Biological Assessment

Catherine Creek RM 37 Stream and Fish Habitat Restoration Project

Prepared for:

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Acronyms and Abbreviations

BMPs	best management practices
BPA	Bonneville Power Administration
cfs	cubic feet per second
dBA	A-weighted decibels
DC	direct current
FA	Functioning Appropriately
FCRPS	Federal Columbia River Power System
FR	Functioning at Risk
FUR	Functioning at Unacceptable Risk
Hz	Hertz
LWD	large woody debris
mi/mi^2	miles/mile^2
NPF	Not Properly Functioning
NRCS	Natural Resources Conservation Service
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OHWM	ordinary high water mark
OWEB	Oregon Watershed Enhancement Board
PF	Properly Functioning
ppm	parts per million
Reclamation	Bureau of Reclamation
SEV	severity of ill-effect
SPCC	Spill Prevention, Control, and Containment
TESC	Temporary Erosion and Sediment Control
TSS	total suspended solids
Union WWTP	City of Union Wastewater Treatment Plant
USWCD	Union Soil and Water Conservation District
WSDOT	Washington State Department of Transportation

Section 1
Introduction

This biological assessment was prepared on behalf of the Bureau of Reclamation (Reclamation) and the U.S. Department of Energy, Bonneville Power Administration (BPA) in accordance with Section 7 of the Endangered Species Act. It also satisfies the provisions for consultation related to essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act, Section 305(b)(2), as amended by Public Law 104 267 (Appendix A). Reclamation and BPA are proposing to implement the Catherine Creek RM 37 Meander Reconstruction Project. This project is intended to address critical habitat limiting factors on Catherine Creek, a tributary to the upper Grande Ronde River in northeastern Oregon, and improve habitat conditions for ESA-listed species. Funding support for the project from both agencies constitutes the federal nexus for this action. The Reclamation is the lead federal action agency for the purpose of this consultation.

The proposed project will be implemented on private land near the town of Union, Oregon in the Upper Grande Ronde Subbasin. Catherine Creek lies within USGS hydrologic unit 17060104. The project area encompasses a 0.57-mile segment of Catherine Creek approximately 37 miles upstream from the confluence with the Grande Ronde River at Lat/Long 45° 13.000'N, 117° 54.3000' W. The legal description of the project location is: Township 4S South, Range 39 East WM, Sections 14, Union County Tax Lots 400, 500, 600. A map of the project location and vicinity is shown in Figure 1.

Background and Consultation History

This project was identified as a high priority restoration action by the Oregon Watershed Enhancement Board (OWEB), the Union Soil and Water Conservation District (USWCD), the Oregon Department of Fish and Wildlife (ODFW), and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). On the basis of these recommendations, Reclamation and BPA elected to fund this project as part of their collective program to mitigate for the adverse effects of operating the Federal Columbia River Power System (FCRPS). The BPA is the primary funding entity and the lead action agency, and Reclamation is managing the design and construction of the project. A list of project contacts is provided in Table 1.

The following timeline describes key communications during the consultation process:

- The design contractor contacted the NMFS on December 13, 2011 to discuss the possibility of using the HIP II programmatic ESA consultation.
- A Reclamation representative and the project design contractor conducted a site meeting with the Services on December 14, 2011. NMFS and USFWS determined that an individual Section 7 consultation would be required for the project.
- The design contractor contacted the Services and established a plan for providing information necessary to initiate Section 7 consultation in a series of phone calls and email exchanges between December 14 and 21, 2011.
- The design contractor provided the Services with a preliminary draft of the project description and plan sheets to the Services for pre-consultation coordination on December 16, 2011.
- The design contractor contacted the NMFS Hydraulic Engineer to discuss the proposed work area dewatering and flow bypass plan on December 27, 2011 and January 3, 2012.

- A draft biological assessment was submitted to the Services on January 6, 2012.
  The USFWS provided comments on the draft biological assessment on January 17, 2012.
- The NMFS provided comments on the draft biological assessment on January 17, 2012.
- The 30% plan set was completed and reviewed by the project sponsor and Reclamation on January 26, 2012 in La Grande, Oregon.
- The revised and final 30% plan set was completed on February 10, 2012.

Project Setting

The Catherine Creek watershed is located in northeast Oregon in Union County. Catherine Creek is a major tributary of the Grande Ronde River, originating in the Eagle Cap Wilderness as two forks draining elevations in excess of 8,000 feet. The Creek flows west through the Wallowa-Whitman National Forest and empties onto a high plain, the Grande Ronde Valley, continuing west through the City of Union and then north to its confluence with the Grande Ronde River at RM 140 (NPCC, 2004).

The Catherine Creek watershed lies within the Blue Mountains Province (Franklin and Dyrness, 1988). The climate here and throughout the upper Grande Ronde River subbasin is heavily influenced by the rainshadow effect of the Cascade Mountains, which partially blocks the penetration of moist air from the Pacific Ocean into the interior Columbia Basin (NPCC, 2004). Winters are cold and wet, with January typically the coldest month of the year. The average daily minimum temperature is 24°F. Summers are warm and dry with July being the warmest month of the year. The average daily maximum temperature is 84°F. Temperature and precipitation vary with elevation and valley floors are colder than slopes of adjacent foothills. Average annual precipitation ranges from 14 inches in the lower elevations to more than 60 inches in higher elevation areas (NPCC, 2004). Most of this precipitation falls as snow during the winter. The hydrology of Catherine Creek is snowmelt driven. Peak discharge occurs during the spring freshet which typically begins in late-March and tapers off in mid-July.

The project area is surrounded by private agricultural lands that have been used for farming and ranching for over a century. The Catherine Creek channel has been significantly hydromodified to support these land uses. Prior to human intervention, the natural channel was highly sinuous, with an estimated sinuosity ratio of 1.90. A review of available aerial photography for the project vicinity indicates that this reach of Catherine Creek was straightened and surrounding wetlands were ditched and drained sometime between the early 1930s and the 1950s. Riparian zones were generally cleared, leaving fragmented and discontinuous patches of mature vegetation. Historical channel meander forms remain evident in satellite imagery and orthophotos. Small wetlands, many associated with these historical meander forms, are scattered in proximity to the existing channel. Several small wetlands occur within or in proximity to the project action area. A wetland delineation report prepared for the project is presented in Appendix B.

These degraded conditions limit the productivity of native salmonid species in Catherine Creek. Restoration of historic meander forms, protecting and enhancing riparian vegetation, and reconnecting floodplain wetlands and off-channel habitats in this system are core objectives in of the restoration strategy for this system (NPCC 2004).

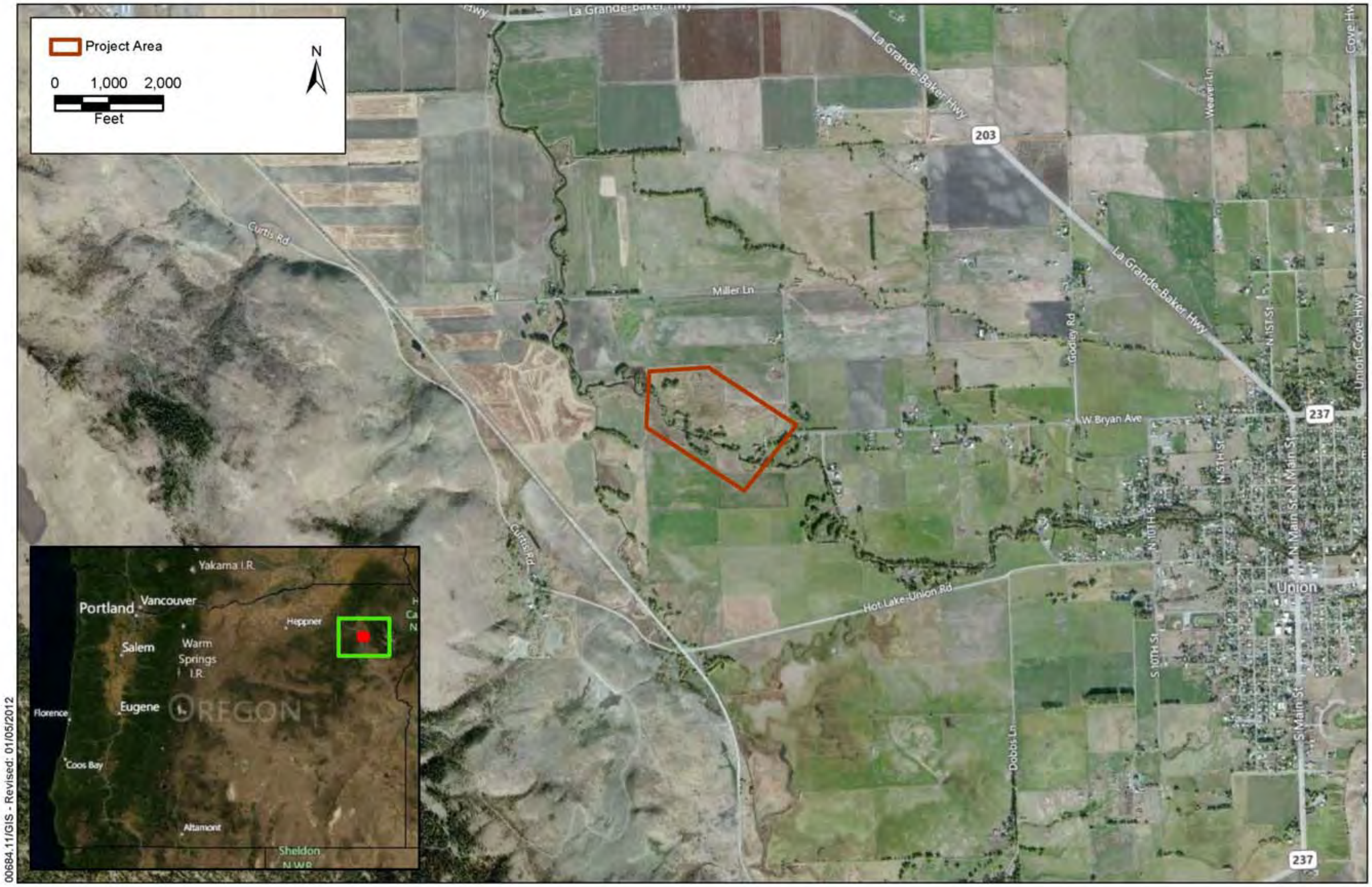

Figure 1
Project Area Location and Vicinity
Catherine Creek Run 37 Meander Reconstruction

Table 1. Project Contact Information

Role	Entity	Contact Information
Lead Action Agency	Bonneville Power Administration	Dan Gambetta Bonneville Power Administration Portland, OR (503) 230-3493 dagambetta@bpa.gov
Cooperating Action Agency	Bureau of Reclamation	Jay Hovde, P.E. Bureau of Reclamation U.S. Bureau of Reclamation 1150 N. Curtis Road, Suite 100 Boise ID 83706-1234 phone: 208-378-5247
Project Partners	Union Soil and Water Conservation District	Craig Schellsmidt District Manager Union SWCD 10507 N. McAlister Rd. La Grande, OR 97850 Phone: (541) 963-1313
	Confederated Tribes of the Umatilla Indian Reservation	Allen Childs Project Biologist, Grande Ronde Fish Habitat Project Ag Service Center, Rm. #4 10507 North McAlister RD Island City, Oregon 97850 541.429.7940 (office & fax)
	Oregon Department of Fish and Wildlife	Vance McGowan Fisheries Habitat Project Leader 107 20th Street La Grande, OR 97850 (541) 962-1836
Landowner	Yeargain Family Trust LLC	Trudy Yeargain 66926 Miller Lane Union, Oregon 97883 541-562-5473 (home)
Project Design and Regulatory Compliance Project Manager	ICF International (contractor to Reclamation)	John Soden 1108 11th St # 301 Bellingham, WA 98225-6623 (360) 255-2920
Project Design Engineer	ICF International	Martin Fisher 711 Capitol Way S # 504 Olympia, WA 98501-1235 (360) 357-4400
Biological Assessment Author	ICF International	Eric Doyle 710 2nd Ave #550 Seattle, WA 98104 (206) 801-2811

Section 2
Project Description

The proposed action will restore habitat conditions in lower Catherine Creek, an important spawning and rearing tributary for spring-run Chinook salmon and summer steelhead in the Upper Grande Ronde River Basin. The Oregon Department of Fish and Wildlife (ODFW) has identified the reach of Catherine Creek between Union and Little Creek, which overlaps the project area, as core winter rearing habitat for juvenile Chinook salmon (Favrot et al. 2010). ODFW has determined that degraded habitat conditions in this reach are limiting the productivity of Chinook salmon and steelhead populations using Catherine Creek (Favrot et al. 2010).

The project is designed specifically to address key limiting factors and improve habitat productivity on a 2,450-foot segment on this potentially productive reach of Catherine Creek. The project will be implemented entirely on private lands, and integrated with the establishment of a conservation easement that will promote the reestablishment of a functional riparian zone and provide protection in perpetuity.

Project Elements

The project team identified a set of restoration objectives designed to address habitat limiting factors on this segment of Catherine Creek and increase habitat suitability for salmon and steelhead. These design objectives and the related project elements are listed below. Project plan sheets depicting the project design are presented in Appendix C. Clearing areas, revegetation, estimated cut and fill volumes and materials quantities are provided in Table 2.

1. Restoring the channel to a more natural configuration
    - The currently hydromodified channel will be realigned, lengthening this channel segment from an existing 2,450 feet to approximately 3,000 feet.
    - Channel sinuosity within the project reach will increase from 1.20 to 1.38 (historical sinuosity prior to hydromodification was approximately 1.90).
    - The channel width/depth ratio will decrease from an average of 22.6 to 18.6.
    - Incised and near-vertical stream banks will be pulled back to a slope of 1.5:1 to 3:1 (horizontal/vertical) to decrease soil erosion, increase pool scour and depth potential, and support revegetation.
    - Approximately 125 cubic yards of existing bank armoring (riprap, concrete rubble) will be removed.
2. Increasing channel complexity
    - A total of 74 engineered large woody debris (LWD) structures, including 57 Type I, 12 Type II, and 5 Type III (Sheets C-18 and C-19) will be installed at specific locations throughout the project reach to maintain the desired channel configuration and increase habitat complexity. LWD components include:
        - 81 logs, 18 in. minimum diameter by 20 ft. length with rootwads intact

  - 25 logs, 15 in. minimum diameter by 20 ft. length with rootwads intact.
  - 69 logs 18 in. minimum diameter by 15 ft. length, no rootwad.
  - 5 logs 12 in. minimum diameter by 20 ft. length no rootwad.
  - 5 logs 18 in. minimum diameter by 20 ft. length no rootwad.
  - Woody debris of various diameters and lengths placed as racking material. Primarily coniferous logs of varying size and composition will be integrated into each set of structures to increase habitat complexity.
- A new 0.36-acre side channel will be constructed. This channel will activate during typical spring flows. The channel will incorporate a buried rock sill at the inlet to prevent possible head cutting and capture by the main channel.
- 250 1-4-foot diameter boulders will be placed within the existing and constructed channel segments.
- Approximately 130 feet (0.14 acre) of abandoned channel will be converted into low-water alcove habitat. Eight coniferous trees with intact branches and rootwads will be placed in the alcove to increase habitat complexity (Sheets C-6 and C-7).
- Approximately 400 feet (0.50 acre) of abandoned channel will be converted into a floodplain bench activated during high stream flows (Sheet C-5).
- Approximately 330 feet (0.57 acre) of abandoned channel will be converted into a floodplain bench activated during high stream flows (Sheet C-7).
- Over 100 linear feet of informal bank armoring composed of metal scrap and concrete debris will be removed and replaced by the habitat enhancing structures (Sheet C-4).
- Three existing pools will be enhanced and five new pools will be created by channel reconfiguration and stabilization with LWD habitat structures.
- Distinct riffle, glide and pool habitat segments will be created through channel reconfiguration, selective LWD and boulder placement, and substrate augmentation.

3. Increasing floodplain connectivity

- Floodplain habitat area and connectivity will be increased by excavating 2.66 acres of inset floodplain along incised portions of the project reach. The inset floodplain will be set at bank full flow and replanted with native riparian species to provide flood energy dissipation.
- A new 420-foot side channel will be constructed to provide off-channel habitat during spring flows and will provide backwater overwintering habitat (Sheet C-9).
- Bank reshaping will improve edge habitats and increase juvenile fish refuge habitat during high flow events.
- Approximately 0.07 acres of historic channel will be re-graded to increase connectivity between the creek and an existing, spring-fed oxbow wetland (Sheet C-5).

4. Improving riparian habitat conditions

- Channel realignment will reconnect remnant riparian vegetation adjacent to historical channel segments (Sheets L-1 and L-2).
- Riparian replanting component of project includes restoration of site-appropriate native vegetation on 4.86 acres of streambank and adjacent riparian habitat (Sheet L-2).

- Integration of the project with an interrelated conservation easement and riparian fencing encompassing the project area. The fencing project is supplemented by the installation of a permanent upland livestock watering system and improvement of an existing livestock crossing. This project, described further below, is being implemented concurrently by the Natural Resources Conservation Service (NRCS).
- Decompaction and revegetation of 2.0 acres of staging sites and access corridors (Sheet L-1).

A summary of quantities is provided on Sheet G-2 of the plan set. Table 2 below provides a summary of construction materials, clearing, spoiling, earthwork, and habitat structure elements.

Table 2. Construction Materials Quantities, Clearing Area, and Cut and Fill Volumes

Construction Activity/Element	Action	Quantity	Units
Site access and staging	Clear and grub	5	ac.
Channel and Bank Reconfiguration			
Excavate new channel, reshape banks and floodplain	Cut	22,020	cy
Backfill and compact old channel	Backfill	5,200	cy
Haul and dispose excess excavated fill, haul and dispose debris (car bodies, concrete rubble, etc). Excess fill will be spread on adjacent agricultural uplands at ODFW approved location	Cut/dispose	16,820	cy
In-Channel Habitat Boulders (250 2-foot diam.)	Fill	780	cy
Cobble/Gravel Material for Riffles	Fill	1,165	cy
Grade control Sill at Side Channel (~15 2-foot diam. Boulders)	Fill	50	cy
LWD Structures			
Logs, 18 in. min. diam. x 20 ft., intact rootwads	Place	81	ea.
Logs, 15 in. min. diam. x 20 ft., intact rootwads	Place	25	ea.
Logs 18 in. min. diam. x 15 ft., no rootwad.	Place	69	ea.
Logs 12 in. min. diam. x 20 ft., no rootwad.	Place	5	ea.
Logs 18 in. min. diam. x 20 ft., no rootwad.	Place	5	ea.
Racking material: Woody debris/brush bundles and primarily coniferous logs of varying length/diam. will be integrated into each set of LWD structures to increase habitat complexity.	Place	TBD	ea.
Whole coniferous trees in alcove habitat	Place	5	ea.

ac. = acres; ft = feet; cy = cubic yards; ea. = each.

Conservation Easement, Fencing, and Livestock Access

The project will be integrated with a conservation easement and riparian fencing project along the 0.75-mile segment of Catherine Creek encompassing 23.3 acres (Appendix F). The easement and fencing plan is being implemented by the NRCS and will be completed concurrent with project construction. The project has complete landowner support.

The riparian zone on both sides of the project area has been temporarily fenced since the fall of 2010 to exclude livestock and allow soils to stabilize prior to replanting. Approximately 17.7 acres are enclosed. The easement project will fence 23.3 acres of riparian habitat with 4-5 strand barbed wire exclosure fences. This part of the project will be funded and installed under the Conservation

Reserve Enhancement Program (CREP) program. This allows the project protection and the opportunity to mature under the 10-15 year conservation easement.

The existing livestock water gap at STA 14+00 (Sheet C-8) currently consists of a shallow plane bed channel with native gravel substrates. The banks at the site are trampled and eroded, and devoid of woody vegetation. This location will be used as the temporary construction crossing as shown on sheet G-4. Following construction the temporary crossing will be removed. A 1-foot layer of 8-inch-minus rock will be placed on the north and south side stream banks in order to stabilize the water gap for future livestock crossing (Sheet C-8). This will improve the existing conditions and reduce the risk of bank slumping and erosion. The existing streambed consists of native gravels and has shown no damage from past use of this water gap. No improvements to the streambed are proposed.

The livestock water plan also includes an off-channel upland watering site, as shown in Appendix F, which complements an existing watering site on the opposite side of the creek.

The USWCD along with CTUIR and ODFW will be responsible for monitoring/maintenance of the easement as well as the landowner. Typically, the CTUIR would maintain fences and the landowner would be responsible for weed control. Under the CREP agreement, the landowner is responsible for maintaining the fences, watering sites, and weed control.

Project Construction and Schedule

The primary construction elements include mobilization, creation of access points and staging areas, vegetation clearing, the use of cofferdams and bypass systems as needed to isolate and dewater the channel for work conducted below the ordinary high water mark (OHWM), meander excavation and bank reshaping, and placement of habitat boulders and large wood structures in the channel and along the banks. Once construction is complete, all temporary access routes will be removed and restored, and all construction materials and debris will be removed. Riparian restoration will be completed in stages, with planting of trees and willow stakes completed during the fall dormant period.

Access, Staging, and Materials Handling

The location and dimension of proposed access points and staging areas are detailed on Sheet G-4. Construction equipment will access the project site from Miller Lane. Once on private property, the equipment will use existing farm roads and fields to access the main staging areas and construction sites. The creek will be accessed from the north and south sides as needed to construct the various elements of the project. Two staging areas for vehicles and equipment will be established on each side of the creek. Access routes to and from each staging area will be sited to avoid mature shrub and tree vegetation.

The south side of the project area will be accessed by a temporary vehicle crossing. The existing bridge is not adequate to support the heavy equipment expected to be used for construction of the new channel. The temporary crossing will include the installation of two culverts to convey flows and allow fish passage, and the construction of a temporary road surface. This road will allow excavators and dump trucks across the river. The crossing is located in a plane bed segment of channel with low, unvegetated, shallow sloping banks and partially embedded gravel substrate. The road and culverts will be removed following construction and the stream banks will be restored to their preconstruction contours. The banks adjacent to the crossing site are bare and/or grass covered, no trees or shrubs will be removed.

Excess material from channel and floodplain excavation will be placed on adjacent agricultural uplands and leveled to a depth of 2 inches as requested by the landowner. With the exception of backfill used to close the existing channel, excavation spoils will not be placed within the Catherine Creek channel or adjacent wetlands (wetlands in the vicinity of the project area are identified on Sheet G-4). All other material, including car bodies, concrete rubble, and metal trash will be hauled offsite for disposal at a permitted commercial facility.

Construction Sequencing

Project construction will take place between July 1 and October 30, 2012, with all in-water work taking place during the August 1 to September 30 in-water work window established specifically for this site by ODFW. The approximate schedule and sequencing of construction elements is provided below. See Table 2 for materials quantities.

1. Stage equipment and materials and prepare site access (July 15 to July 31)
2. Install cofferdams and/or temporary flow bypasses, remove and relocate fish and other aquatic species (August 1 – September 15)
    a. A combination of work area isolation and dewatering methods will be selected in response to anticipated flow conditions throughout the construction periods, and contractor limitations.
    b. Flow bypass will occur in segments as needed within the project area. As shown in the Dewatering Plan on Sheet G-5, we anticipate up to 3 bypasses may be needed during construction. By initiating a small number of shorter bypasses we expect to reduce setup time, be more effective at fish removal, and reduce the length of pipe needed.
3. Channel reconfiguration (August 6 – September 30)
    a. Excavate 1,100 feet of new channel in isolation from Catherine Creek.
    b. Reconfigure banks and bed of existing channel.
    c. Backfill 730 feet of existing channel to create floodplain bench.
4. Install LWD and boulder habitat features and substrate augmentation(August 14 – September 15)
    a. LWD habitat features include 57 Type I structures, 12 Type II structures, and 5 Type III structures. See plan sheets C-18 and C-19 for location and design typicals.
    b. Install 250 2-foot diameter boulders
    c. Place substrate augmentation (cobbles and gravel) at riffle sites.
5. Remove all remaining flow bypass and cofferdams; return flow to channel (September 30)
6. Stabilize and revegetate exposed banks and shoreline (October 1 - October 30)
    a. Install erosion control blanket in channel fill areas and inside channel element.
    b. Install salvaged sod and sedge plugs (see plan sheet L-1)
    c. Apply seed and straw mulch.

   d. Replanting will use manual methods to avoid effects on aquatic habitat

7. Riparian enhancement and disturbed area revegetation (October 1 – 30)
   a. Planting Areas 1, 2, and 3, 4.86 acres from OHWM to the limit of earth work and replanting area boundary
8. Site Restoration (October 1 – October 30)
   a. Apply seed and straw mulch to spoils, staging, and access road areas.
   b. Clean up site and remove all debris and construction materials.

Impact Avoidance and Minimization Measures

The following best management practices (BMPs) are proposed to avoid and minimize potential adverse effects on ESA-listed species and/or critical habitat. Additional conditions may be imposed in ESA Biological Opinions issued for the proposed action by NMFS and USFWS. BMPs are numbered for ease of reference.

Erosion and Spill Control

1. Temporary Erosion and Sediment Control (TESC) Plan
   a. The contractor will prepare a TESC Plan for implementation throughout project construction and have this plan available for inspection.
   b. The TESC Plan will detail appropriate erosion control measures (e.g. delineation of clearing limits, installation of sediment fence and/or straw wattles).
   c. Clearing limits and erosion control measures will be placed during mobilization and prior to clearing and grubbing for construction.
2. Spill Prevention, Control, and Containment (SPCC) Plan
   a. The contractor will prepare a SPCC Plan for implementation throughout project construction and have this plan available for inspection.
   b. The contractor will maintain sufficient containment and cleanup equipment and supplies on site throughout project construction in order to respond to any foreseeable spill of hazardous materials.
   c. Vehicle and equipment staging areas will be located at least 150 feet from Catherine Creek and any other water body or wetlands in the project vicinity.
   d. The contractor will inspect and clean all equipment daily. External oil, grease, dirt, and caked mud will be removed before equipment is operated outside of staging areas.
   e. Temporary impoundments will be established in the equipment staging area to contain untreated wash/rinse water. Wastewater will not be discharged to any water body or wetland.
   f. All construction equipment will be washed prior to and after entering the project site to minimize the potential for spills and leakage, and to avoid spreading noxious weeds.
   g. Staging areas for storing fuels and other potentially hazardous materials will be placed at least 150 feet away from regulated riparian and wetland buffers.

h. Refueling and servicing any equipment or vehicles will take place in dedicated staging areas, except as provided below.

i. For track-mounted equipment, large cranes, and other equipment whose limited mobility makes it impractical to move for refueling, the contractor will take precautions to minimize the risk of fuel reaching the regulated work area.

j. Spill prevention measures and fuel containment systems sufficient to completely contain a potential spill, as well as other pollution control devices and measures adequate to provide containment of hazardous material will be provided during all refueling outside of vehicle staging areas.

k. Refueling will be managed to minimize the amount of fuel remaining in vehicles stored during non-work times.

3. Noxious weed management

   a. Equipment will be washed prior to entering and leaving the project area to avoid potential spread of noxious weeds.

In-Water Work

4. In-water work window

   a. All in-water work will be conducted within the site-specific August 1 to September 30 in-water work window. ODFW defined this work window for this reach of Catherine Creek based on site-specific knowledge of fish presence and migration timing (Appendix D).

5. Stream crossings

   a. A single temporary stream crossing will be created to access the south side of the project area for construction purposes.

   b. The temporary stream-crossing culverts will be sized to accommodate fish passage during the range of flows present during the in-water work period, consistent with current NMFS and ODFW culvert design guidance.

   c. A temporary stream bypass will be used for work area dewatering during installation and removal of the temporary crossing, as described under BMP 6.

   d. Fish exclusion and salvage will be conducted prior to crossing placement and removal as described under BMP 8.

   e. The temporary crossing will be removed prior to the end of the September 30 in-water work window.

6. Work-area dewatering using flow bypass

   a. In-water work areas will be isolated and dewatered using a combination of flow bypasses and cofferdams. Final selection of methods will be determined by the construction contractor and design team based on flow conditions during the in-water work window and practical limitations dictated by site conditions.

   b. Flow bypasses will be designed to accommodate downstream passage of juvenile fish throughout project construction.

c. Channel dewatering will be conducted gradually to encourage volitional movement of fish out of the construction zone prior to fish salvage.

d. Bypass pipes will be sized and oriented to minimize potential for fish injury and disorientation during entrainment (i.e. sized to limit flow velocity to extent practicable, avoiding sharp bends or turns to minimize turbulence).

e. Energy dissipation at bypass discharge will be designed to avoid erosion and fish injury.

f. The proposed bypass and energy dissipation design will be reviewed and approved by an NMFS fish passage engineer prior to construction.

7. Work-area dewatering using cofferdams

    a. Cofferdams will be configured to allow for unimpeded upstream and downstream migration.

    b. Cofferdam and bypass placement will be coordinated to minimize the number of fish capture and handling events (to avoid individual fish exposure to repeated capture and handling stress).

    c. The contractor will not discharge sediment-laden water or water contained within an isolation barrier directly into any Waters of the State unless it has been satisfactorily treated (e.g., by bioswale, filter, settlement pond, pumping to vegetated upland locations, bio-bag, or dirt-bag). Contaminated water will be pumped to baker tanks for storage and proper disposal.

8. Fish salvage

    a. All fish capture, handling and relocation will be directed by qualified and experience fish biologists in accordance with the fish removal protocol described in Appendix E and consistent with NMFS, USFWS, and ODFW guidelines.

9. Spawning Survey

    a. Prior to the commencement of work a spawning survey will be conducted within the project reach. If evidence of spawning is observed by ODFW, the project sponsor will coordinate with NMFS to determine the appropriate action.

Site Restoration and Riparian Enhancement

10. Upon completion of construction, all construction equipment and remaining material will be removed from the site. Care will be taken avoid damage to remaining wetlands and other non-wetland waters, and to existing riparian vegetation.

11. Sheet L-1 shows the proposed seeding and site restoration/erosion control plan. Following construction, all disturbed soils will be treated with soil stabilization measures. For spoils areas, staging, and access areas, the contractor will apply an erosion control native seed mix with straw mulch. These areas will be prepared for seed application by raking or chaining. Following seed application the areas will again be raked or chained to incorporate the seed mix into the native soils. Straw mulch will then be applied at a rate of 2 tons per acre.

12. Invasive vegetation will be managed using manual control methods. No herbicides will be applied.

13. Monitoring and maintenance

a. Revegetation and riparian enhancement will be monitored and maintained for two years following project completion to ensure a minimum of 70 percent survival of tree and shrub planting.

b. Beginning in post-project year three the site will be monitored under the conservation easement and riparian enhancement action implemented by NRCS.

Action Area

Per 50 CFR Part 402.02, the action area in an ESA Section 7 consultation is defined by the physical extent of all measurable direct and indirect effects of a proposed action, as well as the effects resulting from any interrelated or interdependent actions. For the purpose of this consultation, the action area has been separated into a terrestrial component and an aquatic component, which are shown in Figure 2.

The terrestrial component of the action area is defined by:

- The clearing limits of the project construction footprint, as well as staging areas and access routes on the Yeargain property: 5.5 acres (see Appendix C, Sheet G-4).
- The spoil placement sites in upland pasture (24.09 acres) (see Appendix C, Sheet G-4)
- The footprint of the interrelated NRCS conservation easement and fencing project: 23.3 acres (see Appendix F)
- Construction noise in excess of environmental baseline conditions in the project vicinity: a circular zone extending approximately 2,000 feet outward from the construction limits.[1]

The aquatic component of the action area is defined by:

- The existing segment of the Catherine Creek channel within the project footprint: ~2,450 feet.
- The new Catherine Creek channel following construction: 3,000 feet; 7.85 acres.
- Riparian vegetation enhancement areas adjacent to the remeandered channel: 4.86 acres.
- The anticipated downstream limit of suspended sediment effects (i.e. the distance required for construction-related suspended sediment pulses to dissipate to background conditions): 1,400 feet from downstream end of project footprint.

[1] Terrestrial noise limits were calculated using formulae and methods provided in Biological Assessment guidance prepared by the Washington State Department of Transportation (WSDOT 2010), assuming a combined maximum noise level of 97 A-weighted decibels (dBA) during simultaneous operation of excavators, loaded dump trucks and related heavy equipment and a background noise level of 55 dBA in the project vicinity.

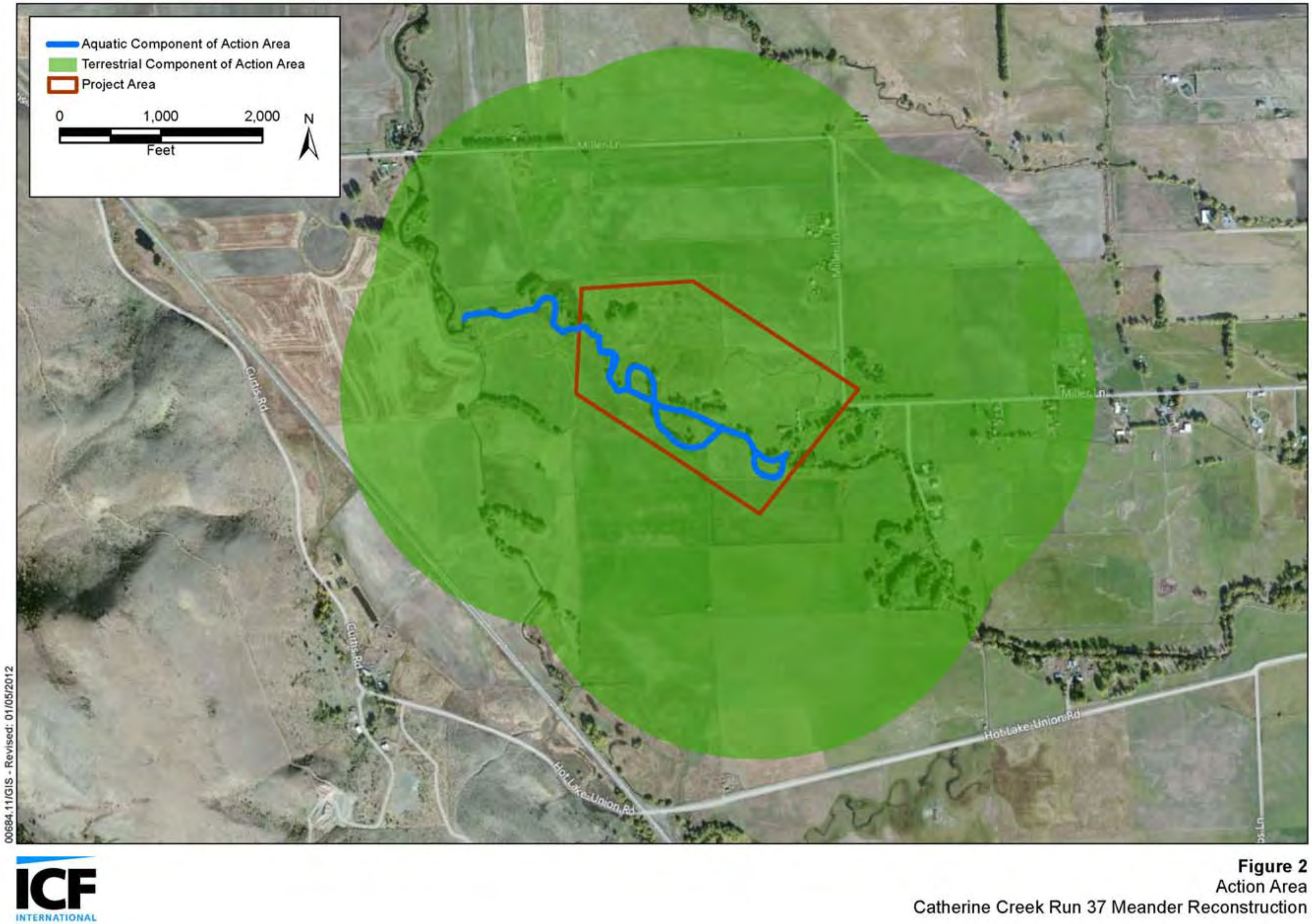

Figure 2
Action Area
Catherine Creek Run 37 Meander Reconstruction

Section 3

Species and Critical Habitat Occurrence in Action Area

The species addressed in this Biological Assessment were identified based on the following information:

- Information on the distribution of ESA-listed salmon and steelhead populations under the jurisdiction of the NMFS obtained from the NMFS Northwest Region website and various sources.
- A species list for Union County, Oregon, obtained from the USFWS web site on February 10, 2012, identifying the known or potential occurrence of ESA-listed species.
- A list of sensitive, threatened and endangered species identified as occurring within the Township, Range, and Sections encompassing the project area from the Oregon Biodiversity Information Center (ORBIC) obtained on January 10, 2012.

ESA-listed species known to occur in the project action area are listed in Table 3.

Other federally listed species under the jurisdiction of USFWS and NMFS are known to occur in the general vicinity but do not occur in the action are. These include the gray wolf and ESA-listed plant species. The action area and surroundings do not provide suitable habitat for gray wolf and this species is unlikely to occur in the vicinity. No ESA-listed plant species have been documented in ORBIC as occurring in the action area or vicinity. Therefore these species are not addressed further in this assessment.

The federal status, biology and ecology, and general habitat requirements for those species that are known to occur, or may occur in Union County and do occur or may occur within the project action area are discussed in further detail in Appendix A.

Table 3. Federally Protected Species Identified as Occurring in Union County, Oregon

Species Common Name (Scientific Name)	Federal ESA Status (Critical Habitat Status)	Occurrence in the Project Action Area
Chinook Salmon of the Snake River Spring/Summer-run ESU (*Oncorhynchus tshawytscha*)	Threatened (Designated)	Present in Catherine Creek. Critical habitat was designated on 10/25/1999, but was not designated in Catherine Creek.
Steelhead of the Snake River Basin DPS (*Oncorhynchus mykiss*)	Threatened (Designated)	Present in Catherine Creek. Critical habitat was designated on 9/2/2005, in Catherine Creek.
Bull Trout of the Columbia River DPS (*Salvelinus confluentus*)	Threatened (Designated)	Present within Catherine Creek. Critical habitat was designated on 9/26/2005 and revised on 10/18/2010. Critical habitat has been designated in Catherine Creek.
ESU = evolutionarily significant unit; DPS = distinct population segment.		

Chinook Salmon

ESU: Snake River Spring/Summer-run, classified as distinct based on distribution.

ESU Status: Threatened listing reaffirmed in 5-year status review, August 15, 2011 (76FR50448)

Population: Catherine Creek

Trend: The most recent (2005-2009) 5-year geometric mean for adult natural-origin spawners was 80, a decrease from the previous 5-year geomean of 95. The most recent (2000-2009) 10-year geometric mean adult recruit-per-spawner productivity metric was 0.71 (Ford et al. 2010).

Occurrence in the Action Area:

Catherine Creek provides known spawning and rearing habitat for Snake River Spring/Summer-run Chinook salmon. The action area provides documented winter rearing habitat and for juvenile Chinook and serves as a migratory corridor. Juveniles are likely to be found in the action area from October through May based on downstream screw trap counts and habitat utilization surveys in the action area. Temperature conditions in the action area are unsuitable for salmonid rearing during the in-water work window.

Adults migrate through the action area from mid-May to mid-July in preparation for spawning, and hold in the action area prior to selecting spawning habitats. Pre-spawn adults have been documented in the action area and vicinity as late as August in recent years, likely due to the higher flows and cooler water temperatures associated with exceptional snowpack conditions. Surveys conducted by ODFW in 2010 and 2011 determined that spawning occurs predominantly upstream of Union, outside of the action area. One redd was observed downstream of Union in 2010, approximately 1.1 miles upstream of the upper limit of the aquatic component of the action area. However, substrate conditions within the action area are suitable for salmonid spawning. The potential to provide spawning habitat has made this reach a high priority for restoration, and increasing habitat suitability for spawning is one of the objectives of the proposed action.

Documentation and additional detail regarding Chinook salmon use of the action area is provided in Appendix D. General run timing for all ESA-listed salmonid species in the action area is shown in Figure 3.

Designated Critical Habitat

Critical habitat for the Snake River Spring/Summer-run Chinook salmon ESU was designated on October 25, 1999 (64 FR 57399). This designation reaffirmed the original critical habitat designation for the ESU of December 28, 1993 (58FR68543). The designation includes all spawning and rearing habitats used by Chinook salmon in Catherine Creek. Essential components of Chinook salmon critical habitat in Catherine Creek include:

1. Spawning and juvenile rearing areas
2. Juvenile migration corridors
3. Areas for growth and development to adulthood
4. Adult migration corridors

Steelhead

DPS: Snake River Basin, classified as distinct based on distribution.

DPS Status: Threatened listing reaffirmed in 5-year status review, August 15, 2011 (76FR50448)

Population: Upper Grande Ronde

Trend: The most recent (2003-2008) 5-year geometric mean for adult natural-origin spawners was 1425, an increase from the previous 5-year geomean of 1332. Estimated adult recruit-per-spawner productivity for this population ranged from 0.92 to 0.96 (Ford et al. 2010).

Steelhead from the Upper Grande Ronde population component of the Snake River Basin DPS migrate to the Catherine Creek watershed as immature adults in October and December and hold prior to spawning in late-winter and spring. The peak return enters the Grande Ronde River in September, typically remaining in holding habitats in the lower Grande Ronde River through October when falling temperatures become more favorable for upstream migration. Spawning surveys have not been conducted regularly in Catherine Creek, however the action area is considered to be probable spawning habitat based on the suitability of channel conditions, flow velocity, and substrates. Egg incubation and fry emergence continues through spring, fry emergence completed by July 1. After emergence, fry migrate to summer rearing habitats in upstream areas of the watershed where water temperatures are more favorable. However, if water temperatures remain favorable fry migration out of the action area may overlap the beginning of the in-water work window.

Documentation and additional detail regarding steelhead use of the action area is provided in Appendix D. General run timing for all ESA-listed salmonid species in the action area is shown in Figure 3.

Designated Critical Habitat

Catherine Creek was designated as critical habitat for the Snake River Basin steelhead DPS on September 2, 2005 (70 FR 52630). This designation includes the entirety of steelhead spawning, rearing, and migratory habitats in the Catherine Creek watershed. Principal component elements (PCEs) of critical habitat in the action area include or may include:

1. **Freshwater spawning sites** with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.

2. **Freshwater rearing sites** with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

3. **Freshwater migration corridors** free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Bull Trout of the Columbia River Distinct Population Segment

DPS: Columbia River Basin

DPS Status: Threatened, June 10, 1998 (63 FR 31647)

Population: Catherine Creek - Grande Ronde Recovery Unit

Trend: Catherine Creek population abundance appears to be declining, based on a steady decrease in redd counts between 1998 and 2008. Core area abundance is stable, estimated at 4,000 adult spawners per year representing resident and adfluvial migrant life history forms (USFWS 2010).

Adfluvial migrant bull trout occur in the action area during migration between mainstem foraging and overwintering habitats in the Grande Ronde and Snake Rivers and spawning and summer rearing habitats in the headwaters of Catherine Creek. ODFW and CTUIR have surveyed bull trout migration in the watershed at a collection weir located downstream of the action area. Juvenile migration has been observed in every month between January and November, with peak movements occurring in January through February, May through June, and September through November. Adult migration at the weir has been documented from mid-April through mid-July and October through November (USFWS 2010). These movement patterns are consistent with those of other adfluvial migrant populations in the Grande Ronde Recovery Unit, as documented in Appendix D. General run timing for all ESA-listed salmonid species in the action area is shown in Figure 3.

Designated Critical Habitat

Critical habitat for the Columbia River bull trout DPS was redesignated on October 18, 2010 (75 FR 63898). The revised designation expanded critical habitat within the Grande Ronde River basin to encompass all habitats used by bull trout in the Catherine Creek watershed (75 FR 63986). The action area is considered foraging, migrating, and overwintering (FMO) habitat. Critical habitat PCEs in the action area include:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
5. Water temperatures ranging from 2 to 15 degrees Celsius (°C) (36 to 59 degrees Fahrenheit (°F)), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures

6. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
7. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
8. No or limited exposure to nonnative predatory; interbreeding; or competing species.

Habitat conditions for bull trout and the condition of critical habitat are described in the Environmental Baseline section.

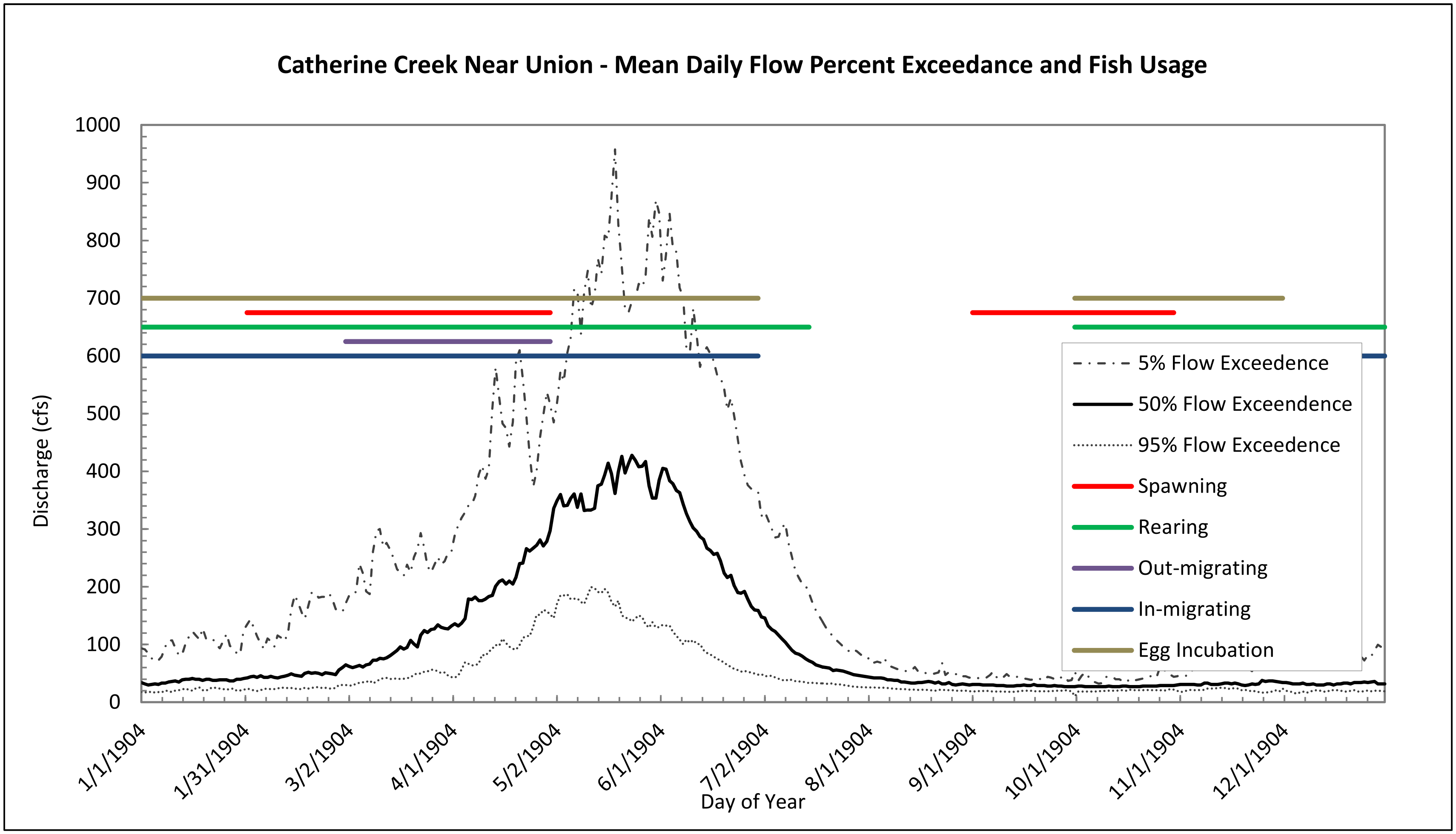

Figure 3. General Run-Timing of ESA-listed Salmonid Species in the Action Area

Section 4
Environmental Baseline

This section describes the environmental baseline conditions in the project action area and the Catherine Creek watershed as they relate to the habitat requirements of ESA-listed species. Condition ratings were derived from various sources, including baseline field surveys, site and aerial photograph interpretation, habitat characterization reports developed by ODFW, personal communication with ODFW personnel with knowledge of the action area, and other relevant literature.

For the purpose of this BA, environmental conditions in the action area are documented using the Matrix of Pathways and Indicators developed for salmon and steelhead by NMFS (1996) and the Matrix of Pathways and Indicators developed for bull trout by USFWS (1998). These matrices both provide criteria for rating the condition of a range of environmental parameters (indicators) on the basis of the habitat function they provide for their respected listed species. The habitat-based pathways and indicators in each matrix are identical, but the criteria for rating the condition of these indicators differ based on difference in habitat requirements between bull trout and other salmonid species. In addition, the USFWS matrix includes a pathway and indicators for describing the viability of bull trout subpopulations in the action area, and the integration of these subpopulations with habitat conditions in the action area.

The NMFS matrix for Snake River spring/summer-Run Chinook salmon and Snake River steelhead is presented in Table 4. The USFWS matrix for Columbia River bull trout is presented in Table 5. Each of these matrices identifies the pathways and indicators that will be affected by the proposed action, and the baseline condition of those indicators at the appropriate action area, watershed, or population scale. The following sections provide a narrative description of baseline conditions for each pathway, with emphasis on those habitat indicators directly and indirectly affected by the proposed action. This discussion uses the rating criteria defined in the NMFS and USFWS matrices to describe the environmental baseline condition of each indicator. The NMFS matrix criteria include Properly Functioning (PF), Functioning at Risk (FR) and Not Properly Functioning (NPF). The USFWS matrix criteria include Functioning Appropriately (FA), Functioning at Risk (FR), and Functioning at Unacceptable Risk (FUR).

Water Quality

Water quality in the Catherine Creek watershed ranges from excellent in the headwater reaches on National Forest lands to increasingly degraded on a downstream gradient towards the confluence with the Grande Ronde River. Catherine Creek is listed as a water quality limited stream by the Oregon Department of Environmental Quality (ODEQ 2000a; 2011). From RM 0 to 11.7, Catherine Creek is listed on the 303(d) list for habitat modification, pesticides, temperature, phosphorus, Chlorophyll a, pH, algae, dissolved oxygen, flow modification, and sedimentation. Moving upstream from RM 11.7 to 31.3, Catherine Creek is listed on the 303(d) list for flow modification, pH, sedimentation, and temperature. The project reach was on the 303(d) list for sediment and nutrients in 2000, with the primary contributors of nutrients being discharges from the wastewater treatment plant in the City of Union (Union WWTP), and non-point source inputs from agricultural lands. The limited capacity of degraded riparian conditions to buffer non-point source pollution from agriculture was identified as a contributing factor to water quality degradation (ODEQ 2000a).

Table 4. Matrix of Pathways and Indicators for Snake River Spring/Summer Chinook Salmon and Snake River Steelhead

Pathway: Indicator	Affected by Proposed Action	Environmental Baseline Condition		
		Properly Functioning	At Risk	Not Properly Functioning
Water Quality:				
Temperature	Yes +LT	-	-	X
Sediment	Yes –ST	X	-	-
Chemical Contamination/ Nutrients	Yes +LT	-	X	-
Habitat Access:				
Physical Barriers	Yes –ST	X	-	-
Habitat Elements:				
Large Woody Debris	Yes +LT	-	-	X
Pool Frequency	Yes +LT	-	-	X
Pool Quality	Yes +LT	-	-	X
Off-channel Habitat	Yes +LT	-	-	X
Refugia	Yes +LT	-	-	X
Channel Conditions and Dynamics:				
Width/Depth Ratio	Yes +LT	-		-
Streambank Condition	Yes +LT	-	X	-
Floodplain Connectivity	Yes +LT	-	-	X
Flow/Hydrology:				
Peak/Base Flows	No		-	X
Drainage Network Increase	No	X	-	-
Watershed Conditions:				
Road Density and Location	No	-	-	X
Disturbance History	No	-	-	X
Riparian Conservation Areas	Yes +LT	-	-	X
+ = Positive Effect; - = Negative Effect; ST = Short Term; LT = Long Term				

Table 5. Matrix of Pathways and Indicators for Columbia River Bull Trout at Subwatershed Scale

Pathways: Indicators	Affected by Proposed Action	Environmental Baseline Condition: Functioning Appropriately	Environmental Baseline Condition: Functioning at Risk	Environmental Baseline Condition: Functioning at Unacceptable Risk
Subpopulation Characteristics:				
Subpopulation Size	No	-	-	X
Growth and Survival	Yes +LT	-	-	X
Life History Diversity/ Isolation	No	-	-	X
Subpopulation Persistence and Genetic Integrity	No	-	-	X
Water Quality:				
Temperature	Yes +LT	-	-	X
Sediment	Yes –ST	NA	-	-
Chemical Contamination/ Nutrients	Yes +LT	-	X	-
Habitat Access:				
Physical Barriers	Yes –ST	X	-	-
Habitat Elements:				
Fine Sediment	Yes +LT	-	X	-
Large Woody Material	Yes +LT	-	-	X
Pool Frequency	Yes +LT	-	-	X
Large Pools	Yes +LT	-	-	X
Off-Channel Habitat	Yes +LT	-	-	X
Refugia		-	-	X
Channel Conditions and Dynamics:	Yes +LT			
Width/Depth Ratio	Yes +LT	-	-	X
Streambank Condition	Yes +LT	-	X	-
Floodplain Connectivity	Yes +LT	-	-	X
Flow/Hydrology:				
Change in Peak/Base Flows	No	-	-	X
Drainage Network Increase	No	-	-	X
Watershed Conditions:				
Road Density and Location	No	-	X	-
Disturbance History	No	-	-	X
Riparian Conservation Areas	Yes +LT	-	-	X
Disturbance Regime	No	-	-	X
Integration of Species and Habitat Conditions:	Yes +LT	-	X	-

+ = Positive Effect; - = Negative Effect; ST = Short Term; LT = Long Term

Temperature studies and data for Catherine Creek indicate that the reach between Union and the Davis Dam, which includes the action area, commonly exceeds 65 degrees and can exceed 70 degrees F during July and August (GRMW and BPA 2010; ODEQ 2000b). Temperatures typically peak in late July in response to increasing air temperatures and declining stream flows. In 2009, temperatures at Union, approximately 1.9 miles upstream, exceeded 70 degrees from mid-July through early August, reaching as high 75 degrees F for several consecutive days. Temperatures periodically exceeded 70 degrees F several additional times in August (BPA and GRMW 2010). The NMFS matrix states that temperatures exceeding 64 degrees F meet the NPF criterion for migration and rearing habitat. The bull trout matrix is less specific with regards to migratory habitat, but states that temperatures in excess of 59 degrees F may pose a thermal barrier to migration. Bull trout commonly tolerate temperatures exceeding 70 degrees F (Adams and Bjornn 1997; Haas 2001; Rieman and Chandler 1999; Saffel and Scarnecchia 1995), and can survive prolonged exposure (e.g. up to 60 days) to temperatures as high as 68 degrees F (Selong et al. 2001). Bull trout migration through the action area has been documented in July and August, periods when high stream temperatures are common (USFWS 2010). Nonetheless, based on observed conditions in the action area the temperature indicator is rated as NPF/FUR for salmon, steelhead, and bull trout.

Available information indicates the sediment indicator is properly functioning. As noted above, this reach was 303(d) listed for sediment in 2000 and subsequently removed in 2008 following TMDL implementation. While substrate embeddedness levels in the action area are moderate (see the Habitat Elements pathway discussion below), substrate fines are relatively low. ODFW (2010) estimated the substrate fines level over the 2.41-mile reach between Pyles Creek and Union at 12 percent. Total suspended solids (TSS) levels in the vicinity of the action area are generally within acceptable ranges. TSS levels range from 1 to 10 mg/L during the August 1 to September 30 in-water work window (ODEQ 2011), with the higher concentrations occurring in the last two weeks of July during the receding leg of the spring freshet. Based on these combined lines of evidence, the sediment condition indicator is rated as PF/FA for salmon, steelhead, and bull trout in the action area.

While the reach encompassing the action area is currently not on the 303(d) list for nutrients, the TMDL for this reach suggests that non-point source pollution from agricultural land uses in this reach contribute to degraded conditions in the listed reaches downstream of Davis Dam. The TMDL determined that degraded riparian conditions contribute to these inputs, and degraded riparian conditions still persist throughout the action area (see the Habitat Elements and Watershed Indicators discussion below). On this basis, the condition of the nutrient indicator is rated as FR.

Habitat Access

Channel conditions in the action area provide unimpeded access for migration of juvenile and adult salmonids. However, upstream passage barriers exist elsewhere in the watershed. The Davis Dams, a pair of irrigation diversion dam located approximately 2.8 miles downstream of the project area, have historically been a barrier to upstream migration of salmon, steelhead, and bull trout. The dams are passable when the diversions are not in operation, but become a partial to complete barrier to upstream passage when the check boards are installed. The timing of water withdrawals has varied historically in conjunction with stream flows, with check board installation occurring as early as June 1 and as late as July 1. The dams can remain in operation as late as October 31. Under these conditions, the dams have posed a significant barrier to bull trout migration and at least a partial barrier to Chinook salmon and steelhead migration. The BPA and the GRMW are currently reconfiguring the dams to provide complete upstream fish passage dependant on flows.

