

Application Name: Catherine Creek River Mile 38 Stream Restoration

Application Number: 220-8205-18750

By: Union SWCD

Offering Type: Upper Grande Ronde Initiative

Application Type: Restoration

OWEB Region: Eastern Oregon

County: Union

Coordinates: 45.211417,-117.897231

Applicant:

James Webster
10507 N McAlister Rd Ste 7
LaGrande OR 97850-2073
(541) 963-1313
jwebster@unionswcd.org

Payee:

James Webster
10507 N McAlister Rd Ste 7
LaGrande OR 97850
(541) 963-1313
jwebster@unionswcd.org

Project Manager:

Aaron Bliesner
10507 N McAlister Rd Ste 7
LaGrande OR 97850
(541) 963-1313
abliesner@unionswcd.org

Budget Summary:

OWEB Amount Requested: \$182,290
Total Project Amount: \$227,335

Administrative Information

Abstract

Provide an abstract statement for the project. 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 CC-38 project is located on privately owned property along Catherine Creek downstream of Union, Oregon. The property is currently managed as an operating farm and ranch, with much of the historic floodplain being in hay and pasture production. The channel through the project reach is moderately confined with a floodplain width of 67 feet, a sinuosity of 1.19, and a stream gradient of 0.5%.

In August 2017, after many years of discussion and negotiation with the Union SWCD and other natural resource agency partners, the landowner signed a riparian easement agreement based on the conceptual actions defined in the 15% conceptual drawings. The landowner has not eliminated the possibility of future, more extensive restoration actions on his property.

Proposed conceptual actions are intended to increase both summer and over-wintering habitat conditions for juvenile salmonids. Favrot and Jonasson (2014) found one pool within the project reach contained the largest amount of overwintering juvenile Chinook in the Catherine Creek basin and also found that a second pool in the reach had the next highest, but lacked a large wood component. In addition, they identified that juvenile Chinook in the reach were primarily associated with small transient wood owing to the lack of stable large wood in the reach.

This project intends to enhance aquatic habitat conditions in five pools with large wood placement, promote riparian plant establishment and survival by reducing stream bank slopes, and decrease mass wasting of stream banks through the placement of large wood complexes. Project construction is planned for the summer of 2021. Project funding is being sought to complete project construction.

Project partners include the Grande Ronde Model Watershed (GRMW), the Bureau of Reclamation (BOR), Oregon Department of Fish and Wildlife (ODFW), the Union Soil and Water Conservation District (District) and the landowners.

Permitting cost have been covered by a TA grant.

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 Sheehy and

Brennan Sheehy

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

I acknowledge that I am responsible for verifying applicable permits, licenses, and General Authorizations required for the project, and can update information at grant agreement execution.

Yes

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 drinking water well
- 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.

Aquatic habitat conditions are poor for juvenile salmonids in Catherine Creek within the CC-38 project reach, downstream of Union, Oregon. Data collected by the Bureau of Reclamation for the Catherine Creek Tributary Assessment indicated that large pools (pools greater than 1 meter deep) have declined. Stream survey data collected in 2010 were compared to data collected by the Bureau of Fish data in 1935 and showed a decrease in the number of large pools from 27 to 5.6. The report indicates that stream channelization and a decrease in the abundance of large wood has led to a decrease in pool formation and maintenance. As an added result, hiding cover and overall channel complexity is lacking. In similar findings, Favrot and Jonasson (2014) reported that Chinook were found most often in areas associated with small transient wood and described an overall lack of large wood and key wood members.

The landowner has worked diligently in the project reach over the past 30 years to maintain a healthy riparian zone by the elimination of grazing and continual planting efforts. Streamside shade through the project reach is in good condition with the exception of a few locations where bank erosion is occurring and revegetation efforts have failed. Data collected during the summer months of 2018 showed that stream temperature tends to limit optimal juvenile salmonid growth. The 7-day mean weekly average temperature (MWAT) for the project reach from 2018 had a maximum of 20°C with an average MWAT of 18°C through the summer months.

In addition to poor habitat conditions, instream flow is limited in Catherine Creek through the project reach. Starting with diversion at the State Ditch located upstream of Union, seven other diversions reduce flows through this reach by as much as 76% during an average summer discharge. Despite the reduced instream flow, the project site has been documented as a stronghold for overwintering Chinook. In a recent survey (Fall 2017), Natural Systems Design, Inc. conducted an AEM survey over approximately 722 meters immediately above the project site and found 1,052 Chinook, 318 steelhead and 107 mountain white fish. This is a good indicator that even though this reach is flow limited Chinook and steelhead are rearing in significant numbers throughout the year in the project area.

The following specific limiting factors for the project reach were identified through the Atlas assessment process.

- 1.1. Habitat Quantity: Anthropogenic Barriers
- 4.1. Riparian Condition: Riparian Vegetation
- 4.2. Riparian Condition: LWD Recruitment
- 5.1. Peripheral and Transitional Habitats: Side Channel and Wetland Conditions
- 5.2. Peripheral and Transitional Habitats: Floodplain Condition
- 6.1. Channel Structure and Form: Bed and Channel Form
- 6.2. Channel Structure and Form: Instream Structural Complexity
- 7.2. Sediment Conditions: Increased Sediment Quantity
- 8.1. Water Quality: Temperature
- 9.2. Water Quantity: Decreased Water Quantity

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

Catherine Creek within the project reach has been manipulated for the past 70 years. In the 1950's the stream reach was straightened and all obstructions removed by bulldozers. In the early 1990's rock barbs were installed to reduce stream bank erosion and decrease meander formations. The structures were moderately successful in reducing stream bank erosion but provided minimal habitat value for ESA listed fish species. Over the past 30 years the landowner has taken an active role in improving the riparian conditions on Catherine Creek. Activities included fencing, off channel watering, and planting of native vegetation.

Observational data from Favrot and Jonasson (2014) and from more recent investigation by the District indicate that the riparian zone along the project reach is only contributing smaller transient wood to the stream and providing

marginal habitat for short durations of time. Two factors combine to reduce the chances of large wood recruitment to this stream reach. First, the majority of the existing vegetation is relatively young (20-30 years old) and will not contribute key members of large wood to the stream for at least the next 50 years. Second, the channel upstream of the project reach through the city of Union, Oregon is confined within a narrow set of levees where down trees that fall into the stream in this section are most often removed to reduce the risk of flooding through town. This reduces the chance for the project reach to recruit large woody material from upstream reaches.

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

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

- Yes
 No

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.

Upper Grande Ronde River Restoration Atlas (BPA, GRMW) Re: restoration prioritization

Federal Columbia River Power System (FCRPS Biological Opinion (BiOp) (U.S. Bureau of Reclamation, Bonneville Power Association, US Army Corps of Engineers, 2004); Re: substrate, water quality, water quantity, temperature, riparian vegetation.

Northeast Oregon Snake River Recovery Plan (National Marine Fisheries Service, 2010); Re: increased sediment quantity, riparian condition, LWD recruitment and temperature. side channel & wetland conditions, floodplain connection, anthropological barriers, in-stream structural complexity decreased water quantity.

NMFS [National Marine Fisheries Service]. 2014. Endangered Species Act Section 7(a) (2) Supplemental Biological Opinion. Consultation on Remand for Operation of the Federal Columbia River Power System. National Oceanic and Atmospheric Administration. NWR-2013-9562. Re: basin appropriate passage and limiting factors.

NMFS [National Marine Fisheries Service]. 2013. Draft Proposed ESA Recovery Plan for Snake River Spring/Summer Chinook salmon and Snake River Steelhead. National Marine Fisheries Service, Northwest Region. National Oceanic and Atmospheric Administration. Predecisional document, Accessed March 28, 2014. Re: limiting factors by species.

Bureau of Reclamation (Reclamation). 2014. Upper Grande Ronde River Tributary Assessment, Grande Ronde River Basin, Tributary Habitat Program, Oregon: Department of Interior, Bureau of Reclamation, Pacific Northwest Region, Boise, Idaho, 74 p Re: limiting factors

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?

A completed project construction for CC-38 will positively impact salmon, steelhead, and bull trout by greatly improving their habitat throughout the project reach. The project will enhance four existing pools with the addition of large wood and create a fifth large pool at a tortuous meander bend with a large engineered wood structure. The project will improve sediment routing through the project reach increasing bar formation. This will increase the hyporheic exchange and create cold water refugia. In addition, the project design will have water quality benefits by decreasing the supply of fine sediment into the stream.

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

- Yes
- No

Regional Assessments or Recovery Plans
ESA Recovery Plan for Snake River Fall Chinook
Northwest Power and Conservation Council Grande Ronde Subbasin Plan
Oregon Conservation Strategy
The Oregon Plan for Salmon and Watersheds

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

- Grande Ronde Subbasin Plan (Northwest Power and Conservation Council, 2004); see p. 193. Re: habitat diversity, temperature, flow, and sediment as pertains to sediment and riparian area impacts.
- Federal Columbia River Power System (FCRPS Biological Opinion (BiOp) (U.S. Bureau of Reclamation, Bonneville Power Association, US Army Corps of Engineers, 2004); see p. 104 Re: substrate, water quality, quantity, temperature, riparian vegetation.
- Northeast Oregon Snake River Recovery Plan (National Marine Fisheries Service, 2010); see p. 261 Re: increased sediment quantity; p. 258, riparian condition; p. 262, LWD recruitment and temperature; p. 260. side channel & wetland conditions, floodplain connection, anthropological barriers, in-stream structural complexity; p. 263. decreased water quantity.
- NMFS [National Marine Fisheries Service]. 2014. Endangered Species Act Section 7(a) (2) Supplemental Biological Opinion. Consultation on Remand for Operation of the Federal Columbia River Power System. National Oceanic and Atmospheric Administration. NWR-2013-9562. Re: basin appropriate passage and limiting factors.

- NMFS [National Marine Fisheries Service]. 2013. Draft Proposed ESA Recovery Plan for Snake River Spring/Summer Chinook salmon and Snake River Steelhead. National Marine Fisheries Service, Northwest Region. National Oceanic and Atmospheric Administration. Predecisional document, Accessed March 28, 2014. Re: limiting factors by species.
- NPCC [Northwest Power and Conservation Council]. 2004. Grande Ronde Subbasin Plan. Prepared by M. Cathy Nowak. Re: current conditions.

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

Goal, Objectives, and Activities

State your project goal. A goal statement should articulate desired outcomes (the vision for desired future conditions) and the watershed benefit.

The final design will incorporate the landowners management needs with the project goals to address limiting factors through the project reach. The intent of project construction will be to increase the quantity and quality of juvenile salmonid rearing habitat through the development and the enhancement of deep thermally stratified pools by the integration of large wood and promotion of riparian vegetation.

List specific and measurable objectives. Objectives support and refine the goal by breaking it down into steps for achieving the goal. (NOTE: If you quantify your objectives, ensure all numbers match the metrics listed in your selected habitat types.) Provide up to 7 objectives.

Objective #1

Objective

- Increase the number of large wood pieces and jams

Describe the project activities. Activities explain how the objective will be implemented.

Appropriately sized engineered large wood structures will be excavated into key locations throughout the project reach by an experienced construction firm. Large wood will be placed to create instream habitat, velocity refugia, and stream bank stabilization.

Increase the number of key members of large wood per mile in the project reach by 500 pieces per mile by 2024.

Objective #2

Objective

- Increase the quantity and quality of habitat diversity

Describe the project activities. Activities explain how the objective will be implemented.

Construction will focus on utilizing large wood (both on site and delivered to the site) boulders, and stream bank sloping to improve sediment routing through the project site and create diversity in water velocities.

Increase the percent of instream cover by 30% through the project reach by 2024

Objective #3

Objective

- Increase juvenile rearing habitat

Describe the project activities. Activities explain how the objective will be implemented.

Large wood and boulders will be used to create cover and improved water velocity conditions in four existing pools and a fifth pool will be created.

Increase the stream area juvenile salmonids can utilize by 25% through the project reach by 2024.

Objective #4

Objective

- Increase number and depth of pools

Describe the project activities. Activities explain how the objective will be implemented.

The project will improve pool conditions in four pools and create one additional pool.

Increase the number of pools by 1 in the project reach by 2024.

Objective #5

Objective

- Increase stem density (number per area) of native shrubs and trees

Describe the project activities. Activities explain how the objective will be implemented.

Streambanks in locations where streamside vegetation has not been able to establish will be resloped to improve site conditions for the reestablishment of riparian vegetation. Post construction all impacted areas will be reseeded and planted with native trees and shrubs.

Increase native species diversity by 50% and stems per acre by 200 plants by 2024.

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

Element	Description	Start Date	End Date
Photo Point Monitoring	Identify key locations to monitor the project implementation through time.	10/2020	5/2021
Request for Proposals	Send out an RFP to contractors to hire the best qualified and most reasonable contractor.	10/2020	1/2021
Project Stake Out	All wood structures locations will be staked out as well as access roads and staging areas.	4/2021	6/2021
Construction	Install all aspects of the project design.	7/2021	8/2021
Seeding and Planting	Reseed and plant all areas impacted by project construction.	7/2021	11/2021
Monitoring and Reporting	Photo Monitoring and OWEB Reporting	6/2021	6/2025

Element	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024	Q2 2024	Q3 2024	Q4 2024	Q1 2025	Q2 2025
Photo Point Monitoring																			
Request for Proposals																			
Project Stake Out																			
Construction																			
Seeding and Planting																			
Monitoring and Reporting																			

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?

Presently streambanks are actively eroding at four locations within the project reach and supplying fine sediment to the channel. At two of these locations large pool structures will be created and the streambanks will be resloped. The engineered design at these pools intends to accelerate velocities into tortuous meander bends and anticipate higher velocities at the other two spots downstream where active bank erosion is taking place. These two spots will have structures that are primarily designed to dissipate these velocities and reduce fine sediment contributions to the stream channel.

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

The overall intent of this restoration effort is to improve pool habitat for ESA listed species. The bank stabilization portions of the project design are intended to protect streambanks in locations that design has increased velocities and increased bank erosion is expected.

Bank Stabilization Materials
Logs
Rocks/Boulders
Vegetation
Rootwads

Stream Side Information

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

- One side
- Both sides

Left side miles treated
0.25

Right side miles treated
0.25

Total miles treated
0.25

- Fish passage improvement
- Fish screening project
- 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

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

✓ Large wood

Number of structures.

12

Average number of logs per structure.

10

Average length of logs per structure (feet)

30

Average diameter of logs per structure (feet)

1.5

Boulders

✓ Combination log/boulder

Number of structures

3

Average number of logs per structure.

10

Average length of logs per structure (feet)

30

Average diameter of logs per structure (feet)

1.5

Average number of boulders per structure.

13

Average size of boulders per structure (feet)

2

Other materials: Materials that stabilize the streambed

Channel reconfiguration and connectivity, including alcoves and side channel reconnection

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

0.25

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

Height (ft.)

4

Length (miles)

0.25

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

Pasture rotation.

Linear stream miles treated

0.25

What assurances will be in place to demonstrate livestock exclusion will be maintained over the long-term, i.e. after 10 years, 15 years?

Cattle have been excluded from access to the stream for the past 30 years. The landowner has proven a commitment to excluding livestock from the stream and has agreed through a landowner agreement with the District to continue to do so for the next 15 years. In addition District staff will monitor the project area to see that all project components are meeting project goals and objectives.

Exclusion other than fencing

Specify materials

The South side of the project area is already fenced and the fence will be rebuilt in areas that have to be removed for construction. The North side of Catherine Creek in the project area will be managed as a hay meadow with livestock excluded.

Miles of fencing and other materials for habitat protection

0.25

Riparian acres protected by fencing and/or other exclusion
3.37

✓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

Prescribed burnings, stand thinning, stand conversions, silviculture

Juniper treatment

Livestock management

Debris and Structure Removal

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

Yes

No

✓ **High Temperature**

Total linear stream miles to be treated.

0.09

Total riparian acres to be treated.

0.23

Left streambank miles to be treated.

0.07

Right streambank miles to be treated.

0.02

Wrap-Up

Watershed Benefit

Describe the watershed or ecosystem function(s) that the project will address through the proposed restoration actions and the resulting benefits to water quality, native fish and wildlife habitat, and/or watershed health. Explain why the project is a priority for investment at this time.

The project location falls within the highest priority section of Catherine Creek for habitat restoration (Catherine Creek Atlas 2012). Data from Favrot and Jonasson (2014) and Natural Systems Design (2017 AEM Survey) indicate that Chinook and steelhead utilize the project reach in both the winter and summer and that this is essential overwintering habitat for Chinook. Two pools in the project reach currently have the highest densities of overwintering juvenile Chinook in the Catherine Creek basin. Both of these pools have a residual depth greater than 1 meter. The pool that has the highest density of juvenile Chinook has the only key large wood members found interacting with the stream in the reach.

This project will address one of the largest deficiencies in the lower reaches of Catherine Creek, the lack of functioning large wood. Project construction will increase the number of key members of large wood per mile by almost 500%. The project will add large wood to four existing pools and greatly enhance cover and flow diversity. In addition, the project will create one large pool that mimics the existing pool upstream to provide excellent habitat for both summer and winter. The completed project will stabilize the banks in two locations by adding logs with rootwads. This will decrease sedimentation and provide low velocity refuge.

Public Awareness

Does this proposed project include public awareness activities?

- Yes
 No

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

This project will be presented in the Districts annual newsletter that is sent out through the local newspaper and is also available in our office.

Design

Were design alternatives considered?

- Yes
 No

Describe the design alternatives that were considered and why the preferred alternative was selected.

Project development for this restoration effort has been in the planning phase for the past 7 years. Over this time several alternatives have been considered. The no action alternative was examined and dismissed because it would result in continued decrease in habitat through the project reach.

The second alternative considered included moving the Catherine Creek channel into the relic meandering channel. The challenge for this alternative is that the historic channel runs through an area that the landowners use to overwinter their cattle with several outbuildings and corrals. The District and the landowners examined several options to overcome this challenge. The option of relocating the structures and corrals was posed but, a suitable location was not identified on the property. The infrastructure could be left in place but an easement could not be developed around the new channel to provide sufficient access for the landowner to operate and use the property. The landowners had the District examine other easement options and even look into the sale of the property. The District developed a map and worked with FSA and NRCS to generate price quotes for a CREP enrollment. Again, a location on the property could not be identified to move the cattle operation and the payments were deemed insufficient to cover the expense. Several local land trust organizations were identified to look into permanent easements but were told the property was too small to make that option feasible. We even investigated the sale of the property, but the landowners did not want to sale the entire property, just that area that would be impacted by the project. County land use laws would not allow us to parcel off a smaller section of the property. After an extensive examination of alternative 2 it was determined that none of the options would work with the landowner's operations.

The third alternative identified was activating the historic channel as a side channel. Two options to achieve this alternative were proposed. The first option was to develop an open, engineered inlet and the second was to design a blind channel to activate the historic channel. Several concerns from this alternative were identified. Flooding and access removed the first option from moving forward. The second option has not been eliminated from discussion however, the landowners would like to see how a blind channel constructed on a project upstream functions over time before agreeing to such actions.

The fourth alternative included instream habitat restoration and the creation of a side channel in a three acre parcel on the north side of the channel. The side channel was discussed with the landowner and over time was deemed to impact grazing too much to work with the cattle operation and consequently was dropped from design. The instream habitat work was carried on to the current design. The 15% concepts developed by the BOR have been approved by the Grande Ronde Model Watershed Implementation Team, ODFW Life Cycle Monitoring Biologists, the landowners and the USWCD.

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"

The project is being submitted at the 30% level with 80% being provided June 23, 2020 and final design

expected December 1, 2020. Project design have been in the development process for the last 7 years. The design at this point is not anticipated to change significantly and we feel very comfortable with the cost estimates provided.

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

Project construction will be conducted using HIP IV guidelines to reduce impacts to the project site. In addition, guidance will be provided from the UFWS to further reduce potential impacts. All efforts will be made to save and protect existing vegetation.

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 Over Site and Fiscal Management	Jim Webster	Union Soil and Water Conservation District	District Manager with several years experience funding and implementing complex instream restoration projects.	jwebster@unionswcd.org	(541) 963-1313
Project Management, Construction Observation, and Revegetation management	Aaron Bliesner	Union Soil and Water Conservation District	Project Leader - Grande Ronde Restoration with several years experience funding and implementing complex instream restoration projects.	abliesner@unionswcd.org	(541) 963-1313
Construction Observation and Revegetation	Deric Carson	Union Soil and Water Conservation District	Watershed Coordinator with many years of data collection and dissemination experience, construction observation, and post construction revegetation management.	dcarson@unionswcd.org	(541) 963-1313
Construction Observation and Project	Vance McGowan	Tetra Tech.	Mr. McGowan has 38 years of experience in fisheries biology, including 8 years of hatchery experience, 28 years of fish and aquatic habitat restoration and 2 years of fish life history studies, and currently a project manager with Tetra Tech.	vance.mcgowan@tetrattech.com	(541) 962-5216

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*

Will effectiveness monitoring be conducted for this project?

