Application Name: Wallowa-Baker Fish Habitat Restoration Project

By: Grande Ronde Model WS Foundation

Offering Type: Open Solicitation

Application Type: Restoration

OWEB Region: Eastern Oregon
County: Wallowa
Coordinates: 45.593592,-117.570003

Applicant:
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Budget Summary:
OWEB Amount Requested: $0
Total Project Amount: $309,609

Administrative Information

Abstract

Provide an abstract statement for the project in 250 words or less. Include the following information: 1) Identify the project location; 2) Briefly state the project need; 3) Describe the proposed work; 4) Identify project partners.

The Wallowa River-Baker Project is located 2.75 miles northwest of Wallowa, Oregon on the Wallowa River, tributary to the Grande Ronde River, at RM 21. The project is located on Tier 1 private property and encompasses 0.6 miles of the Wallowa River.

The stream course and drainage patterns in the project area have been severely altered as a result of agricultural practices and road construction. Riparian forests have been converted to agricultural fields. Instream habitat and habitat complexity have been diminished by in-channel maintenance. Few pools are present and vertical, eroding banks limit floodplain interaction and hyporheic exchange. The project includes placing 30.2 acres in a 15-year conservation easement and addressing limiting factors for ESA listed spring Chinook salmon, summer steelhead, and bull trout by eliminating salmonid stranding and entrapment in the spring creek/irrigation ditch, mproving riparian habitat and channel condition, floodplain and instream habitat creation, increasing habitat complexity, reducing sediment delivery, and contributing towards improved flow and water temperature regimes. Funding will be used for 1) constructing one side channel, 2) floodplain creation and reconnection, and 3) installing 7 mainstem and 11 side channel engineered habitat structures to improve habitat, increase habitat diversity, and provide streambank stabilization. ODFW will design and install a fish diversion and bypass structure and install project fences and plants.

Project partners include ODFW, GRMW, NPT, USFWS, and ODOT.

Location Information

What is the ownership of the project site(s)?

❑ *Public land (any lands owned by the Federal government, the State of Oregon, a city, county, district or municipal or public corporation in Oregon)*

✓ *Private (land owned by non-governmental entities)*

Please select one of the following Landowner Contact Certification statements:

● I certify that I have informed all participating private landowners involved in the project of the existence of the application, and I have advised all of them that all monitoring information obtained on their property is public record.

❍ I certify that contact with all participating private landowners was not possible at the time of application for the following reasons: Furthermore, I understand that should this project be awarded, I will be required by the terms of the OWEB grant agreement to secure cooperative landowner agreements with all participating private landowners prior to expending Board funds on a property.

Please include a complete list of participating private landowners

John and Tarrah Baker

❑ *This grant will take place in more than one county.*

Permits

Other than the land-use form, do you need a permit, license or other regulatory approval of any of the proposed project activities?

● Yes
❍ No

For Details Go to Permit Page

Racial and Ethnic Impact Statement

Racial and Ethnic Impact Statement

❍ The proposed grant project policies or programs could have a disproportionate or unique POSITIVE impact on the following minority persons. (indicate all that apply)

❍ The proposed grant project policies or programs could have a disproportionate or unique NEGATIVE impact on the following minority persons. (indicate all that apply)

● The proposed grant project policies or programs WILL HAVE NO disproportionate or unique impact on minority persons.

Insurance Information

❑ *Working with hazardous materials (not including materials used in the normal operation of equipment such as hydraulic fluid)*

❑ *Earth moving work around the footprint of a well*

❑ *Aerial application of chemicals*

❑ *Transporting individuals on the water*

❑ *Removal or alteration of structures that hold back water on land or instream including dams, levees, dikes, tidegates and other water control devices (this does not include temporary diversion dams used solely to divert water for irrigation)*

❑ *Applicant's staff or volunteers are working with kids related to this project (DAS Risk assessment tool not required, additional insurance is required)*

❑ *Applicant's staff are applying herbicides or pesticides (DAS Risk assessment tool not required, additional insurance is required)*

Additional Information

❑ *This project affects Sage Grouse.*

Problem Statement

Describe the watershed problem(s) that this restoration project seeks to address.

The Interior Columbia Technical Recovery Team rates abundance/productivity for the Wallowa River spring Chinook salmon population as high risk and below viable status. Spatial structure/diversity risk is rated as moderate. Abundance/productivity of the Wallowa River summer steelhead population remains unconfirmed because of insufficient data, but rated at moderate risk.

Abundance, productivity, and spatial distribution of Wallowa River spring Chinook salmon and summer steelhead are limited by lack of habitat quantity and diversity (primarily a lack of pools and large woody debris), excess fine sediment, poor water quality (high summer water temperature), water quantity (low flows, high flows, and alteration of the hydrograph), and passage barriers (irrigation diversions and culverts). The major in-basin/watershed activities affecting salmon and steelhead production potential are logging, fire suppression, grazing, agricultural development, draining of wetlands, water withdrawal, road and railroad construction, human residential development, and the introduction of exotic plant and animal species.

Habitat quality and complexity have been reduced through stream channelization, levee and dike construction, wetland conversion, and removal of riparian vegetation. Such activities have restricted stream floodplain connectivity, resulted in downcutting of stream channels, and led to a reduction in pools and large woody debris. Past removal of beavers and large wood from stream channels also reduced habitat complexity and frequency of pools. Reduced channel stability has resulted in loss or impairment of channels and streambanks, loss of side and braided channels, and reduced distribution of suitable riffles and functional pools. Nine stream segments in the Wallowa Subbasin containing salmon, steelhead and/or bull trout, are water quality limited. 303(d) parameters of concern are temperature, sedimentation, pH, habitat modification, flow modification, and bacteria.

Large trees have been removed from riparian areas and large wood removed from streams. Riparian areas no longer provide shade, food resources, and potential future large wood recruitment, and do not adequately protect streams from sediment input.

Streambanks have been damaged and/or compacted, increasing sediment input to streams, reducing riparian vegetation and function, and contributing excessive nutrients to streams. Excessive fine sediment input and inadequate sediment routing reduces spawning gravel and increases embeddedness.

The Wallowa-Union railroad parallels the Wallowa River for much of its length, restricting stream movement and floodplain connectivity. Highway 82 parallels much of the Wallowa River from the town of Minam to Wallowa Lake, contributing channel runoff and fine sediments to the Wallowa River and its tributaries, confining the Wallowa River and tributaries, and preventing interaction with the floodplain. Loss and impairment of floodplain connectivity restricts floodplain functions and reduces access to previously available overwintering and off-channel areas (seasonal wetlands, off-channel habitat, side channels).

Water in the Wallowa Subbasin is fully appropriated, with most streams over allocated. Wallowa Lake Dam, built in 1918 to store water for irrigation, alters the natural hydrograph and blocks fish passage. Changes in the hydrograph have altered the natural pattern of flows over the seasons, causing inadequate flow, scouring flow, or other flow conditions that inhibit the development and survival of salmonids. Artificial barriers cause total or partial migration blockage to previously accessible habitat. These include dams, roads, culverts, thermal barriers, seasonal push up dams, unscreened diversions, and entrainment in irrigation diversions.

The primary limiting factors identified for ESA listed Snake River spring/summer Chinook salmon and summer steelhead in the Wallowa River within the GRSP, the SR Recovery Plan, and by an Expert Panel convened by ODFW in 2007 are habitat diversity and key habitat quantity, including: instream structural complexity, impaired riparian condition, lack of large wood and large wood recruitment, increased sediment quantity, channelization, and loss of off-channel habitat and floodplain connectivity. Riparian habitat degradation is identified as the most serious problem in the Wallowa River Subbasin.

Within the Project area, the stream course and drainage patterns have been simplified and severely altered as a result of agricultural practices and road construction. Riparian forests have been converted to agricultural fields and for livestock grazing. Instream habitat and habitat complexity have been diminished by in-channel maintenance, including gravel extraction. The pool density is low, reducing adult holding and juvenile rearing habitat. Due to the low density of pools, the gravels are not well sorted impacting adult spawning. Vertical, eroding banks limit floodplain interaction and hyporheic exchange. The width to depth ratio is greater than 35 and sinuosity is low (1.08), which results in wide, shallow flow, thereby increasing temperatures in the summer months. Long, overwidened riffles exist at various locations throughout the project reach.

There is no sign of floodplain connectivity on river left. The river left riparian area is very narrow and quickly turns into an agricultural field that is perched as high as 8 feet above the channel thalweg. The floodplain on river right exhibits connectivity and a series of robust cottonwood galleries and willow stands are present. Based on historic maps and photos, the project area on both streambanks historically contained a wide forested floodplain with a creek entering the Wallowa River from the south, within the project area. Between 1938 and 1956, the area on river left was cleared of the wooded forest and began to be farmed. Since 1956, the riparian area on river right has continued to grow in width and wooded material and the riparian area on river left has progressively shrunk in size with notable bank erosion and reed canary grass choking out competing vegetation.

ESA listed summer steelhead spawning occurs in the Spring Creek ditch with trapping and stranding of juveniles occurring. Entrainment of juvenile salmonids likely occurs during irrigation season.

How have past or current land management practices contributed to the problem?

Both current and historic land management practices contribute to Wallowa Subbasin habitat degradation and pose threats to recovery of the Wallowa River spring Chinook salmon and summer steelhead populations. Impaired habitat conditions result from agricultural, forestry, and grazing practices, dams and other barriers, water withdrawals, roads and channel manipulations. Cumulatively, the effects of development and land use activities have altered watershed hydrology, reduced habitat quality and complexity, floodplain connectivity, and water quality, altered floodplain and upland processes, and contributed to sediment loads and elevated stream temperatures. The alteration of Wallowa Subbasin habitats has affected spring/summer Chinook salmon and summer steelhead population abundance, productivity and spatial structure. To recover, the fish need streams with abundant cold water, clean gravel, pools where they can find food and shelter, and unhindered access to spawning and rearing areas. Thus, their health depends greatly on how lands and water are managed.

Agricultural practices have reduced habitat quality and complexity through stream channelization, levee and dike construction, wetland conversion, and removal of riparian vegetation. Such activities have restricted stream floodplain connectivity, resulted in downcutting of stream channels, and led to a reduction in pools and large woody debris. Agricultural practices have also affected habitat conditions by altering natural hydrologic regimes through conversion of native grasslands and other natural conditions that stored water and slowed surface runoff, and by increasing sediment input to streams. They have reduced water quality by removing large shade-producing trees and by the leaching of pesticides, herbicides, and fertilizers into streams.

Historic timber harvest-related activities reduced salmonid habitat quality and quantity by harvesting large trees from riparian areas, removing large wood from streams, skidding logs across and adjacent to streams, clear-cutting across intermittent or perennial streams, building roads in sensitive areas and/or without proper erosion control structures, and constructing stream crossings that impaired fish passage. Unregulated past forest practices, along with livestock grazing and fire suppression, also modified vegetation patterns on forest lands, which led to the alteration of important ecosystem processes such as fire, insects and succession. Current timber harvest activities continue to threaten salmonid viability when they remove riparian area trees that provide shade and potential future large wood recruitment, do not adequately protect streams from sediment input, and/or construct roads in sensitive areas.

Livestock grazing practices have damaged and/or compacted streambanks, increased sediment input to streams, reduced riparian vegetation and function, and contributed excessive nutrients to streams.

Roads along the Wallowa River and associated tributaries channel runoff and fine sediments to streams. They also intercept subsurface water drainage, disrupt natural drainage patterns and concentrate runoff flow. Some roads confine channels, preventing them from interacting with their floodplain. Along the Mid Wallowa River watershed, between the mouths of the Minam and Lostine rivers, there is a road on one side of the river and a railroad on the other. The valley opens up to the town of Wallowa right along the river. Roads are also present along Mid Wallowa tributaries, along with private timber, farming, ranching, and grazing lands on both sides in lower reaches contributing sediment inputs. The Upper Wallowa River is a moderately confined low gradient reach with a road and railroad on the same side of the river.

Most streams in the Wallowa Subbasin are over allocated, and flows can reach low levels at critical times in fish life history. Low flows caused by withdrawals reduce habitat quantity, increase summer stream temperatures, decrease sediment routing, and impair fish passage. Overland return flows from irrigation systems can warm streams, contribute to high levels of fecal coliform, and in some instances load them with silt. Agricultural activities have drained and cleared many of the deciduous riparian areas which are bench wetlands which were historically abundant in areas such as Alder Slope near Enterprise, Oregon. Deciduous riparian areas perform a water storage function, allowing for slow release and dampening the effect of heavy rains and snow melt. This wetland type has been drained and cleared for agricultural use, primarily pasture.

Diversion structures can limit or prevent passage of juveniles and/or returning adults, and unscreened diversions can result in entrainment of fish in irrigation ditches. Some push-up dams used for water diversion restrict fish passage and contribute fine sediment to the channel.

Wallowa Lake is the only major water impoundment in the Wallowa River Subbasin. Although it is a natural lake, a dam was constructed at the outlet in 1918. The principal use for water stored in Wallowa Lake is irrigation. Due to reduced peak flows from dam operations there are increased fine sediment accumulations in the reaches of the Wallowa River below the dam.

Wallowa Lake Dam and Upper Alder Slope Diversion are significant barriers to fish passage. Other passage barriers include seasonal thermal or flow barriers, which restrict or limit movement of fish. There are also a number of minor impoundments in the subbasin as well as numerous small ponds that serve as water storage for irrigation and livestock.

Residential development along the Wallowa River also places higher demands on limited ground water sources. Residential development along the Wallow River resulted in the loss of native riparian vegetation and streambank stability, and increased erosion.

The FCRPS is a threat to the viability of Wallowa River spring/summer Chinook salmon and summer steelhead. Wallowa River spring Chinook salmon and summer steelhead must pass eight mainstem Columbia and Snake River dams on their journey to the ocean and back. Factors that impact viability include mortality and delayed upstream passage (adults), direct and indirect mortality on downstream migrants (juveniles), alteration of the hydrograph (mainstem and estuary flow regime), alteration of thermal regime, depletion of historically available nutrients, and degraded rearing and food resources for both presmolts and smolts in the Columbia River.

Does this project address one or both of the following:

✓ *Habitat needs for one or more Endangered Species Act-listed species and/or species of concern*

✓ *Concerns identified on 303(d) listed streams*

❑ *No*

Proposed Solution

Goals and Objectives

Provide a goal statement for this restoration application.

To implement habitat protection and enhancement measures that address the primary limiting factors identified for all life stages of ESA listed spring Chinook salmon and summer steelhead in the Wallowa Basin.

List the objectives of this restoration application.

Promote interaction of the Wallowa River and the floodplain by creating 3.2 acres of new floodplain through channel and floodplain excavation and lowering existing streambanks to floodplain level.

Create off-channel deep pool habitat, 5-7 feet deep, to provide salmonid holding habitat, overhead cover, zero velocity margin habitat for juvenile rearing, and promote sediment sorting for improved spawning habitat.

Stabilize and protect existing eroding banks through installation of engineered log jams, vegetation reestablishment, and floodplain construction.

Increase both quantity and quality of summer and winter rearing habitat for native anadromous and resident salmonids.

Create mainstem holding and rearing habitat for salmonids.

Create floodplain and low gradient annually and perennially connected off-channel habitat and side channels.

Install 18 engineered wood and habitat structures to help develop and maintain pools, provide habitat diversity, cover, and food source production, promote wood recruitment, and decrease unnatural rates of erosion.

Reduce erosion at high flows with lowering of floodplain, floodplain development, increased floodplain interaction, and addition of floodplain roughness elements.

Improve the density, condition, and species composition of riparian vegetation within the 30.2 acre easement through seeding and planting of native, locally adapted species, and caging to prevent native ungulate browse.

Meet riparian planting objectives of 1) a 40% survival of planted cuttings and a 50% survival of transplanted clumps by year 2; 2) increasing woody plant percent cover along stream channels by 10% each year after year 2; 3) achieving tree heights of 8 feet or more over 10% of the new main channel length in 5 years; and 4) achieve 15% shade across channel after 3 years (at noon during the low flow season) and achieving 25% shade across channel after 5 years.

Construct 3,000 feet of barbed wire and post and rail fence to preclude livestock use of the 30.2 acre project area .

Provide thermal refugia for native fish species via increased hyporheic exchange in constructed side channel, creation of deep pools, and shade from increased density and improved condition and species composition of riparian zone.

Contribute to decreasing summer water temperature by decreasing width/depth ratios, decreasing length of riffles, increasing density of deep pool habitat, establishment and improvement of riparian zone and function, and improved floodplain connection and hyporheic exchange.

Implement a project that benefits native fish and their habitat and private landowners.

Project History

Continuation - Are you requesting funds to continue work on a project previously funded by OWEB where that work did not result in a completed project?

❍ Yes
● No

Resubmit - Have you submitted, but were not awarded an OWEB application for this project before?

● Yes
❍ No

Provide OWEB Application #

216-5057, 216-5002, 217-5010

Phased - Is proposed work in this application a phase of a comprehensive watershed restoration plan or project?

● Yes
❍ No

List the phases of the project.

Phase	Brief Description	Project Number
1	3 side channels, 32 LWD, Riparian Planting, Fence	
2	Side channel, 15 LWD, Plant & seed, Fish Screen	

Plans and Salmon

Is the proposed restoration activity(ies) identified in a local assessment or other plan?

● Yes
❍ No

Provide name of local plan, Watershed assessment or other locally relevant document.

Grande Ronde Subbasin Plan and Supplement (2004)

Draft Northeast Oregon Snake River Recovery Plan for Spring/Summer Chinook Salmon and Summer Steelhead (2015)

2008 Federal Columbia River Power System Biological Opinion as amended in 2010 and supplemented in 2014.

The Oregon Plan

The Oregon Conservation Strategy

Will this project benefit salmon or steelhead?

● Yes
❍ No

✓Snake River Basin - Steelhead
✓Snake River Spring/Summer-run - Chinook Salmon

How will the resulting restoration project benefit salmon or steelhead or their habitat?

Within the GRSP, the Mid Wallowa River is identified as the third highest priority restoration area in the Wallowa Subbasin for spring Chinook salmon and the fifth highest for summer steelhead. The aquatic technical group formed to prepare the aquatic elements of the GRSP determined that on-the-ground projects within the Project area that result in improved aquatic/riparian habitat, reduced sediment delivery to the streams, and improved flow and water temperature regimes will provide a relatively large increase in abundance, productivity and diversity of spring Chinook salmon and summer steelhead. This Project was designed to improve aquatic/riparian habitat, reduce sediment delivery, improve flow and temperature regimes, and improve overall function of the Wallowa River ecosystem.

This project will address the identified limiting factors and key priority attributes for ESA listed species in this reach of the Wallowa River. Expected biological benefits will be improved migration, rearing, and spawning habitat for ESA listed spring Chinook salmon, summer steelhead, and bull trout and other native fish species such as Pacific lamprey, redband trout, and whitefish. It will also prevent the stranding, entrapment, and entrainment of ESA listed salmonids in the Spring Creek irrigation ditch.

This project builds upon the Phase 1 and Phase 2 measures implemented in 2017. Those measures included 3,454 feet of side channel constructed and connected to the mainstem: Side Channel A = 2,300 feet, Side Channel B = 230 feet, and Side Channel C = 924 feet. They also include 8 acres of floodplain created, 29 engineered wood habitat structures constructed (7 mainstem and 22 side channels), additional wood added to the floodplain to increase floodplain roughness, riparian plantings and protections, and project area seeding.

To further increase key habitat quantity, one side channel (D) off Spring Creek irrigation ditch and associated floodplain will be constructed. The flow in Side Channel D will be year round, ranging from 4 to 50 cfs. A new fish screen and diversion designed and constructed by ODFW at the upstream end of the channel will divert flows to Side channel D and prevent ESA listed juvenile salmonid stranding, entrapment, and entrainment in/from the Spring Creek irrigation ditch. Channel D will return flow to the Wallowa River 1,600 feet earlier than if it remained in the irrigation ditch.

Side Cannel D mimics a meadow stream with a high sinuosity (±2.5) and low gradient. The channel has a low width to depth ratio and is designed to have overhanging vegetation and undercut banks. Wood habitat structures will be constructed within this side channel to maintain channel structure, dissipate energy, and create habitat diversity. It is anticipated that Side Channel D will encourage juvenile rearing. Eleven pools approximately 2.5 feet deep will be created with the addition of engineered wood. In addition, the project will promote hyporheic exchange in the side channels via deep pools that will result in cooler water in these areas. In addition to irrigation return water, flow in Side Channel D will be provided by groundwater and springs in the upper bench and drainage.

Habitat diversity will also be increased by lowering the floodplain in key areas and placement of habitat structures throughout the project. Bioengineered streambank protection will help reduce streambank erosion. Pools along the main channel and side channels will help induce natural sediment sorting and improve rearing, holding, and spawning conditions. Lowering the floodplain will also dissipate the energy focused in the main channel, thereby reducing the shear stress and excessive erosion on the main channel.

Riparian health will be improved by implementing the strategic Planting Plan. This will help increase shade and decrease abundance of reed canary grass.

A mainstem habitat project planned immediately upstream on river right will complement this project.

Does the project address a restoration action identified in a regional assessment or recovery plan?

● Yes
❍ No

Regional Assessments or Recovery Plans
(Draft)Proposed ESA Recovery Plan for Snake River Spring/Summer Chinook & Snake River Steelhead
The Oregon Plan for Salmon and Watersheds
Oregon Conservation Strategy
Oregon's Native Fish Conservation Policy
Northwest Power and Conservation Council Grande Ronde Subbasin Plan

For each plan chosen above, describe how your project is consistent with specific recovery/restoration actions cited in that plan.

The project was designed to address the limiting factors identified in the Draft Recovery Plan and the Grande Ronde Subbasin Plan for ESA listed spring Chinook salmon and summer steelhead in this reach of the Wallowa River. The project was also designed to address the recovery strategies identified in the Draft Recovery Plan for this reach of the Wallowa River. These strategies include reducing mortalities during outmigration to the Snake River; improving quantity and quality of summer and winter rearing habitats; protecting and enhancing spawning and rearing areas; and enhancing steelhead spawning areas and survival of eggs and alevins by reducing sediment in spawning gravels.

The mission of the Oregon Plan for Salmon and Watersheds is "Restoring our native fish populations and the aquatic systems that support them to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits." Within the Oregon Plan specific actions - called "measures" - are organized around the factors that contributed to the decline in fish populations and watershed health. Most of these focus on actions to improve water quality and quantity and habitat restoration. Project design and implementation of project design includes measures to improve water quality, quantity and habitat restoration.

Project design and implementation also addresses three major elements of the Plan: voluntary restoration actions by private landowners; coordinated state and federal agency and tribal actions to support private and voluntary restoration efforts, implement regulatory programs, manage public lands, and promote public education and awareness about watersheds and salmon; and monitoring watershed health, water quality, and salmon recovery to document existing conditions, track changes, and determine the impact of programs and actions.

The purpose of Oregon's Native Fish Conservation Policy is to ensure the conservation and recovery of native fish. The Policy identifies three goals:
1. Prevent the serious depletion of native fish.
2. Maintain and restore naturally produced fish in order to provide substantial ecological, economic and cultural benefits to the citizens of Oregon.
3. Foster and sustain opportunities for fisheries consistent with the conservation of naturally produced fish and responsible use of hatcheries.

The project was designed and will be implemented to ensure the conservation and recovery of native fish and support all three goals.

The Oregon Conservation Strategy is an overarching plan to conserve Oregon’s fish and wildlife, and their habitats. It combines the best available science and conservation priorities with recommended voluntary actions and tools for all Oregonians to define their own conservation role. Conservation strategy species include Snake River spring Chinook salmon and summer steelhead, bull trout, and redband trout. Strategy Species are species of greatest conservation need that include wildlife, fish, invertebrates, plants, and algae. Information about special needs, limiting factors, data gaps, conservation actions, and available resources is provided for each of the 294 Strategy Species.

The project is in the Blue Mountains ecoregion of the Oregon Conservation Strategy. Within the Blue Mountain ecoregion, habitat loss in lower elevation valley bottom habitats, such as riparian areas and wetlands, has been identified as a conservation issue and priority. Key Conservation Issues of particular concern in the Blue Mountains include water quality and quantity and land use changes. The project was designed to improve riparian habitat and water quality. The project was also designed to address the limiting factors for strategy species.

Habitat Types

In which habitat type(s) are you proposing to work?

✓*Instream Habitat: below the ordinary high water mark (includes in-channel habitat restoration, bank stabilization, flow, fish screening, and fish passage) -- Details will follow.*

✓*Riparian Habitat: above the ordinary high-water mark of the stream and within the stream's floodplain. -- Details will follow.*

❑*Upland Habitat: above the floodplain and improves native habitat and watershed function.*

❑*Wetland Habitat: land or areas covered, often intermittently, with shallow water or have soil saturated with moisture.*

❑*Estuarine Habitat: tidally influenced areas.*

Instream Habitat

Select all applicable Instream categories.

✓Bank stabilization

How will the bank stabilization improve water quality and/or native fish or wildlife habitat?

Unnatural, accelerated streambank erosion is occurring within the Project reach due to degradation of the stream side riparian vegetation and land use practices that have removed riparian woody species. A functional riparian area is lacking on the left bank. To increase bank strength and resistance to erosion, restoring eroding streambanks will occur by bank shaping, installation of engineered wood habitat structures, development of riparian vegetation, planting and installing large wood, trees, and shrubs, and riparian fencing and livestock and ungulate exclusion. Floodplain creation and increased floodplain connectivity will also help improve bank stabilization by increasing flow access. Trees and woody material will be added to the floodplain as roughness elements and the floodplain will be planted with native riparian species to dissipate energy, develop a riparian forest buffer, and trap sediment. All of these actions will improve water quality and native fish habitat.

Streambank protection or stabilization using riparian planting, engineered wood habitat structure placement, and increased floodplain area, connectivity, and roughness provides natural stream and floodplain through application of an integrated, ecological approach.

Riparian planting and fencing will occur to protect and promote restoration of native riparian forest. Riparian vegetation is essential for both stabilizing streambanks and regulating water temperatures. Improving the riparian health of the channel by implementing a strategic Planting Plan will help protect streambanks and improve water quality. Much of a streams sediment load, particularly during high flows, is the result of bank erosion. Riparian vegetation traps sediments and nutrients from surface runoff and prevents them from entering the aquatic system. In addition, the dense matrix of roots in a riparian zone can serve as an effective filter of shallow groundwater. This matrix of roots also reduces sediment delivery to the stream by minimizing streambank erosion. Streamside vegetation will help contribute to reducing maximum summer water temperatures by increasing shade and decreasing stream width to depth ratios, along with other actions that increase off-channel habitat, increase hyporheic flow, and increase stream sinuosity.

Available rearing and spawning habitats will be increased and improved by decreasing sediment levels by actions

to restore riparian areas, reshape channel form, increase floodplain area and connectivity, and by the design and placement of engineered wood habitat structures. Pools created by placement of wood structures along the main channel and side channels will help induce natural sediment sorting and improve rearing, holding, and spawning conditions. Large wood will be placed to provide bank roughness for energy dissipation and maximize near bank hydraulic complexity and interstitial habitats through use of various large wood sizes and configurations of the placements.

Vertical eroding banks limit floodplain interaction and hyporheic exchange. Lowering the floodplain will dissipate the energy focused in the main channel, thereby reducing the shear stress and excessive erosion on the main channel.

Side channel construction and associated floodplains will increase hyporheic exchange and increase quantity and quality of available off-channel rearing areas.

Grazing practices threaten salmon and steelhead viability by damaging and/or compacting streambanks, increasing sediment input to streams, reducing riparian vegetation and function, and contributing excessive nutrients to streams. Excluding livestock and removing trespass livestock will decrease sediment input to the Wallowa River and the new side channels.

How do the bank stabilization activities relate to and increase the ecological benefit of the other restoration activities proposed in the application?

All of the Project actions function together to improve habitat for all life stages of ESA listed spring/summer Chinook salmon, summer steelhead, and bull trout. All project actions will address OWEB, Draft Snake River Recovery Plan, and GRSP identified limiting factors.

Engineered large wood habitat structures have been designed to serve multiple functions. Wood structures will provide high flow refugia, increase interstitial spaces for benthic organisms, increase rearing habitat and pool formation, promote natural vegetation composition and diversity, reduce embeddedness in spawning gravels and promote spawning gravel deposition, reduce siltation in pools, reduce the width/depth ratio of the stream, decrease flow velocities, and deflect flows into adjoining floodplain areas to increase channel and floodplain function.

The addition of these habitat structures will also promote development of riparian vegetation by stabilizing streambanks. Lowering the floodplain in key areas will also promote riparian habitat development.

Large trees have been removed from riparian areas and large wood removed from streams. Riparian areas no longer provide shade and potential future large wood recruitment, and do not adequately protect streams from sediment input. Alterations to the vegetation communities has resulted in loss and impairment of riparian conditions important for food production, shading, bank stabilization, nutrient and chemical mediation, control of surface erosion, and production of large-sized woody material. Riparian planting and fencing will occur to protect and restore native riparian forest.

Floodplain creation and connectivity increases floodplain area, increases flow access, increases and improves offchannel habitat, promotes aquifer recharge, increases riparian vegetation, promotes healthy vegetative stands, and decreases sediment.

Bank Stabilization Materials
Logs
Vegetation

Stream Side Information

Are you proposing to treat one or both sides of the streambank?

❍ One side
● Both sides

Left side miles treated
1.2

Right side miles treated
1.2

Total miles treated
1.2

❑Fish passage improvement

✓Fish screening project

Select all the actions you propose to implement to address the problem.

✓*New fish screens installed*

Number
1

Cubic feet per second of flow allowed through screen
50

❑*Existing screens replaced, repaired, modified*

Is a fish screen required per the water right certificate?

❍ Yes
● No

If you are requesting OWEB funds for the fish screen, do you have a letter from ODFW stating the project is ineligible for ODFW fish screen program funding?

❍ Yes
● No

❑Instream Flow

✓**Instream habitat restoration**

Select all the actions you propose to implement to address the problem.

✓*Placement of materials in channel*

Does the proposed project follow:

✓*ODFW Guidelines*

✓*NOAA Guidelines*

✓*Other*

Specify

Bureau of Reclamation and US Army Engineer Research Development Center. 2016. National Large Wood Manual: Assessment Planning, Design, and Maintenance of Large Wood in Fluvial Ecosystems: Restoring Process, Function, and Structure. 628 pages.

What types of instream habitat materials are you proposing to install? (select all that apply)

✓*Large wood*

Number of structures.

18

Average number of logs per structure.

6

Average length of logs per structure (feet)

30

Average diameter of logs per structure (feet)

20

Provide additional information on the log structures, as relevant.

