to restore original channels and side channels consistent with approved recovery plans are encouraged to help recover ESA listed freshwater species.

Side channel habitats are generally relic river channels. They provide important spawning habitat, rearing habitat and refuge habitat during high flows. They are most common in meandering, non-modified, river systems. Abandoned side channels may be reconnected by raising bed and water surface elevation and/or redirecting river flow using a combination of grade control and flow deflecting ELJs or other structures (see action category: *Installation of In-Water Structures*). Side channels may be restored or reconnected to serve a variety of functions, including juvenile rearing and naturally functioning spawning habitat.

Off-channel habitat includes abandoned river channels, spring-flow channels, oxbows, and flood swales. For the purpose of this FPRP, off-channel habitats also include estuarine and marine habitat features, such as distributary channels and pocket estuaries. For example, similar breaching and excavation techniques may be used to restore historical pocket estuaries and coastal marshes that were filled and isolated from the nearshore environment. Both side channel and off-channel habitat have been reduced in number and length by human activities in the floodplain, including activities such as diking, removal of LWM, channel straightening, and bank armoring.

Many stream, river and tidal channels have been straightened and/or put in culverts. This resulted in the loss of important habitat for salmon including low flow refugia. This allows the day-lighting and re-meandering of these streams, rivers, and tidal channels using historic templates.

This action category focuses on the restoration or creation of self-sustaining off-channel habitat. Self-sustaining is not synonymous with maintaining a static condition. Self- sustaining means the restored or created habitat would not require major or periodic maintenance, but function naturally within the processes of the floodplain. However, up to two project adjustments, including adjusting the elevation of the created side channel habitat are included under this proposal. The long-term development of restored channels will depend on natural processes like floods and mainstem migration. Over time, the channel may naturally get drier or be taken over by the main river flow.

In some highly modified environments or environments where grade controls and other channel-modifying structures are less feasible, it may be necessary to create channel and wetland habitats using more construction-intensive techniques. Experimental methods (e.g. the excavation of side channels in bedrock dominated systems) may be covered under this programmatic consultation under specific circumstances where NMFS certifies that actions meet the conditions of this programmatic consultation.

Construction methods under this action category could include the use of heavy equipment and occasionally explosives to clear access corridors, side casting of material, remove water level control structures, excavate historical channels, place instream structures to redirect flows and/or raise channel bed elevations, breach levees and berms to reconnect channels, and construct “starter” channels. The starter channels are used in place of reconstructing remnant channels where remnant channels cannot be identified. Such projects and their designs are subject to additional NMFS or RCO review.

The following channel restoration activities are covered under this FPRP:

1. Creation of new side channel habitat. This approach would create self-sustaining side channels which are maintained through natural processes. Designs must demonstrate sufficient hydrology.

2. Excavating pools and ponds in the historic floodplain/channel migration zone to create connected wetlands. Care should be taken to avoid creating impoundments that can trap and strand juvenile salmonids after flooding. In many cases, outlets to these created pools and ponds to the main stream are necessary.
3. Side-casting material excavated from channels during construction but not including non-native material.
4. Reconnection of channels and existing side channels with a focus on restoring fish access and habitat forming processes (hydrology, riparian vegetation).
5. Use of ELJs, barbs and groins to direct some flow through a side channel (see below GCM: *Pre-Construction/Surveying*).
6. Restoration of existing side channels including one-time dredging and including adjusting the elevation of the created side channel habitat.
7. Culvert removal to daylight streams.
8. Restoration of meander channels to mimic natural historic menders as closely as possible in areas where rivers and stream have been straightened or have been in culverts.

Exclusions

1. None for this action category.

Conservation Measures

1. Projects must comply with the GCMs listed in the General Conservation Measures section of this FPRP as well as the following conservation measures.
2. Excavation and/or re-contouring of off-channel habitat features will be completed before reestablishing connectivity to surface waters to the greatest extent practicable.
3. Side channel habitat will be constructed to prevent fish stranding by providing a continual positive grade to the intersecting waters.
4. Barrier breaching and connection of created or restored habitat features will take place when ESA-listed species and/or sensitive life history stages are least likely to be present.
5. Fish remaining in the existing channel after dewatering will be captured and relocated upstream from the reconnection point.
6. All channel reconstruction/realignment projects shall have a monitoring and adaptive management plan.
7. If the review and approval is by the RCO, a copy of their approval must accompany the Project Information Form.
8. If the review and certification is by NMFS, the Corps will ensure that the project design is reviewed by NMFS's engineers.