Based on observed conditions in the project action area, the habitat access indicator is rated as PF/FA for salmon, steelhead, and bull trout.

Habitat Elements

A pre-design survey of the project reach by the project team, a habitat survey conducted by ODFW (2010) and a study of salmonid microhabitat utilization (Favrot et al. 2010) were used to characterize the condition of habitat elements indicators in the project action area.

As noted in the water quality discussion, this reach of Catherine Creek was 303(d) listed for sediment. However, substrate conditions in the project reach are qualitatively rated as moderate. The substrate composition ranges from fines to boulder-sized material, with small cobbles and three-inch minus gravel predominant. Substrate embeddedness is currently rated at 25-30 percent based on field estimates using the visual estimation methods defined by Platts et al. (1983). This corresponds to a FR rating for substrate conditions in the action area for salmon, steelhead, and bull trout.

Functional large woody debris (LWD) is limited in project area and the project vicinity. ODFW (2010) counted a total of 147 LWD units of all sizes between Pyles Creek and Union, which equates to 61 pieces per mile. However, virtually all of these pieces were below the minimum size criteria specified by the NMFS and USFWS matrices. Only one key piece (≥39 feet and 23 inches diameter) was identified over the 2.41 miles survey reach. An informal survey of LWD pieces in the project area counted three small LWD jams in the middle of the project area, two of which interacted with the channel only under high flow conditions, and 20 to 30 single pieces of woody material greater than 6-inches in diameter scattered throughout the project area. The majority of woody debris is composed of locust or willow trunks and branches less than 12-inches maximum diameter. Due to the small size and limited frequency and distribution of LWD throughout the project reach, this indicator is rated as NPF/FUR in the action area.

Pool frequency and condition are degraded in the action area. The Catherine Creek channel ranges from 40 to 50 feet wide at the OHWM. Under properly functioning conditions, a channel of these dimensions should have anywhere from 9 to 26 pools per mile. As noted in the following section however, the width/depth ratio of the existing channel is significantly degraded from historical conditions. A properly functioning Catherine Creek channel would likely average one half to two thirds this width, which corresponds to a pool frequency of 23 to 47 pools per mile. ODFW (2010) counted a total of 16.6 pools per mile over the Pyles Creek to Union survey reach but the majority were simple lateral and straight scour pools. The frequency of pools with a residual depth greater than 1 meter was only 9.8 per mile, and the frequency of complex pools (deep with LWD cover) was only 3.8 per mile. These survey results are consistent with observed conditions in the action area. Collectively, this information corresponds to a NPF/FUR rating for the pool frequency and pool quality/large pool indicators.

Historically, the Catherine Creek channel actively migrated throughout the action area, creating an abundance of off-channel habitat in the form of side channels, disconnected meanders, and oxbow lakes and wetlands. Hydromodification interrupted this habitat forming process and fragmented much of the existing off-channel habitat from the creek. This condition is evident in the lack of secondary channel habitat in the action area. Secondary channels account for less than 1 percent of total stream length between Pyles Creek and Union (36 meters vs. 3,888 meters of primary channel)

(ODFW 2010). Off-channel habitat area is similarly limited with no functional off-channel habitat observed in a survey of the action area. On this basis, the off-channel habitat indicator is rated as NPF/FUR.

The salmon and bull trout matrices include refugia as an indicator under the habitat elements pathway. Healthy refugia integrate a range of different habitat elements, including pools, complex cover, groundwater inputs, and riparian condition. Both matrices emphasize riparian condition as a metric for rating this indicator. Site observations and available studies indicate that riparian conditions in the action area are not properly functioning. The riparian zone between Pyles Creek and Union is dominated by grass with small to medium diameter trees being secondary. Stream shading in this reach averages 41 percent (ODFW 2010). The action area is characterized by fragmented and discontinuous patches of mature shrubs and trees (primarily locust and willow), separated by bare and/or grass covered stream banks. Where mature vegetation is present it is limited to a narrow band adjacent to the creek. The TMDL developed for the Catherine Creek watershed specifically identifies degraded riparian conditions as a contributing factor to high nutrient levels and substrate embeddedness throughout lower Catherine Creek (ODEQ 2000a). ODEQ concluded that the fragmented and discontinuous riparian vegetation in this reach lacked sufficient buffering capacity to filter non-point source agricultural pollution, and that improving riparian conditions would lead to beneficial improvements in water quality. On this basis, the refugia indicator is rated as NPF/FUR.

Channel Conditions and Dynamics

The project partners conducted a field study of the action area and a review of available literature and archived aerial photographs to support project concept and design development. A comparison of current and historical conditions indicates that this reach was straightened and hydromodified at some point between the 1930s and the 1950s, removing several prominent meanders. Channel migration was subsequently affected by bank armoring with concrete rubble and car bodies, removal of gravel below the bridge at the head of the project site, and ongoing grazing within the riparian area. The channel shows evidence of incision and head cutting throughout this reach that have begun to stabilize naturally, however lateral channel migration continues. Changes in channel form and sediment regime upstream of the project area also contribute to current channel conditions. This reach of Catherine Creek would best be described as moderately unstable. It is attempting to return from a straightened and laterally hardened creek channel with excess energy to a high-sinuosity, lower-energy state through lateral migration, channel widening, and aggradation.

Current channel width/depth ratios in the project reach average 22.6 (vs. an average of 20.4 over the entire reach from Pyles Creek to Union), and sinuosity is 1.20. Measured sinuosity in aerial photos dating from the 1930s ranged from 1.90 to 2.50. Historical width/depth ratios in this reach were likely less than 12.0 based on aerial photograph interpretation. The NMFS and USFWS matrices rate width/depth ratios exceeding 12 and 20, respectively, as NPF/FUR.

Channel widening and lateral migration, channel incision and degraded riparian conditions collectively contribute to poor bank stability along a significant percentage of channel length in the action area. Vertically incised banks are present on one or both banks over at least one third of the 2,500 feet project channel in the project area. Bank armoring artificially enforces bank stability at several locations. A qualitative assessment of bank conditions rates stability at less than 90 percent over 30 to 40 percent of reach length. Over the entire Pyles Creek to Union survey reach 20 percent of streambanks were actively eroding (ODFW 2010). This corresponds to a FR rating under USFWS and NMFS matrix criteria. However, it is important to note that the historical channel was highly sinuous and migratory, meaning that a large percentage of streambanks were probably actively eroding under natural conditions.

Floodplain connectivity in the action area is also degraded. Historical filling of floodplain wetlands, hydromodification, channel incision, and poor riparian conditions have fragmented floodplain connectivity throughout the action area. The condition of this indicator is rated as NPF/FUR.

Flow/Hydrology

The hydrology of Catherine Creek is snowmelt driven with peak runoff occurring during spring snowmelt conditions and generally low stream flows predominating during summer, fall and winter with the exception of occasional storm events. These characteristics are evident in flow data for the watershed from USGS Gage 13320000, which is located approximately 9 miles upstream of the project site (Figure 4). The spring freshet typically commences in early-March, peaking in late-May or early-June and tailing off rapidly. While flows typically drop to summer baseflow levels by mid- to late-July, streamflows in excess of 100 cubic feet per second (cfs) can persist into late July under exceptional conditions.

A review of changes in hydrologic conditions over time suggests that Catherine Creek at hydrology has remained relatively stable over time. Figure 5 shows median daily streamflow curves for four 18 to 24 year periods throughout the 74-year period of record (1912-1996). As shown, mean streamflow conditions have remained broadly stable with some evidence of a broadening of the spring freshet between 1971 and 1995 in comparison to prior decades. However, it is important to note that this gage is located upstream of the vast majority of water withdrawals in the Catherine Creek watershed. Water withdrawals for agricultural and residential use reduce summer baseflows in Catherine Creek by 25 percent in mid-July to as much as 95 percent by the end of September downstream of Union (NPCC 2004; ODEQ 2000a). While the watershed is sparsely populated overall, drainage network density has increased due to the development of forest roads in the headwaters, commercial and residential development in and around Union, and extensive ditching and draining of wetlands for agricultural uses (NPCC 2004). On the basis of this information, peak/baseflow and drainage network conditions in the action area are rated as NPF/FUR for salmon, steelhead, and bull trout.

Watershed Conditions

Watershed conditions affecting the Catherine Creek action area vary from relatively undisturbed in the headwaters reaches in the Eagle Cap Wilderness Area to significantly degraded in and around Union and Reaches downstream. Road densities for the Grande Ronde subbasin in an analysis from the early 1990s were approximately 4.0 miles/mile^2 (mi/mi^2). When roadless areas were excluded, subbasin road density increased to 7.1 mi/mi^2 (McIntosh et al. 1994). A significant portion of road density was attributed to forest roads created to support extensive salvage logging, but road densities in agricultural valley bottoms were also high. While no specific information was identified for the Catherine Creek, road density is expected to exceed at least 3 mi/mi^2 at minimum in populated areas of the watershed with a significant number of valley bottom roads. This corresponds to an NPF/FUR rating for salmon, steelhead, and bull trout.

Catherine Creek and the surrounding watershed has a significant disturbance history associated with the agricultural development of the upper Grande Ronde River valley. The lower watershed near the confluence with the Grande Ronde was covered by Tule Lake, a 20,000-acre complex of floodplain wetlands (NPCC 2004). The majority of these wetlands were drained and converted to agricultural lands in the early 20th Century, accompanied by extensive hydromodification of stream corridors and clearing of riparian vegetation. Wetlands and stream channels in the action area and vicinity were similarly modified. While the lower watershed is not prone to natural disturbance, the history of widespread and extensive habitat conversion throughout watershed nonetheless corresponds to a NPF/FUR rating for disturbance history and riparian reserve conditions.

Bull Trout Subpopulation Characteristics and Integration of Species and Habitat Conditions

The USFWS Biological Opinion for the Davis Dams project documented the current status of bull trout populations in the Catherine Creek watershed (USFWS 2010). The agency noted that significant habitat degradation and the presence of several migration barriers had depressed the abundance and productivity of bull trout subpopulations throughout the upper Grande Ronde subbasin. In addition, migration barriers have fragmented connectivity between fluvial migratory and resident life history forms. While bull trout population monitoring data are limited, redd count surveys indicate that the Catherine Creek subpopulation has significantly declined in abundance over the last 20 years. On the basis of available habitat and population information, all subpopulation characteristics for Catherine Creek bull trout are rated as FUR (Table 5).

The integration of species and habitat conditions in the action area can only be characterized as degraded and functioning at unacceptable levels of risk. The action area is considered to be important forage, migrating, and overwinter (FMO) habitat based on its known use as a migratory corridor (USFWS 2010), and its documented importance as winter rearing habitat for juvenile Chinook salmon and other key prey species (Favrot et. Al 2010). However, 13 of 19 action area- and watershed-scale habitat indicators are functioning at unacceptable risk while only one (habitat access) are functioning properly. In the context of the observed declines in abundance, degraded conditions in the action area must be considered a contributing factor to the declining productivity of this subpopulation as a whole (Table 5).

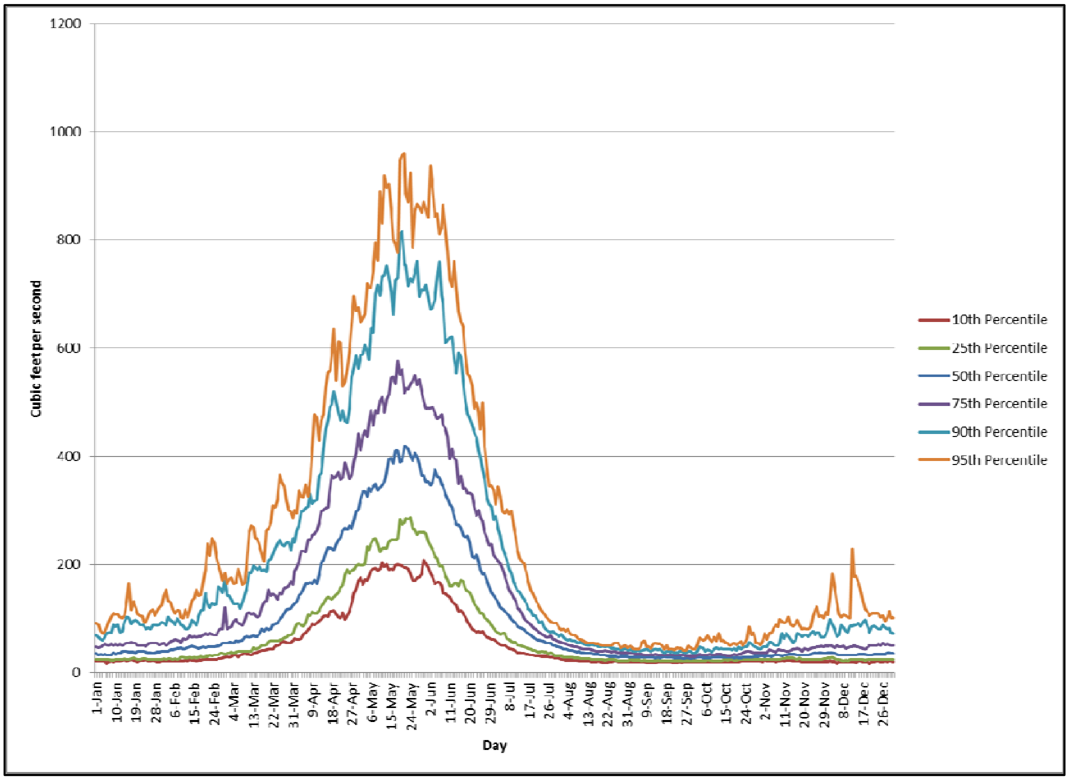

Figure 4. Percentile Distribution of Streamflow Conditions in Catherine Creek at USGS Gage 13320000 for the 1912-1996 Period of Record.

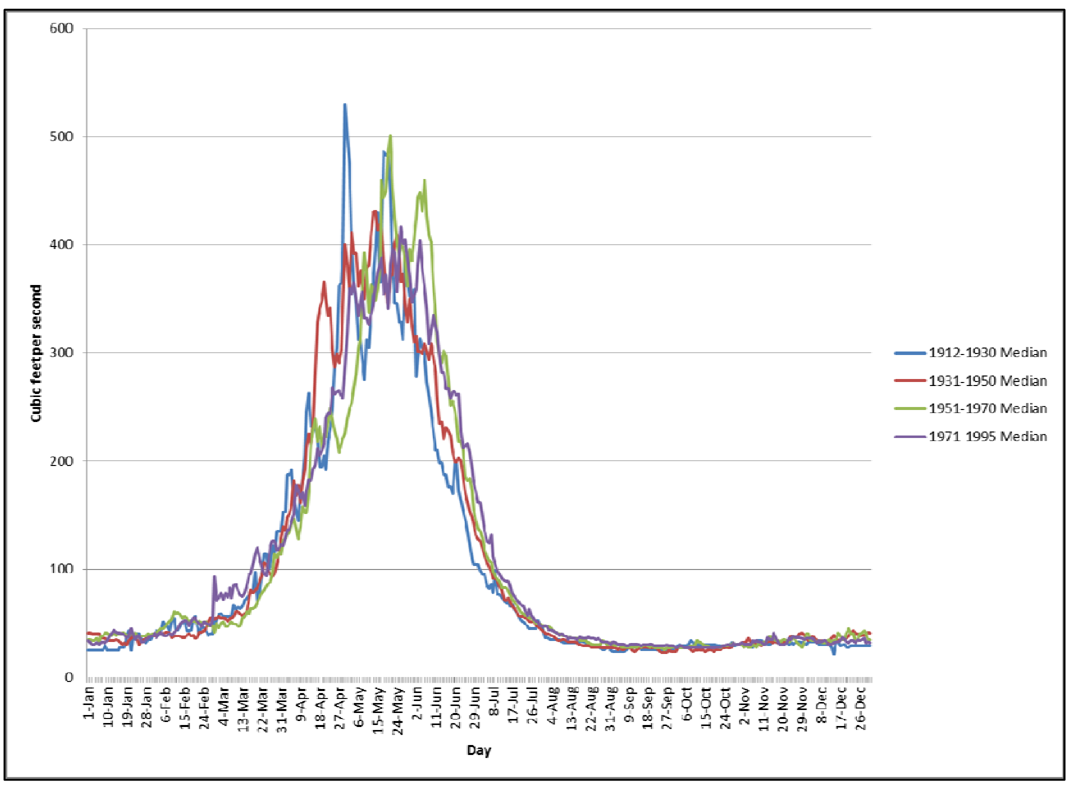

Figure 5. Median (50th Percentile) Streamflow Conditions in Catherine Creek at USGS Gage 13320000 by Period.

Section 5
Effects of the Action

Direct and Indirect Effects on Species

Work Area Dewatering and Fish Salvage

Stressors:	Incidental stranding, electrofishing exposure, capture and handling stress, habitat displacement.
Species/Life Stage:	Rearing juvenile Chinook salmon and steelhead, juvenile bull trout, upstream migrant subadult and adult bull trout.
Probability:	Low likelihood of exposure based on limited species occurrence in action area during in-water work window. However, any individuals in work area during construction are likely to be exposed.
Magnitude:	Channel dewatering will affect up to 80,000 square feet (1.8 acres) of the 2,450-foot active channel. Affected habitat area will vary depending on flow conditions during dewatering.
Frequency:	No more than 4 discrete dewatering events.
Duration:	5 days per activity for total of 20days between August 1 and September 30, 2012.

Construction of the proposed action requires the sequential dewatering of Catherine Creek to allow for channel reconfiguration, installation of habitat structures and other project features, and the removal of shoreline armoring and debris. Project construction has been scheduled during a six week period in mid-summer when adult salmonids are least likely to be present in the action area based on established migration timing (see Species occurrence in the action area in Section 3). Temperature conditions in the action area are also likely to limit, but not avoid, the likelihood of juvenile salmonids occurring in the action area during construction. This presents the potential for bull trout, Chinook salmon, and steelhead exposure to work area dewatering and related capture and handling stress.

Work area dewatering and fish capture, handling, and relocation activities will be conducted consistent with the protocols and impact avoidance and minimization measures described in Appendix E. Key amongst these BMPs is the use of gradual dewatering to promote volitional movement out of the project area. NMFS has estimated that between 50 and 75 percent of fish will move out of an affected reach when streamflows are reduced by 80 percent (NMFS 2006). The use of this technique will significantly reduce the number of individuals exposed to the more harmful effects of this element of the project.

However, some salmonids are expected to remain within the dewatering limits will be exposed to a range of potential stressors, including:

- Stress resulting from habitat displacement during gradual dewatering of work areas (to promote volitional movement) and competition for new habitats
- Altered behavior following capture and handling that increases exposure to predation

- Stranding and asphyxiation
- Direct mortality, injury, and stress from exposure to capture methods including electrofishing, seining, and hand nets
- Physical and thermal stress and possible trauma during holding and transport to release locations
- Entrainment or impingement in block nets, dewatering pumps, and bypass equipment

Stranding and electrofishing exposure present the greatest potential for injury and mortality. Fish that remain in the exclusion area following dewatering and salvage operations will potentially be directly exposed to stranding and asphyxiation or, if trapped in an inundated pool, subject to mechanical injury, and exposed increased turbidity, elevated water temperatures, and decreased DO levels. While every effort will be made to limit adverse effects, some potential for stranding remains because many species of salmonids are cryptic as juveniles and can avoid being detected even when using multiple pass electrofishing because they hide in cobble/boulder interstices (Peterson et al. 2005; Peterson et al. 2004). NOAA Fisheries has estimated incidental take resulting from dewatering and fish handling associated with stream crossing projects. In calculating incidental take from these activities, the agency applied an estimated stranding rate of 8 percent for ESA-listed salmonids (NMFS 2006).

While the project impact avoidance and minimization measures the use of electrofishing, it allows for its use if other capture methods prove ineffective. Net-based capture will be used to the greatest extent possible. However, electrofishing may be necessary where site-specific conditions limit the effectiveness of netting. Therefore, the potential effects of electrofishing are discussed here to provide a worst-case scenario perspective with regards to potential effects.

Significant research has been conducted on incidental mortality and injury rates associated with electrofishing, and has been used to identify equipment settings that provide for effective capture while minimizing injury. Electrofishing injuries are most likely to occur when a large difference in voltage potential is created across the fish body. Damage to the spinal column being the most common form of injury. The preponderance of evidence suggests that small and/or juvenile fish experience lower rates of injury than larger adult fish. Smaller bodied fish generally have less potential for injury because the strength of the voltage gradient created within the body is proportional to body size (Sharber and Carothers 1988). Injury rates can also vary in response to a number of other factors including species-specific sensitivity, water hardness, crew experience, and the type of equipment used (Ainslie et al. 1998 ; Dalbey et al. 1996; Dwyer and White 1997; McMichael et al. 1998; Sharber and Carothers 1988; Snyder 2003; Thompson et al. 1997). Equipment type and setting are controllable parameters that have the greatest effect on injury rates. Research has demonstrated that pulsed direct current (DC) at a setting of 30 Hertz (Hz) or less tends to produce the lowest observed injury rates (Ainslie et al. 1998 ; Sharber and Carothers 1988). Most standard electrofishing and fish removal protocols, including the protocol that will be used for this project, recommend pulsed DC equipment at a 30 Hz or lower setting.

Other stressors associated with fish salvage include exposure to large changes in water temperatures and dissolved oxygen concentrations (when transferred between capture, holding, and release environments), time out of the water, and physical trauma (from net abrasion, squeezing, accidental dropping, etc.). Even in the absence of injury, capture and handling demonstrably increases stress and can have a lingering effect on survival and productivity (Frisch and Anderson 2000). For example, stress and disorientation following handling has been shown to impair predator evasion in salmonids for up to 24 hours following release (Olla et al. 1995).

Dewatering and fish relocation may produce additional effects on survival, growth, and fitness. Fish removed from the exclusion area will be relocated to habitats currently occupied by other juvenile fish. This will lead to increased competition for prey and refuge habitat, which may affect the growth and fitness of affected individuals.

Elevated Suspended Sediment

Stressors:	Suspended sediment exposure in excess of environmental baseline.
Species/Life Stage:	Rearing juvenile Chinook salmon and steelhead.
Probability:	Moderate likelihood of exposure based on known species occurrence in action area during in-water work window.
Magnitude:	Anticipated suspended sediment concentrations ranging from 40 to 150 mg/L within 100 feet of the project, dissipating on a downstream gradient. Measurable effects expected to extend 1,400 feet downstream to the hydraulic break at the Pyles Creek confluence.
Frequency:	Separate pulses during 4 channel rewatering events and 2013 spring freshet.
Duration:	Pulses lasting Up to 6 hours for each rewatering event, for a total of 24 hours between August 1 and September 30, 2012. Brief (<12 hour) pulse anticipated with first flush of reconstructed banks during storm flows or spring freshet.

Removal of flow bypasses and rewatering of dewatered construction sites will result in pulses of suspended sediment that exceed baseline conditions in the action area. Based on the planned number of bypass installation and removals, a total of 4 sediment pulse events are anticipated during the in-water work window. Based on a review of TSS levels associated with in-water construction in streams with similar flow conditions (Muck 2010), Reclamation and BPA anticipate that channel rewatering will produce TSS pulses with concentrations ranging from 40 to 150 mg/L (a matrix of TSS levels associated with various in-water work types is provided in Appendix G). Each pulse will last up to 6 hours for a total of 24 hours during the in-water work window. Elevated TSS levels are expected to decline towards background on a downstream gradient. Available data indicates that construction-related TSS levels in streams tend to drop rapidly at significant hydraulic breaks like large pools or tributary confluences (Reid and Anderson 1999). This suggests that TSS levels will return to baseline or near baseline levels at the confluence with Pyles Creek, approximately 1,400 feet downstream of the project area.

Turbidity is a measure of water clarity as influenced by a combination of suspended inorganic sediments as well as organic materials, whereas TSS refers to suspended inorganic sediments alone. Much of the literature characterizing the effects of suspended sediments on salmonids relies on turbidity-based measurements (e.g. nephalometric turbidity units or NTUs). For this reason, construction-related effects on water quality are commonly referred to as turbidity impacts even though they are primarily suspended sediment impacts. The two terms are used interchangeably here.

Suspended sediments are a natural component of salmonid ecosystems that can have negative, neutral, or even beneficial effects on salmonid survival and fitness depending on the intensity of the stressor (i.e. the water column concentration and nature of the sediments). Adverse responses to elevated turbidity vary depending on the intensity and duration of the impact relative to baseline conditions, water temperatures, and life stage exposed. For example, Gregory (1993) and Gregory and Levings (1998) observed that moderate levels of elevated suspended solids provide visual cover for adult and juvenile salmonids that triggers an instinctual sense of reduced vulnerability to predation. Gregory and Northcote (1993) demonstrated that when suspended solids concentrations exceeded 200 parts per million (ppm), juvenile salmon altered prey reaction and predator avoidance behavior in ways suggestive of a reduced sense of vulnerability and increased their overall feeding rates. Increased feeding rates are in turn correlated with higher fitness.

Studies by Aksnes and Utne (1997), Mazur and Beauchamp (2003), and Vogel and Beauchamp (1999) found that exposure to sublethal concentrations of suspended solids can alter territoriality, feeding, and homing behavior. Sigler et al. (1984) found that chronic exposure to elevated turbidity ranging from 11 to 49 NTU decreased the growth rate of juvenile coho salmon and steelhead and prompted emigration from otherwise suitable habitats. Berg and Northcote (1985) studied the effects of short-term pulses of suspended sediments (measured as turbidity levels) on coho salmon behavior and found that individual responses varied depending on the intensity and duration of exposure. Higher levels of suspended sediments caused stress, as evidenced by gill flaring, and changes in territorial and feeding behaviors. At turbidity levels between 30 and 60 NTU the social organization of juvenile salmonids broke down and indicators of physiological stress began to occur more frequently. In contrast, normal behaviors were observed at turbidity levels between 1 and 20 NTUs. Social organization and behavior reestablish rapidly after elevated suspended sediment levels return to normal (Berg and Northcote 1985; Bisson and Bilby 1982).

The USFWS Washington Fish and Wildlife Office has developed an exposure-based methodology for characterizing turbidity impacts on bull trout based on the intensity and duration of exposure (Muck 2010). This methodology uses a risk assessment methodology for salmonid exposure derived from Anderson et al. (1996) and Newcomb and Jensen (1996), and is applicable to Chinook salmon and steelhead as well as bull trout. (This methodology is attached to this report as Appendix G.) As noted, the proposed action is expected to produce 4 discrete sediment pulses separated by several days. The anticipated maximum TSS exposure for each pulse is expected to range from 40 to 150 mg/L for a duration of 6 hours. This equates to a severity of ill-effect (SEV) ranking of 4 to 6 on the USFWS scale, or sublethal effects ranging from minor behavioral alteration to moderate physiological stress (See Appendix G).

An additional TSS pulse is anticipated during the first flush of the reconstructed stream channel and banks during the first high flow event following project construction. It is important to note that baseline TSS levels are naturally higher during high flow events, to the extent that project-related TSS may lie within the range of natural variability. First flush effects are expected to occur in conjunction with bankfull flows, which is estimated at approximately 200 cfs based on conditions observed in the field relative to the historical hydrographic data. Based on the 90^{th} percentile of stream flows for Catherine Creek (USGS 2011), bankfull flows typically occur with the onset of the spring freshet in March. By this point the affected stream banks will have had over 6 months to stabilize so the likelihood of excessive sediment production is limited. Fall storm events producing high flows in excess of 200 cfs may occur as early as December , but this is atypical. The 90th percentile flows from July 1 to December 31 for the 76-year period of record are well below this threshold.

Bypass Entrainment

Stressors: Entrainment through bypass pipe.
Species/Life Stage: Downstream migrant juvenile Chinook salmon and steelhead.
Probability: High likelihood of exposure based on known downstream migration timing.
Magnitude: Stress, abrasion injury from contact with bypass pipe, disorientation.
Frequency: Continuous during bypass operation overlapping with migration timing.
Duration: August 1 to September 30, 2012.

A series of temporary flow bypasses will used during construction throughout the in-water work window. Average flow rates during this period are expected to range between 30 and 85 cfs based on the hydrologic conditions observed in this watershed over a 76-year period of record (USGS 2011). Each bypass will route all of the flow of Catherine Creek through a 4-foot diameter pipe, which has been sized to pass a maximum flow rate of 100 cfs. The bypass inlet will not be screened in order to accommodate downstream passage of juvenile salmonids.

The proposed action includes a series of BMPs designed to minimize adverse effects from entrainment (See In-Water Work on pg 2-7 and 2-8). However flow velocities in the pipe will be high, presenting the potential for injury from contact with the pipe walls. In addition, fish are likely to be disoriented after being discharged from the bypass pipe, increasing vulnerability to predation. Shear stresses associated with passage through dam bypass channels have been associated with temporary disorientation that leads to increased mortality rates (Cada et al. 1999). It is unclear if sheer stresses in temporary bypass structures reach levels sufficient to increase predation vulnerability (Cada et al. 2003). Nonetheless, the Washington Department of Fish and Wildlife cites this potential as an important consideration in bypass system design, stating that outlets should be designed and sited to minimize predation exposure (WDFW 2001).

In this particular case, the bypass will discharge into a backwatered pool to dissipate flow energy thereby minimizing bed and bank erosion at the site and associated turbidity impacts. The depth and cover provided by the temporary pool should provide entrained fish with sufficient opportunity to avoid predation as they recover from disorientation. While these measures will minimize exposure some predation losses may still occur.

Temporary Upstream Migration Barrier

Stressors: Migration delay.
Species/Life Stage: Adult and subadult bull trout.
Probability: Low likelihood of exposure based on known migration timing.
Magnitude: Decreased survival and fitness from exposure to unfavorable temperatures, reduced population productivity from exposure
Frequency: Continuous throughout project construction.
Duration: August 1 to September 30, 2012.

Work area dewatering will create a complete barrier to upstream fish passage throughout the duration of the August 1 to September 30 in-water work window. While the bypass pipe is unscreened and accessible to downstream passage, flow velocity in the pipe will prohibit upstream migration. There are no practicable methods for mitigating these conditions if a bypass is to be used.

The in-water work window was selected by ODFW specifically for this project to minimize the likelihood of upstream migrant salmonid exposure. ODFW has concluded that adult Chinook salmon and steelhead migration through the action area during this period is unlikely (see Appendix D), therefore the potential for related adverse effects on these species is considered discountable.

Adult and subadult bull trout are known to migrate through the action area during the spring freshet. Upstream migration timing typically corresponds to streamflow, beginning in May, peaking in late-June, and tapering off rapidly by mid-July. A small percentage of migration may extend into the summer in any given year however. Individual migrant bull trout have been observed as late as mid-August in recent years (USFWS 2010).

This suggests that the project has the potential to delay the upstream migration of a small number of adult migrant bull trout. Bull trout trapped below the project reach would experience elevated stream temperatures as the summer progresses. Available temperature data and studies that the reach of Catherine Creek between Union and the Davis Dam that encompasses the action area commonly exceeds 65 degrees and can exceed 70 degrees F during July and August (GRMW and BPA 2010; ODEQ 2000b). Bull trout occur in temperatures exceeding 70 degrees F (Adams and Bjornn 1997; Haas 2001; Rieman and Chandler 1999; Saffel and Scarnecchia 1995), as evidenced by documented migration in Catherine Creek in late-July and mid-August, and can survive prolonged exposure (e.g. up to 60 days) to temperatures as high as 68 degrees F (Selong et al. 2001). However, temperatures exceeding 60 degrees F are unsuitable for long-term survival (Selong et al. 2001).

Indirect Effects

The project will not significantly modify the character of Catherine Creek although localized improvements to habitat conditions will result from the project including creation of pool habitat, increased channel length and complexity, and an improved riparian condition.

The indirect effects of the project are intended to provide significant benefits to salmonids within Catherine Creek, with the overall objective of restoring instream complexity and connectivity to floodplains. The project will improve rearing and migration habitat available to salmon and steelhead bull trout.

Direct and Indirect Effects on the Environmental Baseline and Designated Critical Habitat

Direct Effects

Direct effects are defined as the direct or immediate effects of the project. Direct effects include all immediate impacts (negative and beneficial) from project-related actions (e.g. construction-related impacts such as noise disturbance or loss of habitat) and those disturbances that are directly related to project elements that occur very close to the time of the action itself (e.g. sedimentation).

The discussion below focuses on the direct effects of the Catherine Creek Project related to the diagnostic pathway indicators, and the impacts to the primary constituent elements (PCEs) of Pacific salmon, steelhead and bull trout designated critical habitat. The PCEs are defined as those elements of the designated critical habitat essential to the conservation of the species (70 FR 52664).

Water Quality

Construction of the Catherine Creek Project is likely to temporarily degrade water quality by creating suspended sediment plumes. These effects will be short-term in nature, in the form of periodic pulses during construction.

Sedimentation and Turbidity

Disturbance, placement, and relocation of sediments and substrate materials while constructing the Catherine Creek project will increase turbidity in the water column and could result in sedimentation, or coverage of benthic habitat and organisms. A variety of species (including listed species) may either avoid or be attracted to construction sites due to elevated turbidity and suspension of benthic organisms in the water column during performance of covered activities.

Sedimentation caused by human activity and natural erosion can affect fish through modifications of habitat, such as filling pools, filling interstitial spaces in substrate, changing invertebrate communities (food base), and reducing the interchange of surface and subsurface waters. Increases in fine sediments in low-velocity stream reaches could also cover suitable spawning gravel. Other potential effects to streams include channel braiding, increased width:depth ratios, increased incidence and severity of bank erosion, reduced pool volume and frequency, and increased subsurface flow. These types of changes can result in a reduction in the quality and quantity of spawning and rearing habitat (Meehan 1991).

The duration and intensity of turbidity depends on the quantity of materials in suspension, the particle size of suspended sediments, the volume and velocity of the receiving water in the affected area, and the physical and chemical properties of the suspended sediments (NMFS 2001).

Turbidity within the immediate vicinity of the Catherine Creek project will likely temporarily exceed the background levels. Total suspended solids (TSS) levels in the vicinity of the action area are generally within acceptable ranges. TSS levels range from 1 to 10 mg/L during the August 1 to September 30 in-water work window (ODEQ 2011), with the higher concentrations occurring in the last two weeks of July during the receding leg of the spring freshet. While it is difficult to determine exactly how much of a temporary increase in turbidity will result from the covered activities, suspended sediments are expected to be short term and will not result in chronic sediment delivery to adjacent waters. Minimization measures have been developed to reduce the potential for elevated turbidity, as described previously in Chapter 2.

Habitat Access

Work area dewatering will create a complete barrier to upstream fish passage throughout the duration of the August 1 to September 30 in-water work window. While the bypass pipe is unscreened and accessible to downstream passage, flow velocity in the pipe will prohibit upstream migration. There are no practicable methods for mitigating these conditions if a bypass is to be used.

The in-water work window was selected by ODFW specifically for this project to minimize the likelihood of upstream migrant salmonid exposure. ODFW has concluded that adult Chinook salmon and steelhead migration through the action area during this period is unlikely (see Appendix D), therefore the potential for related adverse effects on these species is considered discountable.

Adult and subadult bull trout are known to migrate through the action area during the spring freshet. Upstream migration timing typically corresponds to streamflow, beginning in May, peaking in late-June, and tapering off rapidly by mid-July. A small percentage of migration may extend into the summer in any given year however. Individual migrant bull trout have been observed as late as mid-August in recent years (USFWS 2010).

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Habitat Elements

The construction of the Catherine Creek Project is expected to have temporary short term negative effects to existing habitat elements, while having a long-term beneficial effect to habitats.

Dewatering of up to 80,000 square feet of channel habitat will lead to the unavoidable mortality of aquatic macroinvertebrates that serve as a primary prey resource for juvenile Chinook salmon and steelhead and a secondary resource for foraging bull trout. The effect of macroinvertebrate loss resulting from channel dewatering on federally protected salmonids is difficult to quantify. The dewatering duration and the macroinvertebrate species exposed to the dewatered condition will be factors in the how those species of invertebrates are affected. However, assuming channel dewatering eliminates all macroinvertebrates in the dewatered portion of the channel, once flow is returned to the dewatered portion of the channel, benthic macroinvertebrates that drift from unaffected areas upstream and insects from allochthonous sources will begin to recolonize the dewatered portion of the channel.

When the disturbance is temporary, a rapid recolonization of the disturbed area is anticipated. Reported rates of recolonization range from about 1 month to 45 days (NMFS 2003). NMFS (2003) did not indicate the duration or area of the dewatering that corresponds to this recolonization time frame.

However, research on the effects of dewatering on aquatic insect communities has shown that affected habitats are quickly recolonized (Fowler 2004; Miller and Golladay 1996; Miller et al. 2007), so this effect will be limited in magnitude and short-term in duration at best. Over the long-term the proposed action will increase channel length in the action area by 550 feet, restore riparian habitat conditions, increase floodplain habitat connectivity with the construction of 2.66 acres of floodplain, and significantly increase functional LWD density increase and aquatic habitat complexity throughout this reach. In addition total number of pools will increase in the project reach from 3 to 8, and 250 1 to 4-foot diameter boulders will be installed for habitat complexity. These beneficial improvements are expected to increase survival and productivity of Chinook salmon and steelhead and bull trout.

Channel Conditions and Dynamics

The Catherine Creek Project will improve channel condition and dynamics. The primary goal of the project design is to restore the channel to a more natural configuration. The currently hydromodified channel will be realigned, lengthening this channel segment from an existing 2,450 feet to approximately 3,000 feet. Channel sinuosity within the project reach will increase from 1.20 to 1.38 (measured historical sinuosity in this reach prior to hydromodification was 1.90). Average width/depth ratio will decrease from an existing average of 22.6 to 18.6. Existing incised and near-vertical stream banks will be pulled back to a slope of 1.5:1 to 3:1 (horizontal/vertical) to decrease soil erosion, increase pool scour and depth potential, and support revegetation. In addition, approximately 125 cubic yards of existing bank armoring (riprap, concrete debris) will be removed.

This will allow the channel to better balance existing water and sediment regimes, while improving floodplain connectivity.

Flow/Hydrology

The Catherine Creek project will not affect the flow or hydrology of Catherine Creek.

Watershed Conditions

Catherine Creek watershed conditions vary from relatively undisturbed in the headwaters reaches in the Eagle Cap Wilderness Area to significantly degraded in and around Union and Reaches downstream. The construction of roads, agriculture, and cattle grazing have all led to degraded riparian, wetland, and floodplain conditions in the lower Catherine Creek watershed which includes the project action area.

The re-meandering of Catherine Creek will require the removal of shrubs, bushes and grasses, to accommodate the construction of new channel alignments. The removal of riparian vegetation will be limited to the area immediately adjacent to the channel and floodplain work. Removal of riparian vegetation may expose soils to erosive forces such as wind and rain. The new channel alignments were designed to avoid existing riparian trees where possible. Some smaller willows and other shrubs may need to be removed or pruned to construct the project, but any removal or pruning will be kept to the minimum necessary to construct the project.

Riparian vegetation impacted during project construction will be replaced with native vegetation appropriate for the area, in the first fall following completion of project construction. The project will also include the planting of 4.86 acres of riparian habitat. Most importantly, a new grazing exclusion program will protect over 17 acres of riparian habitat along the project corridor to all the recovery of woody species. The effects of riparian vegetation removal are limited to the area immediately adjacent to the project site and expected to be temporary and insignificant.

Impacts on Designated Critical Habitat for Chinook Salmon of the Snake River Spring/Summer-Run ESU

Over the short-term, the proposed action will temporarily degrade the condition essential components 1 and 4 of designated critical habitat for Snake River Spring/Summer-run Chinook salmon in the Catherine Creek watershed. Over the long-term, the proposed action will significantly improve the condition of all four essential components, based on the beneficial effects of the action on Chinook salmon habitat pathways and indicators documented in the previous section.

Impacts on Designated Critical Habitat for Steelhead of the Snake River Basin Distinct Population Segment

The ESUs and DPSs addressed in the designation of critical habitat share many of the same rivers and estuaries and have similar life history characteristics/strategies, and therefore have many of the same PCEs in the their preferred habitats. These PCEs include sites essential to support one or more life history stages of the ESU or DPS (sites for spawning, rearing, migration and foraging). These sites in turn contain physical or biological features essential to the conservation of the ESU or DPS (for example, spawning gravels, water quality and quantity, side channels, forage species). On this basis, the proposed action is expected to have a short-term adverse effect on steelhead Critical Habitat PCEs 1, 2 and 3. Over the long-term, the action is expected to beneficially improve the condition of all of these PCEs.

The specific PCEs potentially affected by the project are addressed below.

Spawning Sites

Freshwater spawning by steelhead has been documented in Catherine Creek within the project action area. Based on substrate size in the CC-37 Project reach, the downstream extent of spawning for Chinook and steelhead likely is within this reach. Pebble counts recently collected for design of the project indicate the D50 substrate particle size at the upstream end of the reach is 40 mm transitioning to sand/silt at the downstream end. The reach average substrate D50 is 18mm. Spawning substrate size criteria for spring Chinook and steelhead are 1.6 to 10.2 cm and 0.6 to 10.2 cm, respectively (Bjornn and Reiser 1991). It is possible that steelhead could spawn in the action area but the recommended work window is well outside of their spawning and incubation period (Appendix D).

Rearing Sites

Freshwater rearing habitat for salmon and steelhead occurs in Catherine Creek. Rearing sites require water quantity and floodplain connectivity; water quality and; natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams; aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Once salmon and steelhead have hatched and left the gravel, they remain in freshwater from a few weeks to two years, depending on species and habitat conditions (i.e. water temperature, habitat capacity). During this time, the fish require pools and riffles in which to hold, feed, and avoid predators. Sufficient water quantity must be available in those freshwater areas that afford rearing habitat.

Short term impacts on benthic invertebrates, a primary constituent of juvenile salmon and steelhead diets, could occur from the dewatering associated with channel construction and enhancement. However, benthic macroinvertebrate populations are expected to recover relatively quickly following these activities. Since invertebrate communities will recolonize the relatively small area impacted, no long-term loss of biological productivity or prey base for juvenile salmon and steelhead is expected.

The impacts on shoreline, riparian, and aquatic vegetation and the effects on rearing habitat are considered to be insignificant and/or discountable due to the avoidance and minimization measures that will be employed.

Migration Corridors

Freshwater migration corridors occur in Catherine Creek. Adult fish migrate within Catherine Creek to upstream spawning and rearing habitats. Juvenile fish primarily migrate and rear in the lower reaches of the stream. Migration corridors must be free of obstruction and healthy water quantity and quality conditions must include natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channel habitat, and undercut banks to support juvenile and adult mobility and survival.

The ability to migrate is critical to the persistence of salmonid populations. Salmon and steelhead rely on migratory corridors to move from spawning and rearing habitats to the ocean for foraging and growth, and ultimately back to freshwater for spawning. The use of migratory corridors by salmon and steelhead also results in increased dispersion, facilitating gene flow among local populations when individuals from different local populations interbreed or stray. Local populations that have been extirpated by catastrophic events may become reestablished as a result of movements by salmon and steelhead through migratory corridors.

The impacts on natural cover such as shoreline, riparian, and aquatic vegetation and habitats and the effects on migration corridors are considered to be temporary. The implementation of the riparian restoration element along with the reconnection of floodplain areas to the creek are improvements over the baseline condition.

Impacts on Designated Critical Habitat for Bull Trout of the Columbia River DPS

Critical habitat for bull trout was designated in Catherine Creek on September 26, 2005 (70 FR 56285). On this basis, the proposed action is expected to have a short-term adverse effect on bull trout Critical Habitat PCEs 2, 3, 7, and 8. Over the long-term, the action is expected to beneficially improve the condition of all of these PCEs.

The impacts of the project on those PCEs identified as essential to the conservation of bull trout are described below.

Water Temperature

Freshwater spawning by bull trout has not been documented in Catherine Creek within the project action area. Spawning for bull trout may occur upstream of the project site.

Available temperature data and studies that the reach of Catherine Creek between Union and the Davis Dam that encompasses the action area commonly exceeds 65 degrees and can exceed 70 degrees F during July and August (GRMW and BPA 2010; ODEQ 2000b). Temperatures typically peak in late July in response to increasing air temperatures and declining stream flows. Bull trout migration through the action area has been documented in July and August, periods when high stream temperatures are common (USFWS 2010). Nonetheless, based on observed conditions in the action area the temperature indicator is rated FUR for bull trout.

Over the long term the project will provide increase stream shading, an important component to reducing water temperature.

Complex Stream Channel

Complex stream habitat within the action area is limited (ODFW 2010). Pool frequency and condition are degraded, large woody debris is limited, and substrate consists of predominantly fines in the downstream end of the project reach to gravels at the upstream end. Due to the hydromodification of the creek channel, the floodplain is severely disconnected resulting is a lack of connected secondary channel habitat. Rearing sites require water quantity and floodplain connectivity; water quality and; natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams; aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These elements are limited in the project reach.

Short term impacts on the presence of juvenile salmonids, a primary constituent of bull trout diets, could occur from the dewatering associated with channel construction and enhancement. However, juvenile fish populations are expected to recover relatively quickly following these activities. The increased rearing habitat provided by the project will likely provide a long-term increase of, biological productivity and prey base for bull trout.

The impacts on natural cover such as shoreline, riparian, and aquatic vegetation and habitats and the effects on existing habitat elements are considered to be temporary. The implementation of the riparian restoration element along with the reconnection of floodplain areas, instream pool creation and enhancement, and the reconnection and creation of side channel habitats are expected to be improvements over the baseline condition.

Optimal Migratory Corridor

Freshwater migration corridors occur in Catherine Creek. Adult bull trout migrate within Catherine Creek to upstream spawning and rearing habitats. Juvenile fish primarily migrate and rear in the lower reaches of the stream. Migration corridors must be free of obstruction and healthy water quantity and quality conditions must include natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channel habitat, and undercut banks to support juvenile and adult mobility and survival.

The ability to migrate is critical to the persistence of salmonid populations. Salmon and steelhead rely on migratory corridors to move from spawning and rearing habitats to the ocean for foraging and growth, and ultimately back to freshwater for spawning. The use of migratory corridors by salmon and steelhead also results in increased dispersion, facilitating gene flow among local populations when individuals from different local populations interbreed or stray. Local populations that have been extirpated by catastrophic events may become reestablished as a result of movements by salmon and steelhead through migratory corridors.

The impacts on natural cover such as shoreline, riparian, and aquatic vegetation and habitats and the effects on migration corridors are considered to be improvements over the baseline condition.

Food Base

Dewatering of channel habitat will lead to the unavoidable mortality of aquatic macroinvertebrates that serve as a primary prey resource for juvenile Chinook salmon and steelhead and a secondary resource for foraging bull trout. The disturbance is temporary, and a rapid recolonization of the disturbed area is anticipated. Reported rates of recolonization range from about 1 month to 45 days (NMFS 2003). NMFS (2003) did not indicate the duration or area of the dewatering that corresponds to this recolonization time frame.

Over the long-term the proposed action will increase channel length in the action area by 550 feet, expand aquatic habitat area by an estimated 52,000 square feet, restore riparian habitat conditions, increase floodplain habitat connectivity, and significantly increase functional LWD density increase and aquatic habitat complexity throughout this reach. These beneficial improvements are expected to increase the abundance and diversity of macroinvertebrate prey and juvenile fish in the action area for bull trout.

Indirect Effects

The project will not significantly modify the character of Catherine Creek although localized improvements to habitat conditions will result from the project including creation of pool habitat, increased channel length and complexity, and an improved riparian condition.

The indirect effects of the project are intended to provide significant benefits to salmonids within Catherine Creek, with the overall objective of restoring instream complexity and connectivity to floodplains. The project will improve rearing and migration habitat available to salmon and steelhead bull trout.

Effects of Interrelated and Interdependent Actions

The NRCS has created a permanent conservation easement protecting this entire channel segment. Approximately 17.7 acres of riparian habitat on both sides of the project area was temporarily fenced in 2010 to exclude livestock from the easement area for the construction of the proposed action. The NRCS Conservation Reserve and Enhancement Program will fund the installation of 0.75 miles of permanent livestock exclusion fencing concurrent with the construction of the proposed action, and will create a second upland livestock watering system. Fencing will be integrated with the riparian restoration the livestock crossing improvement components of the proposed action. Livestock fencing will provide a long-term benefit by protecting restored streambanks and allowing restored riparian vegetation to mature. The boundary and fencing limits of the proposed easement are shown in Appendix F.

The construction of this interrelated action is not expected to result in any measurable adverse effects on ESA-listed species or critical habitat. The completed fencing will promote the beneficial recovery of riparian vegetation throughout the project corridor, improving habitat conditions and the critical habitat function of Chinook salmon and steelhead PCEs 1, 2, and3 and bull trout PCEs 1, 3, 4, 5, and 6.

Cumulative Effects

ODEQ (2000) has developed a TMDL for temperature and water quality in Catherine Creek, emphasizing riparian restoration and other measures to improve the summer water temperature regime. TMDL implementation is ongoing. In combination with the beneficial effects of the action, temperature mitigation efforts implemented upstream and downstream of the action area are expected to improve temperature conditions in lower Catherine Creek between Union and Little Creek, or may help maintain current temperatures under future climate change scenarios.

No other non-Federal actions were identified that are considered likely to have cumulative effects on ESA-listed species or designated critical habitat in the action area.

Section 6
Conclusion and Effects Determination

Snake River Spring/Summer-Run ESU Chinook Salmon

The information and analysis presented in this Biological Assessment was the basis of the finding that the Catherine Creek project warrants an effect determination of **May Affect, Likely to Adversely Affect** for Chinook salmon of the Puget Sound ESU.

A determination of **May Affect** is warranted for the Catherine Creek Project based on the following rationale:

- The occurrence of Chinook salmon is documented in the Catherine Creek subbasin and within the project action area.
- The Catherine Creek Project will require in-water work and could affect habitat conditions for Chinook salmon in the project action area over the short-term (construction).

A determination of **Likely to Adversely Affect** is warranted based on the following rationale:

- All in-water work will occur during the ODFW approved in-water work window of August 1 through September 30 for Catherine Creek, which will minimize, but not completely avoid, the likelihood of Chinook salmon presence during in-water work.
- Chinook salmon occurring in the action area may be exposed to fish removal and exclusion activities, suspended sediment pulses, and construction-related disturbance.
- Fish removal and exclusion may involve purposefully disturbing adult Chinook salmon as necessary to displace them prior to work area de-watering.
- Construction activities may cause habitat disturbance sufficient to delay migration or otherwise alter normal behavior.
- Construction activities will result in suspended sediment pulses sufficient to cause effects ranging from behavioral alteration to moderate physiological stress.

Critical Habitat

Based on the findings of this Biological Assessment, the proposed action warrants a **May Affect, Likely to Adversely Affect** determination for critical habitat for Snake River Spring/Summer-run Chinook salmon.

A determination of **May Affect** is warranted based on the following rationale:

- Designated critical habitat does occur in Catherine Creek in the project action area.
- The Catherine Creek Project will involve modification of this designated critical habitat.

A determination of **Likely to Adversely Affect** is warranted based on the following rationale:

- The project will result in temporary degradation of water quality in the action area and significant short-term disturbance of migration corridors and holding and rearing habitats.

- The project will have a long-term positive effect with the creation of 550 linear feet of new channel and the enhancement of 3,000 linear feet of channel.

Adverse effects on critical habitat will be short-term in nature. Over the long-term, the proposed action will beneficially improve the condition of all four essential components of designated critical habitat in the action area.

Snake River Basin Distinct Population Segment Steelhead

The proposed action warrants an effect determination of **May Affect, Likely to Adversely Affect** for steelhead of the Snake River Basin DPS.

A determination of **May Affect** is warranted for the Catherine Creek Project based on the following rationale:

- The occurrence of steelhead is documented in Catherine Creek, within the project action area.
- The Catherine Creek Project will require in-water work and could affect habitat conditions for steelhead in the project action area over both the short-term (construction) and the long-term (550 linear feet of stream length creation, 3,000 linear feet of stream enhancement).

A determination of **Likely to Adversely Affect** is warranted based on the following rationale:

- All in-water work will occur during the ODFW approved in-water work window of August 1st through September 30th for Catherine Creek, which will minimize the number of steelhead and life history stages that may be present in the project action area during in-water work. However, post-emergent fry may still be present in the action area.
- Steelhead occurring in the action area may be exposed to fish removal and exclusion activities, suspended sediment pulses, and construction-related disturbance.
- Fish removal and exclusion will involve capture and handling that may result in stress, injury and/or mortality of juvenile steelhead.
- Construction activities may cause habitat disturbance sufficient to alter normal behavior.
- Construction activities will create suspended sediment pulses sufficient to cause effects ranging from behavioral alteration to moderate physiological stress.

Critical Habitat

The information and analysis presented in this Biological Assessment indicate that the proposed action warrants **May Affect, Likely to Adversely Affect** determination for Snake River Basin DPS critical habitat, under the same rationale presented above for Chinook salmon critical habitat. These adverse effects will be short-term in nature.

Over the long-term, the proposed action will beneficially improve the condition critical habitat PCEs 1, 2 and 3 within the action area.

Columbia River Basin Distinct Population Segment Bull Trout

The information and analysis presented in this Biological Assessment was the basis of the finding that the Catherine Creek Project warrants an effect determination of **May Affect, Likely to Adversely Affect** for bull trout of the Columbia River DPS.

A determination of **May Affect** is warranted for the Catherine Creek Project based on the following rationale:

- The occurrence of bull trout is documented in the Catherine Creek subbasin, within the project action area.
- The Catherine Creek Project will require in-water work and could affect habitat conditions for bull trout in the project action area over the short-term (construction).

A determination of **Likely to Adversely Affect** is warranted based on the following rationale:

- All in-water work will occur during the ODFW approved in-water work window of August 1st through September 30th for Catherine Creek, which will minimize the number of bull trout and life history stages that may be present in the project action area during in-water work. However, upstream migrant bull trout may occur in the action area during the in-water work window.
- Bull trout occurring in the action area may be exposed to fish removal and exclusion activities, suspended sediment pulses, and construction-related disturbance.
- Fish removal and exclusion will involve capture and handling that may result in stress, injury and/or mortality of adult and/or juvenile bull trout.
- Construction activities may cause habitat disturbance sufficient to delay migration or otherwise alter normal behavior.
- Suspended sediment pulses sufficient to cause effects ranging from behavioral alteration to moderate physiological stress.

Critical Habitat

The information and analysis presented in this Biological Assessment support the finding that this Catherine Creek Project warrants a **May Affect, Likely to Adversely Affect** determination for Columbia River Basin DPS bull trout critical habitat, under the same rationale presented above for Chinook salmon and steelhead critical habitat. These adverse effects will be short-term in nature.

Over the long-term, the proposed action will beneficially improve the condition critical habitat PCEs 1, 2, 3, 4, 5, 7 and 8 within the action area.

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Appendix A

Magnuson-Stevens Fishery Conservation and Management Act

Background

Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act to establish new requirements for essential fish habitat (EFH) descriptions in federal fishery management plans and to require federal agencies to consult with NMFS on activities that may adversely affect EFH.

The Magnuson-Stevens Act requires all fishery management councils to amend their fishery management plans to describe and identify EFH for each managed fishery. The Pacific Fishery Management Council (1999) has issued such an amendment in the form of Amendment 14 to the Pacific Coast Salmon Plan, and this amendment covers EFH for all fisheries under NMFS jurisdiction that would potentially be affected by the covered activities. Specifically, these are the Chinook, coho and pink salmon fisheries. EFH includes all streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon. Activities occurring above impassable barriers that are likely to adversely affect EFH below impassable barriers are subject to the consultation provisions of the Magnuson-Stevens Act.

The Magnuson-Stevens Act requires consultation for all federal agency actions that may adversely affect EFH. EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location. Under Section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. Wherever possible, NMFS utilizes existing interagency coordination processes to fulfill EFH consultations with federal agencies. For the covered activities, this goal is being met by incorporating EFH consultation to the Endangered Species Act Section 7 consultation, as represented by this Biological Assessment.

Location

The location of activities covered by this assessment is described in detail in the Biological Assessment in Chapter 1.

Project Description

The project description is provided in the Biological Assessment in Chapter 2.

Occurrence of Essential Fish Habitat

Species from the Pacific salmon guild may occur in the Project Action Area. Species from the groundfish guild and the coastal pelagic guild do not occur within the project action area.

Table 1 identifies the life history stage that may occur within the project action area of the project for those species in the Pacific salmon guild.

Table 1. Pacific Salmon Species with Designated EFH and the Life History Stages that May Occur in the Project Action Area

Pacific Salmon	Egg	Larvae	Juvenile	Adult	Spawning
Chinook salmon	X	X	X	X	X
Coho salmon					
Pink salmon					

Source: PFMC 1999

Salmon Essential Fish Habitat

Effects to the environmental baseline that would impact EFH for Chinook salmon are discussed in detail in Chapter 5 and Chapter 6.

Essential Fish Habitat Minimization Measures

Conservation measures designed to avoid or minimize potential impacts to species protected under the federal Endangered Species Act will also help avoid and minimize impacts of the project on EFH for Pacific salmon. A complete list of avoidance and minimization measures is provided in Chapter 2.

Conclusions

In accordance with EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act, it has been determined that the project will adversely affect EFH in the short-term as a result of construction-related disturbance and water quality impacts. Over the long-term the proposed action will not adversely affect EFH utilized by Pacific salmon species. This determination is based upon the beneficial nature of the project and the long-term effects of the action described in Chapter 6 of the Biological Assessment.