Eighteen engineered wood and habitat structures, seven different types, will be constructed for Phase 2 of the Wallowa River-Baker Project (Design Sheets 15-25). These structures will be installed at specific locations throughout the project reach to 1) increase habitat complexity; 2) promote pool development and maintenance; 3) provide cover; 4) promote sediment sorting; 5) provide margin roughness; 6) decrease riffle lengths and width to depth ratios; 7) promote localized scour; 8) provide bank stabilization; and 9) provide mainstem and side channel maintenance and desired configuration. Habitat structure 6 was designed specifically to provide zero to low velocity habitat with the complexity needed to support winter rearing of spring/summer Chinook salmon.

The habitat structures will be constructed of wood material including large key members and racking and slash material. The key members are installed to provide the basic frame of the structure, while the racking and slash material are used to fill voids and create interstitial space for fish to escape predators. Approved tree species include juniper, cedar, spruce, pine, white fir, or red fir. The entire tree will be imported to the extent possible, including branches and tops of trees, which will be used as racking material. Tops and limbs of some trees will be used as slash.

Four different types of engineered wood and habitat structures (4, 5, 6, and 12) will be installed on the mainstem Wallowa River, contributing 45 logs and trees as members and 20 logs as racking material.

• Type 4 (Design Sheet 16) – one structure. Designed as apex jam and located in the mainstem to stabilize gravel bars and promote vegetation growth. Also intended to collect wood and create log jams, maintaining the split flow in the mainstem.
• Type 5 (Design Sheet 17) – two structures to control flow into the existing side channel on the north side of the

project, prevent the side channel from becoming the mainstem, and to provide margin roughness.
• Type 6 (Design Sheet 18) – three structures to provide bank protection and stabilization. These structures have also been designed to provide margin roughness, to promote deep, large pool development (20-30 feet long), and to provide habitat complexity and cover for rearing salmonids.
• Type 12 (Design Sheet 25) - one structure will be constructed as a bank stabilization structure and to promote pool development.

Three types of wood and habitat structures (1, 1A, 2) will be constructed in Side Channel D. These structures consist of 2 to 3 logs as members (29 total) and racking material (11 total; Design Sheets 13 and 14). They will be placed on multiple bends to promote pool development and provide bank stability. They will also provide needed cover for rearing salmonids.

Side Channel D is designed to mimic a meadow stream with undercut banks. The side channel will be cut in gravel, and natural habitat creation, including development of undercut banks, will occur over time and as sedges establish. In the interim, wood structures are needed to provide habitat complexity for rearing juveniles and to provide stability. The size and configuration of logs is appropriate for this size stream and to create habitat complexity and stabilize banks. Stream flow will be as high as 50 cfs in this side channel.

Additional single juniper logs/trees will be placed throughout Side Channel D and on the floodplain to provide added complexity.

❑ *Boulders*
❑ *Combination log/boulder*
❑ *Other materials: Materials that stabilize the streambed*

✓ *Channel reconfiguration and connectivity, including alcoves and side channel reconnection*

What type(s) of change are you proposing to the channel configuration and connectivity?

Side Channel D will be watered with spring flows and groundwater coupled with irrigation return flows from the Wallowa River and Bear Creek (Design Sheets 2 and 12). The flow in Side Channel D will be year round, ranging from 4 to 50 cfs. A new fish screen and diversion structure designed and constructed by ODFW at the upstream end of the channel will divert flows to Side channel D and prevent juvenile passage and stranding in the Spring Creek irrigation ditch and entrainment from the ditch.

Part of the irrigation ditch will be filled, preventing stranding and entrainment. Fish will be able to access the lower end of the ditch, which will still function as an alcove. The reduction in attraction flows at the downstream end of the ditch is expected to limit its use by salmonids.

This side channel is designed to mimic a meadow stream with a high sinuosity (±2.5) and low gradient. The channel has a low width to depth ratio and is designed to have overhanging vegetation and undercut banks. Wood habitat structures will be constructed within this side channel to maintain channel structure, dissipate energy, and create habitat diversity. It is anticipated that Side Channel D will encourage juvenile rearing.

Eleven side channel pools approximately 2.5 feet deep will be created with the addition of engineered wood and habitat structures. The adjacent floodplain will be constructed to handle the full high flow of 50 cfs and prevent flooding on adjacent landowner’s property. Wood is being added to the constructed floodplain to dissipate energy and to create habitat and channel structure.

Flow will be increased in 1,600 feet of the Wallowa River by diverting water from the creek/ditch into Side Channel D, which will enter the Wallowa River within the project reach. Flow in the creek/ditch currently runs parallel to the Wallowa River and discharges downstream of the project near the Lower Diamond Road crossing. The anticipated

minimum flow in Side Channel D will be 4 cfs. Side Channel D flow will enter Side Channel A. Side Channel A is watered year round. Flow from Side Channel D will improve rearing conditions at the downstream end of Side Channel A . No water rights will be harmed by construction of Side Channel D.

Seven mainstem pools will created by the addition of large wood structures.

Acres off-channel or floodplain habitat connected
1

Number of pools created/added
18

❑*Spawning gravel placement*
❑*Beaver reintroduction*
❑*Non-native plant control*
❑*Nutrient enrichment*
❑*Animal species removal*

Is the primary purpose of the instream habitat restoration treatment(s) to address water quality limiting factors?
❍ Yes
● No

Total miles of stream to be treated with all instream habitat restoration treatments
0.57

❑**Stockpiling logs**

Riparian Habitat

Select all applicable Riparian categories.

❑**Riparian road activities**

✓Fencing and other materials for habitat protection

Select all the actions you propose to implement to address the problem.

✓*Fencing*

Type of fence

Barbed wire and post and rail

Height (ft.)

3.33

Length (miles)

0.57

What other livestock and/or land management practices are you using in conjunction with fencing?

The landowner does not have livestock. Fencing is intended to prevent trespass livestock grazing in the project area. ODFW staff will conduct project maintenance visits every 10-14 days from April-November and remove any trespass livestock from the project area.

One side of the streambank will be fenced, the side owned by the Bakers. The other side of the Wallowa River is ODOT property, which does not have livestock grazing. Upstream of the ODOT property is private property which is already fenced along the river. All four of the side channels will be contained within the exclusion fencing, hence both sides fenced.

Are you proposing to fence one or both sides of the streambank?

❍ One side

● Both sides

Stream miles treated

1.2

✓*Exclusion other than fencing*

Specify materials

A majority of the planted area will have hog panel caging as protection from wildlife browsing.

Miles of fencing and other materials for habitat protection

0.57

Riparian acres protected by fencing and/or other exclusion

30.2

✓Vegetation establishment or management

Select all the actions you propose to implement to address the problem.

✓*Planting*

For Details Go to Plant Page

✓*Non-native plant control*

Specify species

Leafy spurge

Diffuse knapweed

Treatment(s) to be applied

✓*Mechanical (cutting, mowing, girdling, etc.)*

✓*Chemical (pesticides, fungicides, etc.)*

❑*Biological (predators, herbivores, pathogens, etc.)*

Acres to be treated

31

❑*Prescribed burnings, stand thinning, stand conversions, silviculture*

❑*Juniper treatment*

✓Livestock management

Select all the actions you propose to implement to address the problem.

✓*Riparian pasture management*

❑*Cross fencing installed*

❑*Water gap development*

❑Debris and Structure Removal

Is an objective of the riparian treatment(s) to address water quality limiting factors?

● Yes

❍ No

✓Sediment

✓Nutrients

✓High Temperature

Total riparian acres to be treated:

30.2

Total riparian streambank miles to be treated

1.2

Are you proposing to treat one or both sides of streambank?

❍ One side

- Both sides

Left side of bank (miles)
1.2

Right side of bank (miles)
1.2

Stream miles
1.2

Wrap-Up

Outcomes

Explain how the proposed restoration activities address the watershed problem described in the Problem Statement and Goals and Objectives.

Both current and historic management practices pose threats to the recovery of Wallowa River spring/summer Chinook salmon and steelhead populations. Watershed problems include lack of habitat quantity and diversity (primarily a lack of pools and large woody debris); excess fine sediment; channelization and loss of off-channel habitat and floodplain connectivity; riparian habitat degradation; high summer water temperatures; alteration of the hydrograph; and passage barriers.

The landowners, John and Tarrah Baker, have enrolled 30.2 acres (~0.6 river miles) of their Wallowa River property into a 15-year conservation easement with ODFW, allowing riparian, floodplain, and instream habitat creation. This restoration project addresses the primary limiting factors for ESA listed spring/summer Chinook salmon and summer steelhead by eliminating ESA listed salmonid stranding, entrapment, and entrainment, improving aquatic and riparian habitat and channel condition, riparian, floodplain and instream habitat creation, increasing habitat complexity, reducing sediment delivery to the stream, and contributing towards improved water temperature regimes. This project is the second half of Phase 2 of a larger habitat restoration project designed for the Baker property. Phase 1 and the first half of Phase 2 included 1) constructing three side channels to increase stream complexity; 2) creation of 6 acres of floodplain and increased floodplain interaction; 3) installation of 32 large wood habitat structures to increase habitat complexity and stabilize streambanks; 4) riparian planting and seeding; 5) reducing sediment delivery to the stream through streambank stabilization, riparian plantings, and increased floodplain area and connectivity; and 6) promoting aquifer recharge with floodplain reconnection. Phase 2 builds upon Phase 1 measures in 2017. Phase 2 includes construction of one side channel and associated floodplain, a new fish screen and diversion structure at the head of the side channel, 18 wood fish habitat structures and floodplain wood, and riparian planting, protection, and seeding.

This project contributes to improving conditions for ESA listed salmonids and native resident fish populations and addresses many of the watershed problems and basin priorities, including:

Installation of a fish screen and diversion structure and filling in part of the Spring Creek irrigation ditch to eliminate fish stranding.

Stream complexity. The addition of one side channel for off-channel habitat, 18 engineered wood habitat structures, increased floodplain creation and connectivity, and increased riparian species diversity and function will improve and increase habitat complexity in the project reach.

Side channel construction will improve aquatic and riparian habitat diversity and complexity, reconnect stream channels to floodplains, reduce bed and bank erosion, increase hyporheic exchange, provide long-term nutrient storage, provide substrate for macroinvertebrates, moderate flow disturbance, and provide refuge for fish and other aquatic species. Side channel construction will return Spring Creek/irrigation ditch water to the Wallowa River 1,600 feet upstream of current delivery. The fish screen and diversion structure will prevent steelhead stranding and entrapment in Spring Creek/irrigation channel.

Large wood placements will mimic natural accumulations of large wood in the channel. Placement of structures will occur to promote natural habitat formation, particularly pools, and provide instream spawning, rearing and resting habitat. Large wood structures will be installed to increase habitat complexity and stabilize streambanks. Wood structures will provide high flow refugia; increase interstitial spaces for benthic organisms; increase rearing habitat and pool formation; promote natural vegetation composition and diversity; reduce embeddedness in spawning gravels and promote spawning gravel deposition; reduce siltation in pools; reduce the width/depth ratio of the

stream; decrease flow velocities; and deflect flows into adjoining floodplain areas to increase channel and floodplain function.

Floodplain connectivity. The floodplain between the Wallowa River and the side channels will be lowered in order to promote floodplain connectivity and increase habitat diversity. An additional 1 acres of floodplain will be created around the newly constructed side channel and engineered wood habitat structures. Floodplain creation and connectivity increases floodplain area, increases flow access, increases and improves off-channel habitat, promotes aquifer recharge, increases riparian vegetation, and promotes healthy vegetative stands. Vertical, eroding banks along the Wallowa River will be regraded to increase floodplain connectivity. Trees and woody material will be added to the floodplain as roughness elements. The floodplain will be planted with native riparian species to dissipate energy and develop a riparian forest buffer.

Riparian vegetation structure. Riparian structure and function will be improved through improving the density, condition and species composition of riparian vegetation by planting and seeding and reconnecting the Wallowa River with the floodplain. Lowering the floodplain in key areas will promote floodplain interaction and riparian habitat development. Riparian planting and fencing will occur to protect and restore native riparian forest. ODFW will plant trees and shrubs to help stabilize soils.

A strategic Planting Plan, prepared by Ken Diebel, will be implemented. Planted areas will be protected from grazing, herbivory, competing vegetation, and noxious weeds. Species to be planted naturally occur in the project area. Native plant species and seeds will be obtained from local sources to ensure plants are adapted to local climate and soil chemistry. Mechanical control of weed canary grass will occur.

Sediment transport. The project will improve sediment conditions through the project reach. Bioengineered streambank protection will help reduce streambank erosion. Pools along the main channel and side channels will help induce natural sediment sorting and improve rearing, holding, and spawning conditions. Lowering the floodplain will also dissipate the energy focused in the main channel, thereby reducing the shear stress and excessive erosion on the main channel. Riparian planting and fencing will occur to protect and promote restoration of native riparian forest.

Streambank Restoration. Unnatural, accelerated streambank erosion is occurring within the Project reach due to degradation and removal of stream side riparian vegetation and land use practices that have removed riparian woody species. A functional riparian area is lacking on the left bank. To increase bank strength and resistance to erosion, restoring eroding streambanks will occur by bank shaping, development of riparian vegetation, and planting and installing large wood, trees, and shrubs.

Large wood structures will provide bank stability allowing for vegetation establishment. Streambank restoration shall include planting a diverse assemblage of riparian trees and shrubs native to the Project area. Large wood will be placed to provide bank roughness for energy dissipation and maximize near bank hydraulic complexity and interstitial habitats through use of various large wood sizes and configurations of the placements.

Fencing will be installed to prevent access and grazing damage to revegetated sites.

Water quality. Improved water temperatures are anticipated upon successful completion of the project. Improving the riparian health of the channel by implementing a strategic Planting Plan will help increase shade in the reach. The project will promote hyporheic exchange in the side channels via deep pools that will result in cooler water in these areas. Narrowing of width to depth ratios and increased channel sinuosity will also contribute to improving water temperatures.

Describe the steps you will take to minimize adverse impacts to the site and adjacent lands during and after project implementation .

All project activities are covered under HIP III. BPA's internal restoration review team reviewed and approved the design and HIP III coverage is complete. To minimize adverse impacts to the site and adjacent land during and after project implementation the mandatory conservation measures included in HIP III will be implemented, including:

Project inspection. Construction and environmental compliance observation will occur during 100% of Project construction. Project components will be inspected during and after construction.

State and Federal Permits. All applicable regulatory permits and official project authorizations have been obtained.

Timing of in-water work. Appropriate Oregon guidelines for timing of in-water work will be followed.

Site layout and flagging. Prior to construction, the action area will be clearly flagged to identify sensitive resource areas, equipment entry and exit points, road and stream crossing alignments, and staging, storage, and stockpile areas.

Temporary access roads and paths. Existing access roads and paths will be used whenever possible, and the number and length of temporary access roads and paths through riparian areas and floodplains will be minimized to lessen soil disturbance and compaction, and impacts to vegetation. At project completion, all temporary access roads and paths will be obliterated, and the soil will be stabilized and revegetated.

Temporary stream crossings. The number of temporary stream crossings will be minimized. No stream crossings will occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel. After project completion, temporary stream crossings will be obliterated and the stream channel and banks restored.

Staging, storage, and stockpile areas. Staging areas shall be a minimum of 150 feet or more from any natural water body or wetland. Natural materials used for implementation of aquatic restoration, such as large wood, may be staged within the 100-year floodplain at identified locations shown of the Designs. Any material not used in restoration, and not native to the floodplain, will be removed for disposal.

Equipment. Mechanized equipment and vehicles will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment.

Erosion control. Erosion control measures will be prepared and carried out, as described in the environmental permits. Sediment barriers will be installed and maintained for the duration of project implementation.

Dust abatement. Dust control measures will be implemented.

Invasive species control. Prior to entering the site, all vehicles and equipment will be power washed, allowed to fully dry, and inspected to make sure no plants, soil, or other organic material adheres to the surface. Waders, boots, and any other gear to be used in or near water will be inspected for aquatic invasive species.

Work Area Isolation. Any work area within the wetted channel will be isolated from the active stream. The contractor shall provide a dewatering plan for approval prior to construction. Water discharged during dewatering shall be dispersed onto the floodplain at approved locations. Pumps will be screened to NMFS's criteria. All side channel and pool habitat work will occur in isolation from the Wallowa River. Newly constructed channels will be connected to the Wallowa River during the in-water work window.

Fish Salvage. Work area isolation and fish capture activities will occur during periods of the coolest air and water temperatures possible. Salvage will not occur when water temperatures exceed 18oC, or 15oC if bull trout are present. Salvage will be supervised by a qualified fisheries biologist. Fish capture and handling will be conducted to

minimize risk of injury and fish released at a safe site as rapidly as possible.

Electrofishing. Electrofishing will be used only after other salvage methods have been employed. Salvage operations will be led by an experienced fisheries biologist and follow NMFS's electrofishing Guidelines (NMFS 2000).

Dewater. Dewatering will be conducted over a sufficient period of time to allow species to naturally migrate out of the work area.

Fish passage. Fish passage will be provided for adult and juvenile fish during construction. Adequate precautions will be taken to prevent fish stranding.

Minimize time and extent of disturbance. Earthwork in which mechanized equipment is in stream channels and riparian areas will be completed as quickly as possible.

Fill Removal. Excavated material will be hauled to disposal sites within three miles of the Project.

Cessation of work. Project operations will cease when allowable water quality impacts, as defined by the state CWA section 401 water quality certification or HIPIII Turbidity Monitoring Protocol, have been exceeded or when "incidental take" limitations have been reached.

Site restoration. When construction is complete, all streambanks, soils, and vegetation will be cleaned up and restored. All project related waste will be removed. All disturbed areas will be rehabilitated.

Revegetation. Long-term soil stabilization of disturbed sites will be accomplished with reestablishment of native vegetation. Fencing will be installed to prevent access to revegetated sites by livestock.

Implementation monitoring. ODFW will conduct implementation monitoring.

Monitoring Plan
Monitoring will be conducted by ODFW to conduct due diligence and evaluate project effectiveness at meeting objectives. Monitoring will include the following:
1. Measuring survival, growth, and cover of planted and desired woody vegetation for five years post construction and implementation;
2. Measuring percent shade along transects established in and around the stream channels the first five years post construction, and then in years 10 and 15;
3. Pre-project photo points will be established in 2015 and photos taken prior to project construction. Photographs will be taken the first five years post project completion and then every subsequent three years to qualitatively document riparian and channel condition;
4. A pre-project aerial video was recorded by GRMW staff in 2014. Aerial videos will also be recorded by GRMW staff in years 1, 2, 3, 6, 10, and 15 years post construction;
5. Summer steelhead and spring Chinook salmon spawning ground surveys will be conducted 2-3 times annually to note presence or absence of spawning and to document redd locations;
6. Salmonid presence/absence surveys of juvenile rearing will be conducted post-project construction to document usage of project area;
7. Channel cross sections will be established along the restored channel to assess channel development and form over time. The number and location of cross-sections will be determined following project completion and will at a minimum be placed to characterize built features. Channel cross sections will be surveyed 1, 3, 5, 10, and 15 years post project completion.
8. Topographical surveys of the as built project will be conducted 1, 3, 5, 10, and 15 years post project completion to develop a longitudinal profile of the channel and determine changes in mainstem and side channel stream profiles and morphology; and

9. A final report documenting project implementation and monitoring will be submitted.

If due diligence or monitoring indicate project objectives are not being met, ODFW will convene the restoration team and project collaborators to discuss project performance. The restoration team will develop alternatives and identify next steps.

Project Maintenance
Project maintenance will be conducted annually by ODFW for a minimum of 15 years, easement duration. ODFW will inspect project structures, fences, and vegetation and conduct necessary maintenance every 10-14 days, from April–November.

Does this proposed project include outreach activities?
● Yes
❍ No

Describe these activities, as well as any related products, and explain how the proposed activities relate to the project's objectives.

The completed project will be featured in the GRMW quarterly newsletter “Ripples in the Grande Ronde”. The article will include descriptions of project history, objectives, implementation, participants, and cooperators. Funding contributors will also be identified. The benefits of the project to both natural resources and the landowner will be discussed.

Technical abstracts will be submitted for presentations of the project at professional society meetings including River Restoration Northwest and Oregon Chapter of the American Fisheries Society.

Design

Were design alternatives considered?
● Yes
❍ No

If yes, describe the design alternatives that were considered and why the preferred alternative was selected.

A restoration design team was assembled and included the landowners and representatives from ODFW, GRMW, NPT, OWRD, ODOT, NMFS, FWS, and Anderson Perry. The composition of this team assured that the interests of all concerned entities were considered in design. ODFW, as the project manager, oversaw the organization and regular meetings of the design team. Participating design team members developed project objectives and criteria and ensured that objectives and criteria were realized in the resulting restoration project design. The design team reviewed 15%, 30%, 60%, and 90% designs. During technical review, if for any reason specific criteria could not be met, exceptions were discussed and decided upon, and the design process continued. Draft Final design plans were modified based on review by the GRMW technical team and OWEB’s Region 5 review team. The design team reviewed and agreed to the phased design included in this application.

Site constraints for the project include a bridge located just downstream of the project site, a non-regulated levee on river left at the downstream end of the project, and the landowner located to the south of the upstream end of the project site. The bridge must remain in place and cannot be altered as part of the project. Although the levees are not regulated, modifying any portion of the levee was not considered viable in order to not disrupt the approach to the bridge, thereby altering the hydraulics at the bridge. The property owner located to the south of the upstream end of the project is worried about losing agricultural production. Therefore, the design of bank protection on river left in this location needed to be more aggressive in nature to ensure that the river does not push into the

landowner's agricultural area.

The project site is large allowing planning and design to accommodate natural events and conditions. Project design has been informed by historical maps and photographs, field data, topographic surveys, LiDAR, and hydraulic modeling. Hydraulic models were used to evaluate the river's hydraulics and shear stress through the project reach, to determine elevations in the mainstem, to evaluate sediment transport, and to determine elevations for inverts of side channels. The ordinary high water, recurrence of 1.5 years, was used to set the floodplain level. Engineered wood and habitat structures were designed to a 100 year flow event. Draft Final design plans were reviewed and approved by Sean Welch, BPA engineer.

Side Channel D was designed to create additional rearing habitat while preventing stranding, entrapment, and entrainment in and from the Spring Creek irrigation ditch.

The restoration review team discussed the robust willow and cottonwood galleries on river left and potential impacts from project construction. These galleries are within the floodplain and watered regularly as flows over top the river bank and with tree roots below base flow elevation. These conditions are not expected to change by construction of the project. Reproduction by seed is a primary means of cottonwood establishment. Saplings will have access to groundwater and be wetted by surrounding surface water. After the first 2 years of growth, cottonwood saplings become increasingly tolerant of flooding and drought stress as they develop larger root systems. Roots will have grown to almost 3 meters long ensuring access to groundwater during dry periods and to anchor the sapling against all but extreme floods.

ODFW's Grande Ronde Fish Habitat Program has barbed wire fence construction specifications. Fence is post and rail and 4-strand barbed wire. The bottom wire will be 16 inches from the ground to allow young ungulates and other animals to crawl under. The top wire shall be 40 inches from the ground to allow adult animals to jump over it. The actual construction location will be staked, flagged or otherwise marked on the ground by ODFW. All structures shall be constructed to design drawings and specifications which will be included in the awarded contract.

Multiple design team meetings were held and members worked closely with design engineers to develop 15%, 30%, 60%, 90%, and Final Designs. Modifications were made as necessary throughout the design process during design team meetings and within consultation with design team members and permitting agency representatives.

Site visits were conducted with members of the design team, BPA, ODSL, and Corps of Engineers. The design team agreed that the project as designed, will best meet project objectives based on different designs, alignments, and structure configurations considered.

BPA and AP engineers met to review the hydraulic model, geomorphology, and to run sediment transport computations, and BPA approved final designs.

OWEB's Region 5 Technical Review Team recommended dividing the Project into Phases. In an effort to procure OWEB restoration funding, the Project was phased, and other review team recommendations incorporated into final design, including decreasing the number of large wood structures and the amount of wood incorporated in the structures to decrease project cost. The final design was divided into two phases for construction. This application is for the remainder of Phase II. Phase I and part of Phase II was completed in 2017.

Select the appropriate level of design for your project.

- ❍ No design is required.
- ❍ 10-30%: Conceptual design (evaluation of alternatives, concept-level plans, design criteria for project elements, rough cost estimates).
- ❍ 30-85%: Preliminary design (selection of the preferred alternative, draft plans, draft design report, preliminary cost estimates).

- 85-100%: Final design (final design report, plans, and specifications, contracting and bidding documents, monitoring plan, final cost estimate).

If work remains on the project's design, describe the work that remains to be done and when you expect to have it completed. If no design is required put "N/A"

N/A

Project Management

List the key individuals, their roles, and qualifications relevant to project and post project implementation. At a minimum include the following: project management, project design, project implementation, and project inspection.

Role	Name	Affiliation	Qualifications	Email	Phone
Project Design, Project Engineer, Construction Oversight	Chas Hutchins	Anderson Perry & Associates	P.E., Project Manager for AP, has worked for AP for 10 years and been the design engineer for more than 30 fish passage, irrigation, diversion, and stream restoration projects. He has also overseen project construction on these projects.	chutchins@andersonperry.com	(541) 963-8309
Project Maintenance, Project Monitoring	Matt Saladin	Oregon Department of Fish and Wildlife	Matt has been a fish habitat technician for 10 years. He is responsible for annual project inspection and maintenance of all GRFH projects. He is the monitoring and fish salvage lead for all GRFH projects.	matt.b.saladin@state.or.us	(541) 962-1833
Project Management, Project Implementation, Construction Oversight, Project Inspection, Project Monitoring, and Reporting	Colleen Fagan	Oregon Department of Fish and Wildlife	M.S. in Fishery Resources. Has worked as a fishery biologist for ODFW for 18 years, with the primary focus on habitat mitigation and enhancement. Has been on multiple design teams and been responsible for construction and environmental compliance.	colleen.e.fagan@state.or.us	(541) 962-1835

Project Manager, Project Implementation, Construction Oversight, Project Monitoring, Project Maintenance	Winston Morton	Oregon Department of Fish and Wildlife	Fish Habitat Biologist for ODFW for 14 years. Extensive experience in project design and overseeing project construction and monitoring. Has been the Project Manager for multiple ODFW fish habitat projects.	winston.h.morton@state.or.us	(541) 962-1837
Project Inspection	Jeff Oveson	Grande Ronde Model Watershed	Executive Director of the GRMW for 17 years. Instrumental in the establishment of watershed management partnerships among local residents, state and federal agencies, and interest groups concerned with the management of fish and wildlife resources.	jeff@grmw.org	(541) 663-0570
Project Contracting	Mary Estes	Grande Ronde Model Watershed	Office and Fiscal Manager. Extensive experience contracting funding for habitat restoration projects. Oversees contracts ensuring contract requirements are adhered to. Plans, organizes coordinates, and oversees the fiscal operations of the GRMW.	mary@grmw.org	(541) 663-0570

List the major project elements and time schedule for each, including post project implementation.

Element	Start Date	End Date
Floodplain Creation	6/2018	8/2018
Post project inspection and due diligence monitor	9/2018	12/2018
Construct Side Channel D	6/2018	8/2018
Install engineered wood structures	6/2018	8/2018
Seeding and Riparian Planting	8/2018	12/2018
Install Fish Screen	8/2018	11/2018
Fence Construction	9/2018	11/2018

Element	Q2 2018	Q3 2018	Q4 2018
Floodplain Creation			
Post project inspection and due diligence monitor			
Construct Side Channel D			
Install engineered wood structures			
Seeding and Riparian Planting			
Install Fish Screen			
Fence Construction			

Optional Monitoring

OPTIONAL: Restoration Project Monitoring

✓ *Salmonid Monitoring*
❑ *Non-salmonid biological monitoring*
❑ *Water (quantity) flow monitoring*
✓ *Water quality monitoring*
❑ *Rangeland monitoring*
✓ *Onsite*
❑ *Downstream*
❑ *Upstream*
❑ *Upslope*
✓ *Effectiveness monitoring will be conducted for this project*

Budget

Item	Unit Type	Unit Number	Unit Cost	OWEB Funds	External Cash	External In-Kind	Total Costs
Salaries, Wages and Benefits							
GRMW Project Management	Hours	28	$45.00	$0	$0	$1,260	$1,260
			Category Sub-total	$0	$0	$1,260	$1,260
Contracted Services							
Type 1A Habitat Structure (3 structures)	Hours	12	$200.00	$0	$2,400	$0	$2,400
Fish Bypass	Each	1	$28,000.00	$0	$0	$28,000	$28,000
Floodplain Excavation	Cubic yards	10000	$4.00	$0	$40,000	$0	$40,000
ODFW GRFH Program Manager	Hours	80	$45.00	$0	$0	$3,600	$3,600
Design Firm Bidding and Contracting Project Construction	Each	1	$10,000.00	$0	$10,000	$0	$10,000
GRFH Project Technician	Hours	120	$30.00	$0	$0	$3,600	$3,600
Mobilization	Each	1	$12,000.00	$0	$12,000	$0	$12,000
Environmental Controls (1200 C Permit)	Each	1	$5,000.00	$0	$5,000	$0	$5,000
Clearing and Grubbing	Hours	35	$200.00	$0	$7,000	$0	$7,000
GRFH Project Manager	Hours	120	$40.00	$0	$0	$4,800	$4,800
Side Channel D Earthwork	Cubic yards	350	$5.00	$0	$1,750	$0	$1,750
Type 1 Habitat Structure (4 structures)	Hours	16	$200.00	$0	$3,200	$0	$3,200
Work areas isolation and water management	Hours	60	$250.00	$0	$15,000	$0	$15,000
GRFH Project EBA	Hours	120	$30.00	$0	$0	$3,600	$3,600
Type 6 Habitat Structure (2 structures)	Hours	20	$200.00	$0	$4,000	$0	$4,000
Type 12 Habitat Structure (1 structure)	Hours	25	$200.00	$0	$5,000	$0	$5,000
Type 5 Habitat Structure (2 structures)	Hours	4	$200.00	$0	$800	$0	$800
Type 4 Habitat Structure (2 structures)	Hours	4	$200.00	$0	$800	$0	$800
Type 2 Habitat Structure (4 structures)	Hours	16	$200.00	$0	$3,200	$0	$3,200
Miscellaneous Wood (side channels and floodplain)	Each	1	$9,000.00	$0	$9,000	$0	$9,000
Whips	Each	420	$5.00	$0	$0	$2,100	$2,100
Site Restoration	Hours	20	$200.00	$0	$4,000	$0	$4,000
Staff Engineer meetings and site visits, design support during construction, field observation during construction.	Hours	80	$100.00	$0	$8,000	$0	$8,000
Fencing Materials and Installation	Feet	1000	$3.00	$0	$3,000	$0	$3,000
Seeding (20 lbs/ac for 15 ac)	Each	400	$15.00	$0	$0	$6,000	$6,000
Trees & Shrubs	Each	1	$18,405.00	$0	$18,405	$0	$18,405
Fish Screen	Each	1	$15,000.00	$0	$0	$15,000	$15,000
Fish Screen/Headgate Design	Each	1	$15,000.00	$0	$0	$15,000	$15,000

Project Engineer meetings, site visits, design support during construction, and field observation during construction.	Hours	50	$115.00	$0	$5,750	$0	$5,750
Pipeline and Stock Water Development	Each	1	$5,000.00	$0	$5,000	$0	$5,000
Senior Engineer - meetings, site visits, construction observation, and design support during construction.	Hours	10	$140.00	$0	$1,400	$0	$1,400
Category Sub-total				$0	$164,705	$81,700	$246,405
Travel							
Contracted engineering firm travel	Miles	2800	$0.54	$0	$1,498	$0	$1,498
ODFW travel to project site	Miles	9300	$0.54	$0	$0	$4,976	$4,976
Category Sub-total				$0	$1,498	$4,976	$6,474
Materials and Supplies							
			$0	$0	$0	$0	$0
Category Sub-total				$0	$0	$0	$0
Equipment and Software							
			$0	$0	$0	$0	$0
Category Sub-total				$0	$0	$0	$0
Other							
Photopoints (Pre, 1,2,3,6,9,12,15 yrs post)	Hours	54	$35.00	$0	$0	$1,890	$1,890
Aerial Photopoints (pre, 1,2,3,6,9,12 years post)	Hours	54	$45.00	$0	$0	$2,430	$2,430
Vegetation Monitoring & Maintenance (annually for 15 year easement)	Hours	300	$40.00	$0	$0	$12,000	$12,000
Project Topo Survey (as built, 1,3,5,10,15 years post)	Hours	480	$75.00	$0	$0	$36,000	$36,000
Salmonid Presence Absence (redd counts, snorkel surveys)	Hours	90	$35.00	$0	$0	$3,150	$3,150
Category Sub-total				$0	$0	$55,470	$55,470
Modified Total Direct Cost Amounts				$0	$166,203	$143,406	$309,609
Indirect Costs							
Federally Accepted 'de minimus' Indirect Cost Rate (up to 10%)		10%			Indirect Cost Total: $0		
Total				$0	$166,203	$143,406	$309,609

If the budget includes unusually high costs and/or rates, provide justification for those costs and/or rates.