Debris and Sediment Removal

Description

This action subcategory includes removal of sediments, debris, and waste material from aquatic and shoreline habitats for the purpose of improving water and substrate quality and/or restoring natural bed profile. To qualify under this action subcategory, the removed materials must be either manmade or the result of historical human activities and their removal must benefit the environment. Examples include:

1. Removal of treated wood debris on shorelines and submerged habitats.
2. Removal of wood waste accumulations below historical log boom or sawdust and bark loading facilities.
3. Removal of non-native fill or sediment accumulations around manmade structures.

Exclusions

1. Dredging to maintain or improve navigation, berth vessels, or to support any development purpose is excluded from the proposed action.
2. This action subcategory does not cover the removal of sediments that exceed criteria for open water disposal or wood waste that fails to meet criteria for beneficial use as defined by the Dredged Material Management Program (DMMP) (USACE et al. 2014).

Conservation Measures

1. Projects must comply with the GCMs listed in the General Conservation Measures section of this FPRP as well as the following conservation measures.
2. Sediments and wood debris to be removed must be tested and meet DMMP criteria for open-water disposal (USACE et al. 2014). The applicant must append the DMMO suitability determination to the Project Information Form.
3. For actions involving the dredging or removal of submerged sediment, waste, and materials, the following containment BMPs will be used:

A temporary containment area shall be constructed on the barge deck, pier, or other work surface to contain dredged material. The containment area shall be of sufficient size and durability (e.g. impervious plastic sheeting with sidewalls) to prevent the dredged sediments and waste material from re-entering the waterway. The containment basin will provide effective filtration (e.g. through hay bales or other media) to remove suspended sediments from wastewater prior to discharge. The removal of material will occur in a manner that minimizes the generation of suspended sediment. Open water disposal of dredged materials in the Puget Sound Dredge Disposal Area will comply with all applicable DMMP requirements.

APPENDIX D - COMPARISON OF ALTERNATIVES

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Comparisons Between the No Action and Proposed Action Alternatives

Resource Category	Proposed Action Alternative	No Action Alternative
Aesthetics and Visual Resources	• Temporary reduction in visual quality during construction to viewers from I-90 and Umptanum Road (moderate). • Long-term changes to visual landscape due to flood protection berm and lower surface elevation of the Schaake Property, allowing vistas of Yakima River from I-90 (low). • Long-term visual improvement due to reestablishment of site's historic riparian vegetation (low). • Enhanced viewshed from more frequent inundation (low).	• There would be no impacts to visual resources.
Air Quality	• Construction vehicles would temporarily emit pollutants including carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter. Emissions would not exceed threshold values (low). • Dust would be generated during construction and use of unpaved access roads but would be minimized by application of water (low).	• There would be no construction- related emissions. Minor emissions from maintenance vehicles would continue to occur (low).
Cultural Resources	• No built environment resources were found in the Project area. • No archaeological resources were found in locations where surface disturbance would occur. • Potential impacts related to inadvertent discovery of cultural resources would be low; however, ground-disturbing actions must be discontinued in the event of discovery of cultural resources (low).	• There would be no impacts to cultural resources.

