RECLAMATION

Managing Water in the West

DRAFT Environmental Assessment

C Canal Flume Replacement

Klamath County, Oregon

2015-EA-008

U.S. Department of the Interior
Bureau of Reclamation Mid-Pacific Region
Klamath Basin Area Office

November 2015

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Contents

This page intentionally left blank

Chapter 1: Introduction and Background Information

1.1 Introduction

The Bureau of Reclamation (Reclamation) has identified unacceptable structural deficiencies associated with the C Canal Flume (C Flume) within the Klamath Reclamation Project (Klamath Project). A 2013 inspection under Reclamation's special inspection program for urban canals resulted in a Category 1 recommendation, which requires the Klamath Irrigation District (KID) to repair and/or replacement of the deteriorated beams, columns, and other structural members of the C Flume.

This Draft Environmental Assessment (EA) analyzes the potential environmental impacts of correcting the deficiencies of the C Flume. The Draft EA has been prepared in accordance with the *National Environmental Policy Act* (NEPA) (42 U.S.C. §4321 et seq.), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations (CFR) Parts 1500-1508), and the Department of the Interior regulations for the Implementation of the NEPA (43 CFR Part 46). If there are no significant environmental impacts identified as a result of the analyses, a Finding of No Significant Impacts (FONSI) can be signed to complete the NEPA compliance process. This EA will also be used to inform Reclamation's decision-making within the contracting process associated with repayment costs of replacing the C Flume.

1.2 Background

The C Flume, a 4,300 foot long elevated concrete segment of the C Canal, facilitates delivery of water from Upper Klamath Lake to approximately 22,000 acres of farmland within the Klamath Project located in Klamath County, Oregon (*see* Figure 1-1 for maps and Appendix A for pictures). The C Flume was originally constructed in 1909 as a wood structure, and then replaced in 1922 with the existing concrete structure. The existing C Flume is comprised of precast concrete U-shaped sections that have been joined by simple push-together joints. The superstructure and precast substructure were placed on the original foundations. Numerous repairs have been made to the C Flume since 1922, including sealing cracks, reinforcing portions of the longitudinal beams with steel members, and most recently in 2013 and 2014, installing temporary wood and steel shoring for some of the beam sections.

The C Flume crosses beneath the Burlington Northern Santa Fe Railway (BNSF) railroad line, crosses over Oregon State Highway 39, and spans the Lost River Diversion Channel (LRDC). BNSF constructed the railway overpass in 1930, pursuant to an agreement with Reclamation. The portion of the C Flume crossing the highway was modified after the original construction date.

Although a Federal Reclamation facility, the C Flume is operated and maintained by KID. Since 1955, KID has been responsible for the operation and maintenance (O&M) of the C

Flume, pursuant to Reclamation Contract 14-06-200-3784, dated November 29, 1954. In early 2013, KID retained Adkins Engineering, LLP (Adkins) to perform an engineering assessment on the structure. Adkins had just completed that inspection, identifying more than 1,200 locations along the structure that needed to be addressed, when Reclamation initiated a special inspection of the facility in February 2013. Reclamation's special inspection likewise identified deficiencies in the facility, including concrete degradation, cracking, and flaking; metal loss and loss of strength; and sagging beams leading to load carrying capacity concerns and facility leakage. Based on these findings, in July 2013, Reclamation issued a Category 1 recommendation, requiring KID to perform engineering analysis and complete permanent repairs and/or a replacement to the structure.

In order to stabilize the structure until completion of permanent repairs and/or a replacement, KID, Adkins, and Reclamation developed and implemented a plan for temporary wood shoring for the C Flume prior to the 2013 irrigation season. This temporary wood shoring was replaced with steel shoring prior to the 2014 irrigation season. KID also developed, and Reclamation approved, an emergency response plan for operation of the C Flume, which included regular inspections and modified operation of the facility at reduced water levels. These interim measures do not, however, eliminate the freeze-thaw action that continues to degrade the structure and create a potential risk of failure.

1.3 Location

The upstream end of the existing C Flume is located approximately 370 feet southwest of the C-G Canal, one-third of a mile east of Highway 39, and one-half mile north of the LRDC (*see* Figure 1-1). The end of the flume is approximately 925 feet west of Highway 39 and 380 feet south of the LRDC.

The proposed replacement pipe structure would be approximately 4,300 feet long, with a downstream terminus located), approximately 900 feet west of Highway 39, 400 feet south of the LRDC.

The proposed replacement structure would be located within the existing C Flume right-of-way (ROW), which is owned by Reclamation in fee title. The width of the ROW varies from 150 feet wide at the northeast end, to 300 feet wide at the southwest end. The replacement structure will be entirely located within the ROW. Temporary construction access, staging areas, and material storage yards will be located either within or adjacent to the ROW.

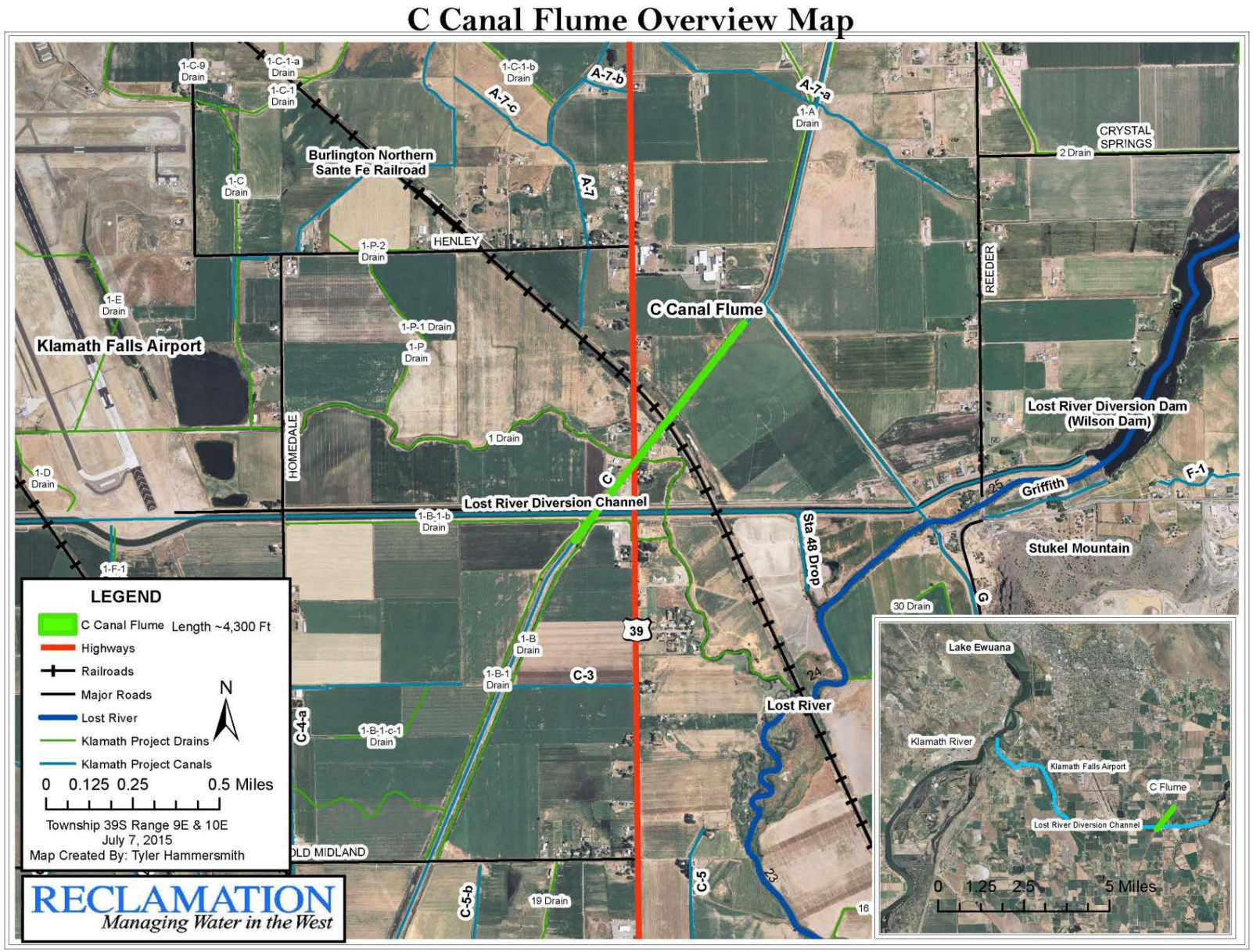
The replacement structure would be located within the boundaries of existing lands owned in fee by Reclamation and in connection with the original structure way for the C Flume. Below is the description of the general location:

- Southeast Quarter of the Northwest Quarter, the Northeast Quarter of the Southwest Quarter, the Northwest Quarter of the Southwest Quarter, and the Southwest Quarter of the Southwest Quarter of Section 30, all in Township 39 South, Range 10 East, Willamette Meridian;

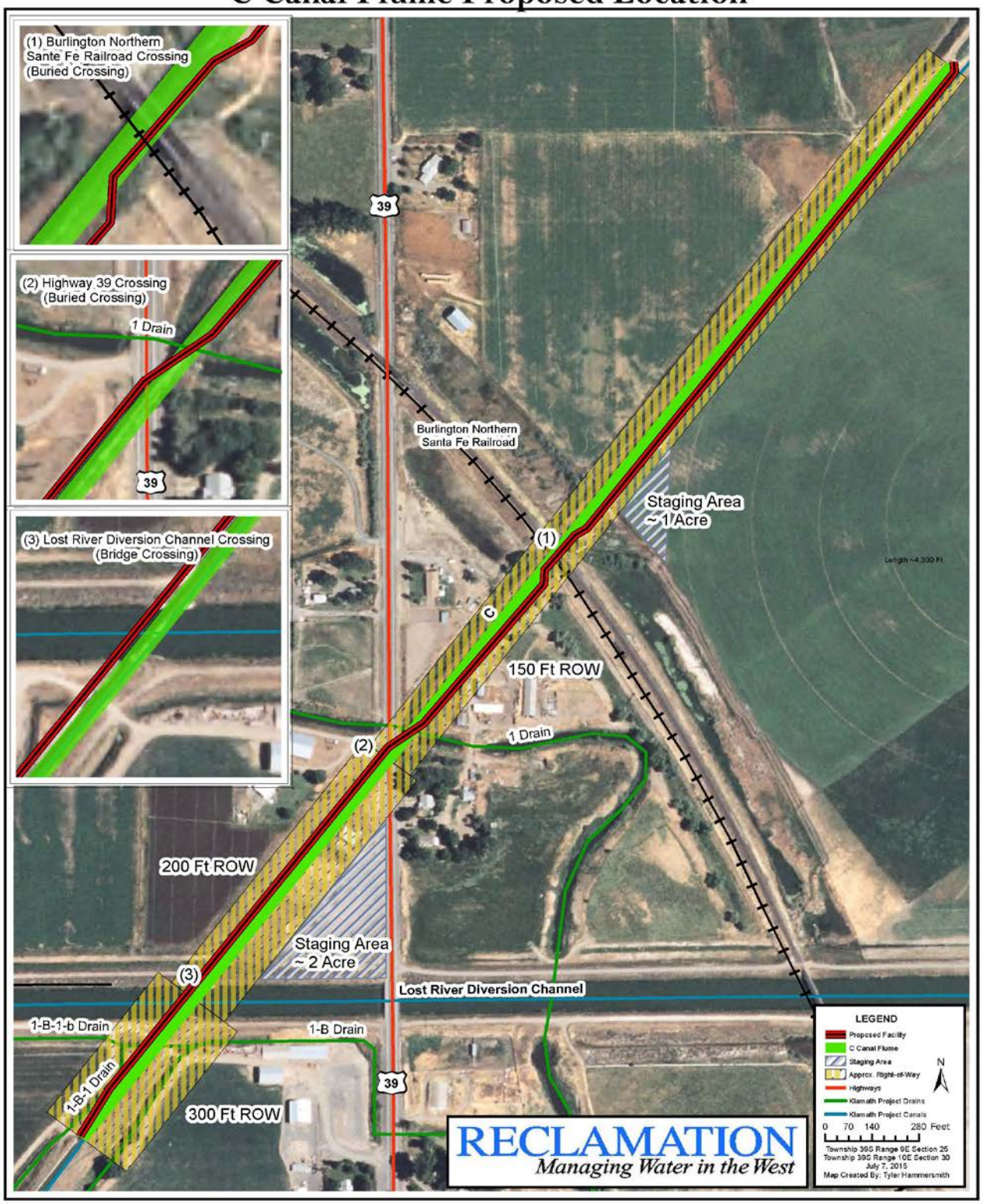
- Southeast Quarter of the Southeast Quarter of Section 25, Township 39 South, Range 9 East, Willamette Meridian; and

- Northeast Quarter of the Northeast Quarter of Section 36, Township 39 South, Range 9 East, Willamette Meridian

Figure 1-1 General Maps; Current and Proposed Locations



C Canal Flume Proposed Location



1.4 Need for the Proposal

The purpose of the proposed action is to address the 2013 Category 1 recommendation for the repair and/or replacement of the C Flume. Action is needed to protect human health, safety, and property from the deteriorating structure and allow Reclamation to continue to satisfy its contractual obligations to Klamath Project water users by delivering water to approximately 22,000 acres of irrigated land within the Main Division of the Klamath Project.

1.5 Decision to be Made

Reclamation will decide whether to authorize KID to construct a proposed replacement structure to the existing C Flume, in satisfaction of the Category 1 recommendation. This decision will be made based on this EA, and the engineering designs and specifications submitted by KID under an MP-620 form, which is required for additions or alterations to Reclamation-owned facilities. Reclamation may also elect to advance funds to KID to cover a portion of costs in connection with the repair and/or replacement of the C Flume, and enter into a repayment contract with KID for the corresponding construction costs and repayment of such funds.

1.6 Authority

The Klamath Project was authorized by the Secretary of the Interior on May 15, 1905, under the Reclamation Act of 1902 (32 Stat. 388).

KID is obligated under article 7(b) of Contract 14-06-200-3784 to promptly make any and all repairs to the transferred works, including the C Flume, which in the opinion of the Secretary of the Interior, are necessary for the proper preservation of the facility.

Reclamation would review and approve engineering designs and specifications submitted by KID for the replacement structure, pursuant to a MP-620 form (a form used by transferred works operating entities in obtaining Reclamation's approval for additions or alterations to Reclamation-owned facilities in the Mid-Pacific Region). Reclamation's prior approval is required for all work to be performed by KID under the proposed activities. Reclamation would inspect all ongoing and completed work to determine it is consistent with authorized designs and specifications.

Title IX, Subtitle G, Section 9603 of the *Omnibus Public Land Management Act of March 30, 2009* (Pub. L. 111-11; 43 U.S.C. §510b) authorizes the Secretary of the Interior to advance federal funds to a non-federal operating entity for performing extraordinary maintenance on Federal Reclamation facilities, and to enter into a contract for the repayment of such funds.

1.7 Regulatory Compliance Laws

Compliance with the following laws and regulations would be required prior to and during

implementation of the proposed action. Permits and approvals would be required from a number of agencies and are summarized in Table 1-1.

***National Environmental Policy Act* (42 U.S.C. § 4321 et seq.)**

Under the *National Environmental Policy Action* (NEPA), federal agencies must consider and disclose the environmental consequences of proposed major actions. The spirit and intent of NEPA is to protect and enhance the environment through well-informed federal decisions, based on sound science. NEPA is premised on the assumption that providing timely information to the decision-maker about the potential environmental consequences of proposed actions would improve the quality of federal decisions. Thus, the NEPA process includes the systematic interdisciplinary evaluation of potential environmental consequences expected to result from implementing a proposed action.

***Endangered Species Act* (16 USC. 1531 et seq.; 50 CFR Parts 17 and 222)**

The *Endangered Species Act* (ESA) requires Federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species (according to the lists maintained by the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS)) or result in the destruction or adverse modification of habitat critical to such species' survival. To ensure against jeopardy, each Federal agency must consult with the USFWS and/or NMFS.

***Clean Air Act* (42 U.S.C. §7401 et seq.)**

The principal federal law protecting air quality is the *Clean Air Act* (CAA), which is enforced by the EPA. Section 176(c) of the CAA (42 U.S.C. §7506(c)) requires any entity of the Federal Government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable State Implementation Plan (SIP) required under section 110 (a) of the CAA (42 U.S.C. §7401(a)) before the action is otherwise approved.

***Clean Water Act* (33 U.S.C. §1251 et seq.)**

The *Clean Water Act* (CWA) strives to "restore and maintain the chemical, physical, and biological integrity of the Nation's water." If water quality is potentially affected by a proposed action, a National Pollutant Discharge Elimination System (NPDES) permit (administered by the states) under section 402 of the CWA is required. If a project has the potential to result in placement of materials into waters of the United States, a Dredge-and-Fill permit under section 404 of the CWA would be required from the U.S. Army Corps of Engineers (USACE). Prior to issuances of either a NPDES or Dredge-and-Fill permit, certification under section 401 of the CWA (as it relates to States and Tribes review and approval of the proposed action) would be also required.

***Federal Migratory Bird Treaty Act of 1918* (16 U.S.C. §§ 703-712)**

The *Federal Migratory Bird Treaty Act* (MBTA) prohibits the take, harm, or trade of any migratory bird species, including owls, hawks, and other birds of prey, and requires that a federal agency must have a policy in place to prevent harm to such species as a result of that agency's actions. The U.S. Fish and Wildlife Service (USFWS) is the agency charged with administering and enforcing the MBTA. A 1972 amendment to the act included owls, hawks, and other birds of prey**.**

***National Historic Preservation Act* (P.L. 89-665), as amended (Public Law 95-515) (54 USC § 300101 *et seq.*)**

The *National Historic Preservation Act of 1966* (NHPA) requires federal agencies to consider historic preservation values when planning their activities. Each federal agency must establish a preservation program for identifying, evaluating, and protecting properties under its ownership or control that are eligible for listing on the National Register of Historic Places. 54 USC § 306108, commonly known as Section 106 of the NHPA, requires federal agencies to take into account the effects of their undertakings on historic properties. Through the Section 106 process, outlined at 36 CFR Part 800, federal agencies identify historic properties potentially affected by an undertaking, assess the effect of the undertaking on historic properties, and then seeks ways to avoid, minimize, or mitigate any adverse effects on historic properties.