There are no unusually high costs. Costs reflect actual costs for construction of Phase 1 and the first half of Phase 2.

If the budget identifies a contingency amount for specific line item(s) within the Contracted Services and Materials and Supplies budget categories, explain the specific reasons a contingency is needed for each line item. Contingencies are line-item specific and cannot be used for other costs.

Funding and Match

Fund Sources and Amounts

Organization Type	Name	Source Note	Contribution Type	Amount	Description	Status
Non-Governmental Organization	Grande Ronde Model Watershed		In-Kind - Labor	$1,260	Project management, contracting, review	Pending
State	Oregon Department of Fish and Wildlife		In-Kind - Materials	$66,100	Seeds, fish scren design, fish screen, and fish bypass system	Secured
State	Oregon Department of Fish and Wildlife		In-Kind - Labor	$76,046	Project construction oversight, meetings, inspections, planting, fencing	Secured
Federal	Bonneville Power Administration		Cash	$166,203	Funding from BPA/GRMW for project construction	Pending
Fund Source Cash Total		**$166,203**	**Fund Source In-Kind Total**		**$143,406**	

Match

Contribution Source-Type: Description	Amount
Grande Ronde Model Watershed-In-Kind - Labor: Project management, contracting, review	$1,260
Oregon Department of Fish and Wildlife-In-Kind - Materials: Seeds, fish scren design, fish screen, and fish bypass system	$66,100
Oregon Department of Fish and Wildlife-In-Kind - Labor: Project construction oversight, meetings, inspections, planting, fencing	$76,046
Bonneville Power Administration-Cash: Funding from BPA/GRMW for project construction	$166,203
Match Total	**$309,609**

Do match funding sources have any restrictions on how funds are used, timelines or other limitations that would impact the portion of the project proposed for OWEB funding?

❍ Yes
● No

Do you need state OWEB dollars (not Federal) to match the requirements of any other federal funding you will be using to complete this project?

❍ Yes
● No

Does the non-OWEB funding include NOAA/PCSRF funds?

● Yes
❍ No

Uploads

Map: Site location_WallowaBaker_Sept 2017.pdf **- Site Location Map**

Planting Details: Map WB_Planting Plan.pdf **- Planting Plan**

Project Design: WBPhase 2 Dwgs 08-08-16.pdf **- Phase 2 Designs**

Support Letters: Wallowa-Baker Letters of Support.pdf **- Letters of Support**

Secured Match Forms: Wallowa-Baker Phase 2 Match Form.pdf **- Phase 2 ODFW Match**

Figures and Tables: Wallowa-Baker - Phase 2 Application Budget.pdf **- Phase 2 Budget Form**

Map: Figure 1 - WB location map.pdf **- Figure 1 Location Map**

Planting Details: WB_Planting Plan.pdf **- Planting Plan**

Photos: Wallowa-Baker Photographs.pdf **- Project Location Photographs**

Plant Page

Planting Questions

Relationship to other conservation programs

❑ *This project will use OWEB funds to increase the planting density on CREP acres.*

Planting Activities

Describe the current condition of the site(s) to be planted.

The river left riparian area is very narrow and quickly turns into an agricultural field that is perched as high as 8 feet above the Wallowa River thalweg within riffle reaches. The riparian area contains an abundance of reed canary grass that appears to have choked out competing vegetation. The ground is currently planted with pastures of grass/alfalfa mix. There are some sparsely spaced large cottonwoods present in the project location. Many cottonwood seeds have sprouted with cottonwoods trying to establish at lower elevations on river left. There are signs of ungulate browsing on river left vegetation, particularly on young willows and cottonwood shoots below browse height.

Describe how you will prepare the site(s) prior to planting and how those activities are appropriate considering the site conditions described in the previous question.

Prior to construction activities that disturb soil and vegetation, noxious weeds will be treated with chemical herbicides at the appropriate time (spring, summer, or fall spraying) dependent on the targeted weed species. The use of herbicides that break down and detoxify relatively rapidly is necessary to prevent adverse effects on germination and growth of reseeded species. Only approved, short-lived herbicides will be used for pre-treatment of noxious weeds.

Only approved herbicides will be used to control noxious weeds near water, wetlands, and riparian areas.

Pre-spraying will be conducted prior to any clearing to reduce the spread of noxious weeds by equipment used during clearing. Treatment methods will vary due to site-specific conditions and the type of species that are encountered.

Methods used to reduce the spread and establishment of noxious weeds will be discussed with landowners and county weed districts.

Fill out the table below. Identify the vegetation communities you plan on planting in, the acres each vegetation community encompasses, and the density of your planting.

Vegetation Community	Acres	Density
Riparian	9	289 stems/acre

Fill out the table below for each vegetation community listed in the table above, provide the common and scientific names of up to five plants that will be planted, the form(tree, shrub, grass), type of plant (bare root, cutting, etc) and

the planting timing.

Vegetation Community	Plants: Common Name	Plants: Scientific Name	Form	Type	Year	Month
Riparian	Coyote willow	Salix exigua	Tree	Cutting	2018	October-November
Riparian	Red osier	Cornus sericea	Tree	Cutting	2018	October-November
Riparian	Black cottonwood	Populus balsamifera	Tree	Rooted	2018	October-November
Riparian	Peachleaf willow	Salix amygdalloides	Tree	Cutting	2018	October-November

Plant Stewardship

After the plantings are installed, will you conduct plant stewardship ("free to grow")?

- ● Yes
- ❍ No

Are you requesting OWEB funds for plant stewardship activities?

- ❍ Yes
- ● No

Explain how you plan to carry out activities to help the plantings survive and grow over time.

Maintenance

For a minimum of 15 years, duration of easement, competing vegetation, especially grasses, will be controlled. A majority of the planted area will have hog panel caging as protection. Yearly inspections and monitoring will occur for the first five years after project implementation. For the duration of the easement, the project will be inspected each spring with maintenance visits conducted every 10-14 days from April through November.

15 growing seasons of non-use by domestic livestock: The restoration channel area will be precluded from domestic livestock use following construction completion, for the duration of the 15-year easement. This will allow planted vegetation, as described in this plan, the opportunity to establish.

Protection from browsing: Hog panel cages, small exclosures, will eliminate all browse pressure from both deer and cattle. A cage will be constructed on the inside of each new meander bend adjacent to the riffle. These areas do not have wood structures and are a logical place to construct each cage. Cages will be installed in the side channel areas. At this time location is uncertain but they will be strategically placed in areas of high planting density that offer the best planting conditions. Once protected vegetation reaches a height above browse capability, the cage will be dismantled and moved to an area on the project needing cage protection.

Mechanical maintenance during the non-use period: Mechanical control of Reed's Canary Grass (RCG) is required. In planted areas along the restoration and side channels competing vegetation will be mowed. Mowing will occur in the spring, which mimics prescribed grazing tactics. This will provide sunlight to planted vegetation, contribute to depleting carbohydrate stores in RCG, and offer desirable plant species a competitive advantage. Mowing will occur adjacent to each hog panel cage. However, if desired species are showing robust growth, mowing may be deferred so that mowing does not accidentally damage them. Additional mowing will occur if necessary.

Monitoring

The survival, growth and cover of desired woody species will be measured throughout the project area, as described in the Planting Plan (Attached).

For the first 5 years after implementation, we will conduct yearly inspections. We will establish photo points to visually document conditions. We will also measure growth, survival, cover, and percent shade. The project site is small enough that we can walk through and measure growth, survival, and cover without the need for transects. The one exception is that we will use transects to measure shade in and around the stream channels. During our inspection we will search for weeds and evaluate what means will be required to control them if found.

Measures of Planting Success

Use the table below to explain how you will document and determine success for the plantings.

Vegetation Community	Parameter	Percentages
Riparian	Percent Survival	40-50% of planted cuttings and clumps by year 2
Riparian	Percent Cover	15% shade year 2 & 25% shade year 5

If, in the course of the 3-5 years following planting, the success rate falls below your standard, what is your plan?

In our experience, we should achieve these survival targets if all steps outlined in our Planting Plan are conducted properly. It is important to wait at least two years before deciding if the planting was a failure. During this time, especially with the clumps, the plants are devoting most of their energy into growing roots. In year 3 the clumps and cuttings begin to grow shoots and develop above ground height and width.

If we are successful with our planting, we expect cover to be an important factor to measure. We expect woody vegetation to spread on its own either clonally or by establishment of volunteer propagules.

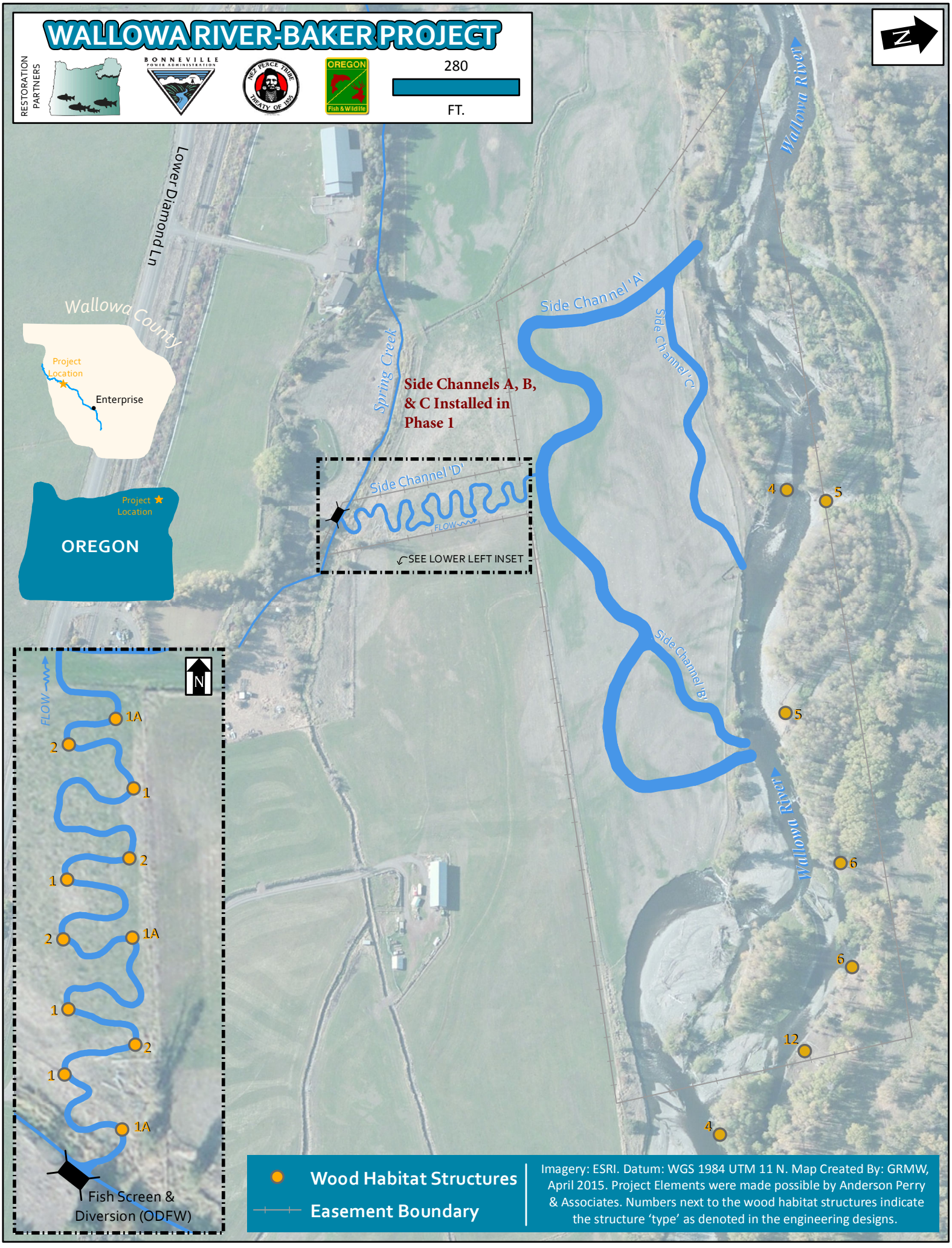
Our experience shows that after initially slow growth, cuttings and clumps can grow 1 to 3 feet per year.

We will establish transects that run through the channel. We will take densitometer readings on each bank and in the middle of the channel and we will follow OWEB monitoring protocols.

Failure to Meet Success Criteria
Replacement of dead trees or shrubs and control of undesirable vegetative competition will be continued until the riparian area is, or will progress to, a fully functional condition and meets success criteria. If success criteria are not being met, we will convene the design team and riparian expert(s) to evaluate alternatives and changes to planting program to ensure a successful planting program.

Permit Page

Project Activity Requiring a Permit or License	Name of Permit or License	Entity Issuing Permit or License	Status
Floodplain Construction	HIP III, 401 Cert, Fill Removal, 404, Sec 106	NMFS and USFWS, ODEQ, ODSL, COE, SHPO	Permitting completed and permits received
Side Channel Construction	HIP III, 401 Cert, Removal-Fill, 404, Sec 106	NMFS and USFWS, ODEQ, ODSL, COE, SHPO	Permitting completed and permits received
Installation of Large Wood Habitat Structures	HIP III, 401 Cert, Removal-Fill, 404, Section 106	NMFS and USFWS, ODEQ, ODSL, COE, SHPO	Permitting completed and permits received
Fish Salvage	HIP III	NMFS and USFWS	Permitting completed, HIP III clearance received
Fence Construction	Section 106	SHPO	Permitting completed, cultural clearance received


WALLOWA RIVER-BAKER PROJECT
RESTORATION PARTNERS
BONNEVILLE POWER ADMINISTRATION
NEZ PERCE TRIBE TREATY OF 1855
OREGON Fish & Wildlife
280
FT.
N
Lower Diamond Ln
Wallowa River
Wallowa County
Project Location
Enterprise
Project Location
OREGON
Spring Creek
Side Channel 'A'
Side Channel 'C'
Side Channels A, B, & C Installed in Phase 1
Side Channel 'D'
FLOW
SEE LOWER LEFT INSET
Side Channel 'B'
Wallowa River
FLOW
N
1A
2
1
2
1
2
1A
1
2
1
1A
Fish Screen & Diversion (ODFW)
4
5
5
6
6
12
4
Wood Habitat Structures
Easement Boundary
Imagery: ESRI. Datum: WGS 1984 UTM 11 N. Map Created By: GRMW, April 2015. Project Elements were made possible by Anderson Perry & Associates. Numbers next to the wood habitat structures indicate the structure 'type' as denoted in the engineering designs.

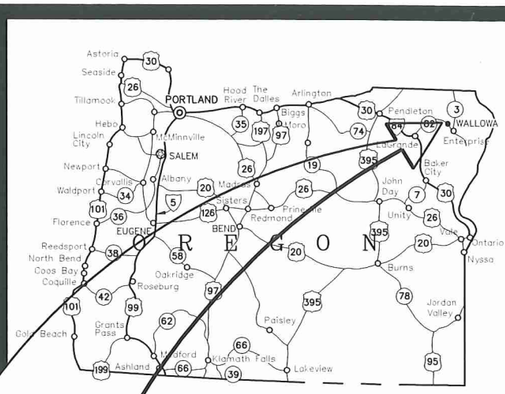
Wallowa Baker Project

Planting Area #1
Planting Area #13
Planting Area #11
Planting Area #5
Planting Area #12
Planting Area #2
Planting Area #7
Planting Area #3
Planting Area #9
Planting Area #4
Planting Area #8
Planting Area #6
Planting Area #10

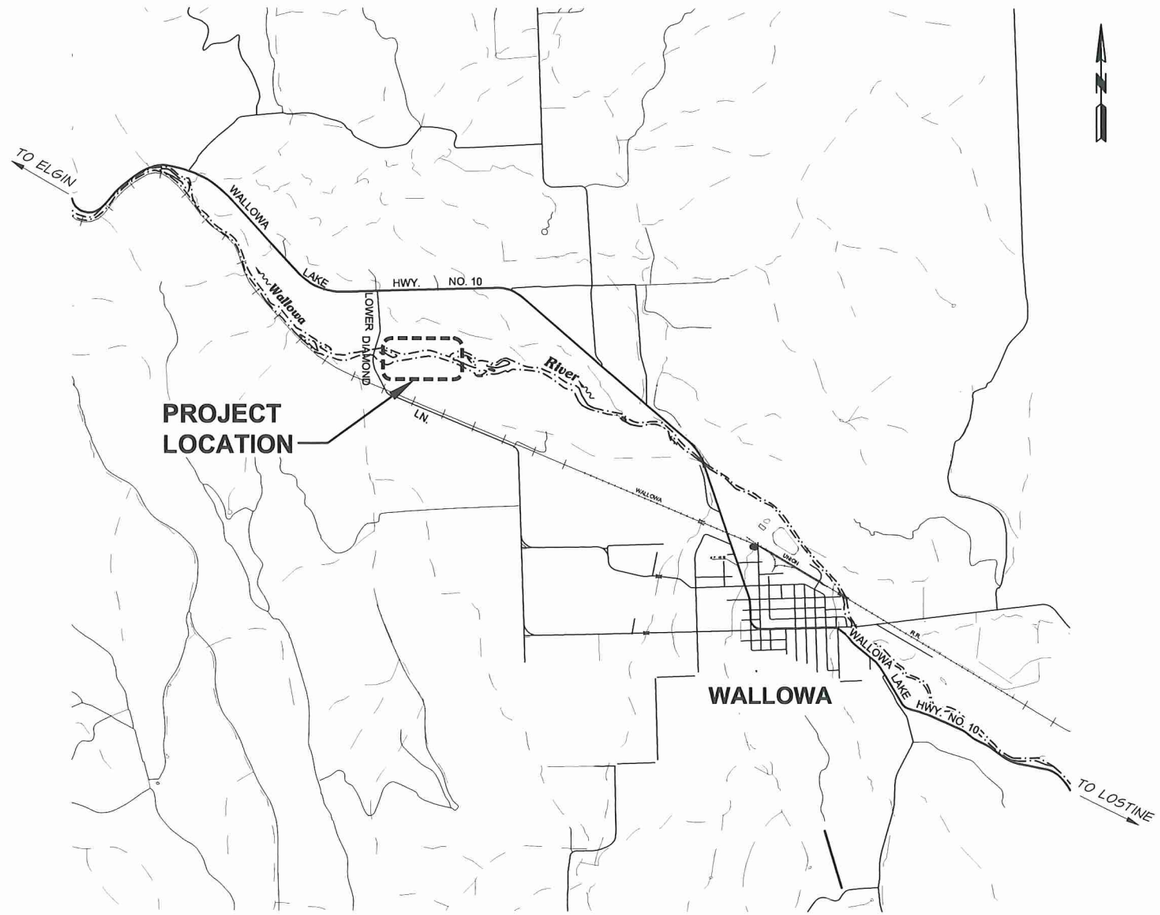
N
W E
S

0 0.02 0.04 0.08 0.12 0.16 Miles

OREGON DEPARTMENT OF FISH AND WILDLIFE
GRANDE RONDE MODEL WATERSHED
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS - 2016
PHASE 2
WALLOWA COUNTY, OREGON



INDEX



VICINITY MAP
N.T.S.

OREGON Fish & Wildlife

GRANDE RONDE MODEL WATERSHED

NEZ PERCE TRIBE TREATY OF 1855

BONNEVILLE POWER ADMINISTRATION

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
3/31/16
RENEWS 06-30-17

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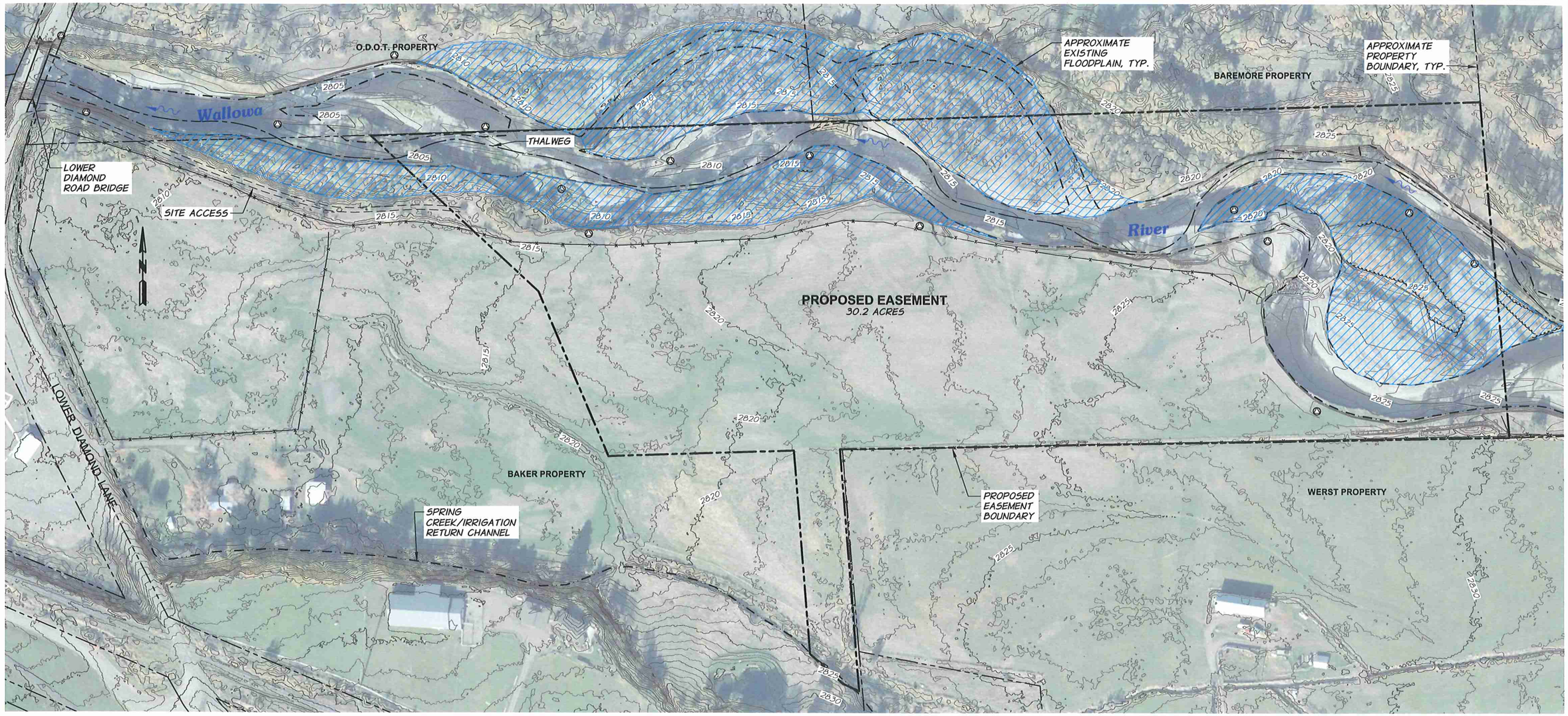
LA GRANDE, OR. WALLA WALLA, WA. PRINEVILLE, OR.



NOTE:
THESE PLANS WERE DESIGNED IN COMPLIANCE WITH THE HIP III PROGRAMMATIC.

DATUM STATEMENT

ELEVATIONS SHOWN ARE A REPRESENTATION OF NAVD 88 (Geoid 12A) AS DETERMINED BY THE NGS ONLINE POSITIONING USER SERVICE (OPUS) OBSERVATIONS AT APA CONTROL POINTS #501, #502, #503.

NOTE:
CONTOURS SHOWN ARE TAKEN FROM 2009 LIDAR DATA PROVIDED BY ODFW AND A FIELD SURVEY PERFORMED BY APA IN SEPTEMBER 2014 BETWEEN TOP OF BANKS ON EACH SIDE OF THE WALLOWA RIVER.

PROJECT OBJECTIVES

TO INCREASE ALL ELEMENTS UTILIZED BY ALL LIFE STAGES OF NATIVE SALMONIDS WITH AN EMPHASIS ON JUVENILE REARING HABITAT AND ADULT HOLDING HABITAT USING AN ECOSYSTEM PROCESS BASED APPROACH.

WALLOWA RIVER CHANNEL CHARACTERISTICS

CHANNEL LENGTH	3,500 FT
SLOPE	0.007 FT/FT
SINUOSITY	1.08
D_{84}	9.3 INCHES
EXISTING FLOODPLAIN	10.92 AC

LIMITING FACTORS

1. KEY HABITAT QUANTITY (REDUCED WETTED DEPTHS)
2. HABITAT DIVERSITY
3. SEDIMENT
4. TEMPERATURE
5. FLOWS

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

100 0 100 200 300
SCALE IN FEET

HORZ. SCALE	1"=100'	VERT. SCALE	
JOB NUMBER	81-46	DATE	2016
ACAD FILE:	Design.dwg		
DESIGNED BY	C. HUTCHINS		
DRAWN BY	D. CHRISTMAN		
REVIEWED BY	B. MOORE		

THIS DRAWING HAS BEEN REDUCED 50%. ADJUST SCALE ACCORDINGLY. BARSCALE SHOWN IS ACCURATE.