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Appendix B

Wetland Delineation Report

Wetland Delineation Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION

Union County, Oregon

anderson perry & associates, inc.
engineering · surveying · natural resources

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December 2011

WETLAND DELINEATION REPORT

FOR

CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION PROJECT

UNION COUNTY, OREGON

DECEMBER 2011

by
Sue Brady, Biologist

ANDERSON·PERRY & ASSOCIATES, INC.

La Grande, Oregon
Walla Walla, Washington

 Job No. 195-18

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A Site Description, Landscape Setting

The U.S. Bureau of Reclamation is developing a project approximately 2 miles west of Union, Oregon, with the goal of reconnecting the floodplain and historic channel of Catherine Creek to restore the natural processes that form and maintain channel complexity essential to spawning, juvenile rearing, and migration for salmonids and other native fish. This Wetland Delineation Report was prepared to aid the project design process.

Union County is located in the Grande Ronde Valley of northeastern Oregon, in the Blue Mountain ecoregion. This region is characterized by a modified continental climate, with cool, moist winters and warm, dry summers, with local conditions influenced greatly by elevation. The Grande Ronde Valley is bordered by the Blue Mountains to the north, west, and south, and the Wallowa Mountains to the east. Union is located in a meadow steppe region, specifically the *Festuca idahoensis – Symphoricarpos albus* vegetation zone (Franklin and Dyrness, 1988). The topography in the study area is flat. The land in and near the study area has been moderately impacted by human use through agricultural activities and the construction and maintenance of roads, railroads, and residences.

The wetlands that are the subject of this Delineation Report are located west of the City of Union, and the study area includes approximately 94.7 acres adjacent to Catherine Creek. Catherine Creek is located in the Grande Ronde River subbasin (HUC 6 – 170601040507). The study area is located in Township 4 South, Range 39 East, Section 14 W.M. and comprises portions of tax lots 400, 500, and 600. The latitude at the northwestern corner of the study area is 45° 13' 13.27" N and the longitude is -117° 54' 43.79" W (see Figures 1, 2A, 2B, and 5 in Appendix A). The elevation of the study area is approximately 2,717 feet above sea level.

This investigation was conducted by Sue Brady, Anderson·Perry & Associates, Inc. (AP) biologist, on September 7 through September 9, 2011, September 22, 2011, and November 18, 2011.

B Site Alterations, Current and Past Land Use

The study area is zoned as Exclusive Farm Use by Union County. This zoning designation "is intended to conserve and maintain productive agricultural land for continued agricultural use, in accordance with the Exclusive Agriculture Land Use Plan classification provisions" (Union County, 1983).

Currently, the land within the study area is used for field crops, hay production, grazing, and other agricultural activities. There is a farm residence with associated outbuildings on the eastern end of the study area.

B.1 Soils

Soils within and adjacent to the immediate study area have been altered by agricultural practices, the construction and maintenance of Miller Lane, and residential areas. This land has been used for agricultural purposes since approximately the 1880s (UCSWCD, 2011). Nearby lands, outside the study area, have been impacted by agricultural and residential development as well as the construction and maintenance of roads and a railroad.

B.2 Hydrology

The land in the study area is flat, located on the floodplain of Catherine Creek. The study area receives water from precipitation and subsurface infiltration, as well as direct overbank flow from Catherine Creek and other nearby surface waters (Little Creek and Pyles Creek) during seasonal high water events.

Surface and subsurface hydrology in the study area has been altered by the channelization of Catherine Creek, which occurred between 1937 and 1956 (UCSWCD, 2011) and the construction of irrigation runoff ditches that carry water through the study area to Catherine Creek during the irrigation season (April through October).

B.3 Vegetation

The non-wetland portions of the study area are mainly covered by a weedy herbaceous layer, including grasses and herbs such as meadow foxtail (*Alopecurus pratensis*), tall fescue (*Schedonorus phoenix*), creeping bentgrass (*Agrostis stolonifera*), fowl bluegrass (*Poa palustris*), cheatgrass (*Bromus tectorum*), Canada thistle (*Cirsium arvense*), prickly lettuce (*Lactuca serriola*), teasel (*Dipsacus fullonum*), common mullein (*Verbascus thapsus*), and devil's beggartick (*Bidens frondosa*).

The various wetland areas support a mix of wetland species, including Pacific willow (*Salix lucida* ssp. *lasiandra*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), tall fescue, fowl bluegrass, reed canarygrass (*Phalaris arundinacea*), barnyardgrass (*Echinochloa crus-galli*), quackgrass (*Elymus repens*), common rush (*Juncus effusus*), Nebraska sedge (*Carex nebrascensis*), panicled bulrush (*Scirpus microcarpus*), American water plantain (*Alisma subcordatum*), spotted ladysthumb (*Polygonum persicaria*), tule (*Schoenoplectus acutus*), and broadleaf cattail (*Typha latifolia*).

Vegetation in the study area has been directly altered by past and current farming practices, including crops, hay production, grazing, and the construction of irrigation ditches.

C Precipitation Data and Analysis

C.1 Climate and Growing Season

The following information on the study area climate is summarized from the Soil Survey of Union County, Oregon (NRCS, 1985), the Western Regional Climate Center historic climate data for La Grande, Oregon (WRCC, 2011), and the Natural Resources Conservation Service (NRCS) National Water and Climate Center WETS tables for La Grande, Oregon (NRCS, 2002).

The climate of Union County is moderate, with warm, dry summers and cool, moist winters. The average daily high temperature at La Grande ranges from approximately 81° Fahrenheit (F) in the summer to approximately 41°F in the winter. The average annual precipitation is 16.8 inches, with 19.9 inches of snow falling during the winter.

The growing season (28°F day, 70 percent interval) for this area is April 21 to October 13. Of the total annual precipitation, 7.1 inches, or about 43 percent, usually fall during April through September, which includes the growing season for most crops.

C.2 Precipitation and NRCS WETS Table Summary

Monthly precipitation data for the station in La Grande, Oregon, approximately 10 miles northwest of the study area, during the three months preceding each of the field investigations are presented on Tables 1a and 1b below (NOAA, 2011; NRCS, 2002). As the field investigations were performed approximately two months apart, separate tables are provided for the September investigations and the November investigation. Refer to Appendix D for current and historic precipitation data.

September Field Investigations. Rainfall amounts were within the normal range in June and July and below the normal range in August and September. At the time of the September field investigations this station was reporting 92 percent of average precipitation for the year to date.

Table 1a. Summary of Monthly Normal and Recorded Precipitation between June 1, 2011, and September 22, 2011, for La Grande, Oregon					
Category	**June**	**July**	**August**	**September**	**Total Year to Date**
Recorded Precipitation (inches)	1.67	0.50	0.00	0.11 (to date)	10.78
Precipitation Average (inches)	1.48	0.64	0.83	0.79 (month)	11.70
Percent of Average	113%	78%	0%	14%	92%
Monthly Normal (inches)					
30% Chance Less Than	1.07	0.31	0.25	0.27	7.29
30% Chance More Than	1.82	0.86	1.05	1.05	14.42

November Field Investigation. Rainfall amounts were above the normal range in October and below the normal range in August, September, and November. At the time of the November field investigation this station was reporting 92 percent of average precipitation for the year to date.

Table 1b. Summary of Monthly Normal and Recorded Precipitation between August 1, 2011, and November 18, 2011, for La Grande, Oregon					
Category	**August**	**September**	**October**	**November**	**Total Year to Date**
Recorded Precipitation (inches)	0.00	0.11	2.07	0.87 (to date)	13.72
Precipitation Average (inches)	0.83	0.79	1.27	1.98 (month)	14.95
Percent of Average	0%	14%	163%	44%	92%
Monthly Normal (inches)					
30% Chance Less Than	0.25	0.27	0.70	1.38	9.37
30% Chance More Than	1.05	1.05	1.51	2.54	18.47

Daily precipitation data at the La Grande station for the two weeks immediately preceding each of the field investigations are presented in Tables 2a and 2b below (NOAA, 2011; NRCS, 2002). As before, separate tables are presented for the September investigations and the November investigation. Refer to Appendix D for daily precipitation data. Highlighted dates represent days the fieldwork for the wetland delineation was performed.

September Field Investigations. Precipitation occurred on only two days during this period, with rainfall above the normal amount expected for those days. The total precipitation during this period was well below normal.

November Field Investigation. Precipitation occurred on six days during this period, with rainfall at or above the normal amount expected on four of those days. The total precipitation during this period was within the normal range.

Table 2a. Summary of Daily Normal and Recorded Precipitation between August 24, 2011, and September 22, 2011, for La Grande, Oregon

Date	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9	9/10	9/11	9/12
Actual precip. (inches)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average precip. (inches)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Daily Normal (inches)																				
30% Less Than	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
30% More Than	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Table 2a. Summary of Daily Normal and Recorded Precipitation between August 24, 2011, and September 22, 2011, for La Grande, Oregon (continued)

Date	9/13	9/14	9/15	9/16	9/17	9/18	9/19	9/20	9/21	9/22	Total
Actual precip. (inches)	0.00	0.00	**0.05**	**0.06**	0.00	0.00	0.00	0.00	0.00	0.00	**0.11**
Average precip. (inches)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	**0.90**
Daily Normal (inches)											
30% Less Than	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.30**
30% More Than	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	**0.90**

Table 2b. Summary of Daily Normal and Recorded Precipitation between November 4, 2011, and November 18, 2011, for La Grande, Oregon

Date	11/4	11/5	11/6	11/7	11/8	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	Total
Actual precip. (inches)	**0.35**	0.00	0.00	**0.02**	**0.08**	0.00	0.00	0.00	0.00	0.00	0.00	**0.15**	0.00	**0.02**	**0.25**	**0.87**
Average precip. (inches)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	**1.05**
Daily Normal (inches)																
30% Less Than	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	**0.75**
30% More Than	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	**1.20**

C.3 Wetland Hydrology and Analysis

Site visits were conducted on September 7 through September 9, 2011, September 22, 2011, and November 18, 2011. Based on recent and historic precipitation data, June and July were within monthly normal values; August, September, and November were below the normal range; and October was above the normal range. This year is below the average precipitation total to date, but within the normal range.

D Investigation Methods

Two methods of investigation were conducted for the analysis of wetlands within the study area: a pre-field review of existing information and an on-site wetland investigation.

D.1. Pre-Field Review

A review of existing literature, maps, and other materials was conducted to identify wetlands or site characteristics indicative of wetlands within the study area. Known wetland and waterway locations were identified from the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Map (USFWS, 2011) (see Figure 3). A Local Wetland Inventory (LWI) has not been conducted for the project vicinity. Note that these sources can only indicate the likelihood of the presence of wetlands. Actual wetland determination must be based on data obtained from field investigation. Soil classifications were taken from Union County soil survey data published by the NRCS in 1985 and from the NRCS website (NRCS, 2011).

D.1.a. Soils. Two soils are mapped in the study area: Catherine silt loam and La Grande silt loam (see Figure 4 in Appendix A).

- Catherine silt loam is a deep, somewhat poorly drained soil, which formed in mixed alluvium derived dominantly from basalt, granite, and andesite. It is found on floodplains and low stream terraces. Native vegetation typically consists of water-tolerant grasses, sedges, and rushes. This soil is rated as Partially Hydric.

- La Grande silt loam is a deep, moderately drained soil, which formed in mixed material derived from basalt, granite, and argillite. It is found on alluvial fans and low stream terraces. Native vegetation typically consists of grasses and forbs. This soil is rated as Not Hydric.

D.1.b. Hydrology. The NWI map identifies one wetland within the study area, mapped as Palustrine Forested, temporarily flooded (see Figure 3 in Appendix A). In addition, Catherine Creek flows through the study area. A remnant oxbow of Pyles Creek is immediately adjacent to, but outside of, the western study area boundary.

D.1.c. Vegetation. The project vicinity is within the overall regional vegetation zone of meadow steppe, specifically the *Festuca idahoensis – Symphoricarpos albus* vegetation zone, in the Blue Mountain ecoregion. Native vegetation of this zone typically consists of perennial bunchgrasses (*Festuca idahoensis, Agropyron spicatum, Poa ampla,* and others), with the addition of forbs (*Achillea millefolium, Balsamorhiza sagittata, Lupinus sericea, Iris missouriensis, Potentilla gracilis,* and others) and some shrubs (*Symphoricarpos albus, Rosa nutkana*) (Franklin and Dyrness, 1988).

D.2. On-Site Wetland Investigation

On-site investigations were conducted by an AP biologist on September 7 through September 9, 2011, September 22, 2011, and November 18, 2011. Procedures outlined in the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region (Version 2.0) (USACE, 2008) were used to determine the presence and extent of wetlands within the study area. The methodology outlined in the manuals is based on three essential characteristics of wetlands: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Field indicators of all three characteristics must be present to make a positive wetland determination.

Twenty-four paired (upland/wetland) sample plots (Plots 1 through 9, 11 through 20, and 22 through 26) were established to determine plant species composition, analyze soil pits, and evaluate hydrology. Sample plot locations were chosen based on local variations in topography and vegetation along the apparent wetland boundary. Wetland Determination Data Forms from the Arid West Regional Supplement were used to record information gathered from the sample plots. Wetland Determination Data Forms are included in Appendix B.

In addition, two unpaired sample plots were located in questionable areas to verify that they were in fact uplands; one in the area identified as wetland on the NWI map (Plot 21) and one in an area that appeared to be a swale or low area on the aerial photograph (Plot 10). Wetland Determination Data Forms from the Arid West Regional Supplement were used to record information gathered from the upland sample plots and are included in Appendix B.

D.2.a. Soils. To determine the presence or absence of hydric soils, soil samples were collected at each representative sample plot. Soils were inspected to a minimum depth of 12 inches; however, the very rocky nature of the soil prevented digging below 8 inches at Sample Plots 9A and 24A. Soils were analyzed for soil matrix color, soil texture, redoximorphic features, and the presence of mottles or gleying. Soil hue value and chroma were determined using the Munsell Soil Color Charts (Munsell Color, 2009). Observations about hydric soil indicators from the Arid West Regional Supplement were noted for each of the sample plots. Indicators found at the sample plots included hydrogen sulfide, depleted matrix, and redox dark surface. No problematic soils were encountered at the sample plots.

D.2.b. Hydrology. Observations of wetland hydrology indicators from the Arid West Regional Supplement were noted for each of the sample plots. Primary indicators found at the sample plots included high water table, saturation, surface soil cracks, hydrogen sulfide odor, and oxidized rhizospheres along living roots. No secondary indicators were necessary for any of the sample plots, and no difficult hydrologic situations were encountered.

D.2.c. Vegetation. Dominant plant species at each sample plot were identified and percent cover was visually estimated. Sample points had an approximately 4 m^2 area for the herb stratum and 25 m^2 for the tree stratum. No vines or saplings/shrubs were located in any of the sample plots. If a plant was not immediately identifiable in the field, a representative sample was collected and identified in the lab using a dissecting microscope when necessary. Plants were keyed to species using Hitchcock and Cronquist (1973), Barkworth et al. (2007), and Wilson et al. (2008). Scientific and common names used in this Report are from the U.S. Department of Agriculture (USDA) PLANTS database (USDA, 2011). Wetland plant indicator status was taken from the National List of Plant Species That Occur in Wetlands: Pacific Northwest (Region 9) (Reed, 1988) and the 1993 Supplement to National List of Plant Species That Occur in Wetlands: Northwest (Region 9) (Reed et al., 1993). Hydrophytic vegetation indicators used were the Dominance Test and the Prevalence Test. No problematic situations were encountered with regard to hydrophytic vegetation, as the grasses and other herbaceous plants were either flowering and growing normally (September field investigations) or were readily identifiable from dormant or dead plant remains (November field investigation).

E Description of All Wetlands and Other Non-Wetland Waters

Eighteen wetland areas were identified based on field observations, totaling 6.88 acres within the study area (see Figures 6A and 6B in Appendix A). One non-wetland water body, Catherine Creek, was identified within the study area.

E.1 Wetlands

The identified wetland areas appear to be naturally formed in areas of depressions, swales, or remnant oxbows of Catherine Creek. These wetlands are part of a larger wetland complex that exists on the floodplain of Catherine Creek and the surrounding Grande Ronde Valley. Descriptions of the vegetation, soils, and hydrology within each wetland are presented below and in Table 3. Each aquatic resource documented by this Report is graphically depicted on the Wetland Delineation Maps for the project area (see Figures 6A and 6B). Wetland Determination Data Forms documenting the delineation are included in Appendix B, while representative color photographs documenting site conditions at the time of the investigation are presented in Appendix C.

E.1.a. Wetland 1. Wetland 1 is located toward the eastern end of the study area, south of Catherine Creek, in a remnant oxbow. Topography is generally flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 1 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 1 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 1 was predominately common rush, with tall fescue, Nebraska sedge, and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 1 is not a "problematic wetland."

E.1.b. Wetland 2. Wetland 2 is located in the central portion of the study area, south of Catherine Creek, in a remnant oxbow. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent and Palustrine Forested. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 2 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 2 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 2 was predominately quackgrass, fowl bluegrass, and common rush, with some spotted ladysthumb, curly dock, and other wetland herbs. Large Pacific willow trees are located on the margins of the oxbow, at the edges of the wetland. The hydrophytic vegetation indicators used were the Dominance Test and the Prevalence Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 2 is not a "problematic wetland."

E.1.c. Wetland 3. Wetland 3 is located on the eastern side of the study area, west of Wetland 1, in a small depression south of and adjacent to Catherine Creek that appears to be a portion of a small remnant oxbow. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 3 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 3 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 3 was predominately quackgrass and fowl bluegrass, with small amounts of other wetland herbs. A line of large Pacific willow trees is located along Catherine Creek at the wetland boundary. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 3 is not a "problematic wetland."

E.1.d. Wetland 4. Wetland 4 is located on the eastern side of the study area, south of Catherine Creek, in the same remnant oxbow as Wetland 3. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 4 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 4 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 3 was predominately common spikerush and fowl bluegrass, with some meadow foxtail and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 4 is not a "problematic wetland."

E.1.e. Wetland 5. Wetland 5 is located in the central portion of the study area, in a shallow depression immediately adjacent to Catherine Creek. Topography is flat. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent and Palustrine Forested. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 5 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. Primary hydrology indicators recorded in Wetland 5 were Saturation (A3) and Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 5 was predominately reed canarygrass and tall fescue, along with common rush, creeping buttercup, and other wetland herbs. A patch of large Pacific willow trees is located at the eastern end of the wetland. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 5 is not a "problematic wetland."

E.1.f. Wetland 6. Wetland 6 is located on the eastern side of the study area, north of Catherine Creek, in a depression within an old oxbow. Topography is generally flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent and Palustrine Forested. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 6 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Depleted Matrix (F3). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 6 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 6 was predominately quackgrass, with some reed canarygrass, cattails, and other wetland herbs. A patch of Pacific willows is located at the northern end of the wetland. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 6 is not a "problematic wetland."

E.1.g. Wetland 7. Wetland 7 is located in the northwestern portion of the study area, north of Catherine Creek, in a remnant oxbow. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 7 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). Hydric soil indicators recorded were Hydrogen Sulfide (A4) and Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. Primary hydrology indicators recorded in Wetland 7 were Hydrogen Sulfide Odor (C1) and Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 7 was predominately common rush and fowl bluegrass, with panicled bulrush, cattails, American water plantain, meadow foxtail, and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 7 is not a "problematic wetland."

E.1.h. Wetland 8. Wetland 8 is located in the eastern side of the study area, north of Catherine Creek, in a remnant oxbow. Wetlands 8, 9, and 10 are located close together and were likely a continuous wetland/oxbow before agricultural activities and construction of farm roads separated them. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 8 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 8 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 8 was predominately common spikerush, with some cattails and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 8 is not a "problematic wetland."

E.1.i. Wetland 9. Wetland 9 is located in the eastern side of the study area, north of Catherine Creek, in a remnant oxbow. Wetlands 8, 9, and 10 are located close together and were likely a continuous wetland/oxbow before agricultural activities and construction of farm roads separated them. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 9 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 9 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 9 was predominately common spikerush, fowl bluegrass, and common rush, with other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 9 is not a "problematic wetland."

E.1.j. Wetland 10. Wetland 10 is located in the eastern side of the study area, north of Catherine Creek, in what appears to be a remnant oxbow. Wetlands 8, 9, and 10 are located close together and were likely a continuous wetland/oxbow before agricultural activities and construction of farm roads separated them. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 10 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicators recorded in Wetland 10 were Saturation (A3) and Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 10 was predominately common rush and Nebraska sedge, with some cattails and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 10 is not a "problematic wetland."

E.1.k. Wetland 11. Wetland 11 is located north of Catherine Creek, extending across the center of most of the study area. The majority of the wetland area consists of one or more remnant oxbows of Catherine Creek, connected to a drainage that carries irrigation runoff water west to Catherine Creek. The large oxbow area at the western end is the wettest area, cut off from Catherine Creek by a farm access road. A culvert carries water from the western arm of the oxbow under the access road to the creek. At the time of the site visits the oxbow was ponded, with water actively flowing through the culvert at the time of the September site visits. Topography is flat. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is not entirely contained within the study area, as it extends east past Miller Lane.

Hydric Soil. Soils in most of Wetland 11 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). Soils in a portion of the eastern end of the wetland are mapped as La Grande silt loam, which is listed as Not Hydric (NRCS, 2011) (see Figure 4). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. Primary hydrology indicators recorded in Wetland 11 were High Water Table (A2), Saturation (A3), and Oxidized Rhizospheres along Living Roots (C3). Surface water was also observed throughout much of the wetland area, although not in any of the sample plots. No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 11 was a very diverse mix of species, including common rush, Nebraska sedge, reed canarygrass, cattails, tule, American water plantain, fowl bluegrass, quackgrass, and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 11 is not a "problematic wetland."

E.1.l. Wetland 12. Wetland 12 is located in the western side of the study area, north of Catherine Creek, within the curve of the large oxbow that forms the western end of Wetland 11. Topography is flat. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 12 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicators recorded in Wetland 12 were Saturation (A3) and Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 12 was predominately common rush, with some curly dock, meadow foxtail, and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 12 is not a "problematic wetland."

E.1.m. Wetland 13. Wetland 13 is located in the central portion of the study area, north of Catherine Creek, in a depression adjacent to the creek. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 13 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 13 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 13 was predominately quackgrass, reed canarygrass, and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 13 is not a "problematic wetland."

E.1.n. Wetland 14. Wetland 14 is located in the northern side of the study area, north of Catherine Creek, in a depression north of Wetland 7. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 14 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicators recorded in Wetland 14 were Surface Soil Cracks (B6) and Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 14 was predominately broadleaved cattails, American water plantain, and curly dock, with tall fescue, spotted ladysthumb, and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 14 is not a "problematic wetland."

E.1.o. Wetland 15. Wetland 15 is located in the central portion of the study area, south of Catherine Creek, in the same remnant oxbow as Wetland 2. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Forested. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 15 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 15 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 15 was predominately Pacific willow and fowl bluegrass, with some curly dock and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 15 is not a "problematic wetland."

E.1.p. Wetland 16. Wetland 16 is located in the eastern portion of the study area, south of and adjacent to Catherine Creek. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Forested. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 16 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicators recorded in Wetland 16 were Surface Soil Cracks (B6) and Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 16 was predominately fowl bluegrass, with some cattails, common rush, curly dock, teasel, and other wetland herbs. A line of large Pacific willows is located on the northern side of the wetland, along Catherine Creek. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 16 is not a "problematic wetland."

E.1.q. Wetland 17. Wetland 17 is located in the eastern portion of the study area, south of and adjacent to Catherine Creek. Topography is flat to concave. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Forested. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 17 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicator recorded in Wetland 17 was Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 17 was predominately fowl bluegrass and reed canarygrass, with some common rush and other wetland herbs. A line of large Pacific willows is located on the northern side of the wetland, along Catherine Creek. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 17 is not a "problematic wetland."

E.1.r. Wetland 18. Wetland 18 is located along the fence line at the eastern edge of the study area, south of Catherine Creek. Topography is concave. At the time of the site visit, a pile of scrap metal, tires, railroad ties, and other debris was located within the wetland. This area is not shown as a wetland on the NWI map. Based on site observations, this wetland is classified as Palustrine Emergent. The wetland is entirely contained within the study area.

Hydric Soil. Soils in Wetland 18 are mapped as Catherine silt loam, which is listed as Partially Hydric (NRCS, 2011). The hydric soil indicator recorded was Redox Dark Surface (F6). No problematic soils were observed.

Hydrology. The primary hydrology indicators recorded in Wetland 18 were Saturation (A3) and Oxidized Rhizospheres along Living Roots (C3). No problematic hydrologic situations were encountered and no secondary hydrology indicators were required.

Hydrophytic Vegetation. Vegetation observed in Wetland 18 was predominately reed canarygrass and common rush, with some curly dock and other wetland herbs. The hydrophytic vegetation indicator used was the Dominance Test. No problematic hydrophytic vegetation situations were encountered.

The wetland boundary was determined using local topographical and vegetation features coupled with sample soil pits and observations of hydrology. Wetland 18 is not a "problematic wetland."

Table 3. Wetlands Delineated within the Study Area					
Wetland	**HGM Wetland Class[1]**	**Dominant Cowardin Class[2]**	**USACE Category and Basis**	**Sample Plots**	**Acres in Study Area**
Upland				10, 21	
1	Riverine Impounding	PEM	Cat.7- Adjacent to Catherine Creek	1	0.35
2	Riverine Impounding	PEM, PFO	Cat.7- Adjacent to Catherine Creek	2	0.19
3	Riverine Impounding	PEM	Cat.7- Adjacent to Catherine Creek	4, 5	0.19
4	Riverine Impounding	PEM	Cat.7- Adjacent to Catherine Creek	6	0.05
5	Riverine Flow-through	PEM, PFO	Cat.7- Adjacent to Catherine Creek	7, 8	0.12
6	Flats	PEM, PFO	Cat.7- Adjacent to Catherine Creek (historic connection)	9	0.11
7	Flats	PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	11,12	0.58
8	Flats	PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	13	0.05
9	Flats	PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	14	0.01
10	Flats	PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	15	0.09
11	Riverine Impounding	PEM	Cat.7- Adjacent to Catherine Creek	16, 19, 20	4.81
12	Flats	PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	17	0.10
13	Flats	PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	18	0.07
14	Flats	PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	22	0.50
15	Flats	PFO	Cat.7- Adjacent to Catherine Creek (historic connection)	3	0.30
16		PFO	Cat.7- Adjacent to Catherine Creek	23	0.08
17		PFO	Cat.7- Adjacent to Catherine Creek	24	0.06
18		PEM	Cat.7- Adjacent to Catherine Creek (historic connection)	25, 26	0.03
				Total	**6.88**

[1]Adamus, 2001 [2]Cowardin et al., 1979

E.2 Other Waters of the State/U.S.

One non-wetland "Water of the U.S." is present within the study area. Catherine Creek is a perennial stream originating in the Wallowa Mountains. This stream has been modified through straightening and is used as an irrigation water source. Approximately 3,400 linear feet (3.5 acres) of the stream is contained within the study area.

F Deviation from LWI or NWI

The NWI map shows one small wetland area within the study area (see Figure 3). During the field investigation, 18 wetland areas were found (see Figures 6A and 6B). The observed wetlands do not include the wetland shown on the NWI map, which was found to be upland. Wetland Determination Data Forms are provided in Appendix B.

G Mapping Method

The best professional judgment of the investigator was used to determine the wetland boundaries based on vegetation, soils, hydrologic, and topographic indicators observed in the field. Pin flags were used to mark the wetland boundaries, sample plot locations, and Ordinary High Water Elevation of Catherine Creek, which were surveyed using a Topcon GMS2 GPS unit with external antenna and beacon. This survey was accurate to the submeter standard.

H Additional Information

Catherine Creek is mapped as Essential Salmon Habitat (DSL, 2011). Protected species that are known to use Catherine Creek include the following:

- Bull trout (*Salvelinus confluentus*) - Columbia River Distinct Population Segment (DPS)
- Chinook salmon (*Oncorhynchus tshawytscha*) - Snake River spring/summer run Evolutionary Significant Unit
- Steelhead (*Oncorhynchus mykiss)* - Snake River Basin DPS

I Results and Conclusions

Based on the results of site investigations conducted on September 7 through September 9, 2011, September 22, 2011, and November 18, 2011, AP confirmed the presence of 18 wetland areas totaling approximately 6.88 acres within the study area. These results are based on the presence of the three required indicators for wetlands as described in the 1987 USACE Manual and the 2008 Arid West Regional Supplement. One non-wetland waterbody (Catherine Creek) was observed in the study area.

These areas are considered jurisdictional Waters of the U.S. Any fill or removal activities in these areas will require permits from the USACE.

J Disclaimer Statement

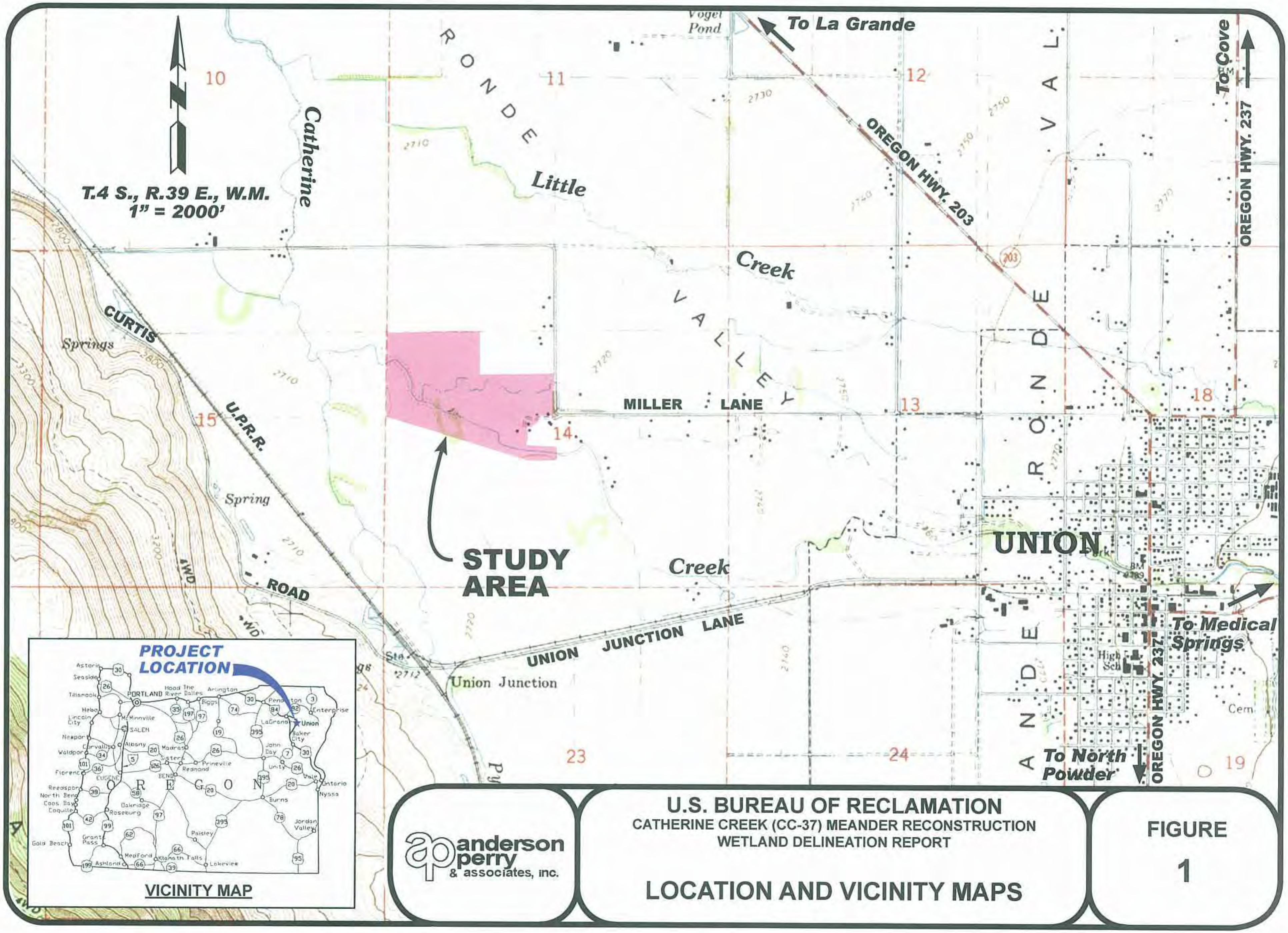
The wetland delineation was conducted in accordance with the routine methodology provided in the USACE Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region (Version 2.0) (USACE, 2008).

This Report documents the investigation, best professional judgment, and conclusions of the investigator. It is correct and complete to the best of my knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

Appendix A

Figures

Job# 195-18-224 Dec. 6, 2011 lbauer



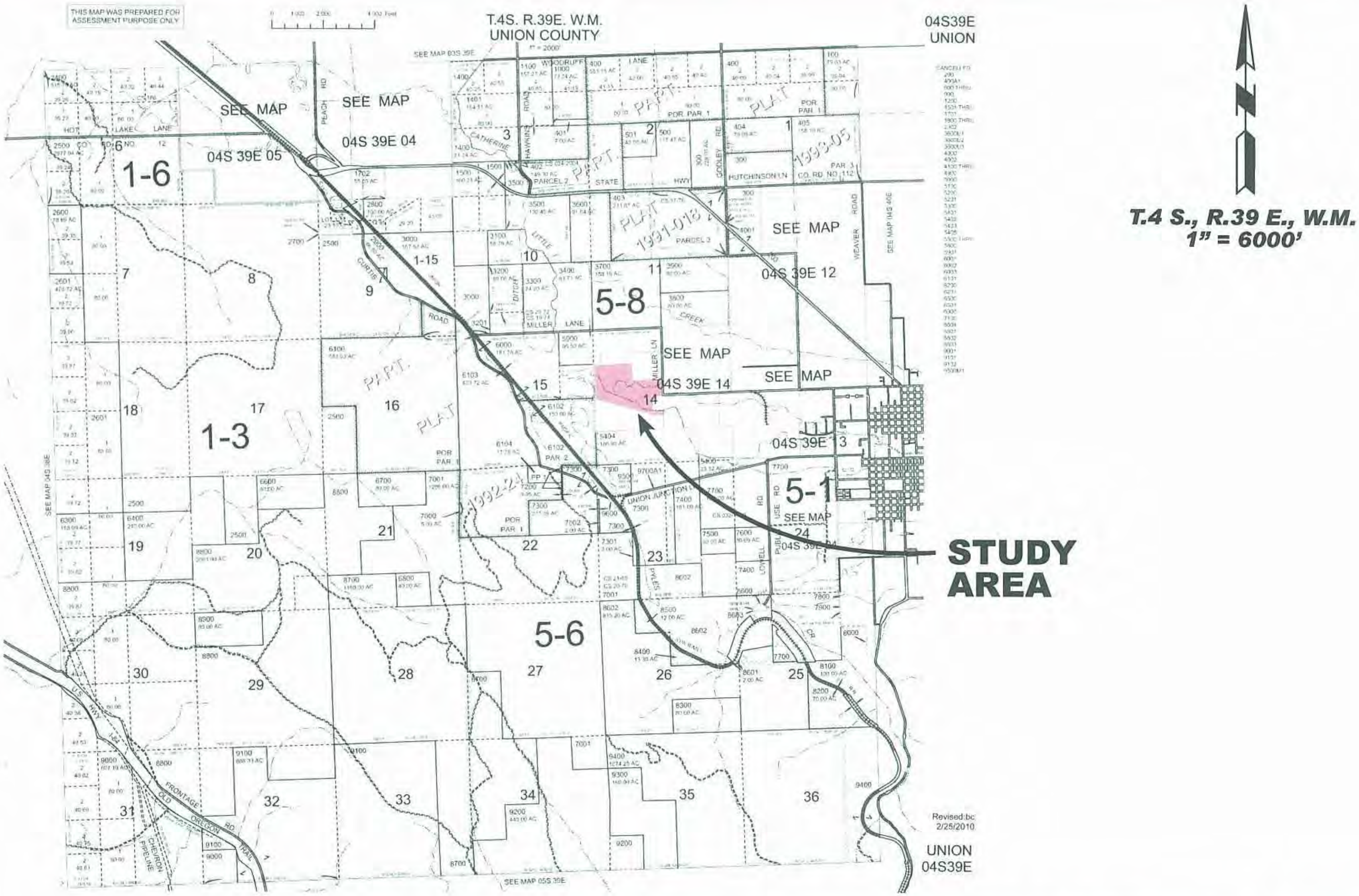
anderson perry & associates, inc.

U.S. BUREAU OF RECLAMATION
CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION
WETLAND DELINEATION REPORT

LOCATION AND VICINITY MAPS

FIGURE 1

Job# 195-18-224 Dec. 6, 2011 lbauer



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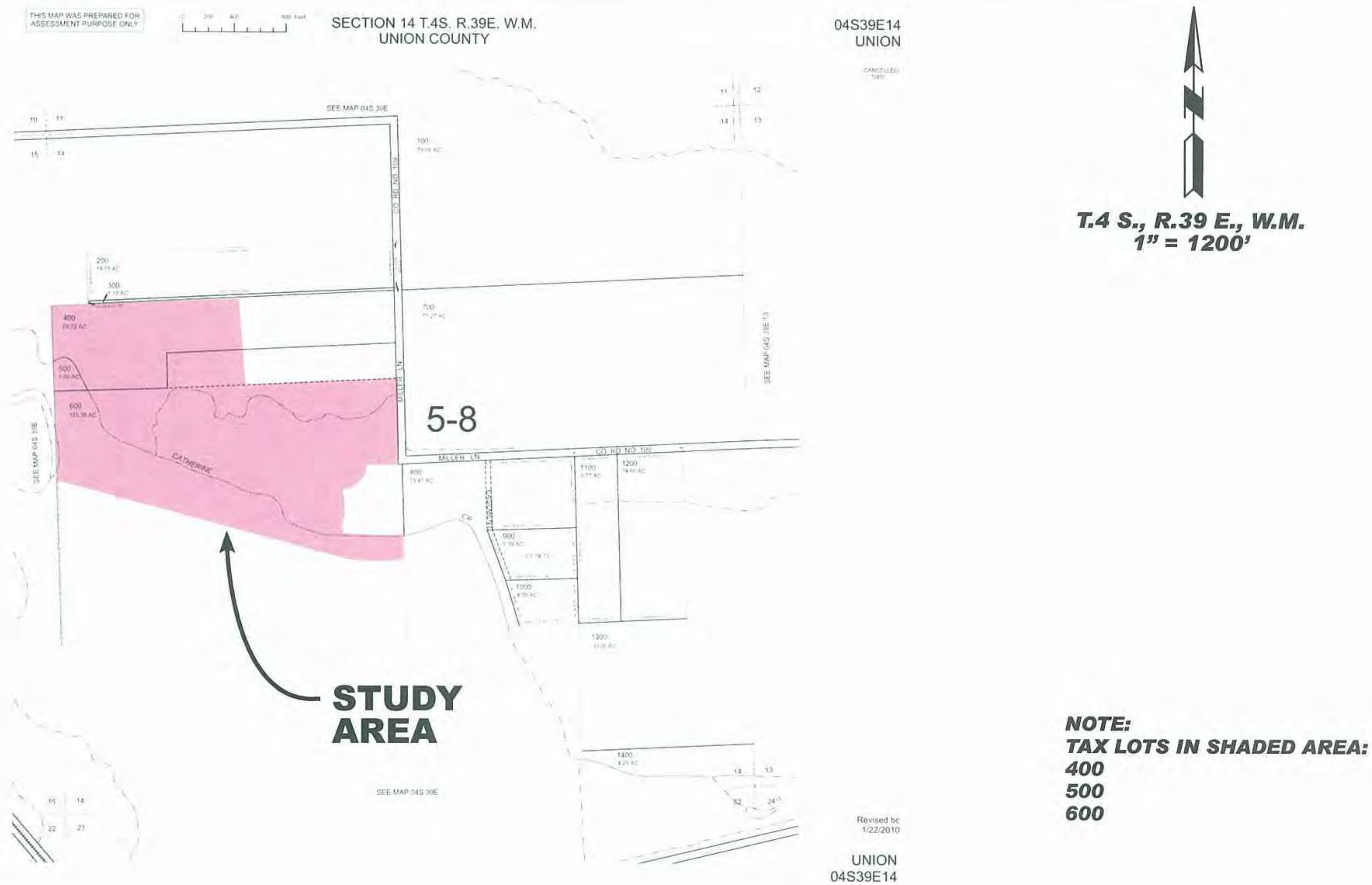
U.S. BUREAU OF RECLAMATION

CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION
WETLAND DELINEATION REPORT

TAX LOT MAP 1

FIGURE
2A

Job# 195-18-224 Dec. 6, 2011 lbauer



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CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION
WETLAND DELINEATION REPORT

TAX LOT MAP 2 - DETAIL

FIGURE 2B

Job# 195-18-224 Dec. 6 , 2011 lbauer

U.S. Fish and Wildlife Service

National Wetlands Inventory

T.4 S., R.39 E., W.M.

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

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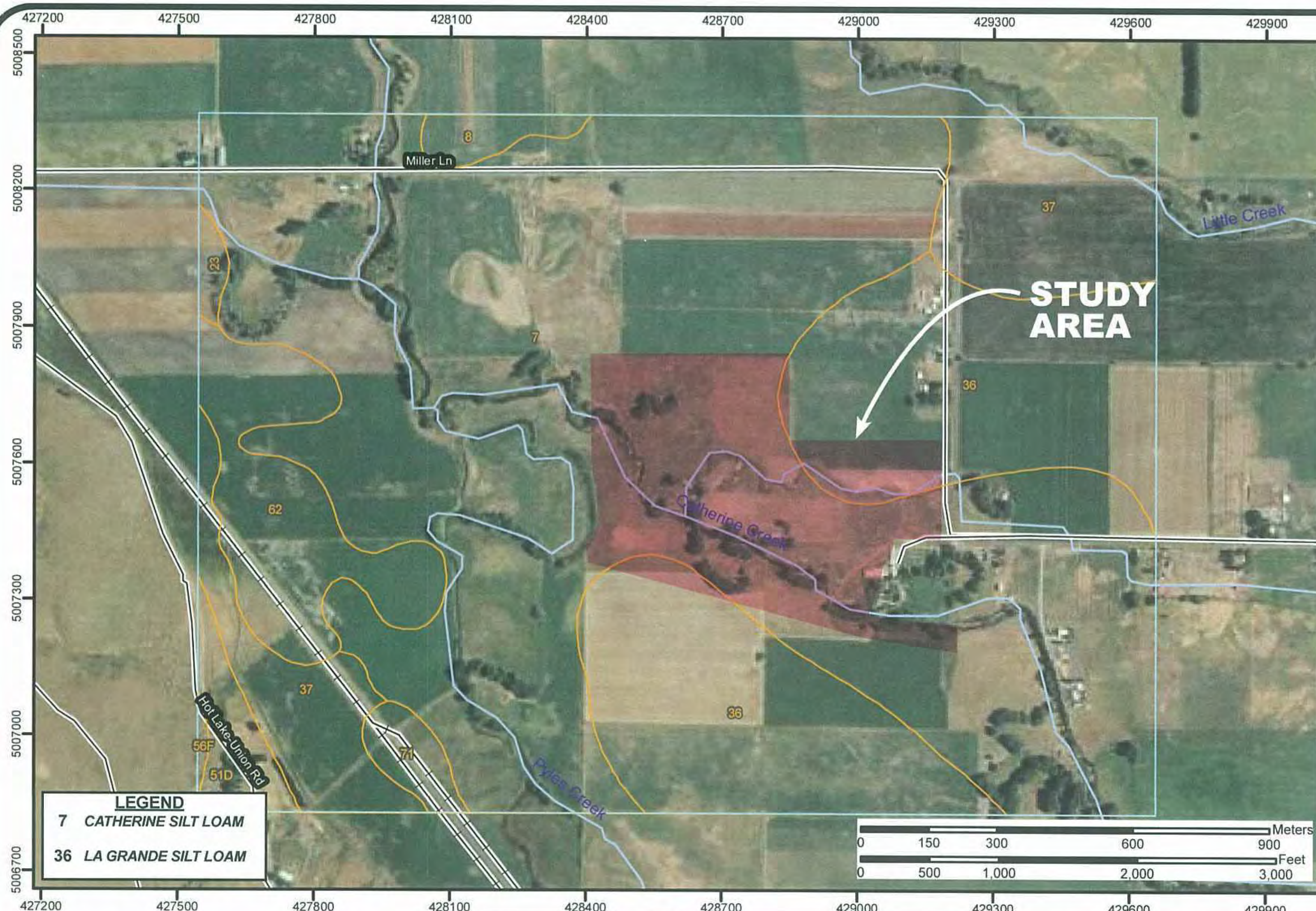
CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION
WETLAND DELINEATION REPORT

NATIONAL WETLANDS INVENTORY

FIGURE 3

Job# 195-18-224 Dec. 6, 2011 lbauer



USDA Natural Resources Conservation Service
Web Soil Survey
National Cooperative Soil Survey

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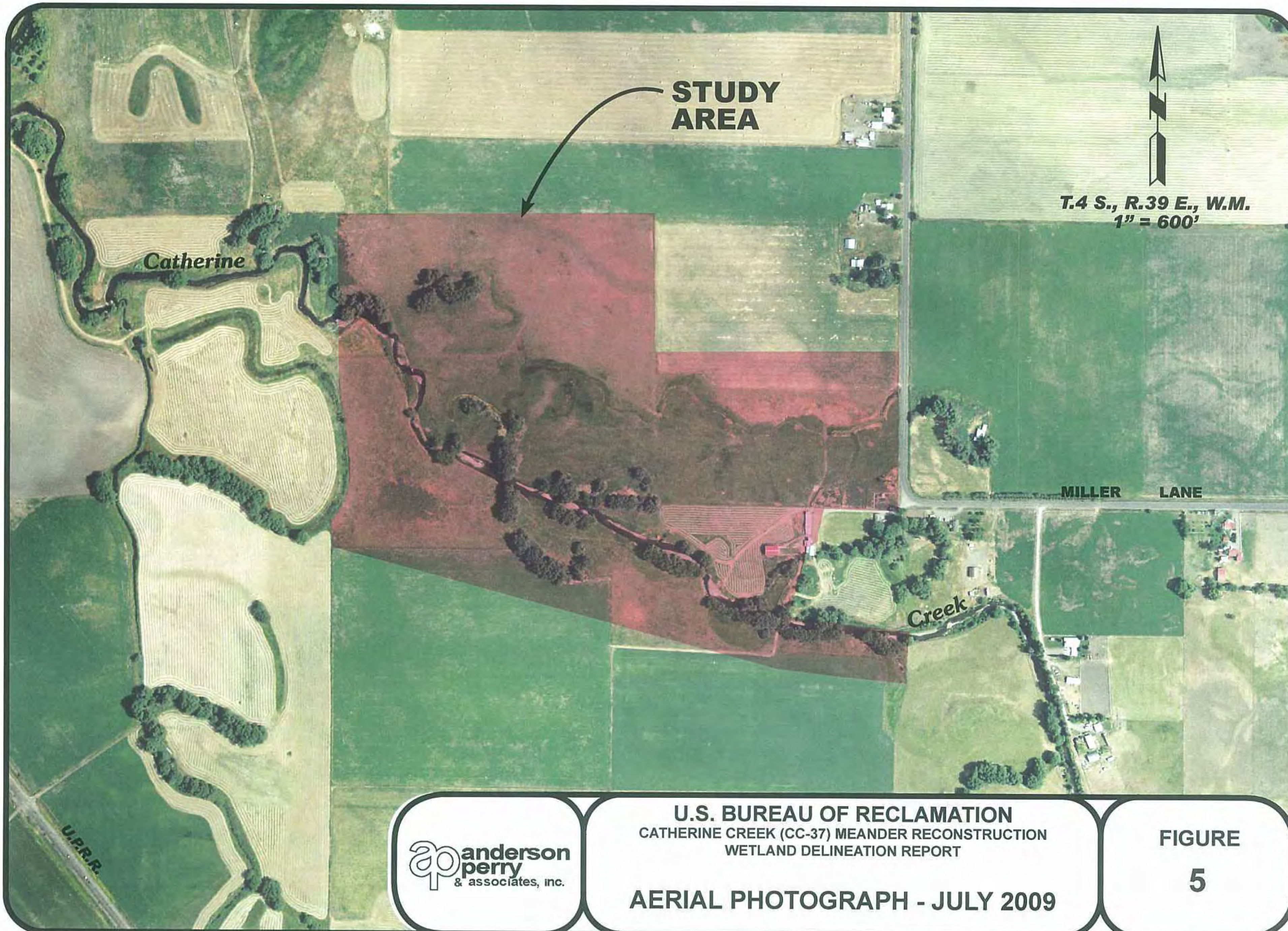
CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION
WETLAND DELINEATION REPORT

SOILS MAP

FIGURE 4

Job# 195-18-224 Dec. 6, 2011 lbauer



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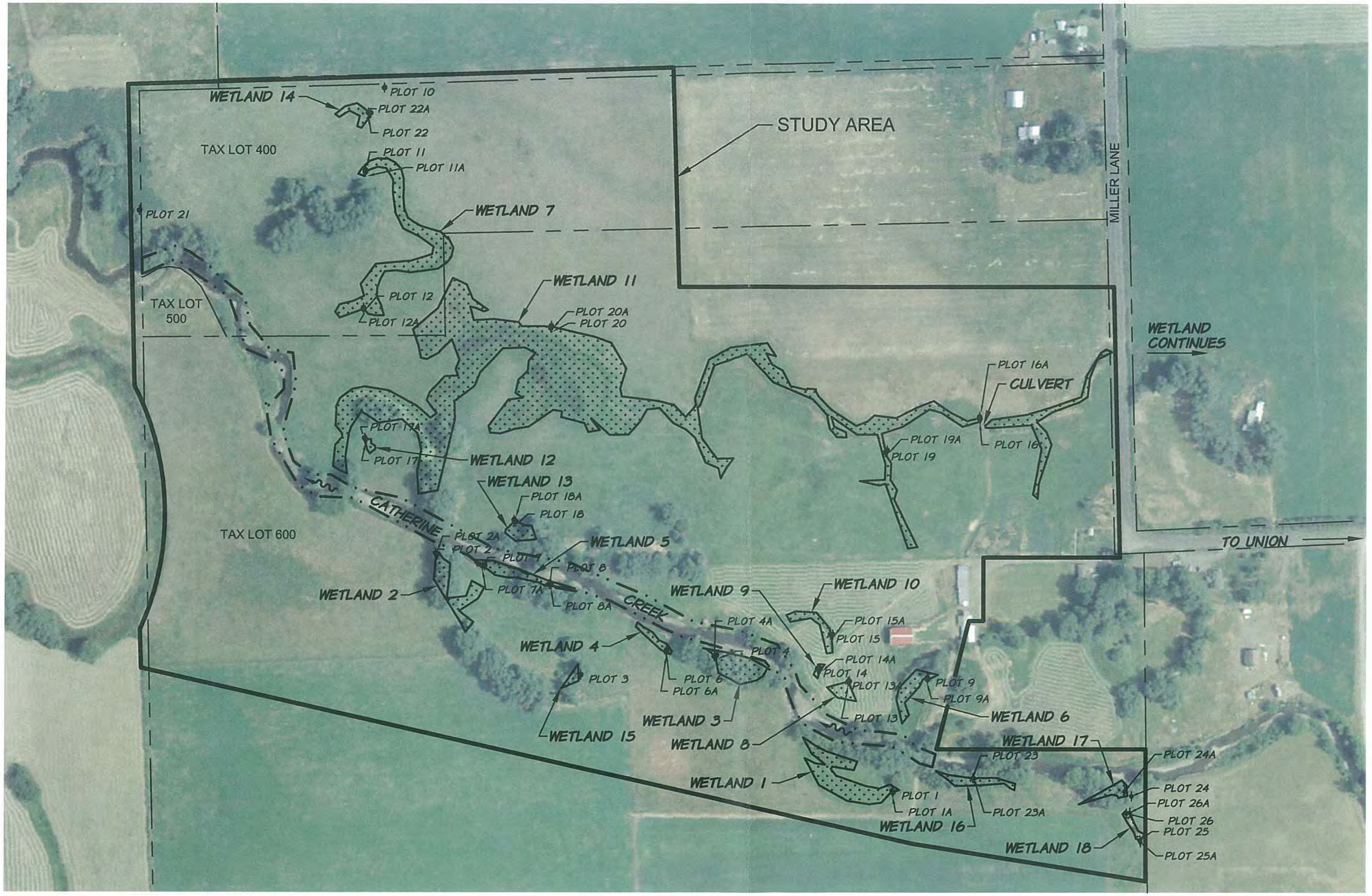
CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION

WETLAND DELINEATION REPORT

AERIAL PHOTOGRAPH - JULY 2009

FIGURE 5



N

SCALE: 1"=300'

T4S R39E SEC 16 WM

NOTE:
WETLAND BOUNDARIES, SAMPLE PLOT LOCATIONS, AND ORDINARY HIGH WATER BOUNDARIES SURVEYED WITH A RESOURCE-GRADE GPS UNIT TO SUBMETER STANDARDS.

LEGEND

ORDINARY HIGH WATER (OHWE)

WETLAND AREA

300 0 300 600 900

SCALE IN FEET

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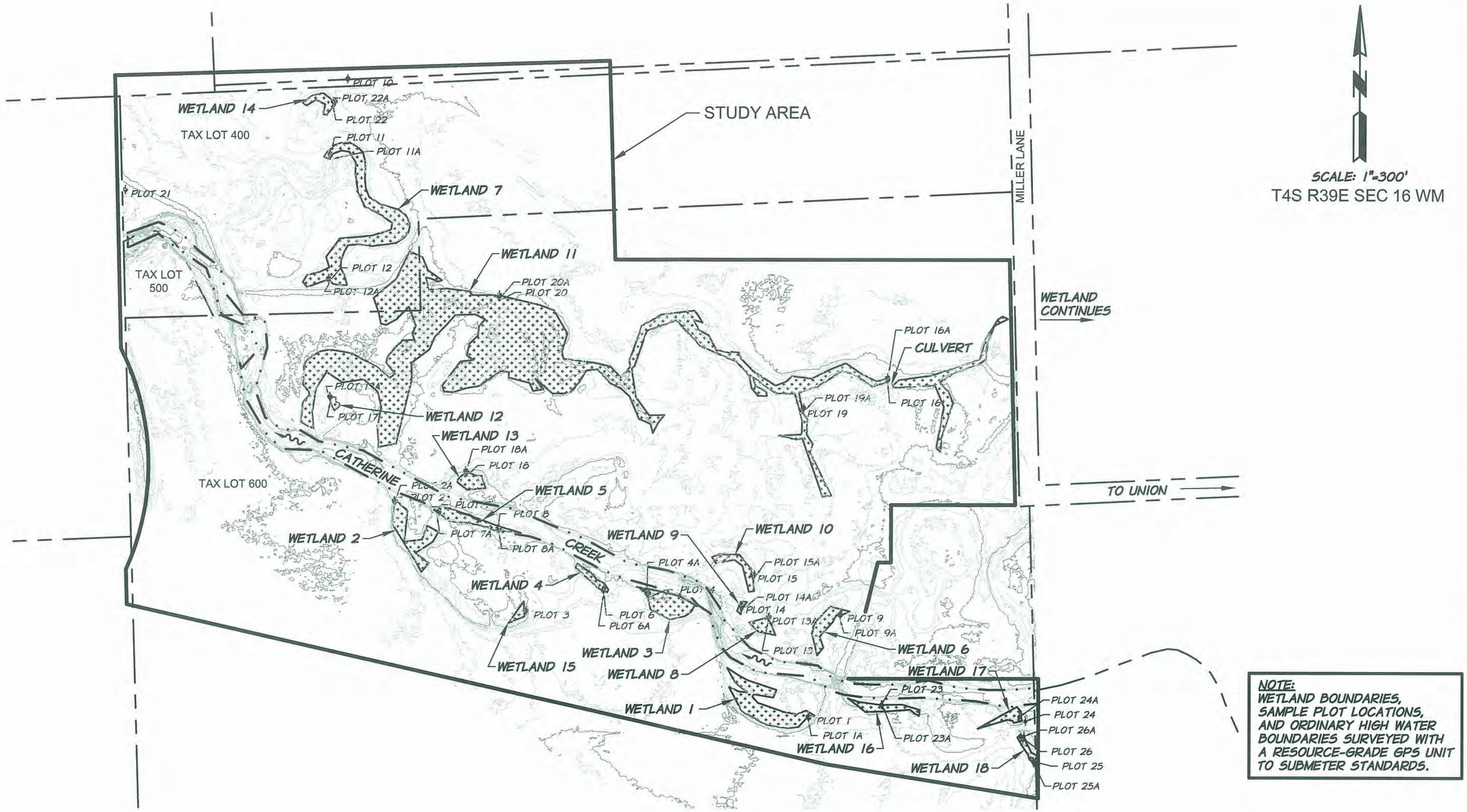
CATHERINE CREEK (CC-37) MEANDERING RECONSTRUCTION
WETLAND DELINEATION REPORT

WETLAND STUDY AREAS

FIGURE

6A



NOTE:
WETLAND BOUNDARIES, SAMPLE PLOT LOCATIONS, AND ORDINARY HIGH WATER BOUNDARIES SURVEYED WITH A RESOURCE-GRADE GPS UNIT TO SUBMETER STANDARDS.