State of Oregon Limited License (O.R.S. § 537.143)

A limited licenses provide temporary authorization from the Oregon Water Resources Department to divert and use water in the State of Oregon for a short-term or fixed duration for certain beneficial uses such as general construction.

Table 2-1 Required Permits/Approvals

Agency	Permit/Approval
Burlington Northern Santa Fe Railway (BNSF)	Potential temporary access/railroad control plan; anticipated to be obtained by Reclamation by December 2015
U.S. Army Corps of Engineers (USACE)	CWA section 404 permit (Non-Reporting Nationwide Permit (NWP) No. 3 (Maintenance)); acquired by Reclamation on May 9, 2014, and pre-certified under CWA section 401.
U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act section 7 consultation on Lost River and shortnose suckers; Reclamation has determined the potential impacts of the Proposed Action is within the scope of analysis of the 2013 Biological Opinion for operation of the Klamath Project and has requested USFWS concurrence. Informal consultation with the USFWS is ongoing with concurrence from the USFWS anticipated to be received in December 2015.
Oregon Department of Environmental Quality (ODEQ)	CAA Air Quality Discharge permit; contractor potentially required to obtain permit from DEQ prior to construction.
Oregon Department of Environmental Quality (ODEQ)	CWA section 402 NPDES permit; acquired confirmation of coverage on October 22, 2015.
Oregon Department of Fish and Wildlife (ODFW)	Scientific Take Permit (OAR §635-007-0910); Reclamation acquired concurrence on proposed application plan and eligible to apply for the permit no earlier than January 2016.
Oregon Department of Transportation (ODOT)	ODOT permit to occupy or perform operations upon a state highway for temporary access and staging area use; acquired by Reclamation on February 14, 2015. Traffic control plan approval to be obtained by KID or its contractor prior to work commencing.
Oregon Water Resources Department (OWRD)	Limited license for use of water for fugitive dust control mitigation measures; anticipated to be acquired by Reclamation in November 2015.
Oregon State Historic Preservation Office (SHPO)	NHPA section 106 compliance; consultations with the Oregon State Historic Preservation Officer on the development of a Memorandum of Agreement (MOA) to resolve the adverse effect to the C Flume are ongoing; Reclamation anticipates through execution of the MOA by December 2015.

Chapter 2: Alternatives

This EA analyzes two alternatives including the No Action Alternative and the Proposed Action. The No Action Alternative reflects conditions without the Proposed Action and serves as a basis of comparison for determining potential effects to the human environment as a result of implementing the Proposed Action.

2.1 Alternative 1 – No Action

Under the No Action Alternative, Reclamation would: not authorize KID to construct the proposed replacement structure; or for modification or alterations to the C Flume nor advance federal funds to KID for a portion of the work and execute a contract with KID for repayment of such funds. No improvements would be made to the existing structure; however, annual O&M activities for the C Flume would continue to occur as in the past. Reclamation considers the No Action Alternative to be unacceptable for the long-term due to human, health, and safety risks.

2.2 Alternative 2 – Proposed Action (Preferred Alternative)

Under the Preferred Alternative, Reclamation would: review and approve the engineering designs and specifications submitted by KID and authorize KID to modify or alter the facility by undertaking construction actions to correct the C Flume Category 1 recommendation. Additionally, Reclamation would advance KID federal funds for a portion of the cost of the work and enter into a contract with KID for repayment of such funds. KID would replace the existing C Flume facility with a buried pipeline. The new facility would include approximately 4,100 feet of a 10-foot diameter buried pipe and 200 feet of an elevated steel pipe structure spanning over the Lost River Diversion Channel (LRDC). The elevated portion would be constructed of steel (AWWA C200) and the underground pipe would be made of either steel (AWWA C200), steel reinforced reinforced polyethylene (SRPE), or high density polyethylenehigh density polyethylene (HDPE).

Construction of the new facility is proposed to occur on both sides of the existing structure and construction activities would allow the existing C Flume to remain in service until the end of the 2017 irrigation season (October 2017). Construction activities would be conducted using standard heavy machinery including, but not limited to:

- bulldozers
- trackhoes
- backhoes
- compaction equipment
- dump trucks
- cranes

Equipment would access the construction site from Highway 39 and either Reclamation's existing access roads or temporary construction easements obtained from adjacent landowners. In the case of temporary construction easements with the adjacent landowners, equipment would access the construction site via existing driveways and farm roads, with one exception. A temporary access road, 25-feet wide, is proposed to be constructed with a gravel base on the east side of the BNSF railway ROW, running approximately 1,600 feet in length. This proposed road would connect Reclamation's existing access road on the north side of the LRDC to Reclamation's fee title land for the existing flume. The footprint of this road would cover approximately one acre of land. This access road would be removed upon completion of construction and the land would be converted as close to pre-construction conditions as practicable.

Staging areas for material, vehicles, and equipment would be established within Reclamation's fee title land for the existing flume, with two exceptions as described below and shown on the maps in Figure 1-1.

1. A staging area, covering approximately 1.1 acres, would be located within the northern portion of ODOT's existing gravel stockpiling area to the west of Highway 39 and immediately south of the LRDC.
2. At the northern end of the proposed temporary access road to be constructed as described above, a staging area covering approximately one acre, would be located within the agricultural field, adjacent to Reclamation's fee title land for the existing C Flume.

If the construction contractor deems it necessary to establish additional staging areas outside Reclamation's fee title land for the existing C Flume, such additional staging areas would be established to avoid mature shrub and tree vegetation. All staging areas would be a minimum of 150 feet from the LRDC, and/or containment measures would be provided for to protect against accidental fuel spills, erosion, etc. An Erosion and Sediment Control Plan as shown in Appendix B) would be included in the KID Contracting Documents and would be carried out by KID or its contractor. KID or its contractor would also develop a Hazardous Materials Control Plan which would follow Reclamation's Safety and Health Standards.

Where the pipe is proposed to cross the LRDC, a wasteway structure would be constructed to release water from a siphon in the event of an emergency or high flow event. This type of configuration already exists on the existing LRDC crossing. Additional drains would also be installed at the low point and in various locations to allow the siphon pipe to be flushed, cleaned, and inspected at the beginning and the end of the irrigation season. An example of this type of configuration can be seen on the existing LRDC crossing.

Access ports would be installed along the entire length of the siphon at intervals of approximately 500 feet. These ports would be provided with flanged watertight seals to ensure adequate pressure is maintained within the pipe system. The ports would also be fitted with security locks to prevent unauthorized entry. In addition, pressure relief valves would be provided at these access ports to relieve pressure from high groundwater (that may arise from under the buried flume) when pressure differentials exceed designated thresholds.

Under the construction schedule proposed by KID, work on the replacement structure would

be complete by the end of April 2018, in time for operation during that year's irrigation season. All remaining work would take place from April 2018 to October 2018.

Demolition, demobilization, and construction would start in October 2016) with closeout in October 2018.

Replacement of the Flume would occur in three phases:

Phase 1 – Construction and on-season work including installation of the replacement pipe, LRDC crossing, and associated components (turnouts, drains and tie-ins, including all parallel work and the LRDC crossing) would occur January 2016 to November 2016.

Phase 2 – Installation of the proposed pipe would continue from November 2016 to April 2018 (including all work crossing the existing flume, tie-ins at each end, and connection of all turnouts).

Phase 3 – Demolition and removal would take place from April 2016 to April 2018 (including site restoration).

Control Plans

In addition to meeting all Reclamation Safety and Health Standards, KID or its contractor would be responsible for developing and implementing the following mitigation and control plans to reduce and or eliminate potential environmental impacts as a result of implementation of the Proposed Action:

- Erosion and Sediment Control Plan
- Hazardous and Toxic Materials Control Plan
- LRDC Dewatering-Fisheries Salvage Plan
- Traffic Control Plan

2.2.1 Phase 1 and Phase 2 - Installation

- Excavate a trapezoidal trench parallel to the existing C Flume, approximately 22 feet wide at the top, 10 feet wide at the bottom, and approximately six (6) feet deep. This trench would be approximately 2,600 feet and on the north-side approximately 1,700 feet on the south-side of the existing C Flume. The new 10-foot diameter pipe would be installed along the entire length of the excavated trench and would require three (3) feet of cover to meet frost depth requirements and to be capable of a minimum of H-20 traffic loads as identified by the American Association of State and Highway Transportation Officials (*note:* H-20 is a calculation of pounds per square inch depending on number of axles or by a formula resulting in load over area).

    - Total excavation for the proposed pipe is expected to be approximately 15,000 cubic yards (CY). Material from the excavation may be used to backfill and cap

over the pipe. It is anticipated that all excavated material would be used on site or disposed of at authorized disposal facilities as approved by Reclamation.

- At the upstream end, the existing concrete canal would be saw cut at the transition to the existing facility. This existing concrete canal material would be removed and recycled into construction as outlined in the demolition plans, which are to be developed by the contractor at a later date, but prior to construction.

- A new 100-foot long concrete canal would be constructed from the existing C Canal to a transition structure, connecting this new canal to the replacement pipe structure. The transition structure connecting the canal to the pipe would be similar in size and nature to the existing transition from C Canal to the C Flume, except that the new transition would be from canal to a pipe, rather than canal to a flume. Construction of this canal-to-pipe transition structure would occur after the replacement pipe is ready for operation and during the off-irrigation season (generally from October through March), so that the connection can be completed without interrupting irrigation service.

- To assist with the transitions to and from the various crossings (e.g., railroad, highway, and LRDC) and transition of elevations fittings would be installed under the pipe to assist in aligning the pipe to be parallel to and offset approximately 20 feet south from the south edge of the existing facility.

    - The canal-to- pipe transition structure would be provided with a trash rack having openings of approximately 8 to 10 inches. KID would periodically clean debris off of the rack. Safety measures such as a ladder, warning signage, fencing, and a floating cable anticipated to be installed at the canal-to-siphon structure.

- The 10-foot diameter pipe would be buried approximately six (6) feet deep (in most areas except the highway crossing), allowing the crest of the pipe to be backfilled and capped with approximately three (3) feet of material such that the pipe and backfill are level with the existing ground elevation. The capping material may be recycled concrete from the demolition of the existing C Flume.

- Due to the types of crossings (e.g., railroad, highway, and the LRDC) the proposed pipe trench depth and the estimated amount of backfill may vary. This condition is also true for the various transition points along the proposed pipe route.

- **Railroad Crossing:**

    - At the intersection with the BNSF railway line, approximately 2,000 feet southwest of the initial starting point of replacement structure, pipe will be installed under the existing trestle bridge.

- The pipe alignment under the BNSF trestle would follow the existing alignment of the C Flume and would be located in order to fit between the existing trestle abutments after the demolition of the existing C Flume structure.

- The pipe would be a minimum of 10 feet from the existing trestle abutments, and excavation for the pipe would not expose the trestle abutment footings.

- Excavation in this area would consist of approximately 400 CY of excavation and possible installation of temporary shoring for the purpose of supporting railroad trestles. Following installation, the pipe would be covered with fill material.

- **Highway 39 Crossing:**

  - The C Flume currently crosses over Highway 39, which is maintained by ODOT. KID's proposed replacement structure would cross under Highway 39. The pipe at this location would be fully buried, and covered with a concrete fill mixture.

  - At the highway crossing, excavation would entail a square trench approximately 13 feet deep and 13 feet wide.

  - The pipe would be fully buried in order to provide a minimum of three (3) feet of cover between the pipe and the highway roadbed.

  - This section of pipe would be buried and encased in controlled-density fill (CDF) slurry. The casing will be reinforced with #4 rebar and concrete.

- **LRDC Crossing:**

  - At the junction of the LRDC , the new facility would cross the LRDC on the north-side of the existing C Flume structure.

  - A 200-foot long elevated pipe would span the LRDC with one center supporting pier (consisting of six (6) piles) installed within the existing concrete liner in the prism of LRDC. The six (6) pipe piles will be driven to capacity in the bottom of the channel and capped with a cast in place concrete pile cap. The concrete pile cap will be approximately 17' 3" x 14' 8" x 5' 0"' thick. The bottom of the cap will reside a few inches into the normal water level.

  - The six (6) steel piles in the center of the LRDC would be installed by cutting the existing concrete liner, installing the piles, and then backfilling the liner with concrete that would be hauled in from off-site. These steel piles may be covered with approved protective coating to ensure durability and would also be

capped on the bottom with a concrete footing that would rest on the existing concrete liner.

- A supporting pier (consisting of three (3) piles each) for this spanned section of pipe would be installed, on each side of the LRDC.

- A temporary crane pad (20 feet by 90 feet) with approximately 200 CY of approved aggregate material (crushed rock) would be placed in the prism of the LRDC to enable the contractor to maneuver a crane that would be used to install the permanent piles in both the embankments and center of the LRDC.

- Two coffer dams would be installed in a "U" shape within the prism of the LRDC to further isolate water from the work area. The work area would include the area around the crane pad, all or a large portion of the existing concrete liner, and the areas along the embankment where new piles would be driven. The coffer dams may be constructed using heavy plastic bladder dams and or through the use of a plastic tarp-like material anchored in place with a total of 90 CY of crushed rock (45 CY per coffer dam). The 90 CY of crushed rock would originate from a Reclamation-approved (industry standard; e.g., triple washed gravel) site and would not contain recycled asphalt or concrete materials due to potential contamination concerns. The coffer dams would be placed in the LRDC prism and then removed within two to three weeks of completion of the pipe structure spanning the LRDC. Coffer dams would be constructed of nonerosive material, such as concrete jersey barriers, sand and gravel bag dams, or water bladders. Constructing a coffer dam by pushing material from LRDC bed or banks would not occur. The coffer dams would include sand and gravel bag dams which would be lined with a plastic liner or geotextile fabric to reduce permeability and prevent sediments and/or construction materials from entering the channel.

  Construction activities within the LRDC would commence in November 2016. Prior to beginning construction work, the LRDC would be dewatered through a coordinated effort by Reclamation, KID, ODFW, and USFWS.

- Temporary Fill Materials: Crane pad aggregate and all materials associated with the water isolation barriers would be removed within three weeks of completion of construction of the replacement pipe across the LRDC. Sediment barriers along the embankments of the LRDC would be removed within 24 months to allow for bank stabilization and to reduce sediment transport into the LRDC during winter and spring months.

- Permanent Materials: Six steel piles and new concrete placed in the existing concrete liner would be the only permanent fill associated with the proposed project.

- Prior to construction, but after dewatering of the LRDC on or around November 2016, Reclamation fisheries biologists would enter the LRDC to conduct fish salvage activities as outlined in Appendix C and as coordinated with ODFW and USFWS.

- Temporary water isolation barriers (anticipated to be sandbags and sediment fences) would be placed along the perimeter of the work area within the LRDC prism (*see* Appendix D indicating the location of the coffer dams/water isolation features).

- Additional temporary sediment control barriers would be installed along the embankments of the LRDC and within the LRDC prism to further assist with dewatering the work area and to reduce turbidity in the remaining 0.5-1 feet of water anticipated to be present in the channel.

2.2.2 Phase 2 – Demolition and Removal

- After all of the siphon pipe, LRDC crossing, and transition structures are installed and completed, the existing C Flume structure would be demolished and the concrete crushed and used as fill over the siphon pipe.

- During the demolition phase (April 2016 through April 2018), removal of the existing C Flume structure across the LRDC would consist of constructing a temporary debris containment structure which would be constructed under the existing flume bridge to catch all small and large diameter debris from demolition of the existing superstructure (concrete tubs, steel beams, etc.). During the demolition phase, the LRDC would not be dewatered.

- It is anticipated that all excavated material would be used on site.

- No excavation or debris spoils would be placed within wetlands in the project vicinity.

- All other demolition material would be hauled off site for disposal at an authorized commercial facility.

- Following construction, all disturbed areas of the site would be treated with soil stabilization measures and seeded with native species.

2.3 Alternatives Considered and Eliminated from Further Study

As part of the feasibility study prepared by Adkins (Adkins 2014) for KID, alternatives were developed according to considerations established for the study. These alternatives were evaluated on technical merit and eliminated from further evaluation in the feasibility study.

- Alternate I: Pipe Siphon Option (350 cubic feet per second (cfs))
- Alternate II: Pipe Siphon Option with Canal Extensions (350 cfs)

- Alternate Ill: Elevated Concrete Flume Option (350 cfs)
- Alternate IV: Elevated Concrete Flume Option with Canal Extensions (350 cfs)
- Alternate V: Pipe Siphon Option with Canal Extension and Highway 39 Re-construction (350 cfs)
- Alternate I-a: Pipe Siphon Option (450 cfs)
- Alternate II-a: Pipe Siphon Option with Canal Extensions (450 cfs)
- Alternate Ill-a: Pipe Siphon Option with Canal Extensions (450 cfs)
- Alternate IV-a: Elevated Concrete Flume Option with Canal Extensions (450 cfs)
- Alternate V-a: Pipe Siphon Option with Canal Extension and Highway 39 Re-construction (450 cfs)

Chapter 3: Affected Environment & Environmental Consequences

This chapter describes the affected environment and evaluates the environmental consequences of the proposed action and implementation of the Proposed Action (Alternative 2). The No Action alternative (Alternative 1) describes the conditions most likely to occur if the proposed action were not implemented and provides the basis for comparison to describe the environmental consequences of implementing the action alternative.

Cumulative impacts are described for each resource. Cumulative impacts result from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

3.1 Resources Not Analyzed in Detail

Effects on several environmental resources were examined and found to be minor. For the reasons noted below, the following resources were eliminated from further review in this EA.