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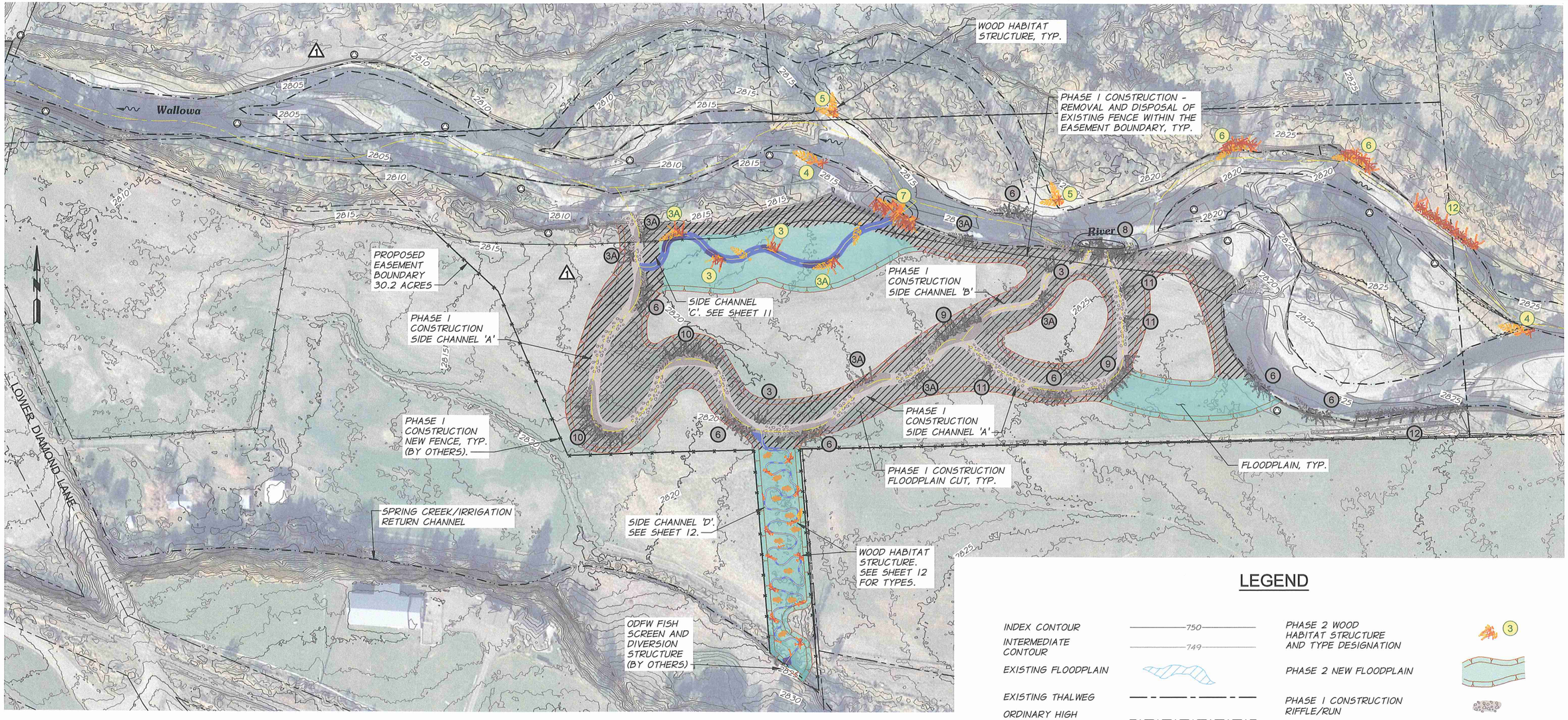
ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

EXISTING SITE PLAN

SHEET 1



DESIGN CRITERIA

PHASE 1 SIDE CHANNEL 'A'

DESCRIPTION	FLOW (CFS)	WATER DEPTH (FT)
LOW FLOW CHANNEL	12	1
50% EXCEEDANCE	3	0.5
HIGH FLOW (5% EXCEEDANCE)	110	2.6
OHW	185	3.25

PHASE 1 SIDE CHANNEL 'B'

DESCRIPTION	FLOW (CFS)	WATER DEPTH (FT)
HIGH FLOW (5% EXCEEDANCE)	100	2.5
OHW	170	3.15

SIDE CHANNEL 'C'

DESCRIPTION	FLOW (CFS)	WATER DEPTH (FT)
HIGH FLOW (5% EXCEEDANCE)	40	1.6
OHW	75	2.2

SIDE CHANNEL 'D'

DESCRIPTION	FLOW (CFS)	WATER DEPTH (FT)
MINIMUM	4	0.75
BANK FULL	15	2

WALLOWA RIVER

DESCRIPTION	FLOW (CFS)
LOW FLOW (95% EXCEEDANCE)	207
50% EXCEEDANCE	380
HIGH FLOW (5% EXCEEDANCE)	1,807
OHW	2,960
2 YEAR FLOW	3,370
5 YEAR FLOW	4,370
10 YEAR FLOW	5,050
20 YEAR FLOW	5,740
50 YEAR FLOW	6,720
100 YEAR FLOW	7,530

LEGEND

- INDEX CONTOUR — 750
- INTERMEDIATE CONTOUR — 749
- EXISTING FLOODPLAIN
- EXISTING THALWEG
- ORDINARY HIGH WATER (OHW)
- IRRIGATION CHANNEL
- SURVEY MONUMENT
- SURVEY CONTROL POINT
- FENCE LINE/GATE
- GRAVEL DRIVEWAY/STREET
- PHASE 2 WOOD HABITAT STRUCTURE AND TYPE DESIGNATION (3)
- PHASE 2 NEW FLOODPLAIN
- PHASE 1 CONSTRUCTION RIFFLE/RUN
- PROPOSED CENTERLINE
- PROPOSED EASEMENT
- PROPOSED FENCE
- PHASE 1 CONSTRUCTION WOOD HABITAT STRUCTURE AND TYPE DESIGNATION (3A)
- PHASE 1 CONSTRUCTION FLOODPLAIN
- SECTION DESIGNATION (A / 2) — SHEET WHERE SECTION WAS TAKEN OR WHERE SECTION IS SHOWN.
- WATER SURFACE ELEVATION
- SHEET CONTINUATION REFERENCE (3 / 3)

REGISTERED PROFESSIONAL ENGINEER — 83517PE — OREGON — NOV. 10, 2009 — CHAS B. HUTCHINS
DRAFT
RENEWS 06-30-17

REVISION	BY	DATE
⚠1 REVISED TO ACCOMMODATE EXISTING LEVEE	C.H.	7/16

100 0 100 200 300 SCALE IN FEET

HORZ. SCALE 1"=100' | VERT. SCALE

DESIGNED BY C. HUTCHINS | JOB NUMBER 81-46 | DATE 2016

DRAWN BY D. CHRISTMAN | ACAD FILE: Design.dwg

REVIEWED BY B. MOORE

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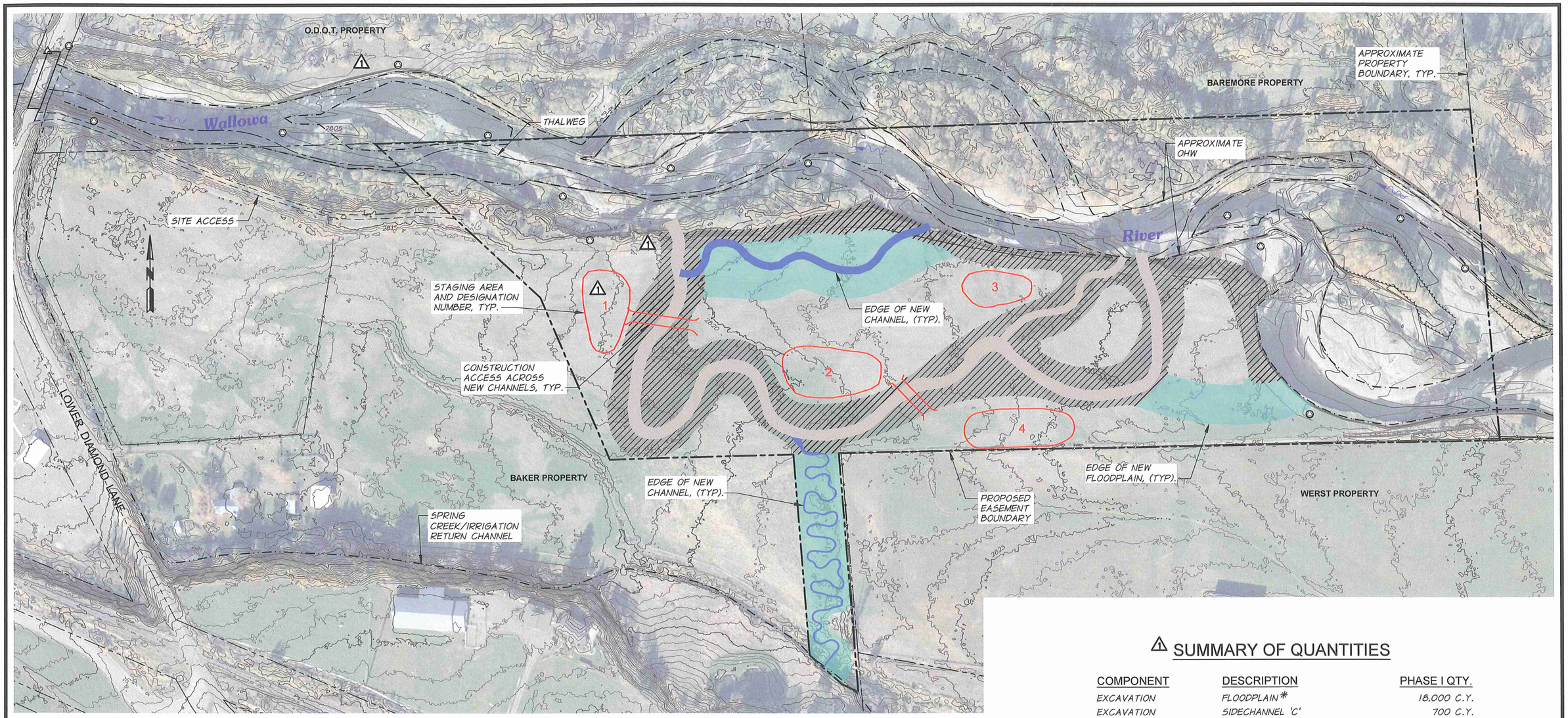
ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS PHASE 2

PROPOSED SITE PLAN AND LEGEND

SHEET 2



GENERAL NOTES:

1. QUANTITIES SHOWN ARE NEAT LINE ESTIMATES AND ARE SHOWN FOR INFORMATION ONLY. CONTRACTOR SHALL NOT USE THESE ESTIMATES FOR BIDDING PURPOSES AND IS RESPONSIBLE FOR CALCULATING HIS OWN QUANTITIES.
2. THE LOCATION OF THE ALIGNMENT SHOWN IS APPROXIMATE. THE ACTUAL LOCATION SHALL BE STAKED IN THE FIELD BY THE ENGINEER.
3. CONTRACTOR SHALL PRESERVE AND PROTECT ALL EXISTING VEGETATION TO THE FULLEST EXTENT POSSIBLE.

⚠1 SUMMARY OF QUANTITIES

COMPONENT	DESCRIPTION	PHASE I QTY.
EXCAVATION	FLOODPLAIN*	18,000 C.Y.
EXCAVATION	SIDECHANNEL 'C'	700 C.Y.
EXCAVATION	SIDECHANNEL 'D'	350 C.Y.
LOG TYPE A	20 FT. X 10" - 12" DBH W/ 3' DIA. RW	35
LOG TYPE B	10 FT. X 10" - 12" DBH W/O RW	4
LOG TYPE C	30 FT. X 16" - 18" DBH W/ 5' DIA. RW	16
TREE TYPE D	45 FT. X 16" - 18" SPRUCE DBH W/ 5' DIA. RW	13
LOG TYPE E	30 FT. X 16" - 18" DBH W/O RW	0
LOG TYPE F	30 FT. X 20" - 24" DBH W/ 5' DIA. RW	55
LOG TYPE G	30 FT. X 20" - 24" DBH W/O RW	7
RACKING MATERIAL H	10 FT. X 6" - 8" DBH	11
RACKING MATERIAL I	10 FT. X 6" - 10" DBH	38
TREE TYPE J	30 FT. X 12" - 14" DBH W/ 5' DIA. RW	6
TREE TYPE K	JUNIPER 20 FT. X 10" - 14" DBH W/O RW	11

*TOTAL NEW FLOODPLAIN CREATED IS 2.6 AC ±

REGISTERED PROFESSIONAL ENGINEER — 83517PE — OREGON — NOV. 10, 2009 — CHAS B. HUTCHINS
DRAFT
RENEWS 06-30-17

REVISION	BY	DATE
⚠1 REVISED TO ACCOMMODATE EXISTING LEVEE	C.H.	7/16

100 0 100 200 300 SCALE IN FEET

HORZ. SCALE 1"=100' VERT. SCALE

DESIGNED BY C. HUTCHINS
DRAWN BY D. CHRISTMAN
REVIEWED BY B. MOORE

JOB NUMBER 81-46 DATE 2016
ACAD FILE: staging and summary.dwg

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ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION FISH HABITAT AND RIPARIAN ENHANCEMENTS PHASE 2

SITE ACCESS AND STAGING PLAN AND MATERIAL SUMMARY

SHEET 3

HIP III GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

DOCUMENTATION: TO BE POSTED ONSITE BY THE CONTRACTOR IN A LOCATION VISIBLE TO THE PUBLIC.

A) NAME(S), PHONE NUMBER(S), AND ADDRESS(ES) OF THE PERSON(S) RESPONSIBLE FOR OVERSIGHT.
B) A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES.
C) PROCEDURES TO CONTAIN AND CONTROL A SPILL OF ANY HAZARDOUS MATERIAL GENERATED, USED OR STORED ON-SITE, INCLUDING NOTIFICATION OF PROPER AUTHORITIES.
D) A STANDING ORDER TO CEASE WORK IN THE EVENT OF HIGH FLOWS EXCEPT AS NECESSARY TO MINIMIZE RESOURCE DAMAGE (ABOVE THOSE ADDRESSED IN THE DESIGN AND IMPLEMENTATION PLANS) OR EXCEEDANCE OF TAKE OR WATER QUALITY LIMITATIONS.

SITE PREPARATION

1) SITE LAYOUT AND FLAGGING: PRIOR TO CONSTRUCTION, THE ACTION AREA WILL BE CLEARLY FLAGGED TO IDENTIFY THE FOLLOWING:

A) SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS,SPRINGS, AND WETLANDS;
B) EQUIPMENT ENTRY AND EXIT POINTS;
C) ROAD AND STREAM CROSSING ALIGNMENTS;
D) STAGING, STORAGE, AND STOCKPILE AREAS; AND
E) NO-SPRAY AREAS AND BUFFERS.

2) TEMPORARY ACCESS ROADS AND PATHS:

A) EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOOD PLAINS WILL BE MINIMIZED TO LESSEN SOIL DISTURBANCE AND COMPACTION, AND IMPACTS TO VEGETATION.
B) TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
C) THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
D) AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND RE-VEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES RE-COMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.
E) TEMPORARY ROADS AND PATHS IN WET AREAS OR AREAS PRONE TO FLOODING WILL BE OBLITERATED BY THE END OF THE IN-WATER WORK WINDOW.

3) TEMPORARY STREAM CROSSINGS:

A) EXISTING STREAM CROSSINGS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
B) TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION.
C) EQUIPMENT AND VEHICLES WILL CROSS THE STREAM IN THE WET ONLY WHERE:
   I. THE STREAMBED IS BEDROCK; OR
   II. MATS OR OFF-SITE LOGS ARE PLACED IN THE STREAM AND USED AS A CROSSING.
D) VEHICLES AND MACHINERY WILL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHEREVER POSSIBLE.
E) THE LOCATION OF THE TEMPORARY CROSSING WILL AVOID AREAS THAT MAY INCREASE THE RISK OF CHANNEL RE-ROUTING OR AVULSION.
F) POTENTIAL SPAWNING HABITAT (I.E., POOL TAILOUTS) AND POOLS WILL BE AVOIDED TO THE MAXIMUM EXTENT POSSIBLE.
G) NO STREAM CROSSINGS WILL OCCUR AT ACTIVE SPAWNING SITES, WHEN HOLDING ADULT LISTED FISH ARE PRESENT, OR WHEN EGGS OR ALEVINS ARE IN THE GRAVEL. THE APPROPRIATE STATE FISH AND WILDLIFE AGENCY WILL BE CONTACTED FOR SPECIFIC TIMING INFO.
H) AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND THE STREAM CHANNEL AND BANKS RESTORED.

4) STAGING, STORAGE, AND STOCKPILE AREAS:

A) STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND, OR ON AN ADJACENT, ESTABLISHED ROAD AREA IN A LOCATION AND MANNER THAT WILL PRECLUDE EROSION INTO OR CONTAMINATION OF THE STREAM OR FLOODPLAIN.
B) NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN THE 100-YEAR FLOODPLAIN.
C) ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
D) ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE REMOVED TO A LOCATION OUTSIDE OF THE 100-YEAR FLOODPLAIN FOR DISPOSAL.

5) EQUIPMENT: MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS). ALL VEHICLES AND OTHER MECHANIZED EQUIPMENT WILL BE:

A) STORED, FUELED, AND MAINTAINED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND OR ON AN ADJACENT, ESTABLISHED ROAD AREA;
B) REFUELED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM A NATURAL WATERBODY OR WETLAND, OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS);
C) BIODEGRADABLE LUBRICANTS AND FLUIDS SHOULD BE USED, IF POSSIBLE, ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.
D) INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND; AND
E) THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION,TO REMAIN GREASE FREE.

6) EROSION CONTROL: EROSION CONTROL MEASURES WILL BE PREPARED AND CARRIED OUT, COMMENSURATE IN SCOPE WITH THE ACTION, THAT MAY INCLUDE THE FOLLOWING:

A) TEMPORARY EROSION CONTROLS.
   I. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWN SLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE.
   II. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION.
   III. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC.
   IV. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION.
   V. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL.
   VI. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.
B) EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE: SUPPLY OF SEDIMENT CONTROL MATERIALS; AND AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

7) TIMING OF IN-WATER WORK: APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), MONTANA FISH WILDLIFE AND PARKS (MFWP) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.

A) BULL TROUT -WHILE UTILIZING THE APPROPRIATE STATE DESIGNATED IN-WATER WORK PERIOD WILL LESSEN THE RISK TO BULL TROUT, THIS ALONE MAY NOT BE SUFFICIENT TO ADEQUATELY PROTECT LOCAL BULL TROUT POPULATIONS. THIS IS ESPECIALLY TRUE IF WORK IS OCCURRING IN SPAWNING AND REARING AREAS BECAUSE EGGS, ALEVIN, AND FRY ARE IN THE SUBSTRATE OR CLOSELY ASSOCIATED HABITATS NEARLY YEAR ROUND. SOME AREAS MAY NOT HAVE DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OF IF THEY DO, THEY MAN CONFLICT WITH WORK WINDOWS FOR SALMON AND STEELHEAD. IF THIS IS THE CASE, OR IF PROPOSED WORK IS TO OCCUR WITHIN BULL TROUT SPAWNING AND REARING HABITATS, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE (SEE APPENDIX B IN THIS BO) TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
B) LAMPREY – THE PROJECT SPONSOR AND/OR THEIR CONTRACTORS WILL AVOID WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY FROM MARCH 1 TO JULY 1 IN LOW TO MID ELEVATION REACHES (<5,000 FEET). IN HIGH ELEVATION REACHES(>5,000 FEET), THE PROJECT SPONSOR WILLAVOID WORKING IN STREAM OR RIVER CHANNELS FROM MARCH 1 TO AUGUST 1. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH THE OTHER OBJECTIVES,THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOW TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DE-WATERING AND SALVAGE PROCEDURES OUTLINED IN US FISH AND WILDLIFE SERVICE (2010).
C) EXCEPTIONS TO ODFW, WDFW, MFWP, OR IDFG IN-WATER WORK WINDOWS WILL BE REQUESTED FROM NMFS AND THE FWS. AN IWW VARIANCE REQUEST (PRE-COORDINATED WITH STAFF BIOLOGISTS)WILL BE E-MAILED FIOM AN APPROPRIATE REPRESENTATIVE OF THE ACTION AGENCY TO THE NMFS HABITAT BRANCH CHIEF AND THE FWS FIELD OFFICE SUPERVISOR FOR THE PROJECT AREA. WORK WILL NOT PROCEED OUTSIDE THE I WW UNTIL THE EXCEPTION IS APPROVED BY E-MAILS FROM NMFS AND/OR THE FWS.

8) DUST ABATEMENT: THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES (IF NECESSARY) BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES. IN ADDITION, THE FOLLOWING CRITERIA WILL BE FOLLOWED:

A) WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
B) DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING A 50:50 (LIGNINSULFONATE TO WATER) SOLUTION.
C) APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).
D) SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
E) PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

9) SPILL PREVENTION, CONTROL, AND COUNTER MEASURES: THE USE OF MECHANIZED MACHINERY INCREASES THE RISK FOR ACCIDENTAL SPILLS OF FUEL, LUBRICANTS, HYDRAULIC FLUID, OR OTHER CONTAMINANTS INTO THE RIPARIAN ZONE OR DIRECTLY INTO THE WATER. ADDITIONALLY, UNCURED CONCRETE AND FORM MATERIALS ADJACENT TO THE ACTIVE STREAM CHANNEL MAY RESULT IN ACCIDENTAL DISCHARGE INTO THE WATER. THESE CONTAMINANTS CAN DEGRADE HABITAT, AND INJURE OR KILL AQUATIC FOOD ORGANISMS AND ESA-LISTED SPECIES. THE PROJECT SPONSOR WILL ADHERE TO THE FOLLOWING MEASURES:

A) A DESCRIPTION OF HAZARDOUS MATERIALS TO BE USED (INVENTORY & STORAGE) AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.
B) WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.
C) SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.
D) WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
E) ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPAULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.

10) INVASIVE SPECIES - EQUIPMENT CLEANING AND MAINTENANCE: THE FOLLOWING MEASURES WILL BE FOLLOWED TO AVOID INTRODUCTION OF INVASIVE PLANTS AND NOXIOUS WEEDS INTO PROJECT AREAS:

A) PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
B) WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.
WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES.

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WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

HIP III GENERAL CONSERVATION MEASURES I

SHEET 4

WORK AREA ISOLATION & FISH SALVAGE

ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN SPAWNING HABITATS. WHEN WORK AREA ISOLATION IS REQUIRED, DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS, FISH RELEASE AREAS, AND, WHEN A PUMP IS USED TO DE-WATER THE ISOLATION AREA AND FISH ARE PRESENT, A FISH SCREEN THAT MEETS NMFS'S FISH SCREEN CRITERIA (NMFS 2011, OR MOST CURRENT). WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

FOR SALVAGE OPERATIONS IN KNOWN BULL TROUT SPAWNING AND REARING HABITAT, ELECTRO-FISHING SHALL ONLY OCCUR FROM MAY 01 TO JUL 31. NO ELECTRO-FISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUG 15. BULL TROUT ARE VERY TEMPERATURE SENSITIVE AND GENERALLY SHOULD NOT BE ELECTRO-SHOCKED OR OTHERWISE HANDLED WHEN TEMPERATURES EXCEED 15 DEGREES CELSIUS. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS TO FISH SPECIES PRESENT.

SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODOLOGIES, AND CONSERVATION MEASURES SPECIFIED BELOW IN STEPS 1 THROUGH 6. STEPS 1 AND 2 WILL BE IMPLEMENTED FOR ALL PROJECTS WHERE WORK AREA ISOLATION IS NECESSARY ACCORDING TO CONDITIONS ABOVE. ELECTRO-FISHING (STEP 3) CAN BE IMPLEMENTED TO ENSURE ALL FISH HAVE BEEN REMOVED FOLLOWING STEPS 1 AND 2, OR WHEN OTHER MEANS OF FISH CAPTURE MAY NOT BE FEASIBLE OR EFFECTIVE. DE-WATERING AND RE-WATERING (STEPS 4 AND 5) WILL BE IMPLEMENTED UNLESS WETTED IN-STREAM WORK IS DEEMED TO BE MINIMALLY HARMFUL TO FISH, AND IS BENEFICIAL TO OTHER AQUATIC SPECIES. DE-WATERING WILL NOT BE CONDUCTED IN AREAS KNOWN TO BE OCCUPIED BY LAMPREY, UNLESS LAMPREYS ARE SALVAGED USING GUIDANCE SET FORTH IN US FISH AND WILDLIFE SERVICE (2010).

1) **ISOLATE:**
   - A) BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
   - B) BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH.
   - C) IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED TO THE BANKS AND FREE OF ORGANIC ACCUMULATION. IF THE PROJECT IS WITHIN BULL TROUT SPAWNING AND REARING HABITAT, THE BLOCK NETS MUST BE CHECKED EVERY FOUR HOURS FOR FISH IMPINGEMENT ON THE NET. LESS FREQUENT INTERVALS MUST BE APPROVED THROUGH A VARIANCE REQUEST.
   - D) NETS WILL BE MONITORED HOURLY ANYTIME THERE IS IN-STREAM DISTURBANCE.

2) **SALVAGE:** -AS DESCRIBED BELOW, FISH TRAPPED WITHIN THE ISOLATED WORK AREA WILL BE CAPTURED TO MINIMIZE THE RISK OF INJURY, THEN RELEASED AT A SAFE SITE:
   - A) REMOVE AS MANY FISH AS POSSIBLE PRIOR TO DE-WATERING.
   - B) DURING DE-WATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.
   - C) SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.
   - D) MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.
   - E) IF BUCKETS ARE USED TO TRANSPORT FISH:
     - I. THE TIME FISH ARE IN A TRANSPORT BUCKET WILL BE LIMITED, AND WILL BE RELEASED AS QUICKLY AS POSSIBLE;
     - II. THE NUMBER OF FISH WITHIN A BUCKET WILL BE LIMITED BASED ON SIZE, AND FISH WILL BE OF RELATIVELY COMPARABLE SIZE TO MINIMIZE PREDATION;
     - III. AERATORS FOR BUCKETS WILL BE USED OR THE BUCKET WATER WILL BE FREQUENTLY CHANGED WITH COLD CLEAR WATER AT 15 MINUTE OR MORE FREQUENT INTERVALS.
     - IV. BUCKETS WILL BE KEPT IN SHADED AREAS OR WILL BE COVERED BY A CANOPY IN EXPOSED AREAS.
     - V. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.
   - F) AS RAPIDLY AS POSSIBLE (ESPECIALLY FOR TEMPERATURE-SENSITIVE BULL TROUT), FISH WILL BE RELEASED IN AN AREA THAT PROVIDES ADEQUATE COVER AND FLOW REFUGE. UPSTREAM RELEASE IS GENERALLY PREFERRED, BUT FISH RELEASED DOWNSTREAM WILL BE SUFFICIENTLY OUTSIDE OF THE INFLUENCE OF CONSTRUCTION.
   - G) SALVAGE WILL BE SUPERVISED BY A QUALIFIED FISHERIES BIOLOGIST EXPERIENCED WITH WORK AREA ISOLATION AND COMPETENT TO ENSURE THE SAFE HANDLING OF ALL FISH.

3) **ELECTROFISHING:** ELECTROFISHING WILL BE USED ONLY AFTER OTHER SALVAGE METHODS HAVE BEEN EMPLOYED OR WHEN OTHER MEANS OF FISH CAPTURE ARE DETERMINED TO NOT BE FEASIBLE OR EFFECTIVE. IF ELECTROFISHING WILL BE USED TO CAPTURE FISH FOR SALVAGE, THE SALVAGE OPERATION WILL BE LED BY AN EXPERIENCED FISHERIES BIOLOGIST AND THE FOLLOWING GUIDELINES WILL BE FOLLOWED:
   - A) THE NMFS'S ELECTROFISHING GUIDELINES (NMFS 2000).
   - B) ONLY DIRECT CURRENT (DC) OR PULSED DIRECT CURRENT (PDC) WILL BE USED AND CONDUCTIVITY MUST BE TESTED.
     - I. IF CONDUCTIVITY IS LESS THAN 100 MS, VOLTAGE RANGES FROM 900 TO 1100 WILL BE USED.
     - II. FOR CONDUCTIVITY RANGES BETWEEN 100 TO 300 MS, VOLTAGE RANGES WILL BE 500 TO 800.
     - III. FOR CONDUCTIVITY GREATER THAN 300 MS, VOLTAGE WILL BE LESS THAN 400.
   - C) ELECTROFISHING WILL BEGIN WITH A MINIMUM PULSE WIDTH AND RECOMMENDED VOLTAGE AND THEN GRADUALLY INCREASE TO THE POINT WHERE FISH ARE IMMOBILIZED.
   - D) THE ANODE WILL NOT INTENTIONALLY CONTACT FISH.
   - E) ELECTROFISHING SHALL NOT BE CONDUCTED WHEN THE WATER CONDITIONS ARE TURBID AND VISIBILITY IS POOR. THIS CONDITION MAY BE EXPERIENCED WHEN THE SAMPLER CANNOT SEE THE STREAM BOTTOM IN ONE FOOT OF WATER.
   - F) IF MORTALITY OR OBVIOUS INJURY (DEFINED AS DARK BANDS ON THE BODY, SPINAL DEFORMATIONS, DE-SCALING OF 25% OR MORE OF BODY, AND TORPIDITY OR INABILITY TO MAINTAIN UPRIGHT ATTITUDE AFTER SUFFICIENT RECOVERY TIME) OCCURS DURING ELECTROFISHING, OPERATIONS WILL BE IMMEDIATELY DISCONTINUED, MACHINE SETTINGS, WATER TEMPERATURE AND CONDUCTIVITY CHECKED, AND PROCEDURES ADJUSTED OR ELECTROFISHING POSTPONED TO REDUCE MORTALITY.

4) **DEWATER:** DEWATERING, WHEN NECESSARY, WILL BE CONDUCTED OVER A SUFFICIENT PERIOD OF TIME TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA AND WILL BE LIMITED TO THE SHORTEST LINEAR EXTENT PRACTICABLE.
   - A) DIVERSION AROUND THE CONSTRUCTION SITE MAY BE ACCOMPLISHED WITH A COFFER DAM AND A BYPASS CULVERT OR PIPE, OR A LINED, NON-ERODIBLE DIVERSION DITCH. WHERE GRAVITY FEED IS NOT POSSIBLE, A PUMP MAY BE USED, BUT MUST BE OPERATED IN SUCH A WAY AS TO AVOID REPETITIVE DE-WATERING AND RE-WATERING OF THE SITE. IMPOUNDMENT BEHIND THE COFFERDAM MUST OCCUR SLOWLY THROUGH THE TRANSITION, WHILE CONSTANT FLOW IS DELIVERED TO THE DOWNSTREAM REACHES.
   - B) ALL PUMPS WILL HAVE FISH SCREENS TO AVOID JUVENILE FISH IMPINGEMENT OR ENTRAINMENT, AND WILL BE OPERATED IN ACCORDANCE WITH NMFS'S CURRENT FISH SCREEN CRITERIA (NMFS 20114, OR MOST RECENT VERSION). IF THE PUMPING RATE EXCEEDS 3 CUBIC FEET SECOND (CFS), A NMFS HYDRO FISH PASSAGE REVIEW WILL BE NECESSARY.
   - C) DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO RIPARIAN VEGETATION OR STREAM CHANNEL.
   - D) SAFE REENTRY OF FISH INTO THE STREAM CHANNEL WILL BE PROVIDED, PREFERABLY INTO POOL HABITAT WITH COVER, IF THE DIVERSION ALLOWS FOR DOWNSTREAM FISH PASSAGE.
   - E) SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OR INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL OR TO FILTER THROUGH VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

5) **RE-WATERING:** UPON PROJECT COMPLETION, THE CONSTRUCTION SITE WILL BE SLOWLY RE-WATERED TO PREVENT LOSS OF SURFACE FLOW DOWNSTREAM AND TO PREVENT A SUDDEN INCREASE IN STREAM TURBIDITY. DURING RE-WATERING, THE SITE WILL BE MONITORED TO PREVENT STRANDING OF AQUATIC ORGANISMS BELOW THE CONSTRUCTION SITE.

6) **SALVAGE NOTICE:** MONITORING AND RECORDING OF FISH PRESENCE, HANDLING, AND MORTALITY MUST OCCUR DURING THE DURATION OF THE ISOLATION, SALVAGE, ELECTROFISHING, DEWATERING, AND REWATERING OPERATIONS. ONCE OPERATIONS ARE COMPLETED, A SALVAGE REPORT WILL DOCUMENT PROCEDURES USED, ANY FISH INJURIES OR DEATHS (INCLUDING NUMBERS OF FISH AFFECTED), AND CAUSES OF ANY DEATHS.

CONSTRUCTION AND POST-CONSTRUCTION CONSERVATION MEASURES FOR AQUATIC SPECIES

1) **FISH PASSAGE:** FISH PASSAGE WILL BE PROVIDED FOR ANY ADULT OR JUVENILE FISH LIKELY TO BE PRESENT IN THE ACTION AREA DURING CONSTRUCTION, UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION OR THE STREAM IS NATURALLY IMPASSABLE AT THE TIME OF CONSTRUCTION. IF THE PROVISION OF TEMPORARY FISH PASSAGE DURING CONSTRUCTION WILL INCREASE NEGATIVE EFFECTS ON AQUATIC SPECIES OF INTEREST OR THEIR HABITAT, A VARIANCE CAN BE REQUESTED FROM THE NMFS BRANCH CHIEF AND THE FWS FIELD OFFICE SUPERVISOR (APPENDIX B OF THIS BO). PERTINENT INFORMATION, SUCH AS THE SPECIES AFFECTED, LENGTH OF STREAM REACH AFFECTED, PROPOSED TIME FOR THE PASSAGE BARRIER, AND ALTERNATIVES CONSIDERED, WILL BE INCLUDED IN THE VARIANCE REQUEST.

2) **CONSTRUCTION AND DISCHARGE WATER:**
   - A) SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS, BUT ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
   - B) DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.
   - C) ALL CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED USING THE BEST AVAILABLE TECHNOLOGY APPLICABLE TO SITE CONDITIONS.
   - D) TREATMENTS TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS AND OTHER POLLUTANTS LIKELY TO BE PRESENT WILL BE PROVIDED.

