Klamath Irrigation District
Infrastructure Modernization Project

Draft Watershed Plan-Environmental Assessment

Mills Creek – Lost River Watershed

Klamath County, Oregon

March 2026

Prepared by

United States Department of Agriculture, Natural Resources Conservation Service – Lead Federal Agency in cooperation with the U.S. Bureau of Reclamation, and Klamath Irrigation District

Lead Agency: United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Oregon

Cooperating Agencies: U.S. Bureau of Reclamation

Sponsoring Local Organization (SLO): Klamath Irrigation District (KID or District) (lead sponsor).

Authority: This Watershed Plan-Environmental Assessment (Plan-EA) has been prepared under the Authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law [PL] 83-566). The Plan-EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, PL 91-190, as amended (42 United States Code [U.S.C.] 43221 et seq.).

Abstract: This document is intended to fulfill requirements of the NEPA and to be considered for authorization of PL 83-566 funding of the Klamath Irrigation District Infrastructure-Modernization Project (project). The project seeks to improve water conservation, water delivery reliability, and public safety for irrigation infrastructure in Oregon's Klamath Basin. The project would include piping and lining approximately 14.3 miles of KID's D Main Canal and laterals. Total estimated project costs are $22,798,000 of which $5,611,000 would be paid by the sponsors and other nonfederal funding sources. The estimated amount to be paid through NRCS PL 83-566 funds is $17,187,000.

Comments: Comments must be submitted during the allotted Draft Public Review Period (within 30 days of the public release of the Draft Plan-EA) and become part of the Administrative Record. Submit comments and inquiries to: Farmers Conservation Alliance, Attention Watershed Plan-EA, 102 State Street, Hood River, OR 97031, or klamath.id.comments@gmail.com

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Draft Watershed Plan-Environmental Assessment Document **For** **Klamath Irrigation District Infrastructure Modernization Project** **Klamath Basin Subwatersheds: Stukel Mountains-Lost River, Anderson Rose Diversion Dam- Lost River, Tule Lake Valley- Lost River, Mills Creek- Tule Lake Valley** **Klamath County, Oregon** **Oregon 2nd Congressional District**	
Authorization	PL 83-566 Stat. 666 as amended (16 U.S.C. Section 1001 et. Seq.) 1954
Sponsor	Klamath Irrigation District
Proposed Action	The Klamath Irrigation District (KID or the District) Infrastructure Modernization Project is an agricultural water conveyance efficiency project. The proposed action would modernize a collection of canals, laterals, and pumps. Specific actions would include the piping and lining of select canal sections and laterals, upgrading pumping stations, elimination of uncontrolled spill, reduction of return flows to surface waterbodies, and mechanisms for better internal coordination between U.S. Bureau of Reclamation (Reclamation) and Klamath Project districts. Established by the federal government in 1905, the Klamath Project provides water for a variety of uses in the Klamath Basin. Today, Reclamation owns most infrastructure in the Project and irrigation districts hold responsibility for operations and maintenance of select infrastructure, under contract with Reclamation. Implementation of the proposed action would meet PL 83-566 Authorized Project Purpose (v), Agricultural Water Management, by modernizing KID's D-System which would include lining or piping canals and laterals and upgrading pump stations. Federal assistance through PL 83-566 would support the District in addressing the following watershed problems and resource concerns: water shortages, water loss in District conveyance systems, water delivery and operations challenges, and agricultural production. Implementation of the proposed action would address the sponsor's objectives and goals to improve water quality, reduce energy consumption and associated costs, and optimize water resources management to support on-farm use.
Purpose and Need	The purpose of the proposed project is to enhance Agricultural Water Management[1,2] by upgrading District infrastructure in a manner that improves water conveyance efficiency, improves drought resilience, and reduces damage to crops resulting from inconsistent water deliveries. Federal assistance is needed to support KID in improving water conservation and water delivery reliability to District patrons throughout the D-system, which would increase drought resilience across KID. Water losses through seepage, evaporation, and fluctuations in water demand make it challenging for the District to manage their system in a way that optimizes the available water. Additionally, the D-system is at the end of the District's canal network, making this region more susceptible to supply disruptions.
Description of the Preferred Alternative	Under the Preferred Alternative, the District would upgrade two pump stations and pipe and line select sections of D-system canals and laterals.

Project Measures	Under the Preferred Alternative, project sponsors would upgrade Adams and Stukel pump stations at the Adams and Stukel sites. Sixteen sections of the D-Canal system would be upgraded via piping or lining, including selected laterals.		
Resource Information			
Subwatersheds	**12-digit Hydrologic Unit Code**	**Latitude and Longitude**	**Subwatershed Size (acres)**
Stukel Mountains-Lost River	180102040902	42.091288 -121.674624	20,685
Anderson Rose Diversion Dam- Lost River	180102040903	42.054173 -121.577427	23,760
Tule Lake Valley- Lost River	180102040904	41.992307 -121.485697	41,146
Mills Creek- Tule Lake Valley	180102040906	41.985814 -121.369094	55,278
Subwatershed Total Size	140,869 acres		
Klamath Irrigation District Size	53,638 acres		
Climate and Topography	Average annual precipitation in KID is 13.7 inches in the northern part of the District and 10.7 inches in the southern part of the District, with only 1.6 inches of rain falling during the summer months (June, July, and August). Summer temperatures in July average 65 to 69 degrees Fahrenheit with highs generally around 92 to 94 degrees Fahrenheit. The typical growing season in the District is 165 days. Irrigated lands are at an elevation of approximately 4,100 feet above sea level. Most of KID's canals slope gently downward from south to north (KID 2021).		
Land Use (Planning Area)	**Use**		**Acres**
	Irrigated Land		72,409
	Non-irrigated Land		68,468
Land Ownership (Planning Area)	**Owner**		**Percentage**
	Private		86.7%
	State-Local		0.1%

[1] A description of Authorized Purposes can be found in 390-NWPM, Part 500, Subpart A, Section 500.3B.

[2] To meet NRCS requirements for a federal investment in a water resources project, the project must meet the Federal Objective set forth in the Water Resources Development Act of 2007 and must be an authorized project purpose under Sections 3 and 4 of Public Law 83-566.

	Federal		9.8%
	Other		3.4%
Population and Demographics	The project would be constructed in Klamath County, OR. The population in Klamath County in 2020 was 69,414. From 2015-= to 2019, roughly 16.7 percent of the population lived below the poverty level (U.S. Census Bureau 2022). The County's proportion of low-income population (45 percent) is higher than the state average (33 percent) (EPA 2020). In 2021, 77.1 percent of the population was White alone, not Hispanic or Latino, 13.8 percent was Hispanic or Latino, and 5 percent was American Indian alone (U.S. Census Bureau 2022).		
Population and Demographics		**Klamath County**	**Oregon**
	Population 2020	69,413	4,237,256
	Unemployment Rate	5.3%	4.1%
	Median Household Income	$46,721	$71,562
Relevant Resource Concerns	Resource concerns identified through scoping are canal efficiency; water conservation; surface water quality issues including sedimentation, temperature, salinity, and nutrient loading; surface water quantity; groundwater quantity; aquatic and fish resources; wetland and riparian resources; and terrestrial wildlife.		
Alternatives			
Alternatives Considered	Six action alternatives were initially considered; four were eliminated from full analysis because they did not address the purpose and need for action, did not achieve the Federal Objective and Guiding Principles, or because they became unreasonable due to cost, logistics, existing technology, social, or environmental reasons. The No Action Alternative and Modernization Alternative were analyzed in full.		
No Action Alternative (Future without Federal Investment)	Under the No Action Alternative, the District would continue to operate and maintain the existing canal, lateral, drain, and pump systems in their current condition. This alternative assumes that modernization of the District's infrastructure would not be reasonably certain to occur, as funding at the large scale necessary to modernize the District's infrastructure is not anticipated from other sources. The No Action Alternative would be a continuation of the District's standard operations and maintenance.		
Preferred Alternative	To determine which of the proposed alternatives best meets the purpose and need, NRCS and KID are considering the needs of the water users, conservation and restoration goals, resources and funding available for the District. The Modernization Alternative is KID's desired alternative. The District is working with engineers to design a system that is technically feasible and addresses the project's purpose and need. Infrastructure improvement actions being considered for this alternative include: converting existing open canal and laterals to buried pipelines, lining a section of the open D Main Canal, and upgrading two pump stations to ensure efficient and reliable delivery of water throughout the system.		

Mitigation, Minimization, and Avoidance Measures	Consultation was initiated by NRCS as the lead federal agency; Tribal Historic Preservation Office (THPO) (November 28, 2023); Oregon State Historic Preservation Office (SHPO) (November 28, 2023); and consulting parties, including affiliated tribes (November 28, 2023), for compliance with Section 106 of the National Historic Preservation Act (NHPA) and any required mitigation measures to be completed prior to project implementation. Ground disturbances would be limited to only those areas necessary to minimize effects on soil, vegetation, water, and land use. Where possible, construction activities would avoid or minimize effects on agricultural lands by confining construction activities to the existing right-of-way (ROW) and easements. Sedimentation best management practices (BMPs) would be employed during and after construction, and construction schedules would minimize disturbance to wildlife and the public. After construction, disturbed areas would be returned to pre-construction contours and replanted with a mix of native grasses and forbs to reduce the risks of erosion and spread of noxious weeds. Wetlands and riparian zones have been identified in the project area. Based on an analysis of aerial imagery and data from the National Wetlands Inventory (NWI), wetlands and riparian areas are located primarily along the perimeter of Lost River and along irrigation canals and laterals. Generally, canals within the project area are not considered wetlands or Waters of the U.S. by federal agencies, or Waters of the State by state agencies. However, prior to project implementation, a wetland and waters delineation would be conducted and consultation with Oregon Department of State Lands (ODSL) and United States Army Corp of Engineers (USACE) would determine the jurisdictional authority of wetland and waters in the project area. If regulated wetlands were identified, they would be avoided to the extent practicable and necessary authorizations would be secured before work began. Prior to construction, the District would complete pre-clearance surveys to verify the presence or absence of bald and golden eagle in the area and all United States Fish and Wildlife Service (USFWS) guidelines would be followed to ensure minimal disturbance to bald or golden eagles nesting near the project area. Surface-disturbing activities would typically not occur during the migratory bird or raptor nesting season, generally from March 1 to August 31. If surface-disturbing activities had to occur during this period, qualified avian biologists would conduct pre-construction avian surveys in appropriate habitats not fewer than 3 days and not more than 7 days before surface-disturbing activities began. The specific area to be surveyed would be based on the scope of the activities. If ground-disturbing activities did not take place within 7 days of the surveys, the work areas would be resurveyed. If nesting migratory birds or raptors were found during surveys, appropriate buffers would be applied. Buffers would remain in effect until the qualified biologist confirmed that either the young had fledged, or the nest had failed. Coordination with the USFWS was completed on December 11, 2023 as required by provision of PL 83-566 Section 12 (See Appendix A).

Project costs	**PL 83-566 funds**		**Other funds**		**Total**	
Construction	$13,738,000	75%	$4,581,000	25%	$18,319,000	100%
Engineering	$930,000	75%	$308,000	25%	$1,238,000	100%

SUBTOTAL COSTS	$14,668,000	75%	$4,889,000	25%	$19,557,000	100%
Technical Assistance	$1,450,000	100%	$0	0%	$1,450,000	100%
Relocation	Not Applicable					
Real Property Rights	Not Applicable					
Permitting	$0	0%	$293,000	100%	$293,000	100%
Project Administration	$1,069,000	71%	$429,000	29%	$1,498,000	100%
Annual O&M	Not Applicable					
TOTAL COSTS	**$17,187,000**	**75%**	**$5,611,000**	**25%**	**$22,798,000**	**100%**

Project Benefits	
Project Benefits	Implementation of the Preferred Alternative would improve District water management operations, reduce KID operation and maintenance costs, and increase District water and energy efficiency.
Number of Direct Beneficiaries	55 patrons
Other Beneficial Effects-Physical Terms	Implementation of the Preferred Alternative would have long-term, beneficial effects on agricultural water availability.

Damage Reduction Benefits	**Proposed Project**
Other – Agricultural Damage Reduction	$1,123,000
Other – Avoided Flood Damages	$26,000
Total Quantified Benefits	$1,149,000
Benefit to Cost Ratio	1.5
Period of Analysis	
Installation Period (years)	4
Project Life	100

Funding Schedule			
Year	**PL 83-566**	**Other Funds**	**Total**
0	$1,700,000	$534,000	$2,234,000
1	$2,303,000	$833,000	$3,136,000
2	$7,625,000	$2,469,000	$10,094,000
3	$5,559,000	$1,775,000	$7,334,000

Environmental Effects

The Preferred Alternative would be planned, designed, and installed to have long-term net-beneficial effects on agricultural production, public safety, water quality and quantity, surface water hydrology, fish and aquatic species, wetland functions, fish and wildlife habitat, and ecosystem services within the Planning Area.

Implementation of the Preferred Alternative would result in minor, unavoidable temporary or short-term adverse effects such as impacts to water, soils, vegetation, fish, wetland, and wildlife habitat within the project area. Most temporary or short-term adverse effects would result from construction activities in the project area. Project sponsors would work closely with partners, contractors, and affected landowners to incorporate measures and BMPs to avoid and minimize short-term adverse effects.

Other long-term minor effects include potential changes of vegetation communities, reduction in groundwater recharge, and reduction of water within wetlands adjacent to and downgradient of canals. Construction would occur outside the primary nesting period for migratory birds of concern. Should an active nest be found, construction would be paused and consultation with a local U.S. Fish and Wildlife Service (USFWS) biologist would occur. After construction, disturbed areas above buried pipelines would be revegetated and recontoured to blend in with the existing landscape. BMPs would be implemented to minimize effects on trees. Wetland delineation would be conducted prior to implementation of the Preferred Alternative. Project activities would be discussed with USACE and Oregon DSL to determine permit requirements.

Major Conclusions	The Preferred Alternative would improve water delivery reliability for KID's patrons; reduce water loss via seepage in District-operated infrastructure; and improve District operational efficiencies in a manner that would reduce KID's operations and maintenance costs.
Areas of Controversy	No areas of controversy have been identified.
Issues to be Resolved	None
Evidence of Unusual Congressional or Local Interest	None
Compliance	Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? Yes _X_ No____

1 Introduction

Across the Western United States (U.S.), aging infrastructure, growing populations, shifting rural economies, and changing climate conditions have contributed to increased pressure on water resources.

In recent years, the Klamath Basin has faced severe droughts that have significantly limited or even stopped the supply of water from Upper Klamath Lake (UKL) to the Bureau of Reclamation's (Reclamation) Klamath Project and two National Wildlife Refuges, the Lower Klamath National Wildlife Refuge (LKNWR) and Tule Lake National Wildlife Refuge (TLNWR). Farmers have been forced to fallow thousands of acres of high value farmland and stop deliveries to the LKNWR, the nation's first waterfowl refuge and critical component of the Pacific Flyway. The lack of water in the Refuge caused large areas to completely dry up, eliminating habitat for upland and migratory birds, resulting in the cancellation of recreational hunting seasons. Due to these factors, modernizing irrigation infrastructure has become a priority for Klamath Project irrigation districts with the goal of conserving water and improving the management of available water resources.

Within the Klamath Basin, irrigated agriculture is the main out-of-stream water use and relies on infrastructure that is over 100 years old to divert, store, reuse, and deliver water to farms and ranches. Klamath Irrigation District (herein referred to as KID or the District), the largest of the Klamath Project irrigation districts, supplies water to over 2,500 patrons through 200 miles of canals (Figure 1-1). In some portions of the District, up to 90 acre-feet of water is lost daily to evaporation and seepage, which means this water can no longer be delivered to patrons, nor can it be made available to the TLNWR or the LKNWR. Aging canals are failing with increasing frequency causing damage to property and high value crops. These mounting liabilities for the District and damages to private properties and crops create an untenable situation for a region that's economy is inextricably linked to agriculture.

Improving irrigation infrastructure by modernizing strategic sections of the District's water distribution system would conserve water, improve the District's ability to manage available water resources, and reduce the District's O&M load.

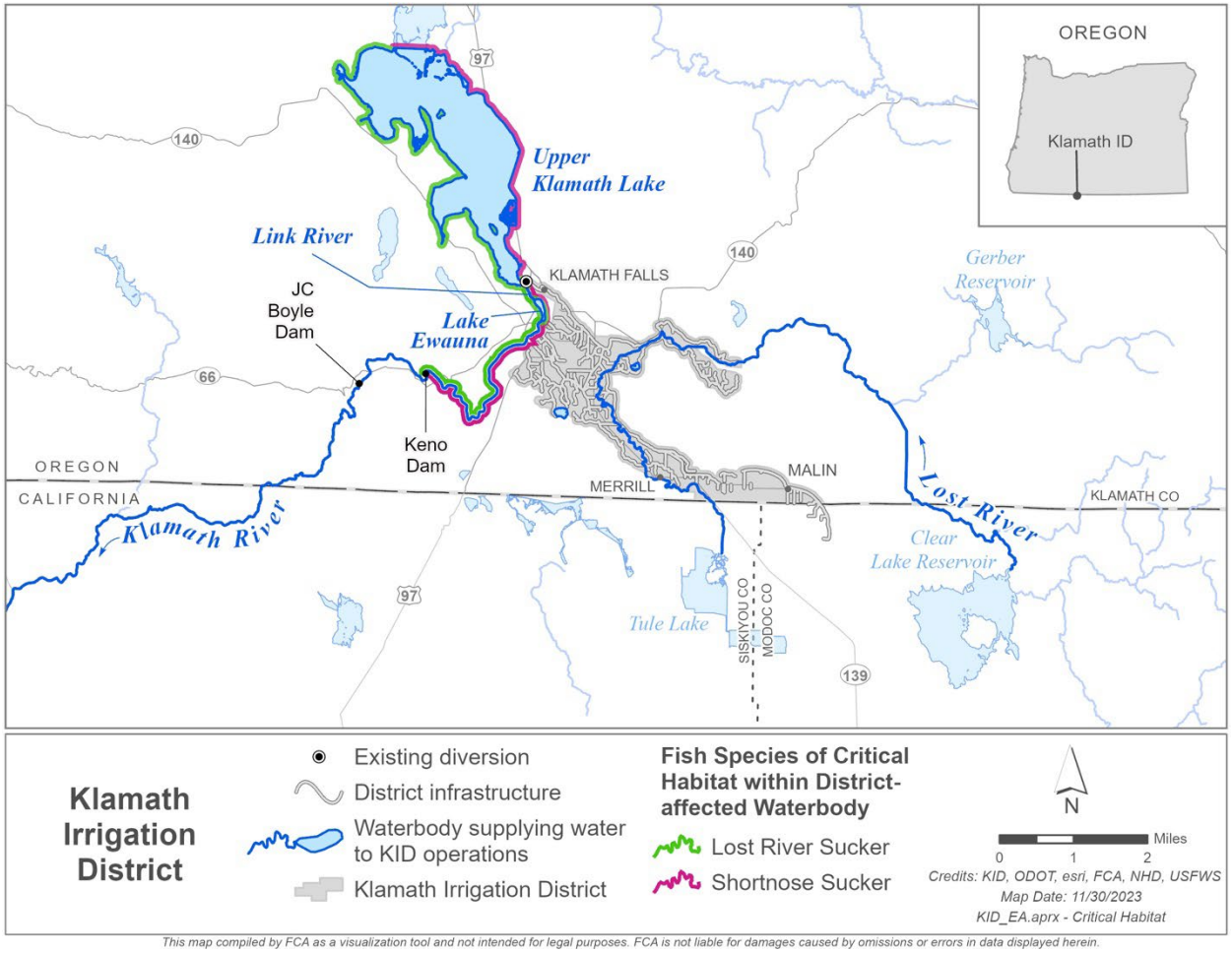

Figure 1-1. Klamath Irrigation District Watershed Context.

1.1 Planning Area

The District is located south of Klamath Falls in Klamath County, Oregon. The planning area is based on the irrigation problem area[3] and is identified by the subwatersheds traversed by the proposed project (see Table 1-1 and Figure 1-2 for details).

[3] The "planning area" referred to in this Plan-EA is equivalent to the term "watershed area" as defined by the National Watershed Program Manual (NWPM) 506.60.TTT (NRCS 2015a). The term "planning area" is used in this Plan-EA in an effort to reduce confusion between the NWPM 506.60.TTT watershed area definition and watershed areas as defined by hydrologic unit codes.

Table 1-1. Klamath Irrigation District Watershed Area.

Subwatershed Name	12-digit Hydrologic Unit Code	Subwatershed Size (acres)
Stukel Mountains-Lost River	180102040903	20,685
Anderson Rose Diversion Dam-Lost River	180102041109	23,760
Tule Lake Valley- Lost River	180102041108	41,146
Mills Creek- Tule Lake Valley	180102040906	55,278
Total		**140,869**

1.2 Project Area

The project area is the portion of the planning area where the KID Infrastructure Modernization Project would occur (Figure 1-2). The project area, making up only a small portion of the District's total system, consists of the District infrastructure to be modernized, areas where new infrastructure would be built, and associated ROWs and/or easements where construction would take place.

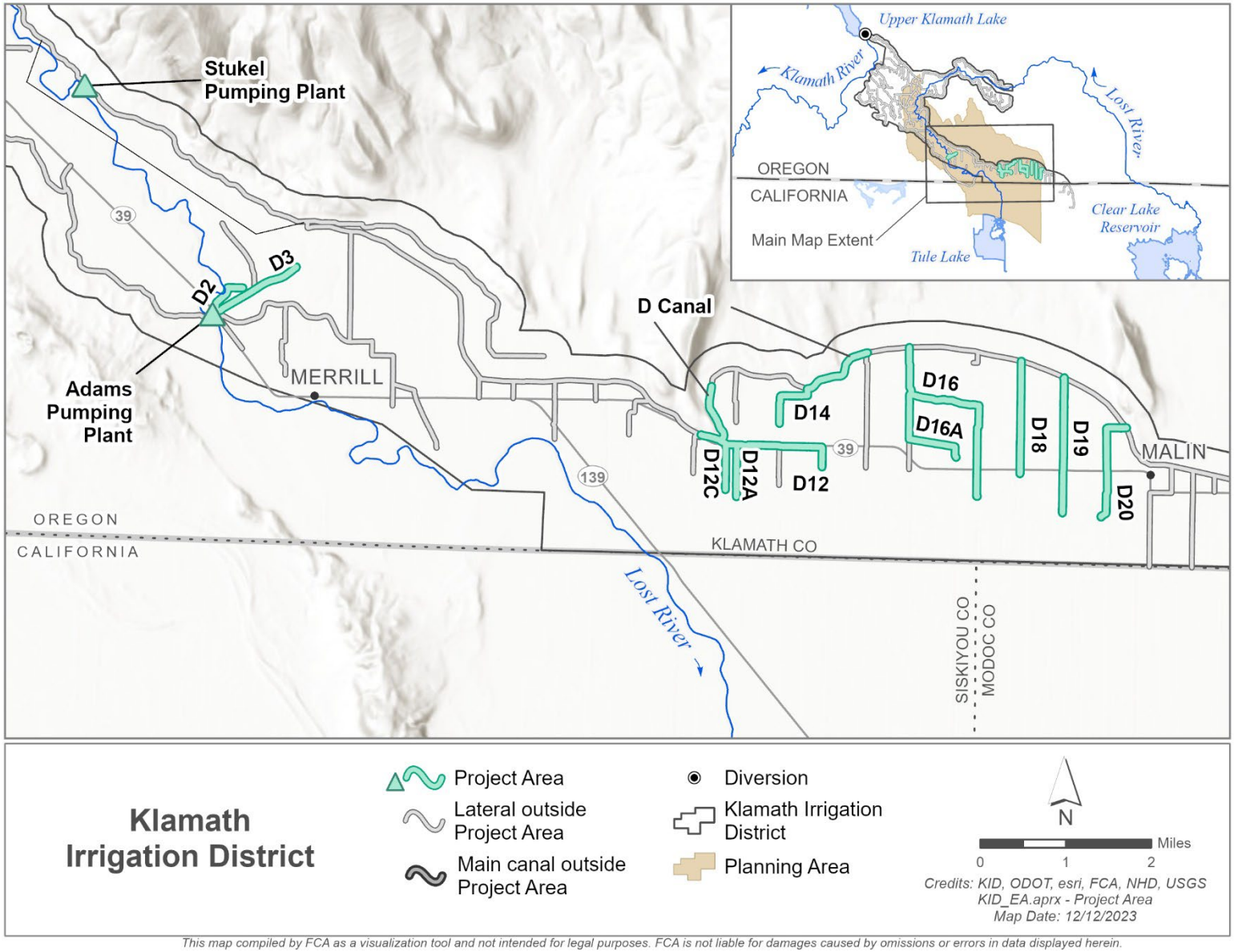

Figure 1-2. Klamath Irrigation District Planning Area and Project Area.