- Yes
- No

Please describe the monitoring activities and any additional sources of funding (amount and source) to support this effort.

During construction salmonids that are captured will be recorded by species, age class and condition. Fish will be released approximately 1 mile upstream of the project site in a deep pool (3.5 feet) on the Hefner/Langford property.

The District will conduct 5 years of photo monitoring and three years of plant establishment monitoring. The District will seek salmonid use and densities studies through our project partners but have not identified funding sources at this time.

Budget

Item	Unit Type	Unit Number	Unit Cost	OWEB Funds	External Cash	External In-Kind	Total Costs
Salaries, Wages and Benefits							
Jim Webster (USWCD) Project Oversight and Fiscal Management	Hours	75	\$47.58	\$0 *	\$0	\$3,569	\$3,569
Aaron Bliesner (USWCD) Project Management and Construction Oversight	Hours	150	\$30.00	\$2,250 *	\$0	\$2,250	\$4,500
Deric Carson (USWCD) Construction Oversight and Planting	Hours	200	\$25.00	\$2,500 *	\$0	\$2,500	\$5,000
Chris Moats Cultural Resource Inventory	Hours	40	\$27.00	\$0 *	\$0	\$1,080	\$1,080
Category Sub-total				\$4,750	\$0	\$9,399	\$14,149
Contracted Services							
Mobilization and Demobilization (In-Kind Cash Provided by USFWS)	Each	1	\$34,717.00	\$14,717 *	\$20,000	\$0	\$34,717
Clearing and Grubbing	Acres	0.5	\$7,150.00	\$3,575 *	\$0	\$0	\$3,575
Large Woody Debris	Each	220	\$400.00	\$88,000 *	\$0	\$0	\$88,000
Racking Material	Each	137	\$10.00	\$1,370 *	\$0	\$0	\$1,370
Slash Material	Cubic yards	60	\$20.00	\$1,200 *	\$0	\$0	\$1,200
Ballast Boulders	Each	52	\$50.00	\$2,600 *	\$0	\$0	\$2,600
3-Log Structure	Each	6	\$342.00	\$2,052 *	\$0	\$0	\$2,052
Meander Bend Structure	Each	2	\$2,416.00	\$4,832 *	\$0	\$0	\$4,832
Revetment Structure	Each	2	\$3,949.00	\$7,898 *	\$0	\$0	\$7,898
Revetment Structure	Each	2	\$3,949.00	\$7,898 *	\$0	\$0	\$7,898
Floodplain Toe Structure	Each	7	\$640.00	\$4,480 *	\$0	\$0	\$4,480
Floodplain Large Wood Structure	Each	4	\$160.00	\$640 *	\$0	\$0	\$640
Floodplain Bench Excavation	Cubic yards	630	\$8.00	\$5,040 *	\$0	\$0	\$5,040
Construction Area BMPS	Each	1	\$6,000.00	\$6,000 *	\$0	\$0	\$6,000
Riparian Seed Mix	Pounds	30	\$15.30	\$459 *	\$0	\$0	\$459
Upland Seed Mix	Pounds	45	\$5.00	\$225 *	\$0	\$0	\$225
Potted Riparian Plants	Each	150	\$5.50	\$825 *	\$0	\$0	\$825
Potted Riparian Plants	Each	150	\$5.50	\$825 *	\$0	\$0	\$825
Riparian Plugs Plants	Each	200	\$1.30	\$260 *	\$0	\$0	\$260
Water Control and Dewatering	Each	1	\$10,000.00	\$10,000 *	\$0	\$0	\$10,000
Project Cleanup and Repairs	Each	1	\$5,000.00	\$5,000 *	\$0	\$0	\$5,000
Fencing and Repair (Landowner)	Each	1	\$5,000.00	\$0 *	\$0	\$5,000	\$5,000
Fiscal Management and Reporting (Jesse Steele GRMW)	Each	1	\$1,800.00	\$0 *	\$0	\$1,800	\$1,800
Project Partners Fish Salvage (Equipment and Labor)	Each	1	\$8,449.00	\$0 *	\$0	\$8,449	\$8,449
Section 106 Clearance: Cultural Resource Inventory and Report	Each	1	\$6,440.00	\$6,440 *	\$0	\$0	\$6,440
Category Sub-total				\$174,336	\$20,000	\$15,249	\$209,585
Travel							
Round Trip Site Visits at 27.6 Miles	Miles	690	\$0.58	\$0 *	\$0	\$397	\$397
Category Sub-total				\$0	\$0	\$397	\$397

Materials and Supplies							
			\$0	\$0	\$0	\$0	\$0
Category Sub-total				\$0	\$0	\$0	\$0
Equipment							
			\$0	\$0	\$0	\$0	\$0
Category Sub-total				\$0	\$0	\$0	\$0
Other							
			\$0	\$0	\$0	\$0	\$0
Category Sub-total				\$0	\$0	\$0	\$0
Modified Total Direct Cost Amounts				\$179,086	\$20,000	\$25,045	\$224,131
Indirect Costs							
Federally Negotiated Indirect Cost Rate			Override Amount			\$2,204	
Post Grant							
Status Reporting Amount	Status Reporting	3	\$250.00	\$750	\$0	\$0	\$750
Effectiveness Monitoring Amount	Effectiveness Monitoring	1	\$250.00	\$250	\$0	\$0	\$250
Total				\$182,290	\$20,000	\$25,045	\$227,335

* = OWEB funds excluded from indirect.

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

N/A

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.

N/A

Funding and Match

Fund Sources and Amounts

Organization Type	Name	Source Note	Contribution Type	Amount	Description	Status
Landowner	John and Brennan Sheehy	Fencing	In-Kind - Labor	\$5,000	Fencing and Repair	Pending
Non-Governmental Organization	Project Partners	Fish Salvage	In-Kind - Labor	\$8,449	Labor and equipment	Pending
Non-Governmental Organization	Union Soil and Water Conservation District	Labor	In-Kind - Labor	\$9,796	Project Management	Secured
Non-Governmental Organization	Jesse Steele Grande Ronde Model Watershed	Fiscal Oversight	In-Kind - Labor	\$1,800	Fiscal Oversight	Pending
Federal	United States Fish and Wildlife Service	PROJECTS Program	Cash	\$20,000	Project construction	Pending
Fund Source Cash Total			\$20,000	Fund Source In-Kind Total		\$25,045

Match

Contribution Source-Type: Description	Amount
John and Brennan Sheehy-In-Kind - Labor: Fencing and Repair	\$5,000
Project Partners-In-Kind - Labor: Labor and equipment	\$8,449
Union Soil and Water Conservation District-In-Kind - Labor: Project Management	\$9,796
Jesse Steele Grande Ronde Model Watershed-In-Kind - Labor: Fiscal Oversight	\$1,800
United States Fish and Wildlife Service-Cash: Project construction	\$20,000
Match Total	\$45,045

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 cash funding include Pacific Coast Salmon Recovery Funds?

- Yes
 No

Uploads

Federally Negotiated Indirect Cost Rate Plan: [Uswc-Na.19F&21P_UnionSWCD.pdf - Indirect Cost Form](#)

Map: [CC RM 38 Stream Restoration Portrait Letter.pdf - Site Map](#)

Project Design: [Catherine Creek RM 38 - 30_Percent_Design_05-27-2020.pdf - 30% Design and Draft BOD Report](#)

Secured Match Forms: [CC38 match form_JGWsigned.pdf - Match Form](#)

Figures and Tables: [IT Proposal Comment Summary CC-38_AKB_vs2_final.pdf - Proposal Questions Response](#)

Figures and Tables: [UGR FIP 2020 Summer Cycle_OWEB Comments_USWCD Responses 061220_CC38 Stream Restoration.pdf - OWEB Questions Response](#)

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.

Currently the riparian condition for the project reach is considered in good functioning state with dense native vegetation. Over the past 30 years the landowner has taken an active role in maintaining streamside vegetation by fencing the stream off from livestock grazing and planting areas with limited vegetation. Over this time period the landowner was unable to establish riparian vegetation at four locations totaling about 0.23 acres. At all four locations the streambanks are vertical and incised within 4-6 foot banks and disconnected from the water table. This project intends to target these four locations for restoration and minimize damage to existing vegetation at all other locations.

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.

The project will reslope the streambanks at all four of the locations described above. The slopes will be cut to enable inundation during bankfull flow events to encourage deposition and increase connectivity with the water table. Stocked piled topsoil will be placed back over the excavated streambanks to increase the chances of survival of freshly planted vegetation. Access roads will be ripped and smoothed out to original grade.

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
Forested Wetlands and Riparian Forests	0.23	15 lb/acre native riparian seed mix
Forested Wetlands and Riparian Forests	0.23	1200 stems/acre willow stakes
Forested Wetlands and Riparian Forests	0.23	150 stems/acre potted plants
Forested Wetlands and Riparian Forests	0.23	200 stems/acre plugs

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
Forested Wetlands and Riparian Forests	Riparian Seed Mix	TBD	Grass	Seeds	2021	October
Forested Wetlands and Riparian Forests	Willow sp.	Salicaceae sp.	Tree	Cutting	2021	August-November
Forested Wetlands and Riparian Forests	Black Cottonwood	Populus trichocarpa	Tree	Rooted	2021	October-November
Forested Wetlands and Riparian Forests	White Alder	Alnus rhombifolia	Tree	Rooted	2021	October-November

Forested Wetlands and Riparian Forests	Water Birch	Betula occidentalis	Tree	Rooted	2021	October-November
Forested Wetlands and Riparian Forests	Wood Rose	Rosa gymnocarpa	Shrub	Plugs	2021	October-November
Forested Wetlands and Riparian Forests	Current sp.	Ribes sp.	Shrub	Plugs	2021	October-November
Forested Wetlands and Riparian Forests	Blue Elderberry	Sambucus cerulea	Shrub	Plugs	2021	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.

The plants will be watered during the summer months every two weeks until the roots can become established and reach the water table.

Measures of Planting Success

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

Vegetation Community	Parameter	Percentages
Forested Wetlands and Riparian Forests	Percent Cover	85% cover for seeding
Forested Wetlands and Riparian Forests	Percent Survival	80% survival for potted and plug plants
Forested Wetlands and Riparian Forests	Percent Survival	60% survival for willow stakes

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

Seeding will be evaluated on an annual basis. If ground cover falls below targets the project site will be reseeded. In year 3 lower elevation locations where willow stakes were planted will be examined. If locations are determined to have insufficient stocking densities, additional willow stakes will be planted. Potted plants and plugs will be evaluated annually during watering for survival. If survival falls below targets watering schedules will be changed. If it is determined that browse is decreasing plant vigor plant caging options will be considered.

Permit Page

Project Activity Requiring a Permit or License	Name of Permit or License	Entity Issuing Permit or License	Status
Fill removal below OHW	DSL/ACOE Joint Permit	Oregon DSL and USACOE	Pending
Excavation	Section 106	Oregon SHPO	Pending
Instream Restoration	Section 7 Compliance	NOAA and USFWS	Pending
Instream work in waters of the state	Section 401 water quality permit	Oregon DEQ	Pending



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

State and Local Governments Indirect Cost Negotiation Agreement

EIN: 93-6007803

Date:

Organization:

Report No(s):

Union Soil & Water Conservation District
10507 N McAlister Road, Suite 7
La Grande, OR 97850-8716

Filing Ref.:
Last Negotiation Agreement
dated August 7, 2019

The indirect cost rates contained herein are for use on grants, contracts, and other agreements with the Federal Government to which 2 CFR Part 200 applies subject to the limitations in Section II.A. of this agreement. The rates were negotiated by the U.S. Department of the Interior, Interior Business Center, and the subject organization in accordance with the authority contained in applicable regulations.

Section I: Rates

Type	Effective Period		Rate	Locations	Applicable To
	From	To			
Final	07/01/18	06/30/19	14.75%*	All	All Programs
Provisional	07/01/20	06/30/21	46.40%**	All	All Programs

***Base:** Total direct costs, less capital expenditures and passthrough funds. Passthrough funds are normally defined as payments to participants, stipends to eligible recipients, or subawards, all of which normally require minimal administrative effort.

****Base:** Total direct salaries and wages, including fringe benefits. The rate applies to all programs administered by the non-federal entity. To determine the amount of indirect costs to be billed under this agreement, direct salaries and wages and related fringe benefits should be summed and multiplied by the rate. All other program costs should be eliminated from the calculation.

Treatment of fringe benefits: Fringe benefits applicable to direct salaries and wages are treated as direct costs; fringe benefits applicable to indirect salaries and wages are treated as indirect costs.

Section II: General

Page 1 of 3

A. **Limitations:** Use of the rate(s) contained in this agreement is subject to any applicable statutory limitations. Acceptance of the rate(s) agreed to herein is predicated upon these conditions: (1) no costs other than those incurred by the subject organization were included in its indirect cost rate proposal, (2) all such costs are the legal obligations of the grantee/contractor, (3) similar types of costs have been accorded consistent treatment, and (4) the same costs that have been treated as indirect costs have not been claimed as direct costs (for example, supplies can be charged directly to a program or activity as long as these costs are not part of the supply costs included in the indirect cost pool for central administration).

B. Audit: All costs (direct and indirect, federal and non-federal) are subject to audit. Adjustments to amounts resulting from audit of the cost allocation plan or indirect cost rate proposal upon which the negotiation of this agreement was based will be compensated for in a subsequent negotiation.

C. Changes: The rate(s) contained in this agreement are based on the accounting system in effect at the time the proposal was submitted. Changes in the method of accounting for costs which affect the amount of reimbursement resulting from use of the rate(s) in this agreement may require the prior approval of the cognizant agency. Failure to obtain such approval may result in subsequent audit disallowance.

D. Rate Type:

1. **Fixed Carryforward Rate:** A fixed carryforward rate is based on an estimate of the costs that will be incurred during the period for which the rate applies. When the actual costs for such periods have been determined, an adjustment will be made to the rate for future periods, if necessary, to compensate for the difference between the costs used to establish the fixed rate and the actual costs.

2. **Provisional/Final Rates:** Within six (6) months after year end, a final indirect cost rate proposal must be submitted based on actual costs. Billings and charges to contracts and grants must be adjusted if the final rate varies from the provisional rate. If the final rate is greater than the provisional rate and there are no funds available to cover the additional indirect costs, the organization may not recover all indirect costs. Conversely, if the final rate is less than the provisional rate, the organization will be required to pay back the difference to the funding agency.

3. **Predetermined Rate:** A predetermined rate is an indirect cost rate applicable to a specified current or future period, usually the organization's fiscal year. The rate is based on an estimate of the costs to be incurred during the period. A predetermined rate is not subject to adjustment. (Because of legal constraints, predetermined rates are not permitted for Federal contracts; they may, however, be used for grants or cooperative agreements.)

E. Rate Extension: Only final and predetermined rates may be eligible for consideration of rate extensions. Requests for rate extensions of a current rate will be reviewed on a case-by-case basis. If an extension is granted, the non-Federal entity may not request a rate review until the extension period ends. In the last year of a rate extension period, the non-Federal entity must submit a new rate proposal for the next fiscal period.

F. Agency Notification: Copies of this document may be provided to other federal offices as a means of notifying them of the agreement contained herein.

G. Record Keeping: Organizations must maintain accounting records that demonstrate that each type of cost has been treated consistently either as a direct cost or an indirect cost. Records pertaining to the costs of program administration, such as salaries, travel, and related costs, should be kept on an annual basis.

H. Reimbursement Ceilings: Grantee/contractor program agreements providing for ceilings on indirect cost rates or reimbursement amounts are subject to the ceilings stipulated in the contract or grant agreements. If the ceiling rate is higher than the negotiated rates in Section I of this agreement, the negotiated rates will be used to determine the maximum allowable indirect cost.

I. Use of Other Rates: If any federal programs are reimbursing indirect costs to this grantee/contractor by a measure other than the approved rate(s) in this agreement, the grantee/contractor should credit such costs to the affected programs, and the approved rate(s) should be used to identify the maximum amount of indirect cost allocable to these programs.

J. Central Service Costs: If the proposed central service cost allocation plan for the same period has not been approved by that time, the indirect cost proposal may be prepared including an amount for central services that is based on the latest federally-approved central service cost allocation plan. The difference between these central service amounts and the amounts ultimately approved will be compensated for by an adjustment in a subsequent period.

K. Other:

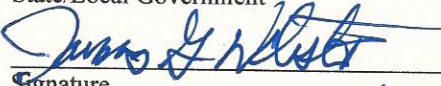
1. The purpose of an indirect cost rate is to facilitate the allocation and billing of indirect costs. Approval of the indirect cost rate does not mean that an organization can recover more than the actual costs of a particular program or activity.
2. Programs received or initiated by the organization subsequent to the negotiation of this agreement are subject to the approved indirect cost rate(s) if the programs receive administrative support from the indirect cost pool. It should be noted that this could result in an adjustment to a future rate.
3. Indirect cost proposals must be developed (and, when required, submitted) within six (6) months after the close of the governmental unit's fiscal year, unless an exception is approved by the cognizant agency for indirect costs.

Section III: Acceptance

Listed below are the signatures of acceptance for this agreement:

By the State or Local Government:

Union Soil & Water Conservation District
State/Local Government

 /s/
Signature

James G. Webster
Name (Type or Print)

District Manager
Title

5/27/2020
Date

By the Cognizant Federal Government Agency:

U.S. Department of the Interior
Cognizant Agency

_____/s/
Signature

Craig A. Wills
Name

Division Chief
Indirect Cost Services Division
Title

Negotiated by Elena Chan
Telephone (916) 930-3824

Catherine Creek River Mile 38 Stream Restoration



Map created and copyrighted by Christopher Moats
Union Soil and Water Conservation District 16DEC2019

The Union Soil and Water Conservation District makes
no representation or warranties, implied or expressed,
concerning the accuracy, completeness, reliability, or
suitability for any purpose of the information and data
contained on this document.

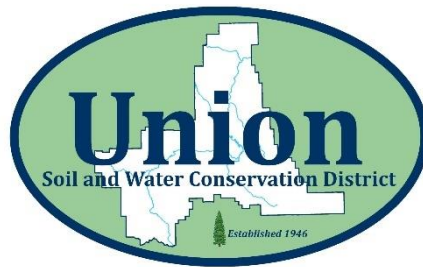
1 inch = 42 yards

N

Catherine Creek River Mile 38 Habitat Restoration Design

Basis of Design Report 30 Percent Design Submittal

Prepared for:



Union Soil and Water Conservation District

10507 North McAlister Road
La Grande, OR 97850

Prepared by:



19803 North Creek Parkway
Bothell, WA 98011
Tel 425-482-7600 Fax 425-482-7652

May 2020

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1. PROJECT BACKGROUND

The Catherine Creek River Mile (RM) 38 Habitat Restoration Design Project (Project) is being sponsored by the Union Soil and Water Conservation District (USWCD). Catherine Creek is a major tributary to the Grande Ronde River that originates in the Wallowa Mountains of the Wallowa-Whitman National Forest. The upper portions of the drainage are in proximity to China Cap Ridge at an elevation of approximately 7,500 feet. The creek flows to the north where it joins the Grande Ronde River at an elevation of 2,665 feet, approximately 6 miles southeast of the town of Imbler, Oregon. Major tributaries upstream of the Project site include the North, Middle, and East forks of Catherine Creek, Little Catherine Creek, and Milk Creek. The Project lies in Township 1 South, Range 39 East, Section 14, within private lands owned by the Sheehy family, and is located approximately 1 mile east of Union, Oregon (Figure 1-1). The lands are primarily managed for livestock grazing and hay production.



Figure 1-1. Project Vicinity Map

1.1 Fisheries Use and Limiting Factors

Catherine Creek is home to native Endangered Species Act (ESA)-listed summer steelhead (*Oncorhynchus mykiss*), spring and summer Chinook salmon (*O. tshawytscha*), and bull trout (*Salvelinus confluentus*). Fish use and timing of steelhead, Chinook salmon, and bull trout by life stage for the Catherine Creek assessment unit as developed through the Catherine Creek and Upper Grande Ronde River Atlas Restoration Prioritization Framework (BPA 2017) are illustrated in Figure 1-2. Darker shades of colors represent periods of high use, lighter shades of colors indicate limited use, and question marks indicate suspected but unconfirmed use.