3) **MINIMIZE TIME AND EXTENT OF DISTURBANCE:** EARTHWORK (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING AND COMPACTING) IN WHICH MECHANIZED EQUIPMENT IS IN STREAM CHANNELS, RIPARIAN AREAS, AND WETLANDS WILL BE COMPLETED AS QUICKLY AS POSSIBLE. MECHANIZED EQUIPMENT WILL BE USED IN STREAMS ONLY WHEN PROJECT SPECIALISTS BELIEVE THAT SUCH ACTIONS ARE THE ONLY REASONABLE ALTERNATIVE FOR IMPLEMENTATION, OR WOULD RESULT IN LESS SEDIMENT IN THE STREAM CHANNEL OR DAMAGE (SHORT- OR LONG-TERM) TO THE OVERALL AQUATIC AND RIPARIAN ECOSYSTEM RELATIVE TO OTHER ALTERNATIVES. TO THE EXTENT FEASIBLE, MECHANIZED EQUIPMENT WILL WORK FROM THE TOP OF THE BANK,UNLESS WORK FROM ANOTHER LOCATION WOULD RESULT IN LESS HABITAT DISTURBANCE.

4) **CESSATION OF WORK:** PROJECT OPERATIONS WILL CEASE UNDER THE FOLLOWING CONDITIONS:
   - A) HIGH FLOW CONDITIONS THAT MAY RESULT IN INUNDATION OF THE PROJECT AREA, EXCEPT FOR EFFORTS TO AVOID OR MINIMIZE RESOURCE DAMAGE;
   - B) WHEN ALLOWABLE WATER QUALITY IMPACTS, AS DEFINED BY THE STATE CWA SECTION 401 WATER QUALITY CERTIFICATION, HAVE BEEN EXCEEDED; OR
   - C) WHEN 'INCIDENTAL TAKE' LIMITATIONS HAVE BEEN REACHED OR EXCEEDED.

5) **SITE RESTORATION:** WHEN CONSTRUCTION IS COMPLETE:
   - A) ALL STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED AS NECESSARY USING STOCKPILED LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL.
   - B) ALL PROJECT RELATED WASTE WILL BE REMOVED.
   - C) ALL TEMPORARY ACCESS ROADS, CROSSINGS, AND STAGING AREAS WILL BE OBLITERATED. WHEN NECESSARY FOR RE-VEGETATION AND INFILTRATION OF WATER, COMPACTED AREAS OF SOIL WILL BE LOOSENED.
   - D) ALL DISTURBED AREAS WILL BE REHABILITATED IN A MANNER THAT RESULTS IN SIMILAR OR IMPROVED CONDITIONS RELATIVE TO PRE-PROJECT CONDITIONS. THIS WILL BE ACHIEVED THROUGH REDISTRIBUTION OF STOCKPILED MATERIALS, SEEDING, AND/OR PLANTING WITH LOCAL NATIVE SEED MIXES OR PLANTS.

6) **RE-VEGETATION:** LONG-TERM SOIL STABILIZATION OF DISTURBED SITES WILL BE ACCOMPLISHED WITH REESTABLISHMENT OF NATIVE VEGETATION USING THE FOLLOWING CRITERIA:
   - A) PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.
   - B) AN APPROPRIATE MIX OF SPECIES THAT WILL ACHIEVE ESTABLISHMENT, SHADE, AND EROSION CONTROL OBJECTIVES, PREFERABLY FORB, GRASS, SHRUB, OR TREE SPECIES NATIVE TO THE PROJECT AREA OR REGION AND APPROPRIATE TO THE SITE WILL BE USED.
   - C) VEGETATION, SUCH AS WILLOW, SEDGE AND RUSH MATS, WILL BE SALVAGED FROM DISTURBED OR ABANDONED FLOOD PLAINS, STREAM CHANNELS, OR WETLANDS.
   - D) INVASIVE SPECIES WILL NOT BE USED.
   - E) SHORT-TERM STABILIZATION MEASURES MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE SEEDS ARE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, JUTE MATTING, AND OTHER SIMILAR TECHNIQUES.
   - F) SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM CHANNEL, WATER BODY, OR WETLAND.
   - G) FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO RE-VEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.
   - H) RE-ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS WILL ACHIEVE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN 3 YEARS.
   - I) INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY 3 YEARS POST-CONSTRUCTION).

7) **IMPLEMENTATION MONITORING:** PROJECT SPONSOR STAFF OR THEIR DESIGNATED REPRESENTATIVE WILL PROVIDE IMPLEMENTATION MONITORING TO ENSURE COMPLIANCE WITH THE APPLICABLE BIOLOGICAL OPINION, INCLUDING:
   - A) GENERAL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED; AND
   - B) EFFECTS TO LISTED SPECIES ARE NOT GREATER THAN PREDICTED AND INCIDENTAL TAKE LIMITATIONS ARE NOT EXCEEDED.

8) **CWA SECTION 401 WATER QUALITY CERTIFICATION:** THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS TO ENSURE THAT IN-WATER WORK IS NOT DEGRADING WATER QUALITY. DURING CONSTRUCTION, CWA SECTION 401 WATER QUALITY CERTIFICATION PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, OR IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED. TURBIDITY MONITORING SHALL BE CONDUCTED IN ACCORDANCE WITH THE HIP III TURBIDITY MONITORING PROTOCOL OUTLINED BELOW AND RECORDED ON THE PROJECT COMPLETION FORM.

TURBIDITY MONITORING PROTOCOL

THE PROJECT SPONSOR SHALL COMPLETE AND RECORD THE FOLLOWING WATER QUALITY OBSERVATIONS TO ENSURE THAT ANY INCREASE IN SUSPENDED SEDIMENT DOES NOT EXCEED THE LIMIT FOR HIP III COMPLIANCE. RECORDS SHALL BE REPORTED ON THE HIP III PROJECT COMPLETION FORM (PNF).

1) TAKE A BACKGROUND TURBIDITY SAMPLE USING AN APPROPRIATELY AND FREQUENTLY CALIBRATED TURBIDIMETER IN ACCORD WITH MANUFACTURER'S INSTRUCTIONS, OR A VISUAL TURBIDITY OBSERVATION, EVERY 2 HOURS WHILE WORK IS BEING IMPLEMENTED, OR MORE OFTEN IF TURBIDITY DISTURBANCES VARY GREATLY, TO ENSURE THAT THE IN-WATER WORK AREA IS NOT CONTRIBUTING VISIBLE SEDIMENT TO THE WATER COLUMN. THE BACKGROUND SAMPLES OR OBSERVATIONS SHOULD BE TAKEN AT A RELATIVELY UNDISTURBED AREA APPROXIMATELY 100 FEET UPSTREAM FROM THE PROJECT AREA. RECORD THE OBSERVATION, LOCATION, AND TIME BEFORE MONITORING AT THE DOWNSTREAM POINT.

2) TAKE A SECOND SAMPLE OR OBSERVATION, IMMEDIATELY AFTER EACH UPSTREAM SAMPLE OR OBSERVATION, APPROXIMATELY 50 FEET DOWNSTREAM FROM THE PROJECT AREA IN STREAMS THAT ARE 30 FEET WIDE OR LESS; 100 FEET DOWNSTREAM FROM THE PROJECT AREA FOR STREAMS BETWEEN 30 AND 100 FEET WIDE; 200 FEET DOWNSTREAM FROM THE PROJECT AREA FOR STREAMS GREATER THAN 100 FEET WIDE; AND 300 FEET FROM THE DISCHARGE POINT OR NON-POINT SOURCE FOR AREAS SUBJECT TO TIDAL OR COASTAL SCOUR. RECORD THE DOWNSTREAM OBSERVATION, LOCATION, AND TIME.

3) COMPARE THE UPSTREAM AND DOWNSTREAM OBSERVATIONS/SAMPLES. IF OBSERVED OR MEASURED TURBIDITY DOWNSTREAM IS MORE THAN UPSTREAM OBSERVATION OR MEASUREMENT (> 10%), THE ACTIVITY MUST BE MODIFIED TO REDUCE TURBIDITY. IF VISUAL ESTIMATES ARE USED, AN OBVIOUS DIFFERENCE BETWEEN UPSTREAM AND DOWNSTREAM OBSERVATIONS SHALL BEAR THE ASSUMPTION OF A (> 10%) DIFFERENCE. CONTINUE TO MONITOR EVERY 2 HOURS AS LONG AS IN-STREAM ACTIVITY CONTINUES.

4) IF THE EXCEEDANCE CONTINUES AFTER THE SECOND MONITORING INTERVAL (AFTER 4 HOURS), THE ACTIVITY MUST STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND, AND THE EC LEAD MUST BE NOTIFIED WITHIN 48 HOURS. THE EC LEAD SHALL DOCUMENT THE REASONS FOR THE EXCEEDANCE, CORRECTIVE MEASURES TAKEN, NOTIFY THE LOCAL NMFS BRANCH CHIEF AND/OR USFWS FIELD SUPERVISOR AND SEEK RECOMMENDATIONS.

5) IF AT ANY TIME, MONITORING, INSPECTIONS, OR OBSERVATIONS/SAMPLES SHOW THAT THE TURBIDITY CONTROLS ARE INEFFECTIVE, IMMEDIATELY MOBILIZE WORK CREWS TO REPAIR, REPLACE, OR REINFORCE CONTROL AS NECESSARY.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

HORZ. SCALE: NO SCALE | VERT. SCALE:
DESIGNED BY: C. HUTCHINS | JOB NUMBER: 81-46 | DATE: 2016
DRAWN BY: P. RICHARDSON | ACAD FILE: staging and summary.dwg
REVIEWED BY: B. MOORE

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FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

HIP III GENERAL CONSERVATION MEASURES II

SHEET 5

NOTE

SIDE CHANNEL 'A' CONSTRUCTED DURING PHASE 1

REGISTERED PROFESSIONAL ENGINEER
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NOV. 10, 2009
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RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	VERT. SCALE
DRAWN BY	D. CHRISTMAN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: Design.dwg	

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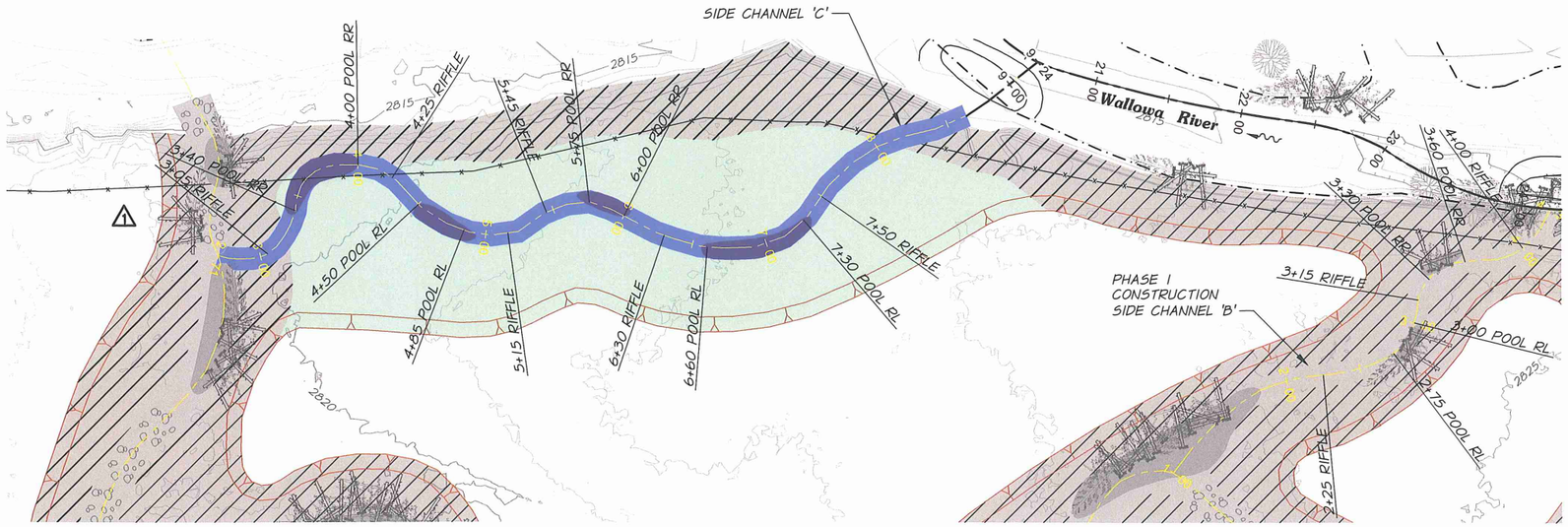
PHASE 2

DESIGN TEMPLATES AND LOCATIONS
SIDE CHANNEL 'A'

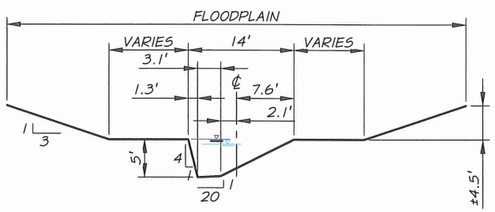
SHEET 6



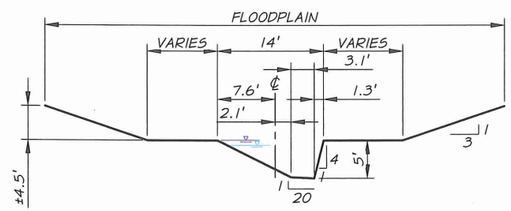
PLAN
SIDE CHANNELS 'B' AND 'C'
1"=50'

NOTES:

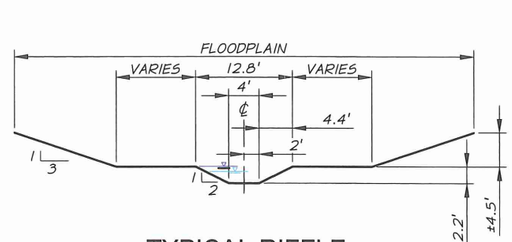
1. THE ENGINEER SHALL PROVIDE STAKING FOR EDGE OF FLOODPLAIN AND EDGE OF CHANNEL AT POOL, RUN, RIFFLE, AND GLIDE LOCATIONS.
2. A DIGITAL TERRAIN MODEL OF THE FLOODPLAIN CUT AREA WITHOUT THE CHANNEL IS AVAILABLE FOR THE CONTRACTOR AND SHALL BE PROVIDED BY THE ENGINEER AT THE REQUEST OF THE CONTRACTOR.



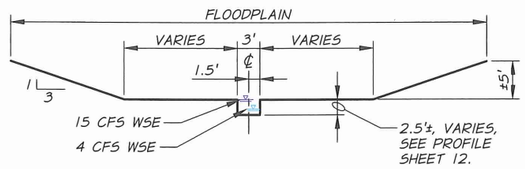
TYPICAL POOL (R/L)
SIDE CHANNEL 'C'
1"=10'



TYPICAL POOL (R/R)
SIDE CHANNEL 'C'
1"=10'



TYPICAL RIFFLE
SIDE CHANNEL 'C'
1"=10'



TYPICAL SECTION
SIDE CHANNEL 'D'
1"=10'

NOTE
SEE SHEET 12 FOR
SIDE CHANNEL 'D' PLAN

NOTE
SIDE CHANNEL 'B' CONSTRUCTED DURING PHASE 1. TYPICAL SECTIONS NOT SHOWN.

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NOV. 10, 2009
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RENEWS 06-30-17
DRAFT

REVISION	BY	DATE
⚠1 REVISED TO ACCOMMODATE EXISTING LEVEE	C.H.	7/16

50 0 50 100 150
SCALE IN FEET

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	AS NOTED
DRAWN BY	D. CHRISTMAN	VERT. SCALE	
REVIEWED BY	B. MOORE	JOB NUMBER	81-46
		DATE	2016
		ACAD FILE:	Design.dwg

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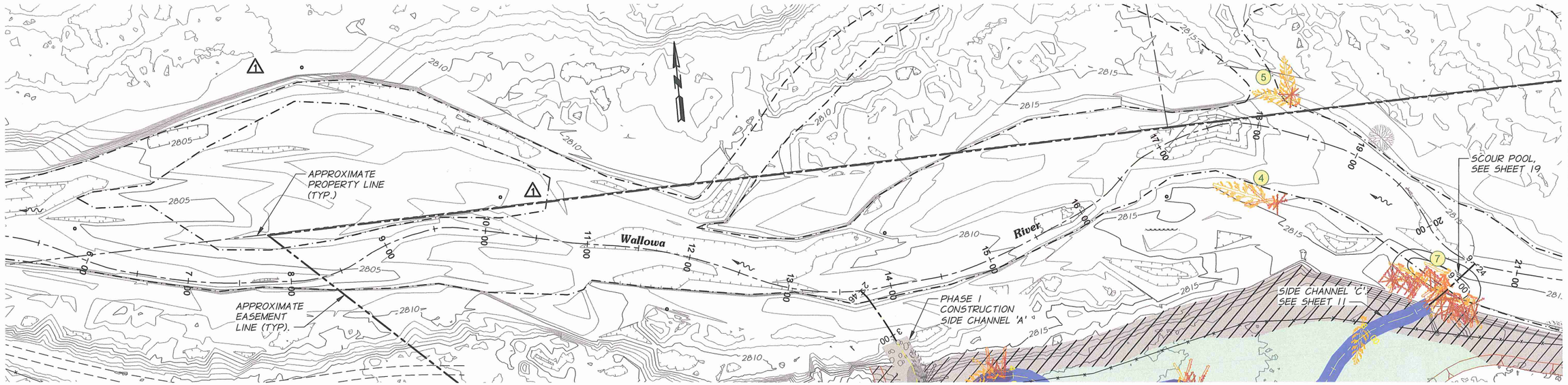
DESIGN TEMPLATES AND LOCATIONS SIDE CHANNELS 'B', 'C' AND 'D'

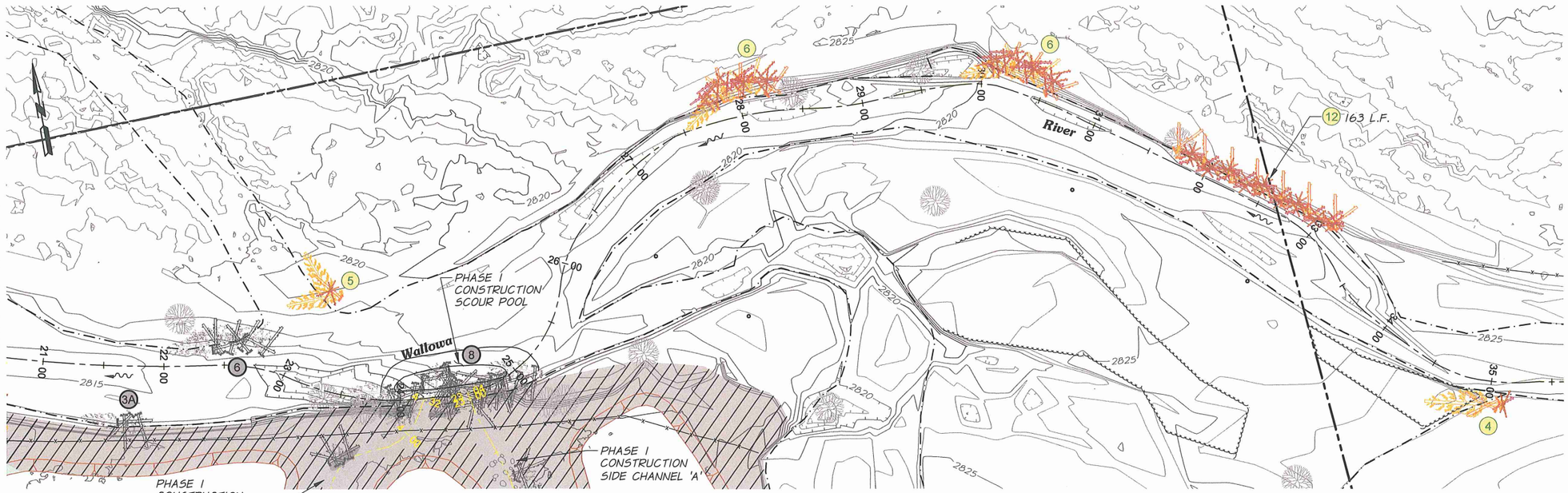
SHEET 7



MAIN CHANNEL PLAN

NOTES:

1. CONTRACTOR SHALL PROVIDE A DEWATERING PLAN TO THE CONTRACTING OFFICER FOR APPROVAL A MINIMUM OF 5 DAYS PRIOR TO CONSTRUCTING WORK AREA ISOLATION OR PERFORMING ANY DEWATERING ACTIVITIES.
2. WATER DISCHARGED DURING DEWATERING OF ISOLATED WORK AREAS SHALL BE DISPERSED ONTO THE FLOODPLAIN AT LOCATIONS APPROVED BY THE CONTRACTING OFFICER.
3. LOCATIONS OF HABITAT STRUCTURES SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS OF STRUCTURES SHALL BE DETERMINED IN THE FIELD UNDER THE DIRECTION OF THE CONTRACTING OFFICER.
4. IN ADDITION TO THE HABITAT STRUCTURES SHOWN, MISCELLANEOUS WOOD MATERIAL COMPOSED OF LOG TYPES 'A' AND TREE TYPES 'J' SHALL BE PARTIALLY BURIED APPROX. 50% THROUGHOUT THE FLOODPLAIN UNDER THE DIRECTION OF THE CONTRACTING OFFICER. THIS MATERIAL IS NOT SHOWN BUT IS ACCOUNTED FOR IN THE SUMMARY OF QUANTITIES ON SHEET 3.
5. CONTRACTOR SHALL REPLACE ALL DAMAGED OR DISTURBED FENCING ON SITE AT HIS OWN EXPENSE, INCLUDING INSTALLATION COSTS UNLESS OTHERWISE NOTED.
6. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.



MAIN CHANNEL PLAN

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
DRAFT
RENEWS 06-30-17

REVISION	BY	DATE
⚠1 REVISED TO ACCOMMODATE EXISTING LEVEE	C.H.	7/16

50 0 50 100 150
SCALE IN FEET

DESIGNED BY	C. HUTCHINS	HORZ. SCALE 1"=50'	VERT. SCALE
DRAWN BY	D. CHRISTMAN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: Design.dwg	

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MAIN CHANNEL PLAN

SHEET 8

NOTE

SIDE CHANNEL 'A' CONSTRUCTED DURING PHASE 1.

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CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	VERT. SCALE
DRAWN BY	D. CHRISTMAN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: Design.dwg	

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FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

SIDE CHANNEL 'A' PLAN AND PROFILE - WEST

SHEET
9

NOTE

SIDE CHANNEL 'A' CONSTRUCTED DURING PHASE 1.

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CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

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DESIGNED BY	C. HUTCHINS	HORZ. SCALE	VERT. SCALE
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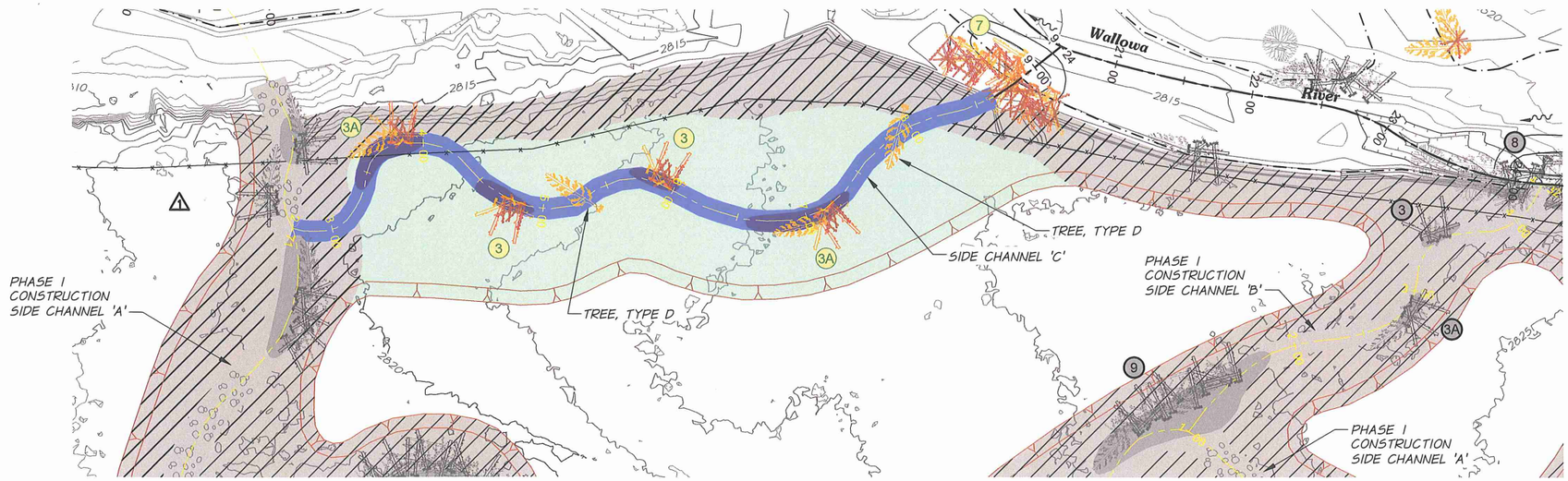
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

SIDE CHANNEL 'A' PLAN AND PROFILE - EAST

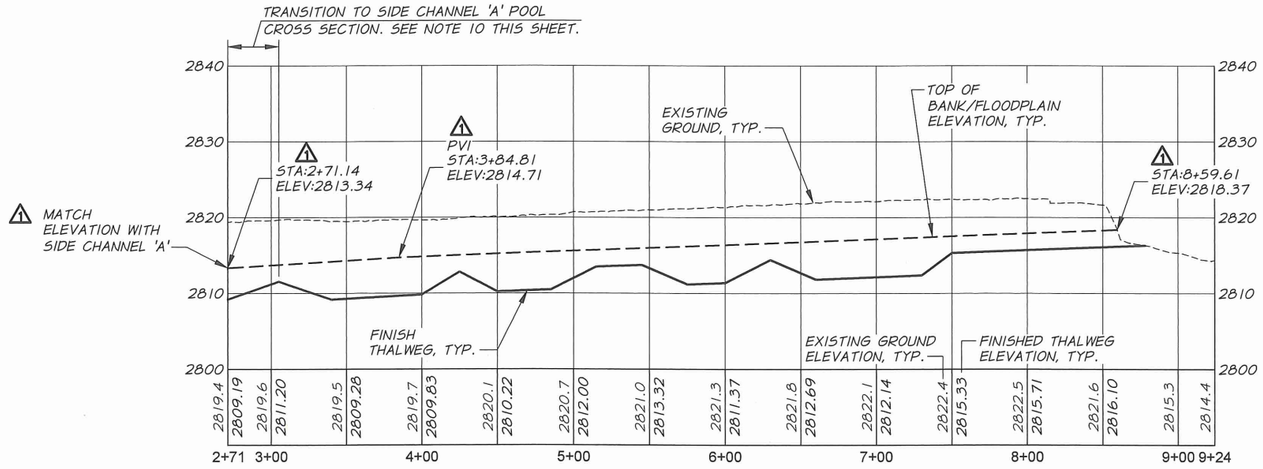
SHEET
10

NOTES:

1. CONTRACTOR SHALL PROVIDE A DEWATERING PLAN TO THE CONTRACTING OFFICER FOR APPROVAL A MINIMUM OF 5 DAYS PRIOR TO CONSTRUCTING WORK AREA ISOLATION OR PERFORMING ANY DEWATERING ACTIVITIES.
2. WATER DISCHARGED DURING DEWATERING OF ISOLATED WORK AREAS SHALL BE DISPERSED ONTO THE FLOODPLAIN AT LOCATIONS APPROVED BY THE CONTRACTING OFFICER.
3. LOCATIONS OF HABITAT STRUCTURES SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS OF STRUCTURES SHALL BE DETERMINED IN THE FIELD UNDER THE DIRECTION OF THE CONTRACTING OFFICER.
4. IN ADDITION TO THE HABITAT STRUCTURES SHOWN, MISCELLANEOUS WOOD MATERIAL COMPOSED OF LOG TYPES 'A' AND TREE TYPES 'J' SHALL BE PARTIALLY BURIED APPROX. 50% THROUGHOUT THE FLOODPLAIN UNDER THE DIRECTION OF THE CONTRACTING OFFICER. THIS MATERIAL IS NOT SHOWN BUT IS ACCOUNTED FOR IN THE SUMMARY OF QUANTITIES ON SHEET 3.
5. LOCATIONS OF THE CHANNEL CENTERLINE SHOWN IS APPROXIMATE. THE ACTUAL LOCATION WILL BE STAKED IN THE FIELD AND SHALL BE INSTALLED UNDER THE DIRECTION OF THE CONTRACTING OFFICER.
6. EXCAVATION TOLERANCE WITHIN THE CHANNEL SHALL BE 0.1'±.
7. EXCAVATION TOLERANCE WITHIN THE FLOODPLAIN SHALL BE 0.2'±.
8. CONTRACTOR SHALL REPLACE ALL DAMAGED OR DISTURBED FENCING ON SITE AT HIS OWN EXPENSE, INCLUDING INSTALLATION COSTS UNLESS OTHERWISE NOTED.
9. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.
10. FINAL SHAPING OF TRANSITION AREA TO BE PERFORMED UNDER THE DIRECTION OF THE CONTRACTING OFFICER.



SIDE CHANNEL 'C' AND PHASE 1 SIDE CHANNEL 'B' PLAN



SIDE CHANNEL 'C' PROFILE

NOTE

SIDE CHANNEL 'B' CONSTRUCTED DURING PHASE 1. PROFILE NOT SHOWN.