1.3 Current Infrastructure

The District has over 2,500 patrons and irrigates 53,638 acres of cropland within its boundary and over 60,000 acres outside its boundary. KID has approximately 200 miles of canals and laterals which are supplied primarily by one major diversion on UKL. The diversion is screened through a vertical-plate, V-shaped fish screen (see Figure 1-3). Diverted water from UKL flows through a 3,300-foot-long tunnel beneath the City of Klamath Falls before reaching the A Canal. Water is then delivered to patrons throughout KID through the A, B, C, G, E, F, and D Canals and their associated systems (see Figure 1-3). The District may also divert water from the Lost River, which is mainly comprised of return flows.

The District has prioritized the D and D-1 Canal delivery systems for modernization and efficiency improvements due to the D system being at the end of the District. The D/D-1 Canal System extends from northwest of Merrill, Oregon, east to Malin, Oregon, and south to the Oregon-California border. The D and D-1 Canal systems serve approximately 12,315 acres and 2,596 acres, respectively. The systems include approximately 51.5 miles of conveyances, siphons, drains, and the Adams and Stukel Pump Stations, which serve as reuse pumping stations. Additionally, the D Canal provides water to two other irrigation districts, Shasta View and Malin, which serve approximately 7,160 acres and 3,985 acres, respectively (SHN 2023).

The D and D-1 main delivery canals are currently unlined, earthen channels that are regulated by control structures and headgates at various locations along the canals. Many of the existing pumps, flow control structures, and headgates are old and in need of improvement. The irrigation flow feeds into earthen open-ditch laterals, which provide irrigation water to patrons. Operational spills from the D and D-1 delivery systems are discharged into various points of Tulelake Irrigation District's (TID) system. Operational challenges related to delivering water to the D system result in inconsistent and unpredictable spills to TID, which creates considerable management challenges for TID.

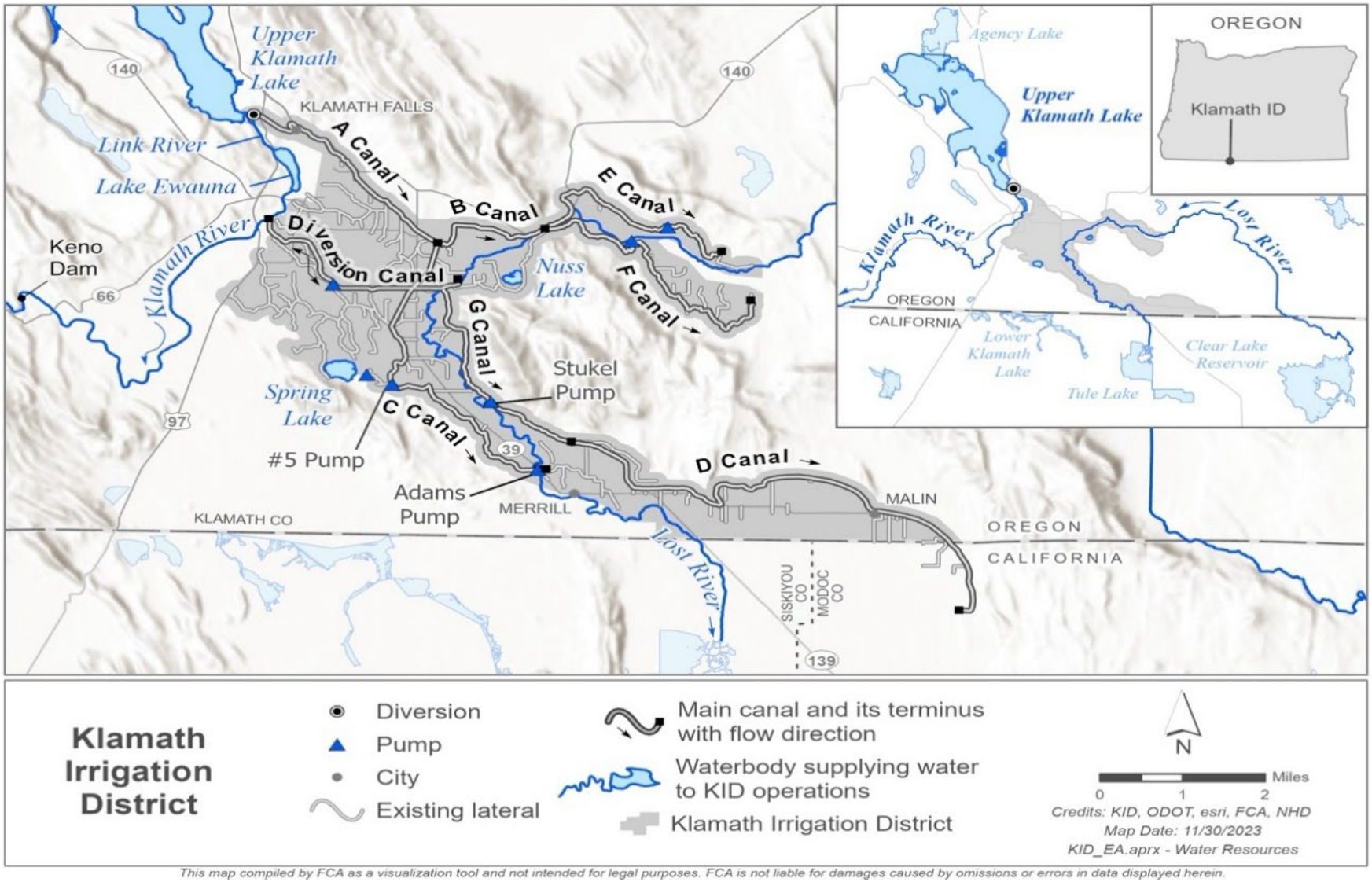

Figure 1-3. Klamath Irrigation District Infrastructure

1.4 Decision Framework

This Plan-EA has been prepared to assess and disclose the potential effects of the proposed action. The Plan-EA is required to request federal funding through PL 83-566. Through this program, NRCS provides technical and financial assistance to project sponsors such as states, local governments, and Tribes to plan and implement authorized watershed project plans for watershed protection; flood mitigation; water quality improvements; soil erosion reduction; rural, municipal, and industrial water supply; irrigation; water management; sediment control; fish and wildlife enhancement; and hydropower.

NRCS is the lead federal agency for this Plan-EA and is responsible for issuance of a decision in accordance with NEPA. NEPA requires that projects using federal funds be evaluated for potential effects to the quality of the human and natural environment (individually or cumulatively). When a proposed project is not likely to result in significant impacts, but the activity has not been categorically excluded from NEPA, an agency can prepare an Environmental Assessment (EA). If it is determined by the federal agency that the project would result in significant effects to the human or natural environment, an Environmental Impact Statement must be prepared (see 40 Code of Federal Regulations [CFR] 1501.4 and 1508.1(J) 7 CFR 650.8).

NRCS has determined the need for a Plan-EA to implement the proposed action under PL 83-566 watershed authority. Prior to implementation of each site-specific project, an on-site Environmental Evaluation review would occur using Form NRCS-CPA-52, Environmental Evaluation Worksheet. The Environmental Evaluation would determine whether that particular project meets applicable project specifications and whether the site-specific environmental effects are consistent with the effects described in this Plan-EA. This process provides information for the Responsible Federal Official to determine if the proposed action has been adequately analyzed and if the conditions and environmental effects described in the Plan-EA are still valid. Where the impacts of the narrower project-specific action are adequately identified and analyzed in the broader NEPA document, no further analysis would occur, and the Plan-EA would be used for purposes of the pending action.

Additionally, the continued feasibility of a project is monitored and documented in the project files every 5 years in accordance with NEPA requirements in the Title 190, General Manual, Part 410. Factors to be considered in determining the continued feasibility are economic, environmental, and social defensibility and the SLO commitment to continue the project. Modifications to the Plan-EA and project are prepared as necessary.

This Plan-EA has been prepared in accordance with applicable Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500–1508), USDA's NEPA regulations (7 CFR Part 650), NRCS Title 190 General Manual Part 410, and NRCS's National Environmental Compliance Handbook Title 190 Part 610. The Plan-EA also meets the NRCS program policy of the 2014 NRCS National Watershed Program Manual (NWPM) (NRCS 2015) and guidance of the 2014 NRCS National Watershed Program Handbook (NWPH) (NRCS 2014). This Plan-EA serves to fulfill the NEPA and NRCS environmental review requirements for the proposed action.

In addition to the requirements and policies under NEPA listed above, the USDA has also conducted its analysis of this Plan-EA following the federal Principles and Requirements for Federal

Investments in Water Resources[4] as well as the Principles, Requirements, and Guidelines (PR&G) for Water and Land Related Resources Implementation Studies (CEQ 2013). The USDA has issued guidance for analysis comprised of DM 9500-13 and DR 9500-13, and NRCS utilizes this guidance as the framework for evaluating water resources investments (USDA 2017).

[4] Principles and Requirements are established pursuant to the Water Resources Development Act of 2007 (PL 110-114).

2 Purpose and Need for Action

The purpose of the proposed project is to enhance Agricultural Water Management[5,6] by upgrading District infrastructure in a manner that improves water conveyance efficiency, improves drought resilience, and reduces damage to crops resulting from inconsistent water deliveries.

Federal assistance is needed to support KID in improving water conservation and water delivery reliability throughout the D-system, which would increase drought resilience across KID. Water losses through seepage, evaporation, and fluctuations in water demand make it challenging for the District to manage their system in a way that optimizes the available water. Additionally, the D-system is at the end of the District's canal network, making this region more susceptible to supply disruptions.

The D-System, 46 miles from the diversion, is particularly difficult for the District to control. It can take 72 to 90 hours to deliver water to this part of the District. Under drought conditions, when water is not available, delivery times can double due to system inadequacies. These operational difficulties, delivering water to users reliant on the D canals and laterals at the tail end of the system, requires more water to be pushed through KID's canals, resulting in up to 20 percent of diverted water leaving the District via end spills.

The proposed project is regionally significant as agriculture is an essential part of the Klamath Basin's economy. Agricultural production depends on the District's ability to deliver water effectively and efficiently, particularly during drought years when surface water allocation is scarce. Modernizing KID infrastructure, specifically the D-System, would improve water conveyance efficiency, reduce operations and maintenance costs, and improve drought resilience for the local agricultural community.

Per the Federal Objective[5], water resource investments—including the proposed action—put forth in this Plan-EA should: "reflect national priorities, encourage economic development, and protect the environment by: (1) seeking to maximize sustainable economic development; (2) seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and (3) protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems" (NRCS 2013). Additionally, the project should seek to achieve the following Guiding Principles as identified by the Federal Government: Healthy and Resilient Ecosystems, Sustainable Economic Development, Floodplains, Public Safety, and Watershed Approach (NRCS 2017).

The proposed project would be eligible for funding under PL 83-566 requirements as an "Authorized Project Purpose (v), Agricultural Water Management,"[7] through improving water conveyance efficiency and reliability to KID patrons, reducing operations and maintenance costs, and improving drought resilience for the local agricultural community.

[5] A description of Authorized Purposes can be found in 390-NWPM, Part 500, Subpart A, Section 500.3B.

[6] To meet NRCS requirements for a federal investment in a water resources project, the project must meet the Federal Objective set forth in the Water Resources Development Act of 2007 and must be an authorized project purpose under Sections 3 and 4 of Public Law 83-566.

[7] A description of Authorized Purposes can be found in 390-NWPM, Part 500, Subpart A, Section 500.3B (NRCS 2015a).

2.1 Watershed Problems and Resource Concerns

Federal assistance is needed to address the following watershed problems and resource concerns.

2.1.1 Water Shortages

In recent years, the Klamath Project has faced severe droughts that have limited, and in some cases, halted, water supply to irrigators. KID experiences highly variable water allocations annually, which leads to regional agriculture instability. District patrons, or those served by the District, were forced to fallow between 9,000 and 17,000 acres of farmland in 2001, 2005, 2012, 2014, 2015, and from 2020 to 2023.

2.1.2 Water Loss in District Conveyance Systems

The District experiences water losses from open canal conveyances via evaporation, seepage, and operational spills. Water lost to seepage and evaporation was quantified in the Water Loss Assessment (FCA 2023a) and the System Improvement Plan (SIP) (SHN 2023). Water loss measurements indicated total losses of 26.5 cfs or 52.6 acre-feet per day in the D Canals.

To address water shortages described above, the District has identified that water conservation and improving operational efficiencies through the modernization of District conveyance systems is a high priority.

2.1.3 Water Delivery and Operations Challenges

The aging state of the District's conveyance system exacerbates the effects of water shortages throughout the KID system. Seepage from the open canals makes it challenging for the District to manage and deliver water reliably. Because it is geographically situated at the end of KID's system, the D-system presents particular water management and operational challenges. These can include fluctuations in available water depending on the time of day, slowed response times to irrigators' water demands, and inconsistent spill to District drains.

To better manage available water under current and anticipated drought conditions and with limited water availability in the Klamath Project, the District aims to minimize water losses through its conveyance system in an effort to transport and deliver water more precisely, accurately, and efficiently.

2.1.4 Agricultural Production

In recent years, prolonged drought conditions and variations in water allocations for the Klamath Project have impacted KID's operations, resulting in a less reliable water supply for District patrons. KID patrons contribute to the economy of the Klamath Basin through agricultural production of high value-crops such as alfalfa, wheat, irrigated pasture, potatoes, and onions. Decreased water allocations to the Klamath Project have led to reduced water supplies for KID. These circumstances have led to District producers having to fallow more acres of productive agricultural land than they otherwise would choose, which results in a decrease in crop production and revenue.[8]

Although many patrons have already invested in updating on-farm infrastructure to improve application efficiency of the water that they receive, in 2021 and 2022 many patrons were forced to fallow portions of their farmlands; in 2020 and 2023 some patrons elected to fallow portions of their

[8] Supporting information is provided in Appendix D.1

farmlands so that farmers in other districts served by KID could attempt to get a crop to market after several low-delivery years.

2.2 Watershed and Resource Opportunities

The PR&G Federal Objective for the project promotes the following Guiding Principles of *Healthy and Resilient Ecosystems*; *Sustainable Economic Development*; *Floodplains*; *Public Safety*; and *Watershed Approach*. Implementation of the project would contribute to the project's objectives and the Federal Objective and Guiding Principles as follows:

- Improve irrigation water management and irrigation water delivery to irrigators within KID's D-system through improved conveyance efficiencies. - *Healthy and Resilient Ecosystems*; *Sustainable Economic Development*
- Support and maintain existing agriculture through enhanced water supply reliability and improved water management within the District's D-system. - *Healthy and Resilient Ecosystems*; *Sustainable Economic Development*
- Reduce the District's O&M involved in delivering irrigation water to KID patrons in the D-system. - *Sustainable Economic Development*

3 Scope of the Plan-EA

3.1 Agency, Tribal, and Public Outreach

Federal, state, and local agencies and representatives, as well as non-governmental organizations, received an invitation to participate in scoping for the project. Advertisements announcing the scoping period and associated scoping meeting were placed in a local newspaper in addition to multiple online locations including NRCS's website and the project website (see Section 7 for more details). Additionally, the District notified patrons of the scoping meeting and invited comments on the scope of the Draft Plan-EA.

In accordance with 36 C.F.R. 800, the National Historic Preservation Act of 1966 as amended, and its subparts, NRCS has initiated consultation and coordination with the State Historic Preservation Office (SHPO) (November 28, 2023), federally recognized Tribes and Tribes with ancestral lands within the APE (November 28, 2023, September 10, 2024, and January 6, 2025.), as well as other Consulting Parties including Certified Local Governments, on the Area of Potential Effects (APE). NRCS and Reclamation have also determined through consultation that NRCS will be the lead federal agency for Section 106 compliance (see Reclamation letter of December 1, 2023, in Appendix E). In correspondence dated February 7, 2025, NRCS further consulted with the consulting parties regarding results of the archaeological and built environment surveys, eligibility determinations, and the No Adverse Effect finding. Original correspondence and responses are in Appendix E. Table E-23 summarizes the consultation efforts and includes details for each consultation.

Per Executive Order 13007, Indian Sacred Sites, and 36CFR 800.2(c)(2)(ii), NRCS has coordinated with federally recognized Tribes whose ancestral lands are known to have been in the counties of the undertaking prior to conducting cultural resources surveys. No input has been received from these entities to date, but through continued consultation with regard to the Findings of Effect persuant to 36CFR 800.5 and 36CFR Part 800.11(e), consideration will be given to any additional input, prior to implementation.

After completion of the cultural resources identification survey and subsequent NRCS review, a copy of the completed survey report has been furnished to the Oregon SHPO and Tribal Governments with ancestral lands within the counties of the APE. Further consultation may take place regarding the resolution of adverse effects (if any) to cultural resources until a Memorandum of Agreement is executed and signed by Oregon NRCS and relevant parties or by comment from the advisory Council of Historic Preservation.

3.2 Scoping Meeting

The scoping meeting was held on Tuesday, February 7, 2023, at 4 P.M. The meeting was held at the Merrill Civic Center, Walt Wilson Hall at 363 W Front St., Merrill, OR. Presenters included staff from NRCS (Gary Diridoni), Farmers Conservation Alliance (FCA) (Raija Bushnell), and the District Manager (Gene Souza). A total of 38 people attended the meeting, excluding staff from KID, NRCS, and FCA.

3.3 Scoping Comments

Scoping comments were accepted from January 23, 2023, to March 9, 2023. Comments were received at the public meeting and via email. See Table E-21 in Appendix E.13 for a list of comments received and where they are addressed in this Plan-EA.

3.4 Identification of Resource Concerns

Table E-22 in Appendix E.13 provides a summary of resource concerns and their relevance to the proposed action. Resource concerns determined not relevant were eliminated from detailed study; resource concerns determined relevant were carried forward for analysis.

4 Affected Environment

The following sections describe the existing ecological, physical, biological, economic, and social resources of the project area and areas that could be affected by the operation of the KID system. The project area is defined in Section 1.2. Per requirements of the PR&Gs, where applicable, this Plan-EA describes the ecosystem services associated with each resource. Ecosystem services refer to the benefits that people and their communities derive from their natural environment in which they live. Availability of water for consumption, buffering against crop failure through pollination, and providing places in which people value living are all examples of benefits that flow from nature to people. Because these ecosystem services contribute to people's "health, wealth, and well-being," but often cannot be quantified in the same way as services sold in marketplaces, federal investment into projects that could impact ecosystems and natural resources require an ecosystem services assessment to illuminate how management decisions will enhance, sustain, or degrade the benefits that nature provides (NRCS 2017; Olander et al., 2018). An assessment of links between ecological function and social well-being helps to ensure that beneficial and detrimental ecological impacts of a project are recognized and that detrimental impacts are minimized to the extent possible (EEA 2019).

Per federal guidance, this Plan-EA assesses ecosystem services based on three of the four service categories (NRCS 2017):

1. Provisioning services: tangible goods provided for direct human use and consumption, such as food, fiber, water, timber or biomass;
2. Regulating services: services that maintain a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe—examples include flood and disease control, water filtration, climate stabilization, or crop pollination;
3. Cultural services: services that make the world a place in which people want to live—examples include spiritual, aesthetic viewsheds, or tribal values; and
4. Supporting services: services that refer to the underlying processes maintaining conditions for life on Earth, including nutrient cycling, soil formation, and primary production.

Figure E4-1 shows a concept diagram that highlights the ecosystem services that interact with District operations and provides a baseline for discussion in Section 6. The diagram links an action that would modernize District infrastructure with potentially impacted ecosystem features and the provisioning, regulating, and cultural services that these ecosystems provide to people. Supporting services are not evaluated in this Plan-EA because they give rise to and support the final ecosystem services (provisioning, regulating, and cultural) (EEA 2019; NRCS 2017).

4.1 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended 54 U.S.C. § 306108) and its implementing regulations (36 CFR Part 800) require federal agencies to take into account the effect of undertakings on historic properties identified within the undertaking's APE, afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on undertakings, and involve appropriate consulting parties in the Section 106 process.

Under Section 106, historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP]…including artifacts, records, and material remains related to such a properties" and "properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria" (36 CFR 800.16(l)(1)). Herein the term cultural resources refers to any prehistoric or historic district, site, building, structure, object, and property of traditional religious and cultural importance to Native American Tribes whether or not it is listed on or is eligible for listing on the NRHP.

The APE comprises all areas where ground-disturbing work would occur under the proposed action, construction staging and access areas, as well as a 100-foot buffer around ground-disturbing construction, staging, and access areas to account for permanent visual impacts from the project and temporary noise and fugitive dust impacts that would occur during construction. Maps of the APE are included in Appendix E.1.1.

To determine an appropriate level of historic property identification efforts and to better understand the area's precontact and historic context, NRCS Cultural Resources Specialists (CRS) reviewed data from the Oregon Archaeological Records Remote Access and Oregon Historic Sites Database to identify previously conducted cultural resource surveys and records of cultural resource records in and near the study area. Three cultural resource surveys were previously conducted within the APE and 19 cultural resource surveys were previously conducted within 0.5 mile of the APE. 15 archaeological sites and 23 built environment resources are within 0.5 mile of the APE (Appendix E.1.5). There were no previously recorded archaeological resources within the APE.

Prior to conducting field inventories, Reclamation required NRCS to submit a request for an Archaeological Resource Protection Act (ARPA) permit for conducting any shovel testing, excavation, or other ground-disturbing identification methods on the federal property Reclamation manages. NRCS received the ARPA permit on November 19, 2024.

Under NRCS's direction, SOI-qualified personnel from Parametrix, Inc. (Parametrix) conducted archaeological and built environment surveys to identify and document cultural resources at least 50 years old that are present within the APE. The archaeological survey was conducted in accordance with *Guidelines for Conducting Field Archaeology in Oregon* (Oregon SHPO 2025) and consisted of a pedestrian survey at 15 meter transect intervals and shovel probes in areas where subsurface ground disturbance deeper than 10 centimeters is expected. Shovel probes were approximately 45 cm in diameter and to the maximum anticipated depth of ground disturbance.