3.1.1 Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in assets that are held in trust by the United States for federally recognized Indian tribes or individuals. There are no Indian reservations, rancherias or allotments in the project area. As shown in Appendix E, the nearest ITA is a public domain allotment approximately 14.86 miles northwest of the project site and on October 22, 2015, the ITA coordinator stated: “The nature of the planned work does not appear to be in an area that will impact Indian hunting or fishing resources or water rights, nor are the proposed activities on actual Indian lands.

[Therefore,] it is reasonable to assume that the proposed action will not have any impact on ITAs."

3.1.2 Indian Sacred Sites

Sacred sites are defined in Executive Order 13007 (May 24, 1996) as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." No Indian sacred sites have been identified in the project area. The Proposed Action would not affect and/or prohibit access to and ceremonial use of Indian sacred sites.

3.1.3 Environmental Justice

Executive Order 12898 requires each Federal agency to identify and address disproportionately high and adverse human health or environmental effects, including social and economic effects of its programs, policies, and activities on minority populations and low-income populations. Reclamation has not identified adverse human health or environmental effects on any population as a result of implementing the Proposed Action. Since there would be no permanent impact to any populations, there would be no adverse human health or environmental effects to minority or low-income populations as a result of the Proposed Action.

3.1.4 Climate Change and Greenhouse Gases

Climate change refers to significant change in measures of climate (e.g., temperature, precipitation, or wind) lasting for decades or longer. Many environmental changes can contribute to climate change (e.g., changes in sun's intensity, changes in ocean circulation, deforestation, urbanization, burning fossil fuels) (EPA 2015). Climate change implies a significant change having important economic, environmental, and social effects in a climatic condition such as temperature or precipitation. Climate change is generally attributed directly or indirectly to human activity that alters the composition of the global atmosphere, additive to natural climate variability observed over comparable time periods.

There would be no impacts contributing to climate change or greenhouse gases (GHG) under the No Action Alternative. Under the Proposed Action Alternative Reclamation would approve KID to replace the C Flume. Potential impacts to climate change or GHG could result from the use of excavators, portable generators (not used or left on site for more than 12 months), backhoes, dozers, cranes, dump and water trucks, etc. for an intermediate period over the course of January 2016 to October 2018. Any impacts to climate change or increases in GHG would be expected to be insignificant due to the size and scope of the project, small change from current conditions, duration of use that is limited to the project construction, and compliance with pollution related laws and regulations. Furthermore, KID would comply with applicable Federal, state, or local air pollution laws and regulations.

3.1.5 Recreation

Recreation is not allowed within or adjacent to the canals of the Klamath Project. There would be no change from existing conditions with implementation of either alternative.

3.1.6 Noise

The area where the C Flume would be replaced is typically impacted by the noise of large farming machinery, railroad and highway traffic, thus the additional temporary noise associated with construction is not expected to be a significant impact. Noise impacts would be minimized by reducing construction activities to 7:00 A.M. to 7:00 P.M., Monday through Sunday. Work hours outside this period (like those hours that may be needed during crossing of Highway 39) would need to be approved in advance by Reclamation or KID. Upon approval, KID would be required to contact adjacent landowners prior to work commencing to inform them of the potential change in work hours and the anticipated level of temporary noise increases during specific construction activities. There would be no long-term increases to the ambient noise levels from the implementation of the proposed action.

3.1.7 Socioeconomics

The Proposed Action would create a short-term demand for construction related products and services, creating short-term jobs and supporting local vendors. Overall, the project would have an insignificant impact on socioeconomic conditions in the project region.

3.2 Resources Analyzed in Detail

3.2.1 Biological Resources

3.2.1.1 Affected Environment:

Federally Listed Threatened and Endangered Species

Federally listed threatened and endangered species that occur within or near lands served by Project canals are shown in Table 1-2. The following species lists were obtained October 23, 2015, by accessing the U.S. Fish and Wildlife Service database for species that may occur within Klamath County, Oregon: http://www.fws.gov/klamathfallsfwo/es/es.html (USFWS 2015)

ESA-Listed Fish Species

Sampling in the LRDC indicates that juvenile suckers (both the Lost River sucker (*Deltistes luxatus*) and the shortnose sucker (*Chasmistes brevirostris*)) are present in low numbers during the summer and that young and old juvenile suckers are present in the LRDC year-round (Phillips et al. 2011). The best evidence indicating the numbers of suckers in the LRDC is available from a monitoring effort in 2005. During this effort trapnets were set at numerous locations in the LRDC to determine the presence and

abundance of fish species. In 64 net sets totaling 1253 hours of netting time, only eight juvenile suckers were captured between May and October of that year (Foster and Bennetts 2006). In addition to trapnets within the LRDC, a screwtrap was operated July through Septemeber downstream of Station 48 (outlet of the LRDC) in 2005. This screwtrap captured two suckers (Foster and Bennetts 2006).

The low catch data for suckers from the 2005 effort corroborate Reclamation's experience of salvaging fish in the LRDC. In November 2014, when the LRDC was dewatered to permit gate and bridge inspections, Reclamation did not observe any suckers among the several thousand stranded fish that were relocated within the LRDC. Much of this salvage effort focused just to the east of the C Flume crossing as this area had several disconnected pools of water on the channel floor.

Evidence from the nearby Klamath River (Phillips et al. 2011) and Lost River (Shively et al. 2000) also indicate that juvenile suckers are present but not necessarily abundant in these adjacent bodies of water.

ESA-Listed Vegetative Species:

Two plant species have been known to exist in Klamath County – Applegate's milk-vetch (*Astragalus applegatei*) and Green's tuctoria (*Tuctoria greenei*). A digital survey was conducted using a Klamath County Endangered Species shapefiles provided by the USFWS in 2015 and after review, Reclamation concluded there are no endangered plant species present within the C Flume project area. From the shapefiles used, the closest instance of a listed endangered species (Applegate's milk-vetch) is approximately 1.5 miles from the project area and no effect is likely to occur with implementation of this project (*see* Figure 1-2). Thus, endangered plant species are not discussed further in this EA.

Table 1-2 Listed, Endangered, Threatened, Proposed, and Candidate Species that May Occur in Klamath County, Oregon.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Klamath Falls Fish and Wildlife Office
1936 California Avenue, Klamath Falls, Oregon 97601
(541) 885-8481 FAX (541)885-7837
kfalls@fws.gov

LISTED, PROPOSED, AND CANDIDATE SPECIES THAT MAY OCCUR IN KLAMATH COUNTY, OREGON

Status: **Endangered**

Phylum	Common Name	Scientific Name	Critical Habitat
Fish	Lost River sucker	*Deltistes luxatus*	Designated
Fish	Shortnose sucker	*Chasmistes brevirostris*	Designated
Mammal	Gray wolf	*Canis lupus*	
Plant	Applegate's milk-vetch	*Astragalus applegatei*	
Plant	Green's tuctoria	*Tuctoria greenei*	Designated

Status: **Threatened**

Phylum	Common Name	Scientific Name	Critical Habitat
Bird	Northern spotted owl	*Strix occidentalis caurina*	Designated
Bird	Yellow-billed cuckoo (Western DPS)	*Coccyzus americanus occidentalis*	Proposed
Fish	Bull trout (Klamath River DPS)	*Salvelinus confluentus*	Designated
Amphibian	Oregon spotted frog	*Rana pretiosa*	Proposed
Mammal	Canada lynx	*Lynx canadensis*	
Plant	Slender Orcutt grass	*Orcuttia tenuis*	Designated

Status: **Proposed**

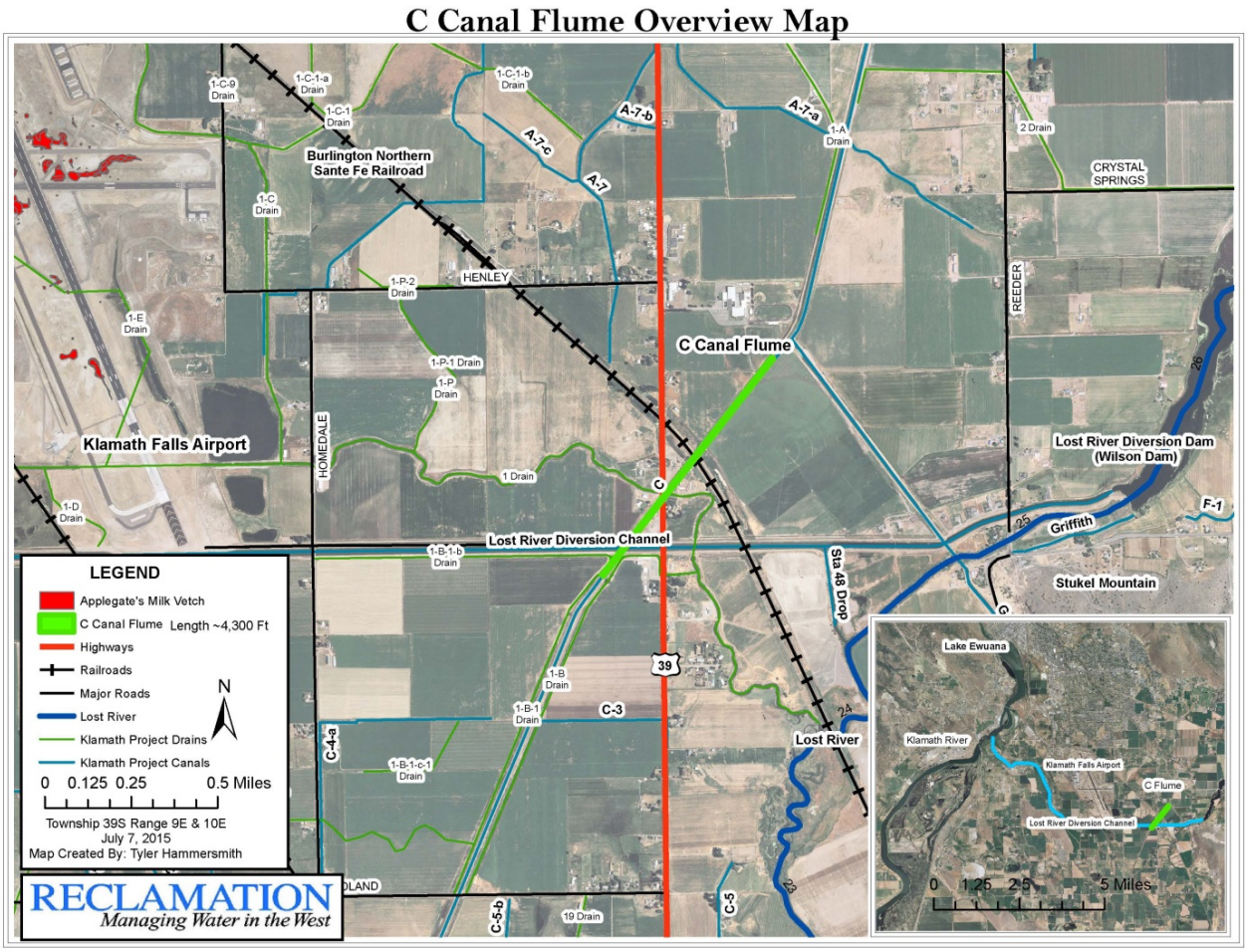
Phylum	Common Name	Scientific Name	Critical Habitat
Mammal	Fisher (West Coast DPS)	*Pekania pennanti*	

Status: **Candidate**

Phylum	Common Name	Scientific Name
Plant	Whitebark Pine	*Pinus albicaulis*

Updated October 8, 2015

Figure 1-2 Proposed Location Overlaid with ESA listed Species



Non-Federally Listed Species

Fish Species:

Non-ESA listed species that may be present in the proposed project vicinity include: Jack Rabbits (*Lepus californicus*); Black Tail Deer (*Odocoileus hemionus columbianus*); Mule Deer (*Odocoileus hemionus)*; Striped skunks (*Mephitis mephitis*); Red-tailed hawk (*Buteo jamaicensis*); American Crow (*Corvus brachyrhynchos*); Western Scrub-Jays (*Aphelocoma californica*); Steller's jay (*Cyanocitta stelleri*); American robin (*Turdus migratorius*); Northwestern garter snake (*Thamnophis ordinoides*); Coyotes (*Canis latrans*); North American raccoon (*Procyon lotor*)*;* and the Mourning Doves (*Zenaida macroura*).

Vegetative Species:

Klamath Basin Area Office (KBAO) staff conducted a site visit on October 14, 2015, to identify native and/or non-native vegetation near the C Flume. Using vegetation taxonomy and wetland indicator status provided online through the Natural Resource Conservation Service (http://plants.usda.gov/java/) a list of present species was created

and is as follows:

- Climbing Nightshade (*Solanum dulcamara*) – Facultative (Occur in wetlands and non-wetlands)
- Common Mallow (*Malva neglecta*) – Upland (Almost never occur in wetlands)
- Yellow Sweetclover (*Melilotus officinalis*) – Facultative Upland (Usually occur in non-wetlands, but may occur in wetlands)
- Russian Thistle (*Salsola tragus*) – Facultative Upland (Usually occur in non-wetlands, but may occur in wetlands)
- Common Mullein (*Verbascum Thapsus*) - Facultative Upland (Usually occur in non-wetlands, but may occur in wetlands)
- Broad-Leaved Cattail (*Typha latifolia*) – Obligated Wetland (Almost always occur in wetlands)
- Wild Asparagus (*Asparagus officinalis*) – Facultative Upland (Usually occur in non-wetlands, but may occur in wetlands)
- Rubber Rabbitbrush (*Ericameria nauseosus*) – Upland (Almost never occur in wetlands)

Non-ESA Terrestrial Species:
Non-ESA listed species that may be present in the proposed project vicinity include: Jack Rabbit (*Lepus californicus*); Black Tail Deer (*Odocoileus hemionus columbianus*); Mule Deer (*Odocoileus hemionus)*; Striped skunk (*Mephitis mephitis*); Red-tailed hawk (*Buteo jamaicensis*); American Crow (*Corvus brachyrhynchos*); Western Scrub-Jays (*Aphelocoma californica*); Steller's jay (*Cyanocitta stelleri*); American robin (*Turdus migratorius*); Northwestern garter snake (*Thamnophis ordinoides*); Coyote (*Canis latrans*); North American raccoon (*Procyon lotor*)*;* and the Mourning Dove (*Zenaida macroura*).

3.2.2 Environmental Consequences

Alternative 1 – No Action:

Under the No Action Alternative, Reclamation would not authorize KID to construct the proposed replacement structure; or for modification or alterations to the C Flume nor advance federal funds to KID for a portion of the work and execute a contract with KID for repayment of such funds. No improvements would be made to any of the existing facilities; however, annual O&M activities for the C Flume would continue to occur as in the past. Minimal impacts to ESA and non-ESA listed fish, terrestrial, and vegetative species associated with the continued historic O&M activities would occur.

Alternative 2 – Proposed Action:

Fisheries Resources (ESA-Listed and Non- Listed)

Under the Proposed Action, specifically those actions involving in-water work such as the construction of an elevated pipe structure across the LRDC and dewatering the LRDC could temporarily strand ESA-Listed and non-ESA listed fish in various pools causing intermittent, non-lethal impacts to fishes that may be present within the LRDC.

To reduce these potential impacts to all fish species that may be present, Reclamation would conduct fish salvage activities during the LRDC dewatering. These activities were developed in coordination with ODFW and the USFWS in fall of 2015, and are fully described in Appendix C and summarized as follows:

- Sufficient depth of water in the LRDC would be maintained to ensure the survival of stranded fish during the dewatering and construction phases of this effort.
- Reclamation staff will salvage fish that are stranded in small and shallow pools within the LRDC.
- All salvaged fish of species other than suckers and trout would be relocated to larger pools within the LRDC that have sufficient depth to provide survival for several weeks while the work is conducted.
- Block nets and electro-fishers would be used to isolate and remove all fish from the immediate construction area (i.e., 100 feet to the east and west of the existing C Flume Crossing) until a coffer dam is installed.
- Pools with remaining fish would reconnect to the Klamath River and the Lost River once the LRDC is re-watered following construction.
- Biological monitoring would be incorporated throughout the dewatering and construction phases to ensure water conditions are adequate for fish protection.
- If Lost River and shortnose suckers are encountered during the salvage of disconnected pools, Reclamation would coordinate with the USFWS and on where to relocate the salvaged individuals. The relocation of salvaged trout from the LRDC would be coordinated with ODFW.

Under the Proposed action, Reclamation anticipates handling between ten (10) and twenty (20) ESA-listed suckers of all life history stages in the LRDC during the November 2016 dewatering effort to replace the C Flume crossing. Many of these fish will be young-of-the-year juveniles, but we may encounter the adult life history stage. Larval suckers are not anticipated to be present during the fall season.

The proposed dewatering and salvage activity, summarized above, has been previously analyzed for its potential impacts to endangered suckers in the *May 31, 2013, Biological Opinions on the Effects of Proposed Klamath Project Operations from May 31, 2013, through March 31, 2018, on Five Federally Listed Threatened and Endangered Species* (BiOp) issued jointly by the USFWS and the National Marine Fisheries Service. In

review of the BiOp, (Section 4.3.1.5, page 43), Reclamation has determined the potential impacts of the Proposed Action and associated salvage are within the scope of analysis of the BiOp and has requested USFWS concurrence. Informal consultation with the USFWS is ongoing with concurrence from the USFWS anticipated to be received in December 2015 (Appendix I).

Discussions with the ODFW related to all other potentially present fish species was initiated in August 2015. On October 19, 2015, ODFW provided agreement (*see* Appendix H) that the activities described in the Proposed Action LRDC salvage plan would be sufficient for Reclamation's renewal application for ODFW's Scientific Taking Permit. In its correspondence, ODFW committed to cooperating with Reclamation in 2016 to assist with issuing a renewal application for a Scientific Take Permit for which Reclamation will be eligible to apply for in calendar year 2016 for activities that would occur in 2016 (e.g., LRDC de-watering).

Vegetation:

The spread of invasive and noxious weeds can be a significant issue in construction projects that involve land disturbance. KID (or its contractor) would regularly monitor all areas disturbed by construction activities for weeds and apply appropriate treatment as needed until project completion.