Catherine Creek Periods of Occurrence in Assessment Unit CCC3A (Mainstem from Pyles Crk to Swackhammer Diversion)		Jan		Feb		Mar		Apr		May		June		Jul		Aug		Sept		Oct		Nov		Dec		
Species	Life Stage	1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31	
Chinook Salmon	Adult migration																									
	Adult Spawning																									
	Incubation/emergence																									
	Juvenile summer rearing																									
	Juvenile winter rearing																									
	Juvenile emigration																									
Steelhead	Adult migration																									
	Adult Spawning			?	?	?	?	?	?	?	?															
	Incubation/emergence			?	?	?	?	?	?	?	?	?	?													
	Juvenile summer rearing																									
	Juvenile winter rearing																									
	Juvenile emigration																									
Bull trout	Adult migration																									
	Adult Spawning																									
	Incubation/emergence																									
	Juvenile summer rearing																									
	Juvenile winter rearing																									
	Juvenile migration																									

Figure 1-2. Fish Periodicity Chart for ESA-listed fish in the CCC3A Assessment Unit (adapted from BPA 2017)

The Grande Ronde Subbasin Plan (NPCC 2005) lists several limiting factors that were assessed in the Ecosystem Diagnosis and Treatment (EDT) modeling of this area. The most important limiting factors to address include habitat diversity and key habitat quality (primarily pools and large wood), temperature, and sediment. Lower priorities to address are competition with hatchery fish, flow, food, pathogens, predation (NPCC 2005). The ESA Recovery Plan for Northeast Oregon Snake River Spring and Summer Chinook Salmon and Snake River Basin Steelhead Populations (NOAA 2017) noted similar limiting factors, and notably included low summer flows, poor fish passage, and impaired riparian conditions. The recovery plan lists the Catherine Creek spring Chinook salmon population as high risk for extinction. Limiting factors were also reviewed and refined during development of the Catherine Creek and Upper Grande Ronde River Atlas Restoration Prioritization Framework (Atlas) (BPA 2017). During development of the Atlas, the Grande Ronde Subbasin was divided into geographic areas and as a result, the Project lies within the CCC3A assessment unit. The Atlas used National Oceanic and Atmospheric Administration (NOAA) “ecological concerns” (i.e., limiting factors) and ranked them as a High, Medium, Low priority, or not applicable. The

limiting factors and the priority rankings assigned by the Atlas Development Team that apply specifically to this assessment area are shown in Table 1-1 below.

Table 1-1. Limiting Factors and Priority Rankings within the CCC3A Catherine Creek Assessment Unit

NOAA Standardized Limiting Factor	Atlas Ranking
1.1: Habitat Quantity: Anthropogenic Barriers	Medium
4.1: Riparian Condition: Riparian Condition	High
4.2: Riparian Conditions: Large Wood Recruitment	High
5.1: Peripheral and Transitional Habitats: Side Channel and Wetland Conditions	High
5.2: Peripheral and Transitional Habitats: Floodplain Condition	High
6.1: Channel Structure and Form: Bed and Channel Form	High
6.2: Channel Structure and Form: Instream Structural Complexity	High
7.2: Sediment Conditions: Increased Sediment Quantity	Medium
8.1: Water Quality: Temperature	High
9.2: Water Quantity: Decreased Water Quantity:	High

1.2 Project Purpose, Goal and Objectives

The overall purpose of this Project is to produce construction-ready designs that improve conditions for ESA-listed fish and other native fish species. The USWCD and Tetra Tech established a goal and measurable objectives for this Project. The Project goal is to enhance and increase natural channel function and processes that improve habitat suitability for spawning and rearing summer steelhead, spring Chinook salmon and other native fish and wildlife resources, while considering landowner constraints and maintaining conditions for productive farming and ranching activities.

The Project design for accomplishing that goal should be rigorous, data-driven, constructability-focused, and permit-ready such that, when implemented, will restore in-stream and riparian conditions in Catherine Creek to the benefit of aquatic species of concern. Included in this goal is the need to understand the hydrologic, geomorphic and ecological processes of Catherine Creek in order to develop restoration techniques that make measurable improvements toward addressing identified key limiting factors. Progress toward the goal will complement appropriate land management strategies of the landowner and work in concert with established planning documents that include:

- Grande Ronde Subbasin Plan (NPCC 2005);
- ESA Recovery Plan for Northeast Oregon Snake River Spring and Summer Chinook Salmon and Snake River Basin Steelhead Populations (NOAA 2017), and;

- Catherine Creek and Upper Grande Ronde River Atlas Restoration Prioritization Framework (Atlas) (BPA 2017).

The Project is intended to restore ecological functions while maintaining landowner management practices and protection of local infrastructure. To address the overall Project goal, the following Project objectives were identified:

- Increase the number of large wood pieces and jams;
- Increase overall habitat diversity;
- Increase juvenile rearing habitat and adult spawning habitat;
- Increase stem density (number per area) of native shrubs and trees using site-appropriate native vegetation; and
- Increase number and depth of pools.

Implementation of the Project will address lack of complex pool habitat, actively eroding streambanks, and poor riparian conditions as the key limiting factors identified for Catherine Creek in this reach. Figure 1-3 illustrates one of the sites exhibiting these conditions and is proposed for large wood additions and plantings.



Figure 1-3. Example of an Existing Pool Lacking Instream Complexity and Riparian Vegetation.

2. RISK ASSESSMENTS AND DESIGN CRITERIA

The Project poses some potential risks to existing infrastructure or resources, including:

- Private roads, fences and corrals, and an irrigation pump along the left bank (west side) of the stream;
- Hay fields along the right bank (east side) of the stream; and
- Downstream landowner residences and outbuildings.

Design criteria for Project elements, including associated risks to infrastructure or failure to perform, compensating analyses, along with habitat benefits are summarized in Table 2-1.

Table 2-1. Project Elements, Purpose, Design Criteria, Risks, Compensating Analyses, and Habitat Benefits

Project Element	Primary Purpose	Design Criteria	Risk Assessment	Compensating Analyses	Habitat Benefits
3-Log Cross Structures	Add habitat complexity in pools.	<ul style="list-style-type: none"> Stable up to the proposed 10-year flood hydraulic conditions. Partial buried of tops where more stability is required. 	<ul style="list-style-type: none"> A private bridge is located 0.4 miles downstream of the Project. 	<ul style="list-style-type: none"> LWD stability calculations (will be included at the 80% design). 	<ul style="list-style-type: none"> Provide complex instream and overhanging cover in pools for adults and juveniles.
Meander Bend LWD Structure	Complex pool habitat and bank stability.	<ul style="list-style-type: none"> Stable up to the proposed 10-year flood hydraulic conditions where needed to trap migrating LWD. 	<ul style="list-style-type: none"> Potential for lateral erosion around the structure. A private bridge located 0.4 miles downstream. 	<ul style="list-style-type: none"> LWD stability calculations (will be included at the 80% design). 	<ul style="list-style-type: none"> Large, complex, and deep pools. Velocity refugia and diversity.
Revetment Log Structure	Bank stability.	<ul style="list-style-type: none"> Stable up to the proposed 100-year flood. 	<ul style="list-style-type: none"> Placed in areas where lateral erosion is not acceptable. 	<ul style="list-style-type: none"> Highly stable structure. LWD stability calculations (will be included at the 80% design). 	<ul style="list-style-type: none"> Complex instream cover and small pools for juveniles. Sediment reduction.
Floodplain Toe LWD Structures	Complex pool habitat and bank stability.	<ul style="list-style-type: none"> Stable up to the proposed 10-year flood hydraulic conditions. 	<ul style="list-style-type: none"> Potential for lateral erosion around the structure. 	<ul style="list-style-type: none"> LWD stability calculations (will be included at the 80% design). 	<ul style="list-style-type: none"> Low velocity micro habitat and cover for juveniles.
Revegetation	Revegetation of all disturbed areas.	<ul style="list-style-type: none"> Use site-appropriate native vegetation. 12-month plant survival of >75%. 	<ul style="list-style-type: none"> Potential for low survival. Noxious weed infestations. 	<ul style="list-style-type: none"> Technical specifications for plant handling, care, installation, and survival. Maintenance of existing riparian fencing to protect vegetation from livestock browse. Noxious weeds shall be monitored and removed. 	<ul style="list-style-type: none"> Long term shading of the stream and overhanging cover. Reduced erosion and sediment production.

3. SITE CONDITIONS AND ANALYSES

This section summarizes information on historical and current impacts on the watershed and Project reach, and presents information developed specifically for the Project design.

3.1 Past and Present Impacts on Stream, Riparian, and Floodplain Conditions

Primary impacts to Catherine Creek started with settlement in the mid-nineteenth century and the watershed has since been heavily influenced by livestock grazing, timber harvest, fire suppression, beaver trapping, and road construction (NPCC 2005). Attempts to control bank erosion are evident by the presence of old rock barbs, many of which have come apart, with single boulders scattered in the vicinity. The history of land use practices has degraded the stream channel resulting in channel incision and significant loss of sinuosity and floodplain connectivity. The Catherine Creek is 303(d) listed by the Oregon Department of Environmental Quality as water quality limited for temperature, flow, and sediment (ODEQ 2012). Several irrigation diversions occur in Catherine Creek both upstream and within the Project that severely reduce summer flows.

Historically, riparian areas in Catherine Creek have been severely impacted and resulted in reduced canopy cover, species composition, structure, and LWD recruitment. Riparian conditions within the Project are variable, with some fenced and protected areas providing good plant density and canopy, while other areas have little to no trees or shrubs (Figure 3-1). The vegetation in the Project area consists of a mixture of riparian and upland species and includes young planted ponderosa pine (*Pinus ponderosa*) and hardwoods including alder (*Alnus* sp.), black cottonwood (*Populus balsamifera*), red osier dogwood (*Cornus sericea*), hawthorn (*Crataegus* sp.) and willows (*Salix* sp.). Shrubs species include wild rose (*Rosa*, sp.) and snowberry (*Symphoricarpo* sp.). Streambanks contained various sedges (*Carex* sp.) and rushes (*Juncus* sp.). No invasive species were observed during surveys.

The National Wetlands Inventory (NWI) shows two types of wetlands within or near the Project area. A narrow band of R3UBH (Riverine) wetlands are identified along nearly the entire length of the Catherine Creek channel, with the exception of the upstream 160 ft. where a narrow band of PFOA (Freshwater Forested/Shrub) wetland is mapped. Additional PFOA and PEM1C (Freshwater Emergent) wetlands occur in the remnant channels on the west bank, but those are outside the impacted areas.



Figure 3-1. Upstream View Showing Variable Riparian Vegetation Conditions within the Project.

3.2 Geomorphic Conditions and Constraints on Physical Processes

Desktop analyses and field surveys were conducted to provide adequate information regarding geomorphic conditions and constraints on physical processes to be considered in the design analyses. Field survey data was collected for hydrologic and geomorphic analyses, for performing hydraulic modeling, for evaluating and identifying physical habitat features present in the Project area, and to develop engineering designs.

The Catherine Creek valley is wide and historically the stream was mostly unconstrained. However, past land management practices led to channel incision and the stream with the Project reach is constrained by high terraces. Instream natural wood is mostly small and infrequent, occurring in clusters at a few sites, and falls well outside the recommended pieces per mile for the watershed. Fox and Bolton (2007) determined that larger streams (6 to 30 meters bankfull width) in Douglas fir-ponderosa pine forests east of the cascades averaged 16 pieces per 100 meters in unmanaged forested basins.

The existing conditions hydraulic modeling of flood extents at the 2- and 100-year flood recurrences illustrating floodplain connectivity of the Project reach are shown on the drawings in Appendix A. More detailed descriptions of geomorphic conditions are included are described below.

3.3 Site Surveys

Site survey information to support the initial assessment and design for the Project was collected by Anderson Perry in 2017. Raw static data from the base station was sent in to the Online Positioning User Service (OPUS) for post-processing and conversion to the preferred coordinate system: North American Datum (NAD) 83, Oregon State Plane, North Zone for the horizontal projection, and to the North American Vertical Datum (NAVD) 88, using International feet, as the vertical projection. Several additional control points were established and marked with rebar and caps. Field data collected included topographic and bathymetric coordinates, including locations and descriptions of key features including road crossings, fence lines and gates, pipes, berms, ditches, culverts, and power lines was collected during field surveys. The survey consisted of approximately 1,200 Global Positioning System (GPS) and Total Station points and included survey cross sections at approximately 50-ft. spacing.

Due to changes in the channel that have occurred since 2017, a supplemental survey will be conducted by Tetra Tech in July 2020 prior to completion of the 80 percent design that will include more detailed collection of channel thalweg, waters edges, and ordinary high water profiles. Habitat units (pools, riffles, runs, and glides) will also be collected. This more detailed survey will allow for detailed analyses of stream geomorphology.

Table 3-1 shows the preliminary existing conditions geomorphic characteristics based on the 2017 survey data. Categories listed as TBD (to be determined) will be included at the 80 percent design stage. The existing channel morphology (Montgomery and Buffington 1997) and stream type (Rosgen 1996) were evaluated based on field data and observations. Most of the cross sections fell within the definition of a Rosgen (1996) C-3 channel type.

Table 3-1. Geomorphic Characteristics of Catherine Creek

Stream Characteristic	Project
Stream Length (feet)	1,450
Side Channel Length (feet)	N/A
Channel Gradient (percent)	0.43
Sinuosity	1.25
Bankfull Width (feet)	TBD
Bankfull Depth (feet)	TBD
Bankfull Cross Sectional Area (square feet)	TBD
Width-to-Depth Ratio	TBD
Floodprone Width (feet)	TBD
Entrenchment Ratio	TBD
Channel Morphology	Pool-Riffle
Rosgen Stream Type	C3
Pool-to-Pool Spacing (feet)	TBD
Percent Run	TBD
Percent Riffle	TBD
Percent Glide	TBD
Percent Pool	TBD
LWD >35 feet long and >12 inches in diameter	TBD

TBD = To be determine following more detailed surveys in July 2020.

Based on visual estimates, substrate appears to be gravel and cobble dominated. Prior to the next design stage pebble counts will be collected using sampling methods similar to those described in Bunte and Abt (2001). The pebble count substrate samples will be collected in representative riffles. Table 3-2 will be filled in at the next design stage and will contain the sediment characteristic metrics including the percentages based on size categories (percent fines, gravels, cobbles, boulders, and bedrock) and the characteristic grain sizes (e.g., D₅₀, D₈₄) of the bed material

Table 3-2. Substrate Size Characteristics Based on Pebble Counts in Riffles (*pending results*)

Substrate Characteristics	Project
Silt/Clay (percent)	TBD
Sand (percent)	TBD
Gravel (percent)	TBD
Cobble (percent)	TBD
Boulder (percent)	TBD
D ₁₆ (mm)	TBD
D ₃₅ (mm)	TBD
D ₅₀ (mm)	TBD
D ₆₅ (mm)	TBD
D ₈₄ (mm)	TBD
D ₉₅ (mm)	TBD

3.4 Hydrology

Catherine Creek lies within the Upper Catherine Creek Watershed [hydrologic unit code (HUC) 10] 1706010405. Hydrologic analysis included evaluation of drainage characteristics at the Project location and estimate of peak flows by two methodologies: gage transfer and regional prediction equations.

3.4.1 Drainage Characteristics

Characteristics of the drainage associated with the Project site were identified for use in estimating design peak flows for Catherine Creek. In addition, drainage characteristics for two Oregon Water Resources Department (OWRD)-operated stream gages, #13320000 Catherine Creek NR Union, OR and #13320300 Catherine Creek at Union, at RM 46.8 and RM 39.3 respectively, were identified to determine if a gage transfer (i.e., using data from another existing gage at an ungaged but similar site) was applicable. Gage #13320000 is approximately 8.5 miles upstream of the Project with a period of peak flow records from 1911 to 2014. Gage #13320300 is approximately 1 mile upstream of the Project with a period of peak flow record from 1997 to 2012. The drainage basin area of the Project site is 112 square miles, compared to 105 square miles at gage #13320000 and 111 square miles at gage #13320300. Table 3-3 provides the drainage characteristics for Catherine Creek at the Project taken from the OWRD Peak Discharge Estimation Mapping Tool.

Table 3-3. Catherine Creek RM 38 Drainage Characteristics

Drainage Characteristics (unit)	Project
Drainage Area (square miles)	112
Mean Slope (degrees)	15.7
Mean Elevation (feet)	5,120
Maximum Elevation (feet)	8,680
Minimum Elevation (feet)	2,715
Soil Storage Capacity (inches)	0.153
Soil Mean Permeability (inches/hour)	1.170
Mean Annual Precipitation (inches)	37.5
Mean January Maximum Temperature (degrees Fahrenheit)	31.6

3.4.2 Gage Evaluation & Transfer

No stream gage exists at the Project site, therefore the gages operated by the OWRD were evaluated as candidate gages for calculating peak discharges by weighting the gage data by a ratio of drainage areas (Thomas et al. 1994; Sumioka et al. 1998; Knowles and Sumioka 2001; Cooper 2006). The OWRD gage #13320000 recorded 93 years of peak flow data from 1912 through 2014. The gage was not in operation from 1913 through 1914, 1920 through 1925, 1997 through 1998, and again in 2010. This gage was determined to be suitable for use because the area of the Project site falls within threshold of 0.5 and 1.5 times the drainage area of the gaged site, which Sumioka et al. (1998),

Knowles and Sumioka (2001), and Cooper (2006) have identified as the preferred ratio for a gage transfer, and the amount of peak flow records obtained.

Gage #13320300 recorded peak flow values from 1997 to 2012, a total of 16 years. Due to the drainage area ratio, this gage is a candidate for calculating peak flows, however, since the gage has less peak flow records than gage #13320000, gage #13320000 was selected to calculate design peak flows for the Project.

A Bulletin 17C Flood Flow Frequency Analysis (England et. al., 2019) was performed for gage #13320000. Flow values occurring in the 1997, 1998, and 2010 floods recorded by gage #13320300 were inserted into the peak flow record for gage #13320000 to account for the missing large flood records in those years. Hydrologic Engineering Center’s (HEC) Statistical Software Package (HEC-SSP) version 2.2 was utilized to perform the Bulletin 17C Flood Flow Frequency Analysis for gage #13320000 from 1926 through 2014, a total of 89 years of peak flow record, see Table 3-4 below. Recorded peak flows before 1926 were not used in order to generate a continuous data set without inserting assumed thresholds for missing data.

Upon completion of the Bulletin 17C Flood Flow Frequency Analysis, a gage transfer was performed to estimate the peak flows at the Project location. OWRD Estimation of Peak Discharges for Rural, Unregulated Streams in Eastern Oregon (Cooper, 2006) was used to estimate the Project design flows (see Table 3-4) and these were utilized for the existing conditions hydraulic model.

Table 3-4. Bulletin 17C Peak Flows for Gage #13320000 and Project Design Peak Flows in cubic feet per second (cfs)

Recurrence Interval (years)	Gage #1332000 Peak Flows (cfs)	Project Design Peak Flows (cfs)
2	765	815
5	1,061	1,129
10	1,259	1,340
25	1,513	1,610
50	1,703	1,812
100	1,895	2,016

The recurrence interval for ordinary high water (OHW) discharge is typically around 1.5 to 2 years but can range from 1 to 32 years (Hey 1997). The 2-year recurrence interval in the hydraulic model was evaluated for comparison against OHW survey points collected from the topo-bathymetric field data described in Section 3.2. Upon completion of the existing conditions hydraulic model, OHW survey points matched up accurately with the 2-year recurrence interval results.

3.5 Hydraulic Modeling

Existing conditions hydraulic modeling was developed for the 30 percent design stage. A two-dimensional (2D) hydraulic model was created for the Project. The 2-D model was constructed

utilizing GeoHECRAS version 2.7 (March 18, 2020 release), coupled with AutoCAD Civil 3D (Civil 3D) 2020 as the primary software applications. GeoHECRAS combines Geographic Information Systems (GIS) and Hydraulic Engineering Center – River Analysis System (HEC-RAS) version 5.0.7 software into one user interface for efficient task management. Civil 3D was used as the main engine behind surface generation. The existing conditions modeling terrain was generated using the field collected topo-bathymetric survey data described in Section 3.3 and Light Detection and Ranging (LiDAR) data from 2007 (Watershed Sciences 2007).

The combined 2007 LiDAR and topo-bathymetric survey surface was used as the terrain component for the 2D modeling mesh. Breaklines were assigned for the existing thalweg, surveyed edge of water, OWH, top of bank, and raised linear features (e.g., roads, terraces, embankments, etc.) to accurately define the mesh geometry. Boundary conditions were set for each terminus, including inflow at the upstream end representing the recurrence interval peak flow, and normal depth at the downstream end representing the energy slope measured downstream.

The land use for the model was based on aerial imagery and knowledge gained from the site survey. The land use was delineated and assigned a Manning’s n roughness value. Roughness values generally follow recommendations provided by Chow (1959) as well as professional experience and judgement. Based on the aerial map, a land cover file was generated for Manning’s roughness values ranging from 0.04 to 0.10, representing the channel bottom, agricultural, riparian, forested, and residential areas. The roughness values used in the model are presented in Table 3-5.