Parametrix identified four archaeological sites (Temporary Sites KID_Surf_site1, KID_Surf_site2, KID_Surf_site3, and KID_Sub_site1) and one archaeological isolate (KID_ISO1) within the APE. None of the archaeological sites or isolates identified during the survey will be physically affected by project-related activities.

The built environment survey was conducted in accordance Oregon SHPO's *Guidance for Historic Resource Surveys in Oregon* (2008) and *Guidance for Recording and Evaluating Linear Cultural Resources* (2013) including specific guidance for documenting irrigation systems. A Reconnaissance-Level Historic Property Survey, consisting of photography and field notes, was completed to identify, document, and evaluate built environment resources at least 50 years old, including the Klamath Irrigation District D Canal, Adams Pumping Plant, and Stukel Pumping Plant.

Parametrix identified and documented four previously unevaluated components of the NRHP-eligible Klamath Project Historic District—the D Canal, the D Canal Lateral System, the Adams Pumping Plant, and the Stukel Pumping Plant (see Tech Reportin Appendix E.1.1)). NRCS determined that none of the four components are individually NRHP eligible. Both the D Canal and D Canal Lateral System are contributing elements to the Klamath Project historic district's overall NRHP eligibility. The Adams Pumping Plant is recommended as a non-contributing resource to the Klamath Project Historic District. Although the pumping plant was built in the historic district's period of significance, it does not share its significance under Criterion A. The plant is also not significant under Criteria B, C, or D.

The Stukel Pumping Plant was determined non-eligible, non-contributing resources to the Klamath Project Historic District. The pumping plant was built outside the historic district's period of significance and does not share its significance under Criterion A. The plant is also not significant under Criteria B, C, or D. The proposed project will not adversely affect the Klamath Project Historic District's integrity of location, setting, design, materials, workmanship, or feeling as the project would not require removal or relocation of the D Canal and the proposed lining of only two segments of the D Canal segment would not detract from the site's overall historic character as a large-scale irrigation system. Although lining the two segments of Canal D introduces visual elements affecting the district's integrity of setting, feeling, materials, and workmanship—i.e., visual change from earthen segments to concrete-lined segments—the site still retains sufficient integrity to portray its original function as an irrigation system. Additionally, the D Canal and over half of its laterals would remain open water conveyance structures, thus retaining their visible connection to each other and other components of the District such as the G Canal and the Adams Pumping Plant.

Based on proposed project activities, the introduction of vibration, noise, and fugitive dust during construction would be minimal and temporary. Atmospheric or audible changes resulting from the project would not diminish the integrity of the historic district, including its setting and contributing components.

Given the project will not significantly detract from the overall integrity of the District, the resource would retain its capacity to convey its significant historical associations with early 20th century expansion of irrigation infrastructure within the Klamath Project. As such, NRCS determined the finding of effect for the project is No Adverse Effect.

In accordance with 36 CFR 800.2(c)–(d) and 36 CFR 800.3(c) and (e)–(f), NRCS identified and consulted with several consulting parties, including the Oregon State Historic Preservation Office (Oregon SHPO), Reclamation, and several federally recognized tribes with ancestral ties to the area—The Klamath Tribes, Modoc Nation, Burns Paiute Tribe, Cow Creek Band of the Umpqua Indians, Confederated Tribes of the Warm Springs Reservation of Oregon, Fort Bidwell Indian Community, Karuk Tribe, and Yurok Tribe.

NRCS initiated the Section 106 process and proposed a project APE for consideration with the consulting parties in correspondence dated November 28, 2023, September 10, 2024, and January 6,

2025 (see letters in Appendix E1). NRCS and Reclamation also determined through consultation that NRCS will be the lead federal agency for Section 106 compliance (see Reclamation letter of February 12, 2024, in Appendix E.1.1). In correspondence dated February 7, 2025, NRCS further consulted with the consulting parties regarding results of the archaeological and built environment surveys, eligibility determinations, and the No Adverse Effect finding. Original correspondence and responses are in Appendix E.1.1. Table E-23 in Appendix E.14 summarizes the consultation efforts and includes details for each consultation.

4.2 Land Use

The study area for the evaluation of potential impacts to land uses consists of the project area and sites that may be used for construction staging and access under the proposed action. The District and the project area are located entirely within Klamath County, Oregon, and are subject to the County's land use regulations.

4.2.1 Land Ownership

Lands within the District are primarily privately owned. The District is 53,638 acres in size and serves more than 2,500 patrons. The D Canal system, in which the project area is located, serves approximately 12,315 acres of irrigated lands and 460 patrons (SHN 2023).

Reclamation retains title to the irrigation infrastructure within the District, including canals, laterals, and associated infrastructure, such as pump stations. Operation and management of canals, laterals, and associated infrastructure has been transferred to KID. Request for title from the federal government to KID has been requested in accordance with the District's understanding of the 1954 contract. See Appendix E.2 for additional information on infrastructure ownership in the project area and lands affected by the project area.

It is understood by the District that Reclamation has priority easements for road and railroad crossings with Klamath County, Oregon Department of Transportation, and BNSF Railroad. This is because Reclamation's irrigation infrastructure pre-dates development of the project area's transportation infrastructure. Requests for title for these crossing easements from the federal government have been requested from the federal government.

4.2.2 Land Use

The project area is located within the D Canal system of the District. Lands served by the D Canal system are primarily agricultural. Portions of the D Canal system run through or adjacent to the towns of Merrill and Malin.

All canal and lateral segments with proposed improvements run adjacent to one or more parcels containing residential uses. The proposed D12 Lateral piping project runs adjacent to Lost River Junior/Senior High School. The D20 Lateral proposed piping project runs through an area of light industrial uses west of the Malin city limits.

The project area is located mainly within Exclusive Farm Use-Cropland (EFU-C) zoning. The Adams Pump Station is located within General Commercial (GC) zoning. The entirety of the McKoen-Paygr D Canal lining project and portions of the Adams Point D Canal lining and D-14 Lateral piping projects are located within Forestry/Range (FR) zoning. See Appendix E.2 for definition of land use types.

In 2019, crops grown within KID included alfalfa, wheat, irrigated pasture, potatoes, onions, and other crops (KID 2021).

4.2.3 Ecosystem Services

Provisioning service: Water available for irrigation: (Figure E4-1): Water diverted primarily from UKL with supplemental and return flows drawn from the Lost River is delivered to patrons for agricultural purposes. This water allows lands to be maintained for the cultivation of crops for human consumption as well as forage such as alfalfa, hay, and pasture for livestock production.

4.3 Socioeconomic Resources

The project area lies within Klamath County, Oregon. Klamath County is the study area for the analysis of potential impacts to socioeconomic resources. The towns of Merrill and Malin are located within the District boundary.

4.3.1 Population

Table E.15 in Appendix E.11 shows the population characteristics for Klamath County. Between 2016 and 2021, the population of Klamath County increased by approximately 4.5 percent. In 2020, the population of Merrill was 821 and the population of Malin was 731 (U.S. Census Bureau 2022).

Race and ethnicity in Klamath County and the state of Oregon are summarized in Table E-16 in Appendix E.11. Approximately 25 percent of the population of Klamath County identifies as a minority, similar to the statewide proportion in Oregon (approximately 28 percent).

4.3.2 Area Employment and Income

Klamath County has lower labor force participation rates and employment rates than Oregon as a whole. The county unemployment rate is higher than that of the state (Table E-17 Appendix E.11.). Agriculture, forestry, fishing and hunting, and mining workers make up 2.6 percent of Klamath County's labor force (U.S. Census Bureau 2022).

. The median household income and poverty rate in Klamath County are below and above Oregon's median, respectively (Table E-18 Appendix E.11).

4.4 Soils

The study area for soils consists of the project area and a buffer area of approximately 50 feet to account for construction activities and to assess potential erosion factors. Additionally, the study area includes the tax lot under each pump. Soils in the KID are generally sandy loams with volcanic ash properties due to the geological influence of the eruption of Mt. Mazama (Crater Lake) (NRCS 2023).

Fordney and Poe loamy fine sands make up the majority of the project area. These soils are predominantly nonhydric. Additional information on soils in the project area can be found in Appendix E.3.

The potential for water-based erosion on most of these soil types is moderate because they each occur on slopes of 0 to 45 percent. Soil loss in the area is due to both water-based erosion and wind-based erosion.

4.4.1 Farmland Classification

NRCS has developed technical soil groups that are associated with a particular soil type and a soil's rating for agricultural commodity production (NRCS 2023). NRCS soil groupings within the project area are 23 percent farmland of statewide importance, 74 percent prime farmland if irrigated, and 2 percent not prime farmland.

4.5 Vegetation

4.5.1 General Vegetation

The study area for vegetation consists of the project area (see Section 1.2, Project Area), plus areas within approximately 50 feet, where people and equipment engaged in construction activities could potentially affect existing vegetation. Detailed lists of the plant species present at the individual project area sites are not available; however, vegetation in the study area is assumed to be similar to the vegetation types that are present in KID. Observations made by a biologist during a site visit in August 2023 substantiate this assumption.

Common vegetation types found in the study area include cultivated crops, pastures, hay fields, and riparian vegetation, as well as disturbed areas dominated by weedy species such as Mexican fireweed, tumble mustard, and stinging nettle. Major agricultural crops are identified in Section 4.2, Land Use, and riparian vegetation is identified in Section 4.8, Wetlands and Riparian Areas. Vegetation communities in the low-lying foothills within the study area consist of western juniper, big sagebrush, rubber rabbitbrush, Idaho fescue, bluebunch wheatgrass, and other native species found in arid Oregon steppe environments (NatureServe 2022a, 2022b). See Appendix E.4.1 for a complete list of species that may occur in the study area.

No special-status species (i.e., threatened, endangered, candidate, and other sensitive plant species protected under the federal Endangered Species Act [ESA] or by the State of Oregon) are known to occur in the study area (ORBIC 2023). Greene's tuctoria (*Tuctoria greenei*), slender Orcutt grass (*Orcuttia tenuis*), and Applegate's milkvetch (*Astralagus applegates*) are listed as endangered under the ESA and are known to occur within the vicinity of the project area and have the potential to occur within the project area (USFWS 2023a). However, these species are unlikely to occur within the project area owing to frequent disturbance and unsuitable habitat. See Appendix E.4.2 for additional information.

Excessive biomass accumulation within and along the District's canals causes large operational issues. Aquatic vegetation such as coontail (*Ceratophyllum demersum*) is abundant in the Lost River and is found within the canal system. During pumping operations, the District performs daily vegetation maintenance to reduce serious damage to pump facilities. Aquatic weeds within irrigation canals are treated by an annual application of aquatic herbicide (Cascade®), generally occurring in late May. Vegetation along the canals is maintained by a combination of burning, mowing, and herbicide application. Controlled burns within canals and ditches are relatively infrequent and occur before the beginning of the irrigation season. Canals and ditches are mowed twice a year. Invasive weed patches along canals and ditches are controlled by twice-a-year application of herbicide (unique blend).

4.5.2 Common and Noxious Weeds

Common weed species that are abundant in the study area include cheatgrass (*Bromus tectorum),* Canada thistle (*Cirsium arvense*), puncturevine (*Tribulus terrestris*), and perennial pepperweed (*Lepidium latifolium*). Various invasive and noxious weed species are also present to varying degrees. Noxious weeds are defined under OAR 603-052-1200 as those that have been declared a menace to the public welfare because of the environmental and economic degradation that occurs when they become established. The spread of noxious weeds is regulated at the county and state levels. Klamath County performs the County's required duties under ORS 569.355 to control noxious weeds in the Oregon portion of the District.

The State of Oregon uses action-oriented weed classification systems to serve as official guidelines for prioritizing responses by county weed management programs and implementing noxious weed

control projects (ODA 2022). Appendix E.5 lists the noxious weeds known to occur in the study area.

4.6 Water Resources

Water resources are defined as lakes, rivers, streams, and other waterbodies that supply water for KID operations. They also include groundwater aquifers that may be linked to Klamath Project operations within the study area. Water resources are described in terms of hydrology (i.e., quantity and timing of water) and quality. Water from these natural sources is diverted or pumped into the manmade conveyance systems (i.e., canals, laterals, etc.) of the Klamath Project, delivered to irrigators and other users, drained from agricultural fields, and in some cases returned to natural waterbodies. While all these features are interconnected, this section focuses on the water resources specific to KID's D-System (Figure 1-2). These waterbodies include UKL, Lake Ewauna, Klamath River, and other small lakes and sumps within the KID that may provide habitat for wildlife (Figure 1-1, Figure 1-3,Appendix E.6, Table E-8).

4.6.1 Water Rights and Operations

KID's water supply is from UKL, Lake Ewauna, and the Klamath River (Figure 1-3). The District has one major diversion, from UKL into the A Canal, with a capacity of 1,150 cfs. The A Canal flows southeast for about 9 miles where it terminates and delivers water into the B Canal and the C Canal. The B Canal flows east about 4 miles where it terminates and delivers water into the E and F canals. The C Canal flows south about 1 mile to the C-G Cutoff, continues southwest about 2 miles to the C-4 Lateral, and flows to the west. The Miller Hill pump station (consisting of three 100 HP pumps) supplies approximately 7 to 80 cfs to the C-4 Canal from the Lost River Diversion Channel. Below the C-G Cutoff, the G Canal flows southeast about 8 miles to discharge into the D Canal. The D Canal receives water from the G Canal and supplemental return flows from the Lost River through the Stukel Pump Station (Figure 1-2). The D-1 Canal receives water from the C Canal and supplemental return flows from the Lost River through the Adams Pump Station (SHN 2023). In the D Canal and its laterals, 42.24 miles (97 percent of the total length) is open unlined canal (Reber 2022).

In addition to its own patrons, the District delivers water to other irrigation districts (Reber 2022). These include the following entities: Van Brimmer Ditch Company, Shasta View Irrigation District, Malin Irrigation District, Pine Grove Irrigation District, Enterprise Irrigation District, Poe Valley Improvement District, Klamath Basin Improvement District, Sunnyside Irrigation District (through Van Brimmer Ditch Company), Tulelake Irrigation District (by contract and through operational spill), Over 110 individual Reclamation Warren Act contracts, and Olene Pump.

On the downstream side, the District measures flow discharging back to the Lost River and to TID to account for flows delivered to other parts of the Klamath Project.

Existing water loss data for the District indicate that between 1991 and 2000, approximately 20 percent of diverted water is lost in end spills, 14 percent is lost to lateral seepage, 1 percent is required for filling and draining the system, and the remaining 65 percent reaches patrons (FCA 2019). Overall, the Klamath Project reuses and recycles between 90 and 95 percent of the diverted water (FCA 2019).

In recent years, the Klamath Project has faced severe droughts that have limited, and in some cases, halted water supply to irrigators. Water shortages are exacerbated due to the aging state of the District's conveyance system. Klamath River water rights for the Klamath Project are being adjudicated by the State of Oregon (MBK Engineers 2021). Despite ongoing construction,

operation, and improvement of the Klamath Project since 1906, water rights were not adjudicated under state water law until the State of Oregon issued the Final Order of Determination of the Klamath Adjudication in 2013. Under the Final Order of Determination, the amount of water that can be diverted by KID and TID was determined based on the historical water use by these districts between 1961 and 2000, prior to the current drought conditions. Certain amendments and corrections were incorporated in 2014, along with the negotiation of the Upper Klamath Basin Comprehensive Agreement; however, the second phase of the adjudicatory process continues with no stated completion date for the final decree and issuance of certificates (OWRD 2024).

KID holds water rights in trust for Klamath Adjudication Claims KA-1000 and KA-1004 and is responsible for diverting water for Claim KA-1002. KID is a claimant in the KA-1000 water right claim in the State of Oregon as part of the Klamath Project (aka Klamath Project Consolidated Claim 321-17/293/323-3) with a water right established on May 19, 1905. The KA-1000 water right season of use is March 1 through October 31, annually. KA-1000 provides claim to all Klamath Project irrigation districts, including the districts and contractors to which KID provides water, with authority to claim up to 570,110 acre-feet of irrigation water stored in UKL, annually. KID also claims a vested water right, Claim KA1004 (aka Consolidated Claim 321-9) that was established on March 21, 1884. The KA-1004 water right season of use is March 1 through October 31, with duty of 3.5 acre-feet per acre each year with an authorized constant 49 cfs diversion. This water right predates the Klamath Project by 21 years and serves the Henley-Ankeny grounds, now known as the A Canal. Information on additional water right claims and permits is available in the District's Water Management and Conservation Plan (KID 2021).

4.6.2 Surface Water Hydrology

4.6.2.1 Upper Klamath Lake

Upper Klamath Lake is near Klamath Falls, Oregon, approximately 16 miles north of the California state line. The lake is fed by surface water from the Williamson and Sprague subbasins (Hydrologic Unit Code (HUC) 18010201 and 18010202, respectively), as well as from smaller tributaries in the UKL subbasin (HUC 18010203). The lake is approximately 25 miles long and 8 miles wide, with a surface area of 61,520 acres (NRC 2008). The average depth is 14 feet. Water level elevations are closely managed to meet both water supply and ecological conservation goals. As a reservoir, UKL has a live storage volume of 515,000 acre-feet (NMFS & USFWS 2013; USFWS 2016).

The outflow at the south end of the lake is impounded by the Link River Dam, which is owned by the Bureau of Reclamation and operated by PacifiCorp. The dam serves as the point of diversion for the A Canal, as well as the diversion for two hydroelectric turbines.

4.6.2.2 Lake Ewauna

Below the Link River Dam, natural flows are conveyed in the short (1.5-mile-long) Link River and then into Lake Ewauna near the city of Klamath Falls. The lake extends into an 18-mile-long reach impounded by the Keno Dam and is also considered the upper extent of the Klamath River. The western end of the Lost River Diversion Channel connects with Lake Ewauna.

4.6.2.3 Klamath River

Below Keno Dam, the Klamath River flows 236 miles through Oregon and California to the Pacific Ocean. The Klamath Basin is approximately 16,000 square miles, and the river is the second largest in California by discharge.

Snowmelt contributions from the Klamath Mountains (Marble Mountains, Salmon Mountains, Scott Bar Mountains, Siskiyou Mountains, and Trinity Alps) provide year-round flow in the Klamath River.

Tailwater from the Klamath Project irrigation and drainage districts is directed back into the Klamath River at river mile 244.

4.6.2.4 Other Waterbodies

Other waterbodies within the footprint of KID include the Lost River, Lost River Diversion Channel, Spring Lake, Nuss Lake, and various wetlands. These waterbodies are not significant contributors to the irrigation water conveyance system but may have limited connection to KID operations, either as supplemental supply (e.g., Lost River Diversion Channel), as a receiver of tailwater from drainage ditches, or hydrologic connection via groundwater.

4.6.3 Surface Water Quality

UKL was a naturally eutrophic body of water (NRC 2002), and land use changes in the Klamath Basin over the last century have contributed additional nutrient loading (NCRWQCB 2017; ODEQ 2010; Risley & Laenen, 1999). The draining of marshland, the decrease of forested area, the increase of agricultural land use, and other anthropogenic activities have resulted in increased nutrient loads that have shifted UKL to a hypereutrophic status. Extensive algae blooms consisting primarily of toxic blue-green algae now occur annually in UKL and the Klamath River during warmer times of the year (USFWS 2016).

ODEQ monitors water quality across the state and updates its list of impaired waterbodies every 2 years (ODEQ 2022). In the most recent report, UKL, Link River, Lake Ewauna, Klamath River, Lost River, and the Lost River Diversion Channel are listed as impaired for certain parameters (see Appendix E.6.1).

Low dissolved oxygen and high pH can be attributed to both agricultural activities and natural conditions (e.g., hydrology, geology, and meteorology). High pH is also a by-product of nutrient enrichment and high primary productivity. Sources of high nutrients include agriculture, habitat modification (removal of riparian vegetation), natural sources, nonpoint sources, and water diversion. Arsenic is thought to come from both natural and anthropogenic sources (USFWS 2016).

4.6.4 Groundwater

Groundwater-surface water interactions are complex across the upper Klamath Basin, reflecting the volcanic geology and modified hydrologic history of the area (Pischel and Gannett 2015). In the project area, there are two main aquifers: 1) the unconfined sedimentary aquifer which consists of saturated fine-grained basin-fill sediment that has low permeability and low to moderate yields; and 2) the confined deep-volcanic aquifer, which consists of highly permeable basalt and has potential for high yields (Pischel and Gannett 2015). The sedimentary aquifer extends as much as 1,800 feet below ground surface in some places and is typically the source for domestic wells in the area. The deep-volcanic aquifer is typically the source for high-volume supplemental irrigation wells such as those installed by the TID along the Oregon-California border. While both aquifers respond similarly to long-term climate trends—i.e., water levels increase during wet periods and decrease during dry periods—the seasonal cycles of drawdown and recovery are very different. Shallow groundwater levels in the sedimentary aquifer rise during the irrigation season and fall once the canal system is shut down in the fall; whereas water levels in the deep-volcanic aquifer decline during the

irrigation season when supplemental irrigation wells are activated and then recover over the winter when the well pumps are shut off.

Near the surface, the Klamath Project infrastructure interacts with shallow groundwater through a variety of pathways. Shallow groundwater can be recharged via precipitation, canal leakage, or infiltration of applied irrigation water, and it can be collected by the agricultural drainage network and discharged to natural waterbodies or downstream irrigation districts. In this region, the rate of aquifer recharge from water supplied by the Klamath Project is thought to be more significant than from the natural sources (e.g., precipitation and runoff) although these rates are not well quantified and vary from year to year (Gannett et al. 2012). Local rates of recharge attributed to canal leakage vary depending on the distance to the canal, depth of the well, and local geological conditions (Gannett et al. 2007).

Over the past two decades, a combination of drought conditions, curtailed surface water delivery from UKL, and increased groundwater pumping have caused incomplete aquifer recovery and a precipitous drop in ground water levels (USFWS 2023b). One of the most visible impacts of the decline in sedimentary aquifer water levels has been the lost viability of domestic wells. Since 2021, hundreds of wells in Klamath County, generally between 80 and 200 feet deep, have been reported dry (Feller 2021; Schwartz 2022). In 2021 and 2022, the scale of the problem prompted an emergency response by the Oregon Department of Human Services and Klamath county to provide storage tanks and deliver potable water to affected residents (Baumhardt 2022).

A water loss assessment in 2019 estimated the D Canal loses 52.6 acre-feet per day while it is operating due to seepage and other factors (FCA 2023a); but the fate of this seepage and its significance to local groundwater levels is not well researched. To date, the direct relationship between the amount of water leaking from canals and the magnitude of groundwater recharge observed in local wells has been difficult to evaluate because of the confounding effects from variability in other influencing factors and limited data availability.

4.6.5 Ecosystem Services

Provisioning service: Water available for irrigation (Figure E4 -1) As described in Section 4.6.1, water delivered to patrons within the study area is diverted primarily from UKL with supplemental flows drawn from the Lost River. This water allows for the cultivation of crops for human consumption and forage that supports livestock production. In recent years, the Klamath Project has faced severe droughts. As a result, KID has faced a high degree of uncertainty in the quantity and timing of water allocations from year-to-year, and in some years has received no surface water from UKL.

Provisioning service: Fish populations (*Figure E4 -1*): Waterbodies associated with District operations support populations of native Lost River sucker and shortnose sucker, both of which are federally and state-listed as endangered. Other species potentially present in waterbodies associated with District operations include lamprey (i.e., Pacific lamprey and Pit-Klamath brook lamprey), minnows (i.e., tui chub and blue chub), sculpin (i.e., Klamath Lake sculpin, marbled sculpin, and slender sculpin), and Klamath redband trout. Introduced species include fathead minnow in UKL, Sacramento perch in Clear Lake, brown bullhead, green sunfish, bluegill, pumpkinseed, largemouth bass, white crappie, black crappie, and yellow perch, and other fish species.