When construction is completed, areas of temporary disturbance would be replanted with a certified weed free native or adapted plant seed mix. The mix of native or adapted plants would be determined in consultation with Reclamation. Adjacent undisturbed sites would also provide seed sources for recolonizing the disturbed areas. KID would monitor and treat weeds within the C Flume ROW as part of its O&M responsibilities following construction.

Terrestrial Species:

Under the Proposed Action, it is anticipated that intermittent, non-lethal, and temporary noise and vibration disturbances in the project location may result in potential insignificant impacts to local ESA and non-ESA-listed terrestrial species.

No tree removal (potential roosting/nesting locations), would occur as a result of implementation of the Proposed Action. During a site visit conducted by Reclamation Natural Resource staff in June 2014 and September 2015, no avian roosting/nesting areas of species covered under the MBTA were found. Additionally, no Golden or Bald Eagles (*Aquila chrysaetos* and *Haliaeetus leucocephalus*; respectively) nor their roosts/nests were sited at the proposed project location.

Overall, the proposed activities are not expected to result in negative effects on eagles and or migratory birds protected under the MBTA or the Bald and Golden Eagle Protection Act.

Potential impacts to all species listed in section 3.2.1 were considered and would be insignificant as a result of KID or its contractor erecting construction fence barriers as deterrents to excavated work and staging areas. Overall impacts would be localized to pre-disturbed lands within Reclamation's ROW and all work would be temporary in nature and limited to the construction period as described in Section 2.2.

3.2.3 Cumulative Impacts

As the Proposed Action is not expected to result in any significant direct or indirect impacts to ESA-listed and non-listed biological resources (i.e., fish, terrestrial, and vegetative species) there would be no significant cumulative impacts.

3.3 Surface and Groundwater Resources

3.3.1 Affected Environment

Surface Water:

The major surface water resources in the vicinity of the Proposed Action include Upper Klamath Lake (UKL), Klamath River, Lost River, and other various conveyance features associated with the Klamath Project. UKL is a large, shallow lake fed by the Williamson River, Wood River and several smaller streams. UKL provides water for several competing resources including irrigation deliveries, regulation for power generation, and downstream flows and lake level requirements for the benefit of endangered species.

Currently, KID's primary water supply is delivered from UKL via the A Canal. The A Canal is 8.7 miles long, has a capacity of 1,150 cfs, passes through a 3,300 foot long tunnel beneath the City of Klamath Falls, and conveys irrigation water to serve approximately 63,000 acres of agricultural land. At the downstream terminus of the A Canal water is conveyed into either the B Canal or C Canal. Water entering the C Canal travels through the earthen canal, then enters the C Flume for approximately 4,300 feet.

The C Flume intersects the LRDC. The LRDC is an earthen-lined channel that extends nearly eight (8) miles from the Lost River to the Klamath River in Klamath County, Oregon. The LRDC carries excess water from the Lost River to the Klamath River and supplies supplemental irrigation water for the reclaimed lake bed of Tule Lake by reverse flow from the Klamath River. Due to the nature of the facility, it can convey water in either direction, east or west, as operated by Reclamation. A radial gate at the confluence of the LRDC and the Lost River is controlled by Reclamation and controls flows within the LRDC to and from the Klamath River.

On average the surface water in the LRDC flows year round. Typical flow rates are 500 cfs during the irrigation season (April through September) and 3,000 cfs during high run-

off events.

Groundwater:

Groundwater data collected on March 20, 2015, indicated groundwater along the alignment is approximately eight (8) to ten (10) feet below the ground surface. In general, the groundwater elevation is expected to be similar to nearby surface water elevations. Following periods of heavy rain, shallower levels of perched groundwater may be encountered (Foundation 2015).

3.3.2 Environmental Consequences

Alternative 1 – No Action:

Under the No Action Alternative, Reclamation would not authorize KID to construct the proposed replacement structure; or for modification or alterations to the C Flume nor advance federal funds to KID for a portion of the work and execute a contract with KID for repayment of such funds. No improvements would be made to any of the existing facilities; however, annual O&M activities for the C Flume would continue to occur as in the past. Minimal to no impacts to surface water or groundwater are likely to occur as a result of the continued historic O&M activities.

Alternative 2 – Proposed Action:

Authorized irrigation deliveries from the C Canal and existing C Flume would continue throughout the construction period and no impoundments of water would be created.

Dewatering of the surface waters within the LRDC (described in section 2.2.1) would occur as part of the Proposed Action. Temporary and isolated turbidity from executing fish salvage activities and installing temporary coffer dams, crane pads and steel piles would be minimal, localized, and temporary in nature. It is anticipated that in the 0.5 to 1 feet of water is expected to be remain in the LRDC after dewatering. All materials (e.g., coffer dams, crane pad, and or fish salvage tools, etc.) placed in the LRDC would be inspected and approved by Reclamation to ensure they do not contain or are not coated with chemicals or like substances that could leach and effect present surface waters. All materials would be removed within three weeks of completing construction activities associated with crossing the LRDC. The permanent steel piles and associated footings would be coated and cured prior to water reentering the LRDC. The Proposed Action would have no effect on water temperature, nutrients, pH or any other water quality parameters outside background levels.

As the LRDC crossing construction plans may have the potential for activities that would result in dredge and fill of waters of the United States, Reclamation obtained concurrence from the USACE regarding compliance with section 404 of the CWA. On May 9, 2014, USACE provided correspondence that Reclamation's Proposed Action is authorized under

USACE's Non-Reporting Nationwide No. 3 (Maintenance) permit (Appendix G) which is recognized as pre-certified by ODEQ under section 401 of the CWA.

To ensure compliance with section 402 of the CWA, Reclamation obtained concurrence from ODEQ that Reclamation's, Klamath Basin Area Office's coverage is active under the 1200-CA NPDES permit. The 1200-CA permit covers all construction projects within the Klamath Project that disturb one (1) acre or more of land and have the potential to discharge stormwater into waters of the State of Oregon (Appendix J).

The Erosion and Sediment Control Plan (as shown in Appendix B) would be included in the KID contracting documents and would be implemented by KID or its contractor to reduce overall surface water sedimentation.

Groundwater

Groundwater could be encountered during trenching activities. Dewatering of the trenches would be required and disposal of groundwater would have to be made in accordance with Reclamation's CWA section 402 NPDES permit conditions, and as specifically identified in the Erosion and Sediment Control Plan (Appendix B). If contaminated water is encountered, the groundwater would be pumped into a water truck and disposed of at an appropriate facility (e.g wastewater treatment facility) approved by Reclamation.

3.3.3 Cumulative Impacts

Since the Project would have negligible effects on surface and groundwater resources and any impacts would be temporary and localized, the Proposed Action would have no significant cumulative impacts on surface or groundwater resources.

3.4 Cultural Resources

3.4.1 Affected Environment:

"Cultural resources" is a broad term that applies to prehistoric and historic-era archaeological sites and structures, components of the built environment, and traditional cultural properties, all of which provide evidence of human behaviors, economic activities, and cultural traditions, both past and present. Cultural resources that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) are known as "historic properties." 54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA), requires Federal agencies to take into account the effects of their undertakings on historic properties. This is accomplished through the section 106 process as outlined at 36 CFR Part 800.

As part of the Section 106 process, efforts to identify historic properties in the proposed

project area of potential effects (APE) were conducted by Reclamation and by Native X, Inc. Archaeological Services (Native X), the latter working on behalf of KID. Reclamation's identification efforts included a pedestrian survey of the APE and recordation of the C Flume structure, which was determined, in consultation with the Oregon State Historic Preservation Officer (SHPO), to be a historic property. Native X also conducted a pedestrian survey of the APE, during which a surface scatter of historic-era debris was identified and recorded. Following a methodology agreed to by Reclamation and the SHPO, Native X completed subsurface archaeological testing within the APE as well. No historic properties were identified through the survey and testing conducted by Native X.

In accordance with the requirements of 36 Code of FR § 800.3(f)(2), Reclamation identified the Klamath Tribes as an Indian tribe that might attach religious and cultural significance to historic properties in the APE. Reclamation contacted the Klamath Tribes via written correspondence, seeking information on potential historic properties pursuant to 36 CFR §800.4(a)(4), and inviting the tribes' participation in the Section 106 process. No formal response from the tribe was received.

In consultation with the SHPO, Reclamation determined that the C-Canal Flume, which is eligible for NRHP inclusion, both individually and as a contributing element to the Klamath Project, is the only historic property in the APE. Reclamation further determined, with SHPO concurrence, that the demolition of the C-Canal Flume would constitute an adverse effect pursuant to36 CFR §800.5(d)(2). Reclamation and the SHPO are currently negotiating the terms of a memorandum of agreement (MOA) that will govern the implementation of the undertaking and the resolution of adverse effects resulting from C-Canal Flume removal. The execution and fulfillment of the stipulations of the MOA will evidence that Reclamation has taken into account the effects of this undertaking on historic properties in compliance with Section 106 of the NHPA. Reclamation's undertaking may not proceed until the MOA is executed and implemented. Once the MOA has been executed it will be incorporated into this EA (Appendix F)

3.4.2 Environmental Consequences

Alternative 1 – No Action:

Under the No Action Alternative, Reclamation would not authorize the removal and replacement of the C Flume and there would be no Federal undertaking or action requiring Section 106 or NEPA compliance. The No Action Alternative would result in no significant impacts to cultural resources.

Alternative 2 – Proposed Action:

The Proposed Action would result in the removal of the C Flume, a component of the larger C Canal and the Klamath Project that has been determined eligible for the NRHP. The physical destruction of the C Flume constitutes an adverse effect

on historic properties pursuant to36 CFR § 800.5(d)(2). Mitigation of this adverse effect will be accomplished through the execution and implementation of a MOA by Reclamation and the SHPO. Completion of the terms of the MOA will fulfill Reclamation's Section 106 compliance responsibilities and result in less than significant impacts to cultural resources from the Proposed Action.

3.5 Hazardous and Toxic Materials

3.5.1 Affected Environment

Use, storage, and disposal of hazardous materials and solid waste associated with construction have the potential to adversely affect the environment if these materials are improperly managed. In general, the most potential impacts are associated with the release of these materials to the environment. Direct impacts of such releases would include contamination of soil, water, and vegetation, which could result in indirect impacts to wildlife, aquatic life, and humans.

3.5.2 Environmental Consequences

Alternative 1 – No Action:

Under the No Action Alternative, Reclamation would not authorize KID to construct the proposed replacement structure; or for modification or alterations to the C Flume nor advance federal funds to KID for a portion of the work and execute a contract with KID for repayment of such funds. No improvements would be made to any of the existing facilities; however, annual O&M activities for the C Flume would continue to occur as in the past. There would be no increase in the potential exposure to hazardous and toxic materials nor would it cause an unauthorized release of a hazardous or toxic material into the environment.

Alternative 2 – Proposed Action:

Construction would require the short-term use of fuels, lubricants, and other fluids that create a potential contamination hazard. As a result, KID or its contractor, would develop and implement (with review by Reclamation) a Hazardous and Toxic Materials Control Plan which would specify that all potentially toxic and hazardous substances would be stored and handled in accordance with industry standards as wells as federal and state regulations. This plan would also identify the procedure for corrective action and cleanup of any spills or leaks of hazardous materials to minimize the impact on sensitive resources. KID and its contractor would comply with Reclamation Safety and Health Standards and or as outlined by Reclamation.

3.5.3 Cumulative Impacts

The Proposed Action incorporates KID or its contractor developing and implementing Hazardous and Toxic Control Plans to control potential contamination hazards, such that they would not result in any significant direct or indirect impacts, there would be no significant cumulative impacts.

3.6 Air Quality

3.6.1 Affected Environment

Air quality in the State of Oregon is regulated by the U.S. Environmental Protection Agency (EPA) and ODEQ. The National Ambient Air Quality Standards (NAAQS), established by the EPA under the CAA, specify limits of air pollutants levels for seven criteria pollutants: carbon monoxide, particulate matter (PM) 10, PM 2.5, ozone, sulfur dioxide, lead, and nitrogen.

Primarily because of topography, weather, and a large number of non-certified woodstoves, Klamath Falls has been identified as area of nonattainment for PM 2.5. With increased understanding of the health effects of particulates, EPA has made the standards more protective over time, addressing smaller sized particles that are the most hazardous but more difficult to control. Since 1994, the Klamath Falls area has attained the larger or coarse (PM10) particulate matter standard. In 2009, with the adoption of a fine particulate (PM2.5) matter standard, EPA changed the legal status of the Klamath Falls Area from attainment (meeting air quality standards) to nonattainment (not meeting air quality standards) for fine particulate matter (PM2.5). ODEQ has adopted an attainment plan with associated regulations to ensure that the Klamath Falls area meets the current PM2.5 standard. A portion of the C Flume is located in the Klamath Falls area of nonattainment for PM 2.5.

3.6.2 Environmental Consequences

Alternative 1 – No Action

Under the No Action Alternative, Reclamation would not authorize KID to construct the proposed replacement structure; or for modification or alterations to the C Flume nor advance federal funds to KID for a portion of the work and execute a contract with KID for repayment of such funds. No improvements would be made to any of the existing facilities; however, annual O&M activities for the C Flume would continue to occur as in the past. Implementation of this alternative does not require any construction and would result in no impacts to air quality other than what has historically occurred.

Alternative 2 – Proposed Action

The replacement of the C Flume would not result in any long-term impacts to air quality. Impacts from the use of heavy equipment during construction activities, such as pollution and fugitive dust, may have a temporary negative effect on air quality. Those effects would be localized and temporary in nature and would cease once construction activities were completed.

Short-term construction activities associated with the Proposed Action facilities would include materials deliveries, vegetation removal, grading and other land preparation activities, pipeline trenching, and land restoration. Light emissions from construction during evening hours may occur along ODOT road-side flaggers and construction entrances/exists. These light emissions are anticipated to be approximately 300 feet away from adjacent homes. Emissions of particulate matter (PM2.5 and PM10) would occur during earth disturbing activities. Construction emissions would vary from day to day and activity to activity depending on the timing and intensity of construction, with each activity having its own potential to release emissions.

As the existing C Flume structure may be utilized for backfill and coverage of the new buried facility, use of a rock crusher may be need. If used, the contractor would be required to secure Air Contaminant Discharge Permits (ACDP) from ODEQ for on-site generators and rock crushers. In addition, the contractor would be required to implement an approved fugitive dust control plan. This plan would include measures for minimizing fugitive dust such as applying dust suppressants and/or water sprays, minimizing the extent of disturbed surface areas, and restricting activities during periods of high wind. Water from adjacent irrigation canals and drains may be used by KID or its contractor for dust suppression measures after they obtain a limited license from the OWRD, anticipated to occur in 2015.

A 100-percent level of control for fugitive emissions is not attainable as some particulate matter in the form of dust and exhaust emissions is unavoidable during construction. Implementation of mitigation measures are expected to result in no violations of air quality standards by reducing this impact to non-significance.

3.6.3 Cumulative Impacts

Compliance with all applicable emission standards and Best Management Practices (BMPs) would reduce potential impacts to less than significant levels. Air quality impacts associated with construction of this alternative would be temporary and less than significant. These impacts are localized in nature and decrease substantially with distance. No other construction projects are currently located or expected in the immediate vicinity of the C Flume. Therefore, construction of this alternative would not contribute to cumulative construction air quality impacts.

3.7 Traffic and Transportation

3.7.1 Affected Environment

The existing C Flume crosses beneath the BNSF railroad line, crosses over Highway 39, and spans the LRDC (*see* Figure 1-1 and Appendix A for pictures). Highway 39 runs southeast out of Klamath Falls through Merrill, and then continues south to California. It generally has one lane in each direction, and posted speeds range from 30 to 55 mph. This section of the highway is designated as a State Freight Route with truck traffic typically accounting for 10 to 25 percent of the traffic.

3.7.2 Environmental Consequences

Alternative 1 – No Action

Under the No Action Alternative, Reclamation would not authorize KID to construct the proposed replacement structure; or for modification or alterations to the C Flume nor advance federal funds to KID for a portion of the work and execute a contract with KID for repayment of such funds. No improvements would be made to any of the existing facilities; however, annual O&M activities for the C Flume would continue to occur as in the past. Under this alternative, no construction would occur. Current traffic volumes and patterns would continue.

Alternative 2 – Proposed Action

Under this alternative the C Flume pipe would be installed under Highway 39 using open trench methods. It is anticipated traffic would be detoured by KID or its contractor (in coordination with ODOT) for approximately three days during the November to March timeframe. The approved traffic control plan for the entire construction period would be implemented to facilitate the movement of traffic through the area in a safe and expedient manner. Since the C Flume would be installed below the existing railroad trestle, no impacts to rail traffic or existing railroad trestle footings is expected.

Reclamation obtained approval on February 14, 2015, from ODOT for temporary access and staging area through the issuance of a Permit To Occupy or Perform Operations Upon A State Highway. Approval of a traffic control plan from Reclamation and ODOT must be obtained by KID or its contractor prior to work commencing.

3.7.3 Cumulative Impacts

Because the approved traffic control plan for the entire construction period would be implemented to facilitate the movement of traffic through the area in a safe and expedient manner, and because the C Flume would be installed below the existing railroad trestle, no impacts to highway or rail traffic are expected. Therefore,

construction activities of this alternative would not contribute to cumulative impacts to traffic and transportation.

Chapter 4 Environmental Commitments

The following environmental commitments and permitting conditions would be implemented before, during, and after construction to assure no significant impacts would occur as a result of the Proposed Action.

General

- KID and its contractors shall be responsible for complying with all environmental requirements identified in this EA, as well as all federal, state, and local laws and or permits that have already been obtained or are yet to be obtained (*see* section 1.7).

- Reclamation's Safety and Health Standards and all applicable Reclamation standards and directives would be applied during construction activities to minimize environmental impacts.