LEGEND

— · — · — ORDINARY HIGH WATER (OHWE)

WETLAND AREA

300 0 300 600 900
SCALE IN FEET

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U.S. BUREAU OF RECLAMATION
CATHERINE CREEK (CC-37) MEANDERING RECONSTRUCTION
WETLAND DELINEATION REPORT

WETLAND STUDY AREAS

FIGURE
6B

Appendix B

Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/7/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 1

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	**Is the Sampled Area**		
Wetland Hydrology Present?	Yes ☒	No ☐	**within a Wetland?**	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. box elder *(Acer negundo)*	10	N	FAC
2.			
3.			
4.			
	10	= Total Cover	
Sapling.Shrub Stratum (plot size= m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. Canada thistle *(Cirsium arvense)*	2	N	FACU
2. common rush *(Juncus effusus)*	90	Y	FACW
3. tall fescue *(Schedonorus phoenix)*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
	102	= Total Cover	
Vine Stratum (plot size= m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	97	10YR 4/6	3	C	M	silty clay loam	
8-12	10YR 3/2	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ______

Water Table Present? Yes ☐ No ☒ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ______

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/7/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 1A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. boxelder *(Acer negundo)*	20	Y	FAC
2.			
3.			
4.			
	20	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. tall fescue *(Schedonorus phoenix)*	90	Y	FAC
2. Canada thistle *(Cirsium arvense)*	2	N	FACU
3. common rush *(Juncus effusus)*	5	N	FACW
4. white clover *(Trifolium repens)*	5	N	FAC
5.			
6.			
7.			
8.			
	102	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 1A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-22	10RY 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/7/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 2

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland? Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	70	Y	FACW
2.			
3.			
4.			
	70	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. quackgrass *(Agropyron repens)*	80	Y	FAC
2. spotted ladysthumb *(Polygonum persicaria)*	20	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A= ____

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					silty clay loam	
4-14	10YR 3/2	90	10YR 4/6	10	C	M/PL	ailty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/7/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 2A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☐	No ☒	**Is the Sampled Area**		
Wetland Hydrology Present?	Yes ☐	No ☒	**within a Wetland?**	**Yes** ☐	**No** ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	70	Y	FACW
2.			
3.			
4.			
	70	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	80	Y	FAC
2. Canada thistle *(Cirsium arvense)*	20	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species □□□t Are OBL, FACW, or 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

SOIL

Sampling Point: 2A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/2	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/7/11

Applicant/Owner: U. S. Bureau of Reclamation State: OR Sampling Point: 3

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	90	Y	FACW
2.			
3.			
4.			
	90	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. curly dock *(Rumex crispus)*	10	N	FAC
2. fowl bluegrass *(Poa palustris)*	90	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					silty clay loam	
4-14	10YR 3/2	95	10YR 4/6	5	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction ˇity/County: Union / Union County Sampling Date: 9/7/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 3A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland? Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (plot size=25 m²)			
1. Pacific willow *(Salix lucida ssp. lasiandra)*	90	Y	FACW
2.			
3.			
4.			
	90	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	95	Y	FAC
2. Canada thistle *(Cirsium arvense)*	5	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 3A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	99	10YR 4/6	1	C	M	silty clay loam	
8-14	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☐ No ☒ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 4

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	30	Y	FACW
2.			
3.			
4.			
	30	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	90	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	90	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	10YR 3/2	100					silty clay loam	
2-14	10YR 3/1	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 4A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒	**Is the Sampled Area**	
Wetland Hydrology Present?	Yes ☐	No ☒	**within a Wetland?**	Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (plot size=25 m^2)			
1. Pacific willow *(Salix lucida ssp. lasiandra)*	30	Y	FACW
2.			
3.			
4.			
	30	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. quackgrass *(Elymus repens)*	90	Y	FAC
2. fowl bluegrass *(Poa palustris)*	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 4A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/3	100					silty clay loam	
2-16	10YR 3/2	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☐ No ☒ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 5

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. quackgrass (*Elymus repens)*	90	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	90	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					silty clay loam	
6-14	10YR 3/2	95	10YR 4/6	5	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 5A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. quackgrass *(Elymus repens)*	100	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 5A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					silty clay loam	
8-16	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 6

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	Is the Sampled Area within a Wetland? Yes ☒ No ☐
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. common spikerush *(Eleocharis palustris)*	40	Y	OBL
2. fowl bluegrass *(Poa palustris)*	40	Y	FAC
3. creeping buttercup *(Ranunculus repens)*	5	N	FACW
4. white clover *(Trifolium repens)*	5	N	FAC
5. meadow foxtail *(Alopecurus pratensis)*	10	N	FACW
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100					silty clay loam	
5-10	10YR 3/1	93	10YR 4/6	7	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

pit was not excavated deeper because hydric soil characteristics were met witihin 10"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 6A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. meadow foxtail *(Alopecurus pratensis)*	95	Y	FACW
2. common spikerush *(Eleocharis palustris)*	3	N	OBL
3. white clover *(Trifolium repens)*	3	N	FAC
4. creeping buttercup *(Ranunculus repens)*	2	N	FACW
5. Canada thistle *(Cirsium arvense)*	2	N	FACU
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 6A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-17	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ______

Water Table Present? Yes ☐ No ☒ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ______

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 7

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	70	Y	FACW
2.			
3.			
4.			
	70	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. creeping buttercup *(Ranunculus repens)*	20	Y	FACW
2. common rush *(Juncus effusus)*	20	Y	FACW
3. reed canarygrass *(Phalaris arundinacea)*	50	Y	FACW
4. panicled bulrush *(Scirpus microcarpus)*	10	N	OBL
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/2	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (inches):	8	

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 7A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a Wetland?	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	70	Y	FACW
2.			
3.			
4.			
	70	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. Canada thistle *(Cirsium arvense)*	20	Y	FACU
2. tall fescue *(Schedonorus phoenix)*	80	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 7A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	100					silty clay loam	
4-14	10YR 3/3	97	10YR 4/6	3	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ____

Water Table Present? Yes ☐ No ☒ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ____

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 8

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	
Hydric Soil Present?	Yes ☒ No ☐	Is the Sampled Area
Wetland Hydrology Present?	Yes ☒ No ☐	within a Wetland? Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	70	Y	FACW
2.			
3.			
4.			
	70	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. tall fescue *(Schedonorus phoenix)*	95	Y	FAC
2. reed canarygrass *(Phalaris arundinacea)*	5	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A= ______

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100					silty clay loam	
5-10	10YR 3/2	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ☒ No ☐

Remarks:

pit was not excavated deeper because hydric soil characteristics were met witihin 10"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ________

Water Table Present? Yes ☐ No ☒ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ________

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 8A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lucida ssp. lasiandra)*	70	Y	FACW
2.			
3.			
4.			
	70	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. tall fescue *(Schedonorus phoenix)*	90	Y	FAC
2. reed canarygrass *(Phalaris arundinacea)*	10	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 8A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 4/3	95	10YR 4/6	5	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ________

Water Table Present? Yes ☐ No ☒ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ________

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 9

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐		
Hydric Soil Present? Yes ☒ No ☐	Is the Sampled Area	
Wetland Hydrology Present? Yes ☒ No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *Salix lucida ssp. lasiandra)*	80	Y	FACW
2.			
3.			
4.			
	80	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. quackgrass *(Elymus repens)*	100	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A= ____

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	100					silty clay loam	
4-12	10YR 4/2	95	10YR 4/6	5	C	M/PL	silty clay loam	
12-15	10YR 3/2	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 9A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *Salix lucida ssp. lasiandra)*	80	Y	FACW
2.			
3.			
4.			
	80	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. quackgrass *(Elymus repens)*	100	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 9A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 4/3	100					silty clay loam	small amt. gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

gravel and rock below 8 inches; could not dig deeper

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 10

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. quackgrass *(Elymus repens)*	75	Y	FAC
2. prickly lettuce *(Lactuca serriola)*	10	N	FACU
3. broadleaved cattail *(Typha latifolia)*	5	N	OBL
4. Canada thistle *(Cirsium arvense)*	5	N	FACU
5. curly dock *(Rumex crispus)*	5	N	FAC
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/3	100					silty clay loam	
15-20	10YR 3/2	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):		

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 11

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	70	Y	FAC
2. broadleaved cattail *(Typha latifolia)*	5	N	OBL
3. American waterplantain *(Alisma subcordatum)*	10	N	OBL
4.			
5.			
6.			
7.			
8.			
	85	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 15 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A= ______

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					silty clay loam	
8-14	10YR 3/1	95	10YR 4/6	5	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☒ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):
Water Table Present?	Yes ☐	No ☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (inches): 8

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 11A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	Is the Sampled Area within a Wetland?	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. cheatgrass *(Bromus tectorum)*	50	Y	UPL*
2. quackgrass *(Elymus repens)*	10	N	FAC
3. Canada thistle *(Cirsium arvense)*	30	Y	FACU
4. white clover *(Trifolium repens)*	10	N	FAC
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species	20	X3=	60
FACU species	30	X4=	120
UPL species	50	X5=	250
Column Totals:	100 (A)		430 (B)

Prevalence Index= B/A= 4.3

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:
UPL* indicator means that the plant species is not listed in the "1988 National List of Plant Species that Occur in Wetlands, Region 9 List," or the "1993 Supplement to the 1988 Region 9 List," and is assumed to be an UPL species, per the 2008 Arid West Regional Supplement guidelines.

SOIL

Sampling Point: 11A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-10	10YR 3/2	100					silty clay loam	
10-22	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 12

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a Wetland?	Yes ☒ No ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. common rush *(Juncus effusus)*	70	Y	FACW
2. panicled bulrush *(Scirpus microcarpus)*	20	Y	OBL
3. curly dock *(Rumex crispus)*	1	N	FAC
4. broadleaved cattail *(Typha latifolia)*	5	N	OBL
5. meadow foxtail *(Alopecurus pratensis)*	5	N	FACW
6.			
7.			
8.			
	101	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					silty clay loam	
8-16	10YR 3/2	95	10YR 4/6	5	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):		

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/8/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 12A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
= Total Cover			
Herb Stratum (plot size=4 m²)			
1. cheatgrass *(Bromus tectorum)*	70	Y	UPL*
2. meadow foxtail *(Alopecurus pratensis)*	15	N	FACW
3. Canada thistle *(Cirsium arvense)*	5	N	FACU
4. white clover *(Trifolium repens)*	5	N	FAC
5. creeping buttercup *(Ranunculus repens)*	5	N	FACW
6.			
7.			
8.			
= Total Cover	100		
Vine Stratum (plot size=4 m²)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species	20	X2=	40
FAC species	5	X3=	15
FACU species	5	X4=	20
UPL species	70	X5=	350
Column Totals:	100 (A)		425 (B)

Prevalence Index= B/A= 4.3

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:
UPL* indicator means that the plant species is not listed in the "1988 National List of Plant Species that Occur in Wetlands, Region 9 List," or the "1993 Supplement to the 1988 Region 9 List," and is assumed to be an UPL species, per the 2008 Arid West Regional Supplement guidelines.

SOIL

Sampling Point: 12A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 4/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ______

Water Table Present? Yes ☐ No ☒ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ______

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 13

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. common spikerush *(Eleocharis palustris)*	50	Y	OBL
2. broadleaved cattail *(Typha latifolia)*	20	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
	70	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A= ______

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):		

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 13A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a Wetland?	Yes ☐	No ☒
Hydric Soil Present?	Yes ☐	No ☒			
Wetland Hydrology Present?	Yes ☐	No ☒			

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass (*Poa palustris*)	100	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 13A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11
Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 14
Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0
Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83
Soil Map Unit Name: Catherine silt loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	**Is the Sampled Area**	
Wetland Hydrology Present?	Yes ☒	No ☐	**within a Wetland?**	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. common spikerush *(Eleocharis palustris)*	40	Y	OBL
2. fowl bluegrass *(Poa palustris)*	30	Y	FAC
3. common rush *(Juncus effusus)*	30	Y	FACW
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					silty clay loam	
4-12	10YR 3/2	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☐ No ☒ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 14A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	40	Y	FAC
2. white clover *(Trifolium repens)*	10	N	FAC
3. Canada thistle *(Cirsium arvense)*	50	Y	FACU
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species	50	X3=	150
FACU species	50	X4=	200
UPL species		X5=	
Column Totals:	100 (A)		350 (B)

Prevalence Index= B/A= 3.5

Hydrophytic Vegetation Indicators:

☐ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 14A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					silty clay loam	
4-10	10YR 3/4	99	10YR 4/6	1	C	M	silty clay loam	
10-16	10YR 3/1	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ______

Water Table Present? Yes ☐ No ☒ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ______

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 15

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐		
Hydric Soil Present? Yes ☒ No ☐	Is the Sampled Area	
Wetland Hydrology Present? Yes ☒ No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. common rush *(Juncus effusus)*	60	Y	FACW
2. broadleaved cattail *(Typha latifolia)*	10	N	OBL
3. Nebraska sedge *(Carex nebrascensis)*	20	Y	OBL
4. curly dock *(Rumex criapus)*	10	N	FAC
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A= ______

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-7	10YR 3/2	95	10YR 4/6	5	C	M/PL	silty clay loam	
7-14	10YR 3/1	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (inches): 8		

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 15A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. tall fescue *(Schedonorus phoenix)*	85	Y	FAC
2. white clover *(Trifolium repens)*	15	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 15A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-14	10YR 3/1	100					silty clay loam	
14-16	10YR 3/1	95	10YR 4/6	5	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☐ No ☒ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 16

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: La Grande silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. quackgrass *(Elymus repens)*	30	Y	FAC
2. common rush *(Juncus effusus)*	30	Y	FACW
3. Nebraska sedge *(Carex nebrascensis)*	30	Y	OBL
4. spotted ladysthumb *(Polygonum persicaria)*	10	N	FACW
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					silty clay loam	
8-16	10YR 3/1	95	10YR 4/6	5	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (inches):	9	

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 16A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: La Grande silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	
Hydric Soil Present?	Yes ☐ No ☒	Is the Sampled Area
Wetland Hydrology Present?	Yes ☐ No ☒	within a Wetland? Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. Canada thistle *(Cirsium arvense)*	20	Y	FACU
2. quackgrass *(Elymus repens)*	70	Y	FAC
3. curly dock *(Rumex crispus)*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species	80	X3= 240
FACU species	20	X4= 80
UPL species		X5=
Column Totals:	100 (A)	320 (B)

Prevalence Index= B/A= 3.2

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 16A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					silty clay loam	
12-16	10YR 3/1	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 17

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. meadow foxtail *(Alopecurus pratensis)*	5	N	FACW
2. common rush *(Juncus effusus)*	90	Y	FACW
3. curly dock *(Rumex crispus)*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
	105	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/1	93	10YR 4/6	7	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches): 9

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 17A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒
Hydric Soil Present?	Yes ☐	No ☒
Wetland Hydrology Present?	Yes ☐	No ☒

Is the Sampled Area within a Wetland? Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. tall fescue *(Schedonorus phoenix)*	50	Y	FAC
2. prickly lettuce *(Lactuca serriola)*	25	Y	FACU
3. Canada thistle *(Cirsium arvense)*	25	Y	FACU
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species	50	X3=	150
FACU species	50	X4=	200
UPL species		X5=	
Column Totals:	100 (A)		350 (B)

Prevalence Index= B/A= 3.5

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 17A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 18

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐				
Hydric Soil Present?	Yes	☒	No	☐	**Is the Sampled Area**			
Wetland Hydrology Present?	Yes	☒	No	☐	**within a Wetland?**	Yes ☒	No ☐	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. reed canarygrass *(Phalaris arundinacea)*	30	Y	FACW
2. quackgrass *(Elymus repens)*	70	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A= ______

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	93	10YR 4/6	7	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/9/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 18A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐
Hydric Soil Present?	Yes ☐	No ☒
Wetland Hydrology Present?	Yes ☐	No ☒

Is the Sampled Area within a Wetland? Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. reed canarygrass *(Phalaris arundinacea)*	30	Y	FACW
2. quackgrass *(Elymus repens)*	70	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 18A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-20	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (**C9**)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☐ No ☒ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/22/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 19

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. common rush *(Juncus effusus)*	75	Y	FACW
2. meadow foxtail *(Alopecurus pratensis)*	20	Y	FACW
3. curly dock *(Rumex crispus)*	5	N	FAC
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 19

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/1	95	10YR 4/6	5	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ______

Water Table Present? Yes ☐ No ☒ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches): 3

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/22/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 19A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐	Is the Sampled Area within a Wetland?	Yes ☐ No ☒
Hydric Soil Present? Yes ☐ No ☒		
Wetland Hydrology Present? Yes ☐ No ☒		

Remarks:

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. tall fescue *(Schedonorus phoenix)*	50	Y	FAC
2. quackgrass *(Elymus repens)*	50	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 19A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 2/2	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):		

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/22/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 20

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐		
Hydric Soil Present? Yes ☒ No ☐	Is the Sampled Area	
Wetland Hydrology Present? Yes ☒ No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. reed canarygrass *(Phalaris arundinacea)*	30	Y	FACW
2. common rush *(Juncus effusus)*	50	Y	FACW
3. Nebraska sedge *(Carex nebrascensis)*	20	Y	OBL
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☒ No ☐ Depth (inches): 12
Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches): 9

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/22/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 20A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. reed canarygrass *(Phalaris arundinacea)*	40	Y	FACW
2. quackgrass *(Elymus repens)*	50	Y	FAC
3. common rush *(Juncus effusus)*	10	N	FACW
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 20A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2	100					silty clay loam	
9-16	10YR 3/3	99	10YR 4/6	1	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (**C9**)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/22/11

Applicant/Owner: U. S. Bureau of Reclamation State: OR Sampling Point: 21

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒
Hydric Soil Present?	Yes ☐	No ☒
Wetland Hydrology Present?	Yes ☐	No ☒

Is the Sampled Area within a Wetland? Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m^2)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pacific willow *(Salix lasiandra)*	50	Y	FACW
2.			
3.			
4.			
	50	= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. quackgrass *(Elymus repens)*	30	Y	FAC
2. Canada thistle *(Cirsium arvense)*	35	Y	FACU
3. prickly lettuce *(Lactuca serriola)*	35	Y	FACU
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species	50	X2=	100
FAC species	30	X3=	90
FACU species	70	X4=	280
UPL species		X5=	
Column Totals:	150 (A)		470 (B)

Prevalence Index= B/A= 3.1

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 21

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/3	100					silty clay loam	
6-15	10YR 3/3	60					silty clay loam	
(same)	10 YR 4/3	40					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/22/11
Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 22
Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0
Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83
Soil Map Unit Name: Catherine silt loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a Wetland?	Yes ☒ No ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. broadleaved cattail *(Typha latifolia)*	30	Y	OBL
2. American water plantain *(Alisma subcordatum)*	20	Y	OBL
3. spotted ladysthumb *(Polygonum persicaria)*	10	N	FACW
4. curly dock *(Rumex crispus)*	30	Y	FAC
5. tall fescue *(Schedonorus phoenix)*	10	N	FAC
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:	(A)		(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	98	10YR 4/6	2	C	M	silty clay loam	
4-14	10YR 3/2	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches):
Surface Water Present?	☐	☒	
Water Table Present?	☐	☒	
Saturation Present? (includes capillary fringe)	☐	☒	

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 9/22/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 22A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. tall fescue *(Elymus repens)*	30	Y	FAC
2. prickly lettuce *(Lactuca serriola)*	30	Y	FACU
3. Canada thistle *(Cirsium arvense)*	40	Y	FACU
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species	30	X3=	90
FACU species	70	X4=	280
UPL species		X5=	
Column Totals:	100 (A)		370 (B)

Prevalence Index= B/A= 3.7

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 22A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/3	100					silty clay loam	
9-17	10YR 3/3	98	10YR 4/6	2	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):		

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 23

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	95	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	95	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	X1=	
FACW species	X2=	
FAC species	X3=	
FACU species	X4=	
UPL species	X5=	
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	99	10YR 4/6	1	C	M	silty clay loam	
2-8	10YR 3/2	95	10YR 4/6	5	C	M/PL	silty clay loam	
8-12	10YR 3/2	80	10YR 4/6	20	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (LRR C)
- ☐ 2 cm Muck (A10) (LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (Nonriverine)
- ☐ Sediment Deposits (B2) (Nonriverine)
- ☐ Drift Deposits (B3) (Nonriverine)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
- ☐ Sediment Deposits (B2) (Riverine)
- ☐ Drift Deposits (B3) (Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☐ No ☒ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 23A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass (*Poa palustris*)	95	Y	FAC
2. Canada thistle (*Cirsium arvense*)	5	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 23A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/3	100					silty clay loam	
8-12	10YR 3/2	100					silty clay loam	
12-16	10YR 3/2	95	10YR 4/6	5	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):
Water Table Present? Yes ☐ No ☒ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 24

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☒	No ☐	**Is the Sampled Area**		
Wetland Hydrology Present?	Yes ☒	No ☐	**within a Wetland?**	Yes ☒	No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	90	Y	FAC
2. reed canarygrass *(Phalaris arundinacea)*	10	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 24

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					silty clay loam	
4-8	10YR 3/2	95	10YR 3/2	5	C	M/PL	silty clay loam	
8-16	10YR 3/2	90	10YR 4/6	10	C	</PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ________

Water Table Present? Yes ☐ No ☒ Depth (inches): ________

Saturation Present? Yes ☐ No ☒ Depth (inches): ________
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 24A

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

□□□e Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. fowl bluegrass *(Poa palustris)*	60	Y	FAC
2. Canada thistle *(Cirsium arvense)*	40	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species	60	X3=	180
FACU species	40	X4=	160
UPL species		X5=	
Column Totals:	100 (A)		340 (B)

Prevalence Index= B/A= 3.4

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: 24A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 4/3	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ☐ No ☒

Remarks:

unable to dig below 8" due to gravel/cobble

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): ______

Water Table Present? Yes ☐ No ☒ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): ______

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 25

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐				
Hydric Soil Present?	Yes	☒	No	☐	Is the Sampled Area			
Wetland Hydrology Present?	Yes	☒	No	☐	within a Wetland?	Yes ☒		No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. reed canarygrass *(Phalaris arundinacea)*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		X1=	
FACW species		X2=	
FAC species		X3=	
FACU species		X4=	
UPL species		X5=	
Column Totals:		(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 25

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100					silty clay loam	
2-14	10YR 2/1	90	10YR 4/6	10	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches): 6

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11
Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 25A
Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat Slope (%): 0
Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83
Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland? Yes ☐ No ☒

Remarks:

VEGETATION – Use scientific names of plants

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m^2)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m^2)			
1. reed canarygrass *(Phalaris arundinacea)*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m^2)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 25A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					silty clay loam	
8-16	10YR 3/3	100					silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? Yes ☐ No ☒ Depth (inches):
(includes capillary fringe)

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11

Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 26

Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83

Soil Map Unit Name: Catherine silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	Is the Sampled Area	
Wetland Hydrology Present?	Yes ☒	No ☐	within a Wetland?	Yes ☒ No ☐

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. common rush (*Juncus effusus*)	95	Y	FACW
2. reed canarygrass (*Phalaris arundinacea*)	5	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 100 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A=

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 26

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100					silty clay loam	
2-16	10YR 2/2	95	10YR 4/6	5	C	M/PL	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):		
Water Table Present?	Yes ☐	No ☒	Depth (inches):		
Saturation Present? (includes capillary fringe)	Yes ☒	No ☐	Depth (inches):	8	

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Catherine Creek Meander Reconstruction City/County: Union / Union County Sampling Date: 11/18/11
Applicant/Owner: U. S. Bureau of Reclamation State OR Sampling Point: 26A
Investigator(s): Sue Brady Section, Township, Range: T4S, R39E, Sec. 14
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 0
Subregion (LRR): LRR B Lat: 45.2203 Long: -117.9912 Datum: NAD83
Soil Map Unit Name: Catherine silt loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐			
Hydric Soil Present?	Yes ☐	No ☒	Is the Sampled Area		
Wetland Hydrology Present?	Yes ☐	No ☒	within a Wetland?	Yes ☐	No ☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (plot size=25 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling.Shrub Stratum (plot size=25 m²)			
1.			
2.			
3.			
4.			
5.			
6.			
		= Total Cover	
Herb Stratum (plot size=4 m²)			
1. reed canarygrass *(Phalaris arundinacea)*	5	N	FACW
2. teasel *(Dipsacus fullonum)*	20	Y	FAC
3. fowl bluegrass *(Poa palustris)*	50	Y	FAC
4. cheatgrass *(Bromus tectorum)*	25	Y	UPL*
5.			
6.			
7.			
8.			
	100	= Total Cover	
Vine Stratum (plot size=4 m²)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		X1=
FACW species		X2=
FAC species		X3=
FACU species		X4=
UPL species		X5=
Column Totals:	(A)	(B)

Prevalence Index= B/A= ______

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 26A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	100					silty clay loam	
4-10	10YR 2/2	100					silty clay loam	
10-16	10YR 2/2	99	10YR 4/6	1	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR C)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? Yes ☐ No ☒ Depth (inches):
(includes capillary fringe)

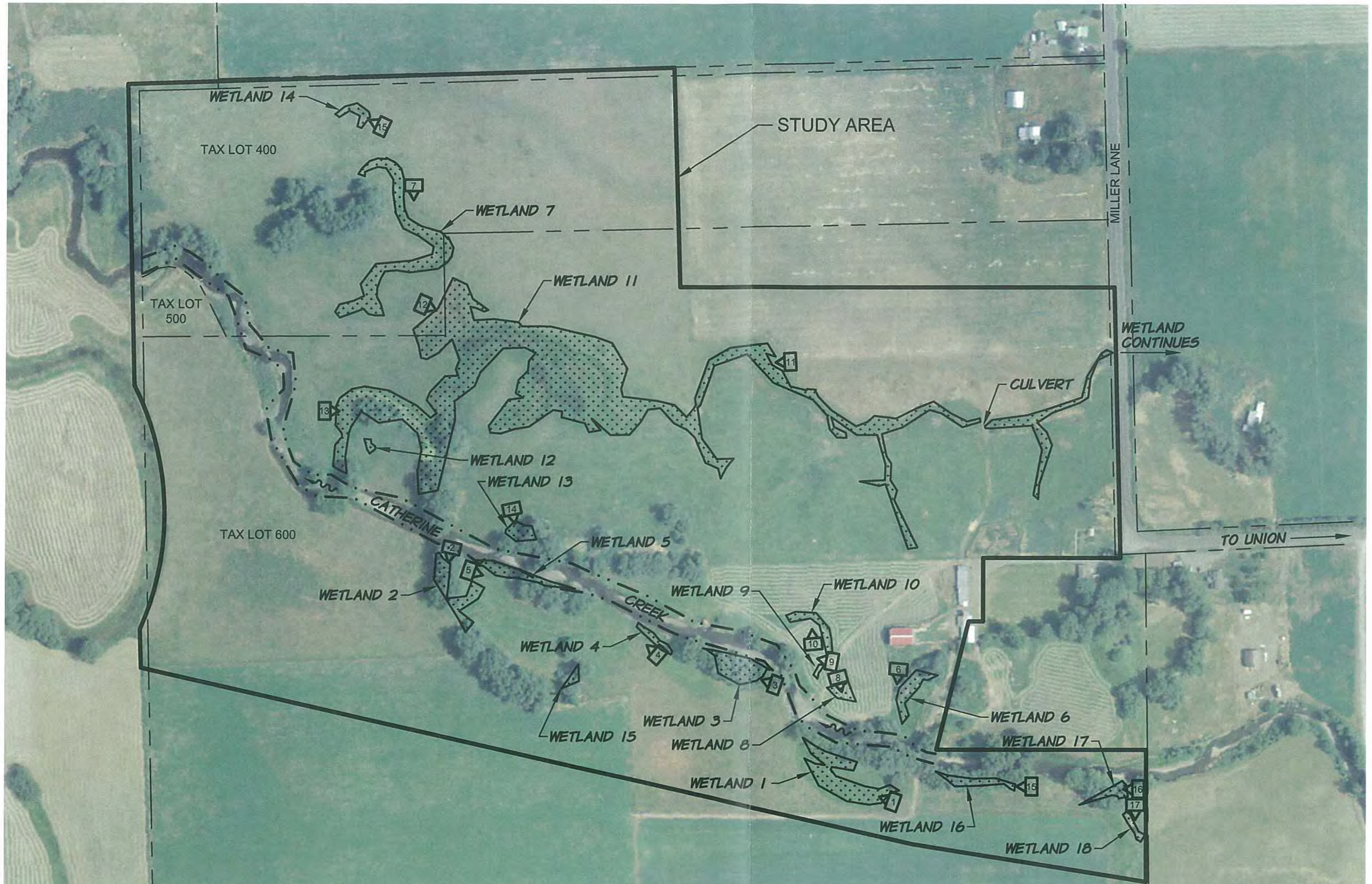
Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix C

Ground Level Color Photographs



N

SCALE: 1"=300'
T4S R39E SEC 16 WM

NOTE:
WETLAND BOUNDARIES, SAMPLE PLOT LOCATIONS, AND ORDINARY HIGH WATER BOUNDARIES SURVEYED WITH A RESOURCE-GRADE GPS UNIT TO SUBMETER STANDARDS.

LEGEND

ORDINARY HIGH WATER (OHWE)

WETLAND AREA

11 PHOTOGRAPH LOCATION AND DIRECTION

300 0 300 600 900
SCALE IN FEET

anderson perry & associates, inc.

U.S. BUREAU OF RECLAMATION
CATHERINE CREEK (CC-37) MEANDERING RECONSTRUCTION
WETLAND DELINEATION REPORT

PHOTO POINT LOCATION MAP

APPENDIX
C

Q:\BUREAU_OF_RECLAMATION\195-18 ICF CATHERINE CRK\DWG\Photo Locations.dwg, Layout1, 12/7/2011 9:51:25 AM, earntz, \\Lgprint1\FieryDoc242 PCL6

PHOTOGRAPH 1 - Wetland 1. Photograph taken by Sue Brady on September 7, 2011.

PHOTOGRAPH 2 - Wetland 2. Photograph taken by Sue Brady on September 7, 2011.

anderson perry & associates, inc.

U.S. BUREAU OF RECLAMATION
CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION
WETLAND DELINEATION REPORT

SITE PHOTOGRAPHS 1

APPENDIX C

Job# 195-18-224 Oct. 11, 2011 lbauer

PHOTOGRAPH 3 - Wetland 3. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 4 - Wetland 4. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 5 - Wetland 5. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 6 - Wetland 6. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 7 - Wetland 7. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 8 - Wetland 8. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 9 - Wetland 9. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 10 - Wetland 10. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 11 - Wetland 11. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 12 - Wetland 11. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 13 - Wetland 11. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 14 - Wetland 13. Photograph taken by Sue Brady on September 9, 2011.

PHOTOGRAPH 15 - Wetland 14. Photograph taken by Sue Brady on October 3, 2011.

PHOTOGRAPH 16 - Wetland 16. Photograph taken by Sue Brady on November 18, 2011.

PHOTOGRAPH 17 - Wetland 17. Photograph taken by Sue Brady on November 18, 2011.

PHOTOGRAPH 18 - Wetland 18. Photograph taken by Sue Brady on November 18, 2011.

anderson perry & associates, inc.

U.S. BUREAU OF RECLAMATION

CATHERINE CREEK (CC-37) MEANDER RECONSTRUCTION

WETLAND DELINEATION REPORT

SITE PHOTOGRAPHS 9

APPENDIX

C

Appendix D

Additional Tables and Information

WETS Station : LA GRANDE, OR4622 Creation Date: 09/09/2002
Latitude: 4519 Longitude: 11805 Elevation: 02750
State FIPS/County(FIPS): 41061 County Name: Union
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.) avg daily max	avg daily min	avg	Precipitation (Inches) avg	30% chance will have less than	more than	avg # of days w/.1 or more	avg total snow fall
January	37.8	23.6	30.7	1.77	1.10	2.14	5	7.8
February	43.1	26.8	35.0	1.31	0.82	1.58	4	2.8
March	51.2	30.8	41.0	1.50	1.08	1.78	5	1.5
April	58.9	35.2	47.1	1.57	1.07	1.87	5	0.4
May	67.1	41.8	54.4	1.90	1.32	2.27	5	0.0
June	75.8	48.3	62.0	1.53	1.07	1.82	4	0.0
July	85.5	53.0	69.2	0.70	0.31	0.86	2	0.0
August	85.9	51.9	68.9	0.86	0.25	1.05	2	0.0
September	76.4	43.4	59.9	0.84	0.27	1.05	2	0.0
October	63.2	35.5	49.3	1.22	0.70	1.51	3	0.1
November	46.2	30.2	38.2	2.12	1.38	2.54	6	2.4
December	38.4	24.5	31.5	1.92	1.08	2.34	5	12.0
Annual	-----	-----	-----	------	14.67	18.55	--	----
Average	60.8	37.1	48.9	------	------	------	--	----
Total	-----	-----	-----	17.25	------	------	48	27.0

GROWING SEASON DATES

Probability	Temperature 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	4/ 6 to 10/23 201 days	4/26 to 10/ 7 165 days	5/17 to 9/24 131 days
70 percent *	4/ 1 to 10/28 210 days	4/21 to 10/13 175 days	5/10 to 9/30 143 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

LA GRANDE, OREGON (354622)

Period of Record Monthly Climate Summary

Period of Record : 9/ 1/1965 to 12/31/2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	38.0	43.2	51.1	58.4	67.4	75.7	86.0	85.9	76.4	62.5	46.6	38.3	60.8
Average Min. Temperature (F)	24.2	26.6	30.6	35.0	41.8	48.6	53.6	52.0	43.9	35.4	30.2	24.6	37.2
Average Total Precipitation (in.)	1.83	1.26	1.47	1.52	1.88	1.48	0.64	0.83	0.79	1.27	1.98	1.84	16.80
Average Total SnowFall (in.)	7.0	3.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.1	2.1	5.8	19.9
Average Snow Depth (in.)	1	0	0	0	0	0	0	0	0	0	0	1	0

Percent of possible observations for period of record.
Max. Temp.: 98.3% Min. Temp.: 97.9% Precipitation: 98.2% Snowfall: 97.4% Snow Depth: 95.7%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Monthly Totals/Averages
Precipitation (inches)
Year: 2011

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2011	2.67	0.69	2.13	1.26	1.75	1.67	0.50	0.00	0.11	2.07	0.87	-	13.72

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 24, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	87	84	99 in 1966	75
Min Temperature	54	51	36 in 1992	42
Avg Temperature	70.5	67	81.0 in 1969	58.5
Precipitation	0.00	0.03	0.42 in 1989	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	2	15 in 2009	6
CDD (base 65)	6	4	16 in 1970+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	85.3	86.5	95.3 in 1977	84.4
Avg Min Temperature	50.4	53.1	47.2 in 1985	54.1
Avg Temperature	67.9	69.8	75.4 in 1977	69.2
Total Precipitation	0.00	0.66	2.94 in 1976	0.27
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	15	26	90 in 1968	16
Total CDD	91	139	257 in 1977	124

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 25, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	91	84	101 in 1966	87
Min Temperature	57	51	34 in 1980	44
Avg Temperature	74.0	67	82.5 in 1966	65.5
Precipitation	0.00	0.02	0.29 in 1989	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	2	11 in 1993	0
CDD (base 65)	9	4	18 in 1966	1

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	85.6	86.4	94.2 in 1977	84.5
Avg Min Temperature	50.6	53.0	47.4 in 1985	53.7
Avg Temperature	68.1	69.7	74.7 in 1977	69.1
Total Precipitation	0.00	0.68	2.94 in 1976	0.27
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	15	28	90 in 1968	16
Total CDD	100	143	257 in 1977	125

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 26, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	91	83	98 in 1996	95
Min Temperature	57	50	36 in 1993	51
Avg Temperature	74.0	67	77.0 in 1996	73.0
Precipitation	0.00	0.03	0.39 in 1977	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	2	14 in 1993	0
CDD (base 65)	9	4	12 in 1996	8

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	85.8	86.3	93.8 in 1971	84.9
Avg Min Temperature	50.9	52.9	47.5 in 1985	53.6
Avg Temperature	68.3	69.6	74.0 in 1977	69.2
Total Precipitation	0.00	0.71	2.94 in 1976	0.27
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	15	30	90 in 1968	16
Total CDD	109	147	257 in 1977	133

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 27, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	95	83	97 in 2001	91
Min Temperature	57	50	36 in 1976	45
Avg Temperature	76.0	67	81.0 in 2001	68.0
Precipitation	0.00	0.03	0.22 in 2004	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	2	10 in 1980	0
CDD (base 65)	11	3	16 in 2001	3

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	86.1	86.2	93.9 in 1971	85.1
Avg Min Temperature	51.1	52.7	47.8 in 1985	53.3
Avg Temperature	68.6	69.5	74.0 in 1971	69.2
Total Precipitation	0.00	0.74	2.94 in 1976	0.27
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	15	32	92 in 1968	16
Total CDD	120	150	257 in 1977	136

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 28, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	97	83	102 in 1986	60
Min Temperature	58	50	32 in 1980	45
Avg Temperature	77.5	66	82.0 in 1986	52.5
Precipitation	0.00	0.03	0.27 in 1996+	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	2	12 in 2010+	12
CDD (base 65)	13	3	17 in 1986	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	86.5	86.1	93.8 in 1971	84.2
Avg Min Temperature	51.4	52.6	47.7 in 1978	53.0
Avg Temperature	68.9	69.4	73.9 in 1971	68.6
Total Precipitation	0.00	0.77	2.94 in 1976	0.27
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	15	34	98 in 1968	28
Total CDD	133	153	264 in 1971	136

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 29, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	76	83	98 in 1998	59
Min Temperature	59	49	39 in 1969	43
Avg Temperature	67.5	66	79.0 in 1999	51.0
Precipitation	0.00	0.02	0.33 in 1966	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	2	14 in 2010	14
CDD (base 65)	3	3	14 in 1999	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	86.1	86.0	93.8 in 1971	83.3
Avg Min Temperature	51.6	52.5	47.7 in 1978	52.7
Avg Temperature	68.9	69.2	73.8 in 1971	68.0
Total Precipitation	0.00	0.79	2.94 in 1976	0.27
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	15	36	102 in 1968	42
Total CDD	136	156	272 in 1971	136

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 30, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	88	82	98 in 1967	68
Min Temperature	54	49	41 in 1993+	44
Avg Temperature	71.0	66	76.5 in 1967	56.0
Precipitation	0.00	0.03	0.40 in 1977	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	2	11 in 1966	9
CDD (base 65)	6	3	12 in 1967	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	86.2	85.8	93.7 in 1971	82.8
Avg Min Temperature	51.7	52.4	47.8 in 1969	52.4
Avg Temperature	69.0	69.1	73.8 in 1971	67.6
Total Precipitation	0.00	0.82	2.94 in 1976	0.27
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	15	38	102 in 1968	51
Total CDD	142	159	280 in 1971	136

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Aug 31, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	79	82	97 in 1998+	58
Min Temperature	47	49	36 in 2006	43
Avg Temperature	63.0	65	77.5 in 2007+	50.5
Precipitation	0.00	0.03	1.90 in 1984	0.05
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	2	2	16 in 1977	14
CDD (base 65)	0	3	13 in 2007+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	86.0	85.7	93.5 in 1971	82.0
Avg Min Temperature	51.5	52.3	47.7 in 1969	52.1
Avg Temperature	68.8	69.0	73.8 in 1967	67.0
Total Precipitation	0.00	0.85	2.94 in 1976	0.32
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	17	40	102 in 1968	65
Total CDD	142	162	285 in 1971	136

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 1, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	69	82	98 in 1967	67
Min Temperature	46	49	34 in 1999	46
Avg Temperature	57.5	65	78.0 in 1967	56.5
Precipitation	0.00	0.02	0.18 in 2010	0.18
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	7	3	16 in 1999	8
CDD (base 65)	0	3	13 in 1967	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	69.0	81.5	98.0 in 1967	67.0
Avg Min Temperature	46.0	48.6	34.0 in 1999	46.0
Avg Temperature	57.5	65.0	78.0 in 1967	56.5
Total Precipitation	0.00	0.02	0.18 in 2010	0.18
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	7	3	16 in 1999	8
Total CDD	0	3	13 in 1967	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 2, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	75	81	100 in 1998	70
Min Temperature	41	48	33 in 2008	43
Avg Temperature	58.0	65	79.5 in 1997	56.5
Precipitation	0.00	0.02	0.41 in 1971	0.06
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	7	3	15 in 2008	8
CDD (base 65)	0	3	15 in 1997	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	72.0	81.3	98.5 in 1998	68.5
Avg Min Temperature	43.5	48.5	35.5 in 1999	44.5
Avg Temperature	57.8	64.8	77.8 in 1987	56.5
Total Precipitation	0.00	0.04	0.57 in 1971	0.24
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	14	6	28 in 1971	16
Total CDD	0	6	26 in 1987	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 3, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	80	81	99 in 1998	81
Min Temperature	42	48	34 in 1975	46
Avg Temperature	61.0	64	76.5 in 1995	63.5
Precipitation	0.00	0.03	0.08 in 2004	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	4	3	15 in 2000	1
CDD (base 65)	0	2	12 in 1995	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	74.7	81.2	98.7 in 1998	72.7
Avg Min Temperature	43.0	48.3	35.7 in 1999	45.0
Avg Temperature	58.8	64.7	75.3 in 1998	58.8
Total Precipitation	0.00	0.07	0.63 in 1971	0.24
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	18	9	40 in 1999	17
Total CDD	0	8	32 in 1998	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 4, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	87	81	100 in 1998	78
Min Temperature	40	48	36 in 1971	55
Avg Temperature	63.5	64	76.5 in 1998	66.5
Precipitation	0.00	0.02	0.71 in 1970	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	1	3	14 in 1969	0
CDD (base 65)	0	2	12 in 1998	2

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	77.8	81.0	99.0 in 1998	74.0
Avg Min Temperature	42.2	48.1	36.5 in 1999	47.5
Avg Temperature	60.0	64.5	75.6 in 1998	60.8
Total Precipitation	0.00	0.09	0.71 in 1970	0.24
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	12	48 in 1999	17
Total CDD	0	10	44 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 5, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	88	80	100 in 1998	74
Min Temperature	45	47	33 in 1969	40
Avg Temperature	66.5	64	78.0 in 2003+	57.0
Precipitation	0.00	0.02	0.74 in 2000	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	3	12 in 1969	8
CDD (base 65)	2	2	13 in 2003+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	79.8	80.8	99.2 in 1998	74.0
Avg Min Temperature	42.8	47.9	38.2 in 1999	46.0
Avg Temperature	61.3	64.4	76.1 in 1998	60.0
Total Precipitation	0.00	0.11	0.89 in 1970	0.24
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	15	51 in 1999	25
Total CDD	2	12	57 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 6, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	77	80	97 in 1998	71
Min Temperature	53	47	34 in 1969	36
Avg Temperature	65.0	63	80.0 in 1966	53.5
Precipitation	0.00	0.03	0.52 in 1978	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	4	13 in 2000+	11
CDD (base 65)	0	2	15 in 1966	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	79.3	80.7	98.8 in 1998	73.5
Avg Min Temperature	44.5	47.8	39.3 in 1975	44.3
Avg Temperature	61.9	64.2	76.2 in 1998	58.9
Total Precipitation	0.00	0.14	0.93 in 2000	0.24
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	19	59 in 2000	36
Total CDD	2	14	69 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 7, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	90	80	96 in 1998	62
Min Temperature	49	47	29 in 1992	46
Avg Temperature	69.5	63	78.0 in 1998	54.0
Precipitation	0.00	0.02	0.72 in 1978	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	4	19 in 1992	11
CDD (base 65)	5	2	13 in 1998	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	80.9	80.5	98.4 in 1998	71.9
Avg Min Temperature	45.1	47.6	39.4 in 1969	44.6
Avg Temperature	63.0	64.1	76.4 in 1998	58.2
Total Precipitation	0.00	0.16	1.37 in 1970	0.24
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	23	70 in 2000	47
Total CDD	7	16	82 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 8, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	86	79	97 in 1981	75
Min Temperature	51	46	34 in 1976	48
Avg Temperature	68.5	63	74.5 in 1979	61.5
Precipitation	0.00	0.02	0.29 in 1998	0.04
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	4	14 in 1978+	3
CDD (base 65)	4	2	10 in 1979	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	81.5	80.3	95.6 in 1998	72.2
Avg Min Temperature	45.9	47.5	39.5 in 1969	45.0
Avg Temperature	63.7	63.9	75.6 in 1998	58.6
Total Precipitation	0.00	0.18	1.59 in 1970	0.28
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	27	76 in 2000	50
Total CDD	11	18	87 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 9, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	91	79	92 in 1981+	61
Min Temperature	50	46	31 in 1970	50
Avg Temperature	70.5	62	72.5 in 2006+	55.5
Precipitation	0.00	0.01	0.41 in 2003	0.02
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	4	19 in 1985	9
CDD (base 65)	6	2	8 in 2006+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	82.6	80.2	94.2 in 1998	71.0
Avg Min Temperature	46.3	47.3	39.9 in 1999	45.6
Avg Temperature	64.4	63.7	74.8 in 1998	58.3
Total Precipitation	0.00	0.19	1.59 in 1970	0.30
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	31	87 in 2000	59
Total CDD	17	20	91 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 10, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	88	78	92 in 1971+	59
Min Temperature	51	46	36 in 1983+	46
Avg Temperature	69.5	62	74.5 in 1968	52.5
Precipitation	0.00	0.02	0.18 in 1980	0.02
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	5	17 in 1985	12
CDD (base 65)	5	2	10 in 1968	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	83.1	80.0	91.3 in 1998	69.8
Avg Min Temperature	46.8	47.1	40.7 in 1999	45.6
Avg Temperature	65.0	63.5	73.2 in 1998	57.7
Total Precipitation	0.00	0.21	1.62 in 1978	0.32
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	36	95 in 2000	71
Total CDD	22	22	91 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 11, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	91	78	94 in 1990	68
Min Temperature	49	45	33 in 2005	46
Avg Temperature	70.0	62	72.5 in 1997+	57.0
Precipitation	0.00	0.02	0.58 in 2000	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	5	18 in 2005	8
CDD (base 65)	5	2	8 in 1997+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	83.8	79.8	89.4 in 1998	69.6
Avg Min Temperature	47.0	47.0	41.2 in 1975	45.6
Avg Temperature	65.4	63.4	71.8 in 1998	57.6
Total Precipitation	0.00	0.23	1.69 in 1978	0.32
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	19	41	106 in 2000	79
Total CDD	27	24	91 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 12, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	72	78	94 in 1996	79
Min Temperature	51	45	34 in 1989	42
Avg Temperature	61.5	61	76.0 in 1996	60.5
Precipitation	0.00	0.02	0.92 in 1972	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	3	5	17 in 1985+	4
CDD (base 65)	0	1	11 in 1996	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	82.8	79.6	88.8 in 1998	70.4
Avg Min Temperature	47.3	46.8	41.3 in 1999	45.3
Avg Temperature	65.1	63.2	71.3 in 1998	57.9
Total Precipitation	0.00	0.25	1.70 in 1978	0.32
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	22	46	110 in 2000	83
Total CDD	27	25	92 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 13, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	91	77	93 in 2002	82
Min Temperature	50	45	32 in 1974	38
Avg Temperature	70.5	61	75.5 in 2001	60.0
Precipitation	0.00	0.03	0.58 in 1980	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	5	20 in 1970	5
CDD (base 65)	6	1	11 in 2001	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	83.5	79.4	88.5 in 1998	71.3
Avg Min Temperature	47.5	46.6	41.2 in 1999	44.8
Avg Temperature	65.5	63.0	71.0 in 1998	58.0
Total Precipitation	0.00	0.28	1.80 in 1978	0.32
Total Snowfall	-	0.0	0.0 in 2010	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	22	51	114 in 1970	88
Total CDD	33	26	95 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 14, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	89	77	92 in 2002	80
Min Temperature	47	44	25 in 1970	49
Avg Temperature	68.0	61	76.0 in 2009	64.5
Precipitation	0.00	0.02	0.79 in 1966	0.00
New Snowfall	0.0	0.0	0.0 in 2011+	0.0
Snow Depth	0	-	0 in 2011+	0
HDD (base 65)	0	6	23 in 1970	0
CDD (base 65)	3	1	11 in 2009	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	83.9	79.3	88.4 in 1998	71.9
Avg Min Temperature	47.5	46.5	41.2 in 1999	45.1
Avg Temperature	65.7	62.9	70.8 in 1998	58.5
Total Precipitation	0.00	0.30	1.80 in 1978	0.32
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	22	57	137 in 1970	88
Total CDD	36	27	97 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 15, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	86	77	95 in 2000	78
Min Temperature	54	44	27 in 1970	43
Avg Temperature	70.0	60	75.0 in 2000	60.5
Precipitation	0.05	0.02	0.24 in 1968	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	0	6	19 in 1970	4
CDD (base 65)	5	1	10 in 2000	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	84.0	79.1	88.5 in 1998	72.3
Avg Min Temperature	47.9	46.3	40.5 in 1970	44.9
Avg Temperature	66.0	62.7	70.7 in 1998	58.6
Total Precipitation	0.05	0.32	1.80 in 1978	0.32
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	22	63	156 in 1970	92
Total CDD	41	28	103 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 16, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	71	76	95 in 1981	78
Min Temperature	47	44	30 in 1969	47
Avg Temperature	59.0	60	74.5 in 2001	62.5
Precipitation	0.06	0.02	0.29 in 1996	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	6	6	19 in 2006+	2
CDD (base 65)	0	1	10 in 2001	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	83.2	78.9	88.8 in 1998	72.7
Avg Min Temperature	47.9	46.1	40.1 in 1970	45.1
Avg Temperature	65.5	62.5	70.9 in 1998	58.9
Total Precipitation	0.11	0.34	1.80 in 1978	0.32
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	28	69	167 in 1970	94
Total CDD	41	29	111 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 17, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	65	76	97 in 1981	75
Min Temperature	40	43	29 in 1965	55
Avg Temperature	52.5	60	76.5 in 1995	65.0
Precipitation	0.00	0.02	0.23 in 1985	0.01
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	12	6	23 in 1965	0
CDD (base 65)	0	1	12 in 1995	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	82.1	78.7	88.9 in 1998	72.8
Avg Min Temperature	47.4	45.9	39.9 in 1970	45.6
Avg Temperature	64.8	62.3	71.0 in 1998	59.2
Total Precipitation	0.11	0.36	1.80 in 1978	0.33
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	40	75	173 in 1970	94
Total CDD	41	30	119 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 18, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	73	75	98 in 1981	70
Min Temperature	50	43	27 in 1971+	55
Avg Temperature	61.5	59	73.5 in 1981	62.5
Precipitation	0.00	0.02	0.82 in 1989	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	3	7	23 in 1965	2
CDD (base 65)	0	1	9 in 1981	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	81.6	78.5	88.8 in 1998	72.7
Avg Min Temperature	47.6	45.8	40.3 in 1970	46.2
Avg Temperature	64.6	62.2	70.9 in 1998	59.4
Total Precipitation	0.11	0.38	1.81 in 1978	0.33
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	43	82	175 in 1970	96
Total CDD	41	31	123 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 19, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	62	75	89 in 1999	72
Min Temperature	50	43	30 in 1971+	50
Avg Temperature	56.0	59	72.5 in 1979	61.0
Precipitation	0.00	0.02	0.36 in 1973	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	9	7	19 in 1965	4
CDD (base 65)	0	1	8 in 1979	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	80.6	78.4	88.5 in 1981	72.6
Avg Min Temperature	47.7	45.6	40.3 in 1970	46.4
Avg Temperature	64.1	62.0	70.4 in 1998	59.5
Total Precipitation	0.11	0.40	1.83 in 1980	0.33
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	52	89	191 in 1970	100
Total CDD	41	32	123 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 20, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	75	75	90 in 1979	64
Min Temperature	40	42	25 in 1983	48
Avg Temperature	57.5	58	72.0 in 1967	56.0
Precipitation	0.00	0.02	0.35 in 2010	0.35
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	7	7	21 in 1968	9
CDD (base 65)	0	1	7 in 1984+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	80.3	78.2	87.7 in 1981	72.2
Avg Min Temperature	47.3	45.4	40.2 in 1970	46.5
Avg Temperature	63.8	61.8	69.8 in 1998	59.3
Total Precipitation	0.11	0.42	1.93 in 1970	0.68
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	59	96	207 in 1970	109
Total CDD	41	33	123 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 22, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	79	74	94 in 1966	64
Min Temperature	43	41	29 in 1971	45
Avg Temperature	61.0	58	74.0 in 1966	54.5
Precipitation	0.00	0.02	0.64 in 2008	0.00
New Snowfall	0.0	0.0	0.0 in 2011+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	4	8	21 in 1977	10
CDD (base 65)	0	1	9 in 1966	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	80.0	77.8	85.8 in 1981	71.5
Avg Min Temperature	46.7	45.1	40.3 in 1970	46.3
Avg Temperature	63.4	61.4	68.6 in 1998	58.9
Total Precipitation	0.11	0.47	1.95 in 1970	0.68
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	70	112	230 in 1970	129
Total CDD	41	35	123 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Sep 21, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	76	74	92 in 1967	65
Min Temperature	39	42	27 in 1983	45
Avg Temperature	57.5	58	71.0 in 1967	55.0
Precipitation	0.00	0.03	0.38 in 1998	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	7	8	20 in 1993+	10
CDD (base 65)	0	1	6 in 1967	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	80.1	78.0	86.9 in 1981	71.9
Avg Min Temperature	46.9	45.3	40.4 in 1970	46.4
Avg Temperature	63.5	61.6	69.1 in 1998	59.1
Total Precipitation	0.11	0.45	1.95 in 1970	0.68
Total Snowfall	0.0	0.0	0.0 in 2011	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	66	104	218 in 1970	119
Total CDD	41	34	123 in 1998	2