Regulating service, Water quality (Figure E4 -1]): Surface water loss in the system can affect water quality parameters including turbidity, sediment, temperature, and dissolved oxygen. In general, lower water levels can contribute to higher temperatures, which in turn can contribute to lower concentrations of dissolved oxygen. Canal wall erosion and periodic failure can contribute to heightened levels of

turbidity in the system. Separately, runoff from irrigated lands can mobilize fertilizers, pesticides/herbicides, and other contaminants back into open canals and streams and return them to the stream system via end spills. Maximizing water level consistency in lakes and reservoirs and consistent live flow levels in streams throughout the season may help to moderate temperatures and pollutant levels. Minimizing the further introduction of pollutants and turbidity into streams through end spills may help to reduce pollutant loads. Section 4.6.3 describes surface water quality in the waterbodies associated with District operations.

4.7 Fish and Aquatic Resources

The study area for fish and aquatic resources consists of the waterbodies associated with KID operations (see Section 4.6.1 Water Rights and Operations), as well as the KID conveyance system of canals, laterals, and drains. Appendix E.7 provides additional supporting information about fish and aquatic resources.

4.7.1 General Fish and Aquatic Species

The isolated nature of historical habitat in the Klamath River and Lost River watersheds has resulted in a limited native fish species assemblage, comprising only five families: *Petromyzontidae* (lampreys), *Cyprinidae* (minnows), *Catostomidae* (suckers), *Salmonidae* (salmon and trout), and *Cottidae* (sculpins). Almost all native species found in the basin are endemic to the basin—that is, they occur nowhere else in the world (NRC 2004). A list of fish species that may occur in the study area can be found in Appendix E.7. Common native species include Klamath River lamprey, Klamath tui chub, blue chub, UKL sculpin, and Klamath Lake Sculpin.

From 1962 to 2024, the upper limit of for anadromous fish within the Klamath River had been at Iron Gate dam. With the removal of Iron Gate dam along with J.C. Boyle, Copco 1, and Copco 2 dams in 2024, Chinook salmon, coho salmon, steelhead, and Pacific lamprey are now able to migrate further up the Klamath River and into the study area. Adult Chinook salmon in 2025 have already been documented migrating through UKL to spawn in upstream tributaries (ODFW 2025).

Non-native fish species that have been introduced include fathead minnow in UKL and brown bullhead, green sunfish, bluegill, pumpkinseed, largemouth bass, white crappie, black crappie, and yellow perch throughout the study area. In addition, non-native bullfrog populations have been increasing in the region, which represents a potential risk to populations of native fish and amphibians.

Based on the hydrologic connectivity between KID's canals, laterals, drains, and waterbodies in the surrounding watersheds, it is possible that the species identified above are present in the project area. However, barriers to migration posed by pumps, fish screens, and diversion dams, as well as degraded habitats and water quality in the District's conveyance system, make it unlikely these species would be present in great abundance. During a reconnaissance site visit in August 2023, a biologist observed unidentified fish in the Lost River within the project area.

4.7.2 Federally Listed Fish and Aquatic Species

Two ESA-listed fish and aquatic species have been documented in the study area; the shortnose sucker (*Chasmistes brevirostris*) and the Lost River sucker (*Deltistes luxatus*) which are listed as endangered. No critical habitat for either species has been designated in the canals, laterals, ditches, or drains that make up the District's conveyance system (USFWS 2023a). Study area waterbodies in which critical habitat has been designated for the suckers are UKL, Lake Ewauna, and the Klamath River.

Lost River suckers can be up to 3.3 feet long and live for up to 55 years. They are native to the Lost River and Upper Klamath River systems, where they have adapted to living in lakes (Moyle 2002). Shortnose suckers can grow up to almost 2 feet long, but growth is variable among individuals. They also are relatively long-lived; some fish have been aged at 33 years old. Both species live in lakes and reservoirs but spawn primarily in streams. Spawning occurs from February through May in riffles or runs with gravel and cobble substrate, moderate flows, and depths of less than 4 feet. After hatching, larvae emerge from the gravel and drift downstream to the preferred lake habitat, rearing along the shoreline in areas of shallow water and emergent vegetation. As they grow larger in the first year, they move to deeper water, and adults typically inhabit areas at least 3 feet deep.

Entrainment of suckers within the irrigation infrastructure occurs and results in sucker occurrence within canals in the study area. Reclamation has coordinated annual fish salvage activities in areas where suckers are encountered in reliable numbers since 2005, including the D-3 lateral within the project area (USFWS 2023b).

Additional species with federal conservation status in the Klamath Basin include:

- Oregon spotted frog (*Rana pretiosa*) is listed as threatened under the ESA. The species is present adjacent to the study area in riverine wetlands of low-lying tributaries to UKL, including Fourmile Canal/Creek, Sevenmile Canal, Wood River, and Crane Creek (USFWS 2024). Water management of UKL and Agency Lake's water levels can influence the lowermost reaches of these tributaries.
- Southern Oregon Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) is considered threatened under the ESA. This species is unlikely to occur in the project area because there are no known observations and there is no suitable habitat or migratory pathways. In addition, the project area is not located within Essential Fish Habitat (NOAA 2023). The species may migrate through UKL as the species continues to colonize upstream habitats post dam removal.
- Bull trout (*Salvelinus confluentus*) is listed as threatened under the ESA. Bull trout are extirpated from the majority of their historical range and currently only occur in headwater systems in the Upper Klamath Basin (ODFW 2023a). For the same reasons as coho salmon, this species is not expected to occur in the project area. Critical habitat for bull trout occurs in tributaries of UKL located to the lake's north. Bull trout may use UKL during the winter as a migratory corridor.

Species that are recorded to have occurred in Lost River within the study area that are federal species of concern include red-band trout (*Oncorhynchus mykiss shortnose*), western ridged mussel *(Gonidea angulata),* montane peaclam *(Pisidium ultramontanum*), and Oregon floater *(Anodonta oregonensis)* (ODFW 2023a; ORBIC 2023). Northwestern pond turtle *(Actinemys marmorata)*, proposed to be listed as threatened under the ESA, is also recorded to have occurred in Lost River and may occur with District canals and they are currently proposed to be listed as threatened under the ESA. See Appendix E.7.2 for more information on the northwestern pond turtle.

4.7.3 State-Listed Species

A list of aquatic species that are protected by the State of Oregon (OAR 635-100-0105) and that may be present in the project area was compiled using the Oregon Biodiversity Information Center (ORBIC) data report (ORBIC 2023) and Oregon Department of Fish and Wildlife (ODFW) fish distribution data (ODFW 2023a). State-listed wildlife species are discussed in Section 4.9.4.

Both the Lost River sucker and the shortnose sucker are listed as endangered by the State of Oregon. Coho salmon are listed as endangered by the State of Oregon. Northwestern pond turtle and redband trout are listed as sensitive-critical and critical, respectively, by the State of Oregon.

No other state-listed threatened, endangered, or candidate fish or aquatic species are known or expected to occur in the study area.

4.7.4 Ecosystem Services

Provisioning service: Fish populations (*Figure E4-1*): Waterbodies associated with District operations support populations of native Lost River sucker and shortnose sucker, both of which are federally and state-listed as endangered. Other species potentially present in waterbodies associated with District operations include lamprey (i.e., Pacific lamprey and Pit-Klamath brook lamprey), minnows (i.e., tui chub and blue chub), sculpin (i.e., Klamath Lake sculpin, marbled sculpin, and slender sculpin), and Klamath redband trout. Introduced species include fathead minnow in UKL, Sacramento perch in Clear Lake, brown bullhead, green sunfish, bluegill, pumpkinseed, largemouth bass, white crappie, black crappie, and yellow perch, and other fish species.

Cultural Service: Culturally important species (*Figure E4-1*) People's values for species conservation may arise from personal use (i.e., enjoying seeing the species and/or its habitat), personal beliefs and moral ethics (i.e., believe protecting a species and its habitat is the right thing to do), altruism (i.e., believing a resource should be protected so that others can use it or benefit from it), and/or a desire to bequest the resource (i.e., believing a resource should be protected for future generations). Some fish species have cultural significance to the Klamath Tribes. These include the Lost River sucker and shortnose sucker, which were a primary food source for the Tribes before the sucker populations collapsed in the 1980s.

4.8 Wetlands and Riparian Areas

The study area for wetlands and riparian areas consists of areas where ground disturbance may occur (see Section 4.5 Vegetation), as well as where hydrologic changes could affect wetland hydrology and/or vegetation. See Section 4.6, Water Resources, for a description and depiction of the KID water supply and distribution system.

Wetlands and riparian areas perform a number of valuable functions, including water storage, water filtration, and biological productivity. They can also support complex food chains that provide sources of nutrients to plants and animals and provide specialized habitat for a wide variety of aquatic and terrestrial species.

Riparian areas are transition zones between waterbodies and adjacent upland areas that support hydrophytic vegetation that is dependent upon the hydrology of the waterbody. A riparian area as defined by the EPA is, "a vegetated ecosystem along a waterbody through which energy, materials, and water pass. Riparian areas characteristically have a high-water table and are subject to periodic flooding and influence from the adjacent waterbody. These systems encompass wetlands, uplands, or some combination of those two landforms." Riparian habitats sometimes, but not in all cases, have all the characteristics necessary to be also classified as wetlands (EPA 2005).

Depending on their characteristics, wetlands and waters in the project area may be subject to federal or state regulations. These are described in Appendix E.8.

4.8.1 Wetland and Riparian Areas in the Project Area

Wetlands and riparian zones have been identified in the project area. Based on an analysis of aerial imagery and data from the National Wetlands Inventory (NWI), wetlands and riparian areas are located primarily along the perimeter of Lost River and along irrigation canals and laterals.

A wetland scientist conducted a reconnaissance site visit to the District in August 2023 and observed hydrophytic vegetation (i.e., species that usually or almost always grow in wetlands) along the edges of Lost River and KID canals and laterals. Aquatic vegetation was also present within Lost River and the canals and laterals in the project area. See Appendix E.8. for a hydrophytic species list and representative photos.

Water typically flows through the District's canals during the irrigation season between March and October (KID 2021). Outside of the irrigation season, standing water can be found in other canals following rain or snow events. Wetlands adjacent to or in irrigation ditches are generally not regulated under Section 404 of the Clean Water Act (see Appendix E.10). Impacts to wetlands adjacent to or within irrigation ditches are exempt from permitting as long as the project does not represent a new use or impairs flow to a jurisidictional water or if the canal contains water year-round and was created in Water of the State through the Oregon Department of State Lands (OR DSL). Hydrophytic plants are found along the banks of irrigation canals within the project area or sometimes in adjacent low-lying downgradient areas outside the project area, as the hydrology provided by the canals can create favorable growing conditions during a portion of the year. Irrigation canals experience losses of water, mainly due to seepage. Water lost to seepage would otherwise support downgradient wetlands.

According to Federal Emergency Management Agency (FEMA) Flood Map panels 4101091375B and 4101091400B, effective December 18, 1984, no floodplain areas are present within the project area.

4.8.2 Wetlands and Riparian Areas Along Natural Waterbodies in the Study Area

Based on the NWI data, aerial imagery, and the District site tour, there are several freshwater herbaceous wetlands along the fringes of UKL, Lake Ewauna, Klamath River, and Lost River. These palustrine wetlands along the fringes of the river and lakes either contain herbaceous vegetation such as reed canary grass and broadleaf cattails or consist of scrub--shrub vegetation such as willows and Russian olive.

4.9 Wildlife Resources

The study area for wildlife includes the project area plus adjoining areas where construction-related noise and human activity could disturb sensitive species. Appendix E.9 provides additional information about wildlife species, including special-status species, known or expected to be present in or near the study area.

4.9.1 General Wildlife

Most wildlife species that may use habitats in KID and the study area are habitat generalists and other species that are able to adapt to or exploit the agricultural environment. Mammals characteristic of such areas include shrews, moles, squirrels, gophers, rabbits, mice, bats, American badger, striped skunk, and coyote. Larger mammals such as deer, pronghorn, and elk may forage in irrigated fields within the District. Amphibian species that may occur in the District include long-toed salamanders, rough-skinned newts, great basin spadefoot, Cascades frog, western toad,

and bullfrogs (USFWS 2016). Animals in the area commonly use the District's canals and waterbodies as habitat and water sources. Larger mammals such as deer, antelope, and elk are commonly found grazing in the fields within the District's irrigated lands. The study area is adjacent to mule deer winter range habitat (ODFW 2012). Appendix E.9 contains a list of wildlife species that are likely to occur in the study area.

4.9.2 Migratory Bird Treaty Act/Bald and Golden Eagle Protection Act Protected Species

The Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) make it illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale any migratory bird, or eagle, or the parts, nests, or eggs of such a bird except under the terms of a valid federal permit from USFWS. Migratory birds are known to travel through the study area and its vicinity. Appendix E.9 contains a list of MBTA/BGEPA species potentially present in the study area.

USFWS maintains a database of known golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*) nesting sites. One golden eagle nesting site is located to the east of Stukel Pumping Plant, and another is located north of the D Canal (ORBIC 2023). These nesting pairs may forage throughout the District including within the study area. Other birds that potentially occur within the study area can be found Table E-13 in Appendix E.9.

Aquatic habitats associated with summer irrigated fields, irrigation canals, and the Lost River are used by various species of ducks, greater white-fronted goose, American coot, red-winged blackbird, greater yellowlegs, and great blue heron (Cornell Lab of Ornithology 2023).

4.9.3 Federally Listed Species

A review of federally and state-listed and sensitive wildlife species that may potentially be present in the study area was performed using the iPaC resource list (USFWS 2023a), eBird (Cornell Lab of Ornithology 2023), and ORBIC data report (ORBIC 2023). ESA-listed aquatic species are discussed in Section 4.7.2, Federally Listed Fish and Aquatic Species.

The ranges of four-ESA listed wildlife species and one proposed ESA-listed wildlife species overlap with the study area (USFW 2023a). There are no known observations of gray wolf (*Canis lupus*), yellow-billed cuckoo (*Coccyzus americanus occidentalis*), or North American Wolverine (*Gulo gulo luscus*) in or near the District, and no areas within the District boundaries have been designated or proposed for designation as critical habitat for either species (ODFW 2022, 2023b; USFWS 2023a). Due to a lack of suitable habitat, neither of these species is expected to be present in the study area. Monarch butterfly (*Danaus plexippus*), proposed to be listed as threatened under the ESA, is potentially present in the study area. Western snowy plover (*Charadrius nivosus nivosus*) was recorded to have occurred within the vicinity of the study area (ORBIC 2023). However, due to unsuitable habitat in the study area, the species is expected to be absent from the study area. Further details on listed, candidate, or proposed species can be found in Appendix E.9.3.

4.9.4 State Listed Species

A list of wildlife species protected by the State of Oregon (OAR 635-100-0105) that may be present within the study area was compiled using the ORBIC data report (ORBIC 2023) and eBird (Cornell Lab of Ornithology 2023).Table E-19 in Appendix E.11 includes state-listed and sensitive wildlife species that may be present in the study area and its vicinity, along with their respective listing status by state. Section 4.7.3 discusses state-listed aquatic species that may be present in the study area.

4.10 Transportation

4.10.1 Area of Potential Impact

The KID D-Canal alignment stretches across southern Klamath County and intersects facilities owned by several agencies including Klamath County, the Oregon Department of Transportation (ODOT), and BNSF Railway. The area of potential impact for the transportation analysis is consistent with the project area and includes all land adjacent to or intersected by the existing D-Canal laterals, including a 50-foot buffer on either side of the lateral alignment to account for potential construction impacts.

Table E-20 in Appendix E.11 lists the crossings of transportation facilities intersecting the existing D-Canal laterals. Crossings are identified in order beginning on the west end of the project area and extending to the east. Most of the laterals are on a north-south alignment. All existing crossings are by culvert.

5 Alternatives

5.1 Formulation Process

The formulation of alternatives followed CEQ regulations for implementing NEPA, as well as the requirements of the PR&G. Scoping comments were also incorporated into the alternative formulation process.

When formulating an alternative, it was first determined whether the alternative met the project purpose and need and if it met the PR&G requirement of achieving the Federal Objective and Guiding Principles. The alternative was further analyzed for four criteria: completeness, effectiveness, efficiency, and acceptability (NRCS 2017; Appendix D.2).

5.2 Alternatives Eliminated from Detailed Study

Four action alternatives were evaluated based on the formulation criteria, but after consideration three were not moved forward to be analyzed in detail as viable alternatives. Alternatives were removed from consideration if they did not address the purpose and need for action, did not achieve the Federal Objective and Guiding Principles, or became unreasonable because of cost, logistics, existing technology, or environmental reasons (National Watershed Program Manual 501.37; PR&G 6.5b [NRCS, 2014]). All potentially viable alternatives were analyzed for a 100-year timeframe. Alternatives that did not meet the purpose and need for 100 years were eliminated. Alternatives eliminated from detailed study and the rationale for dismissing these alternatives is discussed in further detail in Appendix D.2.

5.2.1 D Canal and D-1 Canal Lining and Lateral Piping

This alternative evaluated the lining of the entire D Canal and D-1 Main Canal. Canal lining would involve covering the bottom and sides of the currently open D and D-1 Canals with a geotextile liner and shotcrete to prevent water from seeping into the underlying soils and rock. Canal lining would require subgrade preparation, installation of either Concrete Canvas or high-density polyethylene (HDPE) with a geomembrane liner to protect the HDPE liner across approximately 23 miles of open canals.

The laterals would be gravity piped and would provide irrigation flow to patrons. The lined option would incorporate pump station improvements, including new pumps, the integration of VFDs (Variable Frequency Drive), and automated trash rakes.

Lining would increase water velocity in the canals because the concrete cover is a smoother surface than the existing underlying soils and rock. The smoother surface would make the sides of the canals slippery, and if someone accidentally fell in, it would be more difficult for them to climb out. Fencing and safety ladders would be needed for the canal lining alternative to address the public safety criteria of the Federal Objective.

Canal lining would only partially meet the project purpose of conserving water. While lining would reduce water loss from seepage, it would not reduce water loss from evaporation. The lining materials would have an expected lifespan of approximately 50 years for Concrete Canvas and 25 to 50 years for HDPE before needing to be replaced (SHN 2023). Before replacement, as the system aged, it would likely require maintenance with progressively increasing frequency. This would be necessary to address wear and cracks in the lining, which would otherwise result in increased water loss through seepage over time. Additionally, this alternative would require energy use and other pumping costs for farmers that are similar to their current operational needs.

Several recently completed Final Watershed Plan-Environmental Assessments within Oregon[9] have evaluated the cost efficiency of canal lining against the costs of piping. For canal lining, capital costs were included with increased operations and maintenance costs owing to the relatively fragile nature of a lined canal compared to an unlined canal, as well as one to two additional full replacements of the lining over the 100-year analysis period. Several of these lining cost evaluations relied upon the material unit costs experienced by the Three Sisters Irrigation District. In all cases, it was determined that the combined capital and O&M costs for canal lining exceeded the cost of piping, with the difference being two to five times higher. In all cases, cost was used to justify eliminating the full and complete canal lining alternative from further study. The capital costs for this project alternative are estimated at $85,737,979 over the 100-year analysis period.

Furthermore, full and complete canal lining would not fully meet the project purpose to improve water delivery reliability. An anticipated increase in O&M costs and continued potential losses from evaporation and seepage would preclude the provision of a similar level of water conservation efficiency as piping, making canal lining a less effective approach. As a result, the canal lining alternative was dismissed from further consideration because it would not fully meet the project purpose and need and would not achieve the Federal Objective and Guiding Principles.

5.2.2 Main Canal and Lateral Pressurized Piping

Under this alternative, the District would convert the open D Canal, D-1 Main Canal and all open D Canal and D-1 Main Canal laterals to fully pressurized pipe in the D Canal systems. The following actions would be included in a Canal Pressurized Piping Alternative:

The proposed action in the D Canal system would convert 51.5 miles of open canals and laterals to a fully pressurized pipeline system. Additional actions would include installing one new centralized pump station at the G Canal – D Canal Drop. The capital costs for this project alternative are estimated at $464,651,000.

Piping the D Canal system would meet the project purpose of Agricultural Water Management by improving water management operations, increasing energy efficiency, and conserving water along district infrastructure.

However, the high costs to implement this pressurized piping project renders the alternative infeasible. Additional discussion of alternative costs can be found in Appendix D.3. Based on these costs, canal pressurized piping was eliminated from further study. This alternative does not achieve the Federal Objective and Guiding Principles.

5.2.3 Main Canal Gravity Piping

The District would convert open portions of the D-1 Main Canal and open D Canal to a gravity flow pipe near the Adams Pumping Plant and segments near Malin, Oregon. The following actions would be included in a Main Canal Gravity Piping Alternative:

[9] Swalley Irrigation District Irrigation Modernization Project, Final Watershed Plan-Environmental Assessment, USDA, NRCS, December 2018; Central Oregon Irrigation District, Smith Rock-King Way Infrastructure Modernization Project Final Watershed Plan-Environmental Assessment, USDA, NRCS, July 2020; North Unit Irrigation District Infrastructure Modernization Project Final Watershed Plan-Environmental Assessment, USDA, NRCS, January 2023.

- Pipe the D-1 Canal from just north of the Adams Pumping Plant to the end of the canal (approximately 3.9 miles). This piping would be gravity flow and 60 inches in inner diameter. The capital costs for this project are estimated at $14,297,651.
- Main D Canal piping would occur in two discrete segments of the main D Canal system:
  - From Paygr Road to Shasta View Irrigation District Pumps (approximately 2.1 miles): Piping in this segment would incorporate two 96-inch inner-diameter gravity flow pipes side by side (double piping) to accommodate variable flows during the irrigation season.
  - East of Malin city limits to the Oregon-California state border (all in unincorporated Klamath County; 2.4 miles): Piping of the D Canal in this segment would involve a single 96-inch-inner-diameter pipe and gravity flows.
  - The capital costs for this project are estimated at $43,804,172.

Piping the D-1 Main Canal and portions of the D Canal would meet the project purpose of Agricultural Water Management by improving water management operations, increasing energy efficiency, and conserving water along district infrastructure.

However, the high costs to implement these piping projects, together with the District's lack of capacity to implement these large-scale projects, render the alternative infeasible. Additional discussion of alternative costs can be found in Appendix D.3. Based on these costs and District capacity, Main Canal gravity piping was eliminated from further study. This alternative does not achieve the Federal Objective and Guiding Principles.

5.3 Alternatives Description

5.3.1 No Action Alternative (Future without Federal Investment)

Under the No Action Alternative, federal funding through PL 83-566 would not be available to implement the project. The District would continue to operate and maintain its existing system as needed to ensure water could continue to be delivered. In the imminent future, these operations and maintenance actions would include some limited repairs/replacements of existing infrastructure that are integral to allowing the system to continue delivering water. The District has no specific plans for replacing this infrastructure. However, they are aware that some infrastructure such as pumps, will be reaching the end of their useful life shortly, and they will eventually have to replace it because the system could not function if the pump fails. This alternative assumes that modernization of the District's system to meet the purpose and need of the project would not be reasonably certain to occur. For the purpose of this Plan-EA, the No Action Alternative is a near-term continuation of the standard operating procedures.