- KID or its contractor would be responsible for developing and implementing following mitigation and control plans to reduce and or eliminate potential environmental impacts as a result of implementation of the Proposed Action:
    - Erosion and Sediment Control Plan
    - Hazardous and Toxic Materials Control Plan
    - Spill Prevention Control and Countermeasure Plan
    - LRDC Dewatering-Fisheries Salvage Plan
    - Traffic Control Plan

Access:

- Construction access would be established to define the points of entrance and/or exit to the construction site to stabilize and reduce the tracking of mud and dirt onto the public highway by construction vehicles. The stabilized construction entrances would be inspected to remove sediments that may have built up on a regular basis, or within 24 hours after storm events, and repaired as necessary.

- Existing roads and staging areas will be used whenever possible for project activities. Use of privately-owned land for access will only occur under and consistent with executed temporary construction easements.

- Designation of areas with fencing or other barriers demarking construction areas, staging areas, and access points would be installed prior to and during all construction activities.

- All construction activities would be confined to Reclamation's ROW or on land in which Reclamation has acquired a temporary construction easement.

Air Quality

- If a rock crusher is required for demolition activities, the contractor will obtain an Air Quality Discharge Permit from ODEQ (pursuant to its website accessed at: http://www.deq.state.or.us/regulations/rules.htm) prior to bringing the rock crusher on-site. Additionally, the contractor may need to submit a notice of construction, if applicable, through the ODEQ office in Bend, Oregon prior to crushing activities occurring.

- KID and its contractor will comply with all conditions imposed by OWRD under the limited license for use of water for dust abatement.

Biological-Fisheries

- Reclamation will obtain a Scientific Taking Permit from ODFW prior to dewatering of the LRDC. Reclamation will conduct fish salvage and comply with the conditions of the permit and USFWS recommendations. KID or its contractor will provide Reclamation a minimum notice of two weeks prior to wanting to initiate dewatering of the LRDC. Reclamation will then notify and coordinate with ODFW and USFWS.

Cultural and Paleontological Resources

- In the case that any cultural or paleontological resources, either surface or subsurface, are inadvertently discovered during construction, Reclamation's Mid-Pacific Regional archaeologist shall be notified and construction in the area of the inadvertent discovery will cease until an assessment of the resource and recommendations for further work can be made by a professional archaeologist. Any person who knows or has reason to know that he/she has inadvertently discovered possible human remains on Federal land must immediately provide telephone notification of the discovery to Reclamation's Mid-Pacific Regional archaeologist. Work will stop until the proper authorities are able to assess the situation on-site. This action will promptly be followed by written confirmation to the responsible Federal agency official, with respect to Federal lands. SHPO Officer and interested Native American Indian tribal representatives from appropriate Indian tribes would be promptly notified and consulted. This requirement is prescribed under the *Native American Graves Protection and Repatriation Act* (43 C.F.R. Part 10) and the *Archaeological Resources Protection Act of 1979* (16 U.S.C. §470).

- A Memorandum of Agreement (MOA) with SHPO Officer to mitigate for adverse effects of the Proposed Action must be executed prior to construction commencement.

- In the case that any paleontological resources, either surface or subsurface, are inadvertently discovered during construction, Reclamation's Mid-Pacific Regional archaeologist shall be notified and construction in the area of the inadvertent discovery will cease until an assessment of the resource and recommendations for further work can be made by Reclamation's Mid-Pacific Region.

Hazardous Fuels and Materials

- An Environmental Site Survey would be conducted prior to initiating construction. Any materials or hazardous substances in the ROW area that could be exposed would be removed or other appropriate remedial action taken prior to start of construction.

- The contractor will prepare a project-specific Spill Prevention Control and Countermeasure Plan to be approved by Reclamation to address secondary containment, prevention of spills, spill containment and cleanup procedures, and materials on hand to accomplish the containment and cleanup of petroleum and other hazardous products that may be brought on site. The plan must be approved by Reclamation prior to moving any of these products on site and prior to any construction activity.

- If on-site storage occurs, lubricants and fuels would be placed in temporary, clearly marked, above-ground containers and provided with secondary containment. Construction equipment would be maintained and inspected regularly. Any soil contaminated by fuel or oil would be removed and disposed of by a contractor to an approved disposal site.

- Any hazardous materials and other hazardous substances that are used in construction would be disposed of in accordance with applicable laws and regulations. Excess or unused quantities of hazardous materials would be removed upon project completion. Although hazardous waste generation is not anticipated, any such wastes produced during construction would be properly containerized, labeled, and transported to an approved hazardous waste disposal facility. All nonhazardous waste materials including construction refuse, garbage, and sanitary waste, would be disposed of by removal from the work area to an approved disposal facility. Disposal of any and all materials by burning will not occur. All elements of the Hazardous and Toxic Control Plan to be developed by KID or its contractor, will be implemented and followed throughout the during of the Proposed Action work timeframe.

Land

- After construction is complete, the contractor shall seed Reclamation's ROW with a suitable seed mix for the soil and landscape of the area. The purpose of this seeding will be to reduce erosion and sedimentation. If the soil has been compacted, the top layer of the soil should be tilled to allow for proper establishment of the plants' root systems. The seeded area shall be covered with certified weed-free mulch after the seed is applied.

Noise

- BMP's would be implemented to control temporary noise impacts during construction including mufflers on heavy equipment. The contractor would follow all state and local noise ordinances. To reduce disruptive noise emissions, the contractor would restrict construction activities to the following timeframes: 7:00 A.M. to 7:00 P.M., Monday through Sunday. Work outside this time period requires advance approval from Reclamation or KID. Upon approval, KID would be required to contact adjacent

landowners prior to work commencing to inform them of the potential change in work hours and the anticipated level of temporary noise increases during specific construction activities. There would be no long-term increases to the ambient noise levels after construction is completed.

Records

- KID and its contractors will keep all environmental permits, conditions, guidelines, Reclamation's Safety and Health Standards and all plans and BMPs on the job site and readily available for reference by Reclamation, ODEQ, USACE, USFWS, ODFW, and other appropriate state and local government inspectors.

Utilities

- KID and its contractors will be responsible for locating, marking, and protecting all utilities within the work area prior to commencing ground disturbing activities.

Water Quality

- Silt fencing along the embankment of the LRDC and work areas along C Flume would be established prior to commencing the Proposed Action. Ponding will not be permitted behind the silt fences as the fences will collapse under high pressure. The design of the silt fences will provide sufficient outlets to prevent overtopping. The maximum height of the silt fence should range between 18 and 36 inches above the ground surface (depending on the amount of upslope ponding expected). Silt fences will be inspected daily during periods of prolonged rainfall, immediately after each rainfall event, and weekly during periods of no rainfall. Any required repairs will be made immediately. Sediment must be removed when it reaches one-third to one-half the height of the silt fence. Fences will not be removed until the upslope area has been permanently stabilized with reseeded vegetation. Any sediment deposits remaining in place after the silt fence has been removed will be dispersed to conform to the existing grade.

- Erosion control BMPs will be implemented during all ground disturbing activities to reduce runoff and allow for infiltration, provide sediment trapping and support the establishment of permanent ground covers (e.g., vegetative cover). KID and its contractors shall also comply with the Erosion and Sediment Control Plan as shown in Appendix B and as detailed by KID or its contractor. This plan will serve to provide detailed information about the construction site, and serves as a blueprint for the location, installation, and maintenance of the erosion and sediment control measures to minimize erosion and reduce sediment entering the LRDC. Erosion prevention BMPs may include, but are not limited to surface roughening, temporary vegetation cover, erosion blankets, dust control, etc.

- Temporary fills must be removed from the LRDC entirety and the affected areas returned to pre-construction conditions. The affected areas must be stabilized and revegetated, as appropriate.

- KID and its contractors will implement all reasonably available controls and practices to minimize turbidity during in-water work.

- KID and its contractors will comply with all conditions imposed by OWRD under the limited license for use of water for dust abatement.

- All materials (e.g., coffer dams, crane pad, and or fish salvage tools) anticipated to be placed in the LRDC would be inspected by Reclamation prior to installation to ensure they do not contain or are not coated with chemicals or like substances that could leach and effect present surface waters.

- Coffer dams would be constructed of non-erosive material, such as concrete jersey barriers, sand and gravel bag dams, or water bladders. Constructing a coffer dam by pushing material from LRDC bed or banks will not occur. The Coffer dams will include sand and gravel bag dams which would be lined with a plastic liner or geotextile fabric to reduce permeability and prevent sediments and/or construction materials from entering the channel.

Chapter 5 Consultation and Coordination

This section presents the agencies and parties that were coordinated or consulted with during development of the document.

5.1 ESA Consultation and State Species Coordination

Pursuant to section 7(a)(2) of the ESA (43 U.S.C. § 1521 et seq.), Reclamation initiated informal consultation with USFWS in August 2015 to discuss the appropriate level of consultation that would be required for the Proposed Action. Informal consultation with the USFWS is ongoing and no project actions would be implemented until Reclamation receives biological concurrence from USFWS, anticipated by December 2015 (Appendix I).

Reclamation initiated coordination with ODFW in August 2015 on the permit application for the State of Oregon's Scientific Taking Permit, which would be acquired prior to project actions being implemented. Appendix D indicates ODFW's that ODFW believes the draft proposal (Appendix B) will provide sufficient information for the permit application that can be submitted in application form by Reclamation no sooner than January 2016.

5.2 NHPA Section 106 Consultation

Reclamation initiated consultation with SHPO for this undertaking on August 11, 2014, with a finding of an adverse effect to historic properties (i.e., the C Flume. SHPO concurred with the finding on September 3, 2014. Reclamation also notified the

Advisory Council on Historic Preservation (Advisory Council) of the adverse effect and, on September 25, 2014, the Advisory Council elected to not participate in the resolution of the adverse effect. Consultation with the SHPO on resolution of the adverse effect through negotiation of a Memorandum of Agreement (MOA) is in progress. The Proposed Action will not be implemented until execution and completion of any required stipulations of the MOA.

5.3 CWA Consultation

Reclamation consulted with the Corps on Section 404 of the Clean Water Act and received concurrence from the Corps on the proposed action on May 9, 2014, (Appendix G). As a result, the proposed activities are authorized by the Corps' Non-Reporting Nationwide No. 3 (Maintenance) permit which does not require a pre-construction notice and includes CWA Section 401 water quality certification.

To ensure compliance with the section 402 of the CWA, Reclamation coordinated with ODEQ's Eastern Regional Office and was provided with email correspondence on October 22, 2015,(Appendix J) stating that Reclamation is authorized to conduct the proposed activities under its NPDES Stormwater Discharge Permit number 1200-CA.

5.4 CAA Coordination

Reclamation coordinated with ODEQ's Eastern Regional Office regarding the Proposed Action activities, including fugitive dust control plans. This coordination included discussion and direction from ODEQ on what permits or licenses may be required if KID or its contractor implements the use of various equipment such as sizable generators and or rock crusher.

5.5 Oregon Water Law Coordination

Pursuant to Oregon Revised Statutes sections 537.143 and 537.144, KID is applying to OWRD for a limited license to use water for dust abatement purposes in connection with construction of a structure to replace the C Flume. Reclamation limited license would allow the use of Project water for dust control measures during hours of construction. Anticipated to be issued in November 2015, the limited license would remain in effect for one year and would be renewed on an annual basis if necessary.

5.6 Public Involvement

The review period for the Draft C Flume Replacement Project EA will be held from November 12 through November 30, 2015. The draft EA will be available online at:

http://www.usbr.gov/mp/nepa/nepa_base.cfm?location=kbao, and in hardcopy at the following locations:

- Bureau of Reclamation, Klamath Basin Area Office
  6600 Washburn Way
  Klamath Falls, Oregon 97603

- Klamath County Government Building
  305 Main Street
  Klamath Falls, Oregon 97601

- Klamath Community College (Library)
  7390 S 6th Street
  Klamath Falls, OR 97601

- Oregon Institute of Technology (Library)
  3201 Campus Drive
  Klamath Falls, OR 97601

- Klamath County Library
  126 S. 3rd Street
  Klamath Falls, Oregon 97601

- Klamath Irrigation District
  6640 K.I.D. Lane
  Klamath Falls, Oregon 97603

Chapter 6 References

Adkins 2014	Adkins Engineering, LLP. Klamath Irrigation District "C" Flume Replacement Feasibility Study (Revised Draft). June 2014.
Adkins 2015	Adkins Consulting Engineering, LLP, Anderson Perry & Associates, Inc., Foundation Engineering, Inc. C-Flume Replacement For Klamath Irrigation District Klamath Falls, Oregon. Project: 462-00. Ninety Percent Design. July 30, 2015.
Adkins May 2015	Adkins Engineering, LLP. C-Flume Replacement For Klamath Irrigation District, Klamath Falls, Oregon. Erosion Control Details. May 8, 2015.
EPA 2015	Environmental Protection Agency. Climate Change – Basic Information. 2015. Website: http://www.epa.gov/climatechange/basicinfo.html
Foster and Bennetts 2006	Foster, K., and D. Bennetts. Entrainment monitoring report for the Lost River Diversion Channel in 2005. 12p. 2006.
Foundation 2015	Foundation Engineering, Inc. C-Flume Replacement Project Geotechnical Investigation Report – Draft. Klamath Falls, Oregon. Project 2142023. Prepared for: Adkins Consulting Engineering, LLP, Klamath Falls, Oregon. April 24, 2015.
Phillips et al. 2011	Phillips, b., J. Ross, and A. Wilkens. Klamath Project: Endangered sucker distribution and relative abundance in reconnected wetlands and open water areas adjacent to the Klamath River, Oregon. 22p. 2010.
Shively, et al. 2000	Shively, R.S., A.E. Kohler, B.J., Peck, M.A., Coen, and B.S. Hayes. Water Quality, Benthic Macroinvertebrate, and Fish Community Monitoring in the Lost River Sub-Basin, Oregon and California, 1999 Annual Report. U.S. Geological Survey,Biological Resrouces Division, Klamath Falls, Oregon and Bureau of Reclamation Klamath Falls, Oregon. 2000
USFWS 2015	U.S. Fish and Wildlife Service. Information Resources: Listed, proposed, and Candidate Species Lists (Klamath County, Oregon). (2015) Website: http://www.fws.gov/klamathfallsfwo/es/es.html

Chapter 7 List of Acronyms and Abbreviations

ACDP	Air Contaminant Discharge Permits
Adkins	Adkins Engineering, LLP
APE	area of potential effects
AWWA	American Water Works Association
BMPs	best management practices
BNSF	Burlington Northern Santa Fe Railway
C Flume	C Canal Flume
CAA	Clean Air Act
CDF	controlled density fill
CFR	Code of Federal Regulations
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
DEQ	Oregon Department of Environmental Quality
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
FONSI	Finding of No Significant Impacts
GHG	greenhouse gases
HDPE	High Density Polyethylene
ITA	Indian Trust Asset
ITAs	Indian Trust Assets

KBAO	Klamath Basin Area Office
KID	Klamath Irrigation District
LRDC	Lost River Diversion Channel
MBTA	Migratory Bird Treaty Act
MOA	memorandum of agreement
NAAQS	National Ambient Air Quality Standards
Native X	Native X, Inc. Archaeological Services
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWP	Nationwide Permit
O&M	Operations and Maintenance
OAR	Oregon Administrative Rules
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statute
OWRD	Oregon Water Resources Department
PM	particulate matter
Klamath Project	Klamath Reclamation Project
Reclamation	Bureau of Reclamation
ROW	right-of-way
SHPO	Oregon State Historic Preservation Officer
SIP	State Implementation Plan
SRPE	Steel Reinforced polyethylene

U.S.C.	United States Code
UKL	Upper Klamath Lake
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

Appendices

Appendix A: Pictures of the Existing C Flume Structure

(Photo 1) View southwest of the C Canal Flume

(Photo 2) View from the southwest end of the proposed project

(Photo 3) C Flume Crosing the LRDC looking northeast

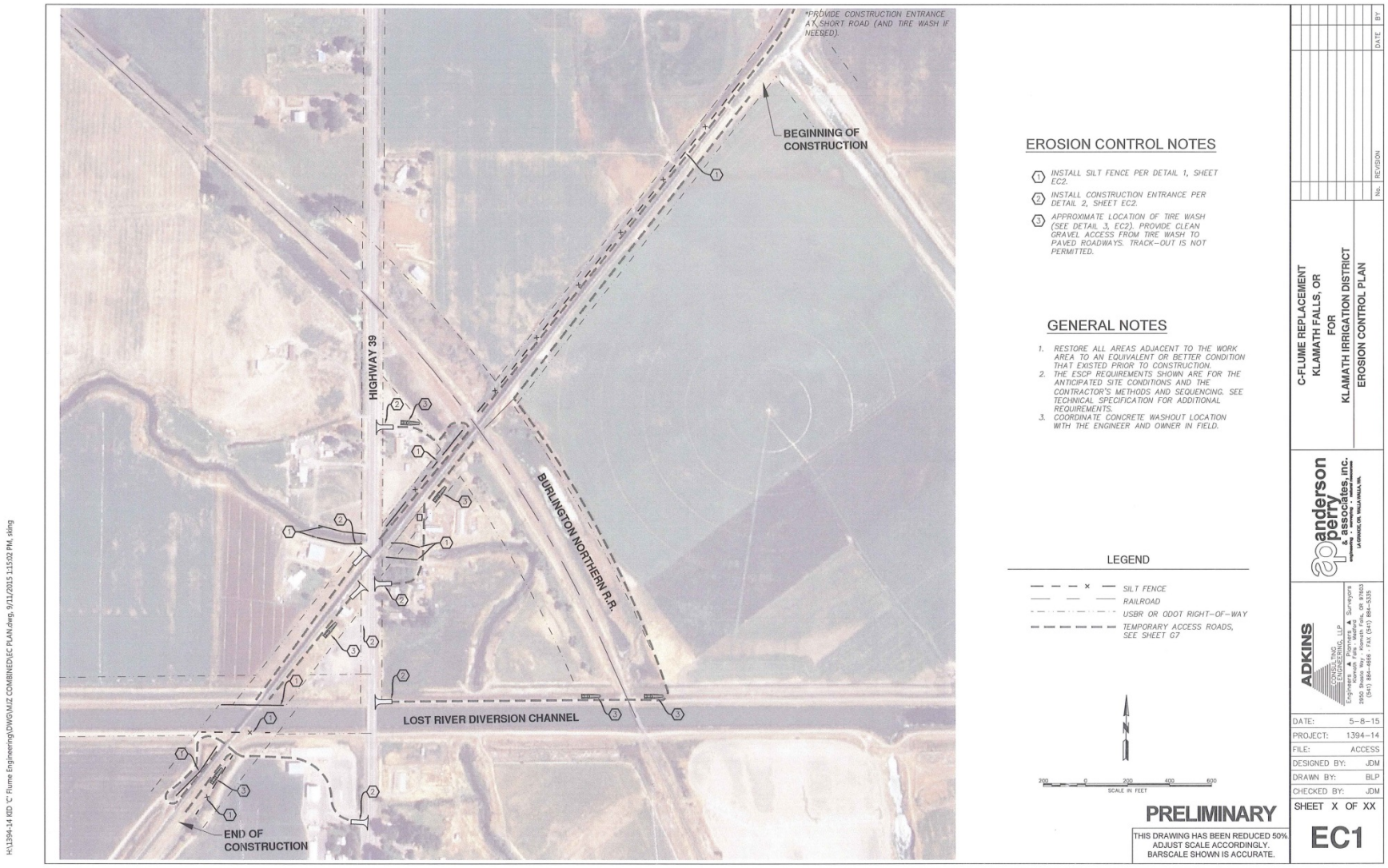
(Photo 4) C Flume crossing under the BNSF railroad