Table 3-5. Manning’s Roughness Values by Land Use

Land Use/Land Cover	Manning’s n Value
Channel	0.04
Agricultural	0.045
Riparian	0.06
Forested	0.08
Residential	0.10

After entering the geometry and hydraulic parameter information, an unsteady mixed flow analysis was computed to review geometry input parameters and model calibration. The 2-year recurrence interval flow was used to calibrate the hydraulic model against the OHW indicators noted from the field survey.

3.6 Sediment Mobility and Transport

Under natural conditions, alluvial river systems tend towards a balanced state in which some erosion and deposition occurs during sediment transporting events but no net change in dimension, pattern, and profile occurs over the course of years (Montgomery and Buffington 1997; Rosgen 1996). Changes in the boundary conditions including sediment supply, channel form modification,

flow, or bank strength can upset the balance leading to a trend of aggradation or incision (Montgomery and Buffington 1997). In the case of the Catherine Creek, channel form modifications in the past included diversions, road construction, and installation of rock barbs leading to unnatural stream profiles that resulted in a loss of sinuosity and floodplain connectivity and altered sediment transport processes.

Using the sediment size analyses described in Section 3.3 above, and the results of the hydraulic analysis described in Section 3.5, an analysis of the existing channel sediment mobility (threshold of motion grain size) will be performed. The analysis will be performed by comparing the critical shear stress (shear stress required to initiate motion) for the median particle size with the bed shear stress at modeled return period peak flows. The details of the analysis will be provided at the next design stage.

3.7 Stability Analyses

Stability analyses for LWD structures will be provided in a Technical Memorandum at the 80 percent design stage.

4. DESIGNS

4.1 15 Percent Design Alternatives

Project development for this restoration effort has been in the planning phase for the past 7 years. Over this time, juvenile salmonid rearing habitat has declined. Four alternatives were considered for the Project. Alternative 1, the no action alternative, was first examined and dismissed as it would lead to a net decrease in habitat through the project reach. Over this same time period several more aggressive restoration options were considered.

Alternative 2 involved a complete remeander of Catherine Creek into its relic (1930s) channel. The challenge for this alternative was that the historic channel runs through an area that the landowners use to overwinter their cattle and contains several outbuildings and corrals. The USWCD and the landowners examined several options to overcome this challenge. The option of relocating the structures and corrals was posed but a suitable location was not identified on the property. The infrastructure could be left in place, but an easement could not be developed around the new channel to provide sufficient access to use the property that didn't inhibit the landowner's operation. The USWCD examined easement options that included developing a map and working with U.S. Department of Agriculture Farm Service Agency and Natural Resources Conservation Service to generate price quotes for enrollment into the Conservation Reserve Enhancement Program. Again, a location on the property could not be identified to move the cattle operation and the payments were deemed insufficient to cover the expense. Several local land trust organizations were also identified to consider the potential for permanent easements, but the property was

considered to be too small to make that option feasible. The sale of the property was also investigated, but the landowners did not want to sell the entire property, just the area that would be impacted by the project. However, county land use laws would not allow parceling off a smaller section of the property. After an extensive examination of Alternative 2 it was determined that none of the options would work with the landowner's operations.

Alternative 3 involved activating the historic channel as a side channel. Two options to achieve this alternative were proposed. The first option was to develop an open, engineered inlet and the second was to design a blind channel to activate the historic channel. Several concerns from this alternative were identified. Flood concerns and access removed the first option from moving forward. The second option has not been eliminated from discussion; however, the landowners would like to see how a blind channel constructed on a project upstream functions over time before agreeing to such actions.

Alternative 4 was then developed using a less aggressive approach that included instream habitat restoration using large wood (LWD) structures, and the creation of a side channel in a 3-acre parcel on the right bank (east) side of the creek. The potential side channel was discussed with the landowner and over time it was deemed to impact grazing too much to work with existing cattle operations and consequently was dropped from design. The instream habitat work components for 6 treatment sites were carried on to the 15 percent design stage by the U.S. Bureau of Reclamation (USBR) and were approved by the Grande Ronde Model Watershed Implementation Team, Oregon Department of Fish and Wildlife (ODFW) Life Cycle Monitoring biologists, the landowners, and the USWCD. The USBR informed the USWCD that it would not be able to advance the designs any further, leading to the hiring of Tetra Tech in March 2020 to complete the designs.

4.2 Revised 15 Percent Design Alternatives

During the Project kickoff meeting and review of the USBR design it was determined that a revised 15 percent design would be needed. One of the treatment sites was eliminated, and other minor modifications were proposed. Tetra Tech submitted the revised 15 percent design alternatives on April 16, 2020, and a design review meeting was conducted on April 22, 2020. Based on the review and recommendations by the design team, the USWCD determined that Tetra Tech could proceed to the 30 percent design stage.

4.3 30 Percent Design

Development of the 30 percent design (this submittal) includes more detailed engineering plans and drawings that include plan view, profile, and section drawings, specifications, materials quantities, and cost estimates, and incorporates the technical comments and recommendations received during the 15 percent alternatives review.

The primary Project elements incorporated into the design at this stage are discussed below and are summarized in Table 1-2 which includes the limiting factors addressed, and general design criteria.

Large Wood Structures – A total of 14 large wood (LWD) structures are proposed using four types of structures that will be utilized to serve a variety of purposes. The five LWD structures include: Three-Log Cross; Meander Bend; Revetment; Floodplain Toe (with and without floodplain benches), and Floodplain LWD structures. LWD placement strategies are intended to address identified limiting factors and provide a number of geomorphic functions and habitat benefits (Table 4-1). Racking material is included on all structures to help stabilize key tree members and add habitat complexity. Ballast boulders and spoils are used on some structures to provide stability against buoyancy and mobility in the areas upstream of potential risks, such as bridges.

Riparian Revegetation, Plantings and Seeding – Planting areas include native shrub, tree species. These will be placed along disturbed channels and streambanks and include live stakes and 1-gallon container plants. Seeding of disturbed areas will use a seed mix of several native species (Table 4-1) that include both riparian and upland species.

Table 4-1. Summary of Project Elements, Limiting Factors Addressed, and General Criteria

Project Elements	NOAA Limiting Factor(s) Addressed	General Criteria
LWD Structures	<p>4.2 - Riparian Condition (LWD Recruitment)</p> <p>6.1 and 6.2 - Channel Structure and Form (Bed and Channel Form and Instream Structural Complexity)</p> <p>7.2: Sediment Conditions: Increased Sediment Quantity</p>	<p>LWD structure types and placement were determined at the 30 percent design to provide geomorphic function and focal species habitat benefits:</p> <ul style="list-style-type: none"> • Geomorphic functions include: <ul style="list-style-type: none"> ○ Bank stability in areas of high risk ○ Increase floodplain complexity and ad roughness elements ○ Create new, or enhance existing scour pools ○ Provide minor increases in sinuosity ○ Increase overall channel roughness • Focal species habitat benefits include: <ul style="list-style-type: none"> ○ Increase number and complexity of pools ○ Provide instream and overhead hiding cover ○ Reduce fine sediments, and trap spawning gravels ○ Provide velocity diversity and refugia • Size criteria for large, medium, and small trees and racking materials for LWD structures are shown in the drawings in Appendix A, based on ODFW & ODF (2010) • Rootwads will generally be in contact in low summer flows (ODFW & ODF 2010) • Acceptable species for trees and logs shall be spruce, pine, Douglas fir, grand or white fir, and juniper. • Stabilize LWD where needed to protect infrastructure (D'Aoust and Millar 2000; USBR 2014)
Riparian Plantings	<p>4.1 - Riparian Condition (Riparian Vegetation)</p> <p>4.2 - Riparian Condition (LWD Recruitment)</p> <p>5.2 - Peripheral and Transitional Habitats (Floodplain Condition)</p> <p>8.1 – Water Quality (Temperature)</p>	<ul style="list-style-type: none"> • Reconnect floodplain areas to facilitate natural colonization of willows and improve food availability for beavers • Plant riparian vegetation - spacing, species, and densities suitable for the site based on regional climate and soil types • Riparian planting buffer width to edge of channel migration zone within limitations by landowner operations

4.4 Preliminary (80 Percent) Designs

Development of the Preliminary (80 percent) design will occur following review and approval of the 30 Percent Design.

4.5 Description of Disturbance and Potential Impacts

Construction is anticipated to occur during the 2021 in-water work window. According to Oregon guidelines, the in-water work window for Catherine Creek is July 1 to August 15. A proposed construction sequence to complete the Project in a single year is provided in Section 5.5. The specific areal extent of disturbance will be developed based on the results of the survey and hydraulic modeling. Potential impacts include impacts from noise and dust, temporary turbidity releases to the stream, minor impacts to resident fish populations from de-fishing activities, possible spills from construction equipment, colonization of disturbed ground by invasive vegetation, short term disturbance issues for landowners, and damage to existing vegetation along designated access routes. Overall impacts will be minimized through incorporation of general conservation measures criteria for specific restoration activity categories (see Section 5.1).

5. CONSTRUCTION DOCUMENTATION

The following sections provide preliminary construction documentation. Complete construction guidance will be included in the Implementation Plan at the final design stage.

5.1 Incorporation of PROJECTS General Conservation Measures and Design Criteria

The Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Services (PROJECTS) Contractor Handbook (USFWS and NMFS 2016) will be included in the contract documentation for construction, and relevant items will be included in the design drawings, construction provisions and specifications, and the implementation plan at the final design stages.

The PROJECTS Contractor Handbook identifies General Aquatic Conservation Measures applicable to all restoration actions that include but are not limited to:

- Site Layout and Flagging;
- Staging, Storage, Stockpile Areas;
- Erosion Control, Turbidity, and Hazardous Material Spill Prevention and Control;
- Equipment, Vehicles, and Power Tools;
- Temporary Access Roads, Paths, and Stream Crossings;
- Surface Water Withdrawal and Construction Discharge Water;

- Fisheries, Hydrology, Geomorphology, Wildlife, Botany, and Cultural Surveys;
- Work Area Isolation and Fish Capture and Release;
- Invasive Species and Non-native Plant Control; and
- Site Restoration and Revegetation.

PROJECT design criteria that shall be followed for Restoration Activity Categories applicable to the Project were identified as follows:

- 2 – Stream Channel Enhancement (Large Wood, Boulder, and Gravel Placement);
- 6 – Streambank Restoration; and
- 19 – Native Vegetation Restoration and Management.

Conservation measures design criteria will be included in the final contract documentation for construction, and relevant items will be included in the design drawings, construction specifications, and implementation plan. The overall design is anticipated to be compliant with all relevant PROJECTS general and species-specific conservation measures.

5.2 Design – Construction Plan Set for Project Bidding and Implementation

The Project plan sheets that include profile, section, and detail sheets that identify all Project elements and construction activities of sufficient detail to govern competent execution of Project bidding and implementation are attached as Appendix A. An outline of construction special provisions is included in the plan sheets.

5.3 List of all Proposed Project Materials and Quantities

Project materials and quantities are provided in Appendix A. The engineer's cost estimates will be provided as a separate document.

5.4 Site Access Staging and Sequencing Plan

The site access, staging, and sequencing plan are provided in Appendix A. Construction sequencing is expected to follow this general order of operation:

1. Complete clearing and grubbing.
2. Install temporary erosion and pollution control measures.
3. Install work area isolation, and conduct fish salvage measures.
4. Install LWD structures.
5. Restore and re-vegetate work areas.
6. Remove erosion control measures, work area isolation, and fish salvage measures.

Plans for work area isolation and dewatering were developed in compliance with PROJECTS general conservation measures. The erosion and pollution control plan and work area isolation and dewatering/staged rewatering are outlined on the drawings in Appendix A. The site reclamation and restoration plan will be provided in the final designs.

5.5 Calendar Schedule for Construction/Implementation

A proposed construction sequence to complete the Project in a single year of construction in 2021 is provided below.

Before in-water work window (prior to July 1):

- Complete pre-construction activities:
 - Construction staking, flagging of sensitive areas, contractor submittals, etc.
 - Mobilize to site and site preparation.
 - Install temporary erosion and sediment controls (TESC).
- Acquisition, hauling, and staging of LWD and other materials.

In-water work window (July 1 to October 15):

- Install block nets and salvage fish (work to be completed by a qualified fish biologist).
- Install and monitor TESC.
- Install work area isolation and dewater work areas.
- Install LWD structures.
- Prewash work areas and pump turbid water to an approved location and monitor to ensure no turbid water returns to the stream.
- Slowly reintroduce flow to the work areas, monitoring for turbidity.
- Remove work area isolation.
- Remove block nets.
- Remove TESC.

After in-water work window (after October 15):

- Complete any excavation remaining above OHW.
- Seed and mulch all disturbed areas.
- Site clean-up and demobilization.
- Plant trees and shrubs in the fall.

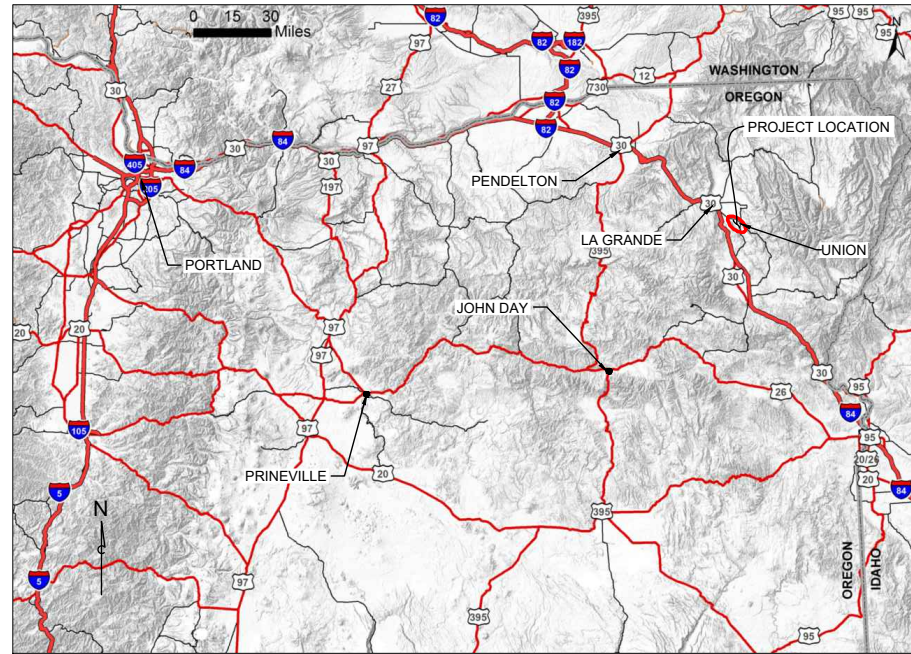
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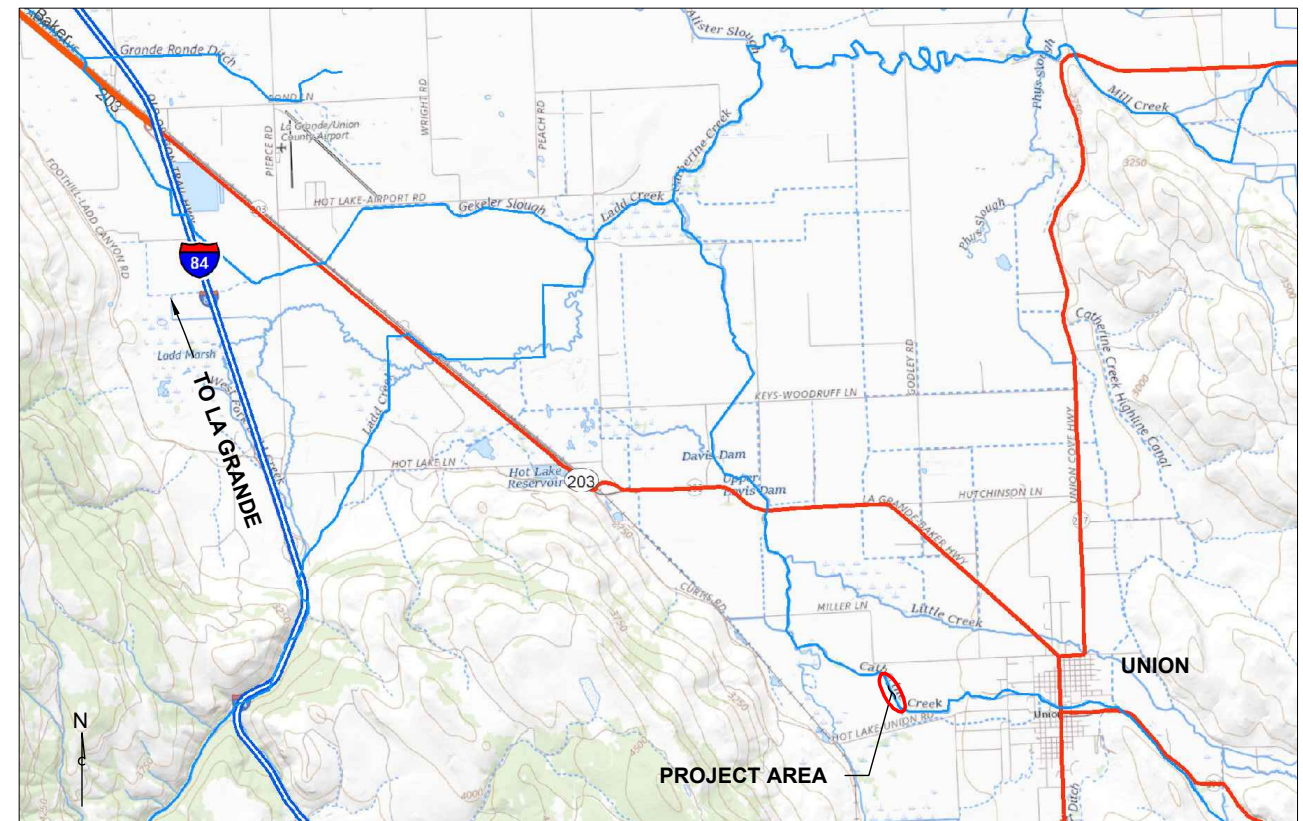
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APPENDIX A
DESIGN DRAWINGS

UNION SOIL AND WATER CONSERVATION DISTRICT CATHERINE CREEK RIVER MILE 38 HABITAT RESTORATION DESIGN 30 PERCENT CONCEPTUAL DESIGN



LOCATION MAP
SCALE: NTS



VICINITY MAP
SCALE: NTS

DRAWING INDEX

DWG#	TITLE
G-01	COVER SHEET
G-02	GENERAL NOTES
G-03 - G-07	GENERAL NOTES - CONSERVATION MEASURES
C-01	EXISTING CONDITIONS
C-11	PROPOSED CONDITIONS OVERVIEW
C-12 - C-13	PROPOSED CONDITIONS
C-21 - C-24	DETAILS - LWD CONSTRUCTION

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NOT FOR
CONSTRUCTION



		PLOTTED AS ANSI B (11" X 17"), PLAN SHEET FULL SIZE ANSI D (22" X 34")				
REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
A	05/25/20	30% CONCEPTUAL DESIGN	JA	JA	CM	VM
A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM

CATHERINE CREEK RIVER MILE 38 HABITAT RESTORATION DESIGN 30% CONCEPTUAL DESIGN	DWG. NO.: G-01
COVER SHEET	CREATED: 05/28/20 SHEET: 1 of 16

ABBREVIATIONS

1H : 1V	HORIZONTAL TO VERTICAL EXAGGERATION	Hz	HERTZ
μS	MICRO SECONDS	ID	IDENTIFICATION
μS/CM	MICRO SECONDS PER CENTIMETER	IDFG	IDAHO DEPARTMENT OF FISH AND GAME
°C	DEGREE CELSIUS	IN, "	INCH
%	PERCENT	LBS	POUNDS
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	LIDAR	LIGHT DETECTION AND RANGING
APP	APPROVED BY	LWD	LARGE WOODY DEBRIS
APPROX	APPROXIMATE	MAX	MAXIMUM
BMP	BEST MANAGEMENT PRACTICE	MIN	MINIMUM
CHK	CHECKED BY	MFWP	MONTANA FISH WILDLIFE AND PARKS
CP	CONTROL POINT	MS	MILLISECONDS
CWA	CLEAN WATER ACT	NAD	NORTH AMERICAN DATUM
CY	CUBIC YARDS	NAVD	NORTH AMERICAN VERTICAL DATUM OF 1988
DBH	DIAMETER AT BREAST HEIGHT	NEPA	NATIONAL ENVIRONMENTAL POLICY ACT
DC	DIRECT CURRENT	NMFS	NATIONAL MARINE FISHERIES SERVICE
DIA.	DIAMETER	NHPA	NATIONAL HISTORIC PRESERVATION ACT
DWG	DRAWING	NTS	NOT TO SCALE
DRW	DRAWN BY	PDC	PULSED DIRECT CURRENT
E.G.	FOR EXAMPLE (LATIN: EXAMPLI GRATIA)	ODFW	OREGON DEPARTMENT OF FISH AND WILDLIFE
EMBED	EMBEDMENT	OHW	ORDINARY HIGH WATER
ENG	ENGINEERED BY	OC	ON CENTER
ESA	ENDANGERED SPECIES ACT	TEMP	TEMPORARY
ETC.	AND OTHER SIMILAR THINGS (LATIN: ET CETERA)	TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
EX	EXISTING	TYP.	TYPICAL
FT, '	FOOT	USFWS	UNITED STATES FISH AND WILDLIFE SERVICE
HEC RAS	HYDROLOGIC ENGINEERING CENTER RIVER ANALYSIS SYSTEM	V	VOLTS
HIP	HABITAT IMPROVEMENT PROGRAM	WDFW	WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
HUC	HYDROLOGIC UNIT CODE	WSE	WATER SURFACE ELEVATION
		YR	YEAR

CONSTRUCTION SEQUENCING:

1. PLACE EROSION CONTROL, WORK AREA ISOLATION, AND FISH SALVAGE MEASURES.
2. COMPLETE CLEARING AND GRUBBING.
3. INSTALL LWD STRUCTURES.
4. RESTORE AND RE-VEGETATE WORK AREAS.
5. REMOVE EROSION CONTROL MEASURES, WORK AREA ISOLATION, AND FISH SALVAGE MEASURES.