The No Action Alternative would not meet the purpose and need of the project. There would be no improvement to Agricultural Water Management or to District water management operations, water and energy efficiency would not be increased, and the District's O&M costs would remain high. Water delivery and operational inefficiencies would remain the same and could potentially worsen over time as equipment and infrastructure continue to age and replacement parts become more difficult to procure. This is especially true of the pumping infrastructure that the District relies on to move water to its patrons. Under the No Action Alternative, the effects of future water shortages and limited water deliveries to District patrons, to other irrigation districts that rely on D Canal deliveries (Malin Irrigation District, Shasta View Irrigation District) and tail water (TID) from the District, and the Tule Lake and Lower Klamath National Wildlife Refuges could be exacerbated.

To meet patrons' irrigation needs, the District must divert excess water from the UKL to account for the water lost. With a changing climate, increasingly reduced snowpack, earlier snowmelt, and a longer dry season, lower availability of water from the UKL and releases to the Klamath River would be expected. The availability of water in the UKL to satisfy irrigation demands would diminish, and water shortages for District patrons would likely result. Additionally, sufficient streamflow in the Klamath River to provide for fish and aquatic species habitat needs would not be available.

5.3.2 Modernization Alternative (Future with Federal Investment)

Under this alternative, federal funding through PL 83-566 would be available. The District would perform the following actions (see Figure 5-1):

- Adams Pumping Plant Pump Replacement (three pumps; 270 total HP): These pump upgrades would include improvements such as replacement of the pump and motor, VFD installation, and traveling screen or trash rake installations.
- Stukel Pumping Plant Pump Replacement (three pumps; 500 total HP): These pump upgrades would include various improvements such as replacement of the pump and motor, VFD installation, and traveling screen or trash rake installations.
- Pipe the D-2 Lateral from just north of the Adams Pumping Plant to the end of the lateral (approximately 0.5 mile). This piping would be gravity flow and 24 inches in inner diameter.
- Line the D-3 Lateral from just north of the Adams Pumping Plant to the end of the lateral (approximately 1.1 miles). The canal, after lining, would continue to be gravity flow. The proposed lining material would be determined during final design, but it would likely be HDPE incorporating a geomembrane liner.
- Pipe the D-12 Lateral, including the D-12A and C spurs, from east of Adams Point along Highway 50 to the end of the lateral on Gaines Road (approximately 2.4 miles). This piping would be a combination of 36-, 24-, and 18-inch-inner diameter gravity flow pipe.
- Pipe the D-14 Lateral from east of Adams Point along Old Malin Highway (approximately 0.7 mile). This piping would be gravity flow and 24 inches in inner diameter.
- Pipe the D-16 Lateral from east of Paygr Road and along Harpold Road (approximately 2.4 miles). This piping would be a combination of 36- and 24-inch-inner diameter gravity flow pipe.
- Pipe the D-16A Spur Lateral from the D-16 Lateral from north of Jellnek Road and southward towards Highway 50 (approximately 1.2 miles). This piping would be gravity flow and 30 inches in inner diameter.
- Pipe the D-18 Lateral from east of Harpold Road and west of McCulley Road (approximately 1.3 miles). This piping would be gravity flow and 30 inches in inner diameter.
- Pipe the D-19 Lateral along McCulley Road (approximately 1.6 miles). This piping would be gravity flow and 30 inches in inner diameter.
- Pipe the D-20 Lateral along Drazil Road (approximately 1.3 miles). This piping would be gravity flow and 30 inches in inner diameter.

- Line the Main D Canal in the Adams Point area (approximately 0.9 mile) to address current operational issues in this area, which are primarily canal sidewall failures. The canal, after lining, would continue to be gravity flow. The proposed lining material would be determined during final design, but it would likely be HDPE incorporating a geomembrane liner.
- Line the Main D Canal starting at McKoen turnout (D-14 Lateral), west of Malin city limits, to Paygr Road (approximately 0.9 mile). The canal, after lining, would continue to be gravity flow. The proposed lining material would be determined during final design, but it would likely be HDPE incorporating a geomembrane liner.

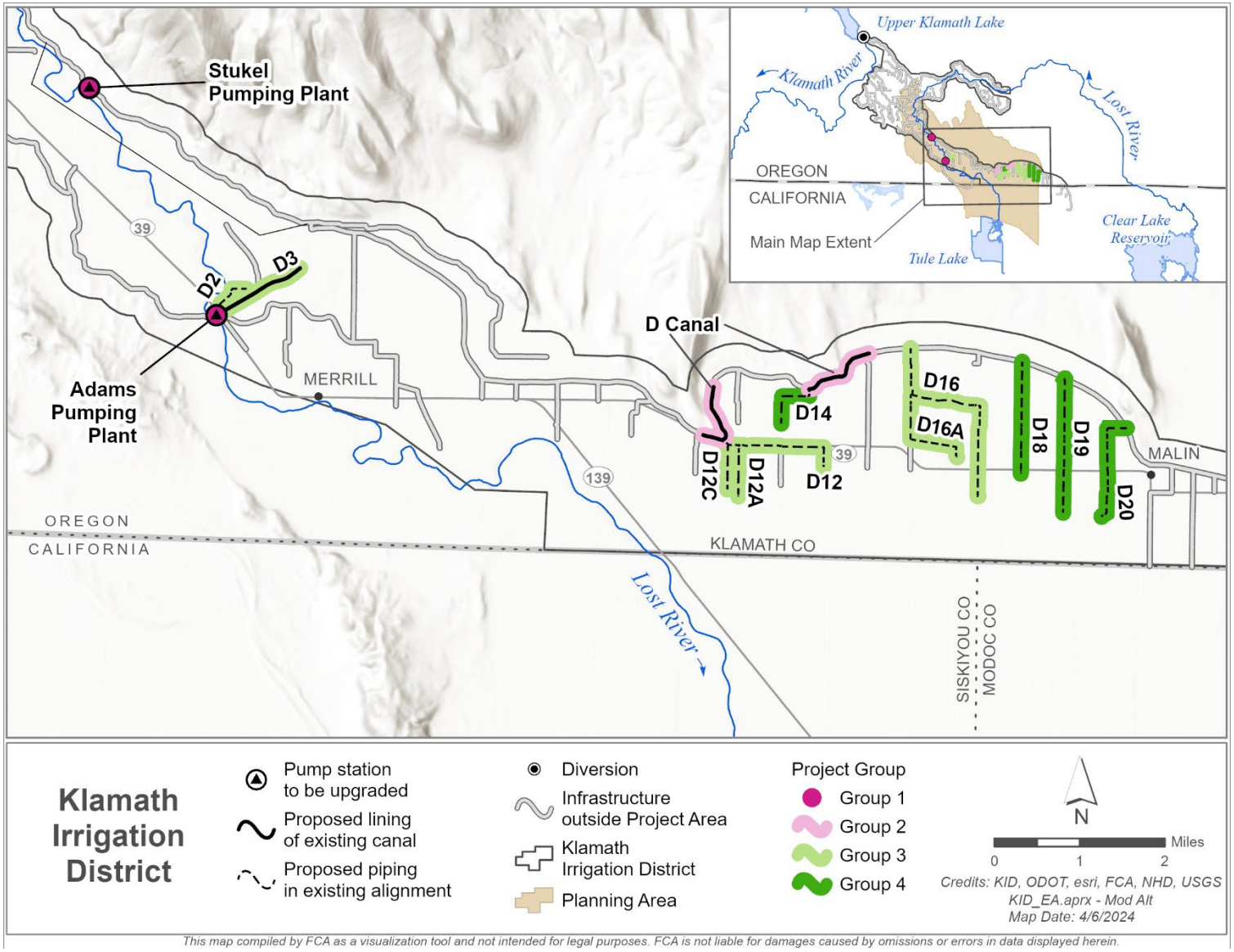

Figure 5-1. Overview of the potential Modernization Alternative for the Klamath Irrigation District Infrastructure Modernization Project.

The District has determined that this alternative is technically feasible and addresses the project's purpose and need. When developing the Modernization Alternative, risk and uncertainty were considered. The Modernization Alternative would provide resiliency in the face of future droughts. The project would support existing land use and future land use trends.

The Modernization Alternative contributes to the sponsors' objectives and the Federal Objective and Guiding Principles as follows:

- Improving water management operations: The Modernization Alternative would improve daily water management operations and enhance water delivery reliability for all patrons and for downstream irrigation districts.
- Increasing energy efficiency: All proposed actions within the Modernization Alternative would reduce the energy demands associated with pumping water throughout the District.
- Lower operating costs: Installing VFDs and other pumping upgrades would decrease annual operating expenses throughout the District.
- Conserving water along District infrastructure: The Modernization Alternative would allow the District to understand inflows more accurately and more effectively manage diverted water. Please see Appendix D for more information on how the management of water would affect crop yields.

The Modernization Alternative is expected to help mitigate the impacts of drought on District patrons and the KID system by replacing the open canal and laterals with a closed-conduit pipeline. To protect the pipeline system itself from climate-driven hazards such as more frequent wildfires, the Modernization Alternative includes HDPE piping that would be buried a minimum of 2 feet below the ground surface.

Piping the components of the KID D Canal system would contribute to the long-term sustainability of irrigated agriculture by minimizing water loss, ensuring more efficient water use, and ensuring more reliable access to irrigation water for District patrons. Reduced KID diversion rates could also allow more live flow to remain in the UKL to meet other water right holders' needs as well as to assist federal agencies' existing requirements for maintaining aquatic habitat protection in UKL. By improving the overall efficiency of water use by irrigated agricultural producers, the Project aims to ensure that the infrastructure investments made today support robust climate resilience and continue to provide benefits for irrigated agriculture and in-stream habitat as climate conditions change.

The estimated project cost for the Modernization Alternative including NRCS Technical Assistance, Program Administration, and permitting would be $22,798,000 (2023 dollars).

Construction of the Modernization Alternative would occur in four project groups over the course of 4 years. Construction would occur predominantly during the non-irrigation season (October to April), with construction beginning as early as the 2025 non-irrigation season. See Section 8.7.2, Planned Sequence of Installation, for a project timeline. Patron deliveries would not be affected during construction. The following sections describe in more detail the pump upgrades, canal piping, and canal lining.

5.3.2.1 Construction Means and Methods – Pump Upgrades

Under the Modernization Alternative, six pumps would be upgraded. Pump upgrades would include replacing existing inefficient pump units with more efficient units, retrofitting existing pump drives with VFDs, and/or installing traveling belt screens or trash rakes. Pump and motor replacements

would increase operability, reduce routine maintenance labor on old pumps, and minimize the likelihood of outages due to pump failure. VFDs allow for greater flexibility in variable flow output, improved flow control, increased efficiency, increased energy savings, and reduced wear and maintenance on the pump. They also allow for increased automation features. Traveling screens or trash rakes at pump intakes would reduce debris entering pumps, decreasing operation and maintenance, and preventing pump failure.

5.3.2.2 Construction Means and Methods – Piping

In general, the existing canal would be trenched for subgrade preparation prior to pipe installation using excavators; excavated material would be side-cast adjacent to the canal. A geotextile liner would be installed in the trench, followed by pipe bedding and the pipe. The side-cast excavated material would then be returned to the trench as pipe cover. Trench design would follow NRCS Conservation Practice Standard for Irrigation Pipeline (Code 430-CPS-1) and USBR Pipe Bedding and Backfill (Geotechnical Training Manual No. 7). All pipeline installation would occur within existing canal alignments. Excess material that could not be reused as backfill following construction of the new pipeline alignments would be disposed of in an approved upland location. Specific details regarding construction materials, means, and methods would be determined during final design.

5.3.2.3 Construction Methods and Means – Canal Lining

Canal lining would involve covering the bottom and sides of the currently open D-3 Lateral near the Adams Pumping Plant, the KID D Canal near the Adams Point turnout, and the KID D Canal west of Malin with HDPE incorporating a geomembrane liner to prevent canal sidewall failure that could result in water seeping into the underlying soils and rock. Canal lining would require subgrade preparation, geotextile liner installation, and application of a layer of HDPE to protect the geotextile liner across approximately 2.9 miles of open canal.

5.4 Summary and Comparison of Alternatives

Table D-31 in Appendix D.4.4 compares the No Action/Future without Federal Investment (Alternative 1) and the Modernization Alternative/Future with Federal Investment (Alternative 2). The table summarizes measures addressed, as well as environmental, social, cultural, and economic effects.

6 Environmental Consequences

6.1 Cultural Resources

A cultural resources Section 106 review has been completed. An application for the ARPA permit was submitted in January 2024 and received in November 2025, for surveys on Reclamation lands. A survey report for both the archaeological resources and historic above ground resources has been completed by the contracted archaeologists and architectural historian at Parametrix, Inc. NRCS is in the process of consulting with Reclamation, SHPO, and Tribes regarding the cultural resources survey report, including the Determinations of Eligibility and the Findings of Adverse Effects. As Reclamation is a landowner for portions of the APE, NRCS Oregon is engaging in consultation over this identification report in two phases. Reclamation will review the contractor's report first, followed by submittal to Oregon SHPO and consulting Tribes. The report is currently in review with Reclamation (see Appendix E). NRCS has determined a finding of No Adverse Effect, pending the outcome of consultation.

Two historic properties, the D Canal and the D Lateral System, have been evaluated and are determined to be Contributing Resources of the Klamath Project Historic District. No historic properties or archaeological resources have been determined to be Eligible for individual listing on the National Register. A determination of adverse effect is dependent upon actions that would diminish the integrity of an eligible resource so that it would no longer convey its significance as a contributing resource to the Klamath Project Historic District. Given the limited physical changes proposed to the D Canal and D Lateral systems, NRCS has determined a finding of No Adverse Effect pending the outcome of consultation. If unforeseen adverse effects arise, NRCS will mitigate the adverse effects through the development of a Memorandum of Agreement in accordance with 36CFR Part 800.13.

6.1.1 No Action (Future without Federal Investment)

The No Action Alternative would maintain existing conditions and activities in the study area as defined in Section 4.1 Cultural Resources. As such, the potential for effects to cultural resources from the No Action Alternative would be limited. However, impacts to unknown cultural resources remain possible through the inadvertent disturbance of these resources by current irrigation and agricultural activities in the study area. Surveys to identify cultural resources present in the study area will be completed prior to project implementation.

6.1.2 Modernization Alternative (Future with Federal Investment)

The Modernization Alternative would have a greater potential for effects to cultural resources than the No Action Alternative. Cultural resources assessment of the APE identified four archaeological resources (Temporary Sites KID_Surf_site1, KID_Surf_site2, KID_Surf_site3, and KID_Sub_site1) and one archaeological isolate (KID_ISO1), four individual historic built environment resources (the D Canal, D Canal Lateral System, Adams Pumping Plant, and Stukel Pumping Plant) in the APE, and historic district that overlaps the APE (the Klamath Project historic district). None of the archaeological sites or isolates identified during the survey were formally evaluated for their NRHP eligibility, because they will not be physically impacted by project-related activities. None of the four individual historic built environment resources are recommended individually eligible for listing in the NRHP. The Klamath Project historic district has been previously determined eligible for listing in the NRHP under Criterion A. The D Canal and D Canal Lateral System are recommended eligible for listing in the NRHP as contributing resources to the Klamath Project historic district and the Adams Pumping Plant and Stukel Pumping Plant are

recommended not eligible, non-contributing resources to the Klamath Project historic district (36 CFR 800.4). Proposed activities associated with the Modernization Alternative include ground disturbance, construction, and staging activities, all of which have the potential to affect unknown cultural resources within the study area. Furthermore, these activities would support existing land use and support land use trends in the future. As a result, effects to unknown cultural resources would remain possible through the inadvertent disturbance of these resources by current irrigation and agricultural activities in the study area.

As the four archaeological sites and one isolate identified in the APE will not be physically impacted by project activities and a 30-foot buffer will be flagged around each site prior to construction to ensure they will be avoided, the project will not have an effect on these archaeological resources (36 CFR 800.5).

Project activities are also not anticipated to diminish the integrity of the Klamath Project historic district or the D Canal and D Canal Lateral System as eligible contributors to this historic district and would not undermine the historic district or these contributing resources' capacity to convey their significance under Criterion A. As such, the project would not have an Adverse Effect on the Klamath Project or its contributing resources, the D Canal and D Canal System (36 CFR 800.5).

NRCS Section 106 consultation with Oregon SHPO for the Project is on-going. As such, NRCS has not yet received concurrence from Oregon SHPO for the eligibility determinations for the Klamath Project historic district, D Canal, D Canal Lateral System, Adams Pumping Plant, and Stukel Pumping Plant or its finding of No Adverse Effect to historic properties under Section 106 of the NHPA.

See Appendix E.10.9 for a discussion of measures that would be implemented to avoid and minimize potential impacts to cultural resources.

6.2 Land Use

6.2.1 No Action (Future without Federal Investment)

6.2.1.1 Land Ownership

The No Action Alternative would have no direct effect on land ownership within the project area.

6.2.1.2 Land Use

The No Action Alternative would have no direct effect on land use within the project area. D Canal and its laterals would continue to operate as an open system. Irrigated agriculture producers within the D System would continue to face increasing water supply uncertainty.

6.2.1.3 Ecosystem Services

Provisioning service: Water available for irrigation (Figure E4-1): Existing District operations are subject to water losses due to inefficient pump and conveyance infrastructure and seepage and evaporation from the open canals. Under the No Action Alternative, current conditions would persist, and ongoing water loss could negatively affect crops relying on District irrigation.

6.2.2 Modernization Alternative (Future with Federal Investment)

6.2.2.1 Land Ownership

Overall, the Modernization Alternative, including lateral piping, main D Canal piping, canal lining, and pump upgrades, would have no effect on land ownership within the project area. There would

be no change to property ownership or to existing ROW or easements. Construction activities related to the pump upgrades, lining, and canal and lateral piping would take place within KID's existing easements. No additional permanent easements will need to be acquired for the proposed Modernization Alternative projects. Permits from Klamath County, Oregon Department of Transportation, and BNSF Railroad would be required for crossing transportation infrastructure as described in Appendix E, Section E.11.

6.2.2.2 Land Use

Overall, the Modernization Alternative would have negligible, temporary effects and beneficial, long-term effects on land use within the project area.

For lateral piping, main D canal and lateral lining, and pump upgrades, noise, dust, and vibration generated by construction activities would be temporary, short-lived, and comparable to that generated by agricultural equipment frequently used in the District. As such, the effects of construction activities on surrounding residential land uses and schools would be negligible. Landowners adjacent to areas of construction would be notified before construction activities begin.

Implementation of the Modernization Alternative would lead to more reliable water delivery to irrigated agricultural lands. This would create a long-term beneficial effect on existing agricultural land uses and zoning designations within the D System.

6.2.2.3 *Piping Laterals*

Laterals in the project area would be piped and covered with fill, graded to match the surroundings, and reseeded according to NRCS guidance. Construction would occur outside of the irrigation season, avoiding the potential for interference with irrigation operations. While the laterals would no longer be open, land use within the existing lateral ROW and easements would continue as conveyance of irrigation water.

6.2.2.4 *D Canal and Lateral Lining*

There would be no change to existing land use within or adjacent to the D Canal and D-3 lateral lining project area. Construction would occur outside of the irrigation season, avoiding the potential for interference with irrigation operations.

6.2.2.5 *Pump Upgrades*

There would be no change to existing land use within or adjacent to the pump upgrade project area.

6.2.2.6 *Ecosystem Services*

Provisioning service: Water available for irrigation (Figure E4-1): Under the Modernization Alternative, the improvement of water delivery efficiency and reliability through infrastructure improvements would support ecosystem services of water for irrigation.

6.3 Socioeconomic Resources

6.3.1 No Action (Future without Federal Investment)

In the No Action there are no expected expenditures, impacts on natural resources, or other changes that would impact regional economic activity or associated jobs and income.

6.3.2 Modernization Alternative (Future with Federal Investment)

6.3.2.1 Regional Economic Development (RED)

The Modernization Alternative construction expenditures of $22.8 million would support construction sector jobs and income, as well as economic ripple effects increasing jobs and income in other economic sectors in Klamath County. Economic ripple impacts would result from the construction sector spending more on labor, materials, and services, which would spur increased sales and economic activity in other sectors (such as hardware stores and construction equipment businesses supplying construction businesses). Impacts of construction sector spending in these other sectors are known as indirect impacts. As household income rises in construction and indirectly impacted economic sectors, household spending will also increase and generate increased economic activity in such sectors as retail, wholesale trade, personal services industries, and real estate (known as induced impacts). Total job and income impacts of the economic activity supported by the proposed project are the sum of the direct impacts (construction sector) and the indirect/induced impacts (in other economic sectors).

The $22.8 million in construction expenditure is spread over 13 project groups. Two project groups are for new pumps that would be manufactured elsewhere and would be installed by current district personnel; as such, installation of these project groups is expected to result in minor economic impacts in Klamath County and project cost of the pumps is not modeled for regional economic impacts. The remaining project groups with expected local economic impacts from construction spending together cost $20.6 million. Spread over 3 years, construction of these project groups is expected to support approximately 70 jobs and $3.7 million in average income over the 3-year construction period (annualized over 103 years[10] this equates to approximately $0.3 million in annualized average income benefits, as presented in Table 5-1). [11] Of these impacts, approximately 50 jobs and $2.5 million in annual income are in the construction sector (direct impacts) while the remaining 20 jobs and $1.2 million income are in other sectors.

The Modernization Alternative would result in greater water conservation than the No Action Alternative. This water is expected to be used to increase irrigated grain production (and reduce fallowing) in the basin. With this benefit and reduced likelihood of pump failure, which also reduces agricultural damages, the average annual economic activity supported by agricultural production is estimated to increase by approximately 20 jobs and an additional $0.8 million in average annualized income (in addition to the NED agricultural income benefits), as shown in Table 5-1.

The Modernization Alternative would also result in reduced Operations, Maintenance, and Repair (OM&R) expenses for KID and its patrons as well as minor benefits related to flooding and

[10] Note that the project has a 100-year life, but that since modeled construction takes three years, benefits extend from year 0 to year 103, so the analysis period across all project groups is 103 years. Note that construction takes four years, but in the first year only the pumps are replaced. As the pumps are not modeled for regional economic impacts, the modeled construction period is only three years.

[11] This estimate includes the economic ripple impacts that would result from the construction and agricultural sector spending more on labor, materials, and services, which would spur increased sales and economic activity in other sectors (such as seed, hardware, and equipment businesses supplying construction and agricultural businesses). Impacts of construction sector spending in these other sectors are known as indirect impacts. As household income rises in construction and indirectly impacted economic sectors, household spending will also increase and generate increased economic activity in such sectors as retail, wholesale trade, personal services industries, and real estate (known as induced impacts).

transportation. However, there are no anticipated effects on District wages and employment. As such, there are expected to be limited induced/indirect effects of these changes, so associated effects are not quantified in this RED analysis.

To the extent that increased water in the region enhances fish and wildlife and supports additional recreation visitation and spending in Klamath County, the long-term, positive regional economic contribution of the project would be larger, and vice versa.

6.4 Soils

6.4.1 No Action (Future without Federal Investment)

Under the No Action Alternative, long-term effects on soils would be negligible. Erosion and sedimentation and occasional canal sidewall failure would continue within the areas of the D System where it presently occurs. Continued operation of the D System would not be expected to affect prime farmlands differently than under existing conditions.