Resource Category	Proposed Action Alternative	No Action Alternative
Fish	• Project would increase habitat area, increase habitat diversity, improve channel complexity, improve water quality, and restore/increase access to wetland, floodplain, side channel, and stream habitat for spawning and juvenile salmonid rearing (moderate). • Short-term impacts on fish could occur as a result of turbidity or accidental spills of contaminants (low). • Short-term loss of riparian vegetation during construction could reduce cover and shading (low). • Injury or mortality of fish would be possible during work area isolation and fish salvage (low). • Completed project would provide refuge to juvenile fish during the higher peak flows that are anticipated under current and future Yakima Project Operations (moderate).	• Peak flow refugia and attenuation of higher flood flows would not occur (low). • Limited side channel access only available at high flows (moderate). • Possibility of fish stranding during overtopping of Yakima River would remain (moderate).
Topography, Geology and Soils	• More natural sediment accretion processes would occur in the floodplain and floodplain wetlands due to inundation of Yakima River waters (low). • Wind impacts on the flood protection berm would be mitigated by seeding with a native seed mix (low). • Temporary erosion at levee breach locations and other work areas during construction would cause localized turbidity or surface erosion. Erosion and sediment control measures would be implemented to mitigate this impact (low). • Minor soil loss would likely occur when the side channels are initially inundated (low). • Changes to topography would occur at levees and areas of the floodplain are graded to encourage wetland creation areas (low). • Completed project would provide flood storage and attenuate higher peak flows (moderate). • Hydric soils would form over time in wetland creation areas (low).	• Localized erosion would continue (low). • Continued sediment deposition at Tjossem Ditch diversion structure would require ongoing dredging (moderate). • Attenuation of higher flood flows would not occur (low).

Resource Category	Proposed Action Alternative	No Action Alternative
Land Use	• Reclamation would exercise their 1890's rights for construction and right of entry access on City of Ellensburg property; construction may result in temporary loss of access (low). • Reclamation would continue working with the City of Ellensburg on a land exchange, including relocation of a displaced farm operation.	• No changes to land use or recreation would occur.
Noise	• Impacts from noise levels during construction would be a moderate but temporary impact on individuals within 100 ft. of the construction area along I-90 (low).	• Noise impacts would be limited to ongoing maintenance actions (low).
Hazardous Materials	• Accidental spills of fuels, lubricants or solvents used by equipment during construction could affect water quality, plants, or animals in the vicinity (low). • Possibility of releases of herbicides during maintenance would be the same as for the no action alternative (low). • All Appropriate Inquiries would be conducted for temporary easements or land acquisition.	• Construction-related releases of hazardous materials would not occur. • Use of herbicides for pest plant control during maintenance could result in inadvertent spills of hazardous substances (low).
Public Health and Safety	• Current level of flood protection would be maintained or increased with construction of flood protection berm. Benefit of protection from Yakima River flooding would be increased for downstream landowners (moderate). • Completed project would provide flood storage and attenuate higher peak flows (moderate).	• Levee, as-is post-flood damage, would only provide flood protection for a 5-year event. • There would be no changes to the configuration of flood control levee. • Flood storage would be limited as would return flows to the river (low).

Resource Category	Proposed Action Alternative	No Action Alternative
Socioeconomics and Environmental Justice	• Some construction funds would likely be spent in the local area for equipment, supplies, and services, providing short-term stimulus for local businesses (low). • Short-term noise, dust, and traffic impacts to residents in the area would not disproportionately affect low-income populations. • Benefits to fisheries on Yakima River (moderate). • Increased level of protection from Yakima River flooding, over current levee conditions, through installation of flood protection berm (moderate).	• No socioeconomic or environmental justice impacts would occur.
Transportation and Infrastructure	• Traffic would be increased along Umptanum Road between June and November of 2019 and 2020 (low). • Traffic could be slowed by construction vehicles entering or leaving the construction area (low). • I-90 would experience the same level of flood protection with construction of the flood protection berm as under the existing levee (low). • Traffic on I-90 may slow during the construction window with the increase in activity adjacent to the Interstate (minor). • Tjossem Ditch headgates expected to experience less sedimentation during the irrigation season; thereby reducing operations and maintenance costs (low).	• There would be no impacts to transportation facilities under this alternative.
Vegetation and Wetlands	• Short-term impacts to wetland and riparian vegetation during construction (low). • Non-native plant communities in restored areas would be replaced by native species, increasing habitat diversity and native plant cover (moderate). • Potential for newly created wetlands would create additional habitat diversity (low). • Some riparian vegetation would be lost. The project would create more riparian areas than it would affect, so losses would be temporary (low). • Vented box culvert would allow connectivity between Wetland CC and Wetland Z and remove traffic crossing through “stream” under high water conditions (low).	• Existing plant communities, including extensive areas of reed canarygrass, would persist, limiting habitat diversity (moderate). • Recruitment of riparian species would likely be low due to competition from reed canarygrass (low). • No construction impacts would occur.