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 4, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	50	52	69 in 1980	66
Min Temperature	32	32	16 in 1974	34
Avg Temperature	41.0	42	58.0 in 1975	50.0
Precipitation	0.35	0.07	0.38 in 1988	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	0 in 2010+	0
HDD (base 65)	24	23	38 in 2003	15
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	48.5	52.8	63.8 in 1975	59.5
Avg Min Temperature	30.2	32.5	14.8 in 2002	40.2
Avg Temperature	39.4	42.6	53.4 in 1988	49.9
Total Precipitation	0.35	0.26	1.14 in 1992	0.24
Total Snowfall	-	0.0	2.0 in 1991	0.0
Avg Snow Depth	-	-	0 in 2010	0
Total HDD	102	90	152 in 2003	59
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 5, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	37	51	67 in 2010+	67
Min Temperature	26	32	14 in 2003	35
Avg Temperature	31.5	42	56.5 in 1975	51.0
Precipitation	0.00	0.07	0.85 in 1991	0.00
New Snowfall	0.0	0.1	0.0 in 2011+	0.0
Snow Depth	0	-	0 in 2011+	0
HDD (base 65)	33	23	41 in 2003	14
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	46.2	52.5	63.6 in 1975	61.0
Avg Min Temperature	29.4	32.4	16.8 in 2002	39.2
Avg Temperature	37.8	42.5	53.3 in 1975	50.1
Total Precipitation	0.35	0.33	1.41 in 1992	0.24
Total Snowfall	0.0	0.1	2.0 in 1991	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	135	113	193 in 2003	73
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 6, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	39	51	71 in 2010	71
Min Temperature	29	32	11 in 2003	50
Avg Temperature	34.0	41	60.5 in 2010	60.5
Precipitation	0.00	0.06	1.41 in 2006	0.00
New Snowfall	0.0	0.0	0.0 in 2011+	0.0
Snow Depth	0	-	0 in 2011+	0
HDD (base 65)	31	24	43 in 2003	4
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	45.0	52.3	63.7 in 1980	62.7
Avg Min Temperature	29.3	32.4	16.2 in 2003	41.0
Avg Temperature	37.2	42.3	53.1 in 1988	51.8
Total Precipitation	0.35	0.39	1.45 in 1991	0.24
Total Snowfall	0.0	0.1	2.0 in 1991	0.0
Avg Snow Depth	0	-	0 in 2010	0
Total HDD	166	137	236 in 2003	77
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 7, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	29	50	68 in 1997+	63
Min Temperature	21	32	11 in 2003	37
Avg Temperature	25.0	41	59.5 in 1999	50.0
Precipitation	0.02	0.07	0.64 in 1985	0.00
New Snowfall	0.0	0.0	3.3 in 1986	0.0
Snow Depth	0	-	3 in 1986	0
HDD (base 65)	40	24	40 in 2011	15
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	42.7	52.0	63.1 in 1980	62.7
Avg Min Temperature	28.1	32.3	15.4 in 2003	40.4
Avg Temperature	35.4	42.1	53.1 in 1980	51.6
Total Precipitation	0.37	0.46	1.54 in 2006	0.24
Total Snowfall	0.0	0.1	3.3 in 1986	0.0
Avg Snow Depth	0	-	0 in 1986	0
Total HDD	206	161	275 in 2003	92
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 8, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	39	50	67 in 2002	39
Min Temperature	21	32	16 in 1993	36
Avg Temperature	30.0	41	55.5 in 1999	37.5
Precipitation	0.08	0.07	0.79 in 1985	0.14
New Snowfall	-	0.0	1.0 in 1985	0.0
Snow Depth	-	-	1 in 1986+	0
HDD (base 65)	35	24	35 in 2011	27
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	42.2	51.7	62.6 in 1980	59.8
Avg Min Temperature	27.2	32.2	17.1 in 2003	39.9
Avg Temperature	34.8	42.0	52.5 in 1980	49.8
Total Precipitation	0.45	0.53	2.03 in 1985	0.38
Total Snowfall	0.0	0.1	3.8 in 1986	0.0
Avg Snow Depth	0	-	1 in 1986	0
Total HDD	241	185	304 in 2003	119
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 9, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	46	49	64 in 2009	45
Min Temperature	31	32	19 in 1993	28
Avg Temperature	38.5	40	50.0 in 1971	36.5
Precipitation	0.00	0.06	0.51 in 1998	0.01
New Snowfall	-	0.0	1.0 in 1985	0.0
Snow Depth	-	-	1 in 1986+	0
HDD (base 65)	26	25	33 in 1994	28
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	42.7	51.4	61.9 in 1980	58.1
Avg Min Temperature	27.7	32.1	18.4 in 2003	38.6
Avg Temperature	35.2	41.8	51.9 in 1980	48.3
Total Precipitation	0.45	0.59	2.07 in 1985	0.39
Total Snowfall	0.0	0.1	4.3 in 1986	0.0
Avg Snow Depth	0	-	1 in 1986	0
Total HDD	267	210	332 in 2003	147
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 10, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	46	49	64 in 2009	45
Min Temperature	38	31	12 in 1986	31
Avg Temperature	42.0	40	52.5 in 1971	38.0
Precipitation	0.00	0.07	0.97 in 1968	0.02
New Snowfall	-	0.0	8.0 in 1985	0.0
Snow Depth	-	-	9 in 1985	0
HDD (base 65)	23	25	40 in 1986	27
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	43.0	51.2	61.5 in 1980	56.8
Avg Min Temperature	28.7	32.1	19.8 in 2003	37.8
Avg Temperature	35.9	41.6	50.8 in 1980	47.3
Total Precipitation	0.45	0.66	2.45 in 1985	0.41
Total Snowfall	0.0	0.1	10.0 in 1985	0.0
Avg Snow Depth	0	-	1 in 1985	0
Total HDD	290	235	363 in 2003	174
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 11, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	54	48	63 in 1996	39
Min Temperature	32	31	10 in 1978	21
Avg Temperature	43.0	40	51.0 in 1981	30.0
Precipitation	0.00	0.06	0.50 in 1968	0.00
New Snowfall	-	0.1	0.0 in 2010+	0.0
Snow Depth	-	-	8 in 1985	0
HDD (base 65)	22	25	46 in 1978	35
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.0	50.9	60.0 in 2009	55.2
Avg Min Temperature	29.0	32.0	21.5 in 2003	36.3
Avg Temperature	36.5	41.4	49.4 in 1980	45.7
Total Precipitation	0.45	0.72	2.45 in 1985	0.41
Total Snowfall	0.0	0.2	10.0 in 1985	0.0
Avg Snow Depth	0	-	2 in 1985	0
Total HDD	312	260	386 in 2003	209
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 12, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	48	48	64 in 1999	44
Min Temperature	31	31	9 in 1985	24
Avg Temperature	39.5	39	58.0 in 1999	34.0
Precipitation	0.00	0.07	0.68 in 2008	0.03
New Snowfall	-	0.0	2.0 in 1978	0.0
Snow Depth	-	-	8 in 1985	0
HDD (base 65)	25	26	45 in 1985	31
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.3	50.6	58.8 in 2009	54.2
Avg Min Temperature	29.2	31.9	22.3 in 2003	35.2
Avg Temperature	36.8	41.2	48.5 in 1999	44.8
Total Precipitation	0.45	0.79	2.49 in 1985	0.44
Total Snowfall	0.0	0.2	11.0 in 1985	0.0
Avg Snow Depth	0	-	2 in 1985	0
Total HDD	337	286	410 in 2003	240
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 13, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	46	47	69 in 1999	38
Min Temperature	31	31	10 in 1985	25
Avg Temperature	38.5	39	61.0 in 1999	31.5
Precipitation	0.00	0.06	1.72 in 1995	0.00
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	6 in 1985	0
HDD (base 65)	26	26	46 in 1985	33
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.5	50.3	58.5 in 1999	53.0
Avg Min Temperature	29.3	31.8	22.2 in 2003	34.5
Avg Temperature	36.9	41.1	49.4 in 1999	43.7
Total Precipitation	0.45	0.85	2.49 in 1985	0.44
Total Snowfall	0.0	0.2	11.0 in 1985	0.0
Avg Snow Depth	0	-	3 in 1985	0
Total HDD	363	312	439 in 2003	273
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 14, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	43	47	66 in 1999	51
Min Temperature	40	31	2 in 1985	36
Avg Temperature	41.5	39	52.5 in 1966	43.5
Precipitation	0.00	0.07	0.63 in 1988	0.00
New Snowfall	-	0.1	1.0 in 1988	0.0
Snow Depth	-	-	5 in 1985	0
HDD (base 65)	23	26	52 in 1985	21
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.4	50.1	59.1 in 1999	52.9
Avg Min Temperature	30.1	31.7	22.2 in 2003	34.6
Avg Temperature	37.2	40.9	49.4 in 1999	43.7
Total Precipitation	0.45	0.92	2.49 in 1995	0.44
Total Snowfall	0.0	0.3	11.0 in 1985	0.0
Avg Snow Depth	0	-	3 in 1985	0
Total HDD	386	338	468 in 2003	294
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 15, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	49	46	64 in 1999	50
Min Temperature	29	30	9 in 1985	47
Avg Temperature	39.0	38	53.5 in 1966	48.5
Precipitation	0.15	0.07	0.48 in 1987	0.29
New Snowfall	-	0.0	0.0 in 2010+	0.0
Snow Depth	-	-	4 in 1985	0
HDD (base 65)	26	27	44 in 1985	16
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.7	49.8	59.4 in 1999	52.7
Avg Min Temperature	30.0	31.6	22.2 in 2003	35.4
Avg Temperature	37.3	40.7	49.3 in 1999	44.0
Total Precipitation	0.60	0.99	2.49 in 1995	0.73
Total Snowfall	0.0	0.3	11.0 in 1985	0.0
Avg Snow Depth	0	-	3 in 1985	0
Total HDD	412	365	499 in 2003	310
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 16, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	41	46	60 in 1966	53
Min Temperature	17	30	9 in 1985	41
Avg Temperature	29.0	38	53.5 in 2001	47.0
Precipitation	0.00	0.07	0.49 in 1966	0.00
New Snowfall	-	0.1	1.0 in 1985	0.0
Snow Depth	-	-	4 in 1985	0
HDD (base 65)	36	27	41 in 1985	18
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.4	49.6	59.3 in 1999	52.7
Avg Min Temperature	29.2	31.5	22.8 in 2003	35.8
Avg Temperature	36.8	40.5	49.1 in 1999	44.2
Total Precipitation	0.60	1.06	2.60 in 1985	0.73
Total Snowfall	0.0	0.4	12.0 in 1985	0.0
Avg Snow Depth	0	-	3 in 1985	0
Total HDD	448	392	527 in 2003	328
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 17, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	43	45	63 in 1976	53
Min Temperature	21	30	17 in 2000+	37
Avg Temperature	32.0	38	50.5 in 2001+	45.0
Precipitation	0.02	0.07	1.08 in 1986	0.12
New Snowfall	-	0.0	2.0 in 1985	0.0
Snow Depth	-	-	5 in 1985	0
HDD (base 65)	33	28	38 in 2000	20
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.4	49.3	59.2 in 1999	52.7
Avg Min Temperature	28.7	31.4	23.8 in 2003	35.8
Avg Temperature	36.5	40.3	49.0 in 1999	44.3
Total Precipitation	0.62	1.13	2.67 in 1985	0.85
Total Snowfall	0.0	0.4	14.0 in 1985	0.0
Avg Snow Depth	0	-	3 in 1985	0
Total HDD	481	420	551 in 2003	348
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

LA GRANDE (354622)
Daily Almanac
Date: Nov 18, 2011

Daily Values	Observed	Normal	Record/Year	Prev Year
Max Temperature	40	45	62 in 1976	51
Min Temperature	31	30	19 in 2000+	33
Avg Temperature	35.5	37	51.0 in 1995+	42.0
Precipitation	0.25	0.07	0.56 in 1979	0.07
New Snowfall	-	0.1	1.0 in 1985	0.0
Snow Depth	-	-	5 in 1985	0
HDD (base 65)	29	28	41 in 2000	23
CDD (base 65)	0	0	0 in 2011+	0

Month-To-Date	Observed	Normal	Record/Year	Prev Year
Avg Max Temperature	44.1	49.0	58.5 in 1999	52.6
Avg Min Temperature	28.8	31.3	24.0 in 1985	35.7
Avg Temperature	36.5	40.2	48.3 in 1999	44.1
Total Precipitation	0.87	1.20	2.82 in 1968	0.92
Total Snowfall	0.0	0.5	15.0 in 1985	0.0
Avg Snow Depth	0	-	3 in 1985	0
Total HDD	510	448	575 in 2003	371
Total CDD	0	0	0 in 2011	0

+ indicates record also occurred in previous years (last occurrence listed).

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

Appendix E

Literature Citations and References

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Appendix C

Project Plan Sheets

RECLAMATION
Managing Water in the West

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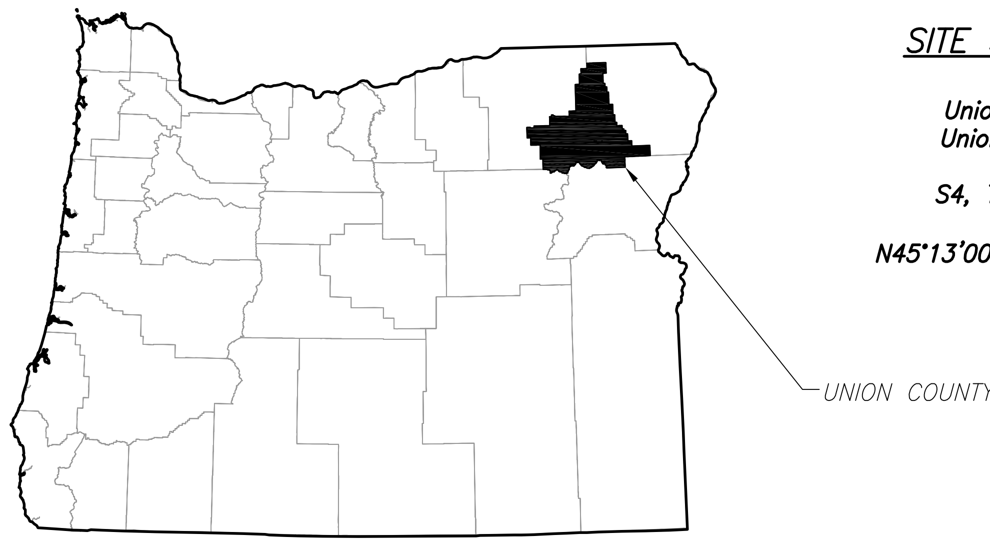
Catherine Creek
RM 37 Restoration Project
Union County, Oregon

SITE SUMMARY

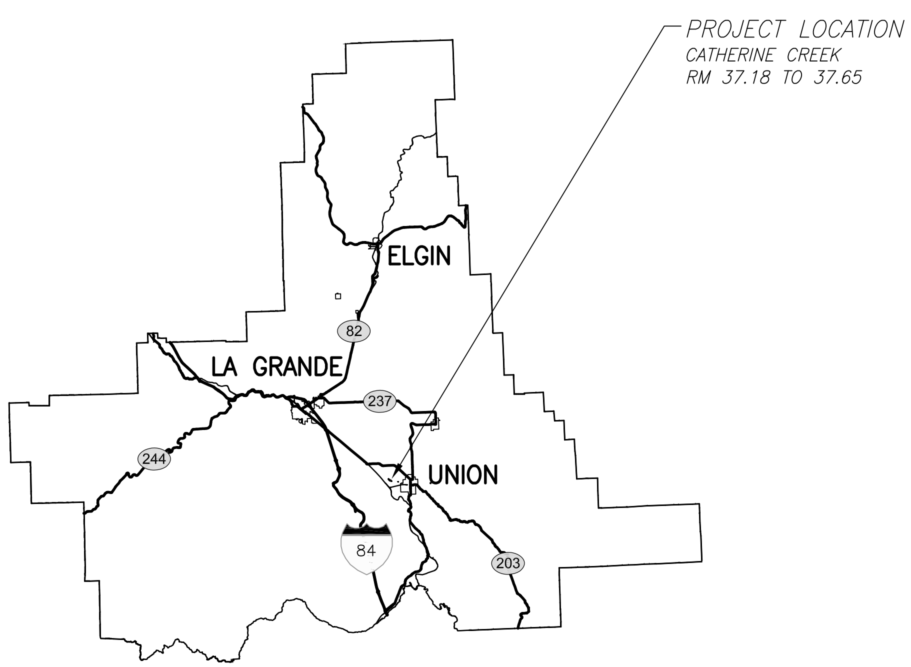
Union County
Union, Oregon

S4, T4S, R39E

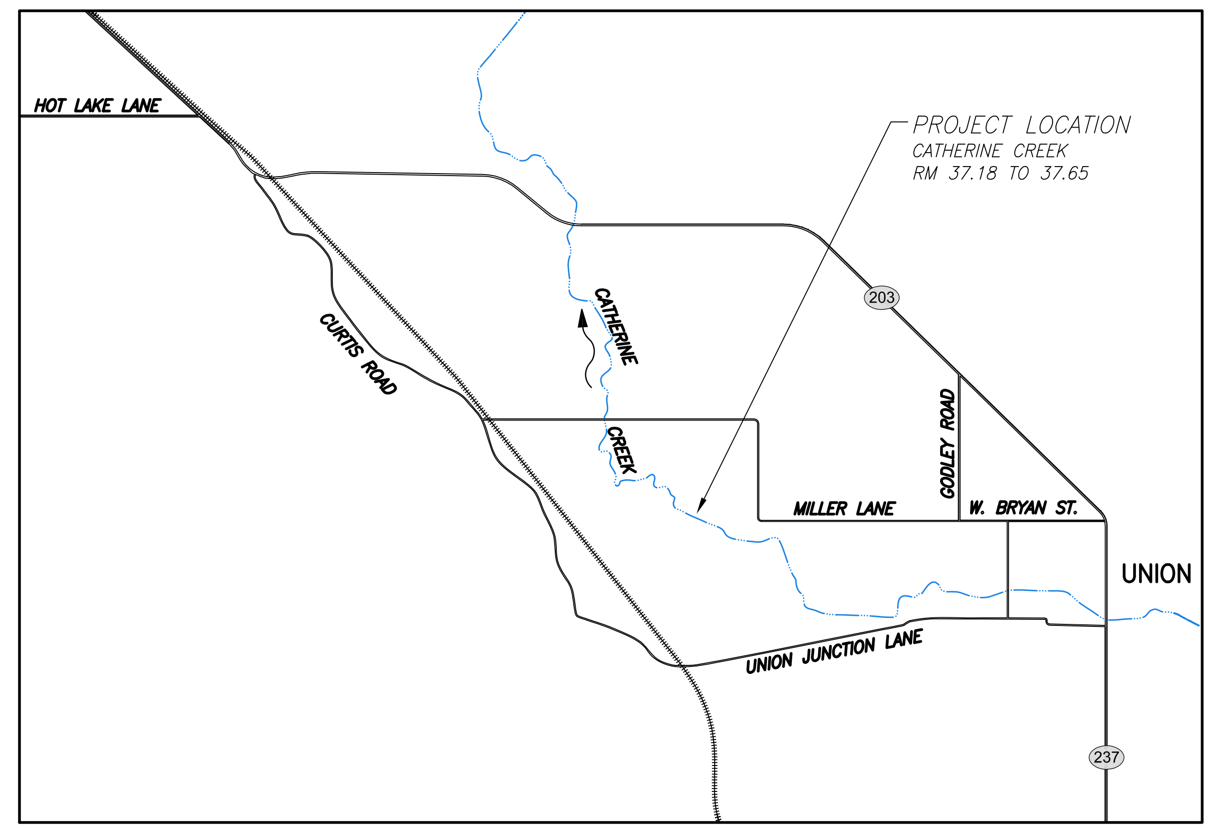
N45°13'00", W117°54'30"



OREGON
NOT TO SCALE



UNION COUNTY, OREGON
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

SHEET INDEX

DRAFT – NOT FOR CONSTRUCTION

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BUREAU OF RECLAMATION
COLUMBIA SNAKE RIVER SALMON RECOVERY PROGRAM
FCRPS HABITAT IMPROVEMENT PROGRAM
GRANDE RONDE SUBBASIN
CATHERINE CREEK – RM 37 RESTORATION PROJECT
COVER SHEET
PRELIMINARY DESIGN DRAWINGS

REV NO

DRAWN
D. STRATTEN
N. TRUSCOTT
M. FISHER

ACCEPTED
NAME
TITLE

BOISE, ID 2012-02-10

COVER SHEET

SHEET G-1

DATE AND TIME PLOTTED
February 10, 2012 05:02
PLOTTED BY:
STRATTEN, DANIEL

CAD SYSTEM
AutoCAD 2012
CAD FILENAME
CC-37 FRONT

GENERAL NOTES

1. THE WORK SHOWN ON THESE PLANS WILL BE PERFORMED FOR UNION SOIL AND WATER CONSERVATION DISTRICT, HEREIN REFERRED TO AS THE "CONTRACTING AGENCY." THE CONTRACTING AGENCY'S REPRESENTATIVE WILL BE MR. CRAIG SCHELLSMIDT OR OTHER PERSONS ASSIGNED BY THE CONTRACTING AGENCY TO ACT AS THE CONTRACTING AGENCY'S REPRESENTATIVE, HEREIN REFERRED TO AS THE "CONTRACTING OFFICER."
2. HORIZONTAL DATUM: US STATE PLANE COORDINATE SYSTEM, OREGON NORTH ZONE, NAD83, INTERNATIONAL FEET.
   VERTICAL DATUM: NAVD88
3. TOPOGRAPHIC MAPPING WITHIN STREAM BANKS OF THE PROJECT AREA BASED ON SURVEYS PERFORMED WITH GROUND SURVEY EQUIPMENT. TOPOGRAPHIC MAPPING OUTSIDE THE STREAM BANKS IS BASED ON LIDAR IMAGING. DUE TO CONTINUED EROSION OF THE STREAM BANK, THE GEOMETRY OF THE STREAM BANKS AT THE TIME OF CONSTRUCTION COULD BE DIFFERENT THAN SHOWN ON THESE PLANS.
4. ELEVATIONS AND DISTANCES SHOWN ARE IN FEET AND DECIMALS WITH CONTOUR INTERVALS AT ONE FOOT INCREMENTS.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE GENERAL SAFETY DURING CONSTRUCTION, AND ALL WORK SHALL CONFORM TO PERTINENT SAFETY REGULATIONS AND CODES. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR COMPLIANCE WITH ALL APPLICABLE PROVISIONS OF OSHA AND NRS CHAPTER 618, IN THE CONSTRUCTION PRACTICES FOR ALL EMPLOYEES DIRECTLY ENGAGED IN THE CONSTRUCTION OF THIS PROJECT.
6. EXISTING UNDERGROUND UTILITY LOCATIONS HAVE NOT BEEN IDENTIFIED AND ARE NOT SHOWN ON THESE PLANS. THE CONTRACTOR IS RESPONSIBLE TO LOCATE UTILITIES PRIOR TO CONSTRUCTION AND PROTECT UTILITIES DURING CONSTRUCTION. THE TELEPHONE NUMBER FOR THE ONE CALL CENTER FOR UTILITY LOCATES IS 1-800-424-5555.
7. THE CONTRACTOR SHALL PURSUE WORK IN A CONTINUOUS AND DILIGENT MANNER TO ENSURE A TIMELY COMPLETION OF THE PROJECT.
8. CONTRACTOR SHALL CONFIRM THE ACCESS POINT, ROUTE(S), AND LOCATION OF STORAGE OF MATERIALS AND EQUIPMENT WITH THE CONTRACTING OFFICER PRIOR TO TRANSPORTING MATERIALS AND EQUIPMENT TO THE PROJECT SITE.
9. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL PROVIDE THE CONTRACTING AGENCY WITH A DETAILED CONSTRUCTION SCHEDULE AND WORK PLAN FOR APPROVAL. THE CONTRACTOR SHALL NOT BEGIN ANY CONSTRUCTION WORK UNTIL THE PROJECT SCHEDULE AND WORK PLAN IS APPROVED BY THE CONTRACTING OFFICER.
10. ALL CONSTRUCTION SHALL BE CLOSELY COORDINATED WITH THE CONTRACTING OFFICER SO THAT THE QUALITY OF WORK CAN BE CHECKED FOR APPROVAL.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE SITE IN A NEAT AND ORDERLY MANNER THROUGHOUT THE CONSTRUCTION PROCESS. ALL MATERIALS SHALL BE STORED WITHIN APPROVED CONSTRUCTION STAGING AREAS.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING, AT THE CONTRACTOR'S EXPENSE, ALL CONSTRUCTION PERMITS AS REQUIRED BY THE LOCAL AGENCIES. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR AND EQUIPMENT REQUIRED TO COMPLY WITH ALL APPLICABLE PERMIT CONDITIONS AND REQUIREMENTS.
13. ANY WORK WITHIN THE ACTIVELY FLOWING CHANNEL OF CATHERINE CREEK SHALL BE LIMITED TO OCCURRING BETWEEN AUGUST 1 AND SEPTEMBER 30.
14. THE CONTRACTOR SHALL PLACE TEMPORARY COFFERDAMS BETWEEN THE ACTIVELY FLOWING CREEK AND THE EXTENTS OF ANY EXCAVATION, FILL PLACEMENT, AND HABITAT STRUCTURE CONSTRUCTION TO KEEP WATER AND FISH FROM ENTERING THE ACTIVE CONSTRUCTION AREA.
15. THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER A MINIMUM OF 5 WORKING DAYS IN ADVANCE OF COFFERDAM CONSTRUCTION TO COORDINATE FISH REMOVAL. THE CONTRACTING AGENCY WILL BE RESPONSIBLE FOR ALL FISH REMOVAL AND HANDLING.
16. DEWATERING WITHIN COFFERDAMS SHALL BE PERFORMED TO THE EXTENT NECESSARY TO CONSTRUCT THE PROJECT AS SHOWN ON THESE PLANS, AS DETERMINED BY THE CONTRACTOR. DISCHARGE FROM DEWATERING WITHIN THE WORK AREA SHALL BE ROUTED TO FLOODPLAIN AREAS SO AS TO ALLOW THE REMOVAL OF FINE SEDIMENTS OR OTHER CONTAMINANTS PRIOR TO REENTERING CATHERINE CREEK. ALL PUMPS USED BY THE CONTRACTOR FOR DEWATERING SHALL HAVE SCREENED INTAKES THAT MEET ODFW SPECIFICATIONS AND JUVENILE FISH SCREENING CRITERIA.
17. ALL EQUIPMENT CONDUCTING IN-WATER WORK, INCLUDING CROSSING CATHERINE CREEK, WORKING WITHIN THE ACTIVELY FLOWING CHANNEL, WORKING WITHIN AN AREA SEPARATED FROM THE ACTIVELY FLOWING CHANNEL BY A COFFERDAM, AND WORKING ON THE TOP OF BANK ADJACENT TO THE ACTIVELY FLOWING CHANNEL, SHALL USE VEGETABLE OIL FOR HYDRAULIC FLUID.

SUMMARY OF QUANTITIES

ITEM NO.	QUANTITY	UNITS	DESCRIPTION
SITE PREPARATION			
1	LUMP SUM	LS	MOBILIZATION
2	LUMP SUM	LS	COFFERDAMS AND DEWATERING
SITE ACCESS			
3	LUMP SUM	LS	TEMPORARY SITE ACCESS ROUTES
4	LUMP SUM	LS	TEMPORARY CREEK CROSSING
EARTHWORK			
5	22,350	CY	CHANNEL AND FLOODPLAIN EXCAVATION
6	4,865	CY	EXCAVATED SOIL PLACED AS FILL ON-SITE
7	6,475	CY	EXCAVATED SOIL DISPOSED OF ON-SITE
8	11,010	CY	EXCAVATED SOIL HAULED OFF-SITE
9	100	EA	IN-CHANNEL HABITAT BOULDERS
10	1,165	CY	COBBLE/GRAVEL MATERIAL FOR CHANNEL LINING
11	1	EA	BOULDER/COBBLE SILL
12	LUMP SUM	LS	STABILIZED LIVESTOCK CROSSING
LWD STRUCTURES			
13	57	EA	TYPE 1 LWD STRUCTURE
14	12	EA	TYPE 2 LWD STRUCTURE
15	5	EA	TYPE 3 LWD STRUCTURE
16	8	EA	FULL TREES IN ALCOVE
17	LUMP SUM	LS	RACKING MATERIAL PLACED AS DIRECTED BY C.O.
EROSION CONTROL			
18	LUMP SUM	LS	TEMPORARY EROSION AND SEDIMENT CONTROL
19	LUMP SUM	LS	SWPPP/SPCC PLAN
PLANTING AND SEEDING			
20	10,980	EA	LIVE STAKE
21	1,150	EA	1 GALLON CONTAINER PLANT
22	1,150	EA	PLANT PROTECTION
23	4.4	AC	SEEDING - SEED MIX 1
24	25.4	AC	SEEDING - SEED MIX 2
25	59.6	TON	STRAW MULCH
26	0.3	AC	SOD SALVAGE AND PLACEMENT
27	2330	EA	SEDGE SALVAGE AND PLANTING
28	4,935	SY	EROSION CONTROL BLANKET

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FCRPS HABITAT IMPROVEMENT PROGRAM
GRANDE RONDE SUBBASIN
CATHERINE CREEK - RM 37 RESTORATION PROJECT
SUMMARY OF QUANTITIES AND NOTES
PRELIMINARY DESIGN DRAWINGS

REV NO

DRAWN
N. TRUSCOTT
M. FISHER

ACCEPTED
NAME
TITLE

BOISE, ID 2012-02-10

SUMMARY OF QUANTITIES AND NOTES

SHEET G-2

SHEET 2 OF 27

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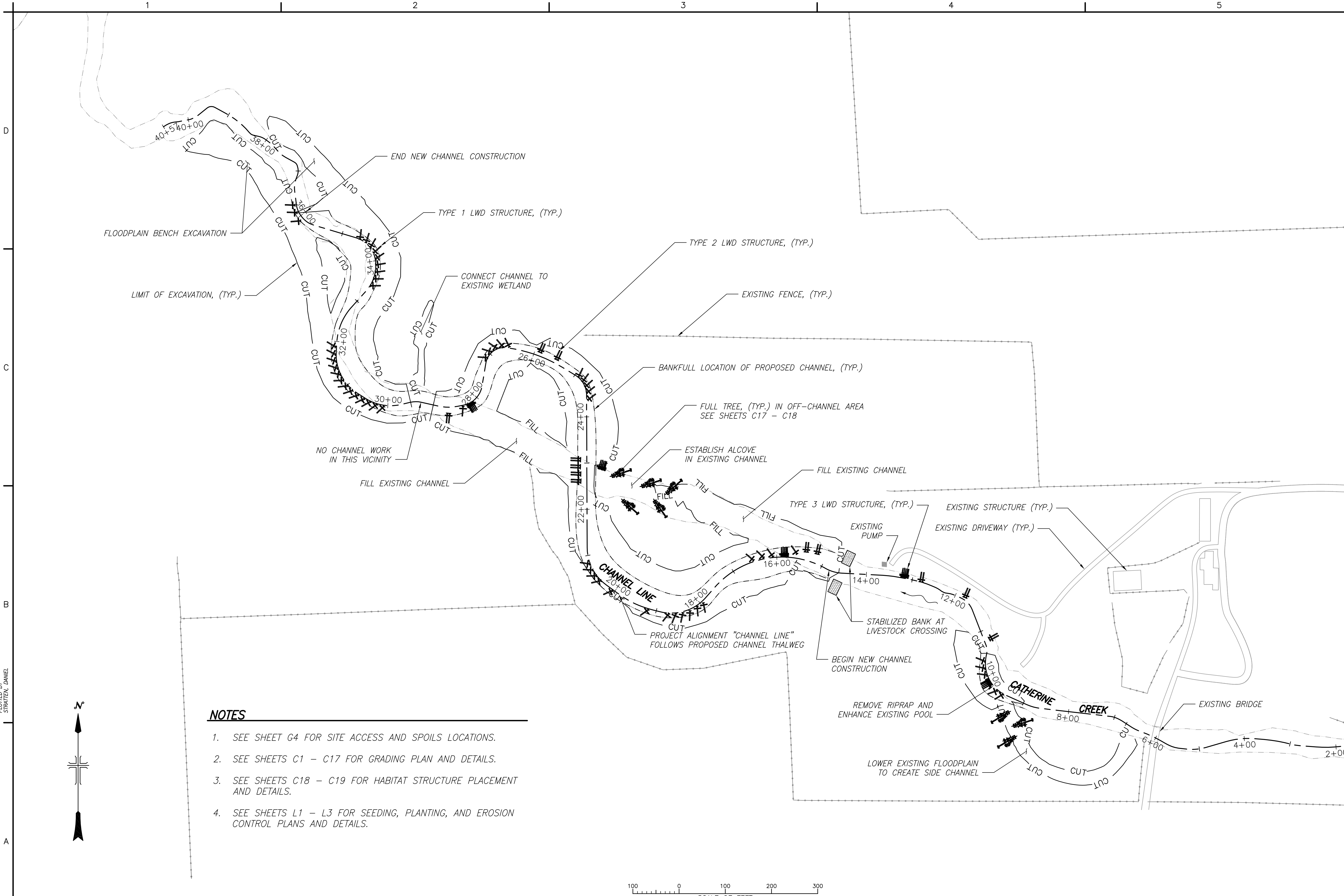

NOTES

1. SEE SHEET G4 FOR SITE ACCESS AND SPOILS LOCATIONS.
2. SEE SHEETS C1 – C17 FOR GRADING PLAN AND DETAILS.
3. SEE SHEETS C18 – C19 FOR HABITAT STRUCTURE PLACEMENT AND DETAILS.
4. SEE SHEETS L1 – L3 FOR SEEDING, PLANTING, AND EROSION CONTROL PLANS AND DETAILS.

PROJECT OVERVIEW

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CATHERINE CREEK – RM 37 RESTORATION PROJECT
PROJECT OVERVIEW
PRELIMINARY DESIGN DRAWINGS

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ACCEPTED
NAME
TITLE
BOISE, ID 2012–02–10

PROJECT OVERVIEW

SHEET G–3

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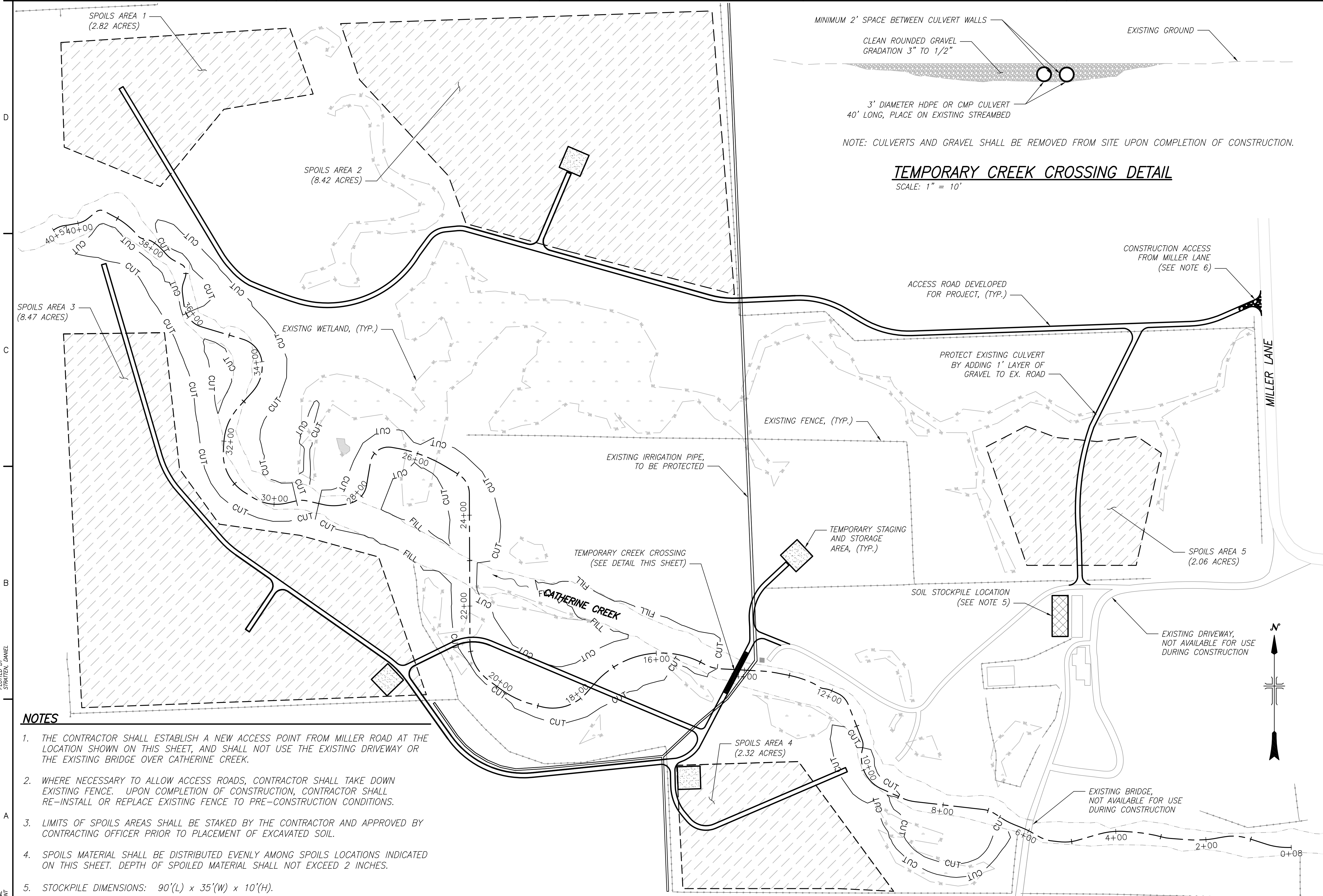

NOTES

1. THE CONTRACTOR SHALL ESTABLISH A NEW ACCESS POINT FROM MILLER ROAD AT THE LOCATION SHOWN ON THIS SHEET, AND SHALL NOT USE THE EXISTING DRIVEWAY OR THE EXISTING BRIDGE OVER CATHERINE CREEK.
2. WHERE NECESSARY TO ALLOW ACCESS ROADS, CONTRACTOR SHALL TAKE DOWN EXISTING FENCE. UPON COMPLETION OF CONSTRUCTION, CONTRACTOR SHALL RE-INSTALL OR REPLACE EXISTING FENCE TO PRE-CONSTRUCTION CONDITIONS.
3. LIMITS OF SPOILS AREAS SHALL BE STAKED BY THE CONTRACTOR AND APPROVED BY CONTRACTING OFFICER PRIOR TO PLACEMENT OF EXCAVATED SOIL.
4. SPOILS MATERIAL SHALL BE DISTRIBUTED EVENLY AMONG SPOILS LOCATIONS INDICATED ON THIS SHEET. DEPTH OF SPOILED MATERIAL SHALL NOT EXCEED 2 INCHES.
5. STOCKPILE DIMENSIONS: 90'(L) x 35'(W) x 10'(H).
6. THE CONSTRUCTION ACCESS ROAD SHALL INCLUDE 50'(L)x12'(W)x1'(T) OF QUARRY SPALLS AT THE CONNECTION TO MILLER ROAD.

PROJECT ACCESS, STORAGE, AND SPOILS

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CATHERINE CREEK – RM 37 RESTORATION PROJECT
PROJECT ACCESS, STORAGE AND SPOILS
PRELIMINARY DESIGN DRAWINGS

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PROJECT ACCESS, STORAGE AND SPOILS

SHEET G-4
SHEET 4 OF 27

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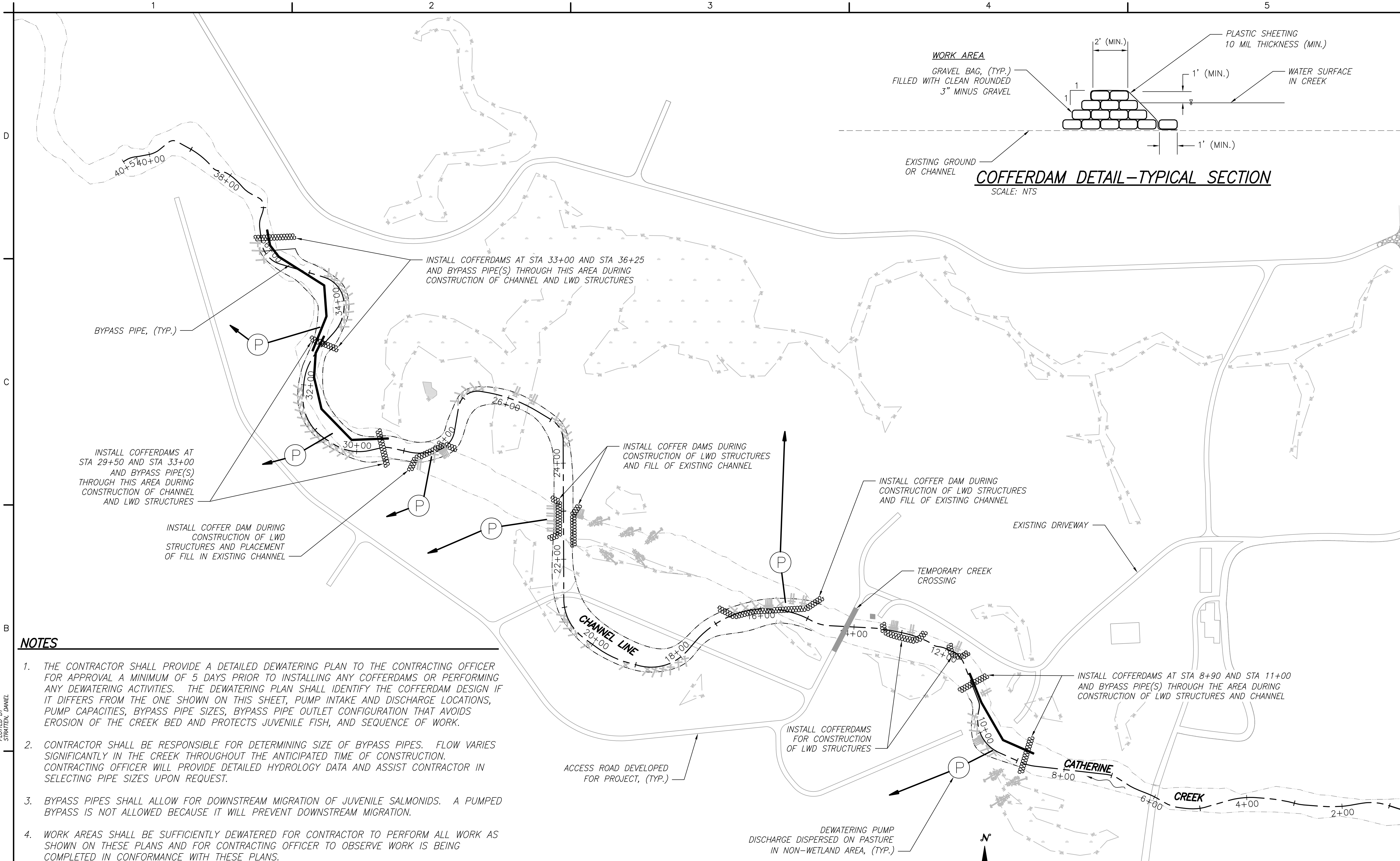

DEWATERING PLAN

NOTES

1. THE CONTRACTOR SHALL PROVIDE A DETAILED DEWATERING PLAN TO THE CONTRACTING OFFICER FOR APPROVAL A MINIMUM OF 5 DAYS PRIOR TO INSTALLING ANY COFFERDAMS OR PERFORMING ANY DEWATERING ACTIVITIES. THE DEWATERING PLAN SHALL IDENTIFY THE COFFERDAM DESIGN IF IT DIFFERS FROM THE ONE SHOWN ON THIS SHEET, PUMP INTAKE AND DISCHARGE LOCATIONS, PUMP CAPACITIES, BYPASS PIPE SIZES, BYPASS PIPE OUTLET CONFIGURATION THAT AVOIDS EROSION OF THE CREEK BED AND PROTECTS JUVENILE FISH, AND SEQUENCE OF WORK.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING SIZE OF BYPASS PIPES. FLOW VARIES SIGNIFICANTLY IN THE CREEK THROUGHOUT THE ANTICIPATED TIME OF CONSTRUCTION. CONTRACTING OFFICER WILL PROVIDE DETAILED HYDROLOGY DATA AND ASSIST CONTRACTOR IN SELECTING PIPE SIZES UPON REQUEST.
3. BYPASS PIPES SHALL ALLOW FOR DOWNSTREAM MIGRATION OF JUVENILE SALMONIDS. A PUMPED BYPASS IS NOT ALLOWED BECAUSE IT WILL PREVENT DOWNSTREAM MIGRATION.
4. WORK AREAS SHALL BE SUFFICIENTLY DEWATERED FOR CONTRACTOR TO PERFORM ALL WORK AS SHOWN ON THESE PLANS AND FOR CONTRACTING OFFICER TO OBSERVE WORK IS BEING COMPLETED IN CONFORMANCE WITH THESE PLANS.
5. ALL PUMP INTAKES SHALL BE SCREENED FOR FISH PROTECTION AS REQUIRED BY ODFW.
6. DEWATERING PUMP DISCHARGE FROM WITHIN COFFERDAMMED WORK AREAS SHALL BE RELEASED ONTO FLOODPLAIN AREAS AWAY FROM WETLANDS. DISCHARGE SHALL NOT CAUSE EROSION OF TOPSOIL.
7. COFFERDAMS MAY BE CONSTRUCTED AS SHOWN IN THE DETAIL AT TOP OF THIS SHEET. ALTERNATIVE METHODS OF COFFERDAM CONSTRUCTION ARE ACCEPTABLE IF APPROVED BY THE CONTRACTING OFFICER.

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CATHERINE CREEK – RM 37 RESTORATION PROJECT
DEWATERING PLAN
PRELIMINARY DESIGN DRAWINGS

REV NO

DRAWN N. TRUSCOTT

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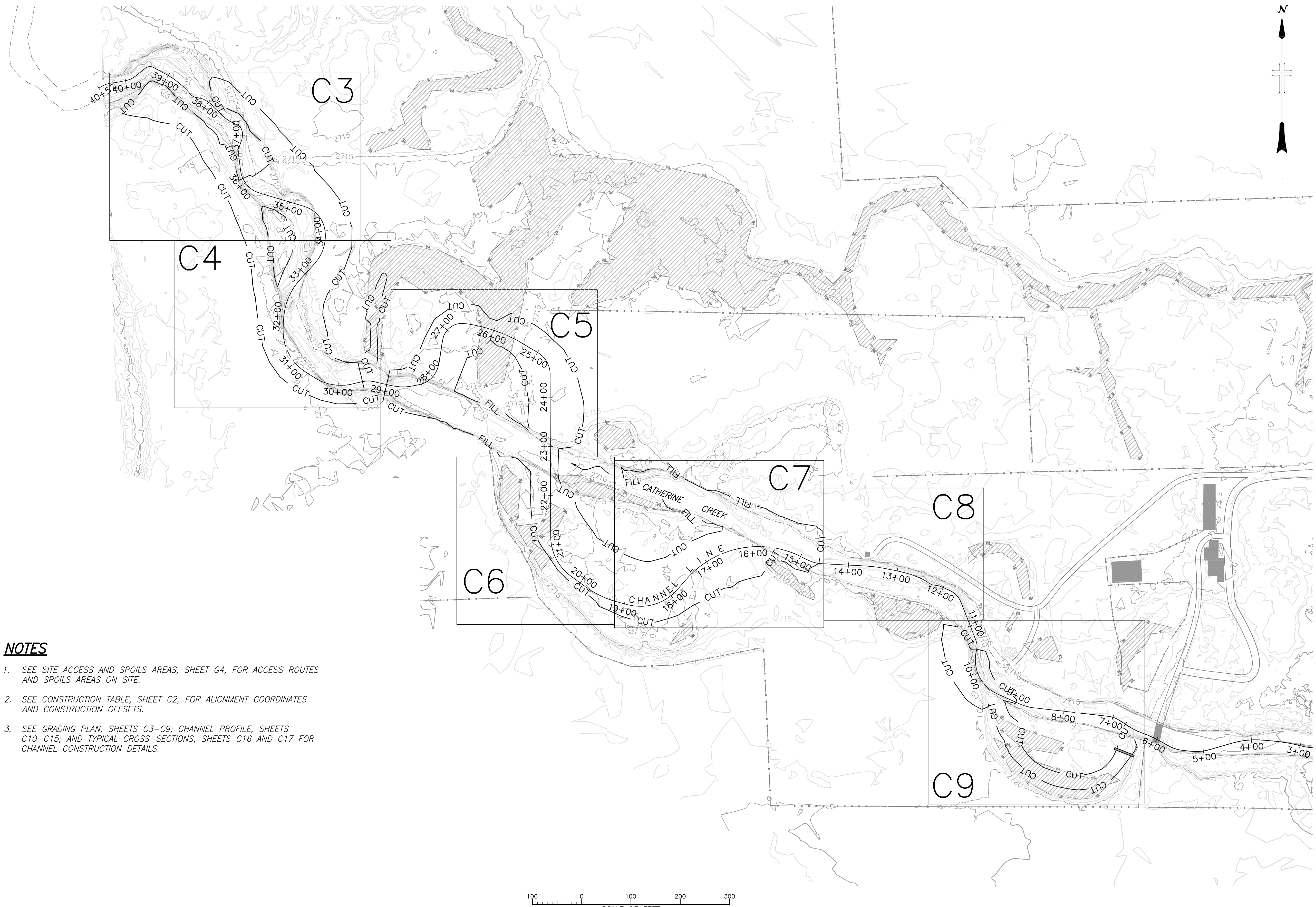
NAME
TITLE

BOISE, ID 2012–02–10

DEWATERING PLAN

SHEET G–5



NOTES

1. SEE SITE ACCESS AND SPOILS AREAS, SHEET G4, FOR ACCESS ROUTES AND SPOILS AREAS ON SITE.
2. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
3. SEE GRADING PLAN, SHEETS C3–C9; CHANNEL PROFILE, SHEETS C10–C15; AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.

GRADING PLAN SHEET INDEX

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CATHERINE CREEK – RM 37 RESTORATION PROJECT

GRADING PLAN INDEX

PRELIMINARY DESIGN DRAWINGS

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NAME
TITLE

BOISE, ID 2011-11-23

REV NO

GRADING INDEX

SHEET C-1

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CAD FILENAME
CC37_GRADING

THIS PAGE RESERVED FOR CHANNEL ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS

	CHANNEL DEFINITION POINTS				FLOODPLAIN BENCH DEFINITION POINS			
	CHANNEL ALIGNMENT		ELEVATIONS		Left Offset		Right Offset	
Channel Station	Northing	Easting	Thalweg Elevation	Bankfull Elevation	Centerline-to-Bench Start	Centerline-to-Bench End	Centerline-to-Bench Start	Centerline-to-Bench End
8+50	575,365.36	8,870,797.01	2,714.40	2,717.90	-22.5	-42.5	22.5	42.5
8+75								
8+86								
9+00								
9+25								
9+50								
9+75								
10+00								
10+25								
10+50								
10+75								
14+50								
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25+10								
25+25								
25+35								
25+50								
25+75								
26+00								

	CHANNEL DEFINITION POINTS				FLOODPLAIN BENCH DEFINITION POINS			
	CHANNEL ALIGNMENT		ELEVATIONS		Left Offset		Right Offset	
Channel Station	Northing	Easting	Thalweg Elevation	Bankfull Elevation	Centerline-to-Bench Start	Centerline-to-Bench End	Centerline-to-Bench Start	Centerline-to-Bench End
26+15								
26+25								
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NOTES

1. SEE GRADING PLAN, SHEETS C3–C9; CHANNEL PROFILE, SHEETS C10–C15; AND TYPICAL CROSS–SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.

GRADING TABLE

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GRADING TABLE
PRELIMINARY DESIGN DRAWINGS

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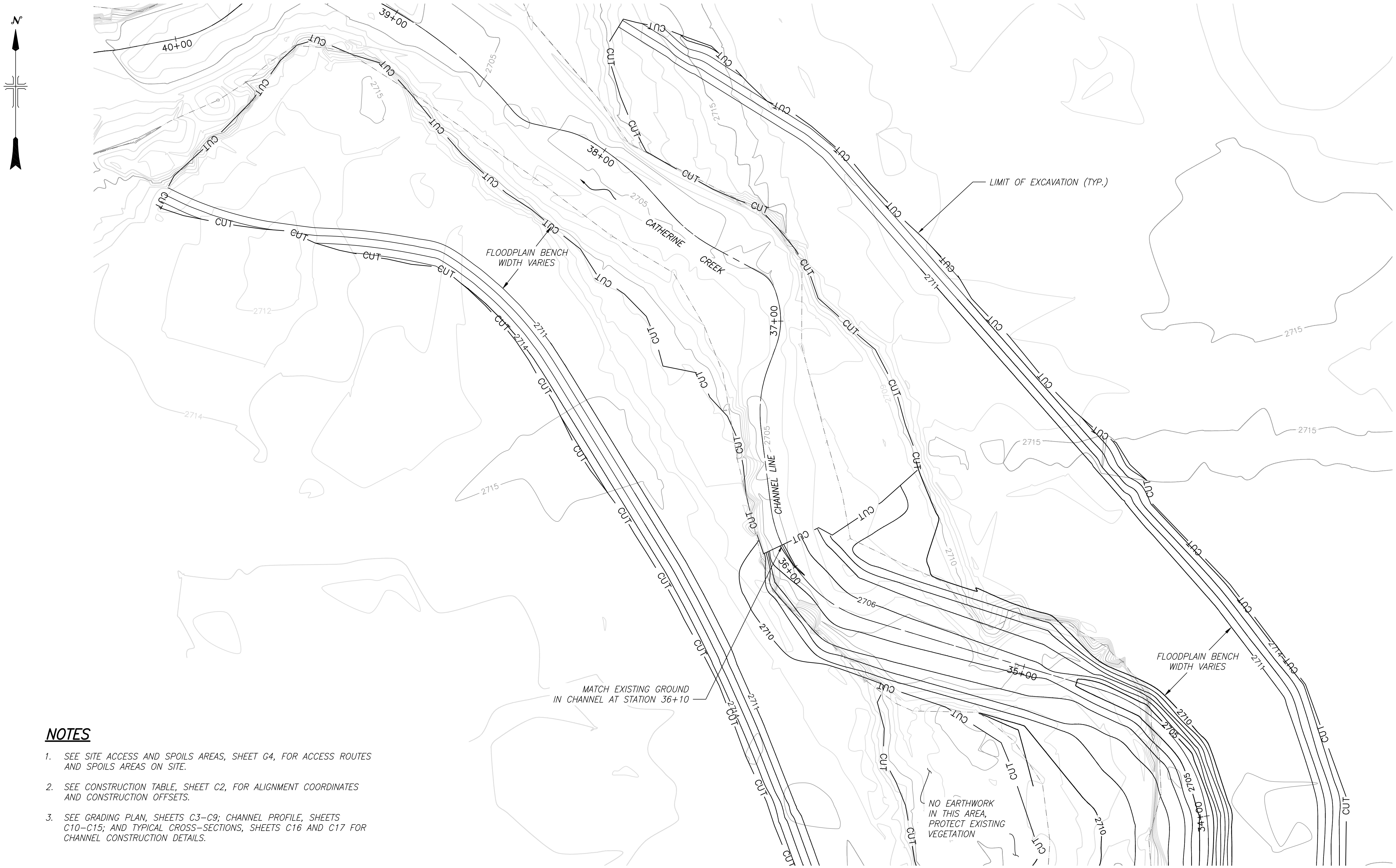
GRADING TABLE

SHEET C–2



NOTES

1. SEE SITE ACCESS AND SPOILS AREAS, SHEET G4, FOR ACCESS ROUTES AND SPOILS AREAS ON SITE.
2. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
3. SEE GRADING PLAN, SHEETS C3–C9; CHANNEL PROFILE, SHEETS C10–C15; AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.

20 0 20 40 60
SCALE OF FEET

GRADING PLAN

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SHEET C–3
SHEET 8 OF 27

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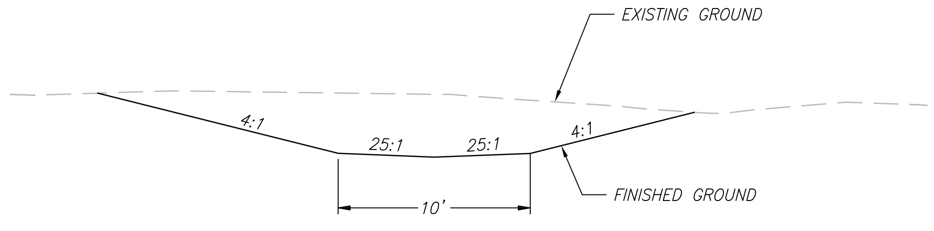
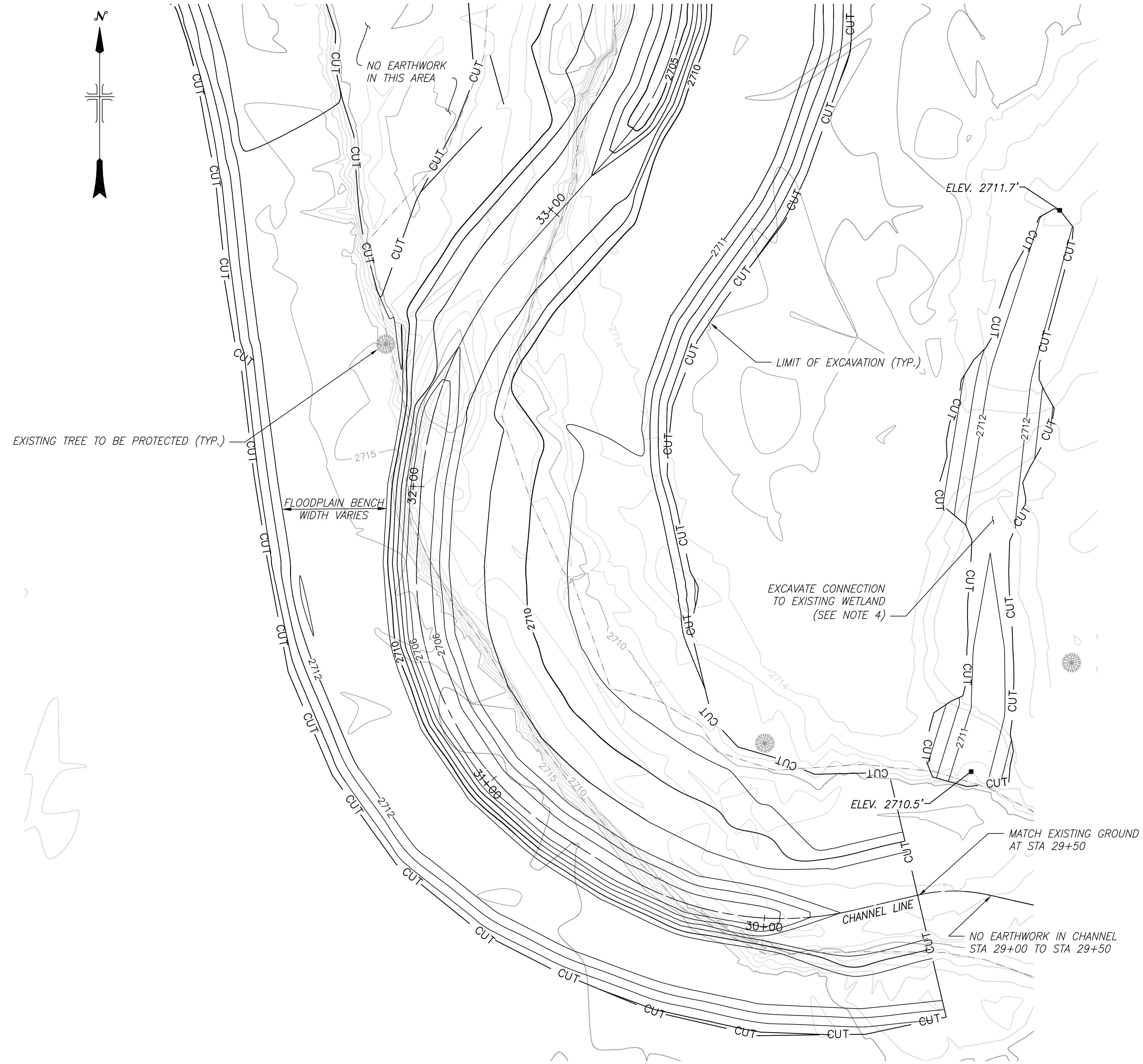


WETLAND CONNECTION TYPICAL CROSS-SECTION



GRADING PLAN

NOTES

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2. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
3. SEE GRADING PLAN, SHEETS C3–C9; CHANNEL PROFILE, SHEETS C10–C15; AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.
4. EXCAVATE CONNECTION TO EXISTING WETLAND PER THE CROSS-SECTION SHOWN ON THIS SHEET. PROFILE SHALL BE AN EVEN SLOPE BETWEEN SPOT ELEVATIONS SHOWN.