6.4.2 Modernization Alternative (Future with Federal Investment)

6.4.2.1 General Soils

Actions proposed under the Modernization Alternative would disturb soils, including soils classified as Farmland of Statewide Importance and Prime Farmland if Irrigated. Lining and piping would take place within the footprint of existing irrigation canals and laterals, where construction of this existing irrigation conveyance has previously disturbed the soils. Canal lining would mitigate erosion and occasional failure of canal sidewalls where it currently occurs. As a result, the long-term effects on soils from the Modernization Alternative would be minor. Most of the work associated with pump replacement and upgrades would take place within the same structures or footprint as existing pump infrastructure, and the limited construction footprint outside of the pump structures would consist of disturbed areas. Therefore, long-term effects from pump replacement and upgrades would be negligible. The Modernization Alternative would result in short-term construction-phase effects involving excavation, trenching, vegetation clearing, backfilling, and grading. These effects would be localized, occurring within limited portions of the project area, and limited to periods of active construction. Construction BMPs would be implemented to minimize short-term impacts. Upon cessation of ground-disturbing construction activities, disturbed areas would be revegetated using an NRCS-approved seed mix to stabilize soils and minimize effects from erosion and sedimentation. Examples of BMPs that would be implemented to minimize soil disturbance and prevent erosion and sedimentation are described in the list of construction-phase avoidance, minimization, and mitigation measures in Appendix E.10.

6.4.2.2 Farmland Classification

Long-term benefits would result from piping and lining open canals and laterals because water savings would support irrigated agriculture on soils classified as Prime Farmland if Irrigated and Farmland of Statewide Importance.

6.4.2.3 Piping Laterals

Soils would be disturbed during construction activities that include clearing, trenching, and ground disturbance adjacent to the laterals during pipe installation. Disturbed areas would be backfilled, re-contoured and re-seeded with a NRCS-approved mix. Soils would become re-stabilized as upland vegetation establishes on these disturbed areas following pipe installation. Overall, piping the laterals would have minor short-term and long-term effects on soils.

6.4.2.4 D Canal and Lateral Lining

Soils adjacent to the D Canal and laterals would be affected by clearing and ground disturbance during construction activities. After construction activities are complete, disturbed soils adjacent to the newly lined portions of canals and laterals would be planted with a NRCS approved seed mix to re-establish plant communities and stabilize soils. Lining would mitigate the effects of soil erosion from canal sidewalls where it currently occurs. Overall, lining the D Canal and laterals would have minor short-term and minor long-term effects on soils.

6.4.2.5 Pumping Upgrades

Minor short-term effects on soils from pumping upgrades could result from construction activities adjacent to existing pump infrastructure including trash rake installation; movement of construction vehicles, equipment, and personnel; and storage and staging activities, all within previously disturbed areas. Disturbed areas would be revegetated as needed using an NRCS-approved seed mix to stabilize soils and minimize effects from erosion and sedimentation. Because most of the work associated with pumping upgrades would take place inside existing structures, negligible long-term effects on soils are anticipated from pump replacement and upgrades.

6.5 Vegetation

6.5.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the District would continue to operate with its current infrastructure. The existing operational impacts on vegetation associated with irrigation canals or adjacent upland vegetation would continue. KID would continue its existing vegetation management practices, which consist of herbicide application within canals and regular removal of vegetation from the system's irrigation canals and laterals.

6.5.2 Modernization Alternative (Future with Federal Investment)

6.5.2.1 General Vegetation

Overall, construction of the Modernization Alternative would have minor long-term effects on vegetation because changes to vegetation would be localized to the project area where disturbance would occur. Minor long-term effects would result from the conversion of riparian to upland plant communities due to changes in water availability along ditches that are piped and backfilled. Construction access and staging would prioritize the use of existing public roads, existing canal maintenance access roads, and disturbed or graveled areas adjacent to existing pump station infrastructure to minimize temporary effects on vegetation.

Following construction, disturbed areas would be re-contoured and planted or seeded with an NRCS-approved native plant mix and maintained as needed based on applicable guidance from NRCS. See Appendix E.10.5 for a discussion of site revegetation measures to be used following completion of construction.

6.5.2.2 Piping Laterals

Vegetation would be disturbed during construction activities that include clearing, trenching, and ground disturbance adjacent to the laterals during pipe installation. Riparian vegetation adjacent to the laterals that would be piped would be converted to dry upland plant communities in the long-term following installation of the pipe. Overall, piping the laterals would have minor long-term effects on vegetation.

6.5.2.3 D Canal and Lateral Lining

Vegetation would be disturbed during construction activities that include clearing and ground disturbance adjacent to the canal and laterals. Vegetation would be reestablished after construction activities are complete. Overall, lining of the canal would have minor short-term effects on vegetation.

6.5.2.4 Pump Upgrades

Effects on vegetation from upgrading the pumping plants are expected to be similar to those described for D Canal and Lateral Lining above for vegetation adjacent to the pumping plants.

6.5.2.5 Noxious Weeds

During construction, exposed soils would be susceptible to weed invasion. The movement of construction vehicles could provide opportunities to spread weeds by transporting their seeds to new locations. During construction, the contractor would use BMPs such as avoiding unnecessary ground disturbance, minimizing ground disturbance where unavoidable, and ensuring that erosion control measures such as straw wattles or bales are free of weeds and weed seeds. See Appendix E.10.7 for a detailed list of BMPs for invasive species control that would be implemented to avoid the spread of invasive plants and noxious weeds.

With the use of BMPs during construction, the Modernization Alternative would have a negligible short-term effect with respect to noxious weeds. Over the long term, noxious weed management would be expected to differ little from existing conditions; current weed control and monitoring activities would be continued.

6.6 Water Resources

6.6.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the District would continue to face challenges delivering water to patrons in the D System due to seepage and evaporation in the open unlined canals and the limited control of distribution due to outdated pumps. Recent drought conditions have exacerbated these challenges by resulting in more frequent curtailments of water supplied from UKL.

6.6.1.1 Water Rights

Water rights would not be affected under the No Action Alternative. The ongoing adjudication process would continue based on historic and currently available information on water use.

6.6.1.2 Surface Water Hydrology

Surface water hydrology in waterbodies identified as a source of water for KID operations would not be affected under the No Action Alternative. Precipitation and runoff feeding into UKL would be determined by regional climatic trends. Surface water in the lake, and the amount diverted to the Klamath Project versus released to the Klamath River, would continue to be determined by water rights and other legal processes.

Waterbodies, irrigation districts, and other users that receive tailwater from KID would not be affected under the No Action Alternative. Other natural waterbodies in the vicinity of the project, that may be fed in part by shallow groundwater, would not be affected under the No Action Alternative. The existing seepage losses from the D System would continue to partially recharge the shallow groundwater aquifer; however, the significance of this interaction has not been quantified.

6.6.1.3 Surface Water Quality

Surface water quality would not be affected under the No Action Alternative. The existing problems with poor water quality in natural waterbodies would continue to occur.

6.6.1.4 Groundwater

Groundwater levels in the study area would not be affected under the No Action Alternative. Seepage from the D System would continue to recharge the shallow sedimentary groundwater aquifer in the vicinity of the project area. Note that the significance of this interaction has not been quantified.

6.6.1.5 Ecosystem Services

Provisioning service: Water available for irrigation (Figure E4-1):

The No Action Alternative would continue to rely on the existing process for managing the quantity and timing of diversions from UKL, and the existing system for delivering water to irrigators. No change to the overall amount of water diverted to the Klamath Project would occur, and the identified losses of water in the D System due to seepage and evaporation would not be addressed. KID would have limited ability to adapt to high year-to-year variation in water allocations and to fulfill its obligation to provide water for irrigation.

Provisioning Services, Fish Populations Figure E4-1);

The No Action Alternative would have no effect on the fish populations described in Section 4.7. The proposed action would not change water levels or the amount of habitat in UKL and Lake Ewauna, nor would it change instream flows in the Klamath River.

Regulating service, Water quality (Figure E4-1):

The No Action Alternative would have no effect on the existing poor water quality found in the study area. Continued low flow through the D System would exacerbate temperature and dissolved oxygen concerns. The open, unlined canals would continue to be susceptible to turbidity from erosion and occasional failure of canal sidewalls and would continue to be exposed to pollutants carried by stormwater runoff.

6.6.2 Modernization Alternative (Future with Federal Investment)

Under the Modernization Alternative, the District would improve its ability to deliver water to patrons in the D canal system by eliminating losses due to canal seepage and evaporation and by gaining more precise control of distribution with VFD pumps. The Modernization Alternative would result in the District having better ability to adapt to a less reliable supply of water due to drought conditions and conflict with other users of water supplied from UKL.

6.6.2.1 Water Rights

Water rights would not be affected under the Modernization Alternative. The ongoing adjudication process would continue based on historic and currently available information on water use.

6.6.2.2 Surface Water Hydrology

Surface water hydrology in waterbodies identified as a source of water for KID operations may be affected under the Modernization Alternative. Precipitation and runoff feeding into UKL would continue to be determined by regional climatic trends, but the rate of withdrawal from the lake into the A Canal may be reduced if less water is lost to seepage in the system downstream. The

cumulative water savings gained by the proposed piping and lining projects in the D System is estimated to be 5,359 acre-feet per season, or approximately 7 percent of the annual D Canal delivery in an average year (FCA 2023b). If this water were retained in the lake and the drawdown of water levels were slower over the course of the irrigation season, then a minor benefit to UKL capacity would accrue, with a maximum difference between the No Action Alternative and the Modernization Alternative occurring in mid-October. The maximum difference in lake capacity under these alternatives was estimated to be 5,326 acre-feet (3.4 percent) (FCA 2023b). Retention of water in UKL and any associated habitat benefits are uncertain because 1) they would depend on the discretion of the District, based on operational conditions that change from year to year, and 2) the amount of water is relatively small and may not be significant in an ecosystem context. The relationship between volume (a.k.a. capacity) and water surface elevation in UKL is not linear and is difficult to predict, but the amount of conserved water is expected to have an immeasurable increase in lake levels. The amount diverted to the Klamath Project versus released to the Klamath River would continue to be determined by water rights and other legal processes.

Waterbodies, irrigation districts, and other users that receive tailwater from KID are unlikely to be affected under the Modernization Alternative. However, more efficient delivery of water to patrons on the D Canal system may require less supplemental pumping from the Lost River, which would allow that water to remain in the stream and be available for TID or the TLNWR. This additional water, assuming the quality is suitable, would indirectly result in a beneficial effect to users downstream.

6.6.2.3 Surface Water Quality

The proposed project activities under the Modernization Alternative would have no effect on the sources of pollution or water quality problems, nor would they provide water treatment to change the composition of releases to downstream waterbodies.

Within the project area (i.e., the D Canal and laterals), the Modernization Alternative may result in a beneficial effect on surface water quality. Water would be conveyed more quickly through piped sections than it would under the No Action Alternative. Water would also not be exposed to sunlight, leading to reduced water temperatures and less accumulation of toxic algae as compared to the No Action Alternative. Piped laterals would not be as susceptible to pollutants that can be carried by stormwater runoff into the open canals.

6.6.2.4 Groundwater

Proposed piping of canals and laterals would minimize the canal seepage that currently occurs under the existing conditions and thereby reduce the rate of groundwater recharge via that pathway. Shallow groundwater in the sedimentary aquifer, which is typically the source for domestic wells in the area, would continue to be recharged by natural precipitation and surface water runoff, by infiltration of irrigation water applied to fields and collected in the drains, and by seepage from canals and laterals outside of the project area.

Water losses in the studied portion of the D Canal amount to approximately 52.6 acre-feet per day during typical operations (FCA 2023a). Ninety-two percent of this loss (48.5 acre-feet per day) occurs over the first five miles, between the G-D split and the east side of Adams Point. Eight percent of the loss (4.1 acre-feet per day) occurs in the four-mile segment between Adams Point and Malin. The Modernization Alternative would line 0.9 miles of the D Canal near Adams Point, and 0.9 miles of the D Canal west of Malin. Losses from the laterals were not studied; however, assuming rates of water loss are proportional to the main canal, the estimated amount of water that

would not be lost to seepage under the Modernization Alternative is approximately 5,359 acre-feet per year (FCA 2023b).

Under the existing conditions, a proportion of the approximately 14 percent of water lost to seepage moves laterally to drains or streams, some is taken up by plants and returned to the atmosphere via evapotranspiration, and some percolates through the soil to recharge the shallow groundwater system. Under the Modernization Alternative, this water would no longer distribute via these pathways and a minor reduction in recharge could accrue. Due to the limitations of available data, the reduction of seepage and its direct effect on groundwater levels was not evaluated. Using a USGS groundwater model (Pischel and Gannet 2015), the assumed total rate of recharge for the project area is 0.25-1.0 foot per year. This would be incrementally reduced by the proposed piping and lining projects. Overall, this reduction in groundwater recharge would likely be minor compared to the effects of groundwater pumping and the long-term seasonal fluctuations in groundwater that typically range by 10 feet or more (Gannett et al. 2007; Gannett and Breen 2015). The effect on the viability of domestic wells in the vicinity of the project area is expected to be minor. Due to the proportion of water lost to seepage that would distribute to the aquifer and the minor reduction the could accrue, the Modernization Alternative would result in a minor adverse effect on shallow groundwater resources in the vicinity of the project area.

6.6.2.5 Ecosystem Services

Provisioning service: Water available for irrigation (Figure E4-1):

The Modernization Alternative would not change the overall amount of water diverted from UKL but may change the timing of release and could increase the efficiency of water management throughout the irrigation season. This would lead to a beneficial effect from greater reliability of irrigation water delivery to patrons in the D System. Retention of water in UKL later into the irrigation season could reduce the need for supplemental diversions from the Lost River Diversion Channel, resulting in more streamflow remaining in the Lost River system. The proposed actions would improve KID's ability to provide water to patrons even when faced with high year-to-year variation in water allocations.

Provisioning Services, Fish Populations (Figure E4-1):

Over the long term, increased water savings under the Modernization Alternative may enable the retention of more water within UKL later into the summer. This could improve habitat for resident fish species in UKL, resulting in beneficial effects for fish populations.

Regulating service, Water quality (Figure E4-1:

The Modernization Alternative could lead to a minor beneficial effect on water quality in the project area. Greater water delivery efficiency would help to maintain water level consistency in lakes and reservoirs and more consistent live flow levels in streams throughout the season. This may help to increase live flow levels in the D Canal System, moderate temperatures and pollutant levels, and moderate existing poor water quality in the study area. The Modernization Alternative would also serve to mitigate turbidity caused by erosion and occasional failure of canal sidewalls.

6.7 Fish and Aquatic Resources

6.7.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the District would continue to operate with its current infrastructure. The existing operational impacts to fish and aquatic resources would continue and

possibly become exacerbated by more frequent drought conditions. Discussion of the effects on specific resources is provided below.

6.7.1.1 General Fish and Aquatic Species

Currently, fish and aquatic species within District-associated waterbodies and within the KID canal system are subject to poor water quality and degraded habitat quality. This would not change under the No Action Alternative. Water diverted from UKL and Lost River would continue to be conveyed through open ditches, and a portion would be lost to seepage and evaporation. District operations at diversion points on UKL would continue to divert at current rates. Habitat availability and associated future effects on habitat availability for fish and aquatic species would not change from current conditions.

6.7.1.2 Federally Listed and State-Listed Fish and Aquatic Species

The No Action Alternative would have no direct effect on federally or state-listed fish species identified in Section 4.7. Incidental take due to entrainment and stranding would remain unchanged. Trends in water levels, habitat availability, and water quality would remain the same within District-associated waterbodies that contain Lost River and shortnose suckers.

6.7.1.3 Ecosystem Services

Provisioning service: Fish populations (*Figure E4-1*): The No Action Alternative would result in no change to the existing water delivery system. Considering anticipated prolonged periods of drought, the No Action Alternative could contribute to long-term adverse effects on populations of native Lost River suckers and shortnose suckers, as well as lamprey (Pacific lamprey and Pit-Klamath brook lamprey), minnows (tui chub and blue chub), sculpin (Klamath Lake sculpin, marbled sculpin, and slender sculpin), and Klamath redband trout.

Cultural service: Culturally important species (*Figure E4-1*): The No Action Alternative may contribute to adverse effects on culturally important species. Continuation of current use and management of water from UKL for Lost River sucker and shortnose sucker populations—species that have cultural significance to the Klamath Tribes—may be adversely affected.

6.7.2 Modernization Alternative (Future with Federal Investment)

Under the Modernization Alternative, the District would pipe and line canals and upgrade pumping plants to allow more efficient delivery of water to irrigators. Water savings as a result of the Modernization Alternative (Section 5.3.2) would, in effect, reduce diversion rates from UKL, resulting in more water within the lake. Discussion of the effects on specific resources is provided below.

6.7.2.1 General Fish and Aquatic Species

The Modernization Alternative could have moderate long-term benefits on fish and other aquatic species in UKL. The Modernization Alternative would result in water savings of approximately 4,786 acre-feet per irrigation season. Water savings would be stored within UKL, thereby increasing water levels within the lake. At maximum, the Modernization Alternative could increase the water volume within UKL by 2.5 percent in October when water levels are lowest. Increased water volume within UKL could improve water quality and habitat availability for fish and aquatic species present within the lake.

In addition, the Modernization Alternative could have minor long-term benefits for fish and other aquatic species in Lost River. Traveling screen upgrades to Adams and Stukel Pumping Plants could

act as partial barriers to fish passage to the conveyance system, thereby preventing entrainment of fish from Lost River into KID's canals and laterals and reducing excess mortality of resident fish.

6.7.2.2 Federally Listed and State-Listed Fish and Aquatic Species

The Modernization Alternative could have minor long-term benefits on Lost River and shortnose suckers in UKL. Increased water levels in UKL could help alleviate listed water quality impairments (temperature, pH, dissolved oxygen, harmful algal blooms) and thereby benefit resident Lost River and shortnose suckers. In addition, higher water levels could help maintain habitats used by suckers in UKL: open water habitats and vegetated fringe habitats. Water quality benefits in UKL could also have minor long-term benefits to SONCC coho salmon that may use this system as the species continues to recolonize upstream habitats.

In addition, the Modernization Alternative could have minor long-term benefits on suckers within Lost River. Traveling screens installed on pumping plants could act as partial barriers to fish passage; this could help minimize entrainment of suckers within Lost River into KID infrastructure and prevent excess mortality. Additionally, the water savings resulting from the Modernization Alternative could reduce the need for supplemental diversions of irrigation water through the Lost River Diversion Channel. Additionally, the water savings resulting from the Modernization Alternative could reduce the amount of spill water recaptured by the District in the Lost River. This would maintain a steadier streamflow within the Lost River, benefiting fish populations in the Lost River system. In-water work to upgrade Adams and Stukel Pumping Plants could have minor short-term impacts to Lost River sucker, shortnose sucker, or SONCC coho salmon that may be present in Lost River adjacent to these plants. With the use of BMPs during construction, the Modernization Alternative would have a negligible short-term effect to these species.

The Modernization Alternative is anticipated to have no effect on Oregon spotted frog. Populations and critical habitat adjacent to the study area are above the elevations that are affected by current water fluctuations (Reclamation 2018), and the Modernization Alternative will not impact the magnitude of water fluctuations in UKL. Thus, the Modernization Alternative will not impact habitat used by Oregon spotted frog. The Modernization Alternative is also anticipated to have no effect on bull trout as increased in water storage in UKL will only occur during the spring and summer and the species may only us UKL during the winter for migration.

A full analysis of potential effects of the Modernization Alternative on ESA listed species will be included in the project's biological assessment.

6.7.2.3 Ecosystem Services

Provisioning service: Fish populations (Figure E4-1): Over the long term, increased water savings under the Modernization Alternative could enable the retention of more water within UKL later into the summer. This could improve habitat for resident fish species in UKL, resulting in beneficial effects on resident fish populations. Water savings resulting from the Modernization Alternative could also reduce the need for supplemental diversions through the Lost River Diversion Channel, conserving more streamflow within the Lost River and benefiting fish populations within that system.

Cultural service: Culturally important species (*Figure E4-1*): Certain water levels are necessary for providing suitable habitat for sucker populations—a species with cultural significance for the Klamath Tribes. The Modernization Alternative could contribute to higher water levels later into the summer within UKL that has resident Lost River and shortnose sucker populations and whose water levels help support riverine wetlands that have resident Oregon spotted frog. Water savings under the Modernization Alternative could also reduce the need for supplemental diversions through the Lost

River Diversion Channel, conserving more streamflow within the Lost River and benefiting sucker populations within that system. In addition, traveling screens installed on pumping plants could act as partial barriers to fish passage and thus could help minimize entrainment of suckers within the Lost River into KID infrastructure and prevent excess mortality.

6.8 Wetland and Riparian Areas

6.8.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the proposed improvements would not be implemented and the effects of the continued operation of the District's system on wetlands and riparian areas in the project area would not differ from the effects associated with current operations. Wetland and riparian vegetation associated with District infrastructure and operations would persist. Wetland and riparian features adjacent to District infrastructure that are supported by seepage would also persist.

6.8.2 Modernization Alternative (Future with Federal Investment)

6.8.2.1 Effects on Wetland and Riparian Areas along the Project Area

The Modernization Alternative would have minor long-term effects on wetland and riparian plant communities. Piping canals would result in the loss of wetland and riparian areas along the canals. Piping and lining canals could reduce water available to wetland and riparian plant communities adjacent to and downgradient of the project area that are reliant on canal seepage.

Before construction begins at a given site, a wetland and waters delineation would be conducted and coordination with DSL and USACE would determine the jurisdictional authority of wetland and waters in the project area. If regulated wetlands are identified, they would be avoided to the extent practicable and necessary authorizations would be secured before work begins (see Appendix E.10.2). See Appendix E.10.10 for measures that would be implemented to avoid and minimize potential impacts to wetlands and riparian areas. Compliance requirements for local, state, and federal permits that may be triggered by the Modernization Alternative are identified in Appendix E.10.11.

The Modernization Alternative would not include work within the 100-year floodplain. Therefore, no effects on floodplains would result.

6.8.2.2 Water Volume Alterations

As discussed in Section 6.6, Water Resources under the Modernization Alternative could increase water volumes within UKL. Water savings associated within the Modernization Alternative would result in lower diversion rates, which would leave more water in these waterbodies. Increased water volumes in these waterbodies could benefit riparian and wetland plant communities that are present along the fringe of UKL by extending the time that water is available for these vegetation communities.

6.8.2.3 Piping Laterals

Piping laterals would have minor long-term effects on wetlands and riparian areas found within the conveyance system. Trenching, placing pipe, backfilling, and other construction activities would result in removal or burial of hydrophytic vegetation within and adjacent to the laterals. Disturbed areas would be revegetated as uplands.

In addition, piping laterals would eliminate seepage. Loss of seepage from piping laterals could reduce water availability to wetland and riparian plant communities adjacent to and downgradient of

the project area. Reduced water availability within these hydrophytic plant communities would have minor long-term effects as it could cause wetlands and riparian areas to transition to upland vegetation.

6.8.2.4 D Canal and Lateral Lining

Wetland and riparian areas would be disturbed during construction activities that include clearing and ground disturbance adjacent to the canal. Disturbed wetland and riparian areas would be reestablished after construction activities are complete and would be revegetated with riparian vegetation. Overall, lining of the canal would have minor short-term effects on wetlands and riparian areas.

In addition, piping and lining canals would eliminate seepage. The effects of lining D Canal and laterals on seepage are expected to be similar to the effects of piping laterals as described above.