(Photo 5) C Flume crossing over Highway 39

(Photo 6) Beginning of the north end of the C Flume looking south

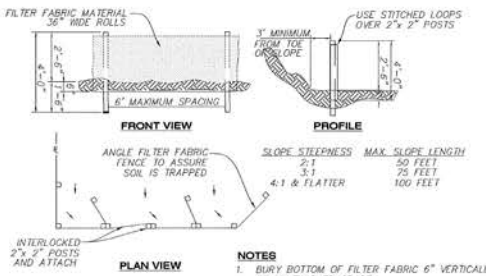
(Photo 7) Termination of the C Flume on the south end of the looking north

Appendix B: Sediment and Erosion Control Plan (Adkins May 2015)



EROSION CONTROL NOTES

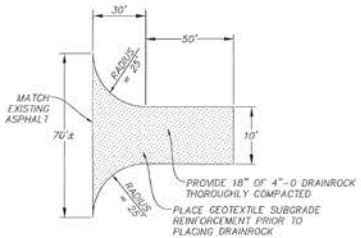
1. CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING THEMSELVES WITH THE 1200-C PERMIT ISSUED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY (SEE PROJECT SPECIFICATIONS).
2. THE ESCP MUST BE KEPT ON-SITE AND ALL EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE PLAN MUST BE INSTALLED IN SUCH A MANNER TO ENSURE THAT SEDIMENT OR SEDIMENT LADEN WATER THAT ENTERS OR IS LIKELY TO ENTER SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATER, ROADWAYS, OR OTHER PROPERTIES DOES NOT OCCUR. (SCHEDULE A.3.A.) AND (SCHEDULE B.3.B.)
3. THE IMPLEMENTATION OF THE ESCP AND CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THE EROSION AND SEDIMENT CONTROL MEASURES IS THE RESPONSIBILITY OF THE PERMIT REGISTRANT UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED BY THE LOCAL DEVELOPMENT AGENCY AND VEGETATION/LANDSCAPING IS ESTABLISHED. THE PERMIT REGISTRANT SHALL BE RESPONSIBLE FOR MAINTENANCE UNTIL THE LOTS ARE THE PERMIT IS TERMINATED. (SCHEDULE A.4.A.) AND (SCHEDULE D.3.)
4. THE PERMIT REGISTRANT MUST BE RESPONSIBLE FOR PROPER INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES, IN ACCORDANCE WITH LOCAL, STATE, OR FEDERAL REGULATIONS. (SCHEDULE A.5.A.) AND (SCHEDULE A. 8.A.)
5. EROSION AND SEDIMENT CONTROL MEASURES INCLUDING PERIMETER SEDIMENT CONTROL MUST BE IN PLACE BEFORE VEGETATION IS DISTURBED AND MUST REMAIN IN PLACE AND BE MAINTAINED, REPAIRED, AND PROMPTLY IMPLEMENTED FOLLOWING PROCEDURES ESTABLISHED FOR THE DURATION OF CONSTRUCTION, INCLUDING PROTECTION FOR ACTIVE STORM DRAIN INLETS AND CATCH BASINS AND APPROPRIATE NON-STORMWATER POLLUTION CONTROLS. (SCHEDULE A.5.D.6.(2)), (SCHEDULE A.5.D.8.(7)), (SCHEDULE A.7.D.4.(2)) & (SCHEDULE A.7.F.)
6. BEGIN LAND CLEARING, EXCAVATION, TRENCHING, CUTTING OR GRADING AND EARTHWORK-SURFACE ROUGHING AFTER INSTALLING APPLICABLE SEDIMENT, EROSION PREVENTION AND RUNOFF CONTROL MEASURES NOT IN THE DIRECT PATH OF WORK. (SCHEDULE A.5.B.6.(3)(A)), (SCHEDULE A.7.C.4.(1)) AND (SCHEDULE A.7.C.6.(1))
7. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES AND FOR ALL ROADWAYS INCLUDING GRAVEL ROADWAYS. (SCHEDULE A.5.B.6.(5).(B)), (SCHEDULE A.5.B.6.(5)(C)) & SCHEDULE A.5.B.6.(8).)
8. WET WEATHER BMPS: CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND ON SLOPES GREATER THAN FIVE (5) PERCENT FROM OCTOBER 1 THROUGH MAY 31 EACH YEAR. (SCHEDULE A.7.A.1.)
9. WET WEATHER BMPS: TEMPORARY STABILIZATION OF THE SITE MUST BE INSTALLED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND OR AT THE END OF EACH WORKDAY IF RAINFALL IS FORECAST IN THE NEXT 24 HOURS AND EACH WEEKEND AND HOLIDAY. (SCHEDULE A.7.A.8.)
10. IDENTIFY, MARK, AND PROTECT (BY FENCING OFF OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES AND VEGETATION AREAS TO BE PRESERVED. IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (E.G., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS. PRESERVE EXISTING VEGETATION AND RE-VEGETATE OPEN AREAS WHEN PRACTICABLE BEFORE AND AFTER GRADING OR CONSTRUCTION. (SCHEDULE A.5.B.1.(1) & (2)) AND (SCHEDULE A.7.C.6.(1))
11. PROVIDE PERMANENT EROSION PREVENTION MEASURES ON ALL EXPOSED AREAS TO PREVENT FROM BECOMING A SOURCE OF EROSION AND REMOVE ALL TEMPORARY CONTROL MEASURES, UNLESS LOCAL ORDINANCES REQUIRE OTHERWISE, AS AREAS ARE STABILIZED. (SCHEDULE A.5.B.6.(8)) AND (SCHEDULE A.7.C.6.(2))
12. ALL TEMPORARY SEDIMENT CONTROLS MUST REMAIN IN PLACE UNTIL PERMANENT VEGETATION OR OTHER PERMANENT COVERING OF EXPOSED SOIL IS ESTABLISHED. IDENTIFY THE TYPE OF VEGETATIVE SEED MIX USED. (SCHEDULE A.7.C.14.(1)) & (SCHEDULE A.7.C.14.(4))
13. SEDIMENT CONTROLS MUST BE INSTALLED AND MAINTAINED ALONG THE SITE PERIMETER ON ALL DOWN GRADIENT SIDES OF THE CONSTRUCTION SITE AND AT ALL ACTIVE AND OPERATIONAL INTERNAL STORM DRAIN INLETS AT ALL TIMES DURING CONSTRUCTION. (SCHEDULE A.7.D.1.(1) – (2))
14. PRIOR TO ANY LAND DISTURBING ACTIVITIES EACH SITE MUST HAVE GRAVELED, PAVED, OR CONSTRUCTED ENTRANCES, EXITS AND PARKING AREAS WITH EXIT TIRE WASH TO REDUCE THE TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS. (SCHEDULE A.7.D.III.(1))
15. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER WATERTIGHT TRUCKS MUST BE USED OR LOADS MUST BE DRAINED ON-SITE UNTIL DRIPPING HAS BEEN REDUCED TO MINIMIZE SPILLAGE ON ROADS. (SCHEDULE A.7.D.III.(3))
16. TEMPORARY STABILIZATION OR COVERING OF SOIL STOCKPILES AND PROTECTION OF STOCKPILE LOCATED AWAY FROM CONSTRUCTION ACTIVITY MUST OCCUR AT THE END OF EACH WORKDAY OR OTHER BMPS, SUCH AS DIVERSION OF UNCONTAMINATED FLOWS AND INSTALLATION OF SEDIMENT FENCES AROUND STOCKPILES, MUST BE IMPLEMENTED TO PREVENT TURBID DISCHARGES TO SURFACE WATERS. (SCHEDULE A.7.E.1.(1)) & (SCHEDULE A.7.E.2.(1) – (3))
17. BMPS THAT WILL BE USED TO PREVENT OR MINIMIZE STORMWATER FROM BEING EXPOSED TO POLLUTANTS FROM SPILLS, NO DISCHARGE OF CONCRETE TRUCK WASH WATER, VEHICLE AND EQUIPMENT CLEANING, VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE, OTHER CLEANING AND MAINTENANCE ACTIVITIES, AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, LEFTOVER PAINTS, SOLVENTS, AND GLUES FROM CONSTRUCTION OPERATIONS. (SCHEDULE A.7.E.1.(2))
18. ANY USE OF TOXIC OR OTHER HAZARDOUS MATERIALS MUST INCLUDE PROPER STORAGE, APPLICATION, AND DISPOSAL. (SCHEDULE A.7.E.III.(2))
19. SOLID WASTE AND HAZARDOUS MATERIALS MANAGEMENT. FOLLOW PROJECT WRITTEN SPILL PREVENTION AND RESPONSE PROCEDURES, EMPLOYEE TRAINING ON SPILL PREVENTION AND PROPER DISPOSAL PROCEDURES; REGULAR MAINTENANCE SCHEDULE FOR VEHICLES AND MACHINERY; AND MATERIAL DELIVERY AND STORAGE CONTROLS, TRAINING AND SIGNAGE, MATERIAL USE, COVERED STORAGE AREAS FOR WASTE AND SUPPLIES. (SCHEDULE A.7.E.III.(3))
20. THE PERMITTEE MUST PROPERLY MANAGE HAZARDOUS WASTES, USED OILS, CONTAMINATED SOILS, CONCRETE WASTE, SANITARY WASTE, LIQUID WASTE, OR OTHER TOXIC SUBSTANCES DISCOVERED OR GENERATED DURING CONSTRUCTION AND MEET ALL STATE AND FEDERAL REGULATIONS AND APPROVALS. (SCHEDULE A.7.E.III.(4))
21. THE ESCP MEASURES SHOWN ON THIS PLAN ARE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE MEASURES MUST BE UPGRADED AS NEEDED TO COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL EROSION AND SEDIMENT CONTROL REGULATIONS. CHANGES TO THE ESCP MUST ALSO BE SUBMITTED IN THE FORM OF AN ACTION PLAN TO DEQ OR ITS AGENT FOR APPROVAL. (SCHEDULE A.7.F.)
22. SIGNIFICANT AMOUNTS OF SEDIMENT, WHICH LEAVES THE SITE, MUST BE CLEANED UP WITHIN 24 HOURS AND PLACED BACK ON THE SITE AND STABILIZED OR PROPERLY DISPOSED. THE CAUSE OF THE SEDIMENT RELEASE MUST BE FOUND AND PREVENTED FROM CAUSING A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIME FRAME. (SCHEDULE A.7.F.1.(1))
23. VACUUMING OR DRY SWEEPING MUST BE USED TO CLEAN-UP RELEASED SEDIMENT AND MUST NOT BE INTENTIONALLY WASHED INTO STORM SEWERS, DRAINAGE WAYS, OR WATER BODIES. (SCHEDULE A.7.F.1.(2))
24. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. TIME-RELEASE FERTILIZERS SHOULD BE USED WITH CARE WITHIN ANY WATERWAY RIPARIAN ZONE. (SCHEDULE A.7.F.1.(3))
25. SEDIMENT MUST BE REMOVED FROM BEHIND A SEDIMENT FENCE WHEN IT HAS REACHED A HEIGHT OF 1/3 THE HEIGHT OF THE FENCE ABOVEGROUND AND BEFORE FENCE REMOVAL. (SCHEDULE A.7.F.II.(1))
26. SEDIMENT MUST BE REMOVED FROM BEHIND BIO BAGS AND OTHER BARRIERS IT HAS REACHED A HEIGHT OF TWO (2) INCHES AND BEFORE BMP REMOVAL. (SCHEDULE A.7.F.II.(2))
27. REMOVAL OF TRAPPED SEDIMENT IN A SEDIMENT BASIN OR SEDIMENT TRAP OR CATCH BASINS MUST OCCUR WHEN THE SEDIMENT RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY (50)% AND AT COMPLETION OF PROJECT. (SCHEDULE A.7.F.II.(3) & (4))
28. DEQ MUST APPROVE OF ANY TREATMENT SYSTEM AND OPERATIONAL PLAN THAT MAY BE NECESSARY TO TREAT CONTAMINATED CONSTRUCTION DEWATERING OR SEDIMENT AND TURBIDITY IN STORMWATER RUNOFF. (SCHEDULE A.7.F.III.)
29. SHOULD ALL CONSTRUCTION ACTIVITIES CEASE FOR THIRTY DAYS OR MORE, THE ENTIRE SITE MUST BE TEMPORARILY STABILIZED USING VEGETATION OR A HEAVY MULCH LAYER, TEMPORARY SEEDING, OR OTHER METHOD. (SCHEDULE A.8.A.)
30. SHOULD CONSTRUCTION ACTIVITIES CEASE FOR FIFTEEN (15) DAYS OR MORE ON ANY SIGNIFICANT PORTION OF A CONSTRUCTION SITE TEMPORARY STABILIZATION IS REQUIRED FOR THAT PORTION OF THE SITE WITH STRAW, COMPOST, OR OTHER TACKIFIED COVERING THAT PREVENT SOIL OR WIND EROSION UNTIL WORK RESUMES ON THAT PORTION OF THE SITE. (SCHEDULE A.8.B.)
31. DAILY INSPECTIONS WHEN RAINFALL AND RUNOFF OCCURS OF THE BMPS AND DISCHARGE OUTFALLS MUST BE THE PROJECT ESCP INSPECTOR. THESE INSPECTIONS AND OBSERVATIONS MUST BE RECORDED IN A LOG THAT IS AVAILABLE ON SITE. (SCHEDULE A.8.B.1.) & (SCHEDULE B.1.B(1))
32. BMPS MUST BE INSPECTED BEFORE, DURING, AND AFTER SIGNIFICANT STORM EVENTS. (SCHEDULE A.7.F.)
33. ALL ESCP CONTROLS AND PRACTICES MUST BE INSPECTED VISUALLY ONCE TO ENSURE THAT BMPS ARE IN WORKING ORDER PRIOR TO THE SITE BECOMING INACTIVE OR IN ANTICIPATION OF SITE INACCESSIBILITY AND MUST BE INSPECTED VISUALLY ONCE EVERY TWO (2) WEEKS DURING INACTIVE PERIODS GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS. (SCHEDULE B.1.B.(1)-(3))
34. IF PRACTICAL, INSPECTIONS MUST OCCUR DAILY AT A RELEVANT AND ACCESSIBLE DISCHARGE POINT OR DOWNSTREAM LOCATION DURING PERIODS THAT THE SITE IS INACCESSIBLE DUE TO INCLEMENT WEATHER. (SCHEDULE B.1.B.(4))



NOTES

1. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
2. 2"x 2" FIR, PINE OR STEEL FENCE POSTS.
3. POSTS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.
4. COMPACT BOTH SIDES OF FILTER FABRIC TRENCH.

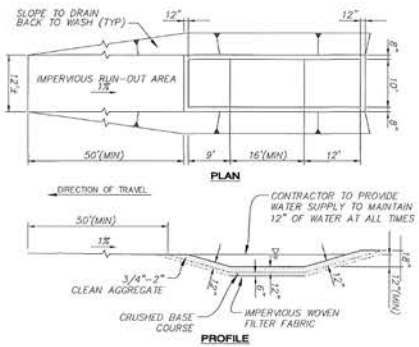
1 EC2 SILT FENCE DETAIL N.T.S.



NOTE

1. TIRE WASH MAY BE REQUIRED IF CONSTRUCTION ENTRANCE DOES NOT PREVENT TRACKING.

2 EC2 CONSTRUCTION ENTRANCE DETAIL N.T.S.



NOTES

1. CONTRACTOR TO REMOVE ACCUMULATED SEDIMENT FROM WHEEL WASH AS REQUIRED.
2. USE WOVEN IMPERMEABLE GEOTEXTILE FABRIC BETWEEN 6" BASE COURSE AND 12" TOP COURSE.
3. TIRE WASH REQUIRED IF STABILIZED CONSTRUCTION ENTRANCE DOES NOT PREVENT TRACKING.
4. IF UTILIZED, CONTRACTOR MUST MAINTAIN A CLEAN GRAVEL ROAD FROM THE TIRE WASH TO THE CONSTRUCTION ENTRANCE.

3 EC2 TIRE WASH DETAIL N.T.S.

PRELIMINARY

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

No.	REVISION	DATE	BY

C-FLUME REPLACEMENT
KLAMATH FALLS, OR
FOR
KLAMATH IRRIGATION DISTRICT
EROSION CONTROL DETAILS

anderson perry & associates, inc.