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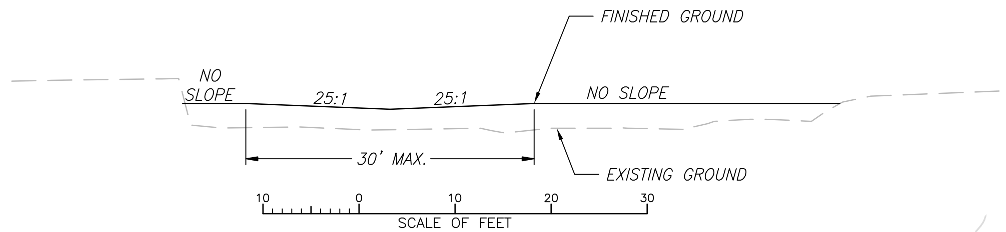
GRADING PLAN

SHEET C-4



CHANNEL FILL TYPICAL CROSS-SECTION

20 0 20 40 60
SCALE OF FEET

GRADING PLAN

NOTES

1. SEE SITE ACCESS AND SPOILS AREAS, SHEET G4, FOR ACCESS ROUTES AND SPOILS AREAS ON SITE.
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4. FILL THE EXISTING CHANNEL AS SHOWN PER THE CROSS-SECTION SHOWN ON THIS SHEET. PROFILE SHALL BE AN EVEN SLOPE BETWEEN SPOT ELEVATIONS SHOWN.

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NAME
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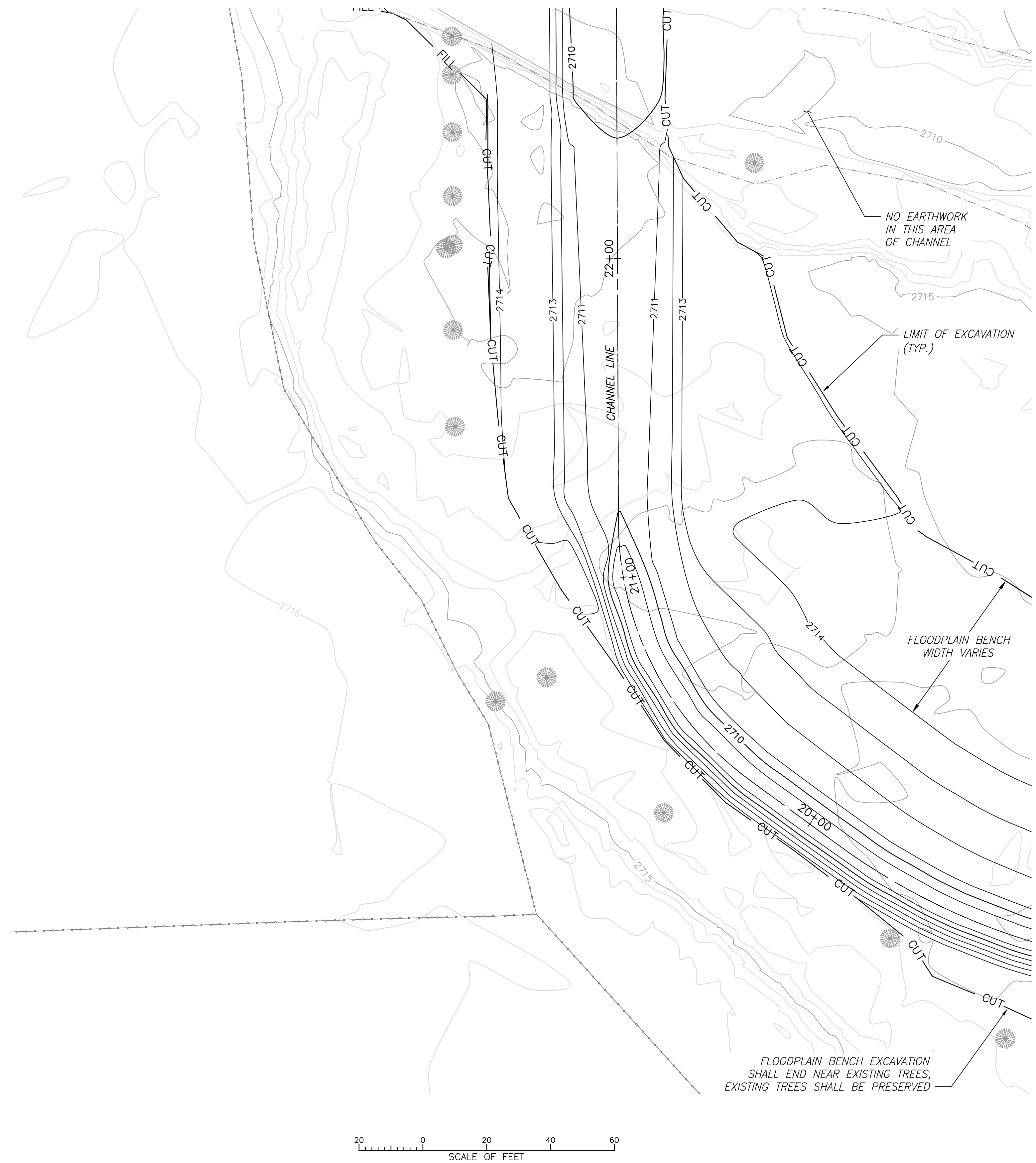
GRADING PLAN

SHEET C-5



GRADING PLAN

NOTES

1. SEE SITE ACCESS AND SPOILS AREAS, SHEET G4, FOR ACCESS ROUTES AND SPOILS AREAS ON SITE.
2. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
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GRADING PLAN

SHEET C-6
SHEET 11 OF 27

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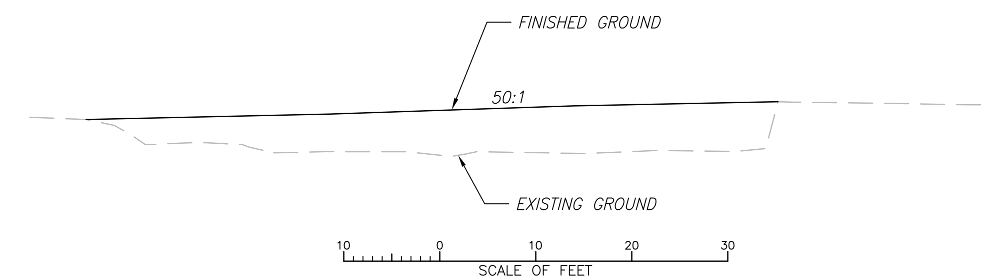
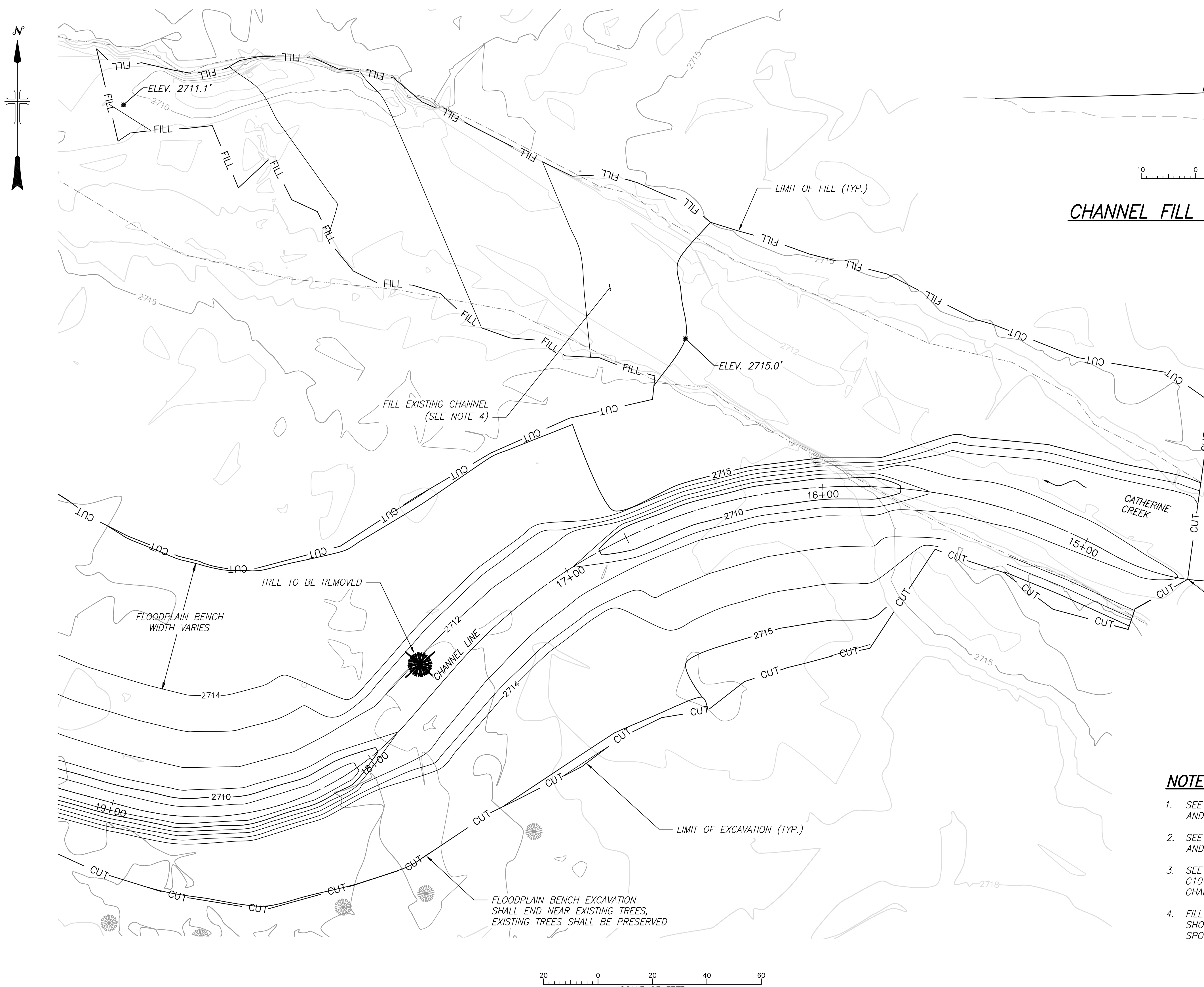


CHANNEL FILL TYPICAL CROSS-SECTION



GRADING PLAN

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2. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
3. SEE GRADING PLAN, SHEETS C3–C9; CHANNEL PROFILE, SHEETS C10–C15; AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.
4. FILL THE EXISTING CHANNEL AS SHOWN PER THE CROSS-SECTION SHOWN ON THIS SHEET. PROFILE SHALL BE AN EVEN SLOPE BETWEEN SPOT ELEVATIONS SHOWN.

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GRADING PLAN

SHEET C-7

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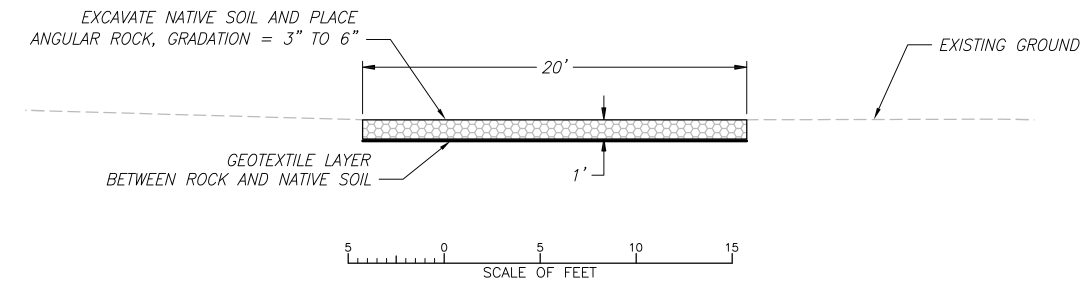
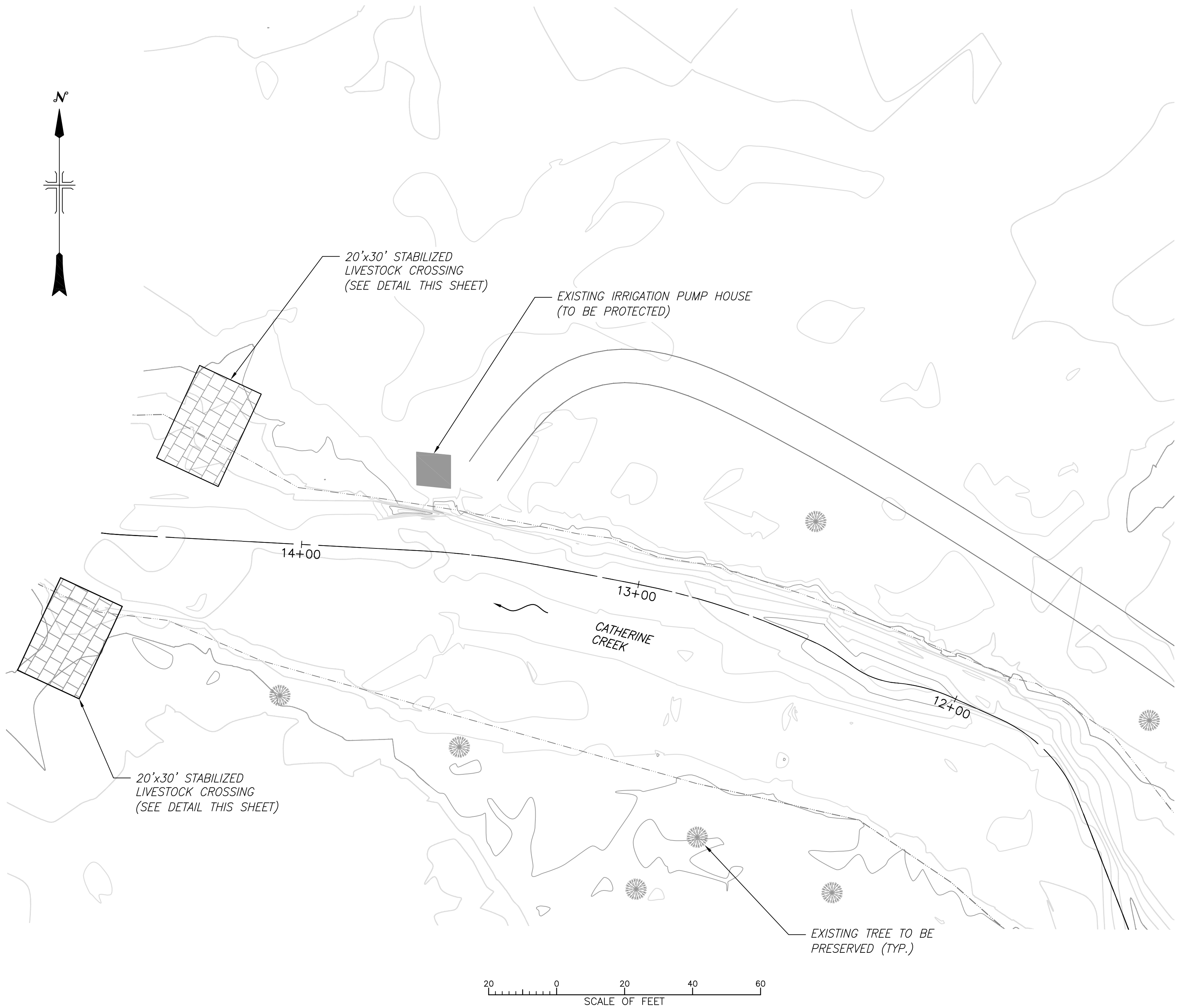


STABILIZED LIVESTOCK CROSSING TYPICAL CROSS-SECTION



GRADING PLAN

NOTES

1. SEE SITE ACCESS AND SPOILS AREAS, SHEET G4, FOR ACCESS ROUTES AND SPOILS AREAS ON SITE.
2. ROCK USED FOR STABILIZED LIVESTOCK CROSSING SHALL BE ANGULAR QUARRY ROCK WITH A MINIMUM SIZE OF 3" AND MAXIMUM SIZE OF 6".

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SHEET C-8

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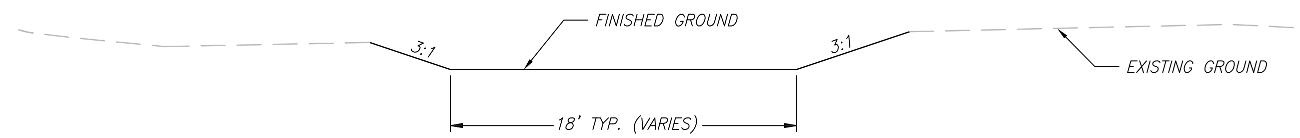
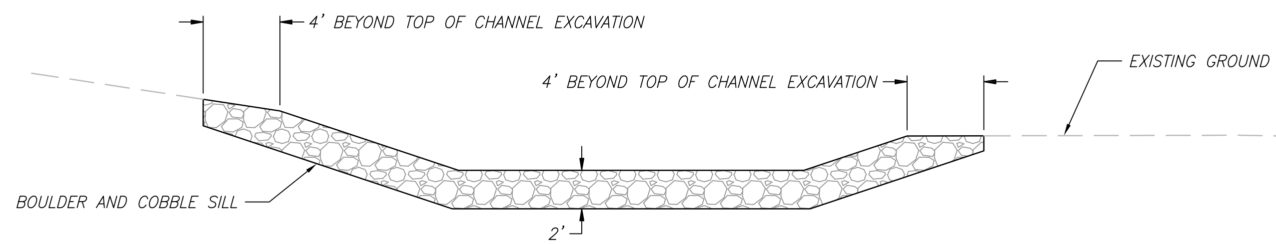
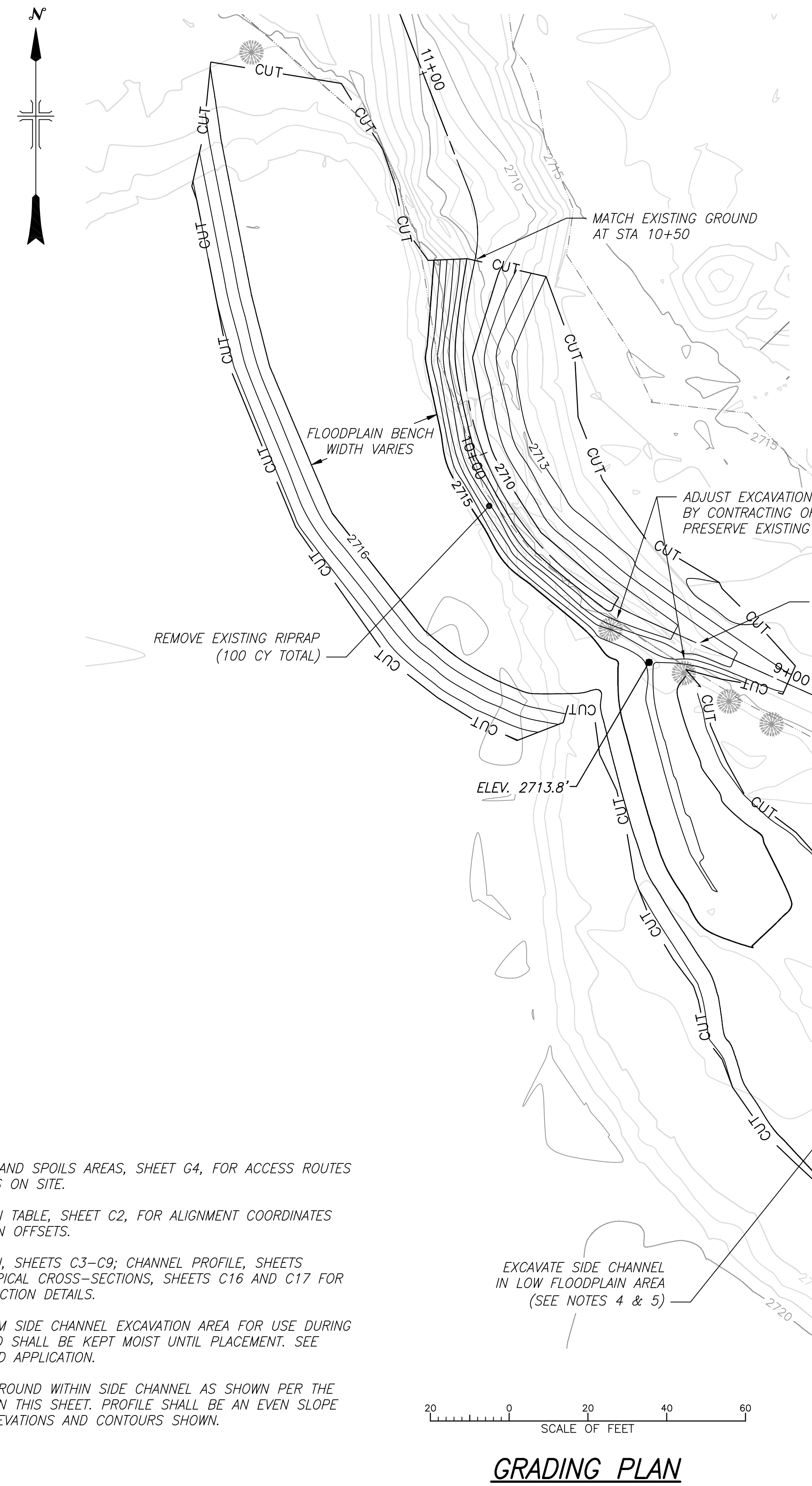
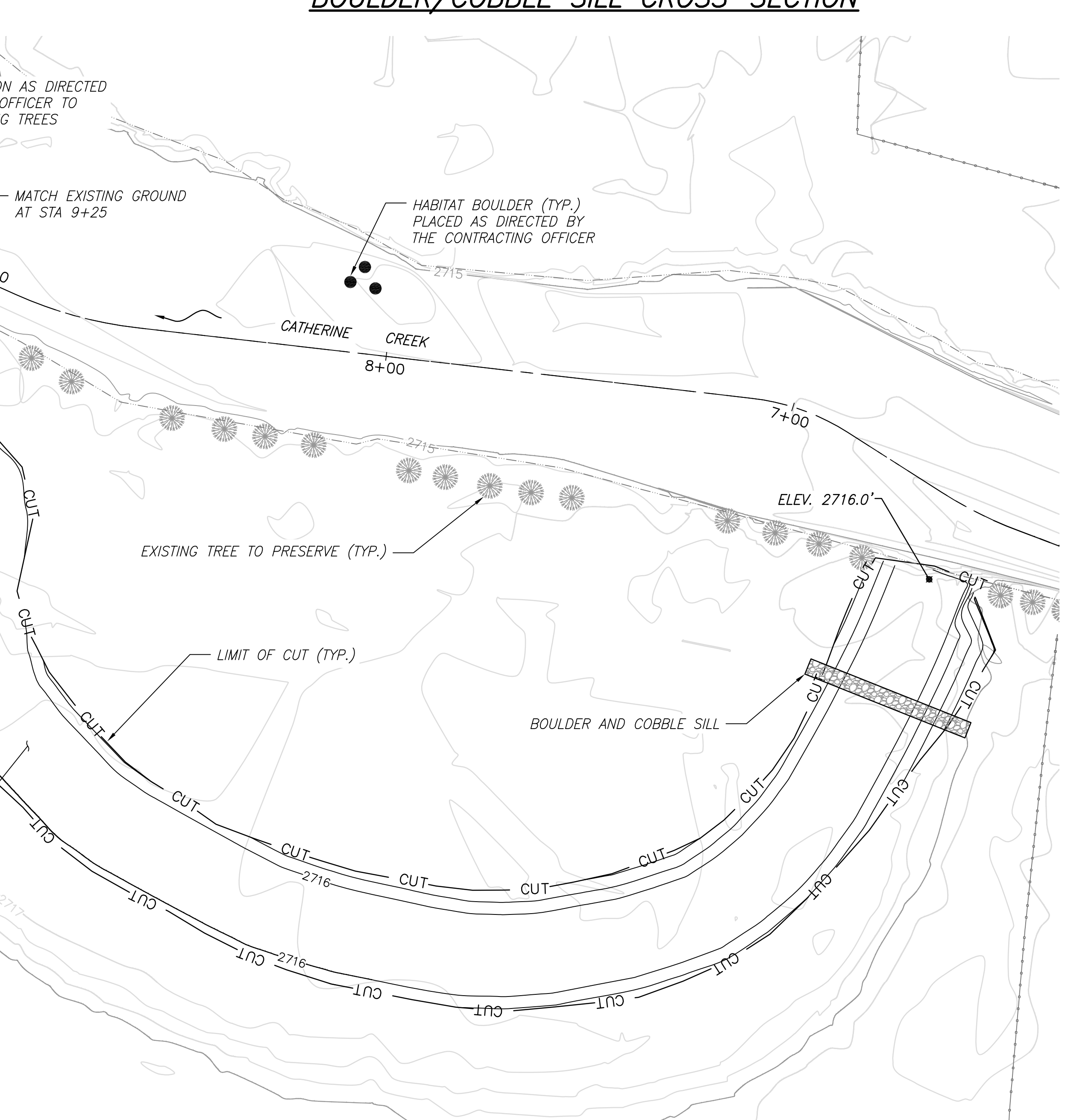


SIDE CHANNEL TYPICAL CROSS-SECTION



BOULDER/COBBLE SILL CROSS-SECTION

GRADING PLAN

NOTES

1. SEE SITE ACCESS AND SPOILS AREAS, SHEET G4, FOR ACCESS ROUTES AND SPOILS AREAS ON SITE.
2. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
3. SEE GRADING PLAN, SHEETS C3–C9; CHANNEL PROFILE, SHEETS C10–C15; AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.
4. SALVAGE SOD FROM SIDE CHANNEL EXCAVATION AREA FOR USE DURING REVEGETATION. SOD SHALL BE KEPT MOIST UNTIL PLACEMENT. SEE SHEET L1 FOR SOD APPLICATION.
5. LOWER EXISTING GROUND WITHIN SIDE CHANNEL AS SHOWN PER THE CROSS-SECTION ON THIS SHEET. PROFILE SHALL BE AN EVEN SLOPE BETWEEN SPOT ELEVATIONS AND CONTOURS SHOWN.

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SHEET C-9

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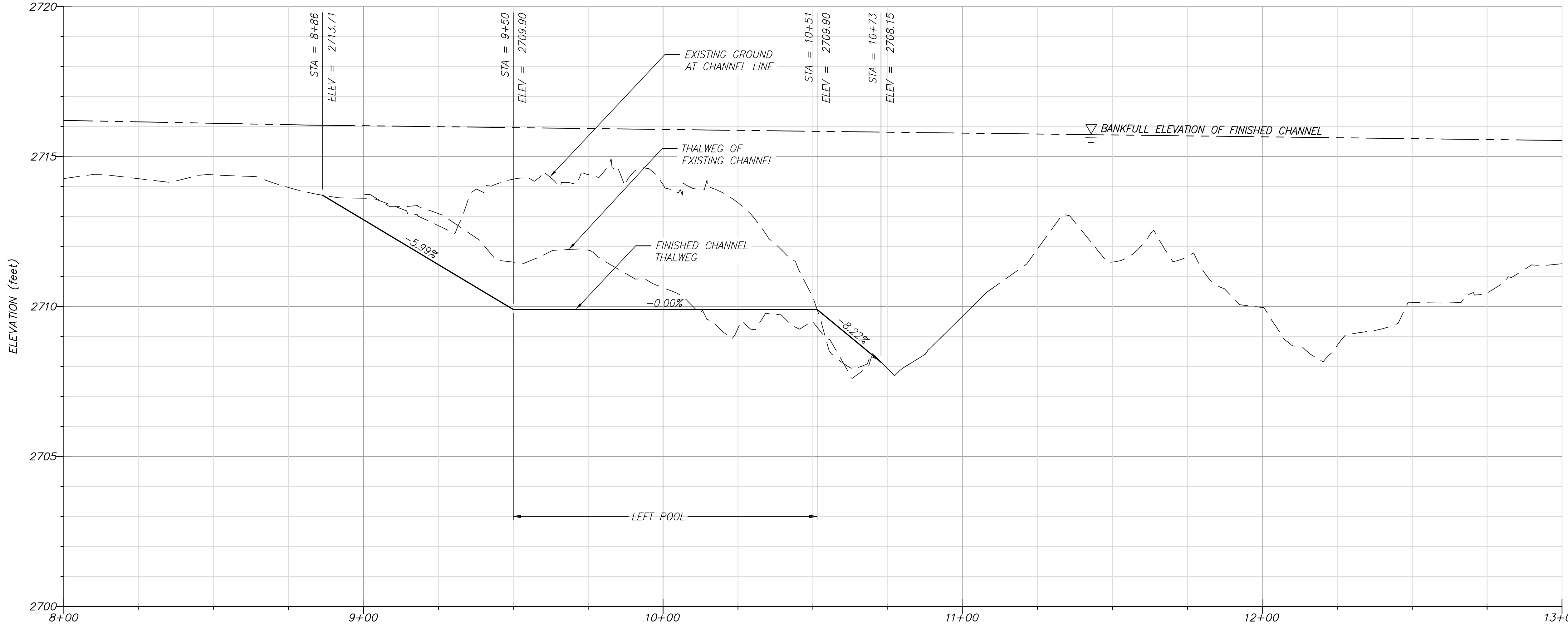

CHANNEL LINE

NOTES

1. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
2. SEE GRADING PLAN, SHEETS C3–C9 AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.

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CHANNEL PROFILE
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CHANNEL PROFILE

SHEET C-10

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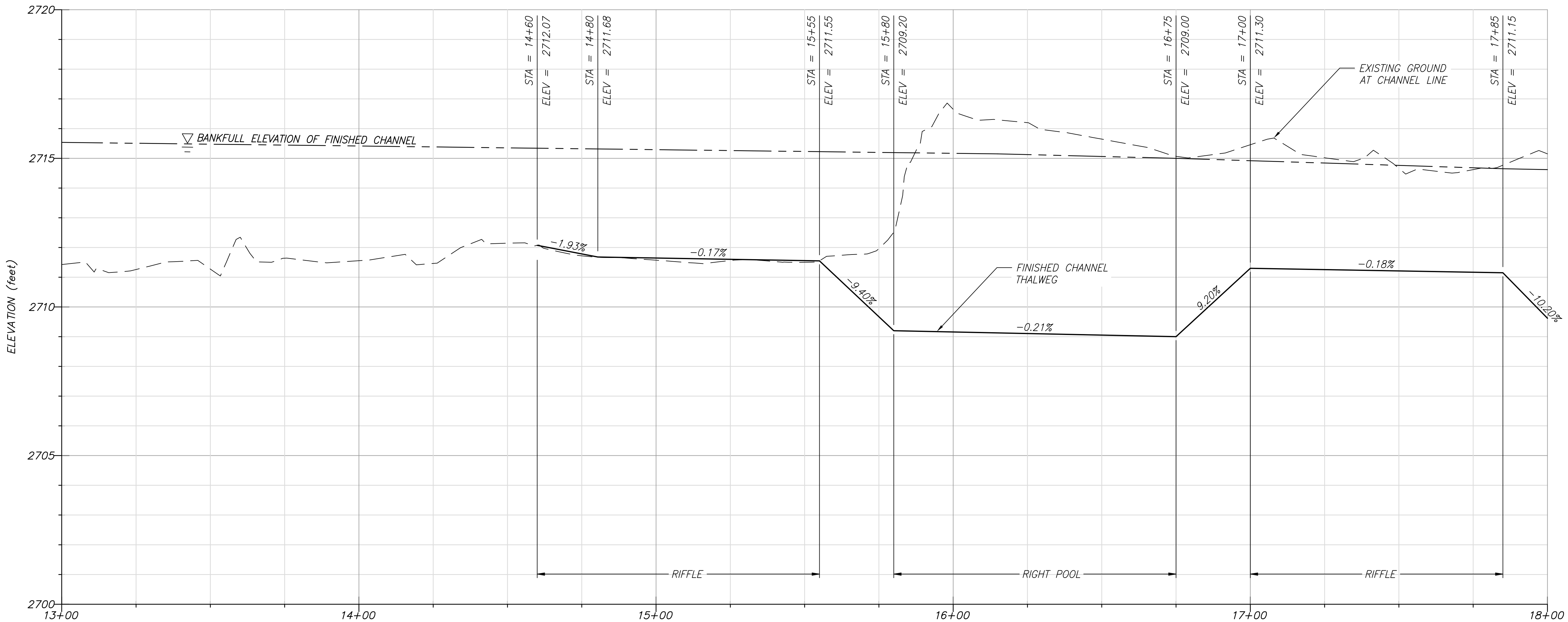

CHANNEL LINE

NOTES

1. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
2. SEE GRADING PLAN, SHEETS C3–C9 AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.

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CHANNEL PROFILE

SHEET C-11

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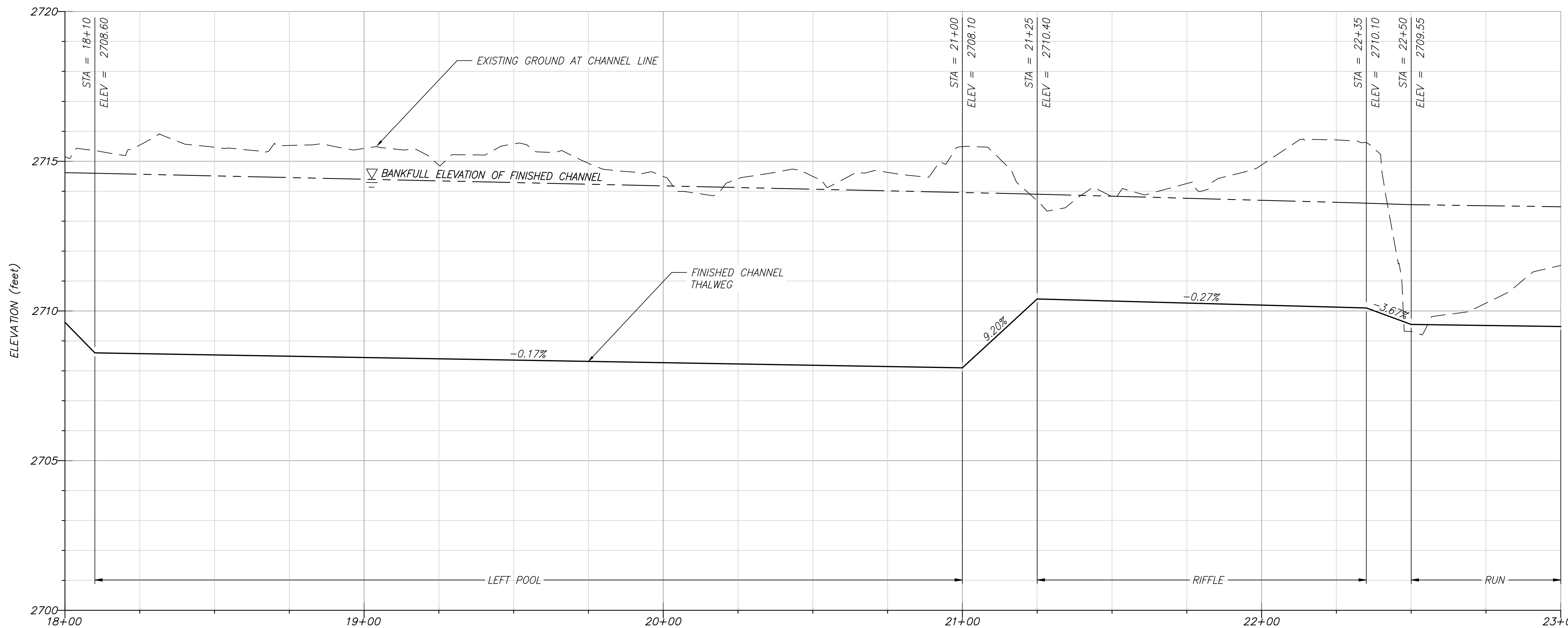

CHANNEL LINE

NOTES

1. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
2. SEE GRADING PLAN, SHEETS C3–C9 AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.

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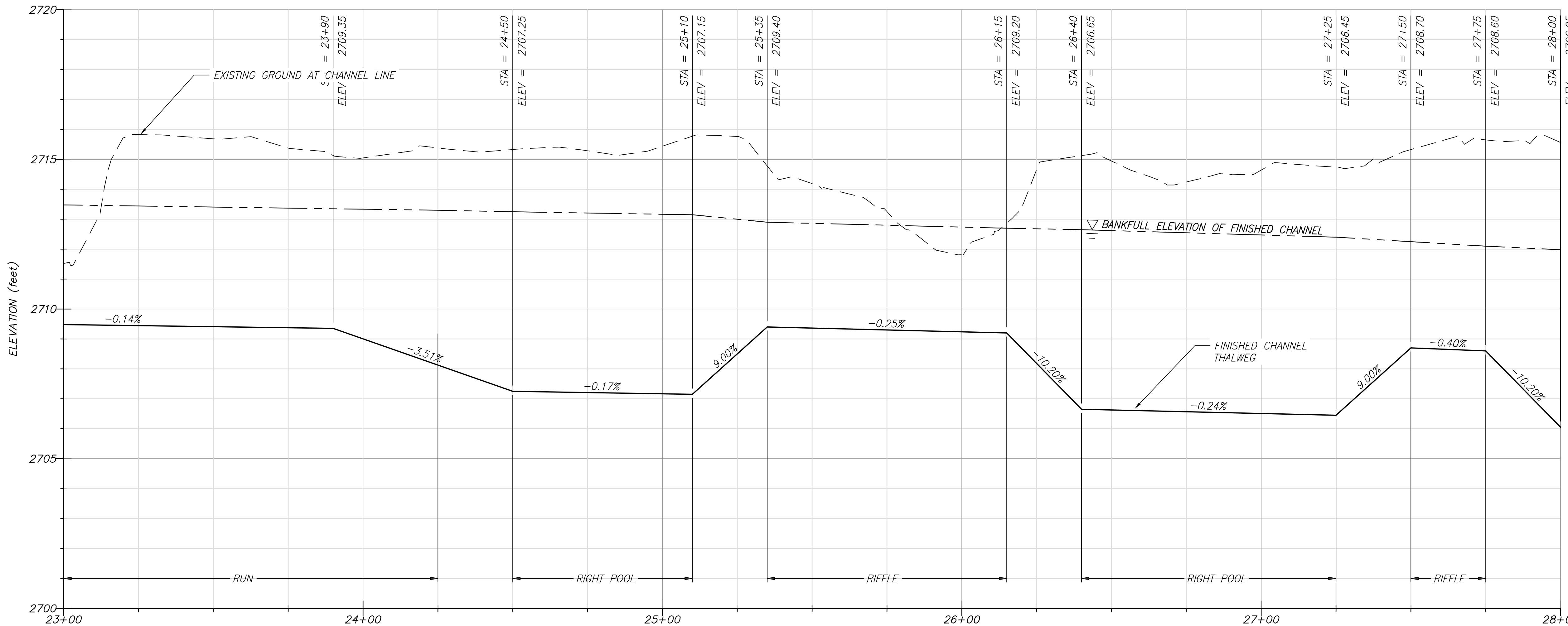
CHANNEL PROFILE

SHEET C-12
SHEET 17 OF 27



CHANNEL LINE

NOTES

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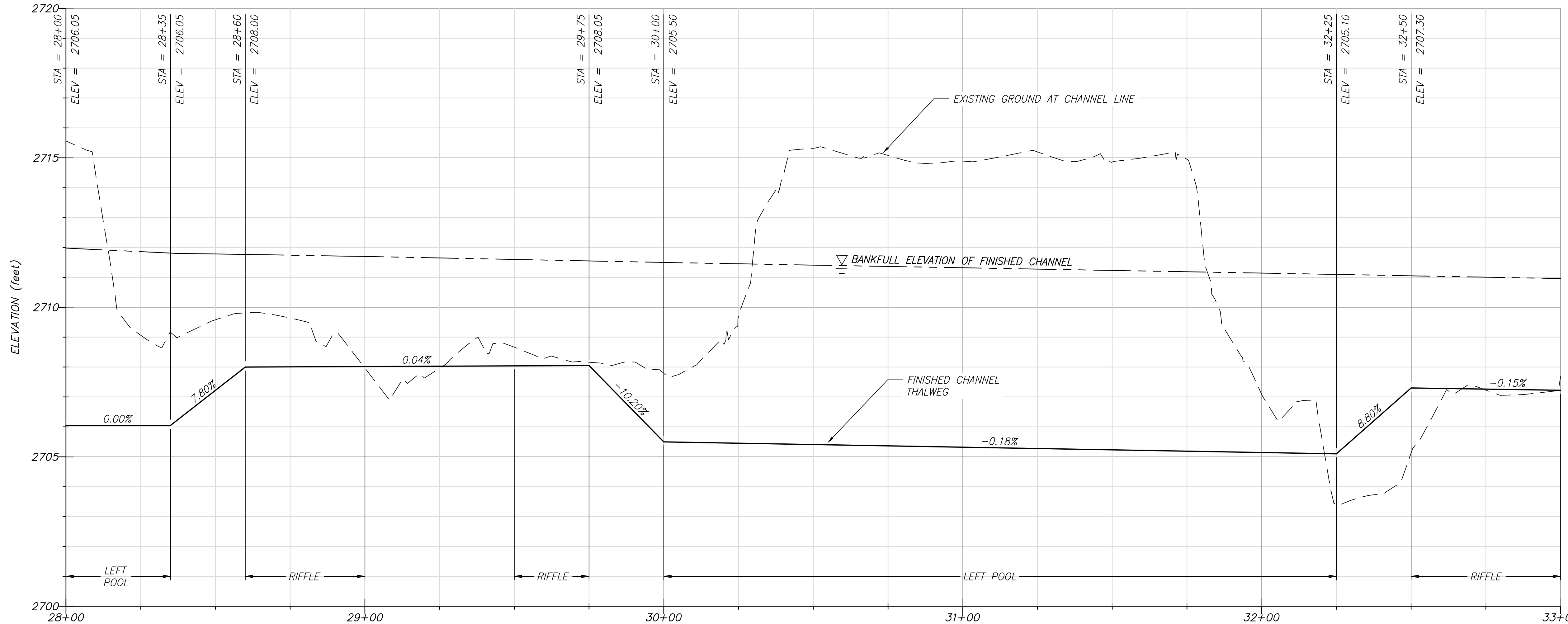
CHANNEL PROFILE

SHEET C-13



CHANNEL LINE

NOTES

1. SEE CONSTRUCTION TABLE, SHEET C2, FOR ALIGNMENT COORDINATES AND CONSTRUCTION OFFSETS.
2. SEE GRADING PLAN, SHEETS C3–C9 AND TYPICAL CROSS-SECTIONS, SHEETS C16 AND C17 FOR CHANNEL CONSTRUCTION DETAILS.

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TITLE

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CHANNEL PROFILE

SHEET C–14

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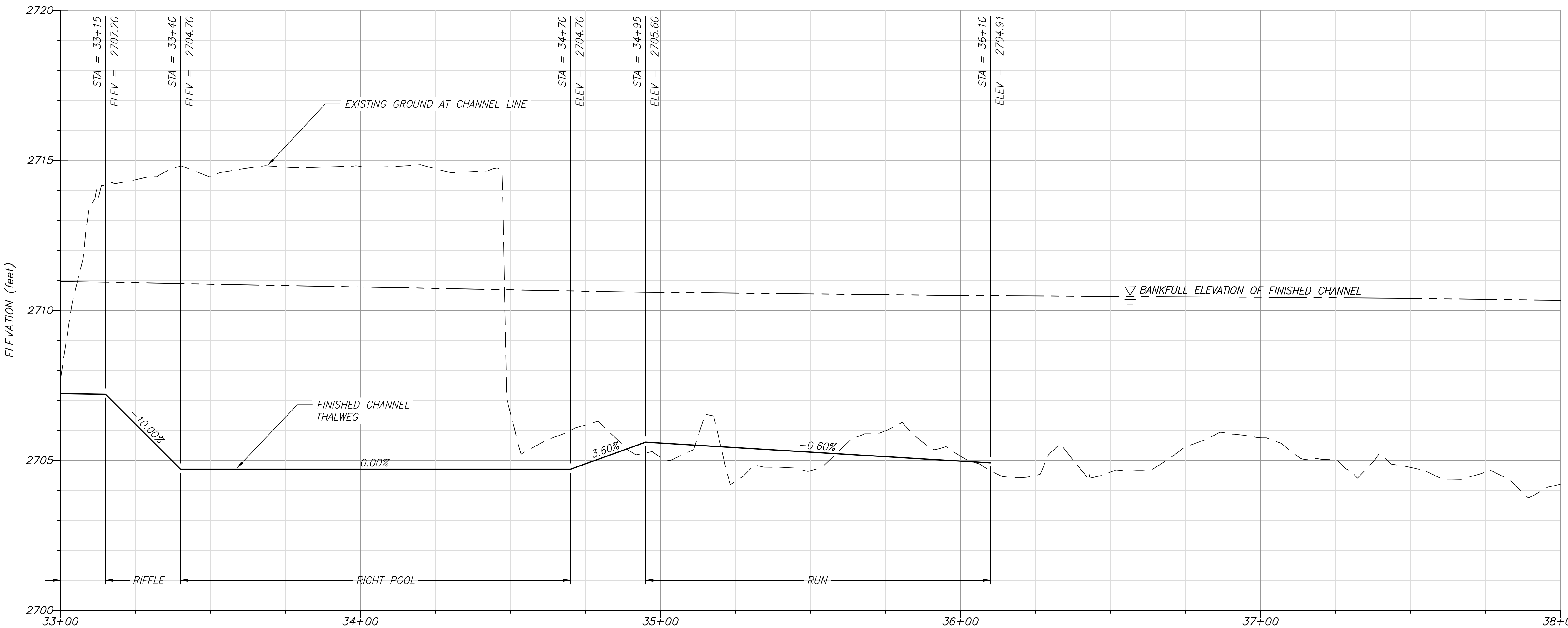

CHANNEL LINE

NOTES

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CHANNEL PROFILE

SHEET C–15

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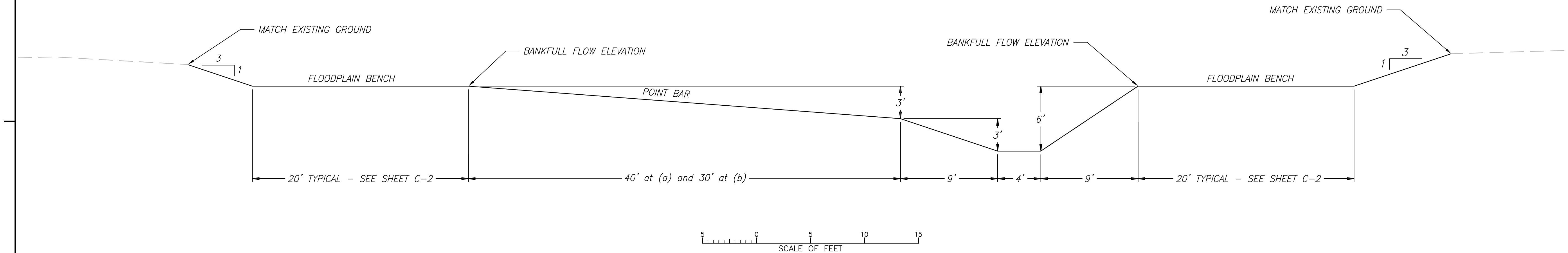
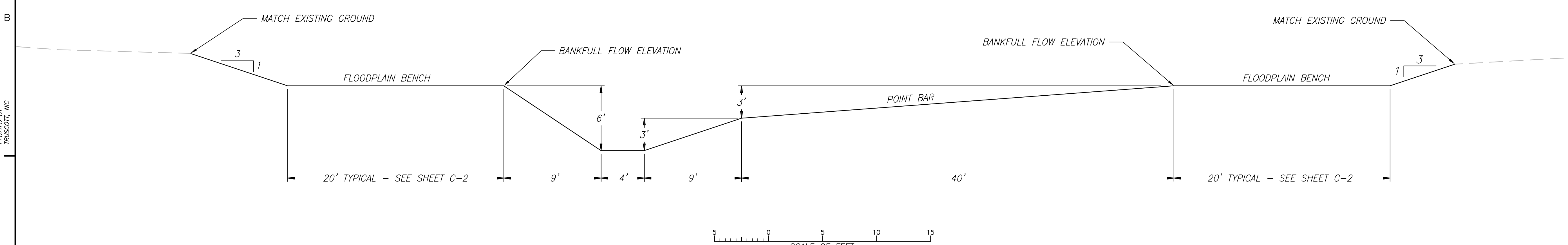


TYPICAL CHANNEL CROSS SECTION – RIGHT POOL

STATION	TO	STATION
15+80		16+75 (a)
24+50		25+10 (b)
26+40		27+25 (b)
33+40		34+70 (a)



TYPICAL CHANNEL CROSS SECTION – LEFT POOL

STATION	TO	STATION
9+50		10+51
18+10		21+00
28+00		28+35
30+00		32+25

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TYPICAL CHANNEL CROSS SECTIONS
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TYPICAL CHANNEL CROSS SECTIONS

SHEET C–16
SHEET 21 OF 27

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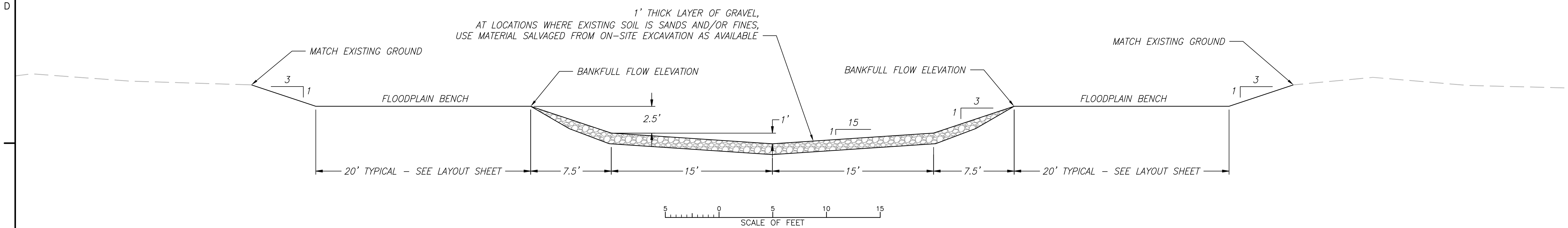
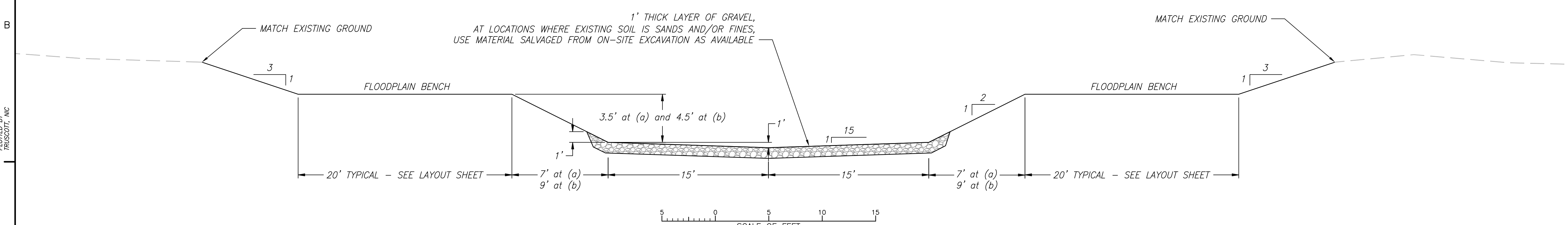


TYPICAL CHANNEL CROSS SECTION – RIFFLE

STATION	TO	STATION
14+80		15+55
17+00		17+85
21+25		22+35
25+35		26+15

STATION	TO	STATION
27+50		27+75
28+60		29+00
29+50		29+75
32+50		33+15



TYPICAL CHANNEL CROSS SECTION – RUN

STATION	TO	STATION
22+50		24+25 (a)
34+95		36+10 (b)

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CATHERIN CREEK - RM 37 RESTORATION PROJECT
TYPICAL CHANNEL CROSS SECTIONS
PRELIMINARY DESIGN DRAWINGS

REV NO

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BOISE, ID 2012-02-10

TYPICAL CHANNEL CROSS SECTIONS

SHEET C-17

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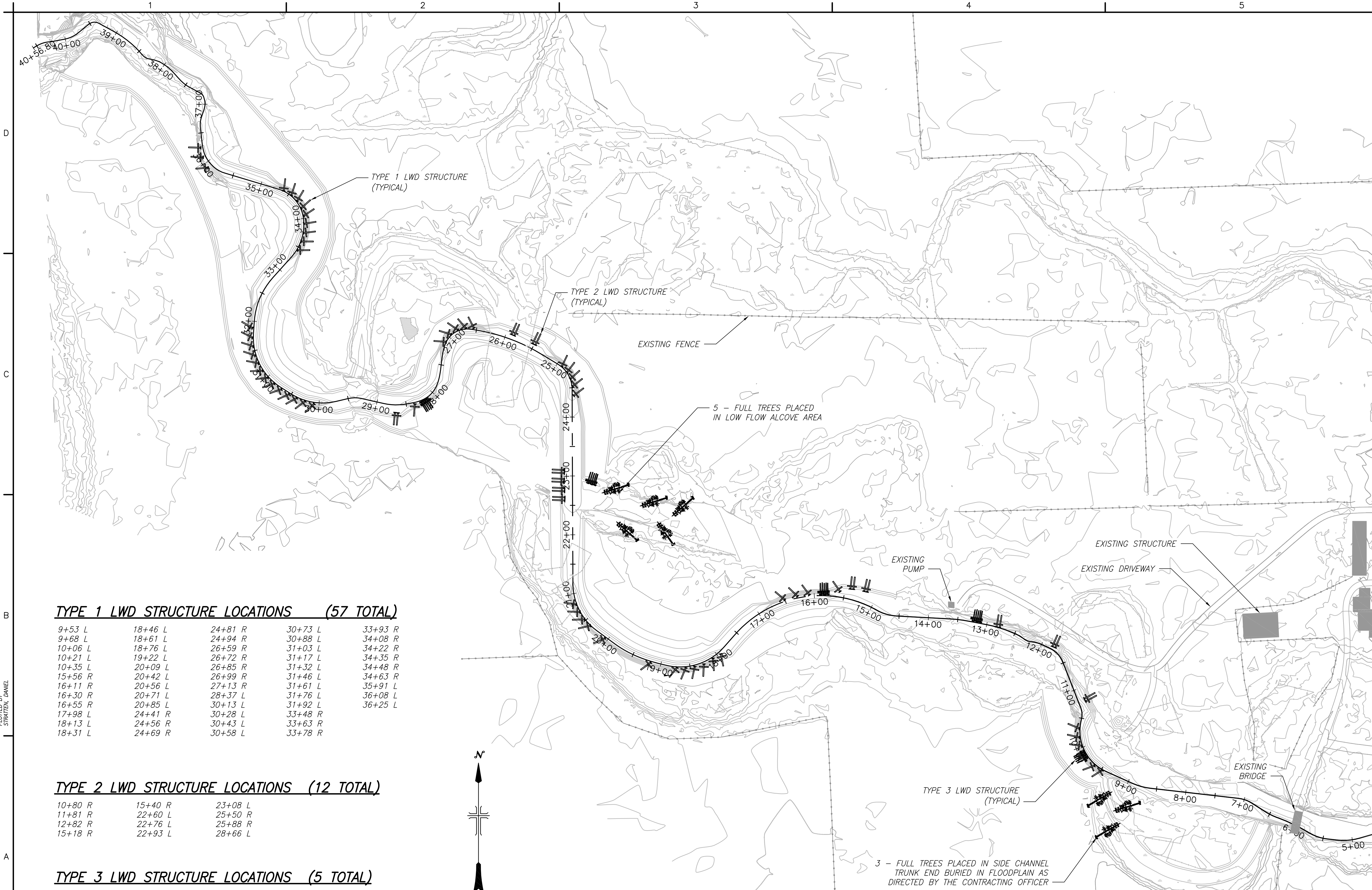

TYPE 1 LWD STRUCTURE LOCATIONS (57 TOTAL)

9+53 L	18+46 L	24+81 R	30+73 L	33+93 R
9+68 L	18+61 L	24+94 R	30+88 L	34+08 R
10+06 L	18+76 L	26+59 R	31+03 L	34+22 R
10+21 L	19+22 L	26+72 R	31+17 L	34+35 R
10+35 L	20+09 L	26+85 R	31+32 L	34+48 R
15+56 R	20+42 L	26+99 R	31+46 L	34+63 R
16+11 R	20+56 L	27+13 R	31+61 L	35+91 L
16+30 R	20+71 L	28+37 L	31+76 L	36+08 L
16+55 R	20+85 L	30+13 L	31+92 L	36+25 L
17+98 L	24+41 R	30+28 L	33+48 R	
18+13 L	24+56 R	30+43 L	33+63 R	
18+31 L	24+69 R	30+58 L	33+78 R	

TYPE 2 LWD STRUCTURE LOCATIONS (12 TOTAL)

10+80 R	15+40 R	23+08 L
11+81 R	22+60 L	25+50 R
12+82 R	22+76 L	25+88 R
15+18 R	22+93 L	28+66 L

TYPE 3 LWD STRUCTURE LOCATIONS (5 TOTAL)

9+86 L
13+18 R
15+82 R
22+90 R
28+20 L

80 0 80 160 240
SCALE OF FEET

LWD STRUCTURES OVERVIEW

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CATHERINE CREEK – RM 37 RESTORATION PROJECT
LWD STRUCTURES LOCATIONS
PRELIMINARY DESIGN DRAWINGS