GENERAL NOTES:

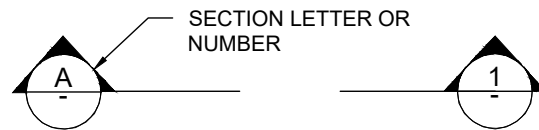
1. HORIZONTAL PROJECTION: NAD83 OREGON STATE PLANES, NORTH ZONE, INTERNATIONAL FOOT.
2. VERTICAL PROJECTION: NAVD88.
3. PROJECT TOPOGRAPHY BASED ON 2007 LIDAR (WATERSHED SCIENCES, 2007) SUPPLEMENTED WITH TOPOGRAPHIC AND BATHYMETRIC SURVEY BY THE FIRM ANDERSON PERRY & ASSOCIATES IN 2017. TOPOGRAPHIC DATA PROVIDED IN THIS DESIGN MAY VARY FROM FIELD CONDITIONS DURING TIME OF CONSTRUCTION DUE TO SUBSEQUENT HIGH WATER EVENTS.
4. ALIGNMENT AND STATIONING DATA ARE BASED ON THE 2017 SURVEY DATA .
5. PROPOSED PROJECT DESIGN, CONSTRUCTION ACTIVITIES, AND MATERIALS SUBJECT TO APPROVAL BY LANDOWNER.
6. CHANNEL STATIONING HEREIN REFERS TO PROPOSED CATHERINE CREEK PROPOSED THALWEG UNLESS OTHERWISE NOTED.

GENERAL CONSTRUCTION NOTES:

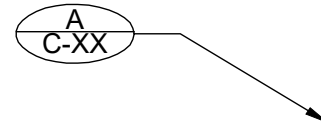
1. THE CONTRACTOR SHALL CONSTRUCT THE RESTORATION DESIGN ELEMENTS IN ACCORDANCE WITH THE PLANS STAMPED "ISSUED FOR CONSTRUCTION". THESE PLANS WILL BE PROVIDED TO THE CONTRACTOR BY THE CONTRACTING AGENCY PRIOR TO CONSTRUCTION. WORK SHALL NOT BE DONE WITHOUT THE CURRENT SET OF APPROVED CONSTRUCTION PLANS.
2. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE ALL APPLICABLE USFWS PROJECTS CONTRACTORS HANDBOOK TERMS & CONDITIONS.
3. CONTRACTOR SHALL CONTACT THE OREGON UTILITY NOTIFICATION CENTER 1-800-522-2404 (OR 811), [HTTPS://DIGSAFELYOREGON.COM](https://digsafelyoregon.com) BEFORE ANY EXCAVATION WORK BEGINS.
4. THE CONTRACTOR SHALL PURSUE WORK IN A CONTINUOUS AND EFFICIENT MANNER TO ENSURE TIMELY COMPLETION OF THE PROJECT.
5. ALL WORK WITHIN THE ACTIVE CHANNEL SHALL OCCUR WITHIN THE ALLOWABLE FISH WINDOW: CATHERINE CREEK (JULY 1 - AUGUST 15).
6. ALL CONSTRUCTION ACTIVITIES SHALL MINIMIZE DISTURBANCE TO AND MAXIMIZE RE-USE OF EXISTING RIPARIAN VEGETATION.
7. THE CONTRACTOR SHALL PROTECT ALL CONTROL POINTS TO THE EXTENT PRACTICAL DURING CONSTRUCTION ACTIVITIES.
8. CONTRACTOR SHALL PROVIDE AN EROSION AND SEDIMENT CONTROL AND DEWATERING PLAN TO OWNER WITHIN 10 DAYS OF THE NOTICE TO PROCEED.
9. TEMPORARY FENCE REMOVALS AND REPLACEMENTS TO BE COORDINATED WITH THE LANDOWNER.

SYMBOLS

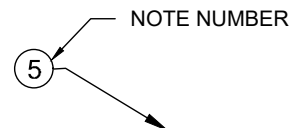
SECTIONS ARE REFERENCED IN THE FOLLOWING MANNER:



CONSTRUCTION DETAILS ARE REFERENCED IN THE FOLLOWING MANNER:



NOTES ARE REFERENCED IN THE FOLLOWING MANNER:



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TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

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A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM

CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

GENERAL NOTES

DWG. NO.:	G-02
CREATED:	05/28/20
SHEET:	2 of 16

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 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.

INSPECTIONS AND MONITORING: PROJECT SPONSOR STAFF OR THEIR DESIGNATED REPRESENTATIVE WILL PROVIDE IMPLEMENTATION MONITORING TO ENSURE COMPLIANCE WITH THIS BIOLOGICAL OPINION, INCLUDING:

- A) GENERAL CONSERVATION MEASURES AND PROJECT DESIGN CRITERIA ARE ADEQUATELY FOLLOWED; AND
- B) EFFECTS TO ESA-LISTED SPECIES ARE NOT GREATER THAN PREDICTED AND TAKE LIMITATIONS ARE NOT EXCEEDED.

GENERAL AQUATIC CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS:

THE ACTIVITIES COVERED ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES; HOWEVER, CONSTRUCTION ACTIVITIES MAY HAVE SHORT-TERM ADVERSE EFFECTS ON ESA-LISTED SPECIES AND ASSOCIATED CRITICAL HABITAT. TO AVOID AND MINIMIZE THESE SHORT-TERM ADVERSE EFFECTS, HAS DEVELOPED THE FOLLOWING GENERAL CONSERVATION MEASURES IN COORDINATION WITH USFWS AND NMFS. THESE MEASURES WILL BE IMPLEMENTED ON ALL PROJECTS.

CLIMATE CHANGE: BEST AVAILABLE SCIENCE REGARDING THE FUTURE EFFECTS WITHIN THE PROJECT AREA OF CLIMATE CHANGE, SUCH AS CHANGES INSTREAM FLOWS AND WATER TEMPERATURES, WILL BE CONSIDERED DURING PROJECT DESIGN.

STATE AND FEDERAL PERMITS: ALL APPLICABLE REGULATORY PERMITS AND AUTHORIZATIONS WILL BE OBTAINED PRIOR TO PROJECT IMPLEMENTATION. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA), NATIONAL HISTORIC PRESERVATION ACT (NHPA), STATE AND FEDERAL SECTION 404 OF THE CLEAN WATER ACT (CWA) PERMITS, AND SECTION 401 WATER QUALITY CERTIFICATIONS.

TIMING OF IN-WATER WORK: FORMAL RECOMMENDATIONS PUBLISHED BY STATE AGENCIES SUCH AS THE OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP) OR INFORMAL RECOMMENDATIONS FROM THE APPROPRIATE STATE FISHERY BIOLOGIST IN REGARD TO THE TIMING OF IN-WATER WORK WILL BE FOLLOWED.

- A) BULL TROUT - UTILIZING STATE-RECOMMENDED IN-WATER WORK WINDOWS WILL DECREASE POTENTIAL EFFECTS TO BULL TROUT, BUT THIS ALONE MAY NOT BE SUFFICIENT TO PROTECT LOCAL BULL TROUT POPULATIONS. THIS IS ESPECIALLY TRUE IF WORK WILL OCCUR IN SPAWNING AND REARING AREAS BECAUSE EGGS, ALEVIN, AND FRY ARE PRESENT NEARLY YEAR ROUND. SOME PROJECT LOCATIONS MAY NOT HAVE DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT, OR IF THEY DO, THEY MAY DIFFER FROM THE IN-WATER WORK WINDOWS FOR SALMON AND STEELHEAD. IF THIS IS THE CASE, OR IF THE PROPOSED WORK IS TO OCCUR WITHIN BULL TROUT SPAWNING AND REARING HABITATS, THE PROJECT SPONSOR WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO ENSURE 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 INSTREAM 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 WILL AVOID WORKING INSTREAM OR RIVER CHANNELS FROM MARCH 1 TO AUGUST 1. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE BEST MANAGEMENT PRACTICES (BMPS) OUTLINED IN USFWS 2010.
- C) EXCEPTIONS TO ODFW, WDFW, MFWP, OR IDFG IN-WATER WORK WINDOWS WILL BE REQUESTED THROUGH THE VARIANCE PROCESS. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES ARE CONSIDERED INCIDENTAL TO CONSTRUCTION-RELATED ACTIVITIES AND SHALL OCCUR DURING STATE-RECOMMENDED IN-WATER WORK WINDOWS.

CONTAMINANTS: THE PROJECT SPONSOR WILL COMPLETE A SITE ASSESSMENT WITH THE FOLLOWING ELEMENTS TO IDENTIFY THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION FOR ANY ACTION THAT INVOLVES EXCAVATION OF MORE THAN 20 CUBIC YARDS OF MATERIAL:

- A) A REVIEW OF AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
- B) A SITE VISIT TO INSPECT THE AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES AND THE CONDITION OF THE PROPERTY;
- C) INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, AND OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
- D) A SUMMARY, STORED WITH THE PROJECT FILE THAT INCLUDES AN ASSESSMENT OF THE LIKELIHOOD THAT CONTAMINANTS ARE PRESENT AT THE SITE, BASED ON ITEMS 4(A) THROUGH 4(C).

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

- A) SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER (OHW), 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-HERBICIDE-APPLICATION AREAS AND BUFFERS.

TEMPORARY ACCESS ROADS AND PATHS:

- A) EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY 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, SOIL COMPACTION, AND IMPACTS TO VEGETATION.
- B) TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, 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 REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE ROAD SURFACE AND ASSOCIATED DITCHES, 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.

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. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR OVER WATER.
- C) EQUIPMENT AND VEHICLES WILL CROSS STREAMS 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) IMPACTS TO 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 INFORMATION.
- H) AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED, AND THE STREAM CHANNEL AND BANKS RESTORED.

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 OF 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.

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CATHERINE CREEK RIVER MILE 38 HABITAT RESTORATION DESIGN 30% CONCEPTUAL DESIGN	DWG. NO.: G-03
GENERAL NOTES CONSERVATION METHODS	CREATED: 05/28/20 SHEET: 3 of 16

GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS (CONTINUED):

EQUIPMENT: MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS 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 WATERBODY 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 TO ONLY 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.

EROSION CONTROL: EROSION CONTROL BEST MANAGEMENT PRACTICES (BMPS) WILL BE PREPARED AND CARRIED OUT, COMMENSURATE IN SCOPE WITH THE ACTION, THAT MAY INCLUDE THE FOLLOWING:

- A) TEMPORARY EROSION CONTROL BMPS.
 - I. TEMPORARY EROSION CONTROL BMPS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE 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 CONTROL BMP ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE BMP.
 - VI. ONCE THE SITE IS STABILIZED FOLLOWING CONSTRUCTION, TEMPORARY EROSION CONTROL BMPS WILL BE REMOVED.
- B) EMERGENCY EROSION CONTROL BMPS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
 - I. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
 - II. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

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 STREAM CHANNELS 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.

SPILL PREVENTION, CONTROL, AND COUNTERMEASURES: 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 THAT WILL BE USED, INCLUDING 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 MATERIAL 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.

INVASIVE SPECIES CONTROL: 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.

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. WORK AREA ISOLATION & FISH SALVAGE ACTIVITIES ARE CONSIDERED INCIDENTAL TO CONSTRUCTION-RELATED ACTIVITIES AND SHALL OCCUR DURING THE STATE-RECOMMENDED IN-WATER WORK WINDOWS.

WHEN WORK AREA ISOLATION IS REQUIRED, DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS, FISH RELEASE AREAS, AND, WHEN A PUMP IS USED TO DEWATER 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, ELECTROFISHING SHALL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. BULL TROUT ARE VERY TEMPERATURE SENSITIVE AND GENERALLY SHOULD NOT BE ELECTROFISHED 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. ELECTROFISHING (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. DEWATERING AND REWATERING (STEPS 4 AND 5) WILL BE IMPLEMENTED UNLESS WETTED INSTREAM WORK IS DEEMED TO BE MINIMALLY HARMFUL TO FISH, AND IS BENEFICIAL TO OTHER AQUATIC SPECIES. DEWATERING WILL NOT BE CONDUCTED IN AREAS KNOWN TO BE OCCUPIED BY LAMPREY, UNLESS LAMPREYS ARE SALVAGED USING GUIDANCE SET FORTH IN USFWS 2010.

STEP 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 4 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 INSTREAM DISTURBANCE.

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 <p>TETRA TECH www.tetratech.com 19803 North Creek Parkway Bothell, Washington 98011 Phone: 425-482-7600 Fax: 425-482-7652</p>	NOT FOR CONSTRUCTION		PLOTTED AS ANSI B (11" X 17"), PLAN SHEET FULL SIZE ANSI D (22" X 34")				CATHERINE CREEK RIVER MILE 38 HABITAT RESTORATION DESIGN 30% CONCEPTUAL DESIGN	DWG. NO.: G-04 CREATED: 05/28/20 SHEET: 4 of 16			
			REV.	DATE	REVISION DESCRIPTION	DRW			ENG	CHK	APP
			A	05/25/20	30% CONCEPTUAL DESIGN	JA			JA	CM	VM
A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM					
GENERAL NOTES CONSERVATION METHODS											

GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS (CONTINUED):

STEP 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 DEWATERING.
- B) DURING DEWATERING, 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 STREAMBANK 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.

STEP 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' ELECTROFISHING GUIDELINES WILL BE USED (NMFS 2004, [HTTP://WWW.WESTCOAST.FISHERIES.NOAA.GOV/PUBLICATIONS/REFERENCE_DOCUMENTS/ESA_REFS/SECTION4D/ELECTRO2000.PDF](http://www.westcoast.fisheries.noaa.gov/publications/reference_documents/esa_refs/section4d/electro2000.pdf)).
- B) INITIAL SITE SURVEYS AND EQUIPMENT SETTINGS
 - I. IN ORDER TO AVOID CONTACT WITH SPAWNING ADULTS OR ACTIVE REDDS, RESEARCHERS MUST CONDUCT A CAREFUL VISUAL SURVEY OF THE AREA TO BE SAMPLED BEFORE BEGINNING ELECTROFISHING.
 - II. PRIOR TO THE START OF SAMPLING AT A NEW LOCATION, WATER TEMPERATURE AND CONDUCTIVITY MEASUREMENTS SHALL BE TAKEN TO EVALUATE ELECTROFISHER SETTINGS AND ADJUSTMENTS. NO ELECTROFISHING SHOULD OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18°C OR ARE EXPECTED TO RISE ABOVE THIS TEMPERATURE PRIOR TO CONCLUDING THE ELECTROFISHING SURVEY. IN ADDITION, STUDIES BY NMFS SCIENTISTS INDICATE THAT NO ELECTROFISHING SHOULD OCCUR IN CALIFORNIA COASTAL BASINS WHEN CONDUCTIVITY IS ABOVE 350 MS/CM.
 - III. WHENEVER POSSIBLE, A BLOCK NET SHOULD BE PLACED BELOW THE AREA BEING SAMPLED TO CAPTURE STUNNED FISH THAT MAY DRIFT DOWNSTREAM.
 - IV. EQUIPMENT MUST BE IN GOOD WORKING CONDITION AND OPERATORS SHOULD GO THROUGH THE MANUFACTURER'S PRESEASON CHECKS, ADHERE TO ALL PROVISIONS, AND RECORD MAJOR MAINTENANCE WORK IN A LOGBOOK.
 - V. EACH ELECTROFISHING SESSION MUST START WITH ALL SETTINGS (VOLTAGE, PULSE WIDTH, AND PULSE RATE) SET TO THE MINIMUMS NEEDED TO CAPTURE FISH. THESE SETTINGS SHOULD BE GRADUALLY INCREASED ONLY TO THE POINT WHERE FISH ARE IMMOBILIZED AND CAPTURED, AND GENERALLY NOT ALLOWED TO EXCEED CONDUCTIVITY-BASED MAXIMA (SEE TABLE 1). ONLY DIRECT CURRENT (DC) OR PULSED DIRECT CURRENT (PDC) SHOULD BE USED.
- B) ELECTROFISHING TECHNIQUE
 - I. SAMPLING SHOULD BEGIN USING STRAIGHT DC. THE POWER NEEDS TO REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. IF FISH CAPTURE IS UNSUCCESSFUL WITH INITIAL LOW VOLTAGE, GRADUALLY INCREASE VOLTAGE SETTINGS WITH STRAIGHT DC.
 - II. IF FISH CAPTURE IS NOT SUCCESSFUL WITH THE USE OF STRAIGHT DC, THEN SET THE ELECTROFISHER TO LOWER VOLTAGES WITH PDC. IF FISH CAPTURE IS UNSUCCESSFUL WITH LOW VOLTAGES, INCREASE PULSE WIDTH, VOLTAGE, AND PULSE FREQUENCY (DURATION, AMPLITUDE, AND FREQUENCY).
 - III. ELECTROFISHING SHOULD BE PERFORMED IN A MANNER THAT MINIMIZES HARM TO THE FISH. STREAM SEGMENTS SHOULD BE SAMPLED SYSTEMATICALLY, MOVING THE ANODE CONTINUOUSLY IN A HERRINGBONE PATTERN (WHERE FEASIBLE) THROUGH THE WATER. CARE SHOULD BE TAKEN WHEN FISHING IN AREAS WITH HIGH FISH CONCENTRATIONS, STRUCTURE (E.G., WOOD, UNDERCUT BANKS) AND IN SHALLOW WATERS WHERE MOST BACKPACK ELECTROFISHING FOR JUVENILE SALMONIDS OCCURS.

VOLTAGE GRADIENTS MAY BE HIGH WHEN ELECTRODES ARE IN SHALLOW WATER WHERE BOUNDARY LAYERS (WATER SURFACE AND SUBSTRATE) TEND TO INTENSIFY THE ELECTRICAL FIELD.