ADKINS CONSULTING ENGINEERING, LLP
Engineers ▲ Planners ▲ Surveyors
2950 Shasta Way - Klamath Falls, OR 97603
(541) 884-4666 / FAX (541) 884-5535

DATE:	5-8-15
PROJECT:	1394-14
FILE:	ACCESS
DESIGNED BY:	JDM
DRAWN BY:	BLP
CHECKED BY:	JDM
SHEET X OF XX	

EC2

H:\1394-14 KID 'C' Flume Engineering\DWG\MIZ COMBINED\EC FLAN.dwg, 9/11/2015 11:42:00 AM, sking

Appendix C: C Flume Fish Salvage Plan for the LRDC Dewatering

Fish salvage in the Lost River Diversion Channel for C Flume Replacement: Addendum to 2016 STP #196763 application renewal

Background

The C Flume replacement project consists of the replacing 4200 feet of elevated concrete flume constructed in the early 1920's with an equivalent inverted siphon pipe system which will be buried alongside the exist elevated flume within the right-of-way. The new system will include extension of the existing canal 600 feet on the west end and 365 feet on the east end, a new 200 feet clear-span bridge structure over the Lost River Diversion Channel (LRDC), and 3,035 feet of 108" diameter steel siphon pipe. Time constraints due to requirements for irrigation delivery require the majority of the project to be constructed alongside of the existing flume. The flume itself is approximately 12 feet wide centered inside a 150 feet BOR right of way, allowing room to construct and bury the siphon system adjacent to the existing flume.

Access to the flume is provided by existing maintenance roads accessible from Short Road near the Klamath Irrigation District office and from Highway 39 north of the Henley School Campus. Construction and installation of the siphon system is anticipated to be “cut and cove”, where a trench is excavated, pipe is installed and connected to adjacent pipe in the trench, and the trench and pipe are backfilled concurrent with progress. In an attempt to balance the amount of excavation and backfill, the depth of excavation is anticipated to be 7 feet. Excess excavation beyond pipe backfill will be used at either end of the open canal extensions. It is anticipated that no off-site disposal of excavated soil will be necessary.

In November 2016, water levels in the Lost River Diversion Channel will be lowered for a two week period to allow for the placement of new footings/pilings across the channel that will support the pipe crossing the channel. The following is a description of fish salvage activities that will occur during the drawdown and throughout the duration that the water level will be held low. As discussed with the local Oregon Department of Fish and Wildlife (ODFW) fish biologist, Reclamation proposes that fish salvage activities of the Lost River Diversion Channel be included in the renewal of our Canal Salvage permit with ODFW for 2016 (STP #196763). Drawdown of the water level in the Lost River Diversion Channel and the efforts to replace the C Flume will create unique conditions for fish and fish salvage that warrant the following detail that will be included when we apply for renewal early 2016.

Isolated Pools

Drawdown of the LRDC will occur gradually over 5 to 7 days. From past experience, locations where fish may become isolated in small pools do not become visible until late in the process. During the LRDC drawdown in November 2014, it was noted that the west end of the channel remained watered with a gradual slope from near the C Flume crossing (nearly dewatered) toward the river (approximately 3-4 feet of water depth). Thus, previously observed isolation pools occurred on the east end of the LRDC between the Lost River Diversion Dam and the area of the C Flume as much of the remaining channel was a continuous pool of water. Reclamation fisheries staff will be present in the field with Reclamation Operational and

Maintenance (O&M) staff during the latter part of the drawdown process to identify and salvage isolated pools.

Removing fish from isolated pools during the initial drawdown is a balance between personnel safety, a quick response time before oxygen is depleted from the water or predators locate isolated fish, and an effective method to capture isolated fish. We propose to act urgently but carefully during the fish salvage of isolated pools. Our initial focus will be to salvage fish from pools that have become isolated near C Flume Crossing, C/G Crossing, and the east end of LRDC (Figure 1).

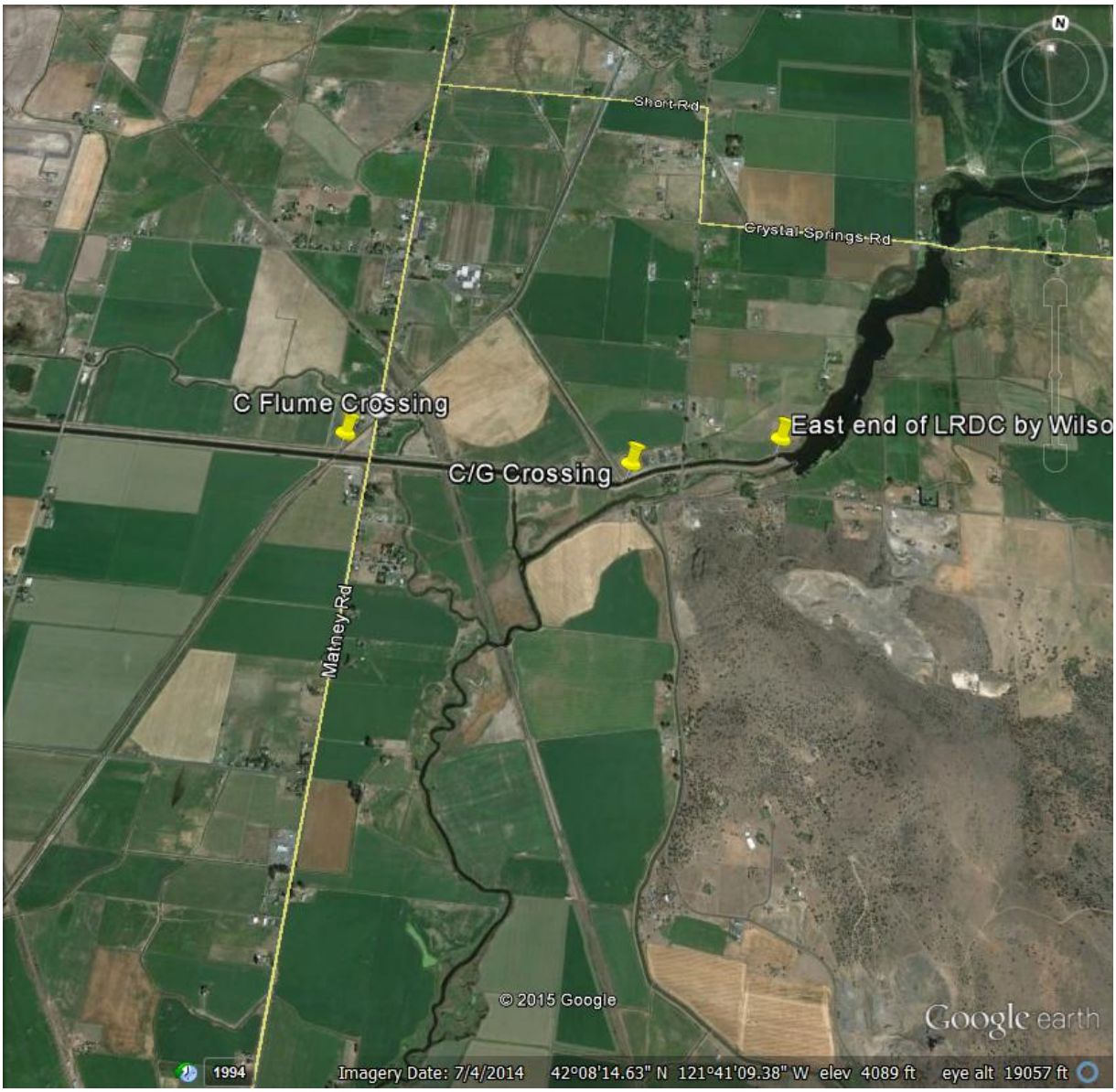


Figure 1. The C Flume Crossing is located on the east end of the Lost River Diversion Channel near C/G Crossing and the Lost River Diversion Dam.

Fish will be captured from isolated pools in this area using capture methods that are judged to be most suitable for each pool. As with the annual fish salvage of Klamath Irrigation Project canals, Reclamation staff propose to utilize several techniques in order to remove fish from isolated pools of water remaining in the canals or LRDC. These methods include using backpack eletrofishing units, seines, dipnets, blocknets, or a combination of the aforementioned gear types.

Reclamation will use Smith-Root model LR-24 backpack electrofishing units set to emit pulsed, direct currents. The automated "Quick Setup" feature on the LR-24 unit will be used to optimize operation of each unit given water conductivity at each salvage location. Should staff observe adverse impacts to fish, such as contusions or "branding", voltage will be adjusted below that of the "Quick Setup" feature. To reduce fish injury, electrofishing operations at each site will begin with the voltage set at 150 V, and raised in 50 V increments until fish exhibit involuntary taxis; voltage will not exceed 400 V.

Initial fish salvage efforts will occur in smaller pools that appear to have large numbers of fish. Fish in pools that appear sufficiently large in volume or appear to have very few fish will be salvaged after the salvage of fish in more dire situations, such as large numbers confined in small pools, is finished. Some pools may remaining sufficiently large to ensure fish survival during the two week period that water levels are low in the LRDC that a fish salvage of some pools may not be necessary. These situations will likely need to be determined in a case by case scenario. Based on 2014 observations, two large and deep pools will remaining within the LRDC where Reclamation proposes that no fish salvage is necessary: one at the east end of the channel between the C/G Crossing and Lost River Diversion Dam, and one at the west end of the channel between C Flume Crossing and the Klamath River.

Fish Isolation from C Flume Crossing

We anticipate that some water may remain near the C Flume crossing (photograph 1). To isolate any fish that may be present in this area, we propose to use two blocking seines to create a fish-free area 100 feet in each direction of the site where a coffer dam is to be constructed. Once the blocking seines are placed and anchored across the channel, we will conduct multiple passes with the electrofishing units in place in the area between the seines. We will conclude the fish removal of this area when a pass with the electrofishing unit produces fewer than 10 fish.

If the bottom material of the LRDC prevents adequate footing for entry into the area to safely electrofish through the area blocked by the seines, Reclamation biologist will use another seine to remove as many fish from the isolated area as possible.

Blocking nets (seines) will remain anchored in place until a coffer dam is constructed for the crane pad. After the coffer dam has been constructed, we propose to remove the blocking nets.

Photograph 1. During drawdown of the Lost River Diversion Channel in November 2014, shallow water remained in the channel near the C Flume Crossing.

Fish Handling and Relocation

In 2014, the concrete apron at the C/G Crossing created a pool of water 1 to 3 feet in depth between the C/G Crossing and the Lost River Diversion Dam on the east end of the channel (Figure 1). Another large pool of water several miles long and 1-3 feet in depth remained in the LRDC to the west of the C Flume. During fish salvage of isolated pools in the LRDC and isolation of fish from the C Flume Crossing in November 2016, Reclamation proposes to relocate all captured fish, except trout and suckers, to these pools. All captured fish will be released on the same date captured.

While conducting fish salvage in the LRDC, we will collect fish in five gallon buckets containing water obtained from the LRDC. As soon as possible to avoid crowding in the buckets, fish will be transferred to a larger container (either 50 to 100 quart insulated coolers or a 160 gallon a transport tank) containing well water that is treated with Novaqua® water and fish conditioner and a 0.5% solution of saline water. Water in the larger transport containers will be oxygenated by bubbling atmospheric air into the water. The bubbled air and saline solution assists stressed fish with respiration. Larger holding and transport containers will not have access to the bottom of the LRDC.

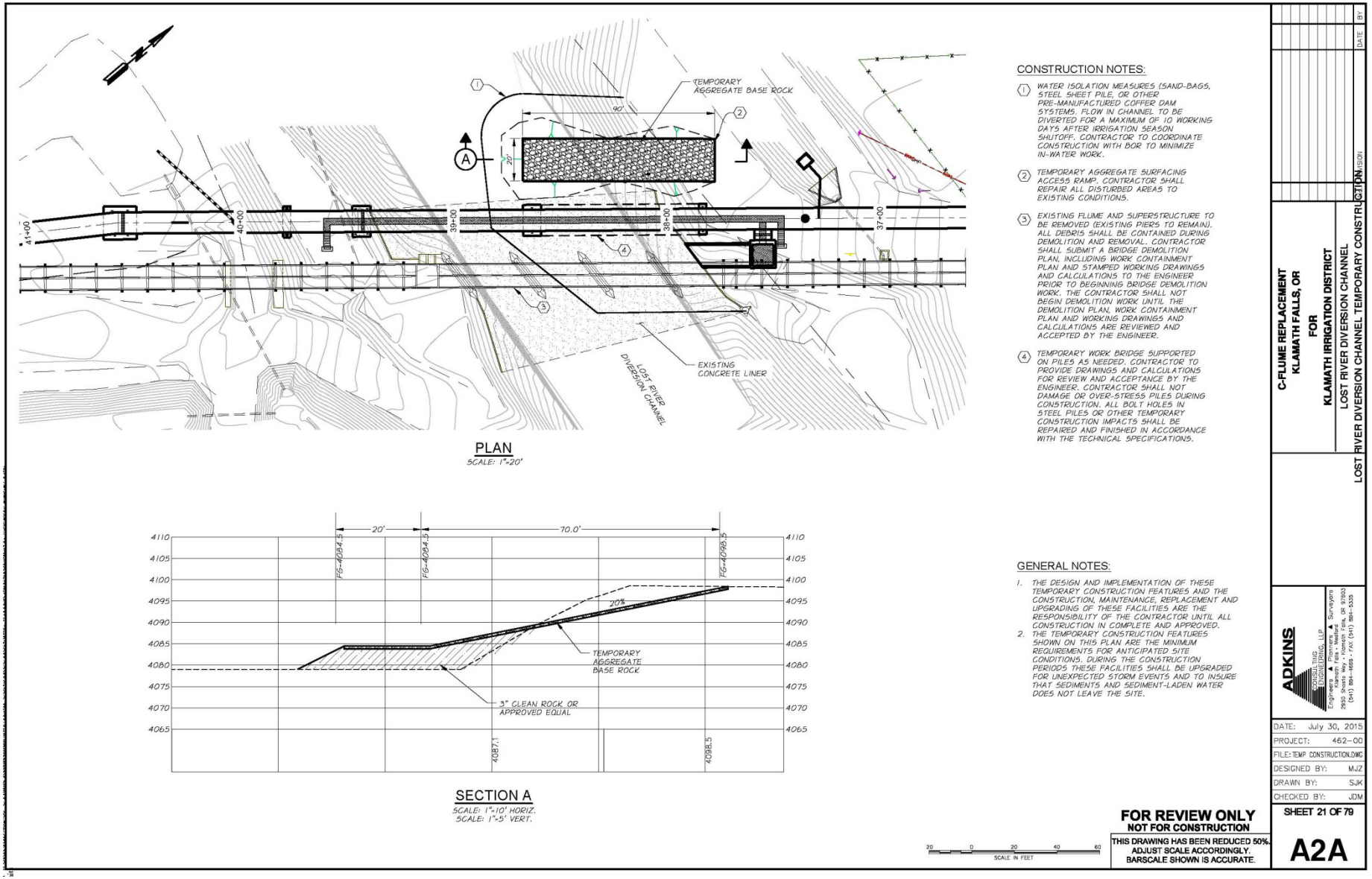
Prior to relocation of fish, we will segregate any trout or suckers we observe. We propose to release any trout in Lake Ewauna near the Link River at Veteran's Park. Reclamation does not anticipate encountering many trout in the LRDC during drawdown. We have only encountered one trout during canal salvage activities in the last decade (prior permit reports can be provided).

Reclamation proposes to measure, identify, and PIT-tag suckers (PIT-tagging only if sucker standard length < 80 mm) we capture prior to release. Reclamation will coordinate with USFWS on the appropriate location for release of salvaged suckers. In 2015, Reclamation will release suckers from the canal salvage to USFWS's care for rearing in private ponds on Lower Klamath Lake Road. At this point, we anticipate a similar release for 2016 suckers from canal

salvage, including suckers captured during LRDC. Prior releases have also been made to Upper Klamath Lake.

All other fish species will be relocated to the remaining large pools within the LRDC. After the two-week work period, the LRDC will be re-watered. Reclamation proposes to periodically monitor the large pools for dissolved oxygen concentrations during low water levels in November 2016. We do not anticipate low dissolved oxygen during this period.

Appendix D: C Flume 90% Engineering Drawings (LRDC Crossing) (Adkins, 2015)



CONSTRUCTION NOTES:

1. WATER ISOLATION MEASURES (SAND-BAGS, STEEL SHEET PILE, OR OTHER PRE-MANUFACTURED COFFER DAM SYSTEMS. FLOW IN CHANNEL TO BE DIVERTED FOR A MAXIMUM OF 10 WORKING DAYS AFTER IRRIGATION SEASON SHUTOFF. CONTRACTOR TO COORDINATE CONSTRUCTION WITH BOR TO MINIMIZE IN-WATER WORK.
2. TEMPORARY AGGREGATE SURFACING ACCESS RAMP. CONTRACTOR SHALL REPAIR ALL DISTURBED AREAS TO EXISTING CONDITIONS.
3. EXISTING FLUME AND SUPERSTRUCTURE TO BE REMOVED (EXISTING PIERS TO REMAIN). ALL DEBRIS SHALL BE CONTAINED DURING DEMOLITION AND REMOVAL. CONTRACTOR SHALL SUBMIT A BRIDGE DEMOLITION PLAN, INCLUDING WORK CONTAINMENT PLAN AND STAMPED WORKING DRAWINGS AND CALCULATIONS TO THE ENGINEER PRIOR TO BEGINNING BRIDGE DEMOLITION WORK. THE CONTRACTOR SHALL NOT BEGIN DEMOLITION WORK UNTIL THE DEMOLITION PLAN, WORK CONTAINMENT PLAN AND WORKING DRAWINGS AND CALCULATIONS ARE REVIEWED AND ACCEPTED BY THE ENGINEER.
4. TEMPORARY WORK BRIDGE SUPPORTED ON PILES AS NEEDED. CONTRACTOR TO PROVIDE DRAWINGS AND CALCULATIONS FOR REVIEW AND ACCEPTANCE BY THE ENGINEER. CONTRACTOR SHALL NOT DAMAGE OR OVER-STRESS PILES DURING CONSTRUCTION. ALL BOLT HOLES IN STEEL PILES OR OTHER TEMPORARY CONSTRUCTION IMPACTS SHALL BE REPAIRED AND FINISHED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.