REGISTERED PROFESSIONAL ENGINEER
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OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17

DRAFT

REVISION	BY	DATE
⚠ REVISED TO ACCOMMODATE EXISTING LEVEE	C.H.	7/16

HORZ. SCALE IN FEET: 50 0 50 100 150
VERT. SCALE IN FEET: 10 0 10 20 30

DESIGNED BY	C. HUTCHINS	HORZ. SCALE 1"=50'	VERT. SCALE 1"=10'
DRAWN BY	D. CHRISTMAN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: Design.dwg	

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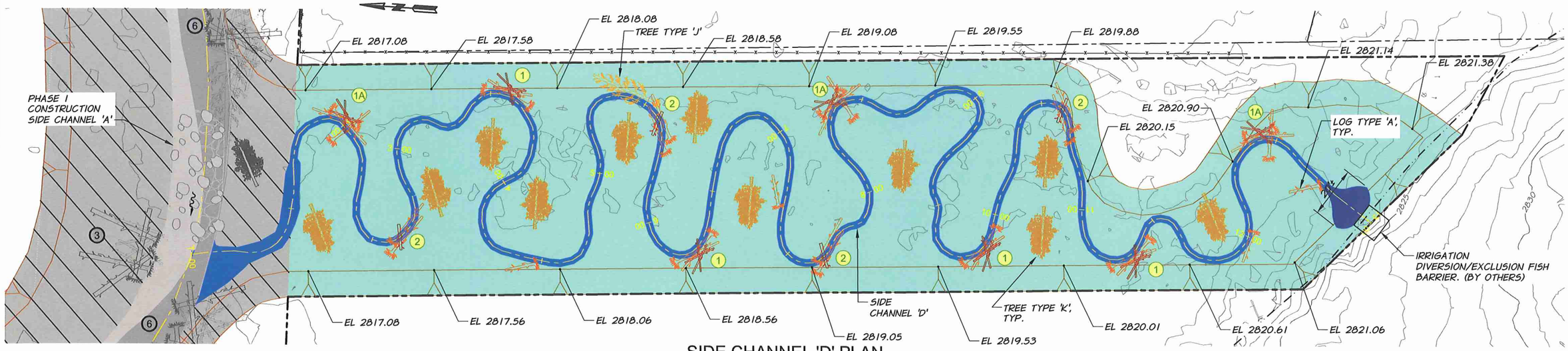
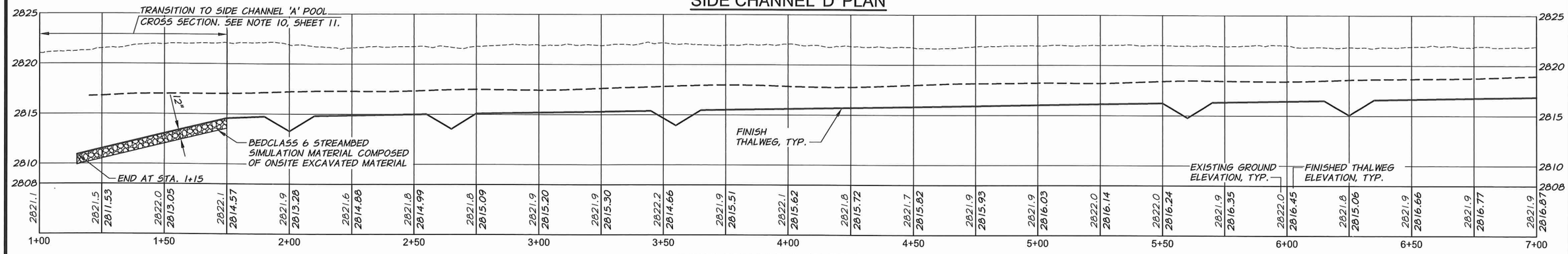
PHASE 2

SIDE CHANNELS 'B' AND 'C' PLAN AND PROFILE

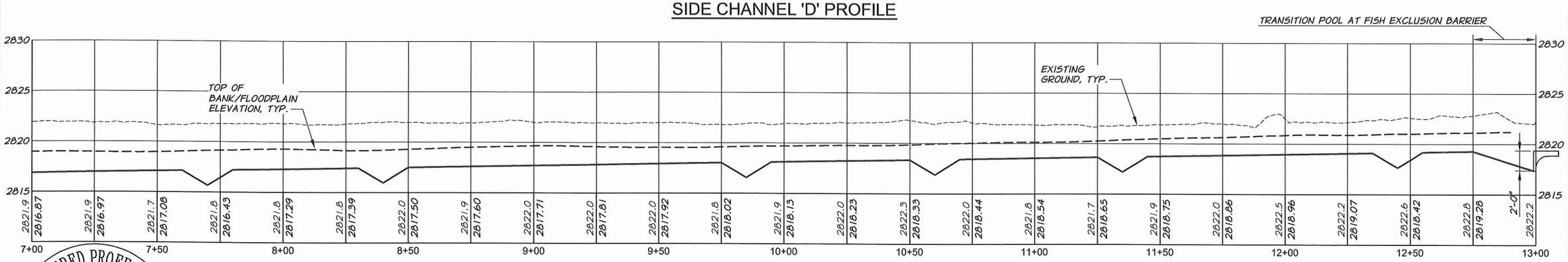
SHEET 11



SIDE CHANNEL 'D' PLAN



SIDE CHANNEL 'D' PROFILE



NOTE:
(SEE NOTES 1-10, SHEET 11.)

SIDE CHANNEL 'D' PROFILE (CONT.)

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

HORZ. SCALE IN FEET: 20 0 20 40 60
VERT. SCALE IN FEET: 5 0 5 10 15

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	1"=20'
DRAWN BY	D. CHRISTMAN	VERT. SCALE	1"=5'
REVIEWED BY	B. MOORE	JOB NUMBER	81-46
		DATE	2016
		ACAD FILE:	Design.dwg

THIS DRAWING HAS BEEN REDUCED 50%. ADJUST SCALE ACCORDINGLY. BARSCALE SHOWN IS ACCURATE.

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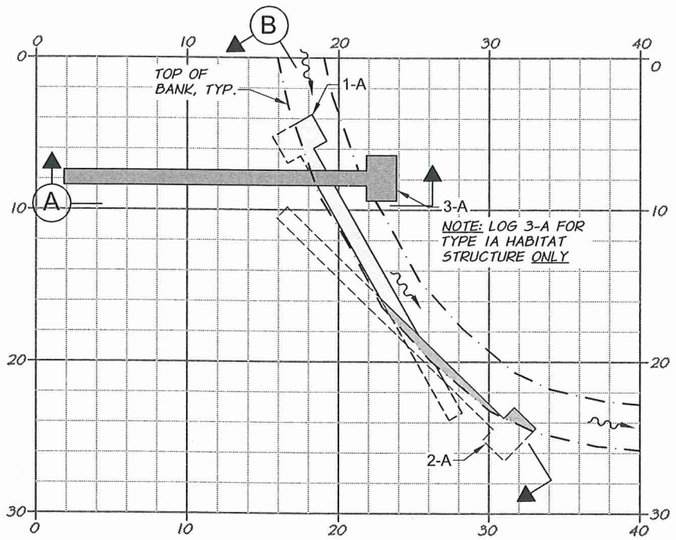
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

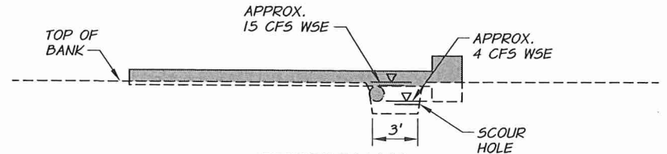
SIDE CHANNEL 'D' PLAN AND PROFILE

SHEET 12



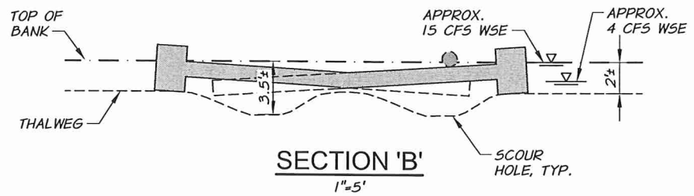
TYPE 1 AND TYPE 1A HABITAT STRUCTURE PLAN

1"=5'



SECTION 'A'

1"=5'



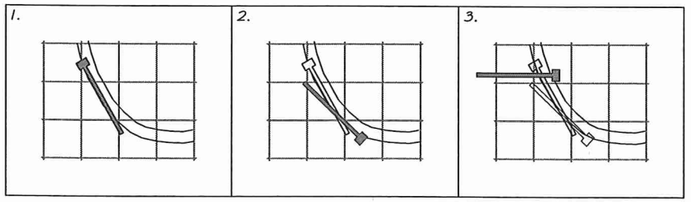
SECTION 'B'

1"=5'

TYPE 1 HABITAT STRUCTURE MATERIAL SCHEDULE			
	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 4 STRUCTURE(S)
LOG TYPE A	20 FT. X 10"-12" DBH W/ 3' DIA. RW	2	8
RACKING MATERIAL H	10 FT. X 6"-8" DBH	1*	4

TYPE 1A HABITAT STRUCTURE MATERIAL SCHEDULE			
	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 3 STRUCTURE(S)
LOG TYPE A	20 FT. X 10"-12" DBH W/ 3' DIA. RW	3	9
RACKING MATERIAL H	10 FT. X 6"-8" DBH	1*	3

*IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPE A, AND USE THIS AS SLASH.



NOTE: STEP 3 FOR TYPE 1A HABITAT STRUCTURE ONLY

TYPE 1 AND TYPE 1A HABITAT STRUCTURE LOG PLACEMENT SEQUENCING

1"=20'

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL BETWEEN EACH LAYER AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.
5. TOP OF BACKFILL AREA SHALL BE COVERED WITH TOPSOIL WITH A MINIMUM THICKNESS OF 6".
6. FINAL INSTALLATION OF THE TYPE A AND TYPE 1A HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
7. DETAILS SHOWN ARE FOR RIVER RIGHT SITUATION. RIVER LEFT INSTALLATION TO BE MIRRORED.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY C. HUTCHINS
DRAWN BY R.RASMUSSEN
REVIEWED BY B. MOORE

5 0 5 10 15
SCALE IN FEET

HORZ. SCALE AS NOTED | VERT. SCALE
JOB NUMBER 81-46 | DATE 2016
ACAD FILE: type 1A wood fig.dwg

THIS DRAWING HAS BEEN REDUCED 50%. ADJUST SCALE ACCORDINGLY. BARSCALE SHOWN IS ACCURATE.

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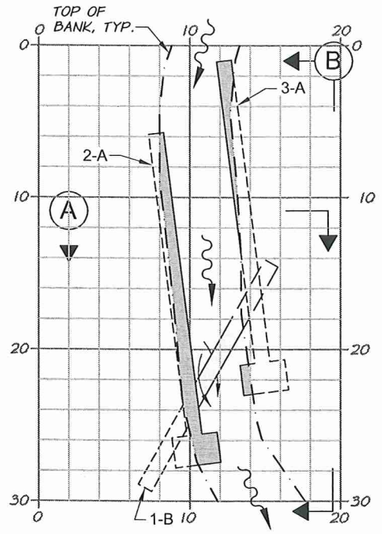
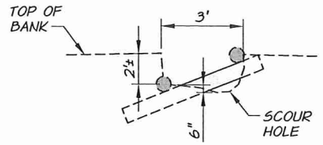
PHASE 2

TYPE 1 AND TYPE 1A HABITAT STRUCTURE

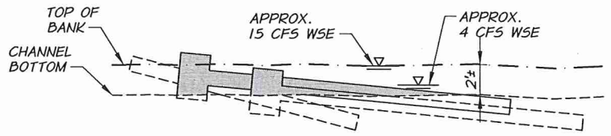
SHEET 13



TYPE 2 HABITAT STRUCTURE PLAN
1"=5'



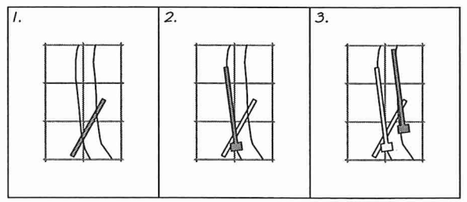
SECTION 'A'
1"=5'



SECTION 'B'
1"=5'

TYPE 2 HABITAT STRUCTURE MATERIAL SCHEDULE			
	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 4 STRUCTURE(S)
LOG TYPE A	20 FT. X 10"-12" DBH W/ 3' DIA. RW	2	8
LOG TYPE B	10 FT. X 10"-12" DBH W/O RW	1	4
RACKING MATERIAL H	10 FT. X 6"-8" DBH	1*	4

*IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPES A, AND B, AND USE THIS AS SLASH.



TYPE 2 HABITAT STRUCTURE LOG PLACEMENT SEQUENCING
1"=20'

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL BETWEEN EACH LAYER AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.
5. TOP OF BACKFILL AREA SHALL BE COVERED WITH TOPSOIL WITH A MINIMUM THICKNESS OF 6".
6. FINAL INSTALLATION OF THE TYPE 2 HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
7. DETAILS SHOWN ARE FOR RIVER RIGHT SITUATION. RIVER LEFT INSTALLATION TO BE MIRRORED.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

5 0 5 10 15
SCALE IN FEET

DESIGNED BY C. HUTCHINS	HORZ. SCALE AS NOTED / VERT. SCALE
DRAWN BY R.RASMUSSEN	JOB NUMBER 81-46 / DATE 2016
REVIEWED BY B. MOORE	ACAD FILE: type 2 wood fig.dwg

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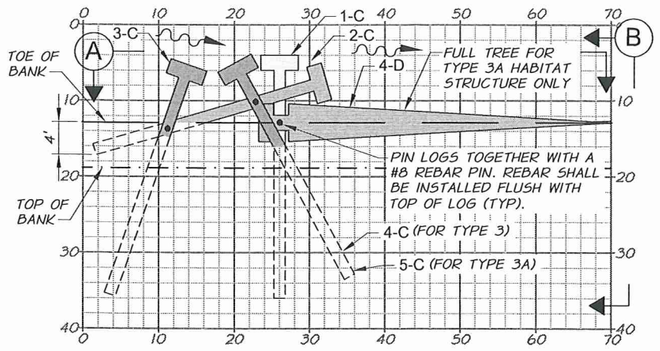
PHASE 2

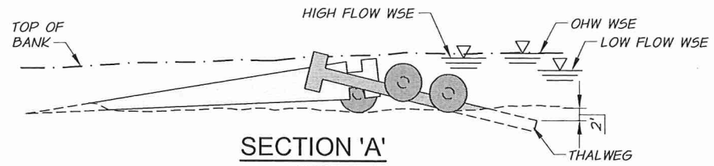
TYPE 2 HABITAT STRUCTURE

SHEET 14



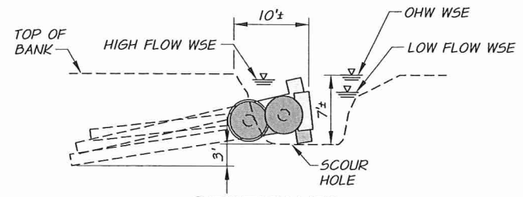
TYPE 3 AND TYPE 3A HABITAT STRUCTURE PLAN

1"=10'



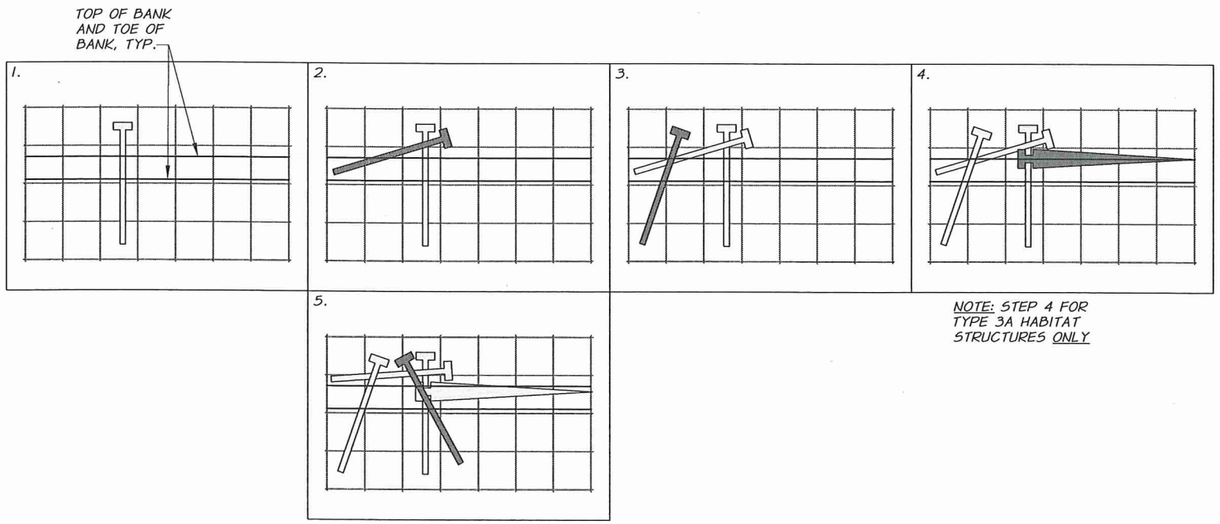
SECTION 'A'

1"=10'



SECTION 'B'

1"=10'



NOTE: STEP 4 FOR TYPE 3A HABITAT STRUCTURES ONLY

TYPE 3 AND TYPE 3A HABITAT STRUCTURE LOG PLACEMENT SEQUENCING

1"=20'

TYPE 3 HABITAT STRUCTURE MATERIAL SCHEDULE

	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 2 STRUCTURE(S)
LOG TYPE C	30 FT. X 16"-18" DBH W/ 5' DIA. RW	4	8
RACKING MATERIAL 1	10-20 FT. X 6"-10" DBH	2*	4

TYPE 3A HABITAT STRUCTURE MATERIAL SCHEDULE

	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 2 STRUCTURE(S)
LOG TYPE C	30 FT. X 16"-18" DBH W/ 5' DIA. RW	4	8
TREE TYPE D	45 FT. X 16"-18" DBH SPRUCE W/ 5' DIA. RW	1	2
RACKING MATERIAL 1	10-20 FT. X 6"-10" DBH	2*	4

* IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPE C AND F, AND USE THIS AS SLASH.

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL BETWEEN EACH LAYER AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. FOR ALL LOGS KEYED INTO BANKS MORE THAN TWO THIRDS OF TREE LENGTH MUST BE BURIED.
5. TOP OF BACKFILL AREA SHALL BE COVERED WITH TOPSOIL WITH A MINIMUM THICKNESS OF 6".
6. FINAL INSTALLATION OF THE TYPE 3 AND 3A HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
7. DETAILS SHOWN ARE FOR RIVER RIGHT SITUATION. RIVER LEFT INSTALLATION TO BE MIRRORED.
8. AT REBAR PIN LOCATIONS, THE CONTRACTOR SHALL DRILL A PILOT HOLE APPROXIMATELY 7/8" DIAMETER. THE PIN SHALL BE DRIVEN THROUGH THE HOLE FITTING SNUGLY AND LEAVING NO VOID SPACE BETWEEN THE PIN AND THE PILOT HOLE.
9. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

10 0 10 20 30
SCALE IN FEET

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	AS NOTED
DRAWN BY	R.RASMUSSEN	VERT. SCALE	
REVIEWED BY	B. MOORE	JOB NUMBER	81-46
		DATE	2016
		ACAD FILE:	type 3a wood fig.dwg

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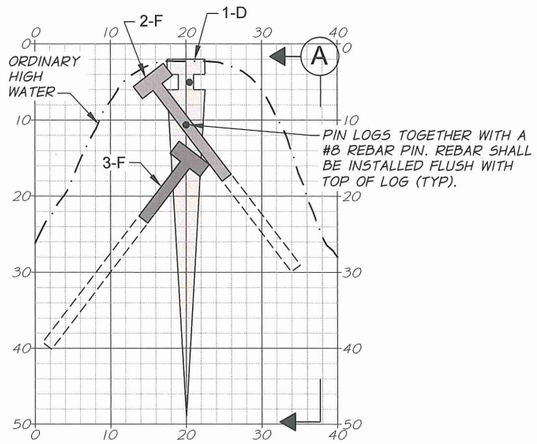
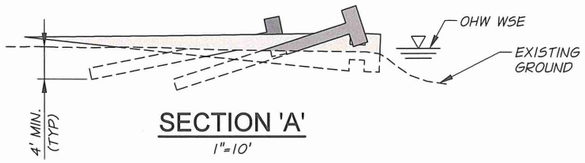
TYPE 3 AND TYPE 3A HABITAT STRUCTURE

SHEET 15



TYPE 4 HABITAT STRUCTURE PLAN

1"=10'

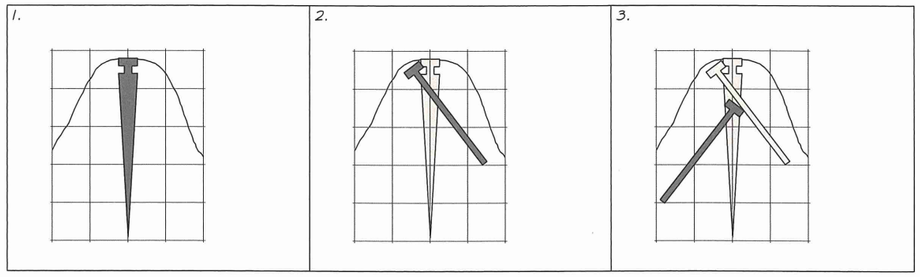


SECTION 'A'

1"=10'

TYPE 4 HABITAT STRUCTURE MATERIAL SCHEDULE			
	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 2 STRUCTURE(S) ⚠1
TREE TYPE D	45 FT. X 16"-18" DBH SPRUCE W/ 5' DIA. RW	1	2 ⚠1
LOG TYPE F	30 FT. X 20"-24" DBH W/ 5' DIA. RW	2	4 ⚠1
RACKING MATERIAL 1	10-20 FT. X 6"-10" DBH	1 *	2 ⚠1
REBAR PIN	#8	2	4 ⚠1

*IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPE F, AND USE THIS AS SLASH.



TYPE 4 HABITAT STRUCTURE LOG PLACEMENT SEQUENCING

1"=20'

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. FOR ALL LOGS KEYED INTO BANKS MORE THAN TWO THIRDS OF TREE LENGTH MUST BE BURIED.
5. FINAL INSTALLATION OF THE TYPE 4 HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
6. AT REBAR PIN LOCATIONS, THE CONTRACTOR SHALL DRILL A PILOT HOLE APPROXIMATELY 7/8" DIAMETER. THE PIN SHALL BE DRIVEN THROUGH THE HOLE FITTING SNUGLY AND LEAVING NO VOID SPACE BETWEEN THE PIN AND THE PILOT HOLE.
7. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.

REGISTERED PROFESSIONAL ENGINEER 83517PE OREGON NOV. 10, 2009 CHAS B. HUTCHINS
DRAFT
RENEWS 06-30-17

REVISION	BY	DATE
⚠1 REVISED TO ACCOMMODATE EXISTING LEVEE	C.H.	7/16

10 0 10 20 30
SCALE IN FEET

DESIGNED BY	C. HUTCHINS	HORZ. SCALE AS NOTED	VERT. SCALE
DRAWN BY	R.RASMUSSEN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: type 4 wood fig.dwg	

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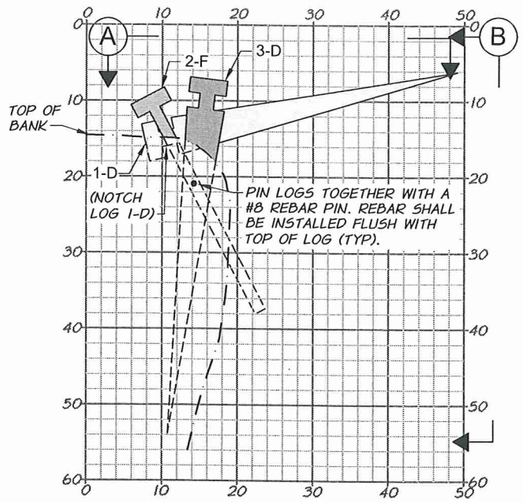
PHASE 2

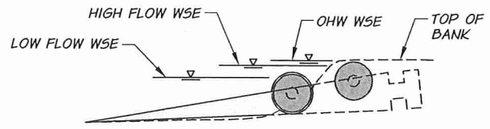
TYPE 4 HABITAT STRUCTURE

SHEET 16



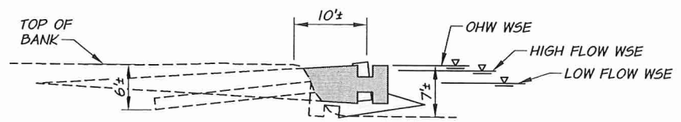
TYPE 5 HABITAT STRUCTURE PLAN

1"=10'



SECTION 'A'

1"=10'

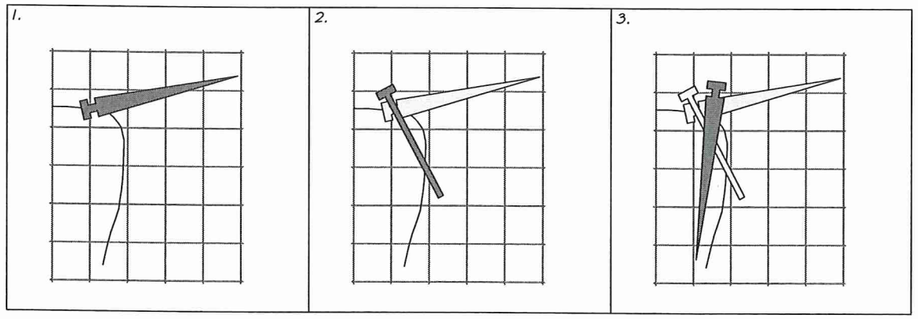


SECTION 'B'

1"=10'

TYPE 5 HABITAT STRUCTURE MATERIAL SCHEDULE			
	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 2 STRUCTURE(S)
TREE TYPE D	45 FT. X 16"-18" DBH SPRUCE W 5' DIA. /RW	2	4
LOG TYPE F	30 FT. X 20"-24" DBH W/ 5' DIA. RW	1	2
RACKING MATERIAL 1	10-20 FT. X 6"-10" DBH	2*	4
REBAR PIN	#8	1	2

*IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPE F, AND USE THIS AS SLASH.



TYPE 5 HABITAT STRUCTURE LOG PLACEMENT SEQUENCING

1"=20'

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. FOR ALL LOGS KEYED INTO BANKS MORE THAN TWO THIRDS OF TREE LENGTH MUST BE BURIED.
5. TOP OF BACKFILL AREA SHALL BE COVERED WITH TOPSOIL WITH A MINIMUM THICKNESS OF 6".
6. FINAL INSTALLATION OF THE TYPE 5 HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
8. AT REBAR PIN LOCATIONS, THE CONTRACTOR SHALL DRILL A PILOT HOLE APPROXIMATELY 7/8" DIAMETER. THE PIN SHALL BE DRIVEN THROUGH THE HOLE FITTING SNUGLY AND LEAVING NO VOID SPACE BETWEEN THE PIN AND THE PILOT HOLE.
9. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

10 0 10 20 30
SCALE IN FEET

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	AS NOTED
DRAWN BY	R.RASMUSSEN	VERT. SCALE	
REVIEWED BY	B. MOORE	JOB NUMBER	81-46
		DATE	2016
		ACAD FILE:	type 5 wood fig.dwg

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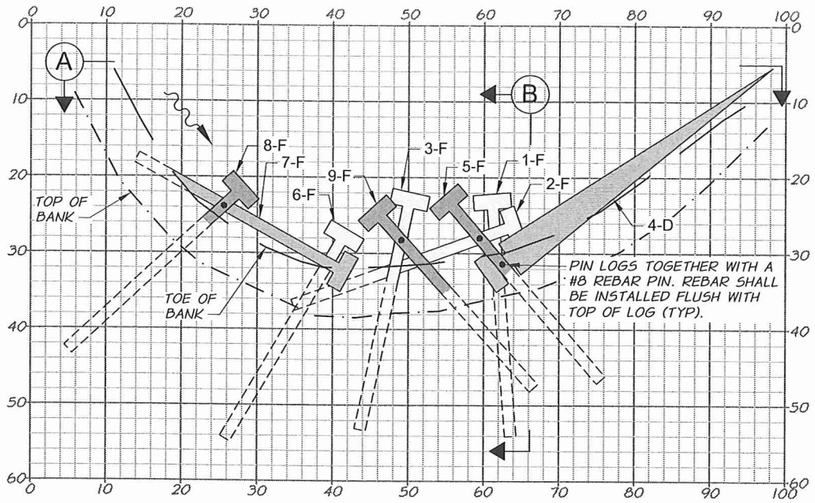
PHASE 2

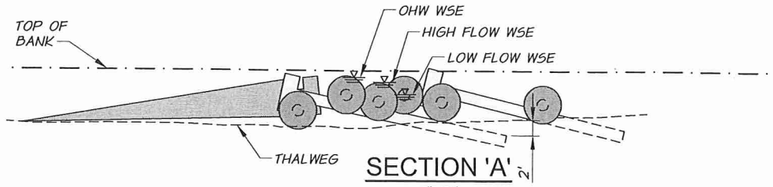
TYPE 5 HABITAT STRUCTURE

SHEET 17



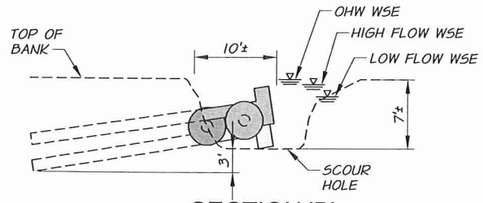
TYPE 6 HABITAT STRUCTURE PLAN

1"=10'



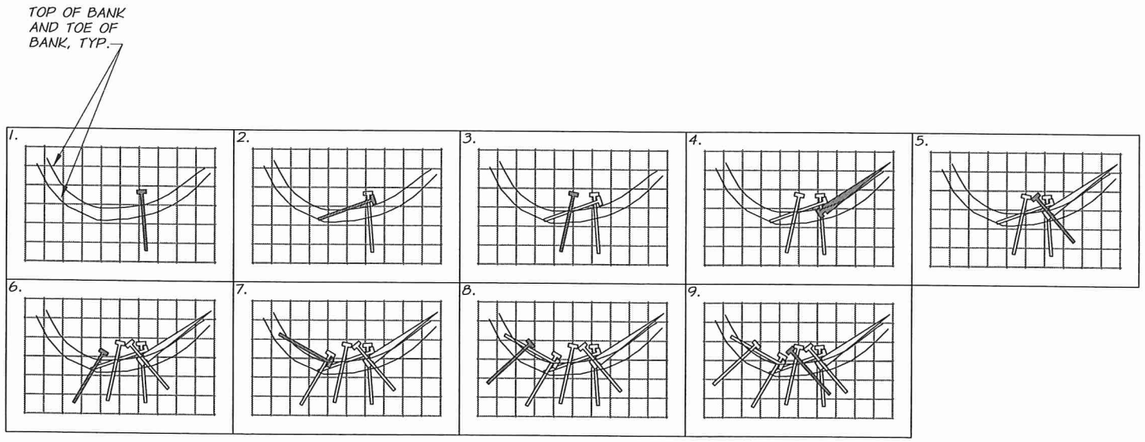
SECTION 'A'

1"=10'



SECTION 'B'

1"=10'



TYPE 6 HABITAT STRUCTURE LOG PLACEMENT SEQUENCING

1"=40'

TYPE 6 HABITAT STRUCTURE MATERIAL SCHEDULE			
	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 2 STRUCTURE(S)
TREE TYPE D	45 FT. X 16"-18" DBH SPRUCE W/ 5' DIA. RW	1	2
LOG TYPE F	30 FT. X 20"-24" DBH W/ 5' DIA. RW	8	16
RACKING MATERIAL 1	10-20 FT. X 6"-10" DBH	4*	8
REBAR PIN	#8 REBAR	4	8

*IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPES C AND F, AND USE THIS AS SLASH.