- IV. DO NOT ELECTROFISH IN ONE LOCATION FOR AN EXTENDED PERIOD (E.G., UNDERCUT BANKS) AND REGULARLY CHECK BLOCK NETS FOR IMMOBILIZED FISH.
 - V. FISH SHOULD NOT MAKE CONTACT WITH THE ANODE. THE ZONE OF POTENTIAL INJURY FOR FISH IS 0.5 M FROM THE ANODE.
 - VI. ELECTROFISHING CREWS SHOULD BE GENERALLY OBSERVANT OF THE CONDITION OF THE FISH AND CHANGE OR TERMINATE SAMPLING WHEN EXPERIENCING PROBLEMS WITH FISH RECOVERY TIME, BANDING, INJURY, MORTALITY, OR OTHER INDICATIONS OF FISH STRESS.
 - VII. NETTERS SHOULD NOT ALLOW THE FISH TO REMAIN IN THE ELECTRICAL FIELD ANY LONGER THAN NECESSARY BY REMOVING STUNNED FISH FROM THE WATER IMMEDIATELY AFTER NETTING.
- C) SAMPLE PROCESSING AND RECORDKEEPING
- I. FISH SHOULD BE PROCESSED AS SOON AS POSSIBLE AFTER CAPTURE TO MINIMIZE STRESS. THIS MAY REQUIRE A LARGER CREW SIZE.
 - II. ALL SAMPLING PROCEDURES MUST HAVE A PROTOCOL FOR PROTECTING HELD FISH. SAMPLERS MUST BE AWARE OF THE CONDITIONS IN THE CONTAINERS HOLDING FISH; AIR PUMPS, WATER TRANSFERS, ETC., SHOULD BE USED AS NECESSARY TO MAINTAIN SAFE CONDITIONS. ALSO, LARGE FISH SHOULD BE KEPT SEPARATE FROM SMALLER PREY-SIZED FISH TO AVOID PREDATION DURING CONTAINMENT.
 - III. USE OF AN APPROVED ANESTHETIC CAN REDUCE FISH STRESS AND IS RECOMMENDED, PARTICULARLY IF ADDITIONAL HANDLING OF FISH IS REQUIRED (E.G., LENGTH AND WEIGHT MEASUREMENTS, SCALE SAMPLES, FIN CLIPS, TAGGING).
 - IV. FISH SHOULD BE HANDLED PROPERLY (E.G., WETTING MEASURING BOARDS, NOT OVERCROWDING FISH IN BUCKETS, ETC.).
 - V. FISH SHOULD BE OBSERVED FOR GENERAL CONDITION AND INJURIES (E.G., INCREASED RECOVERY TIME, DARK BANDS, VISUALLY OBSERVABLE SPINAL INJURIES). EACH FISH SHOULD BE COMPLETELY REVIVED BEFORE RELEASING AT THE LOCATION OF CAPTURE. A PLAN FOR ACHIEVING EFFICIENT RETURN TO APPROPRIATE HABITAT SHOULD BE DEVELOPED BEFORE EACH SAMPLING SESSION. ALSO, EVERY ATTEMPT SHOULD BE MADE TO PROCESS AND RELEASE ESA-LISTED SPECIMENS FIRST.
 - VI. PERTINENT WATER QUALITY (E.G., CONDUCTIVITY AND TEMPERATURE) AND SAMPLING NOTES (E.G., SHOCKER SETTINGS, FISH CONDITION/INJURIES/MORTALITIES) SHOULD BE RECORDED IN A LOGBOOK TO IMPROVE TECHNIQUE AND HELP TRAIN NEW OPERATORS. IT IS IMPORTANT TO NOTE THAT RECORDS OF INJURIES OR MORTALITIES PERTAIN TO THE ENTIRE ELECTROFISHING SURVEY, INCLUDING THE FISH SAMPLE WORK-UP.
 - VII. THE ANODE WILL NOT INTENTIONALLY CONTACT FISH.
 - VIII. 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.
 - IX. 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 IN ORDER TO REDUCE MORTALITY.

TABLE 1. GUIDELINES FOR INITIAL AND MAXIMUM SETTINGS FOR BACKPACK ELECTROFISHING

	INITIAL SETTINGS	MAXIMUM SETTINGS		NOTES
		CONDUCTIVITY (µS/cm)	MAX. VOLTAGE	
VOLTAGE	100 V	100	1100 V	IN CALIFORNIA COASTAL BASINS, SETTINGS SHOULD NEVER EXCEED 400 VOLTS. ALSO, NO ELECTROFISHING SHOULD OCCUR IN THESE BASINS IF CONDUCTIVITY IS GREATER THAN 350 µS/cm.
		100 - 300	800 V	
		> 300	400 V	
PULSE WIDTH	500 µs	5 ms		
PULSE RATE	30 Hz	70 Hz		IN GENERAL, EXCEEDING 40 Hz WILL INJURE MORE FISH.

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REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP	
A	05/25/20	30% CONCEPTUAL DESIGN	JA	JA	CM	VM	
A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM	

CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

GENERAL NOTES
CONSERVATION METHODS

DWG. NO.: **G-05**

CREATED: 05/28/20

SHEET: 5 of 16

GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS (CONTINUED):

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 COMPLIANCE. RECORDS SHALL BE REPORTED ON THE PCF. IF THE GEOMORPHOLOGY OF THE PROJECT AREA (E.G., SILTY OR CLAYLIKE MATERIALS) OR THE NATURE OF THE ACTION (E.G., LARGE AMOUNTS OF BARE EARTH EXPOSED BELOW THE BANKFULL ELEVATION) SHALL PRECLUDE THE SUCCESSFUL COMPLIANCE WITH THESE TRIGGERS, NOTIFY YOUR EC LEAD WHO SHALL PRE-NOTIFY THE SERVICES OF THE LIKELIHOOD OF AN EXCEEDANCE.

- A) TAKE A BACKGROUND TURBIDITY SAMPLE USING A RECENTLY-CALIBRATED TURBIDIMETER IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, OR MEASURE TURBIDITY WITH A VISUAL TURBIDITY OBSERVATION (FIGURE 1). TURBIDITY SHOULD BE MEASURED EVERY 2 HOURS WHILE WORK IS BEING IMPLEMENTED OR MORE OFTEN IF SEDIMENT DISTURBANCE VARIES GREATLY. FREQUENT MONITORING WILL ENSURE THAT THE IN-WATER WORK AREA IS NOT CREATING TURBID CONDITIONS WITHIN THE WATER COLUMN. THE BACKGROUND SAMPLES/VISUAL OBSERVATIONS SHOULD BE TAKEN AT A RELATIVELY UNDISTURBED LOCATION APPROXIMATELY 100 FEET UPSTREAM FROM THE PROJECT AREA. RECORD THE OBSERVATION, LOCATION, AND TIME BEFORE MONITORING AT THE DOWNSTREAM POINT, KNOWN AS THE MEASUREMENT COMPLIANCE POINT.
- B) TAKE A SECOND SAMPLE OR OBSERVATION, IMMEDIATELY AFTER EACH UPSTREAM SAMPLE OR OBSERVATION, AT THE MEASUREMENT COMPLIANCE POINT, APPROXIMATELY 50 FEET DOWNSTREAM FROM THE PROJECT AREA INSTREAMS 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 NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR. RECORD THE DOWNSTREAM OBSERVATION, LOCATION, AND TIME.
- C) 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 (FIGURE 1). MARK "YES" OR "NO" ON YOUR DATASHEET. CONTINUE TO MONITOR EVERY 2 HOURS AS LONG AS INSTREAM ACTIVITY CONTINUES.
- D) IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (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 AND CORRECTIVE MEASURES TAKEN, THEN NOTIFY THE LOCAL NMFS BRANCH CHIEF AND/OR USFWS FIELD SUPERVISOR AND SEEK RECOMMENDATIONS.

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 PLOT DETAILS: ANDREWS, JEREMY
 May 27, 2020 9:47 AM



TETRA TECH
 www.tetratech.com
 19803 North Creek Parkway
 Bothell, Washington 98011
 Phone: 425-482-7600 Fax: 425-482-7652

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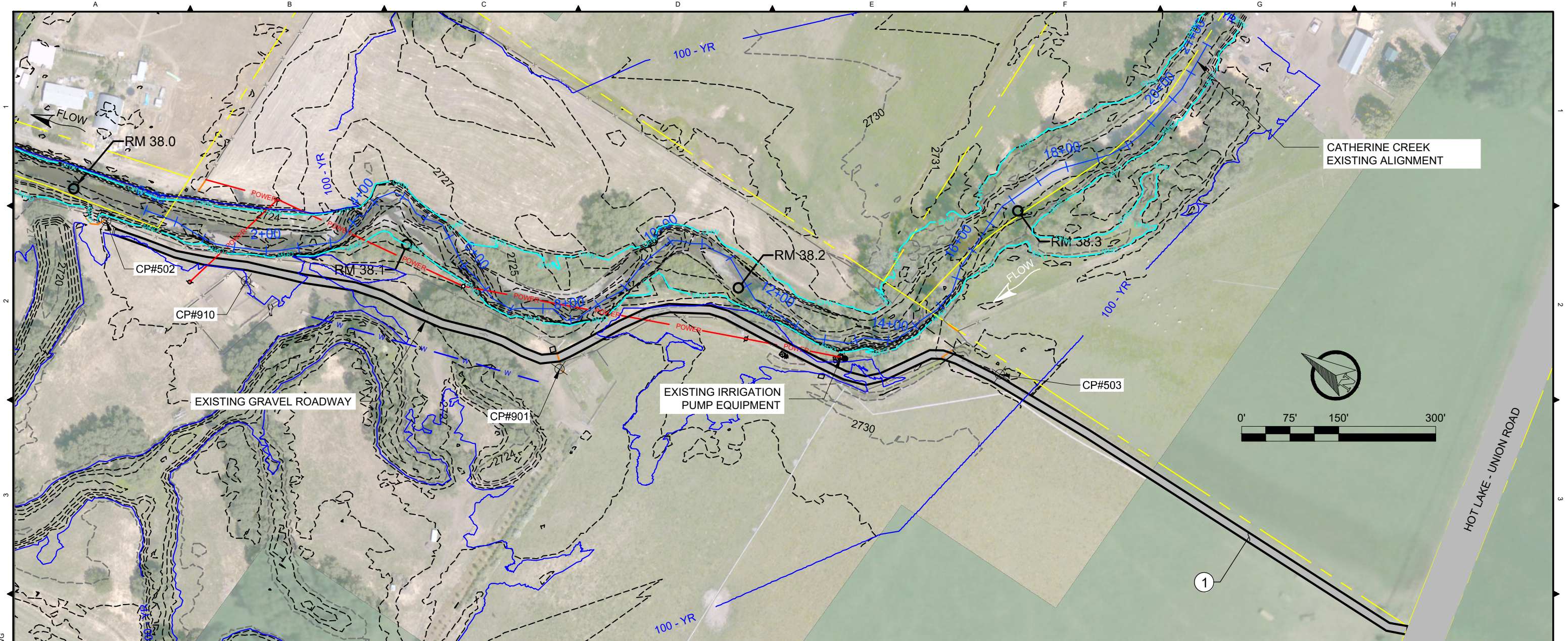
CATHERINE CREEK RIVER MILE 38
 HABITAT RESTORATION DESIGN
 30% CONCEPTUAL DESIGN

GENERAL NOTES
CONSERVATION METHODS

DWG. NO.: **G-07**

CREATED: 05/28/20

SHEET: 7 of 16



NOTES:

1. SITE ACCESS VIA HOT LAKE - UNION ROAD TO THE SOUTH OF THE PROJECT SITE.

LEGEND

- EXISTING CATHERINE CREEK ALIGNMENT
- CONTROL POINT
- OVERHEAD POWER POLE
- STREAM MILE MARKER
- EXISTING FENCELINE
- PARCEL BOUNDARIES
- EXISTING 1-FOOT CONTOURS
- EXISTING 5-FOOT CONTOURS
- EXISTING ROADWAY
- OVERHEAD POWERLINE
- EXISTING OHW
- EXISTING 100-YEAR WSE
- EXISTING WATER LINE

CONTROL POINTS				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
502	574670.46	8872328.56	2726.33	CP
503	573402.83	8872926.89	2731.69	CP
901	573964.94	8872542.81	2727.44	CP
910	574439.90	8872376.08	2726.69	CP

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www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
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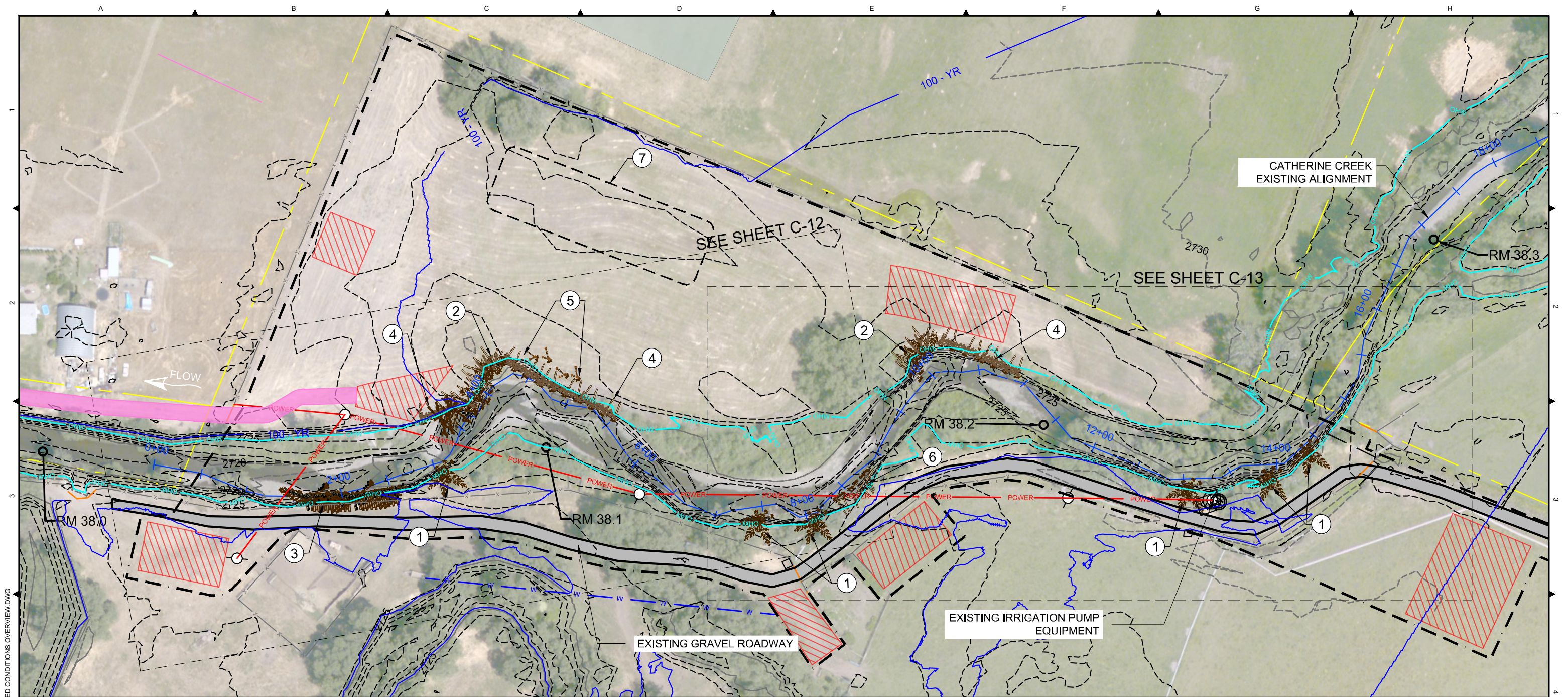
CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

EXISTING CONDITIONS

DWG. NO.: **C-01**

CREATED: 05/28/20

SHEET: 8 of 16

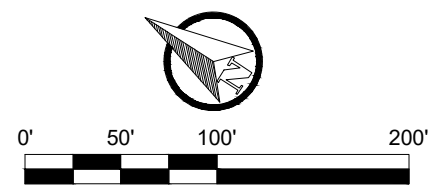


NOTES:

1. PLACE 3-LOG CROSS STRUCTURE FOR COVER AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-21 FOR DETAILS.
2. PLACE MEANDER BEND STRUCTURE TO INCREASE CHANNEL ROUGHNESS, COVER, AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-22 FOR DETAILS.
3. PLACE REVETMENT LOG STRUCTURE FOR INCREASED POOL DEPTH, SEE SHEET C-23 FOR DETAILS.
4. PLACE FLOODPLAIN TOE WITH BENCH STRUCTURE FOR INCREASED ROUGHNESS, COVER, AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-24 FOR DETAILS.
5. PLACE FLOODPLAIN LWD STRUCTURE FOR INCREASED FLOODPLAIN ROUGHNESS, SEE SHEET C-24 FOR DETAILS.
6. PLACE FLOODPLAIN TOE STRUCTURE FOR INCREASED ROUGHNESS, COVER, AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-24 FOR DETAILS.
7. PLACE EXCESS EXCAVATED MATERIAL FROM LWD STRUCTURE INSTALLATION. COORDINATE EXCESS SPOILS LOCATION WITH OWNER'S REPRESENTATIVE AND LANDOWNER.

LEGEND

- EXISTING CATHERINE CREEK ALIGNMENT
- OVERHEAD POWER POLE
- STREAM MILE MARKER
- EXISTING FENCELINE
- PARCEL BOUNDARIES
- EXISTING 1-FOOT CONTOURS
- EXISTING 5-FOOT CONTOURS
- EXISTING ROADWAY
- OVERHEAD POWERLINE
- EXISTING OHW
- EXISTING 100-YEAR WSE
- EXISTING WATER LINE
- PROPOSED STAGING AND MATERIAL STORAGE AREAS
- PROPOSED ACCESS ROUTE
- PROPOSED LWD
- PROJECT EXTENTS



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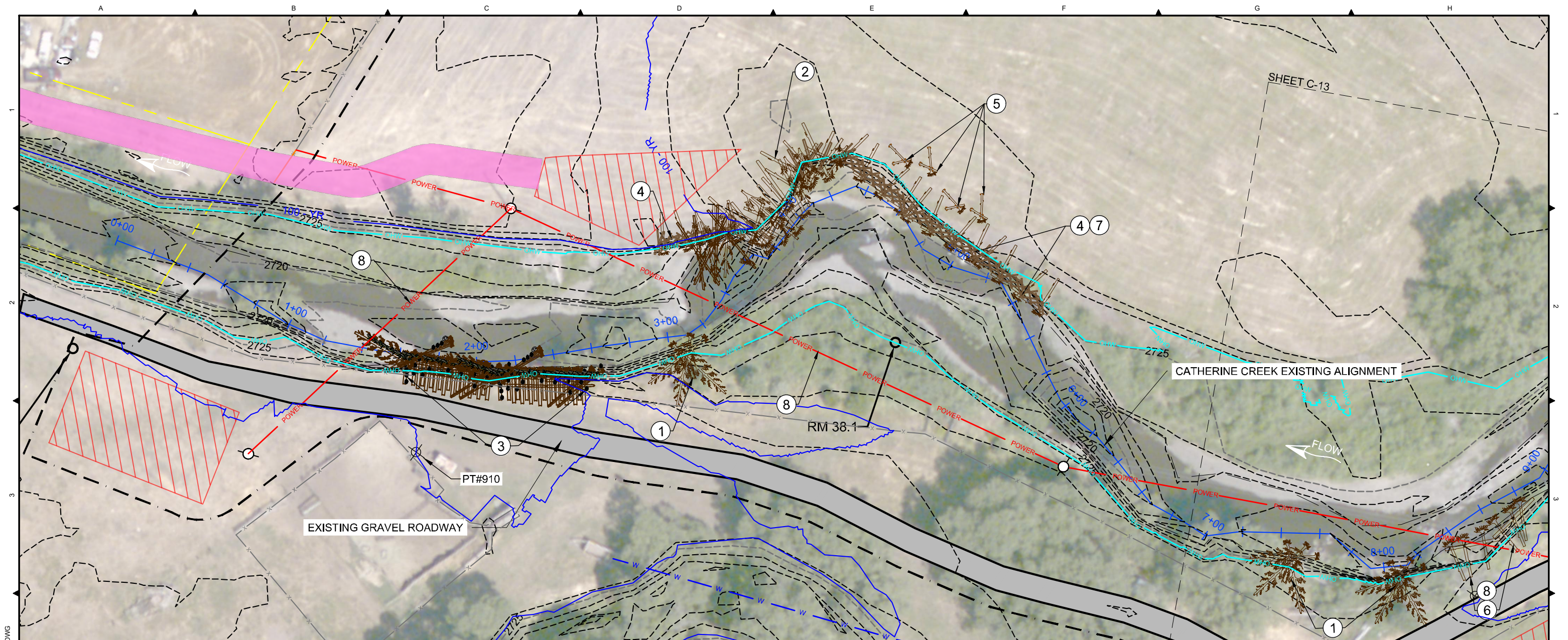


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A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM	

CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

PROPOSED CONDITIONS OVERVIEW

DWG. NO.: **C-11**
CREATED: 05/28/20
SHEET: 9 of 16

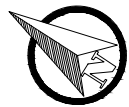


NOTES:

1. PLACE 3-LOG CROSS STRUCTURE FOR COVER AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-21 FOR DETAILS.
2. PLACE MEANDER BEND STRUCTURE TO INCREASE CHANNEL ROUGHNESS, COVER, AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-22 FOR DETAILS.
3. PLACE REVETMENT LOG STRUCTURE FOR INCREASED POOL DEPTH, SEE SHEET C-23 FOR DETAILS.
4. PLACE FLOODPLAIN TOE WITH BENCH STRUCTURE FOR INCREASED ROUGHNESS, COVER, AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-24 FOR DETAILS.
5. PLACE FLOODPLAIN LWD STRUCTURE FOR INCREASED FLOODPLAIN ROUGHNESS, SEE SHEET C-24 FOR DETAILS.
6. PLACE FLOODPLAIN TOE STRUCTURE FOR INCREASED ROUGHNESS, COVER, AND INCREASED HABITAT COMPLEXITY, SEE SHEET C-24 FOR DETAILS.
7. REMOVE EXISTING BOULDERS AND REPLACE AS DIRECTED FOR INSTREAM HABITAT OR BALLAST ON LWD STRUCTURES.
8. PERFORM STANDARD SAFETY PRACTICES WHILE WORKING NEAR POWER LINES. COORDINATE ALL WORK NEAR POWERLINE WITH OWNER'S REPRESENTATIVE.