GENERAL NOTES:

1. THE DESIGN AND IMPLEMENTATION OF THESE TEMPORARY CONSTRUCTION FEATURES AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT AND UPGRADING OF THESE FACILITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IN COMPLETE AND APPROVED.
2. THE TEMPORARY CONSTRUCTION FEATURES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIODS THESE FACILITIES SHALL BE UPGRADED FOR UNEXPECTED STORM EVENTS AND TO INSURE THAT SEDIMENTS AND SEDIMENT-LADEN WATER DOES NOT LEAVE THE SITE.

20 0 20 40 60
SCALE IN FEET

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

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

C-FLUME REPLACEMENT
KLAMATH FALLS, OR
FOR
KLAMATH IRRIGATION DISTRICT
LOST RIVER DIVERSION CHANNEL
LOST RIVER DIVERSION CHANNEL TEMPORARY CONSTRUCTION

DATE BY REVISION

ADKINS CONSULTING ENGINEERING, LLP
Engineers ▲ Planners ▲ Surveyors
2950 Shasta Way • Klamath Falls, OR 97603
(541) 884-4666 • FAX (541) 884-5335

DATE: July 30, 2015
PROJECT: 462-00
FILE: TEMP CONSTRUCTION.DWG
DESIGNED BY: MJZ
DRAWN BY: SJK
CHECKED BY: JDM
SHEET 21 OF 79

A2A

Appendix E: Indian Trust Asset Coordination and Consultation

Indian Trust Assets
Request Form (MP Region)

Submit your request to your office's ITA designee or to MP-400, attention Deputy Regional Resources Manager.

Date: 10/22/2015

Requested by (office/program)	Tyler Hammersmith, KBAO
Fund	XXXR0680R1
WBS	RR.17529652.2500057
Fund Cost Center	
Region # (if other than MP)	
Project Name	C Canal Flume Replacement Project
CEC or EA Number	2015_EA_008
Project Description (attach additional sheets if needed and include photos if appropriate)	The proposed federal action entails the authorization by Reclamation for approving the removal and replacement of the existing Flume. Replacement of Flume, as required by the Category 1 recommendation, would consist of KID replacing the existing Flume with a new facility. The new facility would include approximately 4,100 feet of a 10-foot diameter buried pipe and 200 feet of an elevated structure over the LRDC. The pipe would be made of either Steel (AWWA C200), Steel Reinforced polyethylene (SRPE), or High Density Polyethylene pipe (HDPE). Replacement of the Flume would occur in three phases: 1. Installation during off-season and on-season work in first year through December 2015 to October 2016 (including all parallel work and LRDC crossing) 2. Installation during off-season work from October 2016 to April 2017 (including all work crossing the existing flume, tie-ins at each end, connect all turnouts) 3. Demolition and removal during on-season work from April 2017 to Sept 2017 (including site restoration, demolition.

_Indian Trust Assets Request Form 2015 (10-22-2015).docx Page **1** of **3**

***Project Location (Township, Range, Section, e.g., T12 R5E S10, or Lat/Long cords, DD-MM-SS or decimal degrees). Include map(s)**	Southeast quarter of the northwest quarter, the northwest quarter of the southwest quarter and the southwest quarter of the southwest quarter, Section 30, of Township 39 South, Range 10 East Southeast quarter of the southeast quarter of Section 25, Township 39 South, Range 09 East, of the Willamette Meridian Klamath County, Oregon Northeast quarter of the northeast quarter, Section 36, Township 36, Township 39 South, Range 09 East, of the Willamette Meridian, Klamath County, Oregon

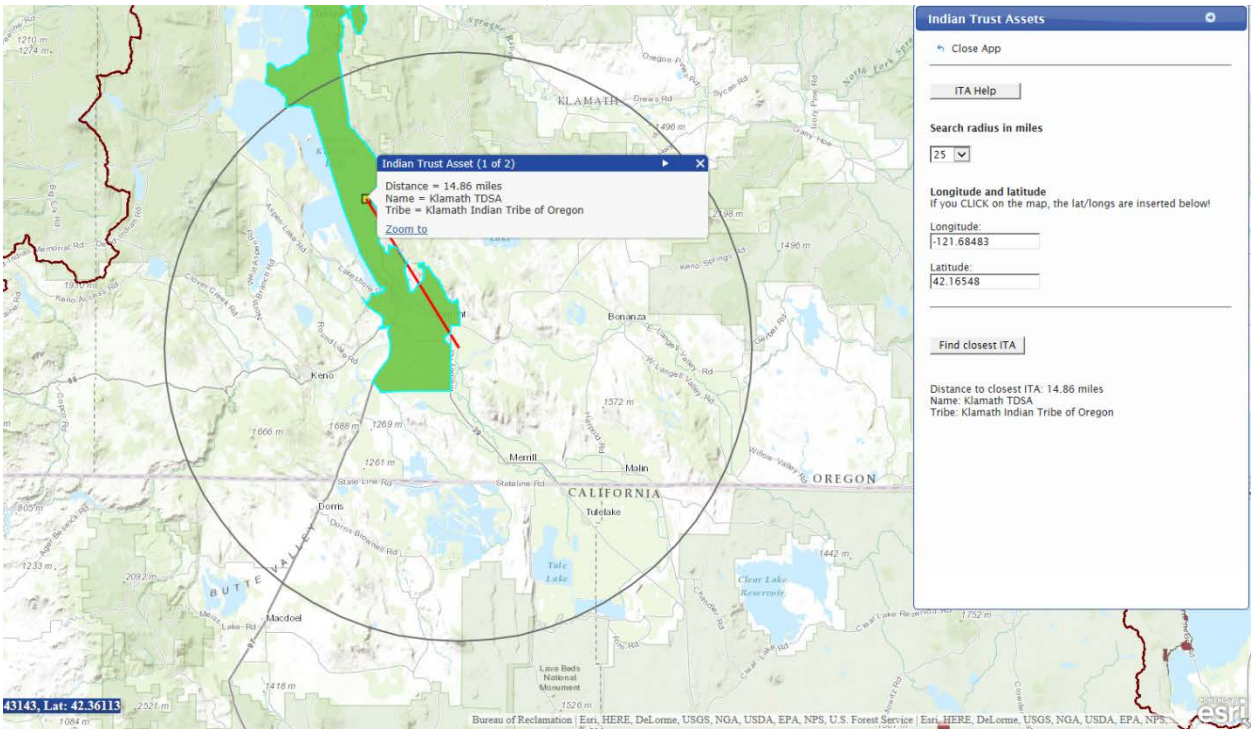
Signature | Tyler Hammaker Jr | 10-22-15
Printed name of preparer | Date

ITA Determination:

The closest ITA to the proposed **C Canal Flume Replacement** activity is the **Klamath TDSA** about 14.86 miles to the Northwest.

Based on the nature of the planned work it does not appear to be in an area that will impact Indian hunting or fishing resources or water rights nor is the proposed activity on actual Indian lands. It is reasonable to assume that the proposed action will not have any impacts on ITAs.

Signature | Kristen L. Hiatt | 10/22/2015
Printed name of approver | Date


Indian Trust Assets
Close App
ITA Help
Search radius in miles
25
Longitude and latitude
If you CLICK on the map, the lat/longs are inserted below!
Longitude:
-121.68483
Latitude:
42.16548
Find closest ITA
Distance to closest ITA: 14.86 miles
Name: Klamath TDSA
Tribe: Klamath Indian Tribe of Oregon
Indian Trust Asset (1 of 2)
Distance = 14.86 miles
Name = Klamath TDSA
Tribe = Klamath Indian Tribe of Oregon
Zoom to
KLAMATH
Bonanza
Keno
Merrill
Malin
CALIFORNIA
OREGON
Dorris
Tulelake
Macdoel
Tule Lake
Clear Lake Reservoir
Lava Beds National Monument
43143, Lat: 42.36113
Bureau of Reclamation | Esri, HERE, DeLorme, USGS, NGA, USDA, EPA, NPS, U.S. Forest Service | Esri, HERE, DeLorme, USGS, NGA, USDA, EPA, NPS

Appendix F: Compliance with the National Historic Preservation Act

Anticipated to be received by December 2015

Appendix G: CWA Section 404 Compliance

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, PORTLAND DISTRICT
EUGENE FIELD OFFICE
211 EAST 7TH AVENUE, SUITE 105
EUGENE, OREGON 97401-2722

REPLY TO
ATTENTION OF:

May 9, 2014

Operations Division
Regulatory Branch
Corps No. NWP-2014-189

Ms. Elizabeth Nielsen
Bureau of Reclamation
6600 Washburn Way
Klamath Falls, Oregon 97603-9336

Dear Ms. Nielsen:

The U.S. Army Corps of Engineers (Corps) has evaluated the Bureau of Reclamation's (Reclamation) request for Department of the Army authorization to maintain a canal flume in the Lost River Diversion Channel, as shown on the enclosed drawings (Enclosure). The project is located near Klamath Falls, in Klamath County, Oregon (Section 30, Township 39 South, Range 10 East). The Corps has determined that Reclamation has met the requirements for a Non-Reporting Nationwide Permit from the Department of the Army.

Based upon information provided in the permit application, the Corps has determined that Reclamation's proposed activities authorized by the Corps' Non-Reporting Nationwide No. 3 (Maintenance). The discharge of dredged or fill material into waters of the United States associated with this particular activity does not require a pre-construction notification to the Corps. Your activities must be conducted in accordance with the conditions found in the Portland District NWP Regional Conditions (Enclosure 2) and the NWP General Conditions (Enclosure 3). You must also comply with the Oregon Department of Environmental Quality (DEQ) Water Quality Certification Conditions (Enclosure 4).

As the lead federal agency, Reclamation is responsible for evaluating the project for potential impacts to the Endangered Species Act, Wild and Scenic Rivers Act, and the National Historic Preservation Act. Reclamation may also need to obtain a removal/fill permit from the Oregon Department of State Lands.

If you have any questions regarding our regulatory authority, please contact Mr. Omar Ortiz at the letterhead address, by telephone at (541) 465-6768, or email omar.m.ortiz@usace.army.mil.

Sincerely,

for Shawn H. Zinszer
Chief, Regulatory Branch

Appendix H: ODFW Scientific Taking Permit Correspondence

Campbell Miranda, Tara Jane <tcampbellmiranda@usbr.gov>

RE: Draft fish salvage for Lost River Diversion Channel 2016

1 message

Elizabeth A OsierMoats <elizabeth.a.osiermoats@state.or.us> Mon, Oct 19, 2015 at 12:05 PM
To: "TYLER, TORREY" <ttyler@usbr.gov>, Elizabeth A OsierMoats <elizabeth.a.osiermoats@state.or.us>, Jared Bottcher <jbottcher@usbr.gov>
Cc: Darrick Weissenfluh <darrick_weissenfluh@fws.gov>, Darin Taylor <detaylor@usbr.gov>, Tara Jane Campbell Miranda <tcampbellmiranda@usbr.gov>

Torrey,

This email is to confirm that the Oregon Department of Fish and Wildlife (ODFW) Klamath District Fish Biologist has reviewed and discussed with Bureau of Reclamation (Reclamation) staff Reclamation's plans for the C-Flume replacement project including the activities proposed at the Lost River Diversion Canal (LRDC). ODFW has reviewed Reclamation's general plans for the dewatering and fish salvage at the LRDC. ODFW concurs that the fish salvage activities at the LRDC should be included in Reclamation's 2016 Oregon Scientific Take Permit (STP) renewal. Reclamation anticipates applying for the STP in early 2016. The 2016 STP cannot be issued until the 2016 calendar year. Please note that the activities covered under the 2015 STP must be completed and reported in the APPS online system before the 2016 STP can be issued.

ODFW does not anticipate any problems reaching agreement on specific details regarding LRDC fish salvage operations and methods. ODFW has committed to cooperating with Reclamation staff over the next few months to finalize LRDC fish salvage operation plans and fish handling methods.

We look forward to continuing to work with you on this and future projects. Please let me know if you have any questions or concerns.

Sincerely,

Elizabeth

Elizabeth A.O. Moats

Acting District Fish Biologist

Klamath Watershed District

ODFW

(O) 541-883-5732

(C) 541-805-4559

Appendix I: Compliance with ESA; Consultation with USFWS

Anticipated to receive concurrence by December 2015

Appendix J: Compliance with CWA Section 402; Coordination with ODEQ

Campbell Miranda, Tara Jane <tcampbellmiranda@usbr.gov>

RE: Bureau of Reclamation- NPDES Permit

1 message

RATLIFF Krista <RATLIFF.Krista@deq.state.or.us> Thu, Oct 22, 2015 at 12:15 PM
To: "Campbell Miranda, Tara Jane" <tcampbellmiranda@usbr.gov>

Hi Tara Jane,

I have highlighted the important language in the 3 documents that indicate all projects 1 acre of more preformed in association with the Bureau of Reclamation's water delivery system. Projects under an acre currently are not regulated under the NPDES permitting program, Section 402. The first permit document we refer to as our permit coverage cover page. This is the actual legal document that states you have been assigned to our General Permit 1200-CA. When you look at the General Permit 1200-CA, the issued to section reads:

"All public agencies responsible for construction activities with storm water discharges that are covered by this permit. The submittal of an approved application and payment of applicable fees are required."

The Bureau of Reclamation has provided DEQ with all required applications and applicable fees since the permit was assigned on 5/23/2002. Likely the reason the site location has changed on the documents from A Canal Fish Screen Project to Klamath Basin Area Office was simply a database input. Because the 1200-CA is assign to a public agencies but coverage spans to all their projects as defined in the highlighted areas of permit coverage cover page signed on 2/20/2001, the site location had to be filled out with the best descriptor at the time. The renewal letter dated May 9, 2005, changed the site location to the Klamath Basin Area Office likely in an attempt to clarify the 1200-CA covers all projects to the BOR water delivery system out of this specific Regional Office.

2/20/2001 was the date the DEQ Water Quality Division Administrator issued the General Permit. The second letter I scanned to you is what DEQ refers to as "the assignment letter." This is the provides the permittee with the date they were assigned to the 1200-CA and the File No. 111792, as well as, the EPA No. ORR10-8008. To be consistent with our terminology the highlighted section of the May 23, 2002, assignment letter, should have said "We are assigning the requested permit." General permit are issued for a 5-year term and applicants are assigned to the General Permit as long as they meet the conditions of coverage. The coverage continues as long as applicable fees are paid and a renewal application is received before the expiration date, which in the 1200-CA was 12/31/2005.

Now the 3rd notice is an acknowledgement that DEQ has received the BORs required renewal application prior to the deadline. Federal rule requires the renewal applications to be received 180 days prior to the

expiration of the General Permit. The last highlighted sentence was DEQ stating if we do not re-issue the 1200-CA by the expiration date of 12/31/2005, BOR, permit File #111793, coverage will remain in effect until final action is taken on your application.

In the screen shot of our database under Last Action, it shows the coverage has been administratively extended under the 1200-CA. So, although new applicants cannot apply for or be assigned to an expired permit, all Permittees remain covered under the expired permit until DEQ takes further action, which we have not.

The BOR coverage is active under the 1200-CA and this assignment covers all projects that disturb an acre or more of land and have the potential to discharge stormwater into waters of state as long as the projects follow the conditions of the expired 1200-CA permit. No individual application are required on a site specific basis. The BOR Klamath Basin Area Office is up to date on all annual fees and permit is administratively extended at this time.

Hopefully this is as clear as mud. Take Care.

Krista Ratliff, Stormwater Specialist

Bend Office; 541-633-2033

From: Campbell Miranda, Tara Jane [mailto:tcampbellmiranda@usbr.gov]
Sent: Wednesday, October 21, 2015 2:20 PM
To: RATLIFF Krista <RATLIFF.Krista@deq.state.or.us>
Cc: Tyler Hammersmith <thammersmith@usbr.gov>
Subject: Re: Bureau of Recalmation- NPDES Permit

re-attaching the document you previously sent....

On Wed, Oct 21, 2015 at 2:19 PM, Campbell Miranda, Tara Jane <tcampbellmiranda@usbr.gov> wrote:

> Hi Krista,
>
> Taking a closer look at the document you sent regarding our permit (re-attached), it seems this document is just documenting that DEQ received our renewal application in 2005, but not that our 1200-CA permit was actually renewed for *site location: klamath Basin Area Office.* I am pulling together our environmental assessment which has to be completed by COB tomorrow and wondered if DEQ had any further correspondence to Reclamation regarding approval of our request for renewal for all our agricultural related actions under File No. 111792; EPA NO. ORR10-8008; Site location: Klamath Basin Area Office Klamath County.

Ultimately, I want to be sure we are in compliance and document it in our EA.

Thanks for all your help,

Tara Jane

On Tue, Sep 22, 2015 at 8:50 AM, RATLIFF Krista <RATLIFF.Krista@deq.state.or.us> wrote:

From: Campbell Miranda, Tara Jane [mailto:tcampbellmiranda@usbr.gov]
Sent: Monday, September 21, 2015 2:01 PM
To: RATLIFF Krista <RATLIFF.Krista@deq.state.or.us>
Cc: Tyler Hammersmith <thammersmith@usbr.gov>; Susan Black <sblack@usbr.gov>
Subject: Bureau of Recalmation- NPDES Permit

Krista,

The Bureau of Reclamation is in need of a copy of our NPDES permit that we have renewed each year since 2005 or 2008.

Could you send us a copy please?

Thanks,

Tara Jane

–

Tara Jane Campbell Miranda, MNR

Natural Resource Specialist

Acting Public Affairs Specialist

Klamath Basin Area Office

Bureau of Reclamation

Office: (541) 880.2540