6.8.2.5 *Pump Upgrades*

Upgrades to Adams and Stukel Pumping Plants would result in minor short-term effects on wetlands and riparian areas. Replacing the pump and motor and installing the VFD would not expand the pumping plant's footprint. Installation of a traveling screen is not anticipated to result in the removal and fill of wetland or riparian areas. The traveling screen would be installed in Lost River and would transport debris to an upland site adjacent to the pumping plant. Construction vehicles accessing the pumping plant would result in the temporary disturbance of hydrophytic vegetation. Disturbed areas would be revegetated with riparian vegetation.

6.9 Wildlife Resources

6.9.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the District would continue to operate with its current infrastructure. The existing operational impacts to wildlife resources in the project area would continue. Wildlife that use the District's irrigation canals and drains would continue to do so.

6.9.2 Modernization Alternative (Future with Federal Investment)

6.9.2.1 General Wildlife

Overall, construction of the Modernization Alternative would have minor short-term effects on wildlife. Temporary, localized effects are expected to occur. Wildlife using habitat within the area have sufficient mobility and are not habitat limited and thus short-term effects are expected to be minimal. As discussed in Sections 6.5, Vegetation, and 6.8, Wetland and Riparian Areas, potential long-term impacts to vegetated habitats used by wildlife would be minimal. In addition, UKL could see increased water volumes (see Section 6.6, Water Resources) that would potentially increase aquatic habitat available to wildlife. Therefore, overall minimal long-term effects on wildlife would be expected under the Modernization Alternative.

6.9.2.2 Piping Laterals

Piping laterals would have minor long-term effects on wildlife. Temporary, localized effects on wildlife could result from construction noise, human activity, and ground-disturbing work at and near project construction areas. Because wildlife using habitat near construction areas are expected to be sufficiently mobile to relocate to available habitat elsewhere, short-term effects would be minimal. Wildlife are not limited by available wetland and riparian areas and their removal as a result of lateral piping would have a minimal effect on wildlife. Ground-disturbed areas would be

revegetated with upland plants which will provide habitat for wildlife. Construction would occur outside of the irrigation season when laterals are dry. If water is present at laterals when construction occurs, BMPs would be implemented at those sites to minimize the effects of turbidity on amphibians or other wildlife that may be present (see Appendix E.9). Effects would cease upon completion of construction and reestablishment of vegetation.

Piping the laterals would permanently remove a water source for terrestrial wildlife species; however, wildlife would be expected to have sufficient time and mobility to locate alternative water sources. Open ditches can also pose a barrier to terrestrial wildlife movement, and piping the canals would make it easier for wildlife to move through the landscape as they would be able to cross over piped and backfilled areas without risk of injury or drowning (Beier et al. 2008).

6.9.2.3 D Canal and Lateral Lining

The lining of D canal and laterals are expected to have similar localized noise disturbance, vegetation, and turbidity effects on wildlife as those described for piping laterals above. Disturbed wetland and riparian areas would be replanted with riparian plants. Wildlife will still be able to use the lined canal and laterals as a water source and the canal and laterals will remain a barrier to movement for terrestrial wildlife. Overall, lining of D canal and laterals would have minimal short-term effects on wildlife.

6.9.2.4 Pump Upgrades

Upgrading the two pumps is expected to have similar localized noise disturbance, vegetation, and turbidity effects on wildlife as those described for piping laterals. Water would be present during construction and BMPs would be implemented at those sites to minimize the effects of turbidity on amphibians or other wildlife that may be present (see Appendix E.9). Disturbed wetland and riparian areas would be revegetated with riparian plants which would still be able to provide habitat to wildlife. Pump upgrades would overall have minor short-term effects on wildlife.

6.9.2.5 Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act Protected Species

Migrating or wintering birds would be minimally affected by construction activities due to their ability to move from disturbed areas to other suitable habitats. No effects on breeding migratory birds are expected because construction activities would occur outside of the irrigation season and therefore outside of the primary nesting season for migratory birds. See Appendix E.10.8 for a discussion of measures that would be implemented to avoid and minimize potential impacts to migratory birds.

Bald and golden eagles may be found foraging within the District in spring and summer (see Section 4.9.2). The critical nesting period for bald and golden eagles is January 1 through August 31. If construction activities occur during the nesting period, the District would follow USFWS guidelines to ensure minimal disturbance to bald or golden eagles nesting near the project area.

6.9.2.6 State and Federally Listed Species

State-listed sensitive species known to occur within the project area and vicinity are limited to species that are also protected under the MBTA. The effects of the Modernization Alternative and related minimization measures are the same as those discussed in Section 6.9.2.

No federally listed terrestrial species have been documented within the project area (see Section 4.9.3); therefore, the Modernization Alternative would have no effects on these species. Monarch butterfly may occur within the project area from approximately June 1 to September 30

(Xerces Society 2018). However, construction of the Modernization Alternative will occur during the non-irrigation season which is when monarch butterflies will not be present within the project area. Thus, the Modernization Alternative is anticipated to have no effect on monarch butterfly.

A full analysis of potential effects of the Modernization Alternative on ESA listed species will be included in the project's biological assessment.

6.10 Transportation

6.10.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the District would continue to operate with its current infrastructure. There would be no changes or impacts to transportation facilities. Maintenance and replacement of transportation crossing would be required as culvert crossings begin to fail due to aging.

6.10.2 Modernization Alternative (Future with Federal Investment)

Long-term impacts from the Modernization Alternative are not expected. Transportation infrastructure would be replaced to match existing conditions or would be improved to meet current design standards.

Construction of the piping and lining of the D Canal laterals would be a high, but temporary, impact to the existing roadway and BNSF Railway crossings of the canal. Details of the crossings are contained in Table E-20 in Appendix E.11.

Table 6-10 is a summary of the types of crossings.

Table 6-10. Crossing Types

Crossing Types/Roadway Classifications	Number of Crossing
Rail	6
State Highway	4
County Roads	13

6.10.2.1 Railroad Crossings

There are six existing active railroad crossings of the D Canal laterals in the project area. This section of the BNSF Gateway Subdivision averages three trains a day and three trains a night. The crossing with new piping would involve jack-and bore construction techniques in order to maintain railroad operations. Coordination with BNSF Railway should begin as soon as possible to understand the constraints around maintaining railroad operations. No detours are available as this is a single mainline track and service cannot be disrupted.

6.10.2.2 State Highway Crossings

Of the existing roadway crossings, four of them cross Highway 50—a state highway owned by ODOT. Highway 50 is a critical east-west highway in southern Klamath County and supports

1,400 to 1,600 vehicles a day. Installation of the pipe would need to be staged to avoid full closures, as there is no alternate route of this classification. Typically, traffic would be detoured on the same or higher classification of roadway to maintain operations. Night work would also be considered to limit impacts to traffic.

6.10.2.3 County Road Crossings

As listed in Table 6-10, many of the existing canal crossings intersect county roadways ranging in classification from local to arterial. Traffic volumes on these county roads range from 250 to 1,000 vehicles a day. Installation of the pipe would need to be staged to avoid full closures and to comply with Klamath County road crossing permit requirements. Typically, traffic would be detoured on the same or higher classification of roadway to maintain operations. For arterials, this may require lengthy out-of-direction travel to the nearest alternative route. Local roads often have more options for alternative routes and may have shorter, less impactful detours.

6.11 Cumulative Effects

6.11.1 Past Actions

Past actions over the last 140 years that have affected resources in the Klamath River Basin watershed are generally land development activities that include irrigated agriculture (consisting of canal system construction, previous piping projects, and diversions), urban and rural residential development, industrial land and water uses, commercial development, water diversions for non-agricultural uses, and transportation infrastructure. Section 4, Affected Environment, describes the nature and extent of these past actions and how they have influenced the existing environment for each resource. Additional details can be found in Appendix E.

6.11.2 Current and Reasonably Foreseeable Future Actions

Current actions are those projects, developments, and other actions that are underway either because they are under construction, or they occur on an ongoing basis. Reasonably foreseeable future actions generally include those actions formally proposed or planned or that are highly likely to occur based on available information. Various sources, including local, state, and federal agency websites and city and county staff, were consulted to obtain information about current and potential future development in the project area. The following sections describe these current actions and reasonably foreseeable future actions. This list is not comprehensive, and other actions may be taking place or may take place in the future.

6.11.2.1 Land Use Development

Ongoing agricultural activities including farming and grazing in the District are not expected to change from current conditions. Land use development in the District would continue to be managed according to the Klamath County Comprehensive Plan and zoning regulations. Land development activities are expected to continue.

6.11.2.2 Biological Opinion

KID, other irrigation districts in the Klamath Project, and federal agencies including Reclamation and USFWS, have developed a multispecies Biological Opinion for the Klamath Project Operations for listed species and those that may become listed during the 5-year life of the Biological Opinion, including the shortnose sucker and the Lost River sucker which are culturally significant for the Klamath Tribes. The action area for the Biological Opinion includes all Project reservoirs, water

transport structures, and irrigated lands as well as the Klamath River downstream to the Pacific Ocean. The Final Biological Opinion by USFWS was published on October 1, 2024.

6.11.2.3 Modernization of Klamath Basin Irrigation Districts

Other irrigation districts in the Klamath Basin are working to modernize their infrastructure using PL 83-566 funding and would implement projects similar to those proposed by KID in this Plan-EA. Two districts—Tulelake Irrigation District and Klamath Drainage District—have initiated the Plan-EA process, but the extents of the projects are still being determined. These three modernization projects, including KID's, are contingent on the availability of funding. In the future, the irrigation districts may also pursue other irrigation efficiency projects using funding through other federal, state, and local funding sources.

6.11.2.4 Klamath Basin SCADA Improvements

Klamath Project irrigation districts within the Klamath Basin, including KID, are working to identify, permit, and install new supervisory control and data acquisition (SCADA), telemetry, and automation hardware and software. New SCADA installations within the irrigation districts' infrastructure will enable immediate water management improvements expected to provide water quality, quantity, and energy efficiency benefits that can support Klamath Project districts and irrigators, the local environment, and the surrounding community. The project will identify and implement a portion of the work needed to align water supply and demand in the Klamath Project, providing the telemetry data and automated control needed to monitor Klamath Project operations, identify opportunities for further water savings, and efficiently operate Klamath Project facilities. Those projects also have the potential to contribute to the improvement or development of tools used to create a deeper understanding of water movements in the basin. Maximizing the use of existing and new data in the basin can support irrigation district and other stakeholder's projects, such as by modelling the expected impacts and outcomes of different types of projects across a wide variety of water management metrics and goals.

6.11.2.5 Dam Removal on the Klamath River

For nearly 100 years, dams on the Klamath River have blocked salmon and steelhead trout from reaching some habitat, encroached on indigenous culture, and harmed water quality for people and wildlife. In 2024, removal was completed for four dams, J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate, which were built between 1908 and 1962. This river restoration project is anticipated to have lasting benefits for the river, salmon, and communities throughout the Klamath Basin.

6.11.2.6 Klamath Basin Drought Resilience Keystone Initiative

Through the Department of the Interior's Restoration and Resilience Framework, the Department has launched the Klamath Basin Drought Resilience Keystone Initiative which will support work with Tribes, water users, local governments, states and other federal agencies to advance scientifically sound, community supported projects that will meaningfully impact ecosystem restoration and maximize the benefits of limited water resources.

The Klamath Basin Drought Resilience Keystone Initiative will guide commitment of $162 million provided through the Bipartisan Infrastructure Law over five years and support a wide range of restoration activities that will help recover listed species, create new habitat for fish and birds, and rethink the way water moves across the landscape to better align agriculture with ecosystem function. These activities will be developed collaboratively with the people who live and work in the basin to maximize public support and improve the chances of long-term success and cooperation.

6.11.3 Cumulative Effects by Resources

Cumulative effects are considered for each resource in combination with past, present, and reasonably foreseeable future actions.

6.11.3.1 Cultural Resources

Although the canal system has undergone changes in the past (e.g., improvements to the Klamath Project from its beginning in 1906 to the present), the basic operations of the District would not be altered by the proposed improvements. Although the lining the D Canal and piping of discreet and dispersed segments of D Canal Lateral System are physical changes to these historic built environment resources, these activities do not sufficiently diminish the integrity of these NRHP-eligible contributing resources to the NRHP-eligible Klamath Project historic district and undermine these contributing resource or the historic district's capacity to convey their significance under Criterion A. As such, the project would not have an Adverse Effect on the Klamath Project or its contributing resources, the D Canal and D Canal System (36 CFR 800.5).

Cumulative impacts on cultural resources would occur if other past, present, or reasonably foreseeable actions or projects affect the same historic properties and/or cultural resources as the proposed action. Cumulative impacts can result from individually minor but collectively significant actions that occur over a period of time. Where impacts on historic properties including any previously recorded, unevaluated, or not yet documented cultural resources such as archaeological sites, built environment resources, cultural landscapes, or traditional cultural properties would be unavoidable, measures to mitigate the adverse effects would be identified in a Section 106 agreement document (e.g., Memorandum of Agreement, programmatic agreement). This document would be developed in consultation with SHPO, THPO, and other consulting parties including affiliated Tribes.

Any cumulative impacts on the District's conveyance system by future actions separate from this project (e.g., new piping) would be analyzed in light of the conveyance system's NRHP eligibility status. Cumulative impacts would not be expected if the conveyance system were determined not eligible for the NRHP; however, if the conveyance system were determined to be eligible and a future action would result in adverse effects under Section 106 of the NHPA, these effects would be addressed in consultation with SHPO, THPO, and other consulting parties, including affiliated Tribes, to mitigate adverse impacts. The cumulative impact analysis would consider whether the impact and proposed mitigation are adverse or beneficial for the human environment.

All other projects considered in this cumulative impact analysis, including other PL 83-566 projects occurring in the area, would likely be required to comply with Section 106 of the NHPA, which requires federal agencies to assess and mitigate adverse effects, including cumulative effects, on historic properties or cultural resources. KID has developed a plan to address unanticipated discoveries of cultural resources and human remains during construction of the proposed action. Other federal projects would implement similar plans and measures. These cultural resource studies, agreement documents, and plans ensure proper documentation, protection, and avoidance, minimization, or mitigation of important cultural resources.

6.11.3.2 Land Use

The project area and lands within the District have been substantially altered over the past century by a variety of human activities including agricultural development, livestock grazing, urban development in Klamath Falls, Oregon, rural residential development, and road and railroad construction. Implementation of the proposed action would support existing land uses as recent

water conservation projects have, and as would implementation of current and reasonably foreseeable future actions and additional irrigation district modernization. Therefore, together with the proposed action, these activities would cumulatively support existing agricultural land uses.

6.11.3.3 Socioeconomic Resources

Past actions, including agricultural and other land development, and recently completed projects have established the socioeconomic setting of the Klamath Basin by supporting development and agriculture. Current and reasonably foreseeable future actions would continue to support agriculture through improved infrastructure. Since the proposed action would also support the local economy through construction expenditures and intensified agricultural production, it would contribute to a cumulative benefit to socioeconomic resources in the area.

6.11.3.4 Soils

Past, ongoing, and future actions in the surrounding area that affect soils include agricultural uses, land development, and water management activities. The amount of soil affected by the proposed action is small and localized to the project area compared to the area affected by other past, present, and reasonably foreseeable future actions in the area; the proposed action would, therefore, make a minor contribution to cumulative effects on soils.

6.11.3.5 Vegetation

Agricultural activities, livestock grazing, vegetation control along roads, and rural residential development are responsible for most of the past and ongoing effects on vegetation in the project area and the region. The amount of vegetation that would be affected by the proposed action is small compared to the area affected by past and ongoing agricultural activities, livestock grazing, vegetation control along roads, and other utility corridors in the area. Current and reasonably foreseeable future actions, such as irrigation infrastructure piping projects in other Districts, would have relatively minor effects on vegetation because effects would be localized to each individual District's ROW or easement and these areas are proportionally a limited area compared to the region. Ongoing effects of past actions are not expected to change measurably from current conditions, and additional effects from the proposed action would be minor because they are localized to the project area and would result in a minor contribution to cumulative effects on vegetation.

6.11.3.6 Water Resources

Past actions over the last 120 years that have affected water resources include rural residential and agricultural development, road construction and maintenance, and other irrigation projects. Since the early 1990s, there has been increasing interest in conserving water and restoring streamflow to the Klamath River and the wildlife refuges. KID and other Klamath Basin irrigation districts have implemented various water conservation projects, which have included piping existing irrigation canals, on-farm conservation, water management changes, and changes to crop production; however, the effectiveness of these projects has been difficult to ascertain in the context of climate-driven changes to the quantity and timing of water supply.

Ongoing and reasonably foreseeable future actions that could affect waterbodies associated with District operations include additional irrigation piping projects being considered by other Klamath Basin irrigation districts that divert water from the Klamath River, Lost River, and UKL, on-farm water conservation work, and Biological Opinion requirements. These actions accompanied by the

proposed action would allow districts more control over the delivery of water to users, including the TLNWR and LKNWR, and may indirectly result in beneficial cumulative effects on water resources.

Reasonably foreseeable irrigation canal and lateral piping projects throughout the Klamath Basin may contribute to a reduction in groundwater levels.

The District would continue to source water from Section 303(d)-listed waterbodies. The possibility of salt accumulation in soils would continue as would the existing problem with moss build-up in the canals.

6.11.3.7 Fish and Aquatic Species

Past and ongoing land uses, water diversions, and reservoir operations are responsible for most of the past and ongoing direct and indirect changes in water availability, seasonality, and access to habitat that has cumulatively affected aquatic communities and habitat in the Klamath Basin.

Past and ongoing land use activities in the project area are not expected to change from current conditions. Future land developments and irrigation district modernization projects may cause short-term and temporary effects on fish, such as sediment inputs or aquatic habitat disturbance, and could potentially affect waters within the same watershed as the proposed action. However, the ongoing and reasonably foreseeable future actions described above, including irrigation modernization activities and the Biological Opinion requirements, are all proposed for improving aquatic habitat conditions in the Klamath Basin.

Implementation of the proposed action when combined with other future actions is anticipated to have a beneficial cumulative effect on fish, aquatic species, and available habitat for these species. Implementation of other irrigation piping projects could have an additive effect on the amount of water conserved.

6.11.3.8 Wetland and Riparian Areas

Past actions that have affected wetlands, riparian areas, and floodplains in the Klamath Basin include land development, agricultural activities and infrastructure, water diversions, and reservoir operations. These activities are expected to continue. Direct effects on wetlands from the proposed action and any effects from other current and reasonably foreseeable irrigation modernization projects are anticipated to be localized to the linear areas where proposed projects would occur, which is a proportionally small area compared to the area that wetlands cover in the region. Indirect effects resulting from altered diversion rates and timing of diversions from the proposed action and from other current or forthcoming irrigation modernization projects are anticipated to benefit wetlands within and adjacent to District associated waterbodies, which support the majority of wetlands found within the region.

Because of the limited direct impacts to wetlands and minor beneficial indirect impacts to wetlands found in and adjacent to District associated waterbodies, implementation of the proposed action is anticipated to have minor cumulative impact on wetland in the project areas of the Klamath Basin.

6.11.3.9 Wildlife

Past and ongoing land use activities including agriculture, urban, and suburban development have affected wildlife and wildlife habitat in the Klamath Basin starting in the early 1900s. Agricultural activities have substantially altered the habitat in the region by removing native vegetation in some areas and diverting streamflow. Some native habitats have been replaced with disturbance-tolerant or introduced species assemblages that may support different wildlife than previously existed. These

ongoing activities would continue to affect wildlife and wildlife habitat in the project area. In addition, the intensity of these ongoing actions is not anticipated to change measurably in the future; this would result in minor additional cumulative effects.

6.11.3.10 Transportation

No cumulative impacts are expected from the Modernization Alternative related to transportation facilities. Transportation infrastructure would be replaced to match existing conditions or improved to meet current design standards.

6.11.3.11 Ecosystem Services

All reasonably foreseeable actions regarding the modernization of irrigation infrastructure in the Klamath Basin would work in concert to conserve water and improve water availability to irrigators. Past and ongoing actions described in the sections above have also contributed to water availability for irrigations and instream flow. Past, ongoing, and reasonably foreseeable actions in the Klamath Basin could all impact ecosystem services. However, implementation of the proposed action when combined with other future actions is anticipated to have a beneficial cumulative effect on all ecosystem services assessed.

7 Consultation, Coordination, and Public Participation

In the development of the Draft Plan-EA, the District and its partners planned and conducted a public scoping meeting, issued press announcements, and had frequent correspondence with federal, state, and local resource agencies, agriculture interests, and other interest groups and individuals. The project development process was designed to work collaboratively with partners, agencies, Tribes, and stakeholders to ensure transparency and cooperation towards a solution that fits within the framework of the purpose and need for action.

A Preliminary Investigative Report (PIR) was prepared to provide sponsors, local partners, agencies, and the public with information to evaluate the goals and objectives of the project. During the development of the PIR, project sponsors conducted initial coordination with natural resource agencies and stakeholders in the Klamath Basin.

Public participation activities prior to release of the Draft Plan-EA included:

Public Announcements

- NRCS public notice (January 23, 2023) https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/oregon/public-notice-announcing-scoping-meeting-klamath-0
- Klamath Falls Herald & News (published 6 times; January 25, 2023 – February 4, 2023)
- Postcard to District patrons (January 26, 2023)

Public Involvement Website

Information about the proposed project was added to a website to inform the public. Oregonwatershedplans.org includes the following information:

- Overview of the NRCS PL 83-566 funding program.
- Overview of NEPA and EA public participation process.
- Frequently Asked Questions about the EA process.
- Background on the District, the Draft Plan-EA and appendices, the PIR and appendices, and presentations and handouts from public meetings.
- Contact information and how to submit public comments.
- Email signup option for more information; subscribers receive updates over the course of project development.

Public Scoping Meeting

The scoping comment period for the KID Modernization Project began January 23, 2023, and ended March 9, 2023. The scoping process was part of an approach to obtain input from stakeholders about the project and to ensure that significant decision-making factors are addressed. The scoping process helped to identify the appropriate level of analysis for the proposed project, which in this case is an EA.

The purpose of the scoping meeting is to inform the community and interested stakeholders about the KID Modernization Project and to gather community comments and suggestions on the proposed project. The scoping meeting was held on Tuesday, February 7, 2023, at 4 P.M. The

meeting was held at the Merrill Civic Center, Walt Wilson Hall at 363 W Front St, Merrill, OR. Presenters included staff from NRCS (Gary Diridoni), FCA (Raija Bushnell), and the District Manager (Gene Souza). A total of 38 people attended the meeting, excluding staff from KID, NRCS, and FCA.

7.1 List of Persons and Agencies Consulted

Table E-23 describes communications with agency personnel that were consulted during development of this Plan-EA. This includes agencies that provided formal or required consultation, or individuals who were conferred with and who provided substantial input. Coordination with state and local agencies has been ongoing since the project's inception. See Table E.14-1 in Appendix E.14.

7.2 Review of Draft Plan-EA

[To be completed after public review of the Draft Plan-EA.]

8 Preferred Alternative

8.1 Selection and Rationale for the Preferred Alternative

NRCS and the District agree that the Modernization Alternative is the Preferred Alternative. NRCS has selected the Modernization Alternative as the Preferred Alternative; the Modernization Alternative meets the purpose and need for the project, best addresses the Federal Objective and Guiding Principles, is the environmentally preferable alternative, and provides the most beneficial effects on environmental, social, and economic resources.