Resource Category	Proposed Action Alternative	No Action Alternative
Water Resources	• Construction actions could lead to temporary increases in turbidity in floodplain wetlands and the Yakima River (low). • Increased exchange with the Yakima River could improve water quality within the wetlands (low). • As new wetland areas are inundated, and vegetation decomposes, short-term reduction in dissolved oxygen (DO) and changes to pH could occur (low). • Decomposing vegetation could release nutrients including phosphorous and nitrogen on a short-term basis (low). • Restored riparian areas would provide shading of surface waters and combined with restored wetlands would help to retain groundwater over a longer period (low). • Current level of flood protection would remain in place, but the level of protection from Yakima River flooding would benefit by increasing substantially (moderate).	• Moderate warming of surface waters in the wetlands, with lack of overstory cover would likely continue (low).
Wildlife	• Short-term displacement of terrestrial wildlife and avian species resulting from construction and potential long-term displacement due to inundation (low). • Long-term increase in riparian habitat for wintering waterfowl and nesting birds (low). • Beneficial increase in extent and diversity of habitat for aquatic wildlife (moderate).	• No construction impacts would occur.
Indian Trust Assets (ITAs)	• Water quality, fish and wildlife habitat, and vegetation would be restored to more historic conditions (moderate).	• No construction impacts would occur.

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APPENDIX E – EVOLUTION OF ALTERNATIVES CONSIDERED BUT ELIMINATED

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Evolution of Alternatives Considered but Eliminated

Alternative	Date Developed	Major Alternative Component	Outcome
0A[a]	December 2003	Full setback of Schaake Levee, tying into Hansen Pits Levee.	Refined and progressed as Mod 1.
0B[a]	December 2003	Full removal of the Jensen Levee. Full removal of Jeffries Levee. Full removal of unnamed levee between Jeffries and Jensen Levees.	Refined and progressed as Mod 2.
Mod 1	August 2004	Full setback of Schaake Levee, terminating near the City WWTP. Full removal of Jensen Levee. Establishment of four seasonal side channels.	Refined and progressed as Alternative 1; Side Channels No. 2b and Side Channel No. 3b were not progressed due to high nutrient levels along alignment.
Mod 2	August 2004	Same as Mod 1, plus: Full removal of Jeffries Levee. Full removal of unnamed levee between Jeffries and Jensen Levees.	Not progressed, as landowners did not support the removal of right-bank levees.
0C[a]	March 2007	Full setback of Schaake Levee, terminating near the City WWTP Establishment of three seasonal side channels on the east floodplain.	Proposed levee alignment not supported by adjacent and downstream landowners; refined and progressed as Alternative 0D.
0D[a]	June 2011	Full setback of Schaake Levee, tying into Hansen Pits Levee. Establishment of three seasonal side channels on the east floodplain.	Side Channel No. 3b was not progressed due to sedimentation concerns; refined and progressed as Alternative 1.

Alternative	Date Developed	Major Alternative Component	Outcome
0E[a]	June 2011	Full removal of the Schaake Levee. Construction of two abbreviated levee alignments providing protection for (1) I-90 and (2) TCF center pivot spray field. Establishment of three seasonal side channels on the east floodplain.	Not progressed, as Alternative 0D preferred by multiple stakeholders over Alternative 0E.
1	February 2014	Full setback of Schaake Levee, tying into Hansen Pits Levee and level of protection equal to 1% ACE + 1-foot freeboard. Partial removal of Jensen Levee. Establishment of two perennial side channels on east floodplain. Establishment of one seasonal side channel on west floodplain.	Not progressed, as Alternative 2A selected as preferred alternative.
2A	February 2014	Full setback of Schaake Levee, tying into Hansen Pits Levee and level of protection equal to 1% ACE + 3-foot freeboard. Establishment of two perennial side channels on the east floodplain.	Alternative 2A could increase flood risk for downstream right-bank landowners; Alternative 2B developed.
2B	June 2015	Same as Alternative 2A, except with a level of protection equal to a 4% ACE along the TCF spray fields.	Alternative 2B could increase flood risk for downstream right-bank landowners, but to a lesser degree than Alternative 2A; Alternative 3 developed.