LEGEND

- EXISTING CATHERINE CREEK ALIGNMENT
- OVERHEAD POWERLINE
- EXISTING OHW
- OVERHEAD POWER POLE
- EXISTING 100-YEAR WSE
- STREAM MILE MARKER
- EXISTING WATER LINE
- EXISTING FENCELINE
- PROPOSED STAGING AND MATERIAL STORAGE AREAS
- PARCEL BOUNDARIES
- PROPOSED ACCESS ROUTE
- EXISTING 1-FOOT CONTOURS
- PROPOSED LWD
- EXISTING 5-FOOT CONTOURS
- EXISTING ROADWAY
- PROJECT EXTENTS



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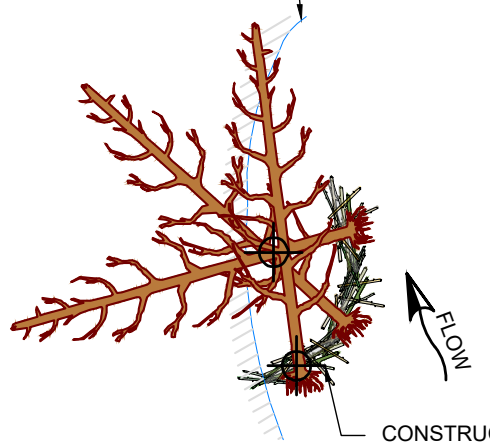
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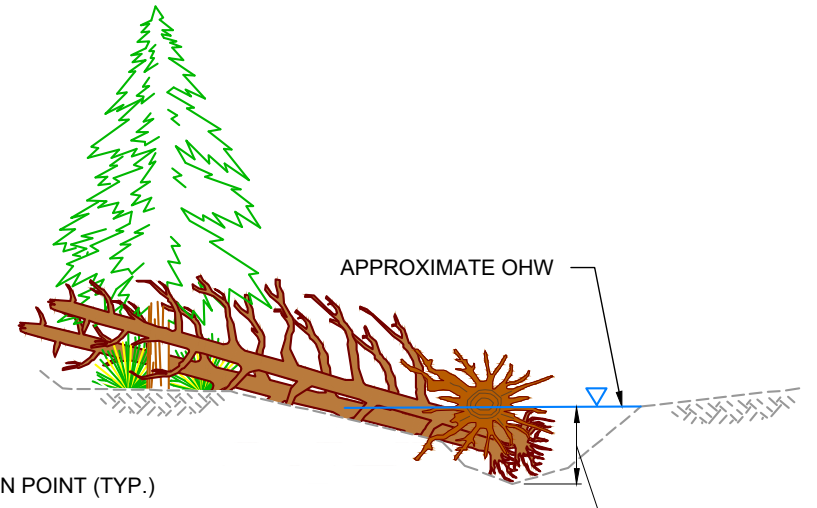
CATHERINE CREEK RIVER MILE 38 HABITAT RESTORATION DESIGN 30% CONCEPTUAL DESIGN PROPOSED CONDITIONS	DWG. NO.:	C-12
	CREATED:	05/28/20
	SHEET:	10 of 16

ORDINARY HIGH WATER CHANNEL (TYP.)

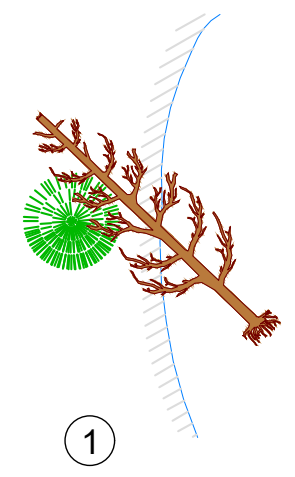


CONSTRUCTION POINT (TYP.)

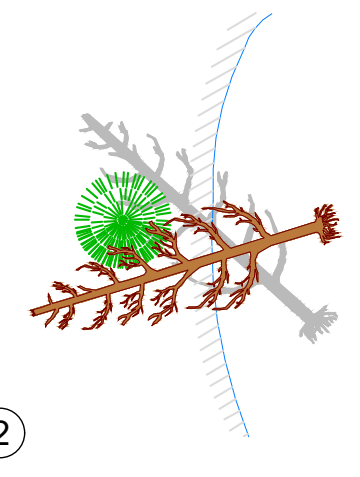
3-LOG CROSS STRUCTURE - LEFT BANK PLAN AND SECTION VIEWS



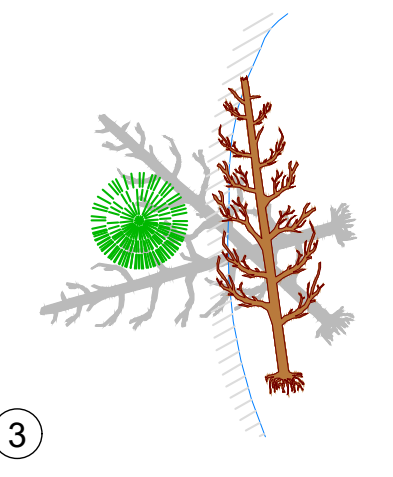
MIN. 3' POOL DEPTH
SEE NOTES 7 AND 8



1



2



3

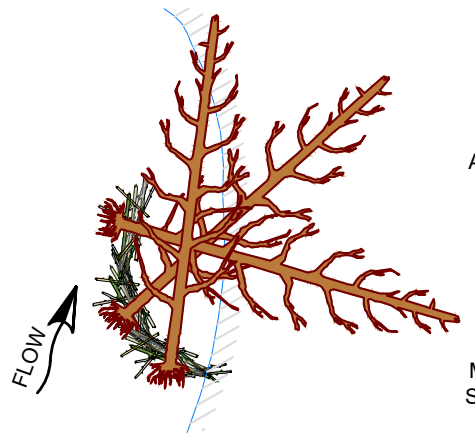
3-LOG CROSS STRUCTURE - LEFT BANK LOG PLACEMENT SEQUENCING

3-LOG CROSS STRUCTURE - TYPE 2 NOTES:

1. PLACE HALF OF THE LENGTH OF THE LARGE TREE IN SEQUENCE #1 WITHIN OHW WITH TIP OF TREE DOWNSTREAM OF LIVE STANDING TREE, IF PRESENT.
2. BURY BOTTOM HALF OF SEQUENCE #1 ROOTWAD IN CHANNEL.
3. PLACE QUARTER TO HALF OF THE LENGTH OF THE LARGE TREE IN SEQUENCE #2 WITHIN OHW WITH TIP OF TREE UPSTREAM OF STANDING TREE, IF PRESENT.
4. BURY BOTTOM HALF OF SEQUENCE #2 ROOTWAD IN CHANNEL.
5. PLACE BOTTOM HALF OF SEQUENCE #3 ROOTWAD IN CHANNEL.
6. RACKING MATERIAL WILL BE ADDED TO STRUCTURE.
7. ROOTWADS SHALL BE BURIED DEEP ENOUGH TO THAT TOPS OF ROOTWADS ARE AT OR BELOW OHW.
8. POOLS SHALL BE EXCAVATED IN-BETWEEN ADJACENT ROOTWADS.
9. ADD RACKING MATERIAL TO HELP STABILIZE KEY MEMBERS AND FILL VOIDS. RACKING MATERIAL MAY CONSIST OF TOPS AND LIMBS OF TREES.
10. PARTIAL BURIAL OF TREES MAY BE REQUIRED; FINAL CONFIGURATION OF STRUCTURE SHALL BE DIRECTED IN THE FIELD BY OWNER'S REPRESENTATIVE

CONSTRUCTION QUANTITIES:

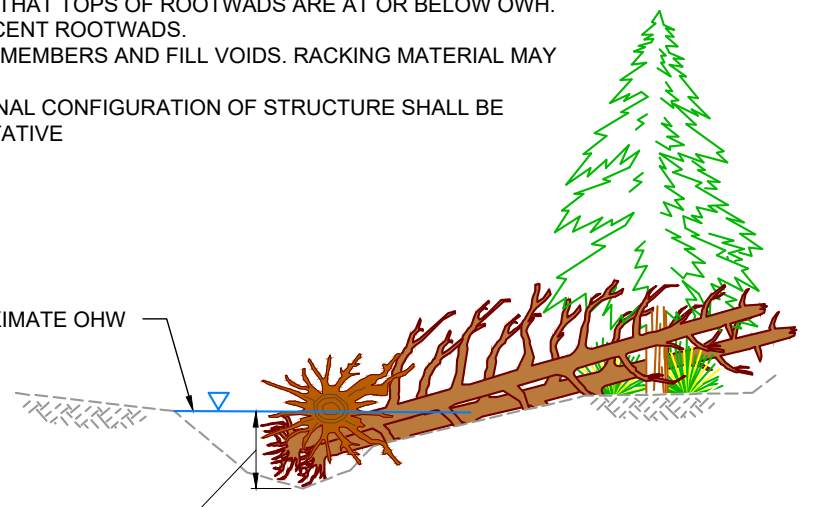
COMPONENT	DESCRIPTION	QUANTITY
WHOLE TREE WITH ROOTWAD	LARGE (18" DBH, 45 FT MIN., 6 FT ROOTWAD)	3
RACKING MATERIAL	MISC. (4-10" DBH, 8-16 FT)	8



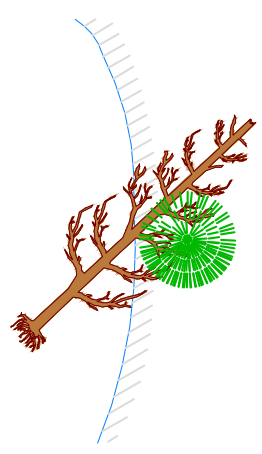
APPROXIMATE OHW

MIN. 3' POOL DEPTH
SEE NOTES 7 AND 8.

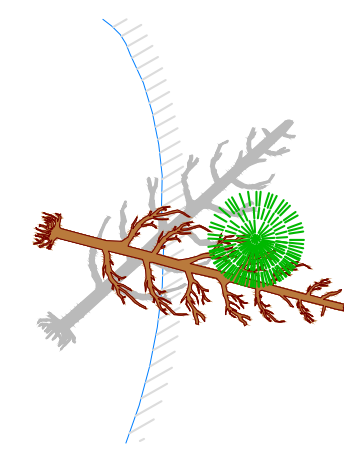
3-LOG CROSS STRUCTURE - RIGHT BANK PLAN AND SECTION VIEWS



1



2



3

3-LOG CROSS STRUCTURE - RIGHT BANK LOG PLACEMENT SEQUENCING

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A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM

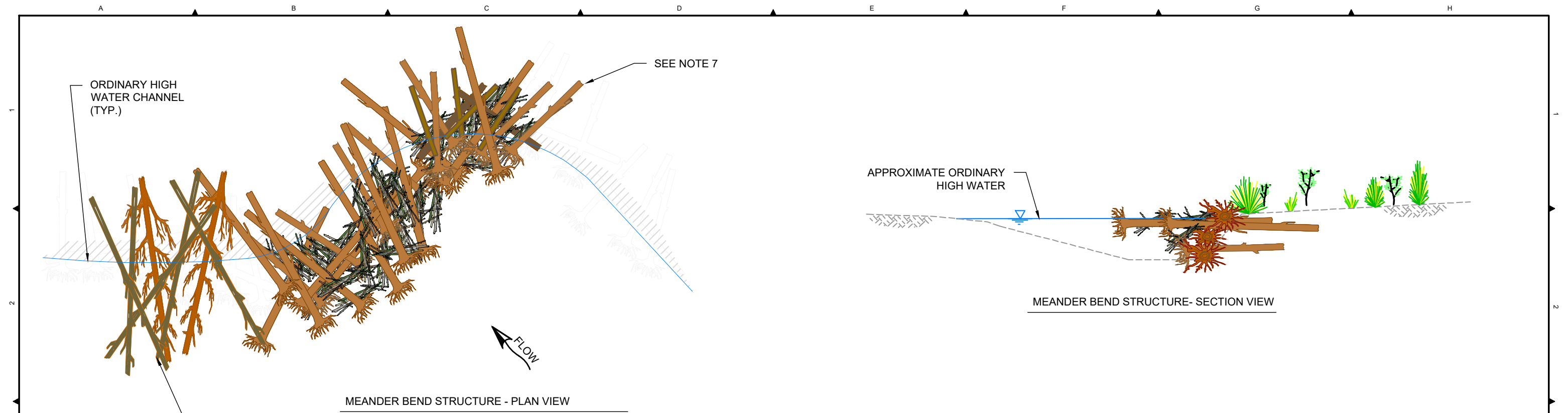
CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

DETAILS
LWD CONSTRUCTION

DWG. NO.:
C-21

CREATED: 05/28/20

SHEET: 12 of 16



SEE NOTE 7

ORDINARY HIGH WATER CHANNEL (TYP.)

APPROXIMATE ORDINARY HIGH WATER

MEANDER BEND STRUCTURE- SECTION VIEW

MEANDER BEND STRUCTURE - PLAN VIEW

SEE NOTE 7

CONSTRUCTION QUANTITIES:

COMPONENT	DESCRIPTION	QUANTITY
WHOLE TREE WITH ROOTWAD	LARGE (18" DBH MIN, 45 FT MIN., 6 FT ROOTWAD)	11
WHOLE TREE WITH ROOTWAD	MEDIUM (14" - 17" DBH, 40 FT MIN., 4 FT ROOTWAD)	8
WHOLE TREE WITHOUT ROOTWAD	LARGE (18" DBH MIN, 45 FT MIN.)	4
WHOLE TREE WITHOUT ROOTWAD	MEDIUM (14" - 17" DBH, 40 FT MIN.)	4
RACKING MATERIAL	MISC. (4-10" DBH, 8-16 FT)	20

MEANDER BEND STRUCTURE NOTES:

1. INSTALL TEMPORARY COFFERDAM TO ISOLATE WORK AREA.
2. FISH SALVAGE TO BE SUPERVISED BY QUALIFIED FISH BIOLOGIST.
3. ANY SPOILS FROM EXCAVATION SHALL BE USED TO BACKFILL STRUCTURE AS CONSTRUCTION PROGRESSES. MATERIAL SHALL BE COMPACTED WITH EXCAVATOR BUCKET. ADDITIONAL ALLUVIAL FLOODPLAIN MATERIAL MAY BE NEEDED TO BURY STRUCTURE AS SHOWN. BALLAST MATERIAL INCIDENTAL TO STRUCTURE COST.
4. PLANT 15 TO 25 WILLOW STAKES IN STRUCTURE TO COMPLETE CONSTRUCTION. OWNER SHALL BE RESPONSIBLE FOR PLANTING WILLOW STAKES.
5. BANKFULL LOCATION WITH RESPECT TO STRUCTURE LOCATION IS A TYPICAL REPRESENTATION AND MAY VARY AT EACH STRUCTURE LOCATION. FINAL CONFIGURATION OF STRUCTURE SHALL BE AS DIRECTED IN FIELD.
6. RACKING MATERIAL MAY CONSIST OF TOPS AND LIMBS OF WHOLE TREES, AND/OR SMALL WHOLE TREES WITH ROOTWADS.
7. COORDINATE INSTALLATION OF ADJACENT STRUCTURES WITH SEQUENCING OF MEANDER BEND STRUCTURE.

LOG PLACEMENT SEQUENCE DEVELOPED AT A LATER DESIGN PHASE

MEANDER BEND STRUCTURE- LOG PLACEMENT SEQUENCING

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A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM

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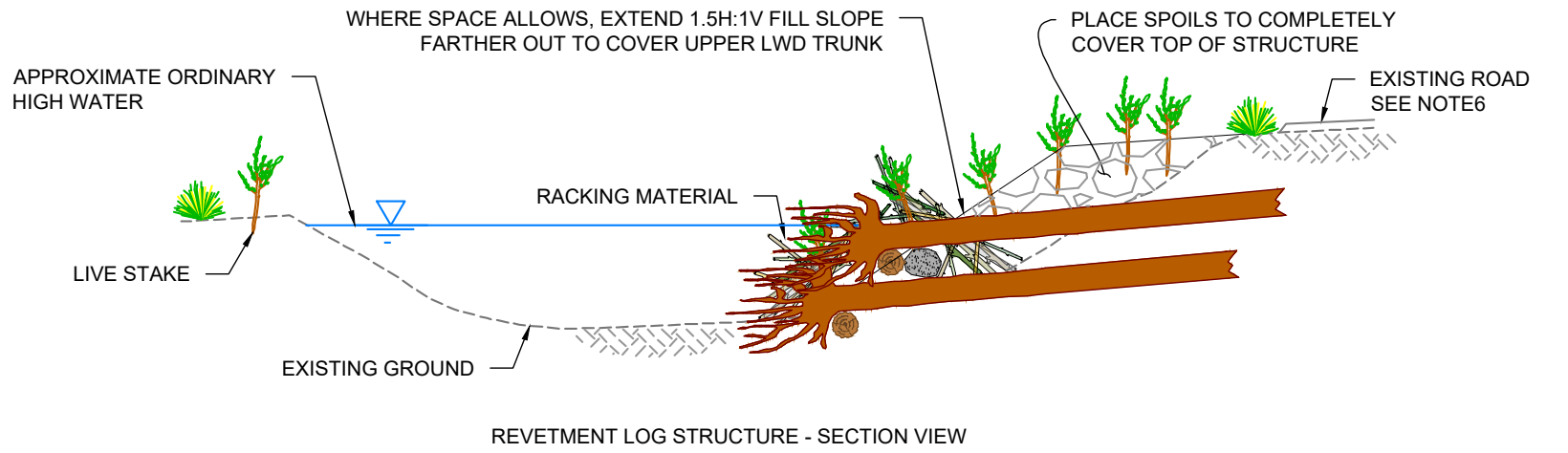
CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

DETAILS
LWD CONSTRUCTION

DWG. NO.: **C-22**
CREATED: 05/28/20
SHEET: 13 of 16

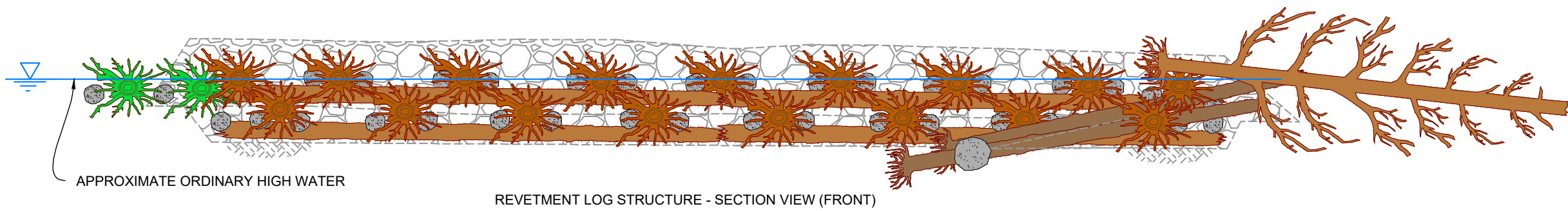
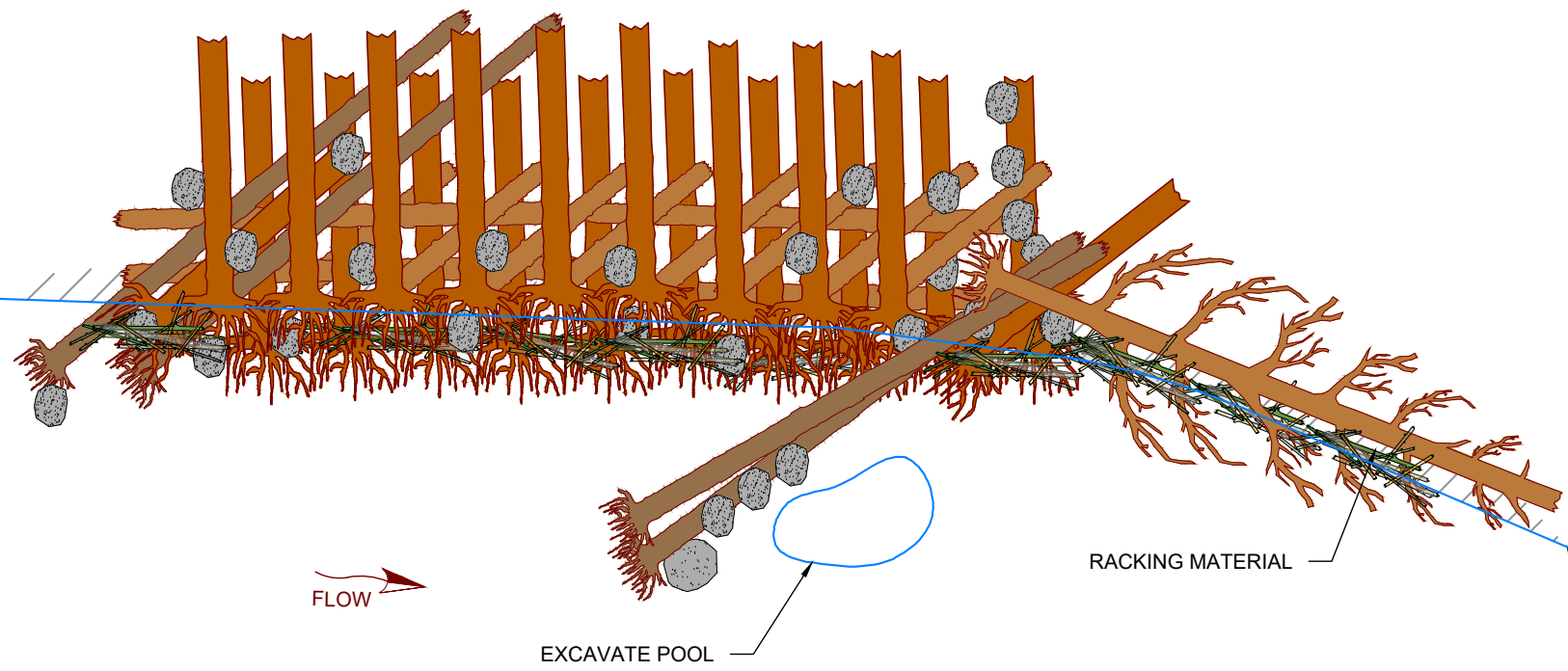
CONSTRUCTION QUANTITIES:

COMPONENT	DESCRIPTION	QUANTITY
WHOLE TREE WITH ROOTWAD	LARGE (18" DBH MIN, 35 FT MIN., 6 FT ROOTWAD)	5
WHOLE TREE WITH ROOTWAD	MEDIUM (14" - 17" DBH, 35 FT MIN., 4 FT ROOTWAD)	21
WHOLE TREE WITHOUT ROOTWAD	MEDIUM (14" - 17" DBH, 35 FT MIN.)	16
BOULDER BALLAST	2.0 FT DIAM.	26
RACKING MATERIAL	MISC. (4-10" DBH, 8-16 FT)	20



RETVEMENT LOG STRUCTURE NOTES:

- SUITABLE SPOILS FROM EXCAVATION SHALL BE USED TO BACKFILL STRUCTURE AS CONSTRUCTION PROGRESSES. MATERIAL SHALL BE COMPACTED WITH EXCAVATOR BUCKET. ADDITIONAL ALLUVIAL FLOODPLAIN MATERIAL MAY BE NEEDED TO BURY STRUCTURE AS SHOWN. BALLAST MATERIAL INCIDENTAL TO STRUCTURE COST.
- RACKING MATERIAL MAY BE ADDED TO FRONT OF STRUCTURE WHEN AVAILABLE. LIVE STAKES TO BE PLANTED DURING CONSTRUCTION.
- EXCAVATE MINIMUM 2-FOOT DEPTH POOLS AROUND REVETMENT STRUCTURES.
- OHW LOCATION WITH RESPECT TO STRUCTURE LOCATION IS A TYPICAL REPRESENTATION AND MAY VARY AT EACH STRUCTURE LOCATION. FINAL CONFIGURATION OF STRUCTURE SHALL BE AS DIRECTED IN FIELD.
- SEED WITH NATIVE VEGETATION AND LIVE STAKES. RACKING MATERIAL MAY CONSIST OF TOPS AND LIMBS OF WHOLE TREES, AND/OR SMALL WHOLE TREES WITH ROOTWADS.
- EXISTING ROAD WILL REQUIRE TEMPORARY REMOVAL AND REPLACEMENT TO PRE-EXISTING CONDITIONS.



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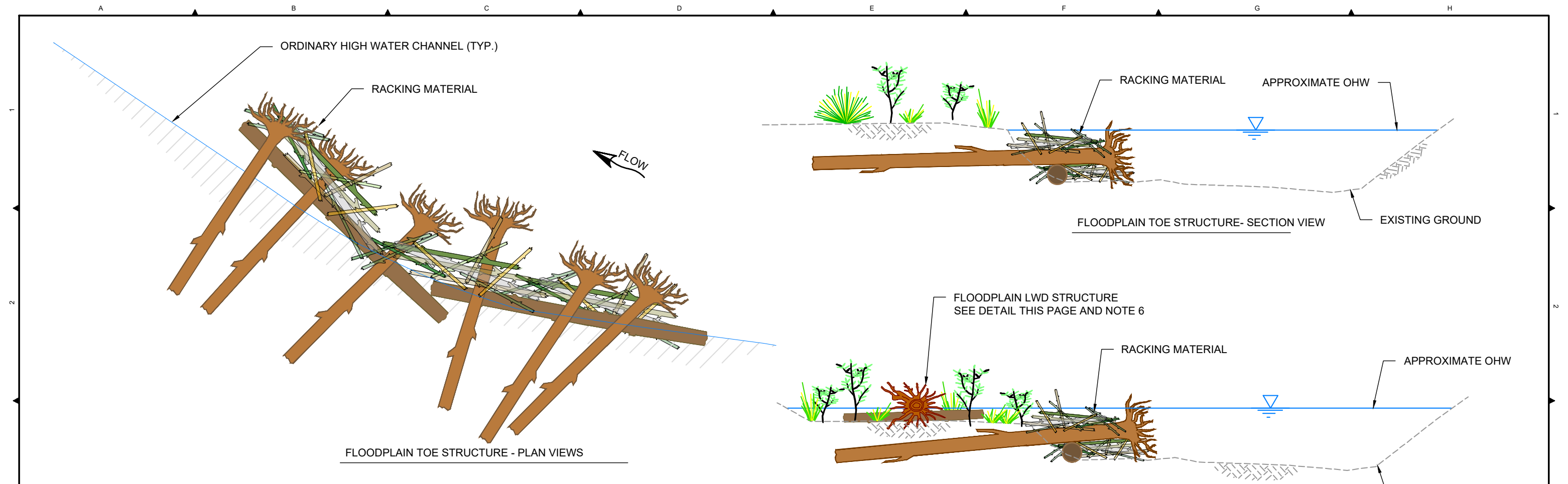
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PLOTTED AS ANSI B (11" X 17"), PLAN SHEET FULL SIZE ANSI D (22" X 34")

CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

DETAILS
LWD CONSTRUCTION

DWG. NO.: **C-23**
CREATED: 05/28/20
SHEET: 14 of 16

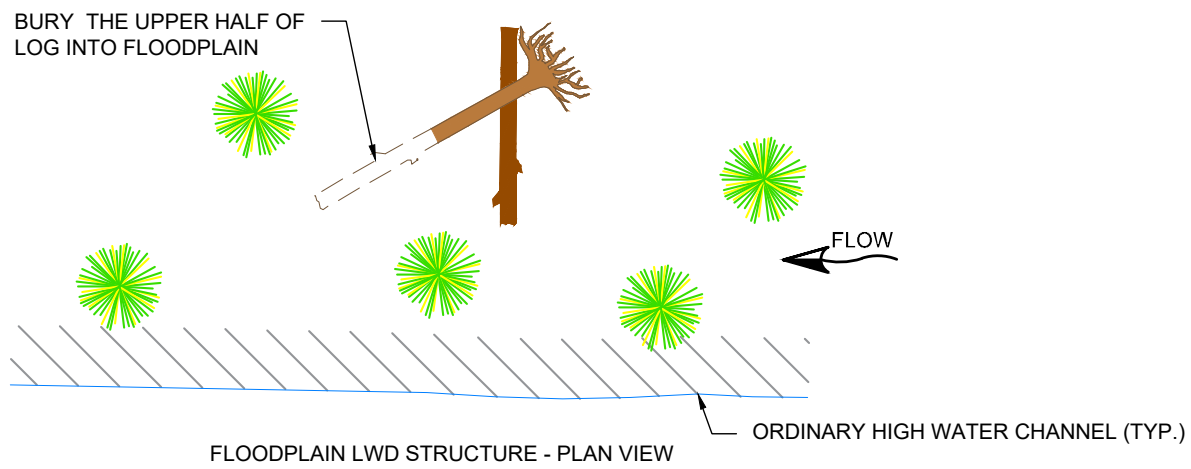


TOE WOOD STRUCTURE NOTES:

1. INSTALL TEMPORARY COFFERDAM TO ISOLATE WORK AREA.
2. FISH SALVAGE TO BE SUPERVISED BY QUALIFIED FISH BIOLOGIST.
3. ANY SPOILS FROM EXCAVATION SHALL BE USED TO BACKFILL STRUCTURE AS CONSTRUCTION PROGRESSES. MATERIAL SHALL BE COMPACTED WITH EXCAVATOR BUCKET. ADDITIONAL ALLUVIAL FLOODPLAIN MATERIAL MAY BE NEEDED TO BURY STRUCTURE AS SHOWN. BALLAST MATERIAL INCIDENTAL TO STRUCTURE COST.
4. PLANT 15 TO 25 WILLOW STAKES IN STRUCTURE TO COMPLETE CONSTRUCTION. OWNER SHALL BE RESPONSIBLE FOR PLANTING WILLOW STAKES.
5. OHW LOCATION WITH RESPECT TO STRUCTURE LOCATION IS A TYPICAL REPRESENTATION AND MAY VARY AT EACH STRUCTURE LOCATION.
6. FINAL CONFIGURATION OF FLOODPLAIN TOE, FLOODPLAIN TOE WITH BENCH, AND FLOODPLAIN LWD STRUCTURES SHALL BE AS DIRECTED IN FIELD. DEPTH OF BENCH VARIES FROM 1-3 FT.
7. RACKING MATERIAL MAY CONSIST OF TOPS AND LIMBS OF WHOLE TREES, AND/OR SMALL WHOLE TREES WITH ROOTWADS.

FLOODPLAIN TOE CONSTRUCTION QUANTITIES:

COMPONENT	DESCRIPTION	QUANTITY
WHOLE TREE WITH ROOTWAD	LARGE (18" DBH, 45 FT MIN., 6 FT ROOTWAD)	6
WHOLE TREE WITHOUT ROOTWAD	LARGE (18" DBH, 45 FT MIN.)	2
RACKING MATERIAL	MISC. (4-10" DBH, 8-16 FT)	6



FLOODPLAIN LWD CONSTRUCTION QUANTITIES:

COMPONENT	DESCRIPTION	QUANTITY
WHOLE TREE WITH ROOTWAD	LARGE (18" DBH, 45 FT MIN., 6 FT ROOTWAD)	1
WHOLE TREE WITHOUT ROOTWAD	MEDIUM (14" - 17" DBH, 35 FT MIN.)	1

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A	04/08/20	15% ALTERNATIVE ANALYSIS	JDB	JDB	JA	VM

CATHERINE CREEK RIVER MILE 38
HABITAT RESTORATION DESIGN
30% CONCEPTUAL DESIGN

DETAILS
LWD CONSTRUCTION

DWG. NO.: **C-24**
CREATED: 05/28/20
SHEET: 15 of 16

SPECIAL PROVISIONS

INTRODUCTION

THE OREGON STATE DEPARTMENT OF TRANSPORTATION'S (ODOT) 2018 (OR NEWER) STANDARD SPECIFICATIONS FOR CONSTRUCTION SHALL APPLY UNLESS OTHERWISE NOTED IN THE FOLLOWING SPECIAL PROVISIONS. THE "CONTRACTING AGENCY" OR "OWNER" SHALL REFER TO THE UNION SOIL AND WATER CONSERVATION DISTRICT. ADDITIONAL SPECIFICATIONS IN THE FOLLOWING CONTRACT SECTIONS ARE INCLUDED FOR ITEMS NOT COVERED BY THE ODOT STANDARD SPECIFICATIONS (STANDARD SPECIFICATIONS).

PART 00100 - GENERAL CONDITIONS

SECTIONS 00120, 00130, AND 00180 (EXCEPT 00180.70, 00180.80) OF THE STANDARD SPECIFICATIONS DO NOT APPLY.

PART 00200 - TEMPORARY FEATURES AND APPURTENANCES

SP 00210 MOBILIZATION

SP 00220 ACCOMMODATIONS FOR PUBLIC TRAFFIC

SP 00280 SPCC AND TESC PLANS AND IMPLEMENTATION

SP 00290 ENVIRONMENTAL PROTECTION

PART 00300 - ROADWORK

SP 00320 CLEARING AND GRUBBING

SECTION 01030 - SEEDING

SP 01030.30 - UPLAND SEEDING

PART 01040 - PLANTING

SP 01040.019 - RIPARIAN PLANTING

PART 01091 - WATERWAY ENHANCEMENTS

SP 01091 LWD STRUCTURES

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CATHERINE CREEK RIVER MILE 38 HABITAT RESTORATION DESIGN 30% CONCEPTUAL DESIGN SPECIAL PROVISIONS	DWG. NO.:	S-101
	CREATED:	05/28/20
	SHEET:	16 of 16



Match Funding Form

Document 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 <https://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: Catherine Creek River Mile 38 Stream Restoration

Applicant: Union Soil and Water Conservation District

Match Funding Source	Type	Status*	Dollar Value	Match Funding Source Signature/Date*
Jim Webster (USWCD)	in-kind	secured	\$8,716	<i>Jim Webster</i> 5/29/20
Jesse Steele (GRMW)	in-kind	pending	\$1,800	
John Stevenson (USFWS)	in-kind	pending	\$20,000	
John and Brennan Sheehy (Landowner)	in-kind	pending	\$5,000	
Project Partners Fish Salvage	in-kind	pending	\$8,449	
	(select)	(select)		
	(select)	(select)		

*** IMPORTANT:** If you selected “secured” 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 Match Funding Source Signature/Date 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.



CC38

GRANDE RONDE MODEL WATERSHED

Implementation Team Project Proposal Site Tour Evaluation

Project Proposal Name: Catherine Creek River Mile 38 Stream Restoration
Date: 6/5/2020 **BSR:** CC3A **Tier:** 1 **Rating (H, M, L)** H, M

Current Fish Use and Life Stage

What are the current fish species and life stages that would be affected by the proposed activities? Will this project improve critical life stage access/habitat?
Steelhead, Chinook - Yes

Summer rearing for Chinook and steelhead was rated high for this reach in Atlas. If habitat is improved in this reach it may help address density dependence in upper reaches.

Juvenile Chinook rearing has been documented within this area and this project as designed will be a benefit to increasing rearing habitat. It will also provide holding habitat for returning adults.

Limiting Factors

What limiting factors does the project address? Are there other limiting factors that should be considered in the final proposal?
Lack of large wood and complex habitat.

Riparian Condition, Peripheral and Transitional Habitats, Channel Structures, Water Temperature and Decreased Water Quality are all rated high for this reach. This project will address most factors (not addressing flow, but TFT has made progress in this reach) to the extent allowed by the landowner at this time.

Proposed Restoration Activities

What restoration activities are being proposed? Are there additional activities that should be included in the final proposal? Are the activities appropriate for the site?

Placement of large wood structures and boulders to stabilize eroding streambanks and enhance fish habitat. Yes

Creation of 1 pool and enhancement of 4 others, plus some bank stabilization.

Technical Merit

Is the project technically sound (i.e. are goals and objectives well defined)? Are techniques appropriate? Is the cost-benefit ratio suitable? Has there been an appropriate level of planning and design?

Yes. Yes. Cost Benefit? Yes.

As this project has been in the planning and design phase for 7 years, it has clearly undergone rigorous analysis of techniques to meet the objectives outlined in the design. Due to the significant absence of LWD within the reach and the high densities of rearing Chinook and Steelhead, these actions would undoubtedly enhance rearing capacity/ quality. However, the proposed wood structures and the resulting “locking in place” of the channel should be discussed by the IT as recommended below.

Objective 3 is probably the main objective. Objectives 1, 2, and 4 could be rolled into a single objective or put under Obj. 3 for example:

Each objective was identified as addressing a specific limiting factor in the project reach described in the Catherine Creek Atlas and on page 5 of this proposal. By separating the 5 objectives we are better able to speak directly to the comment highlighted below.

“Objective 1: Our objective is to increase rearing habitat for juvenile salmonid species. We will do this by increasing the habitat quantity and quality with the construction of 1 large pool and enhancing habitat features of 4 existing pools by incorporating complex large wood and boulder features within these habitats. These methods will provide structural and thermal diversity within the main Catherine Creek channel.
Objective 2: Is to increase riparian conditions within the project area. We will do this by sloping stream banks to allow colonization of vegetation and increase the stem density of native tree and shrub communities within the existing riparian zone by planting and re-seeding.”

You could also add some specific metrics to the objectives so they are measurable and time bound.

Agreed measurable and time bound metrics have been added to each objective

- Obj 1) Increase the number of key members of large wood per mile in the project reach by 500 pieces per mile by 2024.
- Obj 2) Increase the percent of instream cover by 30% through the project reach by 2024.
- Obj 3) Increase the stream area juvenile salmonids can utilize by 25% through the project reach by 2024.
- Obj 4) Increase the number of pools by 1 in the project reach by 2024.
- Obj 5) Increase native species diversity by 50% and stems per acre by 200 plants by 2024.

- Boulder size – page 13 of the proposal has boulder as an average of 3 feet in diameter but page 14 of the design sheet has them as 2 feet in diameter.

On page 13, the size of boulders has been changed to 2 ft.

- Designs are technically sound and appear to be able to address the goals of this project given the current constraints for restoration.

Project benefits include restored streambank stability using stabilized wood and vegetation which is much needed in the actively eroding areas and significant uplift in habitat complexity and diversity. Some of the best pools in the reach occur within this property. Large pool/bend structures in 30% concepts look complex and robust.

Ice flows can be significant in reach and other project with similar bio-engineered streambank treatments with wood placed perpendicular have been damaged. Perhaps consider altering orientation of key members with a downstream orientation to help avoid abrupt/direct ice attack

Discussions between the District and the Engineer of record were had with respects to rootwad orientation, high flow and ice. The District was given assurance that the orientation would be sufficient. An example of these structures has been tested by this consultant in nearby streams and has performed as designed.

Recommendations for Improvement/Contingencies

Consider changing project name to something else more appropriate. CC-38 Stream Restoration is a stretch.

The District ~~feels~~ is confident that this project has balanced ~~landowners~~ landowners' requirements with instream restoration and does not plan to change the name.

It is recognized that the application process required the sponsors to submit this project at the 30% design stage. While in support of the project, review by the IT should occur before funding is approved.

The CC-38 project has been in the development stages for the past 7 years. The actions that have been described in the 30% design have all been agreed ~~upon~~ to by the landowners, project partners (ODFW and GRMW), the District and the Engineer of Record. We plan to move forward with the 30% design and do not anticipate any significant changes to the design. 80% and final design will be made available to the IT ~~group~~ team upon completion.

Fish salvage procedure is detailed in the design sheets and appears appropriate, but high water temperature in this section of Catherine Creek will likely slow progress. Fortunately the design requires structure specific isolation and does not attempt to de-water large sections of the main

channel which will speed up salvage operations considerably. I didn't see where fish were going to be released – the design sheets only say "...at a safe location" but are not specific. How far are they being transported? It is likely that they can be released in the closest pool upstream of the project.

Fish will be released approximately 1 mile upstream of the project site in a deep pool (3.5 feet) on the Hefner/Langford property.

Other Comments

Project primarily provides bank stabilization for the landowner however proposed wood/boulder structures should improve instream fish habitat. Project completion should help with maintaining good relations with this and hopefully other landowners on Catherine Creek.

Given the infrastructure limitations that prevent the implementation of alternative designs this project will still be beneficial to ESA species in this section of Catherine Creek and the cost appears appropriate.

Proposal based on 30% Design and engineer estimate. Budget appears reasonable for treatments. How much uncertainty is there with 30% concepts?

Project actions and plans have been vetted with the landowner over the past 7 years. It has taken this time for all of the project partners to agree to the course of action and we do not anticipate any significant changes as design progress to final.

Permit status shown as pending. Is there certainty project can go in summer 2021.

All project milestones have been met to date and we do not anticipate any significant road blocks to construction during the instream work window of 2021.

Recommend funding project either with balance of FY20 funds or FY21 funds.

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CC38 Restoration Project (18750)

Note: post-grant EM and reporting will be coordinated such that reports will include discussion of findings related to PE as part of the EM activities.

Thank you.

Wondering why applicant has excluded all indirect on this project? With a FNICR aren't you required to accept indirect, even if you apply it as cash match to other components of the project instead of collecting as indirect funding?

The District FNICR only allows us to bill indirect cost for our time that is directly billed to the grant (not including in-kind labor). In this budget the District is requesting a total of \$2,204 of indirect cost based on a request for \$4,750 in SWB using the indirect cost based on our FY21 FINCR of 46.4%.

Budget shows landowner contributing fencing repair, but this isn't represented in the Funding/Match page? Please respond in the application.

A description of the landowner contribution for fence construction has been added to the application.

Is permitting under the scope of work of this project or the TA project? Please respond in the application.

Yes, and a description has been added to the application abstract.

OWEB supports allowing the IT the opportunity to review 80% designs for input prior to implementation.

The USWCD will vet all design products with the IT group as the design work continues to a Final Design.