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL BETWEEN EACH LAYER AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. FOR ALL LOGS KEYED INTO BANKS MORE THAN TWO THIRDS OF TREE LENGTH MUST BE BURIED.
5. TOP OF BACKFILL AREA SHALL BE COVERED WITH TOPSOIL WITH A MINIMUM THICKNESS OF 6".
6. FINAL INSTALLATION OF THE TYPE 6 HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
7. DETAILS SHOWN ARE FOR RIVER RIGHT SITUATION. RIVER LEFT INSTALLATION TO BE MIRRORED.
8. AT REBAR PIN LOCATIONS, THE CONTRACTOR SHALL DRILL A PILOT HOLE APPROXIMATELY 7/8" DIAMETER. THE PIN SHALL BE DRIVEN THROUGH THE HOLE FITTING SNUGLY AND LEAVING NO VOID SPACE BETWEEN THE PIN AND THE PILOT HOLE.
9. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

10 0 10 20 30
SCALE IN FEET

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	AS NOTED
DRAWN BY	R.RASMUSSEN	VERT. SCALE	
REVIEWED BY	B. MOORE	JOB NUMBER	81-46
		DATE	2016
		ACAD FILE:	type 6 wood fig.dwg

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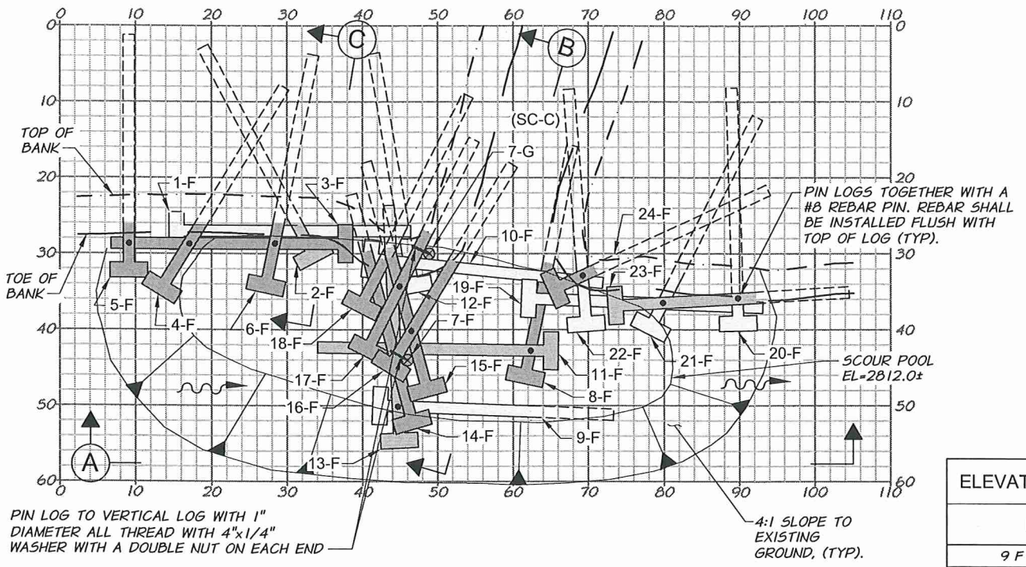
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

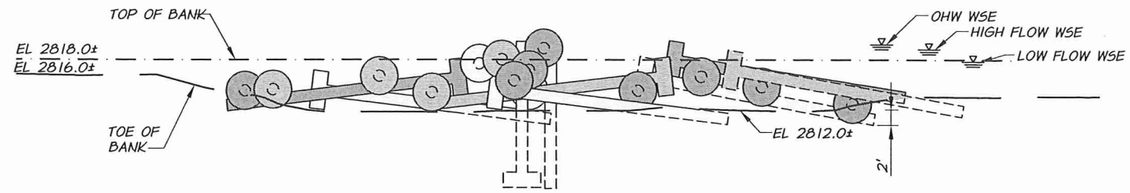
TYPE 6 HABITAT STRUCTURE

SHEET 18



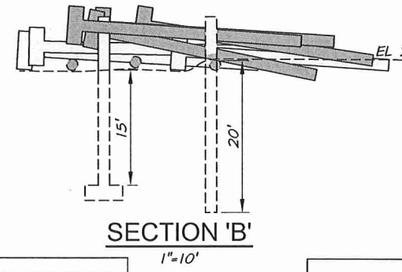
TYPE 7 HABITAT STRUCTURE PLAN

1"=10'



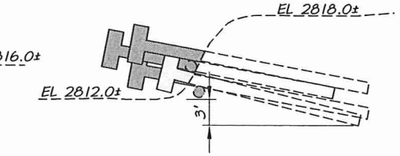
SECTION 'A'

1"=10'



SECTION 'B'

1"=10'

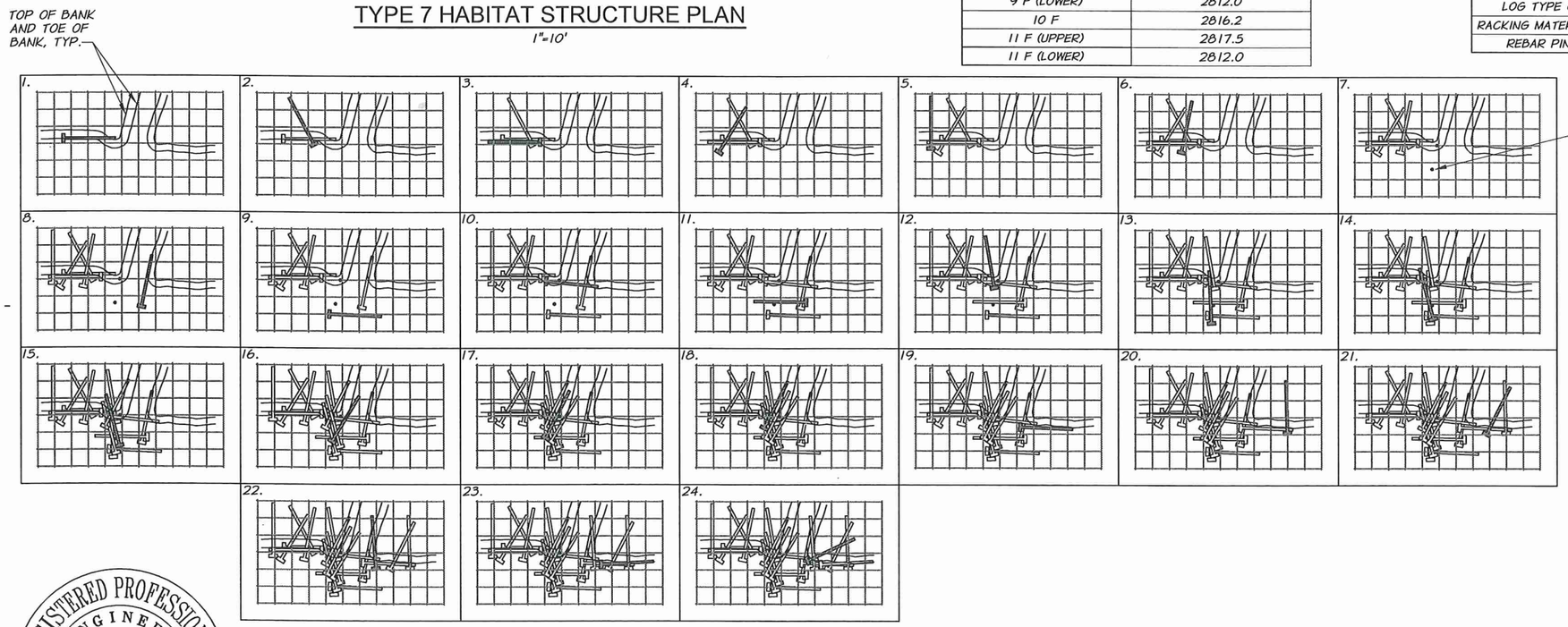


SECTION 'C'

1"=10'

ELEVATION OF CRITICAL KEY MEMBERS	
LOG	ELEVATION
9 F (UPPER)	2815.5
9 F (LOWER)	2812.0
10 F	2816.2
11 F (UPPER)	2817.5
11 F (LOWER)	2812.0

TYPE 7 HABITAT STRUCTURE MATERIAL SCHEDULE			
	DESCRIPTION	QTY. EA.	TOTAL QTY. FOR 1 STRUCTURE(S)
LOG TYPE F	30 FT. X 20"-24" DBH W/ 5' DIA. RW	24	24
LOG TYPE G	30 FT. X 14"-16" DBH W/O RW	1	1
RACKING MATERIAL 1	10-20 FT. X 6"-10" DBH	10*	10
REBAR PIN	#8	10	10



TYPE 7 HABITAT STRUCTURE LOG PLACEMENT SEQUENCING

1"=40'

*IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPES F, AND G, AND USE THIS AS SLASH.

NOTE: LOG 7-F MAY BE INSTALLED EARLIER AS NEEDED TO ACCOMODATE SPACE NEEDED TO EXCAVATE THE HOLE FOR THE LOG. IN LIEU OF INSTALLING LOG 12-F, (2) LOG TYPE G's MAY BE INSTALLED IN THIS LOCATION AT A DEPTH OF 20' EACH.

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL BETWEEN EACH LAYER AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. FOR ALL LOGS KEYED INTO BANKS MORE THAN TWO THIRDS OF TREE LENGTH MUST BE BURIED.
5. TOP OF BACKFILL AREA SHALL BE COVERED WITH TOPSOIL WITH A MINIMUM THICKNESS OF 6".
6. FINAL INSTALLATION OF THE TYPE 7 HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
7. AT REBAR PIN LOCATIONS, THE CONTRACTOR SHALL DRILL A PILOT HOLE APPROXIMATELY 7/8" DIAMETER. THE PIN SHALL BE DRIVEN THROUGH THE HOLE FITTING SNUGLY AND LEAVING NO VOID SPACE BETWEEN THE PIN AND THE PILOT HOLE.
8. RACKING AND SLASH MATERIAL SHALL NOT BE PLACED IN THE OPEININGS TO THE SIDE CHANNEL 'C'.
9. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY C. HUTCHINS
DRAWN BY R.RASMUSSEN
REVIEWED BY B. MOORE

10 0 10 20 30
SCALE IN FEET

HORZ. SCALE AS NOTED | VERT. SCALE
JOB NUMBER 81-46 | DATE 2016
ACAD FILE: type 7 wood fig.dwg

THIS DRAWING HAS BEEN REDUCED 50%. ADJUST SCALE ACCORDINGLY. BARSCALE SHOWN IS ACCURATE.

anderson perry & associates, inc.
engineering - surveying - natural resources
LA GRANDE, OR. WALLA WALLA, WA. PRINEVILLE, OR.

ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION FISH HABITAT AND RIPARIAN ENHANCEMENTS PHASE 2

TYPE 7 HABITAT STRUCTURE

SHEET 19

NOTE

TYPE 8 HABITAT STRUCTURE CONSTRUCTED DURING PHASE 1.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

HORZ. SCALE | VERT. SCALE

DESIGNED BY C. HUTCHINS
DRAWN BY R.RASMUSSEN
REVIEWED BY B. MOORE

JOB NUMBER 81-46 DATE 2016
ACAD FILE: type 8 wood fig.dwg

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ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION FISH HABITAT AND RIPARIAN ENHANCEMENTS PHASE 2

TYPE 8 HABITAT STRUCTURE I

SHEET 20

NOTE

TYPE 8 HABITAT STRUCTURE CONSTRUCTED DURING PHASE 1.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	VERT. SCALE
DRAWN BY	R.RASMUSSEN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: type 8 wood fig.dwg	

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LA GRANDE, OR. WALLA WALLA, WA. PRINEVILLE, OR.

ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

TYPE 8 HABITAT STRUCTURE II

SHEET
21

NOTE

TYPE 9 HABITAT STRUCTURE CONSTRUCTED DURING PHASE 1.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY C. HUTCHINS
DRAWN BY R.RASMUSSEN
REVIEWED BY B. MOORE

HORZ. SCALE | VERT. SCALE
JOB NUMBER 81-46 | DATE 2016
ACAD FILE: type 9 wood fig.dwg

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ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

TYPE 9 HABITAT STRUCTURE

SHEET 22

NOTE

TYPE 10 HABITAT STRUCTURE CONSTRUCTED DURING PHASE 1.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	VERT. SCALE
DRAWN BY	R.RASMUSSEN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: type 10 wood fig.dwg	

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WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

TYPE 10 HABITAT STRUCTURE

SHEET
23

NOTE

TYPE II HABITAT STRUCTURE CONSTRUCTED DURING PHASE I.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2009
CHAS B. HUTCHINS
RENEWS 06-30-17
SIGNED 03-31-16

REVISION	BY	DATE

DESIGNED BY	C. HUTCHINS	HORZ. SCALE	VERT. SCALE
DRAWN BY	R.RASMUSSEN	JOB NUMBER 81-46	DATE 2016
REVIEWED BY	B. MOORE	ACAD FILE: type 11 wood fig.dwg	

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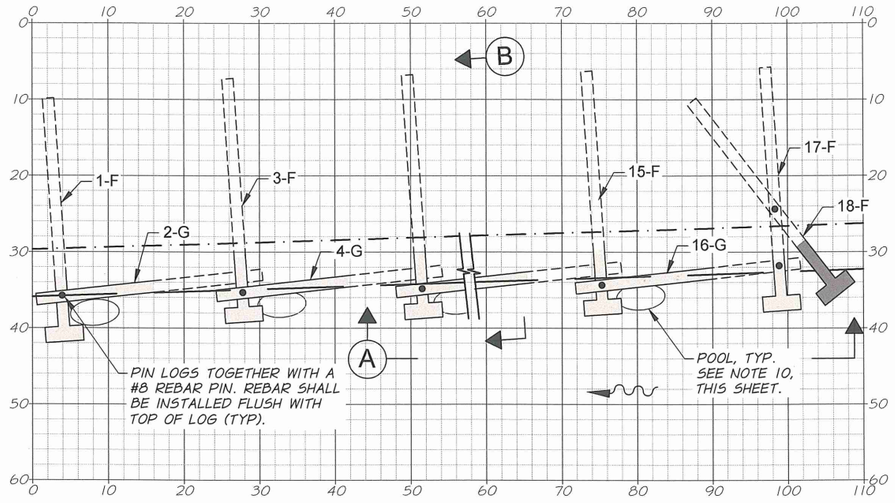
ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

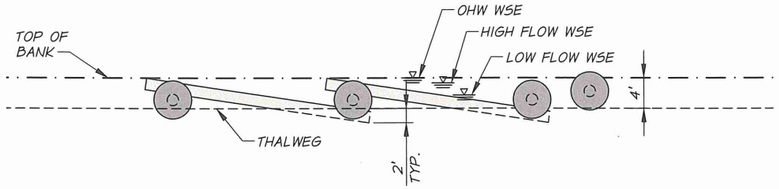
TYPE 11 HABITAT STRUCTURE

SHEET
24



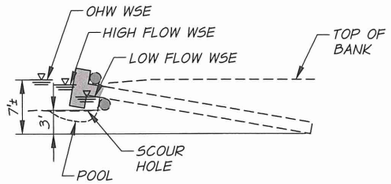
TYPE 12 HABITAT STRUCTURE PLAN

1"=10'



SECTION 'A'

1"=10'

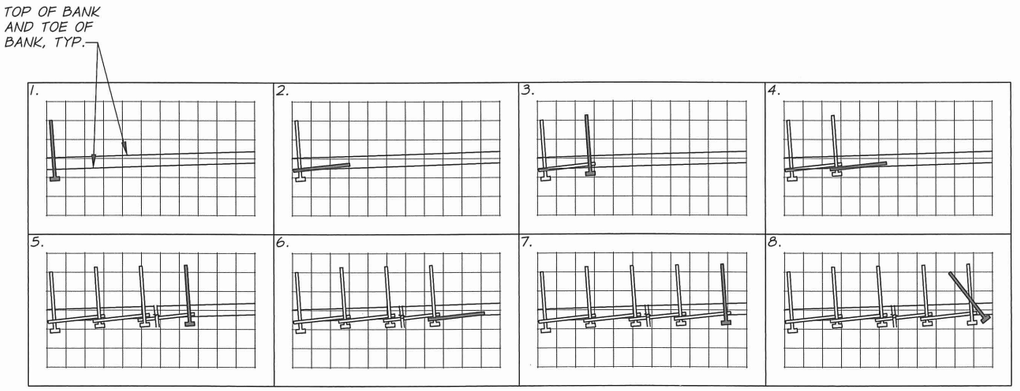


SECTION 'B'

1"=10'

TYPE 12 HABITAT STRUCTURE MATERIAL SCHEDULE		
	DESCRIPTION	TOTAL QTY. FOR 163 L.F. IN 1 STRUCTURE ⚠1
LOG TYPE F	30 FT. X 20"-24" DBH W/ 5' DIA. RW	9 ⚠1
LOG TYPE G	30 FT. X 14"-16" DBH W/O RW	6 ⚠1
RACKING MATERIAL 1	10-20 FT. X 6"-10" DBH	* 6 ⚠1
REBAR PIN	#8	9 ⚠1

* IN ADDITION TO THE RACKING MATERIAL, THE CONTRACTOR SHALL IMPORT THE TOPS AND LIMBS OF THE LOG TYPES F, AND G, AND USE THIS AS SLASH.



NOTE: REPEAT STEPS 3-4 UNTIL REACHING THE UPSTREAM END OF THE HABITAT STRUCTURE.

TYPE 12 HABITAT STRUCTURE LOG PLACEMENT SEQUENCING

1"=40'

CONSTRUCTION NOTES

1. CONTRACTOR SHALL BACKFILL AROUND LOGS WITH A COMBINATION OF GENERAL BACKFILL AND RACKING MATERIAL.
2. PROVIDE RACKING MATERIAL BETWEEN EACH LAYER AS DIRECTED BY THE CONTRACTING OFFICER.
3. CONTRACTOR SHALL APPLY WATER TO THE BACKFILL PERIODICALLY FOR COMPACTION AND TO FORCE MATERIAL INTO VOIDS.
4. MORE THAN TWO THIRDS OF TREE LENGTH MUST BE BURIED.
5. TOP OF BACKFILL AREA SHALL BE COVERED WITH TOPSOIL WITH A MINIMUM THICKNESS OF 6".
6. FINAL INSTALLATION OF THE TYPE 12 HABITAT STRUCTURE SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
7. DETAILS SHOWN ARE FOR RIVER RIGHT SITUATION. RIVER LEFT INSTALLATION TO BE MIRRORED.
8. AT REBAR PIN LOCATIONS, THE CONTRACTOR SHALL DRILL A PILOT HOLE APPROXIMATELY 7/8" DIAMETER, OR CREATE AN "X" BY BORING THROUGH THE LOG WITH A CHAIN SAW. THE PIN SHALL BE DRIVEN THROUGH THE HOLE FITTING SNUGLY AND LEAVING NO VOID SPACE BETWEEN THE PIN AND THE PILOT HOLE.
9. ALL SAWCUT ENDS OF LOGS SHALL BE CHEWED OR FRAYED PRIOR TO PLACEMENT.
10. CONTRACTOR SHALL EXCAVATE POOLS SHOWN UNDER THE DIRECTION OF THE CONTRACTING OFFICER.

REGISTERED PROFESSIONAL ENGINEER
83517PE
OREGON
NOV. 10, 2005
CHAS B. HUTCHINS
DRAFT
RENEWS 06-30-17

REVISION	BY	DATE
⚠1 REVISED TO ACCOMMODATE EXISTING LEVEE	C.H.	7/16

DESIGNED BY C. HUTCHINS
DRAWN BY R.RASMUSSEN
REVIEWED BY B. MOORE

10 0 10 20 30
SCALE IN FEET

HORZ. SCALE AS NOTED VERT. SCALE
JOB NUMBER 81-46 DATE 2016
ACAD FILE: bank prot dets.dwg

THIS DRAWING HAS BEEN REDUCED 50%. ADJUST SCALE ACCORDINGLY. BARSCALE SHOWN IS ACCURATE.

anderson perry & associates, inc.
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LA GRANDE, OR. WALLA WALLA, WA. PRINEVILLE, OR.

ODFW / GRMW
WALLOWA RIVER - BAKER RESTORATION
FISH HABITAT AND RIPARIAN ENHANCEMENTS
PHASE 2

TYPE 12 HABITAT STRUCTURE

SHEET 25

NEZ PERCE TRIBE
Department of Fisheries Resources Management

Administration • Enforcement • Harvest • Production • Research • Resident Fish • Watershed

ADMINISTRATION DIVISION
104 Lolo Street • P.O. Box 365 • Lapwai, Idaho 83540
Phone: (208) 843-7320 • Fax: (208) 843-7322

Oregon Watershed Enhancement Board
State Land Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

March 19, 2015

Dear Project Reviewers:

On behalf of the Nez Perce Tribe's Department of Fisheries Resources Management (DFRM), I would like to take this opportunity to express our support for implementation funding on the Wallowa River-Baker Habitat Restoration Project. The Nez Perce Tribe is a co-manager of fisheries resources in the Northeast Oregon, including the Wallowa River. Since time immemorial, the Nez Perce Tribe lived, fished, hunted and gathered along the banks of streams within the Wallowa River. Salmon, steelhead, and other fish species continue to be critically important to Nez Perce religion and culture.

This project is a collaborative effort of the Oregon Department of Fish and Wildlife (ODFW), John and Tarrah Baker - the property owners, and the Grande Ronde Model Watershed. The DFRM participated in the project's design review and will contribute in the planning and planting of riparian vegetation. The intent of this project is to improve fish habitat, with an emphasis on juvenile Chinook salmon and steelhead rearing and riparian vegetation enhancements.

The project area is located 2.75 miles northwest of the town of Wallowa, Oregon, just south of the Wallowa Lake Hwy/Hwy 82. All restoration activities are scheduled to take place within a 30.2 acre 15-year conservation easement comprised of both private property and Oregon Department of Transportation land, which contains 0.6 miles of the Wallowa River. The Wallowa River is a tributary to the Grande Ronde River, with the confluence at river mile 21.

Limiting factors identified for spring/summer Chinook salmon and summer steelhead in this section of the Wallowa River are: instream structural complexity, increased sediment quantity, bed and channel form, and riparian vegetation. In an effort to address these limiting factors, the project proposes to create off-channel habitat and side channels which will be perennially connected to the main channel, increasing both thermal refugia and overwintering rearing habitat for Chinook and steelhead. Side channel additions and floodplain improvements will create habitat with reduced gradient, lowered width/depth ratio, as well as increased sinuosity, undercut banks, riparian vegetation, and deep pool habitat. In an effort to further diversify fish habitat, wood habitat structures are proposed throughout the main channel and side channels. Alcoves will also be implemented throughout the side channel habitat intended to enhance Pacific Lamprey spawning and rearing habitat.

This project exemplifies cooperative relationships between land owners and fisheries resource managers in Northeast Oregon. Therefore, the DFRM fully endorses ODFW's proposal. It not only has the potential to enhance fish passage at a critical point in the river, but this project will contribute toward future collaborative restoration actions.

Sincerely,

David B. Johnson
Program Manager
Department of Fisheries Resources Management

Oregon
Kate Brown, Governor

Department of Transportation
Environmental Department
3012 Island Avenue
La Grande, OR97850

Phone: 541.963.1905
Cell: 541.786.3178
Fax: 541.963.9079

February 24, 2015

To: Oregon Watershed Enhancement Board 775 Summer St. NE, Suite 360 Salem, OR 97301-1290

From: Paul Kennington, Environmental Program Coordinator, ODOT

Re: Support for ODFW 'Wallowa River - Baker Restoration Project' Proposal

Dear Members of the Oregon Watershed Enhancement Board,

The Oregon Department of Transportation supports the ODFW 'Wallowa River - Baker Restoration Project' Proposal. ODOT owns property to the NW of this project, and this land is currently used for staging/stockpiling. The land is threatened by erosion and will directly benefit from the bank stabilization portion of the proposed work. This will save the Department of Transport both time & money, with the added benefit of environmental restoration and reduced sediment discharge into the Wallowa River.

Although this project is not essential to ODOT operations, the department does wholeheartedly support the concept of environmental enhancement, and therefore supports the proposed river restoration project.
Thank you for your consideration.
Sincerely,

Paul B. Kennington
Environmental Coordinator
ODOT Region 5

CC: Michael Buchanan, District 13 Manager
CC: Pete Caldwell, Elgin/Enterprise Maintenance Manager

Oregon
John A Kitzhaber, MD., Governor

Department of Fish and Wildlife
Enterprise District Office
65495 Alder Slope Road Enterprise, OR
97828 (541) 426-3279
FAX (541) 426-3055
www.dfw.state.or.us

February 25, 2015

Oregon Watershed Enhancement Board
775 Summer Street NE, Suite 360
Salem, Oregon 97301-1290

Dear Oregon Watershed Enhancement Board,

The Wallowa River-Baker project simultaneously addresses a suite of ecosystem and fish habitat opportunities with support and mutual investment from engaged landowners. This project has the Wallowa District's confidence and support, and I encourage you to fund this proposal.

Through the Baker property, the Wallowa River provides important migration and rearing habitat for ESA-listed Chinook salmon, steelhead, and bull trout, amongst other native species (e.g. rainbow trout, whitefish). Like many rivers in the Grande Ronde basin, over a century of development in the Wallowa River floodplain has led to an unstable channel lacking in riparian vegetation. With loss of proper ecosystem function, the quantity and quality of fish habitat has also been largely reduced.

The Wallowa River-Baker project has exciting potential to benefit these fish species by emphasizing development of off-channel rearing habitat. Side channels and backwater areas are highly-favored by fish, especially rearing juveniles. By increasing the quantity of suitable habitat, fish are allowed to spread out resulting in lower rearing densities. Lower rearing densities, by reducing competition among individuals, has shown to promote higher growth and survival rates.

The nature of this project design will also promote the sustainability of these habitats. By allowing the river to remain dynamic and interact with the floodplain, high flow events will keep side channels active and scoured out maintaining fish habitat over time. In addition, temperature is a limiting factor in the Wallowa River. The project elements of connecting the spring-fed channel, in addition to increasing aquifer recharge through the property, will also create important thermal refuge for rearing and migrating fish.

Of course, the unique opportunity to include such diverse and beneficial project elements is credited to John and Tarrah Baker for committing a significant sum of property into a conservation easement as part of this project. The volunteerism of private citizens to care for Oregon's watersheds and rivers is the core of the Oregon Watershed Enhancement Board's mission. For that reason, among the benefits this project would have for Wallowa River fisheries, I encourage your support.

Sincerely,

Jeff Yanke
Wallowa District Fish Biologist
Enterprise, OR

April 10, 2015

John & Tarrah Baker
75167 Lower Diamond Lane
Wallowa, OR 97885

Oregon Watershed Enhancement Board
State Land Building, Third Floor
775 Summer Street NE, Suite 360
Salem, OR 97301-1290

RE: Wallowa River-Baker Restoration Project

Members of the Board:

Our interest in a fish habitat program on our property adjacent to the Wallowa River began in 2007. We were losing land to the river, and the deposition occurring was ruining spawning habitat. In each of the following years the problem became more severe with loss of more land and fences. This continues to the present.

We were aware of the success of another restoration project on the Wallowa and decided to pursue the possibility here. After many consultations and visits with the ODFW biologist in the LaGrande office, a plan evolved that would satisfy the goals of a fish habitat/restoration project consistent with our vision for a portion of our land.

The project design is now basically complete. We appreciate all the work which has gone into this, by all agencies and personnel. We endorse the plan and look forward to its implementation.

Sincerely,

Tarrah M Baker John A Baker

Cc: Colleen Fagan, ODFW, LG Office
Winston Morton, ODFW, LG, Project Manager

MATCH FUNDING FORM

Document here the match funding shown on the budget page of your grant application

OWEB accepts all non-OWEB funds as match. An applicant may not use *another OWEB grant* to match an OWEB grant; this includes ODA Weed Board projects because they are funded through OWEB grants. However, an applicant who benefits from a pass-through OWEB agreement with another state agency, by receiving either staff expertise or a grant from that state agency, may use those benefits as match for an OWEB grant. (Example: A grantee may use as match the effort provided by ODFW restoration biologists because OWEB funding for those positions is the result of a pass-through agreement).

At the time of application, match funding for OWEB funds requested does not have to be *secured*, but you must show that at least 25% of match funding has been *sought*. On this form, you do not necessarily need to show authorized signatures ("secured match"), but the more match that is secured, the stronger the application. Identify the type of match (cash or in-kind), the status of the match (secured or pending), and either a dollar amount or a dollar value (based on local market rates) of the in-kind contribution.

If you have questions about whether your proposed match is eligible or not, see Allowable Match document in OGMS http://apps.wrd.state.or.us/apps/oweb/fiscal/nologin.aspx under Technical Assistance application or contact your local OWEB regional program representative (contact information available in the instructions to this application).

Project Name: Wallowa-Baker Fish Habitat Project Phase 2 Applicant: GRMW

Match Funding Source	Type (√ one)	Status (√ one)*	Dollar Value	Match Funding Source Signature/Date*
ODFW	☐ cash ☒ in kind	☒ secured ☐ pending	$142,146.00	Colleen Logan 9/14/17
GRMW	☐ cash ☒ in kind	☐ secured ☒ pending	$1,260.00	
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		

* **IMPORTANT:** If you checked the "Secured" box in the Status Column for any match funding source, you must provide either the signature of an authorized representative of the match source in the final Column, or attach a letter of support from the match funding source that specifically mentions the dollar amount you show in the Dollar Value Column.