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LWD STRUCTURES LOCATIONS

SHEET C-18

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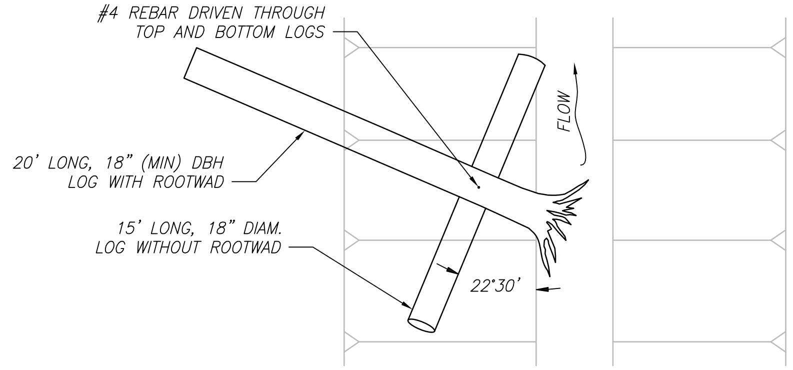
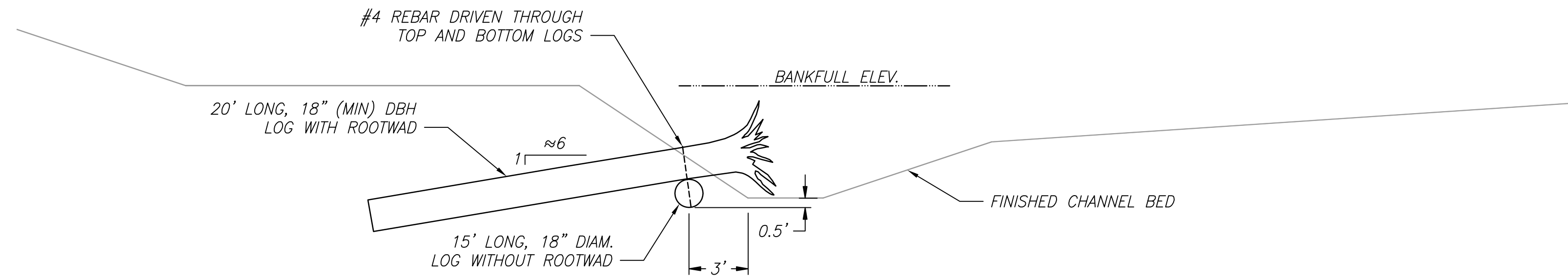
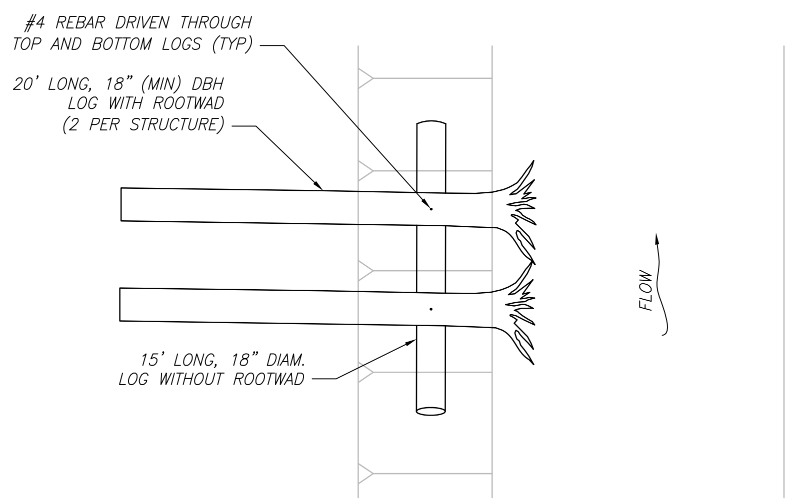


TYPE 1 LWD STRUCTURE – PLAN VIEW



TYPE 1 LWD STRUCTURE – SECTION VIEW



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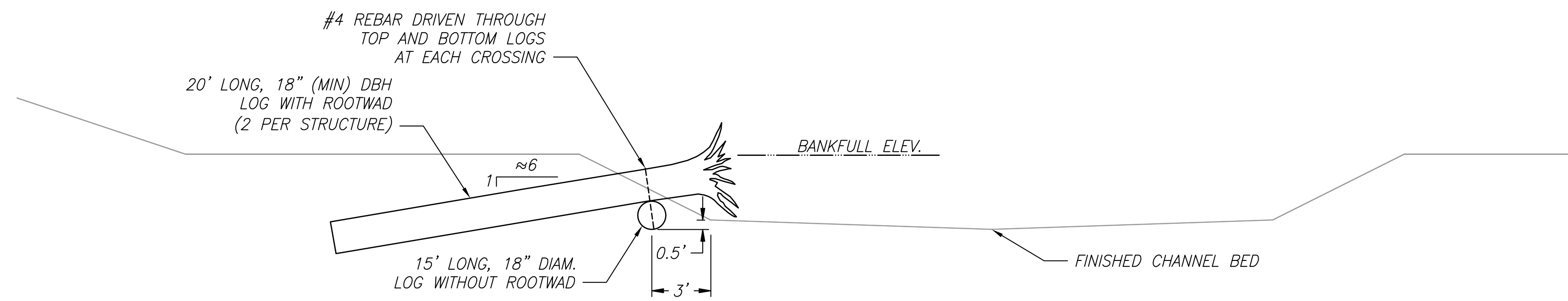
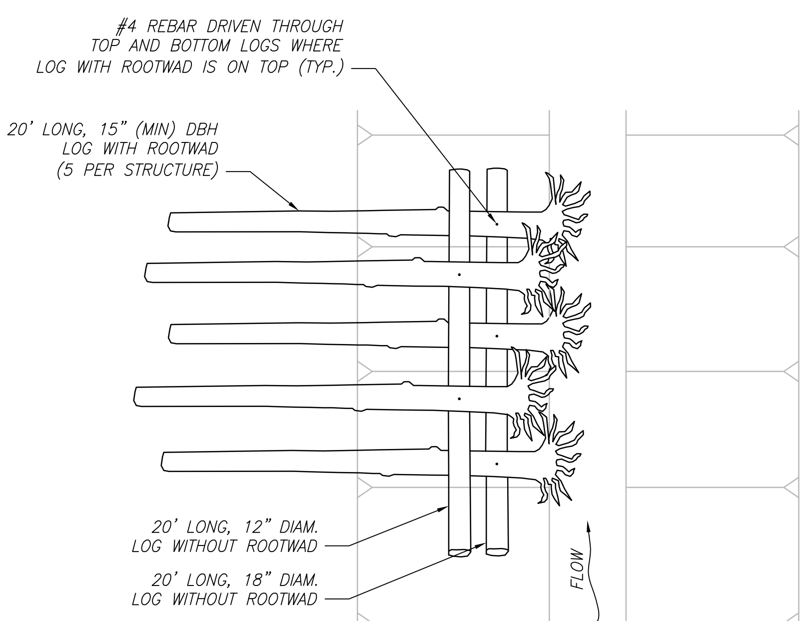


TYPE 2 LWD STRUCTURE – SECTION VIEW



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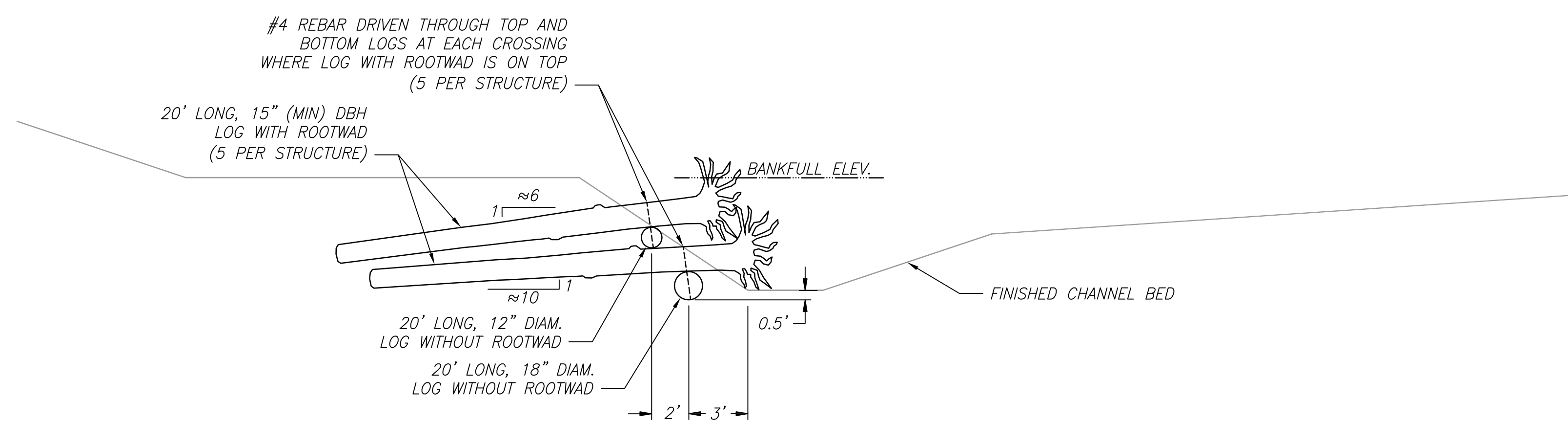

TYPE 3 LWD STRUCTURE – SECTION VIEW

5 0 5 10 15
SCALE OF FEET

LWD STRUCTURE DETAILS

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LWD STRUCTURE DETAILS
PRELIMINARY DESIGN DRAWINGS

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LWD STRUCTURE DETAILS

SHEET C-19

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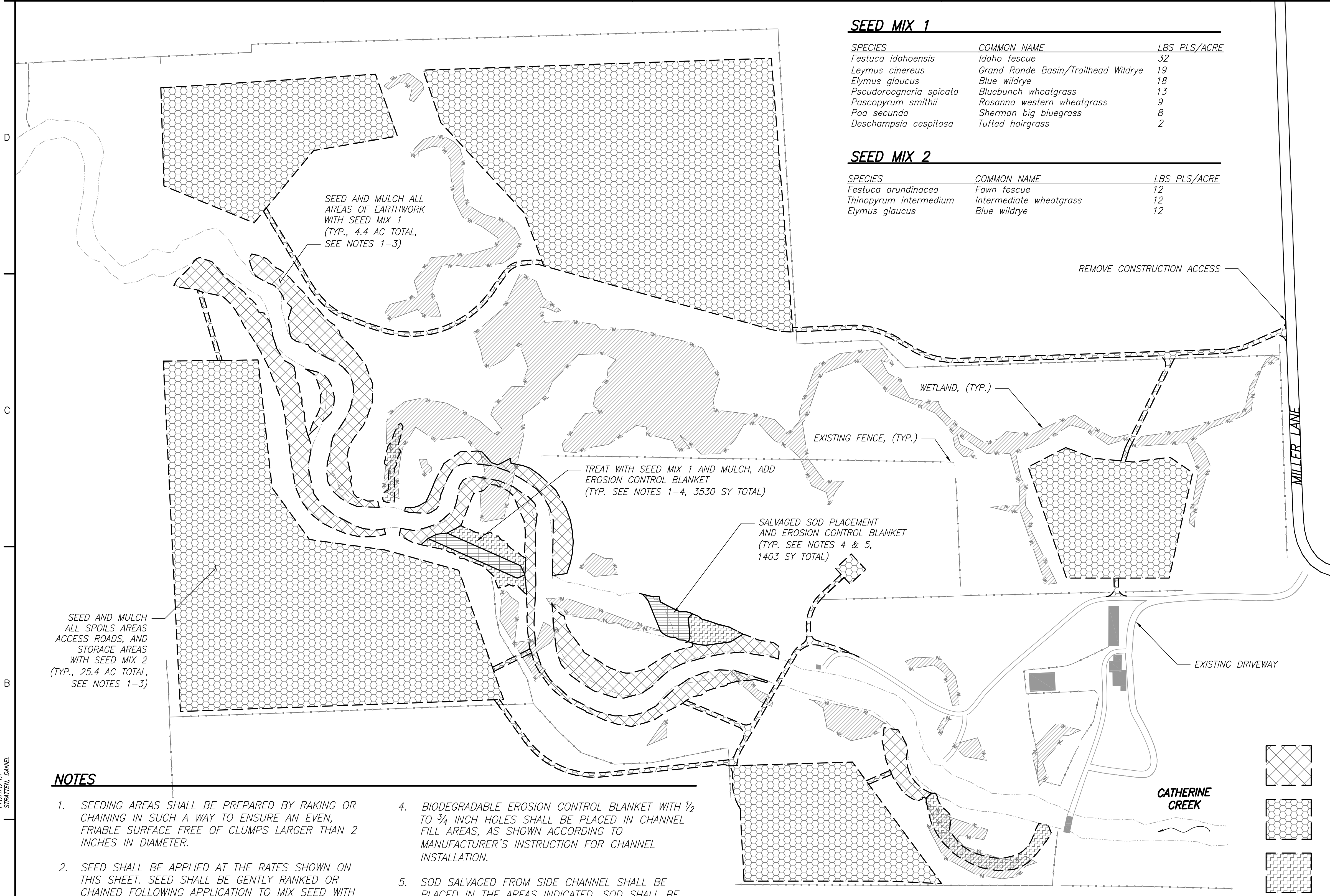

SEED MIX 1

SPECIES	COMMON NAME	LBS PLS/ACRE
Festuca idahoensis	Idaho fescue	32
Leymus cinereus	Grand Ronde Basin/Trailhead Wildrye	19
Elymus glaucus	Blue wildrye	18
Pseudoroegneria spicata	Bluebunch wheatgrass	13
Pascopyrum smithii	Rosanna western wheatgrass	9
Poa secunda	Sherman big bluegrass	8
Deschampsia cespitosa	Tufted hairgrass	2

SEED MIX 2

SPECIES	COMMON NAME	LBS PLS/ACRE
Festuca arundinacea	Fawn fescue	12
Thinopyrum intermedium	Intermediate wheatgrass	12
Elymus glaucus	Blue wildrye	12

NOTES

1. SEEDING AREAS SHALL BE PREPARED BY RAKING OR CHAINING IN SUCH A WAY TO ENSURE AN EVEN, FRIABLE SURFACE FREE OF CLUMPS LARGER THAN 2 INCHES IN DIAMETER.
2. SEED SHALL BE APPLIED AT THE RATES SHOWN ON THIS SHEET. SEED SHALL BE GENTLY RANKED OR CHAINED FOLLOWING APPLICATION TO MIX SEED WITH THE TOP HALF INCH OF SOIL.
3. FOLLOWING APPLICATION AND RAKING, SEED SHALL BE MULCHED WITH STRAW AT A RATE OF 2 TONS PER ACRE.
4. BIODEGRADABLE EROSION CONTROL BLANKET WITH ½ TO ¾ INCH HOLES SHALL BE PLACED IN CHANNEL FILL AREAS, AS SHOWN ACCORDING TO MANUFACTURER'S INSTRUCTION FOR CHANNEL INSTALLATION.
5. SOD SALVAGED FROM SIDE CHANNEL SHALL BE PLACED IN THE AREAS INDICATED. SOD SHALL BE PLACED BELOW EROSION CONTROL BLANKET AND SHALL BE HELD IN PLACE BY EROSION CONTROL BLANKET ANCHORING.

SEED MIX 1 AND MULCH

SEED MIX 2 AND MULCH

SEED MIX 1, MULCH & EROSION CONTROL BLANKET

SALVAGED SOD PLACEMENT & EROSION CONTROL BLANKET

125 0 125 250 375
SCALE OF FEET

SEEDING AND EROSION CONTROL PLAN

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L–1

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SEEDING AND EROSION CONTROL PLAN
PRELIMINARY DESIGN DRAWINGS

REV NO

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BOISE, ID 2012–02–10

SEEDING AND EROSION CONTROL PLAN

SHEET L–1

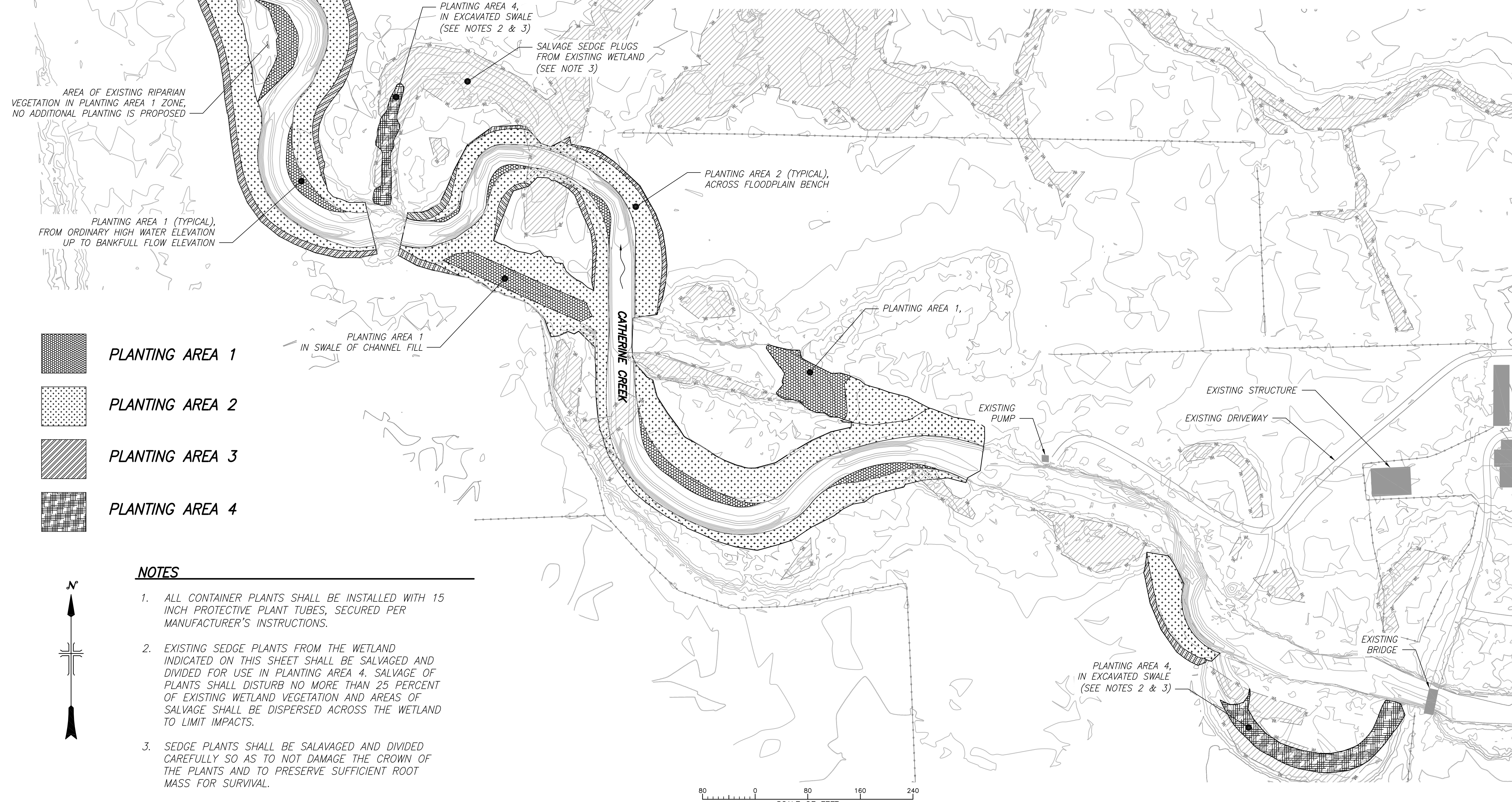
PLANT SCHEDULE

PLANTING AREA 1 (32,594 sf, 0.75 ac)	SPECIES	COMMON NAME	SPACING	QUANTITY	SIZE/TYPE
On upper point bars and in swales	Salix exigua	Coyote willow	4'	2040	4' Live Stake

PLANTING AREA 2 (138,827 sf, 3.19 ac)	SPECIES	COMMON NAME	SPACING	QUANTITY	SIZE/TYPE
Across floodplain bench areas in constructed channel and adjacent channel fill area of similar elevation	Populus trichocarpa	Black cottonwood	4'	1740	4' Live Stake
	Salix exigua	Coyote willow	4'	5210	4' Live Stake
	Salix prolixa	McKenzie willow	4'	1740	4' Live Stake

PLANTING AREA 3 (23,745 sf, 0.55 ac)	SPECIES	COMMON NAME	SPACING	QUANTITY	SIZE/TYPE
From slope break at back of floodplain bench to limit of earthwork	Alnus incana	Speckled alder	4'	370	1 Gal. Container
	Crataegus douglasii	Black hawthorne	4'	300	1 Gal. Container
	Populus trichocarpa	Black cottonwood	8'	110	1 Gal. Container
	Cornus sericea	Red–osier dogwood	4'	370	1 Gal. Container

PLANTING AREA 4 (16,046 sf, 0.31 ac)	SPECIES	COMMON NAME	SPACING	QUANTITY	SIZE/TYPE
On upper point bars and in swales	Salix exigua	Coyote willow	4'	250	4' Live Stake
	Carex spp.	Salvaged sedge plugs	2'	2330	Salvage on–site (see Notes 3 & 4)



PLANTING AREA 1

PLANTING AREA 2

PLANTING AREA 3

PLANTING AREA 4

NOTES

1. ALL CONTAINER PLANTS SHALL BE INSTALLED WITH 15 INCH PROTECTIVE PLANT TUBES, SECURED PER MANUFACTURER'S INSTRUCTIONS.

2. EXISTING SEDGE PLANTS FROM THE WETLAND INDICATED ON THIS SHEET SHALL BE SALVAGED AND DIVIDED FOR USE IN PLANTING AREA 4. SALVAGE OF PLANTS SHALL DISTURB NO MORE THAN 25 PERCENT OF EXISTING WETLAND VEGETATION AND AREAS OF SALVAGE SHALL BE DISPERSED ACROSS THE WETLAND TO LIMIT IMPACTS.

3. SEDGE PLANTS SHALL BE SALAVAGED AND DIVIDED CAREFULLY SO AS TO NOT DAMAGE THE CROWN OF THE PLANTS AND TO PRESERVE SUFFICIENT ROOT MASS FOR SURVIVAL.

PLANTING PLAN

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PLANTING PLAN

PRELIMINARY DESIGN DRAWINGS

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PLANTING PLAN

SHEET L–2

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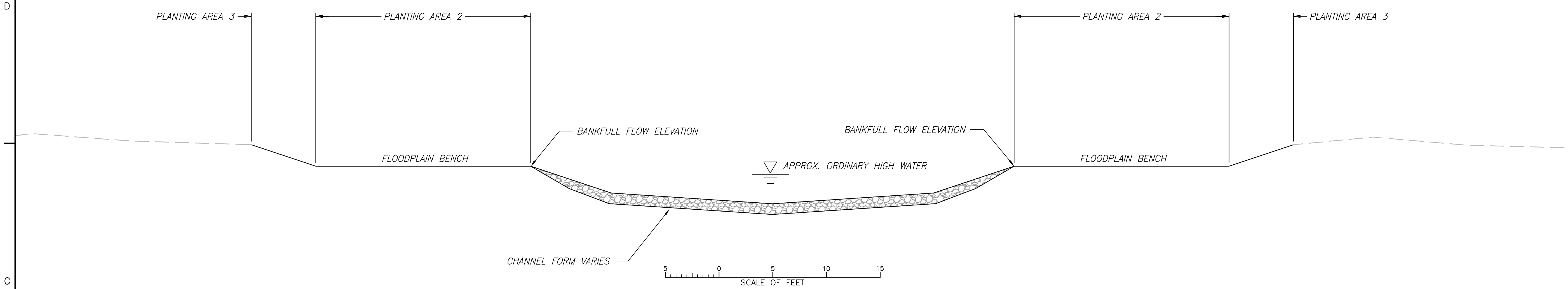
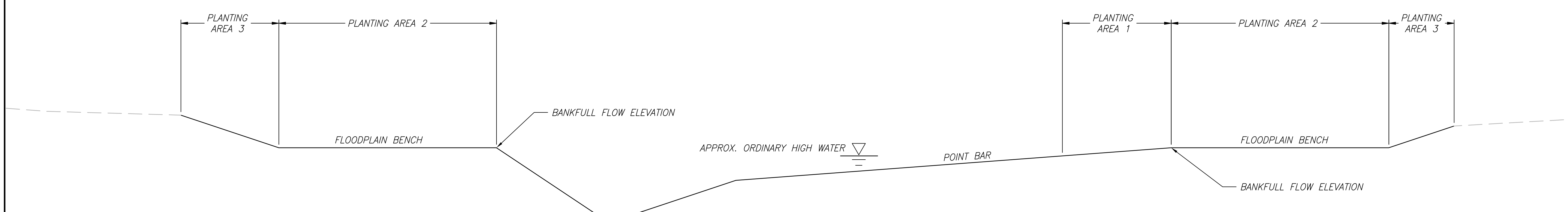


TYPICAL PLANTING AREAS IN RIFFLES AND RUNS



5 0 5 10 15
SCALE OF FEET

TYPICAL PLANTING AREAS IN POOLS

NOTES

1. THESE CROSS-SECTIONS SHALL SERVE AS A GUIDELINES FOR DETERMINING PLANTING AREA BOUNDARIES. SEE PLANTING PLAN (SHEET L2) FOR LAYOUT AND SIZE OF ALL PLANTING AREAS.

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TYPICAL CHANNEL CROSS SECTIONS
PRELIMINARY DESIGN DRAWINGS

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PLANTING DETAILS

SHEET L-3
SHEET 27 OF 27

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Appendix D

ODFW In-Water Work Window for the Catherine Creek RM 37 Meander Reconstruction Project

CC-37 Habitat Restoration Project
In-water Work Window Recommendation
ODFW – La Grande Fish District

The ODFW La Grande Fish District recommended in-water work window for the Catherine Creek 37 Habitat Restoration Project (CC-37 Project) is August 1 through September 30. As this is a deviation from ODFW's published guidelines for timing of in-water work, (www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_Work2008.pdf), the rationale for this recommendation is provided below.

Supporting Information

ODFW published guidelines include two in-water work windows for Catherine Creek: 1) from the confluence of the Grande Ronde River upstream to (and including) Little Creek, July 1 to October 15, and 2) from Little Creek upstream, July 1 to August 15. These work windows are intended to minimize, not necessarily eliminate, the impacts resulting from in-water work on sensitive fish species that inhabit Catherine Creek including spring Chinook salmon, summer steelhead, interior redband trout and bull trout. They are intended to protect vulnerable life stages of these species including spawning, egg incubation, rearing, and migration. Providing protection within stream reaches that are spawning areas for multiple species is challenging and is often a compromise between conflicting needs.

The CC-37 project is located downstream of Union, approximately 1.3 miles upstream from the confluence of Little Creek, placing it very close to the boundary between the two published work window guidelines for Catherine Creek.

Catherine Creek upstream of Little Creek is spawning habitat for all of the species listed above, with bull trout spawning restricted to headwater areas. The in-water work window for this reach is positioned between when fry emergence is expected complete for steelhead and redband trout and the onset of Chinook spawning. With steelhead and redband trout being primarily spring spawners, fry emergence is expected to occur later into the spring/summer than spring Chinook or bull trout. Fry emergence is expected to be complete by July 1. Spring Chinook spawning occurs from mid-August through mid-September.

The in-water work guideline for upper Catherine Creek is a compromise, however, as adult Chinook are migrating and holding here prior to spawning, from late-May until spawning, during much of ODFW's published in-water work guideline. While the adults are able to move and avoid in-water work activity, this is a stressor during a critical time.

The area downstream of Little Creek is rearing and migration habitat for the sensitive species listed previously. Rearing and migration occurs within this reach from fall through early summer. Water temperatures are not favorable for use of this reach by these species in the summer. Key factors for consideration within this reach are use by rearing/migratory bull trout, salmon and steelhead smolt outmigration and upstream migration of adult Chinook and steelhead.

Studies of bull trout movement have not been done in Catherine Creek, but inferences from investigations conducted in streams throughout the region suggest that bull trout would possibly move into lower Catherine Creek as early as October, and then move for areas upstream in May and/or June (Contor et al. 2003; Germond 2000; Hemmingson et al 1997; Hemmingson et al 2001a; Hemmingson et al. 2001b; Hemmingson et al. 2002; Sankovich et al. 2003; Sankovich et al. 2004; Schwartz et al. 2005; Whitesel et al. 2001). Bull trout would move in and out of the area based on the suitability of the habitat conditions, primarily streamflow and water temperature.

Adult Chinook migration within lower Catherine Creek generally occurs mid May through mid July and steelhead migration, March through May. However, holding adult Chinook have occasionally been found in the vicinity of the CC-37 Project reach in early August, likely the result of exceptionally abundant spring flows that have occurred in recent years.

Juvenile salmon and steelhead outmigration and rearing occurs in lower Catherine Creek October through May (Anderson et al. 2011; Favrot et al 2010a). Juvenile Chinook early migrants begin reaching the screw trap location 4.8 miles upstream of the CC-37 Project reach mid to late September. The median date for the early juvenile Chinook migrants at the screw trap is mid-October through mid-November (Keefe et al. 1994; Keefe et al. 1995; Jonasson et al. 1996; Jonasson et al. 1997; Keefe 3t al. 1998; Jonasson et al. 1999; Monzyk et al. 2002; Reischauer et al. 2003; Jonasson 2006; Yanke et al. 2007; Nesbit et al. 2007; Van Dyke et al. 2008a; Van Dyke et al. 2008b; Yanke et al. 2008; Yanke et al. 2009; Favrot et al. 2010b; Anderson et al 2011). This is a critical factor considered in this recommendation as it has been established that early migrant juvenile Chinook utilize the CC-37 Project reach during the fall and early winter months (Favrot et al. 2010a).

In both 2010 and 2011, Chinook spawning surveys were conducted downstream of Union to the confluence of Little Creek. Two redds were documented downstream of Union in 2010, but none in 2011 (Joseph Feldhaus, personal communication; ODFW unpublished data). The most downstream redd in 2010 was approximately 1.1 miles upstream of the upper extent of the CC-37 Project (ODFW unpublished data).

Based on substrate size in the CC-37 Project reach, the downstream extent of spawning for Chinook and steelhead likely is within this reach. Pebble counts recently collected for design of the project indicate the D_{50} substrate particle size at the upstream end of the reach is 40 mm transitioning to sand/silt at the downstream end (Vance McGowan, personal communication). The reach average substrate D_{50} is 18mm. Spawning substrate size criteria for spring Chinook and steelhead are 1.6 to 10.2 cm and 0.6 to 10.2 cm, respectively (Bjornn and Reiser 1991).

Based on the information presented, it is unlikely that Chinook will spawn within the CC-37 Project reach.

Steelhead spawning surveys are not conducted regularly within the reach of Catherine Creek downstream of Union. It is possible that steelhead could spawn in the project reach, but the recommended work window is well outside of their spawning and incubation period.

Conclusion

Given the information presented, a project specific in-water work window is recommended in order that work occurs during the period when sensitive fish species are least likely to occur in the CC-37 Project reach. The recommended in-water work window for the CC-37 Project is August 1 to September 30.

The beginning of the work window is shifted one month later to avoid, to the extent practicable, the presence of lingering pre-spawning adult Chinook. Based on the preponderance of evidence, it is unlikely that Chinook spawning would occur in the CC-37 Project reach prior to construction. However, it is recommended that a spawning survey be conducted in the reach prior to commencement of work.

The end of the work window is shifted 1.5 months later, again, to provide a project specific in-water work window during the time that the presence of sensitive fish species is expected to be lowest. The work window end date was determined by the expected presence of downstream migrating juvenile Chinook early migrants. As described previously, these downstream migrants begin reaching the screw trap located upstream of Union mid to late September with the median passage date being mid-October to mid-November. The early migrants have not been found in the CC-37 Project reach until October (Favrot et al. 2010a). Thus, it would be appropriate to end the work window September 30 to avoid impacts to Juvenile Chinook migrants. This would also protect fall downstream migrating bull trout as they would likely not enter the reach before the juvenile Chinook.

While redband trout could be present in the CC-37 Project reach throughout the entire year, their abundance is expected to be lowest during the recommended in-water work window due to unfavorable streamflow and water temperature.

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Appendix E

Fish Salvage Protocol

C. Trap and Haul/Relocate Fish, Amphibians, and Reptiles Prior To Channel Diversion

Trap and haul operations will be initiated in August 2012. CTUIR/ODFW biologists assume that by waiting until the summer baseflow period, maximum water temperatures will persist and salmonid fish that have been rearing in the project reach will relocate to upper reaches of the system. The following provides a description of sequential steps of trap and haul effort. ODFW and CTUIR fish crews will initiate fish removal by first conducting fish population surveys for purposes of establishing a baseline fish population assessments within the project area. These fish will be relocated to upstream locations as described below. Three 50m index sites within the approximate 2400 meter river reach will be surveyed. Data provided through this effort will give project biologists a better assessment of what to expect in terms of magnitude of effort and setup requirements. Following completion of index sites surveys, CTUIR/ODFW crew will initiate trap and haul efforts along the entire reach until populations are depleted. Fish, amphibians, and reptiles captured during population surveys will be transported upriver.

1. The upper and lower reaches of the project area will be block-netted to prevent movement of fish into the restoration reach.
2. Seine nets will be utilized first (where possible) to capture/remove fish.
3. A Smith-Root Model 12A POW electroshocker to capture remaining fish, using NMFS protocol (“Backpack Electrofishing Guidelines”, NMFS June 2000 or later versions if available).
4. Fish transport will be conducted using 2, 6-wheeled, All Terrain Vehicles (ATVs) with integrated utility beds for secured storage of fish containers.
5. Fish will be transported in aerated 64-quart coolers and secured in ATV utility beds. Fish hold times will be minimized and multiple transport trips will be required. Water temperatures will be continuously monitoring as work progresses to avoid thermal stress.
6. All fish (salmonid and non-salmonid species), amphibians, and reptiles will be salvaged from the channel planned for dewatering and relocated to upstream locations; and
7. Transported fish, amphibians, and reptiles will be relocated to several designated sections above the restoration reach to avoid concentrating fish at designated release sites.

Following completion of initial trap and haul efforts, dewatering and diversion structures will be completed. Channel diversion will be accomplished by initially constructing a small, earthen plug to divert water into the restoration channel, followed by complete installation of earthen plugs (streambanks) and rootwad revetments. As soon as the diversion structure is constructed and the creek diverted into the restoration channel, ODFW and CTUIR crews will continue with trap and haul operations in the abandoned stream reach (from lower diversion to mouth) to salvage any remaining fish, amphibians, and reptiles that were not captured and hauled during initial trap and haul efforts. Every effort will be made to capture and remove all fish and other organisms from the dewatered stream reaches. If necessary, staff will conduct snorkeling in abandoned channel to determine whether any fish remain in the channel reach.

Juvenile salmonids and steelhead begin outmigration and rearing in early October through May. An estimated 15,000-25,000 juvenile salmonids could potentially be encountered during the effort based on an estimated rearing density of 0.10 fish/square meter of habitat (24,000 square meters). This estimate is believed to be conservative (on the high side) with anticipated elevated water temperatures within the project reach during late summer and probable decreased summer salmonid juvenile rearing within the project reach.

Appendix F

Conservation Easement and Livestock Plan


Catherine Creek CC-37
Fish Habitat Enhancement Project
Conservation Easement Plan
Catherine Cr Easement (23.2 Acres)
Yeargain Property (154.1 Legal Acres)
Trough
Solar Water Development
500
250
0
500 Feet
N
W
E
S
Miller Lane
Improved Livestock
Water Gap

Appendix G

USFWS Suspended Sediment Effects Analysis Guidance

DETERMINING EFFECTS FOR SECTION 7 CONSULTATIONS

There are numerous factors that can influence project-specific sediment effects on bull trout and other salmonids. These factors include the concentration and duration of sediment input, existing sediment conditions, stream conditions (velocity, depth, etc.) during construction, weather or climate conditions (precipitation, wind, etc.), fish presence or absence (bull trout plus prey species), and best management practice effectiveness. Many of these factors are unknown.

Newcombe and Jensen (1996) and Anderson et al. (1996) provide the basis for analyzing sediment effects to bull trout and other salmonids and their habitat. Newcombe and Jensen (1996) conducted a literature review of pertinent documents on sediment effects to salmonids and nonsalmonids. They developed a model that calculated the severity of ill effect (SEV) to fish based on the suspended sediment dose (exposure) and concentration. No data on bull trout were used in this analysis. Anderson et al. (1996), using the methods used by Newcombe and Jensen (1996), developed a model to estimate sediment impacts to salmonid habitat.

A 15-point scale was developed by Newcombe and Jensen (1996, p. 694) to qualitatively rank the effects of sediment on fish (Table 1). Using a similar 15-point scale, Anderson et al. (1996) ranked the effects of sediment on fish habitat (Table 2).

We analyzed the effects on different bull trout life history stages to determine when adverse effects of project-related sediment would occur. Table 3 shows the different ESA effect calls for bull trout based on severity of ill effect.

The effect determination for a proposed action should consider all SEV values resulting from the action because sediment affects individual

Table 1 – Scale of the severity (SEV) of ill effects associated with excess suspended sediment on salmonids.

SEV	Description of Effect
	Nil effect
0	No behavioral effects
	Behavioral effects
1	Alarm reaction
2	Abandonment of cover
3	Avoidance response
	Sublethal effects
4	Short-term reduction in feeding rates; short-term reduction in feeding success
5	Minor physiological stress; increase in rate of coughing; increased respiration rate
6	Moderate physiological stress
7	Moderate habitat degradation; impaired homing
8	Indications of major physiological stress; long-term reduction in feeding rate; long-term reduction in feeding success; poor condition
	Lethal and paralethal effects
9	Reduced growth rate; delayed hatching; reduced fish density
10	0-20% mortality; increased predation; moderate to severe habitat degradation
11	> 20 – 40% mortality
12	> 40 – 60% mortality
13	> 60 – 80% mortality
14	> 80 – 100% mortality

fish differently depending on life history stage and site-specific factors. For juvenile bull trout, an SEV of 5 is likely to warrant a "likely to adversely affect" (LAA) determination. However, abandonment of cover (SEV 2), or an avoidance response (SEV 3), may result in increased predation risk and mortality if habitat features are limiting in the project's stream reach. Therefore, a LAA determination may be warranted at an SEV 2 or 3 level in certain situations. For subadult and adult bull trout, however, abandonment of cover and avoidance may not be as important. A higher SEV score is more appropriate for adverse effects to subadult and adult bull trout. In all situations, we assume that SEV scores associated with adverse effects are also sufficient to represent a likelihood of harm or harass[1].

Table 2 – Scale of the severity (SEV) of ill effects associated with excess suspended sediment on salmonid habitat.

SEV	Description of Effect
3	Measured change in habitat preference
7	Moderate habitat degradation – measured by a change in invertebrate community
10	Moderately severe habitat degradation – defined by measurable reduction in the productivity of habitat for extended period (months) or over a large area (square kilometers).
12	Severe habitat degradation – measured by long-term (years) alterations in the ability of existing habitats to support fish or invertebrates.
14	Catastrophic or total destruction of habitat in the receiving environment.

When evaluating impacts to habitat as a surrogate for species effects, adverse effects may be anticipated when there is a notable reduction in abundance of aquatic invertebrates, and an alteration in their community structure. These effects represent a reduction in food for bull trout and other salmonids, and correspond to an SEV of 7 – moderate habitat degradation.

Newcombe and Jensen (1996) used six data groups to conduct their analysis. These groups were 1) juvenile and adult salmonids (Figure 1), 2) adult salmonids (Figure 2), 3) juvenile salmonids (Figure 3), 4) eggs and larvae of salmonids and non-salmonids (Figure 4), 5) adult estuarine nonsalmonids (no figure provided), and 6) adult freshwater nonsalmonids (no figure provided). No explanation was provided for why juvenile and adult salmonids were combined for group 1. As juveniles are more adapted to turbid water (Newcombe 1994, p. 5), their SEV levels are generally lower than for adult salmonids given the same concentration and duration of sediment (Figures 1-3).

[1] Harm and harass in this context refers to the FWS's regulatory definition at 50 CFR 17.3. E.g., Harm means "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering."

Table 3 – ESA Effect calls for different bull trout life stages in relation to the duration of effect and severity of ill effect. Effect calls for habitat, specifically, are provided to assist with analysis of effects to individual bull trout.

	SEV	ESA Effect Call
Egg/alevin	1 to 4	Not applicable - alevins are still in gravel and are not feeding.
	5 to 14	LAA - any stress to egg/alevin reduces survival
Juvenile	1 to 4	NLAA
	5 to 14	LAA
Subadult and Adult	1 to 5	NLAA
	6 to 14	LAA
Habitat	1 to 6	NLAA
	7 to 14	LAA due to indirect effects to bull trout

The figures of Newcombe and Jensen (1996) have been modified in this document. In each figure, values (in mg/L) are provided for each duration to determine when adverse effects would occur. Specific values are also given for when harm would be likely to occur. For example:

> Figure 1 – This figure is for both juveniles and adults. From Table 2, bull trout are "likely to be adversely affected" given an SEV of 5. On Figure 1, a sediment concentration of 99 mg/L for one hour is anticipated to be the maximum concentration for an SEV of 4. At 100 mg/L, an SEV of 5 occurs. In addition, one hour of exposure to 5,760 mg/L is the maximum for an SEV of 7. Exposure to 5,761 mg/L for one hour would warrant an SEV of 8. This would be the threshold between harassment and harm. An SEV of 7 would be harassment, and an SEV of 8 would be considered harm.

The following provides some guidance on use of the figures.

Definitions from Newcombe and Jensen (1996, p. 696). These definitions are provided for consultations that may have impacts to bull trout prey such as Chinook and coho salmon.

> Eggs and larvae – eggs, and recently hatched fish, including yolk-sac fry, that have not passed through final metamorphosis.
>
> Juveniles – fry, parr, and smolts that have passed through larval metamorphosis but are sexually immature.
>
> Adults – mature fish.

Bull trout use:

Newcombe and Jensen (1996) conducted their analysis for freshwater, therefore the use of the figures within this document in marine waters should be used with caution.

Figure 1 – Juvenile and Adult Salmonids. This figure should be used in foraging, migration and overwintering (FMO) areas. In FMO areas, downstream of local populations, both subadult and adult bull trout may be found.

Figure 2 – Adult Salmonids. This figure will not be used very often for bull trout. There may be circumstances, downstream of local population spawning areas that may have just adults, but usually this would not be the case. Justification for use of this figure should be stated in your consultation.

Figure 3 – Juvenile Salmonids. This figure should be used in local population spawning and rearing areas outside of the spawning period. During this time, only juveniles and sub-adults should be found in the area. Adults would migrate to larger stream systems or to marine water. If the construction of the project would occur during spawning, then Figure 1 should be used.

Figure 4 – Eggs and Alevins. This figure should be used if eggs or alevins are expected to be in the project area during construction.

Figure 5 – Habitat. This figure should be used for all projects to determine whether alterations to the habitat may occur from the project.

Background and Environmental Baseline

In determining the overall impact of a project on bull trout, and to specifically understand whether increased sediment may adversely affect bull trout, a thorough review of the environmental baseline and limiting factors in the stream and watershed is needed. The following websites and documents will help provide this information.

1. Washington State Conservation Commission's Limiting Factors Analysis. A limiting factors analysis has been conducted on watersheds within the State of Washington. Limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon, including all species of the family Salmonidae." These documents will provide information on the current condition of the individual watersheds within the State of Washington. The limiting factors website is http://salmon.scc.wa.gov. Copies of the limiting factors analysis can be found at the Western Washington Fish and Wildlife Library.

2. Washington Department of Fish and Wildlife's (1998) Salmonid Stock Inventory (SaSI). The Washington Department of Fish and Wildlife (WDFW) inventoried bull trout and Dolly Varden (*S. malma*) stock status throughout the State. The intent of the inventory is to help identify available information and to guide future restoration planning and implementation. SaSI defines the stock within the watershed, life history forms, status and factors affecting production. Spawning distribution and timing for different life stages are provided (migration, spawning, etc.), if known. SaSi documents can be found at http://wdfw.wa.gov/fish/sasi/index.htm.

3. U.S. Fish and Wildlife Service's (USFWS 1998a) Matrix of Diagnostics/Pathways and Indicators (MPI). The MPI was designed to facilitate and standardize determination of project effects on bull trout. The MPI provides a consistent, logical line of reasoning to aid in determining when and where adverse affects occur and why they occur. The MPI provides levels or values for different habitat indicators to assist the biologist in determining the level of effects or impacts to bull trout from a project and how these impacts may cumulatively change habitat within the watershed.

4. Individual Watershed Resources. Other resources may be available within a watershed that will provide information on habitat, fish species, and recovery and restoration activities being conducted. The action agency may cite a publication or identify a local watershed group within the Biological Assessment or Biological Evaluation. These local groups provide valuable information specific to the watershed.

5. Washington State Department of Ecology (WDOE) - The WDOE has long- and short-term water quality data for different streams within the State. Data can be found at http://www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html. Clicking on a stream or entering a stream name will provide information on current and past water quality data (when you get to this website, scroll down to the Washington map). This information will be useful for determining the specific turbidity/suspended sediment relationship for that stream (more information below).

6. Washington State Department of Ecology (WDOE) - The WDOE has also been collecting benthic macroinvertebrates and physical habitat data to describe conditions under natural and anthropogenic disturbed areas. Data can be found at http://www.ecy.wa.gov/programs/eap/fw_benth/index.htm. You can access monitoring sites at the bottom of the website.

7. U.S. Forest Service, Watershed Analysis Documents - The U.S. Forest Service (USFS) is required by the Record of Decision for Amendments to the USFS and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl to conduct a watershed analysis for watersheds located on FS lands. The watershed analysis determines the existing condition of the watershed and makes recommendations for future projects that move the landscape towards desired conditions. Watershed analysis documents are available from individual National Forests or from the Forest Plan Division.

8. U.S. Fish and Wildlife Service - Bull Trout Recovery Plans and Critical Habitat Designations. The draft Bull Trout Recovery Plan for the Columbia River Distinct Population Segment (DPS) (also the Jarbidge River and the St. Mary-Belly River DPS) and the proposed and final critical habitat designations provide current species status, habitat requirements, and limiting factors for bull trout within specific individual recovery units. These documents are available from the Endangered Species Division as well as the Service's web page (www.fws.gov).

These documents and websites provide baseline and background information on stream and watershed conditions. This information is critical to determining project-specific sediment impacts to the aquatic system. The baseline or background levels need to be analyzed with respect to the limiting factors within the watershed.

Consultation Sediment Analysis

The analysis in this section only applies to construction-related physiological and behavioral impacts, and the direct effects of fine sediment on current habitat conditions. Longer-term effects to habitat from project-induced channel adjustments, post-construction inputs of coarse sediment, and secondary fine sediment effects due to re-mobilization of sediment during the following runoff season, are not included in the quantitative part of this effects determination. Those aspects are only considered qualitatively.

The background or baseline sediment conditions within the project area or watershed will help to determine whether the project will have an adverse effect on bull trout. The following method should be followed to assist in reviewing effects determinations and quantifying take in biological opinions.

1) Determine what life stage(s) of bull trout will be affected by sedimentation from the project. Life history stages include eggs and alevins, juveniles, and sub-adults and adults. If projects adhere to approved work timing windows, very few should be constructed during periods when eggs and alevins are in the gravels. However, streambed or bank adjustments may occur later in time and result in increased sedimentation during the time of the year when eggs and alevins may be in the gravels and thus affected by the project.

2) Table 4 provides concentrations, durations, and SEV levels for different projects. This table will help in analyzing similar projects and to determine sediment level impacts associated with that type of project. Based on what life history stage is in the project area and what SEV levels may result from the project, a determination may be made on effects to bull trout.

3) Once a "likely to adversely affect" determination has been made for a project, the figures in Newcombe and Jensen (1996) or Anderson et al. (1996) are used to determine the concentration (mg/L) at which adverse effects[2] and "take" will occur (see Figures 1-5). For example, if a project is located in FMO habitat, Figure 1 would be used to determine the concentrations at which adverse effects will occur. Since Figure 1 is used for both adults and juveniles, an SEV of 5 (for juveniles) is used (see Table 2). For (a.) the level when instantaneous adverse effects occur, find the SEV level of 5 in the one hour column. The corresponding concentration is the instantaneous value where adverse affects occur. In this example, it is 148 mg/L. For (b), (c), and (d), adverse effects will occur when sediment concentrations exceed SEV 4 levels. The exact concentrations for this have been provided. For each category, find the SEV 4 levels and the corresponding concentration levels are the values used.

[2] For the remainder of the document, references to "adverse effects" also refer to harm and harass under 50 CFR 17.3.

For impacts to individual bull trout, adverse effects would be anticipated in the following situations:

a. Any time sediment concentrations exceed 148 mg/L over background.
b. When sediment concentrations exceed 99 mg/L over background for more than one hour continuously.
c. When sediment concentrations exceed 40 mg/L over background for more than three hours cumulatively.
d. When sediment concentrations exceeded 20 mg/L over background for over seven hours cumulatively.

For habitat effects, use Figure 5 and the same procedure as above for individual bull trout. For example, adverse effects would be expected to occur in the following situations:

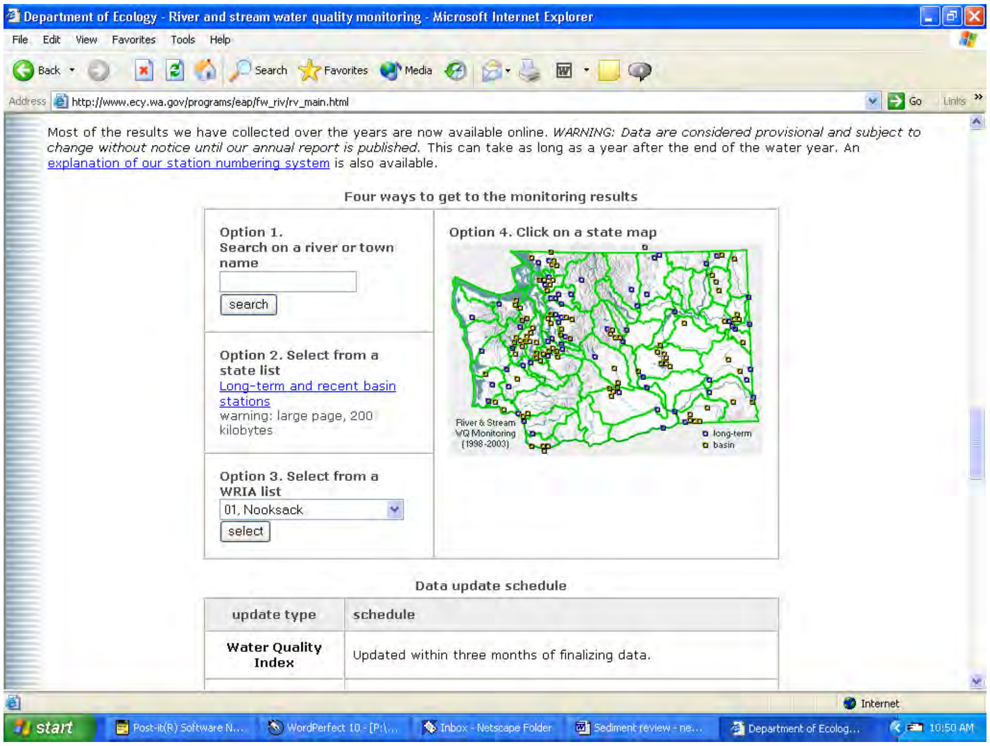
a. Any time sediment concentrations exceed 1,097 mg/L over background.
b. When sediment concentrations exceed 885 mg/L over background for more than one hour continuously.
c. When sediment concentrations exceed 345 mg/L over background for more than three hours cumulatively.
d. When sediment concentrations exceeded 167 mg/L over background for over seven hours cumulatively.

4) Because sediment sampling for concentration (mg/L) is labor intensive, many applicants prefer to monitor turbidity as a surrogate. To do this, the sediment concentration at which adverse effects to the species and/or habitat occurs is converted to NTUs. Two methods, regression analysis and turbidity to suspended solid ratio, are available for this conversion. The regression analysis method should be used first. If not enough data are available then the turbidity to suspended solid ratio method should be used.

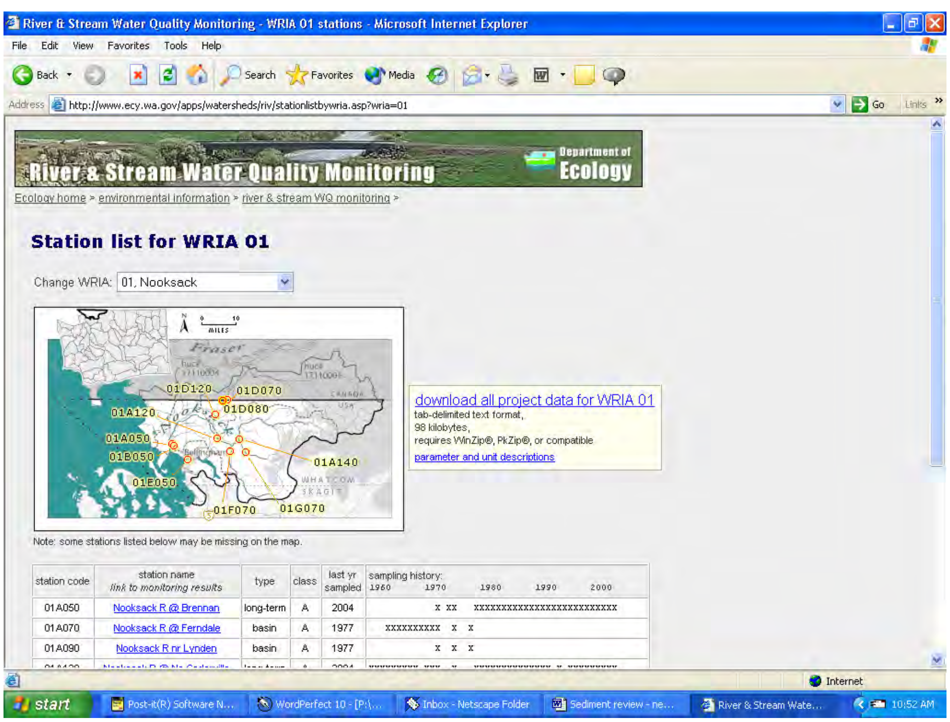
   a. Data – as described above in Background and Environmental Baseline, an attempt should be made to find turbidity and suspended solid information from the project area, action area, or the stream in which the project is being constructed. This information may be available from the Tribes, watershed monitoring groups, etc. Try to obtain information for the months in-water construction will occur, which is usually during the fish timing window (in most cases, July through September). If you are unable to find any data for the action area, use the WDOE water quality monitoring data. The following are the steps you need to go through to locate the information on the web and how to download the data:

      i. Go to the WDOE webpage (http://www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html).

      ii. When you get to the website, the page will state "River and Stream Water Quality Monitoring." If you scroll down the page, you will see the following text and map.



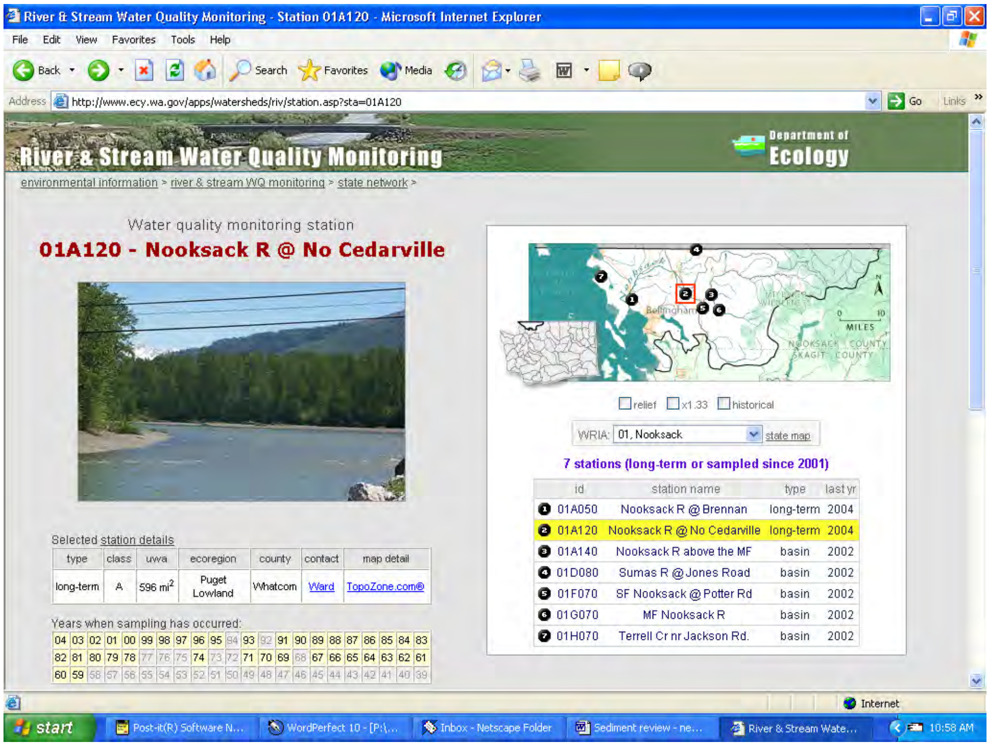
iii. The map shows all the water quality monitoring stations in Washington. You can click on a watershed, or go to Option 3, click on the down arrow and find your watershed. You will then get the following webpage. This is an example for the Nooksack River.