Alternative	Date Developed	Major Alternative Component	Outcome
3	August 2015	Partial setback of Schaake Levee, retaining a portion of the existing Schaake Levee; level of protection equal to the greater of existing level of protection or Corps criteria. Establishment of two perennial side channels on the east floodplain.	Progressed to 30 Percent Design. In January 2017, BOR (Reclamation) elected to finish the design. The setback levee alignment was constrictive to flood flows; proposed side-channel widths were large and impacted a lot of quality riparian wetland vegetation. BOR1 was developed.
BOR1	December 2017	Setback levee terminates just west of WWTP. Portions of existing levee to be retained at the 90-degree bend and at the bend near Tjossem Ditch headworks. Side-channel alignments and widths updated to reduce vegetation impacts.	Well received. Stakeholders suggested considering routing side channels around the wetland ponds. BOR1a was developed.
BOR1	January 2018	Decision to leave the portion of the levee at the 90-degree bend and maintain in perpetuity.	Confirmation: Reclamation management agreed on the importance of keeping and maintaining this piece of levee to protect I-90.

Alternative	Date Developed	Major Alternative Component	Outcome
BOR1a	January 2018	Per stakeholder feedback consider BOR1 with the side-channel alignments going around rather than through Wetland C and Z ponds.	Hydraulic analysis showed that going around increases channel length and reduces slope and sediment transport capacity to a point that the channels would not be sustainable. Possible routes were discussed at a March 2018 meeting onsite with the technical advisory group. Side channels would have been constructed in open fields with no trees for shade, constraints of routing Side-channel 2 between wetlands and Tjossem Ditch reduced slopes even further, and with the field visit it became evident to some that the BOR1 alignments used existing high flow channels. In these channels, the lower width and discharge capacity channels (compared to alt. 3) could mimic excellent wetland conditions with flowing channels that exist in the southern portion of Wetland Z. BOR1 was preferred, continue with BOR1.
BOR1		Remove Schaake Levee from the PL8499 program, negating need to tie into to similar protection, and shorten levee.	Confirmation of southern setback levee termination.
BOR1	February 2018	Reclamation to take ownership of Schaake Levee.	Confirmation: Reclamation would take ownership of the existing levee prior to construction of the new levee. Kittitas County would make modified repair to existing levee prior to transfer (fall of 2018). Reclamation would own and maintain new levee.

Alternative	Date Developed	Major Alternative Component	Outcome
BOR2	May 2018	Eliminate the northern 2,400 feet of the setback levee and construct a flood protection berm for the remaining portion rather than levee with riprap.	Proposed as hydraulic analysis indicated there was no benefit. Removal negated need to cross Wetland E with a levee and substantially reduced costs and wetland impacts. Decision based on discussions with WSDOT (Julie Heilman) on May 21, 2018, followed by discussion with Wendy Christensen on May 22, 2018. BOR2 preferred with riprap required along I-90 road prism to counter potential erosion because of not having a levee in this area.
BOR2a	July 2018	Proposed no riprap along I-90 prism.	WSDOT met onsite and reviewed hydraulic results. While inundation slightly increases its either slow backwater or reduced velocity compared to existing. Prism already has large cobble protection. WSDOT agreed that no new riprap was necessary, but a flap gate would be required on culvert near Wetland E that brings water from under the Interstate.
BOR2b	August 2018	Forego flap-gate on culvert near Wetland E that brings water from under the Interstate.	WSDOT agreed after reviewing culvert inverts compared with modeled flood elevations that a flap-gate would not function as hoped, and the minor backwater it would cause is similar to existing conditions. BOR2b preferred.
BOR3	October 2018	BOR2b with a decision on Side-channel 2 crossing to design and install a vented concrete box-culvert at Side-channel 2.	Decision based on discussions with permitting agencies, City of Ellensburg and project team members. BOR3 taken to final design.

[a] Alternative name developed for purposes of this table

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