Application for Wallowa-Baker Fish Habitat Restoration Project
BUDGET

Totals automatically round to the nearest dollar

A	B	C	D	E	F	G	H
Itemize projected costs under each of the following categories:	**Unit Number**	**Unit Cost**	**OWEB Funds**	**BPA Funds**	**Cash Match**	**In-Kind Match**	**Total Costs**
	(e.g., # of hours)	(e.g., hourly rate)					(add columns D, E, F)
SALARIES, WAGES AND BENEFITS. List position titles, include only costs of employees charged to this grant.							
GRMW Project Management	28	$45				$1,260	$1,260
		SUBTOTAL (1)	0	0	0	$1,260	$1,260
CONTRACTED SERVICES. Labor, supplies, and materials to be provided by *non-staff* for project implementation.							
ODFW GRFH Program Manager	80	$45				$3,600	$3,600
GRFH Project Manager	120	$40				$4,800	$4,800
GRFH Project Technician	120	$30				$3,600	$3,600
GRFH Project EBA	120	$30				$3,600	$3,600
Environmental Controls (1200 C Permit	1	$5,000		$5,000			$5,000
Mobilization	1	$12,000		$12,000			$12,000
Clearing and Grubbing	35	$200		$7,000			$7,000
Floodplain Excavation Cubic yards	10,000	$4		$40,000			$40,000
Side Channel D Earthwork Cubic yards	350	$5		$1,750			$1,750
Work areas isolation and water management	60	$250		$15,000			$15,000
Type 1 Habitat Structure (4 structures)	16	$200		$3,200			$3,200
Type 1A Habitat Structure (3 structures)	12	$200		$2,400			$2,400
Type 2 Habitat Structure (4 structures)	16	$200		$3,200			$3,200
Type 4 Habitat Structure (2 structures)	4	$200		$800			$800
Type 5 Habitat Structure (2 structures)	4	$200		$800			$800
Type 6 Habitat Structure (2 strucutures)	20	$200		$4,000			$4,000
Type 12 Habitat Structure (1 structure)	25	$200		$5,000			$5,000
Miscellaneous Wood (side channels and floodplain)	1	$9,000		$9,000			$9,000
Site Restoration	20	$200		$4,000			$4,000
Split Rail Fence Materials	1,000	$3		$3,000			$3,000
Seeding (20 lbs/ac for 15 ac)	400	$15				$6,000	$6,000
Vertical bundles	120	$20		$2,400			$2,400
Whips	420	$5				$2,100	$2,100
Poles	105	$5		$525			$525
Fish Screen/Headgate Design	1	$15,000				$15,000	$15,000
Fish Screen	1	$15,000				$15,000	$15,000
Fish Bypass	1	$28,000				$28,000	$28,000
Pipeline and Stock Water Development	1	$5,000		$5,000			$5,000
Senior Engineer - meetings, site visits, construction observation, and design support during construction	10	$140		$1,400			$1,400
Project Engineer meetings, site visits, design support during construction, and field observation during construction	50	$115		$5,750			$5,750
Staff Engineer meetings and sites visits, design support during construction, field observation during construction	80	$100		$8,000			$8,000
Design Firm Bidding and Contracting Project Construction	1	$10,000		$10,000			$10,000

A	B	C	D	E	F	G	H
Itemize projected costs under each of the following categories:	**Unit Number**	**Unit Cost**	**OWEB Funds**	**BPA Funds**	**Cash Match**	**In-Kind Match**	**Total Costs**
	(e.g., # of hours)	(e.g., hourly rate)					(add columns D, E, F)
		SUBTOTAL (2)	$0	$149,225	$0	$81,700	$230,925
TRAVEL. Mileage, per diem, lodging, etc. Must use current State of Oregon rates.							
ODFW travel to project site	9,300	0.535				$4,976	$4,976
Contracted engineering firm	2,800	0.535		$1,498			$1,498
		SUBTOTAL (3)	$0	$1,498	$0	$4,976	$6,474
MATERIALS/SUPPLIES. Refers to items that are "used up" in the course of the project. Costs to OWEB must be directly related to the implementation of this grant.							
		SUBTOTAL (4)	0	0	0	0	0
EQUIPMENT/SOFTWARE. List portable equipment costing **$300** or more per unit. Must remain property of a governmental entity, tribe, watershed council, SWCD, institution of higher learning or school district.							
		SUBTOTAL (5)	0	0	0	0	0
OTHER. Costs must be necessary and reasonable for successful completion of this grant.							
Photopoints (Pre,1,2,3,6,9,12,15 yrs post)	54	35				$1,890	$1,890
Aerial Photopoints (Pre,1,2,3,6,9,12,15 yrs post)	54	45				$2,430	$2,430
Project Topo Survey (as built,1,3,5,10,15 yrs post)	480	75				$36,000	$36,000
Vegetation Monitoring & Maint (annually 15 yrs)	300	40				$12,000	$12,000
Salmonid presence/absence (annual redd counts, snorkel surveys)	90	35				$3,150	$3,150
		SUBTOTAL (6)	0	0	0	$55,470	$55,470
[Add subtotals above]		**MODIFIED TOTAL DIRECT COSTS (7)**	0	150,723	0	143,406	294,129

A	B	C	D	E	F	G	H
Itemize projected costs under each of the following categories:	**Unit Number**	**Unit Cost**	**OWEB Funds**	**BPA Funds**	**Cash Match**	**In-Kind Match**	**Total Costs**
	(e.g., # of hours)	(e.g., hourly rate)					(add columns D, E, F)
GRANT ADMIN. Select one of the methods below. Fill in the requested rate. Compute by multiplying MTDC (7) line by this rate.							
Federally Negotiated Indirect Cost Rate	☐						
Federally Accepted 10% *de minimis*	☐						
OWEB Negotiated Indirect Cost Rate	☐						
SUBTOTAL (8)			0	0	0	0	0
POST-GRANT. Pre-paid costs ($3,500 or less) that are associated with either post implementation status reporting or effectiveness monitoring or plant establishment costs. List each separately.							
Post-Implementation Status Reporting ($3,500 or less)	/yr						
Effectiveness Monitoring ($3,500 or less)	/yr						
Plant Establishment ($3,500 or less)	/yr						
SUBTOTAL (9)			0	0	0	0	0

BUDGET TOTAL **Totals automatically round to the nearest dollar**

RESTORATION BUDGET TOTAL (10) **[Add Category Totals (7), Subtotals (8) and (9)]**	0	150,723	0	143,406	294,129

EFFECTIVENESS MONITORING BUDGET TOTAL

EFFECTIVENESS MONITORING BUDGET TOTAL (11) **This only applies if you are doing Effectiveness Monitoring; see Application Instructions and R17. Transfer Grant Budget Total (9) from the Effectiveness Monitoring Budget Insert.**	0	0	0	0	0

PLANT ESTABLISHMENT BUDGET TOTAL

PLANT ESTABLISHMENT BUDGET TOTAL (12) **This only applies if you are doing a planting project; see Application Instructions and R18. Transfer Grant Budget Total (9) from the Plant Establishment Budget Insert.**	0	0	0	0	0

GRANT BUDGET TOTAL ***Totals automatically round to the nearest dollar**

GRANT BUDGET TOTAL **[Add Totals (10), (11), and (12) as applicable]**	0	150,723	0	143,406	294,129

* The totals for these two columns must mirror the match totals provided in Section II(7) of the application and on the Match Funding form (Attachment A).

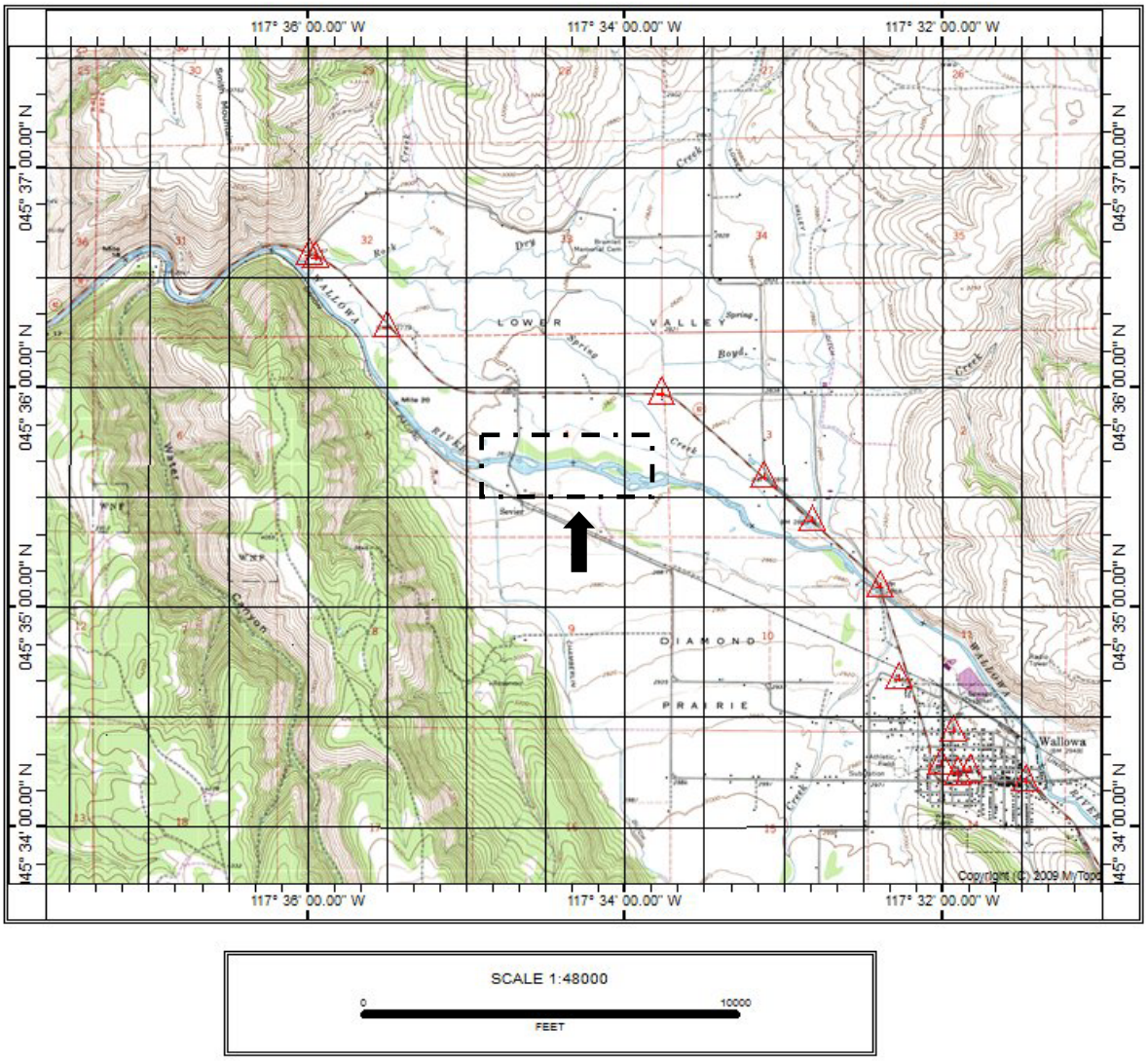


Figure 1. Location of the Wallowa River-Baker Project, as indicated by the dash lined box above the arrow. Project located Township 1 North, Range 42 East, Section 4, Willamette Meridian, Wallowa County, Latitude 4.594011 and Longitude -117.575855.

Wallowa River - Baker Restoration
Planting Plan

Riparian Forest Buffer Sheet

Landowner:
Address:
Phone:
County: Wallowa
Water Body: Wallowa River

Objectives:
Create forested riparian buffer to meet future condition of fully functioning riparian area.

Considerations:

- Intense canary grass competition
  - Plant and prepare site to reduce competition from canary grass
  - Conduct proper site preparation
    - Planting areas should be clean. All competing vegetation removed down to bare mineral soil
  - Plant at high density levels to shade out the grass

- Intense herbivory
  - Provide tree/shrub protection
    - Construct livestock panel cages (keeps deer and elk from browsing)
    - Wrap aluminum foil at the base of each cutting (discourages mice and voles from girdling trees)

Riparian Buffer Width:
Concentrate woody species planting on the banks edge, 0- 10 feet.

Ecological Site Description:

Cottonwood-willow- Riparian (RO1OXYO11OR)

Dominant vegetation:
Cottonwood
Short and tall willows

Sub-dominant vegetation:
Alder
Dogwood
Water birch
Currant species
Mock orange

Recommended Species List:
Species

Locally adapted willow
Red osier dogwood
Black cottonwood/
Peachleaf willow
Alder

Schedule of Work:

Collect cuttings	Fall after trees have gone dormant and lost leaves
Plant	Fall after trees have gone dormant and lost leaves
Maintenance	On-going until plants are established

PLANTING DIRECTIONS

1. Select individual planting spots on a site-specific basis. The best micro-site takes precedence over spacing.
2. Remove debris and competing vegetation from each planting spot. Clear down to bare mineral soil.
3. Handle cuttings carefully. Keep in cooler storage until ready to plant. Keep cool, moist, and covered during storage and transport. Do not allow to dry out. Ideally soak the cutting for 10-14 days prior to planting.
4. Plant in the fall as soon as the trees have gone dormant for the winter and lost their leaves. Plant prior to ground frost.
5. Do not plant when air temperatures are more than 65 degrees, or when humidity is less than 50%.
6. Insert cuttings into moist soil with two to three buds showing above ground. Ensure bottom of cutting will be below ground water level during active growing season. Cuttings should be 6- 10 feet long or long enough to reach mid-summer water table, and be at least 3/4 inch in diameter depending on species. Collect cuttings in the fall after bud break. Keep moist and cool until planting.
7. Poles should be at least% inch in diameter and at least 6-10 feet long. Poles should be planted using a stinger or auger or backhoe for the "cluster planting method." Be sure to "mud in" after planting to avoid air pockets in the planting hole.
8. Consider planting oversized container stock of hard- to- root species, such as alder, if specialized stock is available.
9. At least % of the pole should be below ground.

MAINTENANCE

Control competing vegetation, especially grass, around each plant for at least two growing seasons and then implement a prescribed grazing plan designed to benefit and protect woody vegetation.

2 growing seasons of non-use by domestic livestock: The restoration channel area will be precluded from domestic livestock following construction completion. This period of rest will allow planted vegetation, as described in this plan the opportunity to establish prior to reintroduction of domestic livestock. A majority of the planted area will have hog panel caging as protection.

- Hog panel cages, small exclosures, will eliminate all browse pressure from both deer and cattle. A cage will be constructed on the inside of each new meander bend adjacent to the riffle. These areas do not have wood structure and are a logical place to construct each cage. Cages will be installed in the side chatmel areas. At this time location is uncertain but they will be strategically placed in areas of high planting density that offer the best planting conditions. Once protected vegetation reaches a height above browse capability the cage will be dismantled and moved to an area on the project needing cage protection.

Mechanical maintenance during the non-use period: Mechanical control of Reed's Canary Grass (RCG) is required during the period of non-use. In planted areas along the restoration and side channels competing vegetation will be mowed. Mowing will occur in the spring, which mimics prescribed grazing tactics. This will provide sunlight to planted vegetation, contribute to depleting carbohydrate stores in RCG, and offer desirable plant species a competitive advantage. Mowing will occur adjacent to each hog panel cage. However, if desired species are showing robust growth mowing may be deferred so that mowing does not accidentally damage them. Additional mowing will occur if necessary.

PLANTING GUIDELINES-

Poles and Whips

Preferred Species:

- Coyote willow *(Salix exigua)*
    - Or locally adapted willow

Red osier dogwood *(Cornus sericea)*
- Black cottonwood *(Populus balsamifera)*

Plant Material Collection and Storage:
Preference is for local sources of cuttings along the river itself and on nearby tributaries and irrigation ditches.
- Cuttings should be collected while the plants are dormant and buds are set.
- Cuttings should be at least 6-10 feet long (long enough to reach mid-summer water table) and 3/4 inches or larger in diameter.
- Plant immediately if possible. If not, store in a cooler kept at 33-40 degrees F.
- Pre-soak stored cuttings 10-14 days before planting.
- Red osier dogwood cuttings should be wounded (with a knife, or scrapping,) through the bark in several locations to enhance rooting and establishment.

Planting Location:
- Near banks edge (0- 10 feet)
- 2-foot spacing between plants

Planting Method:
- Plant using a stinger or auger. The hole should be only slightly larger than the pole.
    - Consider using a "Waterjet stinger" if there are no gravel bars in the planting areas.
    - Consider "cluster planting technique" using a back hoe to dig down to the appropriate water table depth and plant several poles in the one hole.
- No matter what planting method is used, it is essential to have good contact between cutting and soil for roots to sprout. Air pockets around the cutting will kill the roots.

PLANTING GUIDELINES- (continued)

CLUMPS

Clump planting is a successful method of establishing woody vegetation in riparian restoration projects. They are particularly successful in areas that are droughty, for example the side channels that are being proposed for this project.
- Use a back hoe to dig up an existing clump. Attempt to keep at least 70% of the root system intact.
- Replant as quickly as possible. Do not let the root system dry out. Keep moist, cover with a tarp. Sprinkle with water if necessary.
- Ideally pre-dig the holes where the clumps are going to be planted. Ensure the holes are deep enough to reach mid-summer water table.
- "Mud in" planted clumps to eliminate any air pockets that can kill roots. Make sure 4-6 feet of stem is above ground.
- Lop off about a third to half the willow tops. This stimulates more rooting and reduces the leaf mass the root system must support.
- Clumps should be about 8-10 feet apart and as close to the ordinary high water mark as possible.

VERTICAL BUNDLE PLANTING

Preferred Species

- Coyote willow *(Salix exigua)*

- Red osier dogwood *(Cornus sericea)*

Plant material collection and storage

- Preference is for local sources of cuttings along the river itself and on nearby tributaries and irrigation ditches.
- Cuttings should be collected while the plants are dormant and buds are set.
- Cuttings should be at least 6-8 feet long and 3/4 inches or larger in diameter.
- Plant immediately if possible. If not, store in a cooler kept at 33-40 degrees F.
- Pre-soak stored cuttings 2-10 days before planting.

Planting location

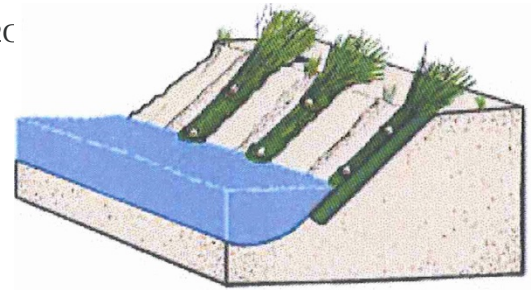
Along banks

Constructing bundle

- Bundles shall consist of 3-5 willow or dogwood cuttings so that the bundles are about 3-to - 6 inches in diameter.
  Tops should be with tops and butts with butts. Butts of each cutting in the bundle should be even on the ground.
- Tie bundles together with Sisal rope or cotton string or non-galvanized wire in at least two places- 1-2 feet from bottmn and at about 2/3 the length of the bundle.

Planting

- Dig a trench vertically on the streambank 12-to -16 inches longer than the bundle. Ensure the bottom of the trench is 6-8 inches into the bed below the low water tnark.
- **Trenches should be sloped to 2:1 or flatter.**
- The depth of the trench should be at least 4-to-9 inches.
- Place the bundle in the trench.
- Stake the bundle into place using at least two wedge shaped wooden stakes.
  - The stakes should be at least 3-foot long and cut from a kiln-dried 2 x 4.
- To form the wedge shape the 2 x 4 should be cut diagonally. (See the attached diagram)
- Place stakes between the ties or at 1/3 and 2/3 the length of the bundle.
- Pound the stakes into the ground until only 3 inches is above the bundle.
- Cover at least 2/3 of the bundle with soil.
- To ensure good soil-to-stem contact gently wash in the soil with a small amount of water.
- Trim the terminal buds of the cuttings.



MAINTENANCE

Control competing vegetation, especially grass.

Non-use by domestic livestock: Domestic livestock will not be allowed in the project area following construction. A majority of the planted area will have hog panel caging as protection from wildlife browsing.

- Hog panel cages, small exclosures, will eliminate all browse pressure from deer. Along the restoration channel, a cage will be constructed on the inside of each new meander bend adjacent to the riffle. At this time, location is uncertain but they will be strategically placed in areas of high planting density that offer the best planting conditions. Once protected vegetation reaches a height above browse capability the cage will be dismantled and moved to an area on the project needing cage protection.

Mechanical maintenance: Mechanical control of Reed's Canary Grass (RCG) is required during the period of non-use. In planted areas along the restoration and side channels, competing vegetation will be mowed with hand held weed eaters. Mowing will occur in the spring, which mimics the prescribed grazing tactic in the attached grazing management plan. This will provide sunlight to planted vegetation, contribute to draining carbohydrate stores in RCG, and offer desirable plant species a competitive advantage. Mowing will occur in and to each hog panel cage. However, if desired species are showing robust growth mowing may be deferred so mowing does not accidentally damage them. Additional mowing will occur if necessary through the year.

MONITORING

Measure survival, growth and cover of desired woody species through out the project area.

For the first 5 years after implementation, we plan on yearly inspections. We will establish photo points to visually document conditions. The project site is small enough that we can walk through and measure growth, survival, and cover without the need for transects. The one exception is that we will use transects to measure shade in and around the stream channels. During our inspection we will search for weeds and evaluate what means will be required to control them if found.

Success criteria include:

(1) Percent survival of planted cuttings and clumps,

- Achieve 40% survival of planted cuttings by year 2.
- Achieve 50% survival of transplanted clumps by year 2.

In our experience, we should achieve these survival targets if all step outlined in our planting plan are conducted properly. It is important to wait at least two years before deciding if the planting was a failure. It seems, especially with the clumps, the plants are devoting most of their energy into growing roots. In year 3 the clumps and cuttings begin to grow shoots and develop aboveground height and width.

(2) Percent cover along stream channels.

- Increase woody plant percent cover along stream channels by 10% each year after year 2.

If we are successful with our planting, we expect cover to be an important factor to measure. We expect woody vegetation to spread on its own either clonally or by establishment of volunteer propagules.

(3) Tree height, and

- Achieve tree heights of 8 feet or more over 10% of the new main channel length in five years. Our experience shows that after initially slow growth cuttings and clumps can grow 1 to 3 feet per year.

(4) Percent shade over the new channel.

- Achieve 15% shade across channel after 3 years (at noon during the low flow season)
- Achieve 25% shade across channel after 5 years.

We will establish transects that run through the channel. We will take densiometer readings on each bank and in the middle of the channel. We will follow OWEB monitoring protocols.

References:

Hoag, JC and D Ogle. 1994. *The Stinger, a tool to plant unroofed hardwood cuttings of willow and cottonwood species for riparian or shoreline erosion control or rehabilitation.* USDA Natural Resources Conservation Service, Idaho Plant Materials Technical Note No. 6, Boise, ID. 13 pp.

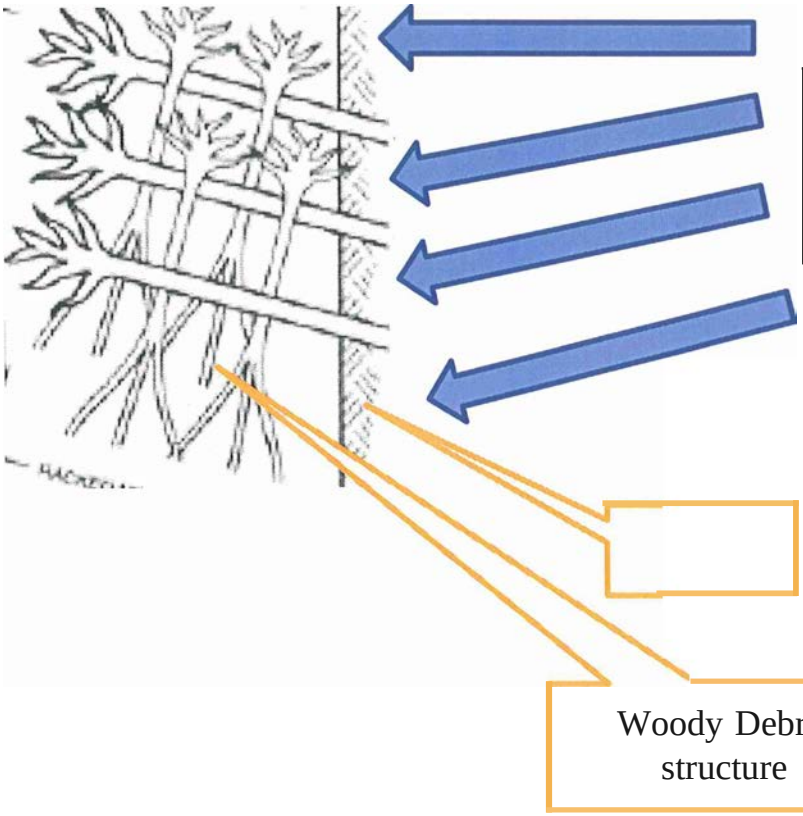
Hoag, JC et al. 2001. *Waterrjet Stinger: A tool to plant dormant unroofed cuttings of willows, cottonwoods, dogwoods and other species.* USDA-NRCS Aberdeen Plant Materials Center, Boise, ID. ID-TN 39. Feb. 2001.

Hoag, J.C. 2003. *Willow Clump Plantings.* USDA-NRCS Aberdeen Plant Materials Center, Boise, ID. ID-TN42, Dec. 2003. 8p.

Hoag, JC. 2007. *How to plant willows and cottonwoods for riparian rehabilitation.* USDA Natural Resources Conservation Service, Idaho Plant Materials Technical Note No. 23, Boise, ID. 12 pp.

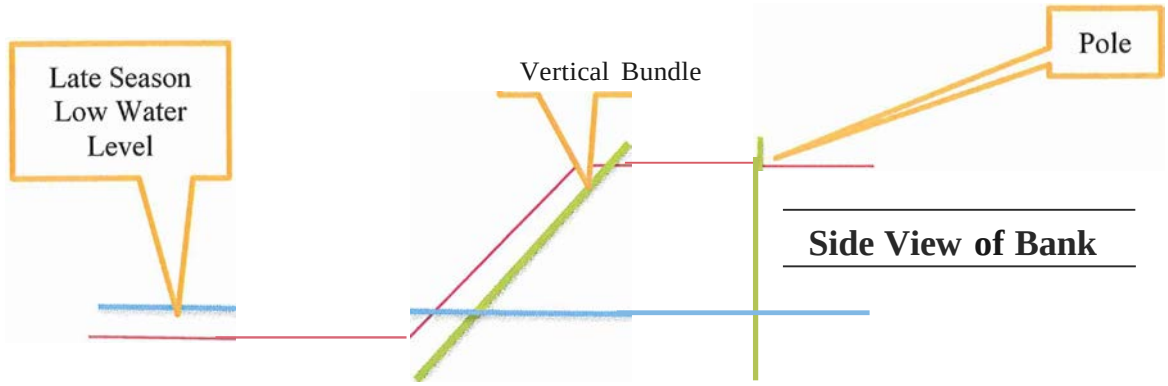
Hoag, JC. 2010. *Cluster Plantings: A way to plant live unroofed cuttings in coarse soils including sands, gravels and cobbles.* PMC, Aberdeen, ID. IS 26, riparian wetland project. 8p

Tilley, D., Ogle, D., St. John, L., Hoag, C., and J. Scianna. 2012. *Native Shrubs and Trees for Riparian Areas in the Intermountain West.* Idaho Plant Materials Program Technical Note 32, Boise, Idaho. 8/9/12. 63p

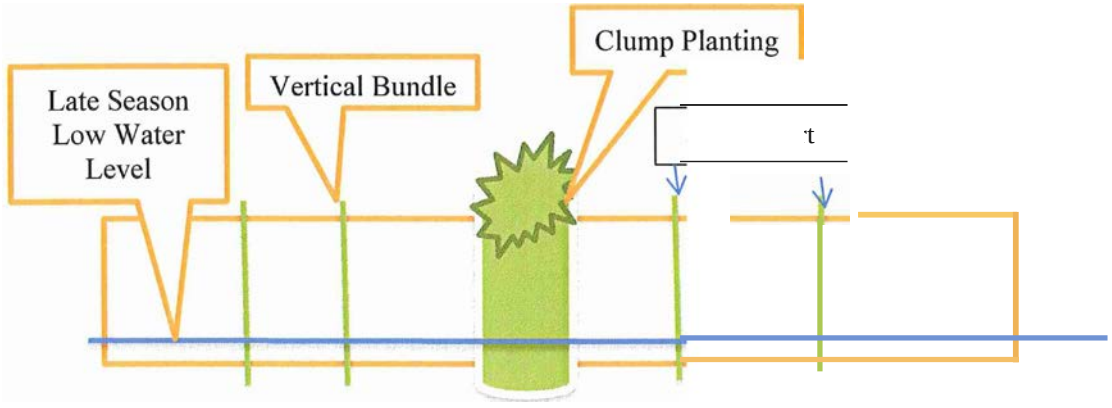


Plant vertical bundles, clumps, poles with waterjet stinger, or use cluster-planting planting technique

Woody Debris structure



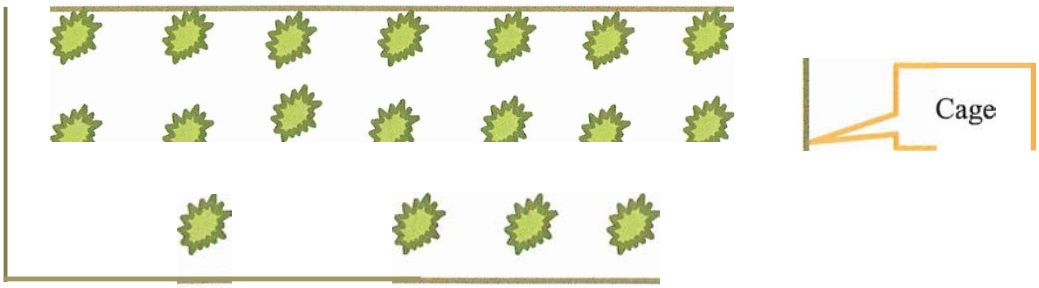
Side View of Bank



Front View of Bank

Riffle Planting-

High Density Of Whips -2-foot by 2-foot spacing
8-foot by 16-foot planting area



Planting Area	Vertical Bundles	Whips	Poles	Clumps	
1	75		20		
2		63		20	
3		330	20	10	
4	40	330	20	10	
5	40		20	10	
6	100	420	100		
7	75		20	10	
8	20		5		
9	75		20	10	
10	50	63	10	5	
11	75		20	10	
12		63	20	5	
13		330	60	30	
Total	550	1599	335	120	2604.00
Costs	$11,000.00	$7,995.00	$1,675.00	$9,000.00	$29,670.00
				Cages=	$10,000.00
				Total Cost	**$39,670.00**

Vertical bundles = local willows and dogwoods

Whips= Local willows and dogwoods

Poles= cottonwood and peachleaf willow-- if available oversized container nursery stock

Clumps= local willows and dogwoods

Wallowa Baker Project

Planting Area #1
Planting Area #13
Planting Area #11
Planting Area #5
Planting Area #12
Planting Area #2
Planting Area #7
Planting Area #3
Planting Area #9
Planting Area #4
Planting Area #8
Planting Area #6
Planting Area #10

N
W E
S

0 0.02 0.04 0.08 0.12 0.16 Miles

Figure 2. Looking downstream from the Baker property at the localized bank erosion (April 2007).

Figure 3. Looking downstream from the Baker property, in June 2, 2009, showing the Wallowa River laterally migrating through the narrow riparian buffer, carving what would become the main channel by the end of runoff.

Figure 4. Looking downstream, June 25, 2009, at the Wallowa River from the Baker Property. Location is close to Figure 4. As flows receded, this became the main channel.

Figure 5. Looking upstream from the right bank of the Baker property (July 2010. Looking towards the locations of Figures 4 and 5. The bank is over 500 ft long.

Figure 6. ODFW employees and the landowners surveying the abandoned left bank channel. This was the main channel in 2009-2012 and still activates at higher flows. Photo is taken from a location in proximity to the photo in Figure 6 (January 2012).

Figure 7. Aerial photo of Wallowa-Baker Project location looking downstream, 2010.

Figure 8. Aerial photo of Wallowa-Baker Project looking downstream, 2012. New channel carved on right bank and left bank channel now only activated at high flows.