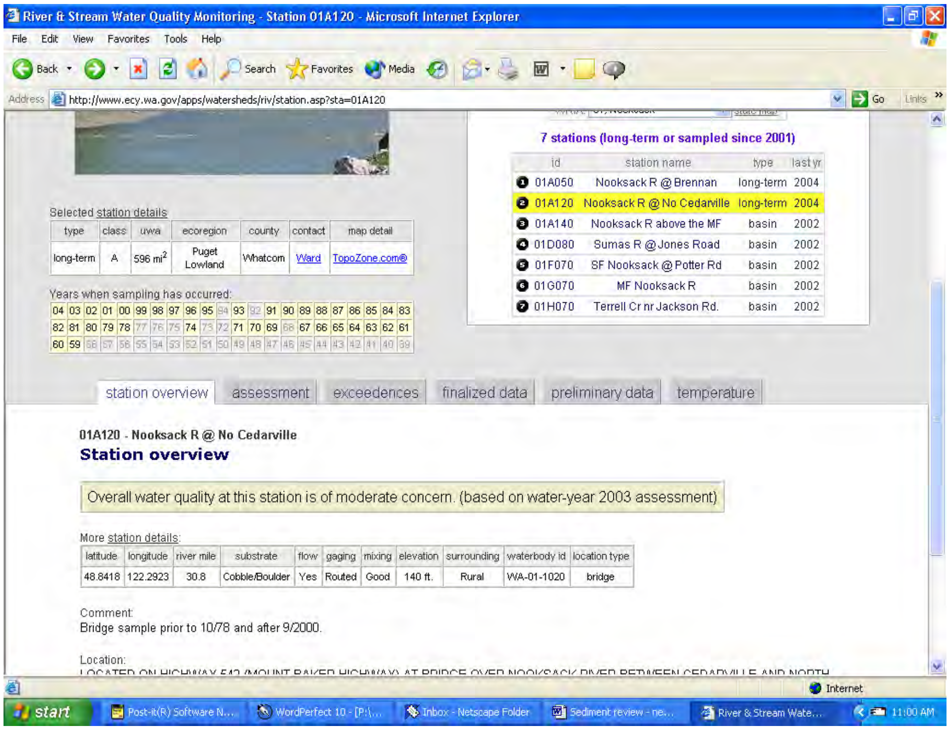
iv. This webpage shows you all the monitoring stations in this watershed. Scrolling down a little on the webpage, you get a list of the monitoring stations and the years that data were collected. The more years in which data were collected the better; however, you want to pick the monitoring station closest to the project site. If a project is located on a tributary, do not use data from the main river in the watershed. Find a monitoring station on a tributary and use that data. **Justification for the use of the data needs to be made in the BO.** The following language was used in the Anthracite Creek Bridge Scour BO. Changes to this paragraph to represent regression analysis are not italicized.

"*The guidance of Newcombe and Jensen (1996) requires a measurement of the existing suspended sediment concentration levels (mg/L) and duration of time that sediment impacts would occur. The Service used data available on the Washington Department of Ecology (WDOE) website to determine a ratio of turbidity (NTU) to suspended solids (mg/L)*(website to find the correlation between turbidity and suspended solids) *in Anthracite Creek. No water quality data was available for Anthracite Creek, so the Service used water quality monitoring data from a different tributary within the Snohomish River watershed. Patterson Creek, which is a tributary to the Snoqualmie River, was used to determine the ratio of turbidity to suspended solids* (correlation between turbidity and suspended solids). *The Service believes that Patterson Creek would have very comparable water quality data as Anthracite Creek. The turbidity to suspended solid ratio for Patterson Creek is 1:2.4 during the proposed months of construction (July through September).*" Delete the last sentence for regression analysis or put in the equation used for analysis and the R^2.

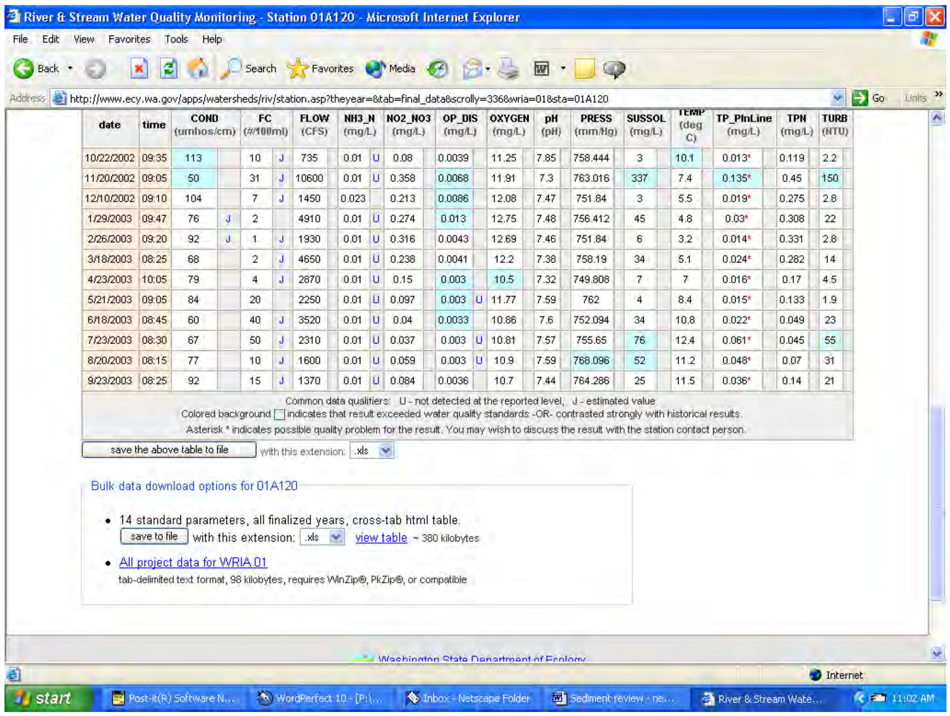
v. When you select the monitoring station, the following webpage appears. This monitoring station is on the Nooksack River at North Cedarville.



vi. Moving down the webpage, you find the following. The page shows the years data were collected and 4 to 6 tabs that provide different information. Click on the finalized data tab.



vii. Selecting the finalized data, a new page comes up; scrolling down that page you see the following. The top part of the page shows the finalized data for the most recent year data were collected. Below the data is a box that says "Bulk data download options..." Click on the "save to file" button for the 14 standardized data parameters. Follow the instructions to save this file. This saves all the data from that monitoring station so the regression analysis can be conducted.


River & Stream Water Quality Monitoring - Station 01A120 - Microsoft Internet Explorer

http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?theyear=&tab=final_data&scrolly=336&wria=01&sta=01A120

date	time	COND (umhos/cm)	FC (#/100ml)	FLOW (CFS)	NH3_N (mg/L)	NO2_NO3 (mg/L)	OP_DIS (mg/L)	OXYGEN (mg/L)	pH (pH)	PRESS (mm/Hg)	SUSSOL (mg/L)	TEMP (deg C)	TP_PlnLine (mg/L)	TPN (mg/L)	TURB (NTU)
10/22/2002	09:35	113	10 J	735	0.01 U	0.08	0.0039	11.25	7.85	758.444	3	10.1	0.013*	0.119	2.2
11/20/2002	09:05	50	31 J	10600	0.01 U	0.358	0.0068	11.91	7.3	763.016	337	7.4	0.135*	0.45	150
12/10/2002	09:10	104	7 J	1450	0.023	0.213	0.0086	12.08	7.47	751.84	3	5.5	0.019*	0.275	2.8
1/29/2003	09:47	76 J	2	4910	0.01 U	0.274	0.013	12.75	7.48	756.412	45	4.8	0.03*	0.308	22
2/26/2003	09:20	92 J	1 J	1930	0.01 U	0.316	0.0043	12.69	7.46	751.84	6	3.2	0.014*	0.331	2.8
3/18/2003	08:25	68	2 J	4650	0.01 U	0.238	0.0041	12.2	7.38	758.19	34	5.1	0.024*	0.282	14
4/23/2003	10:05	79	4 J	2870	0.01 U	0.15	0.003	10.5	7.32	749.808	7	7	0.016*	0.17	4.5
5/21/2003	09:05	84	20	2250	0.01 U	0.097	0.003 U	11.77	7.59	762	4	8.4	0.015*	0.133	1.9
6/18/2003	08:45	60	40 J	3520	0.01 U	0.04	0.0033	10.86	7.6	752.094	34	10.8	0.022*	0.049	23
7/23/2003	08:30	67	50 J	2310	0.01 U	0.037	0.003 U	10.81	7.57	755.65	76	12.4	0.061*	0.045	55
8/20/2003	08:15	77	10 J	1600	0.01 U	0.059	0.003 U	10.9	7.59	768.096	52	11.2	0.048*	0.07	31
9/23/2003	08:25	92	15 J	1370	0.01 U	0.084	0.0036	10.7	7.44	764.286	25	11.5	0.036*	0.14	21

Common data qualifiers: U - not detected at the reported level, J - estimated value
Colored background indicates that result exceeded water quality standards -OR- contrasted strongly with historical results.
Asterisk * indicates possible quality problem for the result. You may wish to discuss the result with the station contact person.

save the above table to file with this extension: .xls

Bulk data download options for 01A120

- 14 standard parameters, all finalized years, cross-tab html table. save to file with this extension: .xls view table ~ 380 kilobytes
- All project data for WRIA 01 tab-delimited text format, 98 kilobytes, requires WinZip®, PkZip®, or compatible

Washington State Department of Ecology

viii. Open Excel and open the file that was just downloaded. Verify that all data appear to be available. After you have worked with these files, you will get an idea if something appears wrong. If the data looks like something is wrong, verify it by comparing the data to the finalized data on the webpage (look at each year's finalized data). After the file is open, delete all columns except the date, sussol (mg/L) and turb (NTU).

ix. Next delete the rows that do not need to be included. Only save the months in which the project will be constructed. For example, if work will be conducted during the work timing window of July 15 through August 31, delete all rows except those that contain data for July and August. The data consist of one data collection point each month. In addition, delete any values that have a "U" or "J" in the column to the right of the NTU value. This data may not be accurate; data may not be detectable at reported level or is an estimated value. The blue cells indicate the value exceeds water quality standards or contrasted strongly with historical results.

x. After deleting the unnecessary columns and rows, your data should contain 5 columns. You can now delete the columns to the right of the values. This will give you 3 columns. The first being the date, the second column contains the suspended solid data (mg/L) and the third column the turbidity (NTU) data.

b. Regression analysis. Once you have the data reduced to the months construction will occur, you can determine the relationship between turbidity and suspended solids using regression. The following steps will provide the regression equation using the data obtained above. These steps are for Excel 2007.

   i. With your mouse, highlight both columns of data (suspended solid and turbidity), but do not include the heading information.

   ii. Then click on “Insert”, “Scatter” and then the graph that does not have any lines on it (should be the upper left graph).

   iii. The graph is placed on your Excel sheet, so move it over so you can see all the data and the graph.

   iv. Now add the trendline to the graph. This is done by clicking (left button) once on any of the points on the graph. Then right click. A window pops open and click on “Add Trendline.” A “Format Trendline” window appears. Make sure Linear is checked, and down on the bottom, check Display Equation on chart and Display R-squared value on chart. Click on close.

      1. The X and Y data are opposite of what you want so you need to swap the values. This is done by left clicking once anywhere on the graph and then right click and click on “select data.” A window pops open and you want to click on Edit. An Edit Series window appears and you want to click on the little red arrow next to Series X values. This allows you to select the data in the table. Upon clicking the red arrow, you will see the column under sussol (mg/L) being selected by a moving line around the cells. Select the data under Turb (NTU) by left clicking and holding the button down and drag all the way down to the last cell in that column. The whole column should have the moving line around all the cells. Click on the little red arrow in the Edit Series window. That will expand out the window and you will do the same for the Series Y values. Click on the red arrow next to that, then left click and hold and select all the cells in the column under Sussol (mg/L), and then click on the red arrow again. When the Edit Series window expands, click on OK, and then click on OK.

   v. The equation that you want to use for your conversion from NTUs to suspended solids is now on the graph. Hopefully, your R-squared value is also high. This gives you an indication of how well your data fits the line. A one (1) is perfect. If this number is low (and a ballpark figure is less than 0.60) then you may want to consider using the ratio method to determine your conversion from NTUs to suspended solids.

1. Outliers – sometimes there will be data that will be far outside the norm. These values can be deleted and that will help increase your R-squared value. If you are good at statistics there are ways of determining outliers. If not, you will probably just use the data as is, unless you think something is really not right, then you may want to delete those data points.

vi. Using the equation for the regression analysis, convert the sediment concentrations found for when adverse affects occur to bull trout and their habitat (number 3 above) to NTUs. For our example, let's say our NTU to suspended solid equation is: $y = 1.6632x - 0.5789$. Adverse effects would then occur at (solve for x):

For impacts to the species adverse effect would occur in the following situations:

a. Any time sediment concentrations exceed 89 NTU over background.
b. When sediment concentrations exceed 60 NTU over background for more than one hour continuously.
c. When sediment concentrations exceed 24 NTU over background for more than three hours cumulatively.
d. When sediment concentrations exceeded 12 NTU over background for over seven hours cumulatively.

For impacts to habitat

a. Any time sediment concentrations exceed 660 NTU over background.
b. When sediment concentrations exceed 532 NTU over background for more than one hour continuously.
c. When sediment concentrations exceed 208 NTU over background for more than three hours cumulatively.
d. When sediment concentrations exceeded 101 NTU over background for over seven hours cumulatively.

c. Turbidity:suspended solid ratio: To calculate the turbidity to suspended solid ratio you need to download the same data off the Ecology website as described above. Sometimes the monitoring stations have limited amount of data and by running the regression analysis it is possible to get a negative slope (an increase in turbidity results in a decrease in suspended solids). This is very unlikely to occur in a stream. Other times you have so few data points that the R^2 value shows that the correlation between suspended solid and turbidity is not very good. When R^2

values are below 0.60, determine the turbidity to suspended solid ratio. The following are the steps needed to calculate the turbidity to suspended solid ratio.

i. After you deleted all the columns and rows of data you do not need, you should have 3 columns of data. The first being the date, the second column contains the suspended solid data (mg/L) and the third column the turbidity (NTU) data.

ii. Calculate the average turbidity and suspended solid value for all data. Average the turbidity column and average the suspended solid column.

iii. Calculate the turbidity to suspended solid value for the average turbidity and average suspended solid value obtained in ii. Divide the average suspended solid value by the average turbidity value.

iv. If any outliers are identified, they should be deleted. Recalculate the turbidity:suspended solid ratio if outliers have been removed (should automatically be done when values are deleted).

vii. Using the turbidity to suspended solid ratio, convert the sediment concentrations found for when adverse effects occur to bull trout and their habitat (number 3 above) to NTUs. For our example, let's say our NTU to suspended solid ratio is 2.1. Adverse effects to the species would then occur in the following situations:

   a. Any time sediment concentrations exceed 70 NTU over background.
   b. When sediment concentrations exceed 47 NTU over background for more than one hour continuously.
   c. When sediment concentrations exceed 19 NTU over background for more than three hours cumulatively.
   d. When sediment concentrations exceeded 10 NTU over background for over seven hours cumulatively.

   Adverse effects to the species through habitat impacts would occur in the following situations:
   a. Any time sediment concentrations exceed 522 NTU over background.
   b. When sediment concentrations exceed 421 NTU over background for more than one hour continuously.
   c. When sediment concentrations exceed 164 NTU over background for more than three hours cumulatively.
   a. When sediment concentrations exceeded 80 NTU over background for over seven hours cumulatively.

5) Determine how far downstream adverse effects and take will occur. There is no easy answer for determining this. Table 4 provides some sediment monitoring data for a variety of projects. These data can be used to determine the downstream extent of

sediment impacts for a project. Note that in Table 4 there is not a single downstream point that can always be used because sediment conveyance and mixing characteristics are different for each stream. **An explanation of how the distance downstream was determined needs to be included in each BO.**

Figure 1 – Severity of ill effect scores for juvenile and adult salmonids. The individual boxes provide the maximum concentration for that SEV. The concentration between 4 and 5 represents the threshold for harassment, and the concentration between 7 and 8 represents the threshold for harm.

Juvenile and Adult Salmonids
Average severity of ill effect scores

Concentration (mg/L)	Hours			Days			Weeks		Months		
	1	3	7	1	2	6	2	7	4	11	30
162755	10	11	11	12	12	13	14	14	-	-	-
59874	9	10	10	11	12	12	13	13	14	-	-
22026	8	9	10	10	11	11	12	13	13	14	-
8103	8	8	9	10	10	11	11	12	13	13	14
2981	$\boxed{5760}$ 7	8	8	9	9	10	11	11	12	12	13
1097	6	$\boxed{2335}$ 7	$\boxed{1164}$ 7	8	9	9	10	10	11	12	12
403	5	6	7	$\boxed{491}$ 7	8	9	9	10	10	11	12
148	5	5	6	7	$\boxed{214}$ 7	8	8	9	10	10	11
55	$\boxed{99}$ 4	5	5	6	6	$\boxed{95}$ 7	8	8	9	9	10
20	3	$\boxed{40}$ 4	$\boxed{20}$ 4	5	6	6	$\boxed{42}$ 7	8	8	9	9
7	3	3	4	$\boxed{8}$ 4	5	6	6	$\boxed{18}$ 7	$\boxed{8}$ 7	8	9
3	2	2	3	4	$\boxed{4}$ 4	5	5	6	7	$\boxed{4}$ 7	8
1	1	2	2	3	3	$\boxed{2}$ 4	5	5	6	7	$\boxed{2}$ 7

Figure 2 - Severity of ill effect scores for adult salmonids. The individual boxes provide the maximum concentration for that SEV. The concentration between 5 and 6 represents the threshold for harassment, and the concentration between 7 and 8 represents the threshold for harm.

Adult Salmonids
Average severity of ill effect scores

Concentration (mg/L)											
162755	11	11	12	12	13	13	14	14	-	-	-
59874	10	10	11	11	12	12	13	13	14	14	-
22026	9	10	10	11	11	12	12	13	13	14	14
8103	8	9	9	10	10	11	11	12	12	13	13
2981	8	8	9	9	10	10	11	11	12	12	13
1097	$\boxed{2190}$ 7	8	8	8	9	9	10	10	11	11	12
403	6	$\boxed{1095}$ 7	$\boxed{642}$ 7	8	8	9	9	10	10	11	11
148	$\boxed{156}$ 5	6	6	$\boxed{331}$ 7	$\boxed{175}$ 7	8	8	9	9	10	10
55	5	$\boxed{78}$ 5	6	6	7	$\boxed{94}$ 7	8	8	9	9	9
20	4	4	$\boxed{46}$ 5	$\boxed{24}$ 5	6	6	$\boxed{50}$ 7	$\boxed{27}$ 7	8	8	9
7	3	4	4	5	$\boxed{12}$ 5	6	6	7	$\boxed{14}$ 7	$\boxed{8}$ 7	8
3	2	3	3	4	4	$\boxed{7}$ 5	$\boxed{4}$ 5	6	6	7	$\boxed{4}$ 7
1	2	2	3	3	4	4	5	$\boxed{2}$ 5	$\boxed{1}$ 5	6	6
	1	3	7	1	2	6	2	7	4	11	30
	Hours			Days			Weeks		Months		

Figure 3 - Severity of ill effect scores for juvenile salmonids. The individual boxes provide the maximum concentration for that SEV. The concentration between 4 and 5 represents the threshold for harassment, and the concentration between 7 and 8 represents the threshold for harm.

Juvenile Salmonids
Average severity of ill effect scores

Concentration (mg/L)											
162755	9	10	11	11	12	13	14	14	-	-	-
59874	9	9	10	11	11	12	13	14	14	-	-
22026	8	9	9	10	11	11	12	13	13	14	-
8103	$\boxed{13119}$ 7	8	9	9	10	11	11	12	13	13	14
2981	6	$\boxed{4448}$ 7	8	9	9	10	11	11	12	13	13
1097	6	6	$\boxed{1931}$ 7	8	9	9	10	11	11	12	13
403	5	6	6	$\boxed{687}$ 7	8	9	9	10	11	11	12
148	$\boxed{197}$ 4	5	6	6	$\boxed{254}$ 7	8	9	9	10	11	11
55	4	$\boxed{67}$ 4	5	6	6	$\boxed{96}$ 7	8	8	9	10	11
20	3	4	$\boxed{29}$ 4	5	6	6	$\boxed{36}$ 7	8	8	9	10
7	2	3	4	$\boxed{10}$ 4	5	6	6	$\boxed{13}$ 7	8	8	9
3	1	2	3	4	$\boxed{4}$ 4	5	6	6	$\boxed{5}$ 7	8	8
1	1	1	2	3	4	$\boxed{1}$ 4	5	6	6	8	8
	1	3	7	1	2	6	2	7	4	11	30
	Hours			Days			Weeks		Months		

Figure 4 - Severity of ill effect scores for eggs and alevins of salmonids. The individual boxes provide the maximum concentration for that SEV. The concentration between 4 and 5 represents the threshold for both harassment and harm to eggs and alevins.

Eggs and Alevins of Salmonids
Average severity of ill effect scores

Concentration (mg/L)	Hours			Days			Weeks		Months		
	1	3	7	1	2	6	2	7	4	11	30
162755	7	9	10	11	12	13	14	-	-	-	-
59874	7	8	9	10	12	13	14	-	-	-	-
22026	7	8	9	10	11	12	13	-	-	-	-
8103	7	8	9	10	11	12	13	14	-	-	-
2981	6	7	8	10	11	12	13	14	-	-	-
1097	6	7	8	9	10	11	12	14	-	-	-
403	6	7	8	9	10	11	12	13	14	-	-
148	5	6	7	9	10	11	12	13	14	-	-
55	5	6	7	8	9	10	12	13	14	-	-
20	5	6	7	8	9	10	11	12	13	-	-
7	4	5	7	8	9	10	11	12	13	14	-
3	4	5	6	7	8	10	11	12	13	14	-
1	4	5	6	7	8	9	10	11	13	14	-

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Figure 5 - Severity of ill effect scores for salmonid habitat. The individual boxes provide the maximum concentration for that SEV. The concentration between 6 and 7 represents the threshold for anticipating adverse effects to bull trout through habitat modifications.

Salmonid Habitat
Average severity of ill effect scores

Concentration (mg/L)	1	3	7	1	2	6	2	7	4	11	30
	Hours			Days			Weeks		Months		
162755	11	12	12	13	14	-	-	-	-	-	-
59874	10	11	12	12	13	14	-	-	-	-	-
22026	9	10	11	11	12	13	14	14	-	-	-
8103	8	9	10	11	11	12	13	14	14	-	-
2981	8	8	9	10	11	11	12	13	13	14	-
1097	7	7	8	9	10	10	11	12	13	13	14
403	$\boxed{885}$ 6	7	7	8	9	10	10	11	12	12	13
148	5	$\boxed{345}$ 6	$\boxed{167}$ 6	7	8	9	9	10	11	12	12
55	4	5	6	$\boxed{68}$ 6	7	8	9	9	10	11	11
20	3	4	5	5	$\boxed{29}$ 6	7	8	8	9	10	11
7	2	3	4	5	5	$\boxed{12}$ 6	7	7	8	9	10
3	2	2	3	4	5	5	$\boxed{5}$ 6	7	8	8	9
1	1	1	2	3	4	4	5	$\boxed{2}$ 6	7	7	8

Reference List

1. Anderson, P. G., B. R. Taylor, and G. C. Balch. 1996. Quantifying the effects of sediment release on fish and their habitats.Canadian Manuscript Report of Fisheries and Aquatic Sciences 2346.

2. Newcombe, C. P. and J. O. T. Jensen. 1996. Channel suspended sediment and fisheries: synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16(4): 693-727.

3. Newcombe, C. P. 1994. Suspended sediment in aquatic ecosystems: ill effects as a function of concentration and duration of exposure.Victoria, British Columbia.

ESA Consultations:

While reviewing a project for sediment related impacts, there are a couple things to think about.

1. Time frame – how does sediment affect feeding, breeding, and sheltering. This is important when thinking about the likelihood of harm (significant impairment of essential behavior…) and/or harassment (significantly disrupt normal behavior…). During ESA consultations this must always be in the back of your mind.

2. Individual fish – Throughout this document, the term bull trout and their habitat are used. Please remember to think about risks to individual bull trout. The ESA is designed to protect individuals as well as populations, but effect determination and analysis or take are both about effects to individuals. For example, on page 4 of the Sediment Template (literature review), under Biological Effects of Sediment on bull trout, the last sentence in the first paragraph states "Specific effects of sediment on fish and their habitat can be put into three classes that include:" The document then defines lethal, sublethal, and behavioral effects. These effects can be to an individual or to multiple individuals within a reach.

3. Habitat – similarly, sediment input into a stream can alter habitat, and this can impact an individual bull trout as well as multiple bull trout within a reach. The preceding discussion addresses fish habitat in general and not necessarily critical habitat or PCE's. An attempt was made to clarify this in the document. It was not possible to relate sediment input to the critical habitat PCE's. The information needed to address sediment input and impacts to the PCEs can be found within the Sediment Template document.

Table 4 - Water quality monitoring data received by the Washington Fish and Wildlife Office. Calculated Values are exact SEV values for juvenile and adult salmonids (Figure 1) based on Newcombe and Jensen (1996), and for habitat (Figure 5) by Anderson et al. (1996).

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data – how sediment data was provided in monitoring report.	Concentration (mg/L) used for determining SEV level. From original sediment data, concentration was either directly used, or was calculated using ratio or regression as stated in comments column.	Duration of elevated sediment concentration levels during project construction.	SEV (Juvenile and Adult Salmonids) Calculated SEV value for impacts to salmonids based on Newcombe and Jensen (1996)	SEV Habitat Calculated SEV value for habitat based on Anderson et al. (1996)	Comments
Culvert Removal or Removal and Replacement								
Siegel Creek Culvert Removal, Siegel Creek – Clark Fork River Watershed (Montana) Culvert removal Channel stabilization Bank reshaping	Lolo National Forest Bankfull width: 12 ft Average discharge: 2.8 CFS Slope: 6.7% Drainage area: 9,245 acres	Grab samples No distance Provided. Assume 150 ft. Automatic sampling - 150 ft downstream	Sediment load Ave: 0.07 tons/day Peak: 0.4 tons/day Sediment load Ave: 0.04 tons/day Peak: 0.3 tons/day	9.4 (average)* 53.7 (peak)* 5.4 (average)* 40.3 (peak)*	24 hrs* > 3 to 7 hrs* 24 hrs* > 3 to 7 hrs*	5 5 at 3 hrs 5 at 7 hrs 4 4 at 3 hrs 5 at 7 hrs	5 5 at 3 hrs 6 at 7 hrs 4 5 at 3 hrs 5 at 7 hrs	Creek dewatered during work. All sediment sampling was in mg/L. Concentration reached baseline at 1.5 miles downstream. Most of sediment appeared to settle within several hundred feet.
Sheep Creek Culvert Replacement Sheep Creek – Selway River Watershed (Idaho) Culvert replacement	Bitterroot National Forest Discharge: 1.5-2.0 CFS baseflow Channel width: 5 feet Slope: 8.9% Rosgen B4 channel	Approximately 100 ft. Distance not given, stated right below work area where water was put back in stream.	Baseline 1.69 mg/L 4.5 mg/L – 25 min 7.5 mg/L – 2 min 7.5 mg/L – 30 min 34.37 mg/L – 30 min 164.19 mg/L – 11 min 15,588.6 mg/L – 30 min 677 mg/L – 30 min 105.31 mg/L – 30 min 29.17 mg/L – 30 min 17.6 mg/L – 30 min 19.74 mg/L – 30 min 15,588.6 mg/L – 30 min	11..8 162.5 2,737.9 (average) 15,586.9 (peak)	1.5 hrs (building diversion dam and diverting stream) 15 min (diversion failure) 6.5 hrs (diversion removed and stream stabilizing, exact duration unknown, stopped monitoring before sediment conc. returned to background. 30 min (peak during diversion removal)	3 4 8 8	3 4 9 8	Creek dewatered during work. All sediment sampling in mg/L.

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Culvert Removal or Removal and Replacement, continued								
Graves Creek Road Repair Graves Creek – Quinault River Watershed (Washington) Road widening Culvert installation	Olympic National Park Project located 1.5 and 1.7 miles upstream of Upper Quinault Bridge Discharge: 3,200 – 3,700 cfs Slope: 0.4%	Distance from project site on tributary to the confluence with the Quinault was not provided. Road runs along Quinault River, so assume distance was less then 50 feet. Monitoring data is at confluence.	Baseline: 1.5 NTUs Confluence: 39 NTUs Below new culvert: 5.5 NTUs	52.5	2 hrs Monitoring report stated that construction was limited to less than two hours.	4	5	No diversion Culvert was installed on small trib. to Quinault River. Data indicates concentration and duration of sediment at trib. confluence with Quinault. Data analysis: Used Quinault River data downstream of Quinault Lake. No data available upstream. One year of data available – used July through October (4 months) NTU:SS ratio = 1:1.4 Regression: Negative slope Used ratio in analysis
Sulpher Creek State Route 241 Yakima County Culvert replacement	Project located approximately 1.5 miles of I-82 on SR141, near airport. Slope 3.5%	100 and 200 ft	Data provided in NTUs	100 ft 137.1 36.8 77.6 436.3 94.6 118.7 200 ft 33.8 50.0 55.5 213.0 147.2 141.0	 6 hr# 1 hr# 1 hr# 6 hr# 1 hr# 1 hr# 1 hr# 1 hr# 1 hr# 6 hr# 1 hr# 1 hr#	 6 4 4 7 4 5 4 4 4 6 5 5	 6 4 4 7 5 5 4 4 4 7 5 5	Dewatered stream Data analysis: Sulpher Creek has 2 monitoring stations, each a half mile apart. Both stations only have one year of data. Using individually, there would only be 2 points. Combined data for regression analysis. Used regression Regression: SS = 2.6561*NTU + 14.362 Ratios: Lower site ratio of 1:3.7 upper site has 1:3.3. Combined data 1:3.4.
Everett Vicinity Bridge 2/5N Seismic Retrofit Snohomish River and unnamed side channel Removal of 2 culverts of an existing temporary access road	Culverts removed in side channel Project located at Highway 2 over Snohomish River. Slope: In tidally influenced section of Snohomish River Construction occurred during low tide and channel had very little water running.	Work conducted in side channel of Snohomish River, sample taken 10 ft below confluence with river	Reading of 825 NTUs found, no background on that day, background next day was 15.6 NTUs.	713.4	2.5 hrs	6	7	Side channel not dewatered. Data analysis: Used Snohomish River data at Snohomish. 27 years of data on the lower Shohomish River. Used regression NTU:SS ratio = 1:2.1 Regression: SS = 0.878*NTU + 2.7839

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Culvert Removal or Removal and Replacement, continued								
Judd Creek Vashon Island Culvert replacement stream dewatered during construction. Water quality monitoring data for other Judd Creek project said "another stream simulation culvert replacement"	Judd Creek enters in NW corner of Quartermaster Harbor of Vashon Island. Monitoring report did not state where project was located. Drainage area: 3,292 acres. Discharge: 2.2 cfs Slope: 1.5% - used lower reach	100, 500, 1800 ft.	Data provided in graph format (NTUs). All values were estimated from graph	100 20 379.1 172 18.5 500 11.3 41.4 72.7 16.3 1800 19 41.4 9.2	 6 hrs 7 hrs 5 hrs 13 hrs 6 hrs 7 hrs 6 hrs 14 hrs 4 hrs 7 hrs 12 hrs	 4 7 6 5 4 5 5 5 4 5 4	 5 7 6 5 4 5 6 5 4 5 4	Stream was dewatered. Ecology does not monitor water quality in streams on Vashon Island. No stream water quality monitoring data available. Used 1:2 as an estimated average ratio.
Judd Creek Vashon Island Culvert Replacement stream dewatered during construction.	Judd Creek enters in NW corner of Quartermaster Harbor of Vashon Island. Drainage area: 3,292 acres. Discharge: 2.2 cfs Slope: 2.0%	100, 500, 1600 ft.	Data provided in graph format (NTUs). All values were estimated from graph	100 ft 9.6 49.7 20.6 500 ft 12 20.9 22.2 1,600 ft 10 22.5 11	 3 hrs 4 hrs 5.5 hrs 1.5 hrs 6 hrs 3.5 hrs 1 hr 2.5 hrs 2	 3 5 4 3 4 4 3 4 3	 3 5 5 3 5 4 3 4 3	Stream was dewatered. Ecology does not monitor water quality in streams on Vashon Island. No stream water quality monitoring data available. Used 1:2 as an estimated average ratio.
Harris Creek Snoqualmie River Culvert Replacement	Harris Cr. located approx. 2 miles north of Carnation, WA. Project in upper reaches of creek. Drainage area: 8,626 acres. Slope: 3.9% Discharge: 1.3 cfs (King County data)	Not provided	Document stated all water quality criteria were met except for one exceedance, 24 NTUs above background.	48	1 hr#	4	4	Stream was dewatered. Ecology does not monitor water quality in Harris Creek. No stream water quality monitoring data available. Used 1:2 as an estimated average ratio.

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Bank Stabilization								
Swede Heaven Bank Stabilization N.F. Stillaguamish River Project: 300 feet long, placing rock groins, LWD, and plantings	Project located approx. 5.5 miles west of Darrington, WA. Drainage area: 685 sq. miles. Discharge: 1,892 cfs Slope: 0.3% Bankfull width: 210 ft.	300, 600, and 1,200 ft downstream	Data provided in NTUs.	300 ft. 56.7 103.8 191.5 28.4 27.5 16.1 22.8 35.7 42.4 20.0 600 ft. 33.6 38.5 31.6 17.7 24.5 20.4 1,200 ft 47.6	 1 hrs** 3 hrs** 3 hrs** 30 min. 1.5 hrs 30 min 30 min 1.5 hrs 30 min 1 hrs# 2 hrs** 2 hrs** 3 hrs** 1 hrs# 30 min 30 min 1 hrs**	 4 5 6 3 4 3 3 4 3 3 4 4 4 3 3 3 4	 4 5 6 3 4 3 3 4 3 3 4 4 4 3 3 3 4	Construction area was diverted. Streambank was isolated. Data analysis 9 years of data available for the N.F. Stillaguamish River at Darrington, used July and August months when construction occurred. NTU:SS ratio = 1:3.5 Regression: Negative slope Used ratio in analysis
MP 9.2 Oil City Road Hoh River Riprap (170 ft) and LWD placement	No project location given, Oil City Road runs along the north bank of the lower Hoh River. Discharge: 2,541 cfs Drainage area: 253 sq. miles Slope: 0.3%	300 and 600 ft downstream	Monitoring data was only for LWD placement and not riprap installation Data provided in NTUs.	300 ft. 8.4 7.7 9.4 600 ft 7.5	 10 min 10 min 10 min 20 min	 2 1 2 2	 1 1 1 2	No information on how project constructed, dewatered. Project became influenced by WSDOT diversion dam release 5-6 miles upstream. 13 Years of data available for the Hoh River at the DNR Campground near the Hwy 101 Bridge. NTU:SS ratio = 1:1.2 Regression SS = 0.3874*NTU + 5.5385 Used regression analysis
SR 20 – debris jam Skagit River tributary	Project located at milepost 90 on SR20. No exact location, so used tributary just east of Concrete WA. Slope: 8.1%	Data stated sampling points located upstream and downstream of project area on the Skagit River. Two additional points located on two Skagit tributaries that are culverted under SR20.	Turbidity readings taken once a week in absence of any major rainfall and more frequently during a runoff producing rain event.	Met water quality standards.	Met water quality standards.			High turbidity was sampled, but this was due to runoff from rain events and not project. Channel was dewatered during construction.
Emergency Bank Protection Hoh River Rock placed in stream	No information on location of project. Work conducted in December.	Samples drawn 150 - 200 ft downstream of project.	Turbidity readings taken usually after large deposit of rock was placed in the river.	Met water quality standards. NTUs were provided for project, but levels were same as background.				NTU's read between 10.7 and 17.2. For emergency work, this seems very clear water.

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Bank Stabilization, continued								
Rivershore Lane Emergency Watershed Project South Fork Stilliguamish River Reconstructed 1,000 ft of riverbank and stabilized the bank with rock vanes, logs, and rootwad structures.	Project located 0.5 miles SE of Robe WA. Discharge: 461 cfs Slope: 0.4%	300, 600 ft, and 3.3 miles		600 ft 130.3 14.2 20.9 12.5 98.1 120.7 3.3 miles 50.1 32.8	 6 hrs 2.5 hrs 2 hrs 1 hr 1 hr 10.5 hrs 4 hrs 4.5 hrs**	 6 4 4 3 4 6 5 5	 6 4 4 3 5 7 5 5	Work area was dewatered by construction of a bypass channel. 9 years of data available for the N.F. Stillaguamish River at Darrington, used July and August months when construction occurred. NTU:SS ratio = 1:3.5 Regression had negative slope, used ratio. No 300 ft readings were taken, data logger not operating correctly.
Boulder Creek Bank Stabilization Montana	No project location was given. Unable to determine any stream characteristics information.	350 and 4,300 ft	Data estimated off of graph of monitoring data – in mg/L	350 ft 77.4 334.5 4,300 ft 13.25 155.6	 3.5 hrs 12.5 hrs 3.5 hrs 12.25 hrs	 5 7 4 6	 5 8 4 7	Project area was dewatered by constructing diversion channel.
Saxon Bank Stabilization Project South Fork Nooksack River Construct tree revetment and 3 rock vanes. Protecting 1,400 ft. of bank.	Project located at town of Saxon, WA. Slope: 0.7% Drainage area: 129 sq. miles Discharge: 748 cfs	300 ft	Summary of data provided in email which gave NTU levels when monitoring was above 5 NTU's, WA water quality standard.	43.0	4 hrs#	5	5	Had constructed an in-channel deflector to move the bulk of the river flow away from construction site. Data analysis. Two years of data for the S.F. Nooksack River at Potter Road. Used July through September data. NTU:SS ratio = 1:1.9 Regression: SS = 1.7249*NTU + 0.5206 Used regression
Lower Hutchinson Creek Project South Fork Nooksack River Installation of ELJs and levee setback	Project located at confluence of Hutchinson Creek and S.F. Nooksack River near Acme, WA. LEJs installed on S.F. Nooksack and Hutchinson Creek. S.F. Nooksack Slope: 0.7% Drainage area: 129 sq. miles Discharge: 748 cfs Hutchinson Creek Slope: 1.1%	300, 1200, 3000 ft.	Daily monitoring was provided in NTU's. Most work occurred either in dewatered section of Hutchinson Creek or outside wetted channel.	300 ft. 14 12	 1 hr 0.5 hr	 3 2	 3 2	Hutchinson Creek was diverted. Unable to tell from data where samples were taken, used estimated average ratio of 1:2.0 from S.F. Nooksack River (see previous entry for Saxon Bank project) NTU:SS ratio = 1:2.0 Project had low turbidity, no monitoring was done at 1200 and 3000 ft.

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Bank Stabilization, continued								
Green River Fish Restoration Project Green River Installation of in-stream gravel nourishment and construction of 2 ELJs	Project located at RM 60 on the Green River. 2 miles east of Palmer WA. Drainage area: 231 sq. miles Discharge 958 cfs Slope: 0.8%	300, 600, 1200, 2500 ft	Data provided in NTUS. No background values provided, so used first couple readings of the day as background.	300				Data analysis; 29 years of data for the Green River at Kanaskat. Data collected at Cumberland-Palmer Road bridge. Used July and August data. Ratio: 1:1.7 Regression: S = 0.0983*NTU + 1.9326 Used ratio, regression data not correlated.
				19.0	3.25	4	4	
				20.5	11.75#	5	5	
				39.9	9.5**	5	5	
				45.5	5.25	5	5	
				16.6	5.0	4	4	
				63.5	11.25**	6	6	
				74.6	10.5#	6	6	
				112.3	2.75**	5	5	
				27.0	7.75**	5	5	
				9.0	9.5**	4	4	
				87.1	11**	6	6	
				118.4	8.5#	6	6	
				600				
				11.1	3.25	4	4	
				121.9	0.75	4	5	
				28.8	11.75#	5	5	
				31.3	9.5**	5	5	
				35.7	9.0#	5	5	
				9.9	5.0	4	4	
				58.6	11.25**	6	6	
				67.3	10.5#	6	6	
				10.7	2.75**	3	3	
				23.5	7.75**	5	5	
				9.9	9.5**	4	4	
				121.8	11**	6	7	
				100.6	8.5#	6	6	
				1200				
				22.4	4.75	4	4	
				36.7	11.75#	5	6	
				20.6	9**	5	5	
				23.5	11.5#	5	5	
				20.2	2.25**	4	4	
				48.3	11.25**	5	6	
				130.3	6.75#	6	6	
				19.7	7.75**	5	5	
				18.8	11.75#	5	5	
				143.1	11**	6	7	
				75.6	9.0#	6	6	
				2500				
				11.4	4.75	4	4	
				19.1	3.0	4	4	
				13.4	10.0**	4	5	
				26.9	9.5	5	5	
				12.5	2.25**	3	3	
				33.4	11.25**	5	5	
				67.7	2.25#	5	5	
				48.8	4.5	5	5	
				20.9	7.75**	5	5	
				12.7	9.5**	4	4	
				104.1	11**	6	6	
				63.4	10.0#	6	6	

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Bank Stabilization, continued								
Maple Creek Channel Reconstruction Thornton Creek 2 culvert removals, 2 bridge installations, channel reconstruction with habitat enhancement, boulder clusters, porous weirs, logjams, etc.	Project located on the S.F. Thornton Creek, just upstream of Hale School, above 30th St. NE bridge. S.F. Thornton Creek Drainage area: 12.1 sq. miles Discharge: 8 cfs Slope: 0.3% Bankful: 8 ft	200, 600, and 1660 ft downstream	Data provided in NTUs in graph. Estimated values from graph. Project site was dewatered, data collected during rewatering site.	200 ft 131.8 600 ft 48.1 1660 ft 40.5	 1.75 hrs 3 hrs 1.5 hrs	 5 5 4	 5 5 4	Site was dewatered and had excessive flows that overtopped diversion dams and flushed system prior to monitoring. Data analysis King County water quality data was used. 30 years of data for Thornton Creek collected at mouth. Used July and August data. Ratio: 1:2.5 Regression: SS = 3.2973*NTU - 3.6295 Used regression.
Bridge Construction and/or Repair								
SR 90 – Wilson Creek Bridge Widening Project Wilson Creek tributary to Yakima River	Project located on Wilson Creek at I-90 Bridge at Ellensburg WA. Slope: 0.6% Drainage area: 13 sq, miles	100 and 200 ft downstream		100 ft. 55.2 21.4 20.6 200 ft. 202.3 28.2 22.5	 1 hr# 6 hrs 1 hr 2 hrs 4.5 hrs 1 hr	 4 4 3 5 4 3	 4 5 3 6 5 3	Data analysis 3 years of data for Wilson Creek at Highway 821. Used July through September data. NTU:SS ratio = 1:3.2 Regression SS = 2.4425NTU + 6.2212 Used regression
SR – 12 Black River Bridge Scour Protection Black River – Tributary to Chehalis River. Placement of riprap to protect bridge column, placement of filter blanket and streambed gravel, installation of temporary work platform.	Project located on Black River, approximately 2 miles SE of Oakville, WA Slope: 0.2% Drainage area: 144 sq. miles Discharge: 162 cfs	300, 500 and 600 ft	Data provided in NTUs.	300 ft 10.6 8.8 9.6 18.8 500 ft 12.0 8.1 19.1 600 ft 12.5 6.4 12.8	 0.5 hr 5 hr 5 hr 1 hr# 4.5 hr 4.5 hr 1 hr# 2.5 hr 4.5 hr 1 hr#	 2 4 4 3 4 4 3 3 3 3	 2 4 4 3 4 4 3 3 3 3	Inwater silt curtain used. Data analysis: Ecology monitoring site at project location did not have turbidity and SS data. Used the data from the Black River at Moon Road Bridge monitoring station approximately 2 miles upstream. Six years of data available, July through September. NTU:SS ratio = 1:1.5 Regression had negative slope. Used ratio.

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Bridge Construction and/or Repair, continued								
Monroe Trestle Bridge Skykomish River Removal of railroad trestle	Project location is unknown. Project near City of Monroe WA. Discharge: 3,946 cfs Drainage area: 842 sq. miles Slope: 0.2%	300 ft (three locations across stream)	Turbidity was only high on one side of stream, that data is analyzed.	Site 1 6.9	32 hrs	5	5	Used sediment curtain around project. Data analysis 26 years of data for Skykomish River at Monroe. Used July through September data. NTU:SS ratio = 1:1.9 Regression: SS = 0.8453*NTU + 1.9163 Used regression
Humptulips River Bridge Scour Repair Humptulips River Project involved repair and augment riprap and placement of LWD	Project located on Humptulips River at US 101 Bridge. Slope 0.4% Drainage area: 276 sq. miles, 132 Sq. miles at project location Discharge: 1,340 cfs Bankfull at project location: 80-220 ft.	300 ft.	Measurements were recorded throughout the day, 5 to 7 times. Data provided in NTUs. Because time between monitoring sampling was anywhere from one to two hours during sediment generating activities, the peak turbidity values may not have been captured.	7.6 11.0	6.5 hrs** 7 hrs#	4 4	4 4	No stream dewatering occurred. Data analysis. 25 years of data for the Humptulips near Humptulips at the Highway 101 Bridge. Used July through September data. NTU:SS ratio = 1:1.6 SS = 0.6514*NTU + 1.1202 Used regression
Humptulips River Bridge Scour Repair Humptulips River Project involved installation of rock barbs and LWD in stream.	Project located on Humptulips River at US 101 Bridge. Slope 0.4% Drainage area: 276 sq. miles, 132 Sq. miles at project location Discharge: 1,340 cfs Bankfull at project location: 80-220 ft.	300 ft.	Met water quality standards.					

Project and Watershed	Stream Charact. at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concent.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Open Trench or Dredging of Stream								
Williams Pipeline, Mt. Vernon Loop North Fork Stillaguamish River Project involved installing a pipeline under the NF. Stillaguamish River	Project located on the NF Stillaguamish approximately 1 mile north of Arlington WA. Drainage area: 262 sq miles Discharge: 1,896 cfs Slope: 0.3%	100, 600, 2000 ft and 1 mile	Monitoring conducted throughout project. Project also took samples for analysis in lab. Regression equation determined from lab analysis: SS = 2.3237*NTU + 3.6702 Equation provides higher total suspended solids then Ecology data.	100 ft				Stream is diverted and dewatered during trenching. Open trench is exposed to river when one side of river is trenched and dredging occurred on opposite side. Data analysis. Used regression from project monitoring determined in lab for both SS and NTUs. Regression SS = 2.3237*NTU + 3.6702
				185.7	1 hr	5	5	
				220.2	1 hr	5	5	
				83.4	4 hr	5	5	
				113.8	9 hrs	6	6	
				95.5	1 hr	4	5	
				312.5	20 hrs	7	8	
				338.9	20 hrs	7	8	
				76.2	4 hrs	5	5	
				145.3	12 hrs	6	7	
				1070.5	29 hrs	8	9	
				676.6	6 hrs	7	8	
				132.0	9.5 hrs	6	7	
				93.5	5 hrs	5	6	
				600 ft				
				25.9	1 hr	3	3	
				16.7	0.5 hr	3	3	
				25.4	8.5 hrs	5	5	
				13.0	3 hrs	4	4	
				37.4	8.5 hrs	5	5	
				73.0	21 hrs	6	7	
				19.8	0.5 hr	3	3	
				135.3	20.5 hrs	7	7	
				23.7	0.5 hr	3	3	
				59.8	1.5 hr	4	4	
				50.7	9.5 hrs	5	6	
				293.1	31.5 hrs	7	8	
				41.7	5.5 hrs	5	5	
				122.4	10 hrs	6	6	
				12.7	9.5 hrs	4	4	
				12.7	9 hrs	4	4	
				2000 ft				
				12.6	3 hrs	4	4	
				25.9	1.5 hrs	4	4	
				14.1	4 hrs	4	4	
				34.7	9 hrs	5	5	
				45.3	2 hrs	4	4	
				212.8	18 hrs	7	7	
				25.3	5 hrs	4	5	
				30.4	10.5 hrs	5	5	
				18.2	4 hrs	4	4	
				185.7	14.5 hrs	7	7	
				22.8	7.5	5	5	
				75.7	5.5 hrs	5	6	
				75.4	9.5 hrs	6	6	
				32.0	1.5 hrs	4	4	
				22.9	1 hrs	3	3	
				1 mile				
				20.5	1.5 hrs	4	4	
				16.5	1.5 hrs	3	3	
				45.5	2.5 hrs	4	5	
				23.1	3.5 hrs	4	4	
				394.6	0.5 hr	5	5	
				232.4	17 hrs	7	7	
				22.3	4.5 hrs	4	4	
				46.6	5.5 hrs	5	5	
				25.3	3.5 hrs	4	4	
				123.2	9.5 hrs	6	6	
				30.5	6.5 hrs	5	5	
				22.9	3.5 hrs	4	4	
				45.4	9 hrs	5	6	

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Open Trench or Dredging of Stream, continued								
Williams Pipeline, Mt. Vernon Loop. Pilchuck River Project involved installing a pipeline under the Pilchuck River. Used open trench method.	Exact project location unknown, used location where pipeline crosses the Pilchuck on topo map. Located SW of Machias, WA. Slope: 0.4% Drainage area: 127 sq. miles Discharge: 744 cfs	100, 400, and 1000 ft	Measurements taken every hour throughout construction.	100 ft. 54.9 400 ft. 38.5 1000 ft. 34.8	 62 hrs 57 hrs 51 hrs	 7 6 6	 7 7 7	River was not dewatered or diverted. Open water trenching. Data analysis. 14 years of data for the Pilchuck River at Snohomish at the Highway 2 Bridge. Used July through September data. NTU:SS ratio = 1:2.3 Regression SS = 1.4319*NTU + 2.5223 Used regression
Williams Pipeline – Sumas Loop		Construction method:						
Smith Creek	Trib to mainstem Nooksack River by Lawrence WA Slope: 0.8%	Dam and pump	Met water quality standards.					
Saar Creek (two locations where crossed creeks)	Trib to Frasier River, creek enters Canada, located near Sumas, WA Slope: 0.6%	#1: Open cut #2: Dam and pump	Met water quality standards. Met water quality standards.					
Kenny Creek	Unable to locate creek	Open cut	Met water quality standards.					
Unnamed trib to Sumas River	Located 2 miles SE of Nooksack, WA. Slope: 2.3%	Dam and pump	Met water quality standards.					
Breakenridge Cr.	Trib to Sumas River, located 2 miles east of Nooksack, WA Slope: 1.9%	Dam and pump	Met water quality standards.					
Williams Pipeline – Mt. Vernon Loop		Construction method:						
Armstrong Creek	Trib to mainstem Stillaguamish at Arlington, WA Slope: 0.5%	Dam and pump	Met water quality standards.					
Trib to SF Stillaguamish River	Unable to locate creek	Dam and pump	Met water quality standards.					

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Open Trench or Dredging of Stream, continued								
Williams Pipeline – Snohomish Loop		Construction method:						
Sternoff Crossing	Unable to locate creek	Flume	Met water quality standards.					
Seidel Creek – had Siedel Creek on monitoring form	Trib to Bear Creek, 1.4 miles NE of Avondale, WA, which enters Sammamish River. Slope: 1.0%	Dam and pump	Met water quality standards.					
Struve Creek	Trib to Bear Creek, 1.1 miles SE of Cottage Lake, WA, which enters Sammamish River. Slope: 3.0%	Dam and pump	Met water quality standards.					
Williams Pipeline – Ft. Lewis Loop		Construction method:						
Muck Creek	Trib to the Nisqually River. Site located on Ft. Lewis, 2.7 miles W of Rocky Ridge.	Open cut	Met water quality standards.					
South Fork Creek	Trib to the Nisqually River. Site located on Ft. Lewis, 2.7 miles W of Rocky Ridge. Just South of Muck Creek crossing.	Open cut	Met water quality standards.					
Williams Pipeline Ft. Lewis Loop Nisqually River Project involved installing a pipeline under the Nisqually River Used open trench method.	Project located 0.8 miles SW if McKenna, WA Drainage area: 517 sq. miles Discharge: 1,500 cfs Slope: 0.1%	600, 1250, 2500, 5200 ft, 2 miles, and 4 miles	Samples taken approximately every hour. Samples at 2 miles was only taken once, two samples were taken at 4 miles (4.5 hours apart). These samples were used to determine downstream extent of plume. Data provided in NTUs.	600 ft. 35.1 1,250 ft. 24.4 2500 ft. 16.2 5200 ft. 12.8 2 miles 15.5 4 miles 9.5	22 hrs 22 hrs 22 hrs 22 hrs 4.5** Used 4 miles time 4.5**	6 5 5 5 4 4	6 6 5 5 4 4	Open cut, no diversion or dewatering occurred. Data analysis. 3 years of data for the Nisqually River at McKenna. Used July through September data. NTU:SS ratio = 1:0.8 Regression SS = 0.7159*NTU + 0.5214 Used regression

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Open Trench or Dredging of Stream, continued								
Maintenance Dredging and Disposal, Lower Snohomish River Snohomish River Clamshell and hydraulic dredging were used on the Upper and Lower Sediment Basins and the Navigational Channel. Disposal location was at Elliott Bay for clamshell dredging and Port of Everett's Riverside Business Park Disposal Site for the hydraulic dredging.	Downstream settling basin is located immediately west of the Everett Marina. Upstream settling basin is located southeast of the I-5 Bridge.	Background monitoring occurred 300 feet upstream of dredging. Clamshell dredging: samples taken at 600 ft. Three samples taken, surface (2 foot depth), mid, and bottom (2 feet above bottom). Hydraulic dredging: 300 ft for dredging activities – surface, mid and bottom readings, 600 ft for disposal activities. Samples taken twice daily, once during slack tide, once during strong ebb or flood tide. --------- Ebb tide sampling at 300, 600, 1500, 2250, and 2480 ft.		Clamshell dredging Mid and bottom reading: 58.3 Additional samples taken during ebb tide, which exceeded background levels. Not enough information provided to determine concentration and duration. Hydraulic dredging All within water quality standards.	1 hr	4	4	High turbidity readings were in mid to lower samples which may have been in higher salinity waters, not freshwater from river. Sediment analysis: Project location is in tidally influenced area. No sediment monitoring at this time location. Used lowest Snohomish River data, near City of Snohomish. 25 years of data, December through February. NTU:SS ratio = 1:1.9. Regression SS = 1.2748*NTU + 4.8946 Used regression -------- Dredging stopped during strong ebb tides to reduce sediment impacts.
Grays Harbor Dredging.	Exact location with Grays Harbor was not provided. Project was in tidal area	Samples taken at 300 and 600 feet from dredging operation. Samples taken at surface, midwater, and bottom.	Data provided in NTUs	Met water quality standards. Midwater and bottom samples highly variable. When samples were above water quality, resampling both background and at monitoring location, showed in compliance.				
Miscellaneous Activities								
Mount Vernon Wastewater Treatment Plant Outfall Project Skagit River Project involved extending the outfall from the river bank out into the thalwag of the river.	Project located in City of Mount Vernon. Drainage area: 3,093 sq. miles Discharege: 14,000 cfs Slope: 0.1%	Monitoring occurred 100 feet upstream of project and 300 feet downstream	Data provided in NTUs	Met water quality standards for sheet pile driving (cofferdam) and dewatering, no information provided on putting water back into site and removing sheet piles.				

Project and Watershed	Stream Characteristics at Project Location	Monitoring Locations	Original Sediment Data	Concentration (mg/L) used for determining SEV level.	Duration of elevated sediment concentration.	SEV (Juvenile and Adult Salmonids)	SEV Habitat	Comments
Miscellaneous Activities, continued								
Silver Creek Dam Removal Tributary to the White River. Project involved removal of 10-year-old log stringer dam about 5 ft high.	Project located approximately 1120 ft upstream of the confluence with the White River, near Silver Springs Campground. Approximately 3.3 miles SE of Snoquera, WA on Highway 410. Drainage area: 8.0 sq. miles Slope: 8.4% Discharege: 8.3 cfs	159, 559, and 1118 ft downstream	Data provided in NTUs in graph. Estimated values from graph. Project site was not dewatered, logs pulled out of stream and sediment released.	159 ft 114.5 559 ft 157.0 1118 ft. 55.2	 1 hr 0.75 0.75	 5 5 4	 5 5 4	No BMPs or conservation measures used to minimize sedimentation. Sediment analysis. No gage located on creek. Paul Bakke monitored project and determined NTU to suspended sediment ratio of 1:1.9789 Used ratio: 1:2

* Values calculated from monitoring report. Concentration calculated using equation tons/day = 0.0027* cfs* mg/L (USACE 1995). Background concentration 1.5 mg/L (average). Stream velocity 2.76 cfs. Duration: monitoring report stated sediment concentration levels decreased to near pre-removal levels in about 24 hours (used for average values), peak values based on 8 to 10 hour work day.

** Exact duration is unknown as monitoring stopped when work day was over. Unable to determine when concentrations returned to baseline.

Exact duration is unknown as monitoring did not provide start or stop times to be able to make accurate determination.