Section 6, Environmental Consequences describes effects on resources in detail. The Preferred Alternative would be expected to have no long-term effects on water resources because the changes would be measurable, apparent, and localized to the project area. Effects on land use would include negligible temporary effects from construction activities, and beneficial long term effects on agricultural land uses. Effects on soil resources would be short-term and minor because the effects would only occur in a relatively small portion of the larger project area and primarily during the construction period. Effects on vegetation resources would be minor long-term effects caused by disturbance to and/or removal of existing vegetation during construction. Effects on fish and aquatic species could be beneficial long-term effects due to an increased amount of water retained in UKL and conserved streamflow in the Lost River. Effects on wetlands and riparian areas would be minor and long term, as the project would result in the loss of wetlands and riparian areas adjacent to the canals and a potential reduction in water within wetlands adjacent to and downgradient of the canals. Effects to wildlife would be minor short-term effects due to construction activities, and minor long-term effects due to the loss of a water source for terrestrial species. All potential adverse effects on resources would be mitigated through BMPs and other compliance measures.

In the long term, the Preferred Alternative would benefit several of the resources assessed. As analyzed in the NEE Analysis, this alternative would yield positive economic benefits including increased agricultural yield and reduced O&M costs. When compared with the No Action Alternative in the face of current conditions and future environmental and agricultural changes, the Preferred Alternative would support the agricultural resiliency of District patrons and the health and resiliency of the ecosystem downstream.

8.2 Measures to be Installed

The Preferred Alternative includes pump replacements, piping of canals and laterals, and canal lining. These projects would include the improvements to the KID system described in Section 5.3.2, Modernization Alternative (Future with Federal Investment).

The Preferred Alternative would be implemented in multiple project groups with construction occurring over portions of 4 years (four non-irrigation seasons) A detailed breakdown of project costs can be found in Appendix D.3., Sections 8.7, Installation and Financing, and 8.8, Operations and Maintenance, provide additional details about construction and O&M of the Preferred Alternative.

8.3 Minimization, Avoidance, and Compensatory Mitigation Measures

Project design features and BMPs would be applied during construction of the Preferred Alternative to avoid and minimize effects on environmental and social resources. Potential measures that could be included as construction-phase BMPs are described in Appendix E.10.

8.4 Land Rights and Easements

Prior to construction and where needed, the District would coordinate with landowners and obtain all necessary easements or agreements.

8.5 Permits and Compliance

See Appendix E.10.11 for local, county, state, and federal permits and compliance requirements for planning and implementation of the Preferred Alternative.

8.5.1 Local and County

Klamath County Planning Department – Under OAR Chapter 340, Division 18, a Land Use Compatibility Statement (LUCS) would be submitted for County approval prior to construction. The LUCS is required supporting documentation for various State permits from ODEQ (1200-C permit) and DSL (Removal-Fill permit).

Irrigation uses and associated infrastructure are allowed uses within Klamath County zoning designations in the project area. Development of allowed uses would require submittal and approval of a Site Plan Review application prior to construction.

Road crossing permits from Klamath County would be required for the 13 local roads being crossed by the piped laterals described in the Preferred Alternative. These permits would be obtained from the Klamath County Public Works Department.

For irrigation piping crossing railroad property, Utility License Agreements are required when utility facilities are installed, relocated, removed, or maintained along or across all BNSF property. If surveying is necessary for the completion of an application, a Temporary Occupancy Permit must be executed in order to enter BNSF right-of-way.

8.5.2 State of Oregon

Department of Environmental Quality – The National Pollutant Discharge Elimination System program, implemented by ODEQ, would require a permit for construction activities including clearing, grading, excavation, dewatering, and materials and equipment staging and stockpiling that would disturb one acre or more of land and have the potential to discharge into a public waterbody.

The proposed project would meet these conditions; therefore, prior to project construction, as appropriate, a 1200-C permit would be applied for.

Applicants for CWA Section 404 authorization from USACE are also required to obtain a Section 401 water quality certification from ODEQ through a joint application process. The District would prepare a joint permit application for this project, which would be reviewed by USACE and DSL. The District would not begin construction until after the application is approved by both regulatory authorities. In addition, EPA must make a neighboring jurisdiction determination once the water quality certification is issued (CWA section 401(a)(2)).

Oregon Department of State Lands – DSL implements the State of Oregon's Removal-Fill Law (ORS 196.800.990), which regulates the removal or fill of material in wetlands and waterways and requires any person who plans to remove or fill material within waters of the state to obtain a permit from DSL. Additional information can be found in Appendix E.10.11.1

Oregon Department of Transportation – For an activity such as utility installation along or across a state highway, or an activity that requires the use of the state highway for other than a normal transportation activity, an utility encroachment permit is required. ODOT Maintenance District 11, based in Klamath Falls, Oregon, would be the local agency to issue the utility encroachment permit. Utility encroachment permit applicants are required to give Tribes advance notice of intended utility work on state highway right of way.

8.5.3 Federal

National Historic Preservation Act Section 106 – Pursuant to 36 C.F.R. 800 of NHPA (1966, as amended in 2000) and the regulations of the Advisory Council on Historic Preservation implementing Section 106 of the NHPA (54 U.S.C. 306108), federal agencies must take into account the potential effect of an undertaking on "historic properties," which refers to cultural resources listed in or eligible for listing in the NRHP. Consultation with the Oregon SHPO to fulfill Section 106 obligations would be completed for the project prior to implementation.

Clean Water Act Section 404 – USACE administers Section 404 of the CWA with the oversight of EPA. This law regulates the dredge or fill of wetlands and other waters over which USACE has jurisdiction. USACE and EPA define wetlands as "those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (EPA 2023). Additional information can be found in Appendix E.10.11.2.

Farmland Protection Policy Act – The Farmland Protection Policy Act (7 U.S.C. 4201 et seq.) directs federal agencies to identify and quantify adverse impacts of federal programs to farmlands. The Act's purpose is to minimize the number of federal programs that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses. The proposed project would occur primarily in Exclusive Farm Use zones; however, all work would be done within existing and new easement agreements. The proposed project would support agricultural production and the intention of the Act.

Endangered Species Act – The ESA establishes a national program for the conservation of threatened and endangered species and the preservation of the ecosystems on which they depend. The ESA is administered by USFWS for wildlife and freshwater species and by NMFS for marine and anadromous species. The ESA defines procedures for listing species, designating critical habitat for listed species, and preparing recovery plans. It also specifies prohibited actions and exceptions. Section 7 of the Act, called Interagency Cooperation, is the mechanism by which federal agencies

ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. Under Section 7, federal agencies must consult with USFWS when any action the agency carries out, funds, or authorizes (such as through a permit) may affect a listed endangered or threatened species.

Improved water conveyance would result in higher quality water within some of District's waterbodies and increase the available habitat for the species. In addition, the installation of a fish screen and removal of a partial barrier would prevent bull trout entrainment into the irrigation system and increase habitat availability for the species. Short-term impacts to water quality during construction are unlikely to adversely affect bull trout. Coordination with USFWS and NMFS regarding ESA-listed fish species is ongoing, and informal Section 7 consultation under the ESA as amended would be initiated following the public review period.

Magnuson-Stevens Act – The Magnuson-Stevens Act requires including EFH descriptions in federal fishery management plans, and it requires federal agencies to consult with NMFS on activities that may adversely affect EFH (P.L. 104-297). EFH can include all streams, lakes, ponds, wetlands, and other viable waterbodies, as well as most of the habitat historically accessible to salmon necessary for spawning, breeding, feeding or growth to maturity. As the proposed action would not affect EFH, consultation under the Magnuson Stevens Act is not required.

Safe Drinking Water Act – Since the project would have no direct or indirect discharge to groundwater, permitting under the Safe Drinking Water Act is not required.

Migratory Bird Treaty Act – The MBTA implements various treaties and conventions between the United States and other countries including Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds (16 U.S.C. 703–712). Under the Act, taking, killing, or possessing migratory birds, or taking, destroying, or possessing their eggs or nests, is unlawful. The Act classifies most species of birds as migratory except for upland and nonnative birds such as pheasant, chukar, gray partridge, house sparrow, European starling, and rock dove.

Bald and Golden Eagle Protection Act – The BGEPA prohibits the taking or possessing of and commerce in bald and golden eagles, with limited exceptions (16 U.S.C. 668–668d). The Act covers intentional acts or acts in "wanton disregard" of the safety of bald or golden eagles. Bald eagles may also be found foraging within the District in spring and summer months; however, the project's activities are planned for the non-irrigation season (i.e., late fall and winter). No direct impacts are anticipated.

National Wild and Scenic Rivers Act – The designation of a river and river segments under the Wild and Scenic Rivers Act provides legal protections from adverse development and provides a mechanism for management of the river's resources. No wild and scenic rivers occur within the proposed project area.

8.6 Costs

The total project cost for the Preferred Alternative is $22,798,000.. Pub. L 83-566 funds would support $17,187,000 of the total project cost, where the $5,611,000 remainder of the cost would be contributed by other nonfederal funds. Table 8-1 itemizes the costs for each project feature and the distribution of how the costs would be shared by the sponsors and NRCS for each cost item.

[2] Estimated design costs are preliminary and were calculated by taking a percentage of the estimated construction cost. Design costs are funded 100% by NRCS PL 83-566

Section 8.9, Economic and Structural Tables, itemizes the costs and shows the distribution of costs among the sponsors and NRCS.

- Construction costs account for all material, labor, and equipment necessary for the installation of pump modifications, canal and lateral piping, and canal lining associated with the Preferred Alternative. These costs were estimated based on costs for similar installations at other irrigation districts in Oregon. The planning construction costs were estimated using the best available information about the proposed project without having detailed design information.
- Engineering costs were estimated as a percentage of the cost of construction.
- The costs presented are planning-level estimates and do not reflect final costs. Detailed designs and construction cost estimates would be completed prior to initiating the proposed project. Final construction costs would only reflect the time and materials to perform the work.

8.7 Installation and Financing

The following subsections present further details regarding installation of and financing for the Preferred Alternative. Included in this section is a framework for implementing the Preferred Alternative; the framework includes the sequence of installation, responsibilities, contracting, real property and relocations, financing, and conditions for providing assistance.

8.7.1 Framework for Carrying out the Plan

The Preferred Alternative would be implemented in a planned sequence as discussed below in Section 8.7.2, Planned Sequence of Installation. The responsibilities of NRCS and the sponsors for the Preferred Alternative are outlined in Section 8.7.3, Responsibilities. No cost-shared on-farm measures are involved with the Preferred Alternative; therefore, the responsibilities of individual participants do not need to be discussed. No preconditions are anticipated for installing the project.

8.7.2 Planned Sequence of Installation

The District would obtain all approvals and permits for the proposed project prior to the start of construction. The entire project would be completed over portions of a 4-year period expected to commence during the 2025–2026 non-irrigation season and end by 2029. The District has developed a project phasing schedule that addresses District priorities while working within engineering and funding constraints to meet District, patron, and community development needs.

8.7.3 Responsibilities

NRCS would be responsible for leading the planning efforts, providing engineering design and construction oversight assistance, and certifying completion of the project. The District would be responsible for engineering design, project administration, environmental permitting, contracting, and construction implementation.

As a cooperating agency, Reclamation would be responsible for assisting in the planning effort; reviewing engineering designs to ensure construction methods meet Reclamation standards; participating in Section 106 of NHPA as the owner of the infrastructure; providing language for this Plan-EA; and providing subject matter experts to answer questions regarding topics such as the history of the Klamath Project, O&M plans, past ESA consultations, and other topics as needed.

NRCS and Reclamation would each prepare its own Finding of No Significant Impact (FONSI) statement if warranted. Further site-specific environmental compliance may be required for specific implementation activities. Each agency would be responsible for preparing categorical exclusions or other such instruments for implementation.

8.7.4 Contracting

Irrigation modernization projects would be completed using NRCS funding mechanisms. The District would be primarily responsible for overseeing and administering the construction of the project in coordination with NRCS.

8.7.5 Real Property and Relocations

All construction would be completed under either existing Reclamation-operated and -maintained easements as described in Section 6.2.2.

8.7.6 Financing

NRCS would provide approximately 75 percent of the total project cost which would include technical and financial assistance for the Preferred Alternative through PL 83-566.62. The District would be responsible for securing funding for the remaining 25 percent of the costs including funds that are not eligible under the National Watershed Program (project administration and technical assistance). Table 8-1 and Table 8-3 present installation costs of the project and the proportion of funding through PL 83-566 funding and other funding sources.

The majority of the required match funding would be expected to be provided through grants. If necessary, a portion of the project cost would be financed through loans.

O&M costs after project completion would be provided through KID revenues. O&M costs would not increase due to the proposed project and could decrease with the efficiency upgrades to the pumping infrastructure. O&M costs would be budgeted on an annual basis.

8.7.7 Conditions for Providing Assistance

Conditions for the District to receive program funds for the proposed project include completion of a Final Plan-EA, NRCS issuing a FONSI, and authorization of funding by the chief of NRCS. The chief of NRCS would act on behalf of the Secretary of the Interior to ensure that the proposed project meets the requirements and conditions of 16 U.S.C. 1005.

8.8 Operations and Maintenance

The District would be responsible for project O&M for the 100 years of its design life. Prior to construction, a separate O&M agreement, based on the NRCS National Operation and Maintenance Manual, would be made between NRCS and the District. The agreement would continue through the design life of the project and could be modified with NRCS approval.

The District will maintain a separate O&M agreement with Bureau of Reclamation for the transferred works as identified in Section 4.2.1.

Project sponsors and NRCS would conduct annual inspections of project measures to ensure the quality of ongoing O&M. The District would be in charge of scheduling O&M inspections and be responsible for necessary work. District O&M would consist of a pump, canal lining, and canal piping inspection program that would systematically cover inspection of the proposed project over a period of several years.

The proposed system would continue its current operation schedule, and work would be performed on an as-needed basis. During the winter months, outside of the irrigation season, the District would perform system component maintenance including maintaining pumps, canals and laterals, trash rakes, and other components of the water delivery system. All procedures would be followed as specified in the O&M agreement between the District and NRCS.

8.9 Economic and Structural Tables

A summary of the economic analysis of the Preferred Alternative (NEE Alternative) and Future Without Federal Investment is provided in Section 5.4, Summary and Comparison of Alternatives. The full NEE Analysis can be found in Appendix D. The costs and benefits associated with the proposed project are detailed in the following tables in this section. Table 8-1 (NWPM 506.11, Economic Table 1) presents the projected installation costs and the percentages of costs to be shared by the sponsors and NRCS for the proposed project.

Table 8- 2(NWPM 506.12, Economic Table 2) presents the proposed project's cost, as well as the proportion of PL 83-566 funding and other funding sources. The average annual NEE costs are shown in Table 8-3 (NWPM 506.18, Economic Table 3).

Table 8-1. Economic Table 1 – Estimated Installation Cost, Klamath River Watershed, Oregon, 2023 dollars[1]

Works of Improvement	Number				Estimated Costs (2023 dollars)[1]						Total
					Public Law 83-566 Funds			Other Funds			
	Unit	Federal land	Non-Federal land	Total	Federal land NRCS[2]	Non-Federal land NRCS[2]	Total	Federal land	Non-Federal land	Total	
PG1 Line D-Canal AP	Miles	0.00	0.93	0.93	$0	$993,000	$993,000	$0	$313,000	$313,000	$1,306,000
PG2 Line D-Canal M2P	Miles	0.00	0.89	0.89	$0	$1,310,000	$1,310,000	$0	$520,000	$520,000	$1,830,000
PG3 Pipe D-2	Miles	0.30	0.22	0.52	$325,000	$240,000	$565,000	$101,000	$75,000	$176,000	$741,000
PG4 Line D-3	Miles	0.00	1.10	1.10	$0	$803,000	$803,000	$0	$268,000	$268,000	$1,071,000
PG5 Pipe D-12	Miles	0.00	2.59	2.59	$0	$2,342,000	$2,342,000	$0	$759,000	$759,000	$3,101,000
PG6 Pipe D-14	Miles	0.00	0.72	0.72	$0	$769,000	$769,000	$0	$240,000	$240,000	$1,009,000
PG7 Pipe D-16	Miles	0.00	2.44	2.44	$0	$2,624,000	$2,624,000	$0	$853,000	$853,000	$3,477,000
PG8 Pipe D-16A	Miles	0.00	1.21	1.21	$0	$1,291,000	$1,291,000	$0	$413,000	$413,000	$1,704,000
PG9 Pipe D-18	Miles	0.00	1.32	1.32	$0	$1,487,000	$1,487,000	$0	$475,000	$475,000	$1,962,000
PG10 Pipe D-19	Miles	0.00	1.58	1.58	$0	$1,797,000	$1,797,000	$0	$578,000	$578,000	$2,375,000
PG11 Pipe D-20	Miles	0.00	1.31	1.31	$0	$1,506,000	$1,506,000	$0	$482,000	$482,000	$1,988,000
PG12 Adams Pump	Acres	0.00	0.30	0.30	$0	$850,000	$850,000	$0	$267,000	$267,000	$1,117,000
PG13 Stukel Pump	Acres	0.00	0.58	0.58	$0	$850,000	$850,000	$0	$267,000	$267,000	$1,117,000
Total project	**N/A**	**N/A**	**N/A**	**N/A**	**$325,000**	**$16,862,000**	**$17,187,000**	**$101,000**	**$5,510,000**	**$5,611,000**	**$22,798,000**

1/ Price base: 2023 dollars Prepared November 2025

2/ Federal agency responsible for assisting in installation of works of improvement.

Table 8-2. Economic Table 2 – Estimated Cost Distribution-Water Resource Project Measures, Klamath River Watershed, Oregon, 2023 dollars[1,2]

Works of Improvement	Installation Cost – PL 83-566				Installation Cost – Other Funds				Total
	Construction	Engineering	Project Admin Subtotal [2]	Total Public Law 566	Construction	Engineering	Project Admin Subtotal [3]	Total Other	
PG1 Line D-Canal AP	$782,000	$54,000	$157,000	$993,000	$261,000	$18,000	$34,000	$313,000	$1,306,000
PG2 Line D-Canal M2P	$1,049,000	$63,000	$198,000	$1,310,000	$349,000	$21,000	$150,000	$520,000	$1,830,000
PG3 Pipe D-2	$440,000	$31,000	$94,000	$565,000	$147,000	$10,000	$19,000	$176,000	$741,000
PG4 Line D-3	$635,000	$39,000	$129,000	$803,000	$211,000	$13,000	$44,000	$268,000	$1,071,000
PG5 Pipe D-12	$1,898,000	$132,000	$312,000	$2,342,000	$633,000	$44,000	$82,000	$759,000	$3,101,000
PG6 Pipe D-14	$603,000	$42,000	$124,000	$769,000	$200,000	$14,000	$26,000	$240,000	$1,009,000
PG7 Pipe D-16	$2,132,000	$148,000	$344,000	$2,624,000	$711,000	$49,000	$93,000	$853,000	$3,477,000
PG8 Pipe D-16A	$1,031,000	$64,000	$196,000	$1,291,000	$344,000	$21,000	$48,000	$413,000	$1,704,000
PG9 Pipe D-18	$1,186,000	$82,000	$219,000	$1,487,000	$396,000	$27,000	$52,000	$475,000	$1,962,000
PG10 Pipe D-19	$1,444,000	$100,000	$253,000	$1,797,000	$482,000	$33,000	$63,000	$578,000	$2,375,000
PG11 Pipe D-20	$1,202,000	$83,000	$221,000	$1,506,000	$401,000	$28,000	$53,000	$482,000	$1,988,000
PG12 Adams Pump	$668,000	$46,000	$136,000	$850,000	$223,000	$15,000	$29,000	$267,000	$1,117,000
PG13 Stukel Pump	$668,000	$46,000	$136,000	$850,000	$223,000	$15,000	$29,000	$267,000	$1,117,000
Total project	**$13,738,000**	**$930,000**	**$2,519,000**	**$17,187,000**	**$4,581,000**	**$308,000**	**$722,000**	**$5,611,000**	**$22,798,000**

1/ Price base: 2023 dollars. Prepared November 2025

2/ Includes $1,069,000 in project administration costs and $1,450,000 in technical assistance costs.

3/ Includes $429,000 in project administration costs and $293,000 in permitting costs.

Table 8-3. Economic Table 3 – Estimated Average Annual Cost of the Modernization Alternative, Klamath River Watershed, Oregon, 2023 dollars

Project Group	Project Outlays (Amortization of Installation Cost) [1]	OM&R Costs[2]	Other Direct Costs	Total Annualized Costs
PG1 Line D-Canal AP	$37,000	$42,000	$0	$79,000
PG2 Line D-Canal M2P	$52,000	$54,000	$0	$106,000
PG3 Pipe D-2	$21,000	$0	$0	$21,000
PG4 Line D-3	$30,000	$33,000	$0	$63,000
PG5 Pipe D-12	$87,000	$0	$0	$87,000
PG6 Pipe D-14	$27,000	$0	$0	$27,000
PG7 Pipe D-16	$97,000	$0	$0	$97,000
PG8 Pipe D-16A	$48,000	$0	$0	$48,000
PG9 Pipe D-18	$53,000	$0	$0	$53,000
PG10 Pipe D-19	$64,000	$0	$0	$64,000
PG11 Pipe D-20	$54,000	$0	$0	$54,000
PG12 Adams Pump	$33,000	$12,000	$0	$45,000
PG13 Stukel Pump	$33,000	$11,000	$0	$44,000
Total	**$636,000**	**$152,000**	**$0**	**$788,000**

Note: Totals may not sum due to rounding. Prepared November 2025

1/ Price Base: 2023 dollars amortized over 100 years at a discount rate of 2.75 percent.

2/ Price Base: 2023 dollars. Future OM&R costs are amortized over 100 years at a discount rate of 2.75 percent following the replacement cost methodology illustrated in Example 1-1 (page 1-8) and Figure 1-3 (page 1-20), Section 611.0103(b), Part 611 - Water Resources Handbook for Economics, National Resource Economics Handbook.

The Preferred Alternative damage-reduction benefits would include agricultural yields, power cost savings, reduced O&M costs, and avoided carbon emissions.

(NWPM 506.20, Economic Table 5A) presents the average annual watershed protection damage-reduction benefits.

Table 8-4. Economic Table 5A – Estimated Average Annual Damage Reduction Benefits, Klamath River Watershed, Oregon, 2023 dollars[1]

Item	Damage Reduction Benefit, Average Annual	
	Agricultural-related	Non-Agricultural-related
PG1 Line D-Canal AP		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$70,000	
Flood Damage Reduction	$22,000	
On-Site Subtotal	$92,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$92,000**	
PG2 Line D-Canal M2P		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$113,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$113,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$113,000**	
PG3 D-2		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$20,000	
Flood Damage Reduction	$3,000	
On-Site Subtotal	$23,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$23,000**	
PG4 Line D-3		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$72,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$72,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$72,000**	

Item	Damage Reduction Benefit, Average Annual	
	Agricultural-related	Non-Agricultural-related
PG5 D-12		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$105,000	
Flood Damage Reduction	$1,000	
On-Site Subtotal	$106,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$106,000**	
PG6 D-14		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$44,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$44,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$44,000**	
PG7 D-16		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$228,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$228,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$228,000**	
PG8 D-16A		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$55,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$55,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$55,000**	

Item	Damage Reduction Benefit, Average Annual	
	Agricultural-related	Non-Agricultural-related
PG9 D-18		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$82,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$82,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$82,000**	
PG10 D-19		
On-Site Damage Reduction Benefits		
Agricultural Production Value	$156,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$156,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$156,000**	
PG11 D-20		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$67,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$67,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$67,000**	
PG12 Adams Pump		
On-Site Damage Reduction Benefits		
Agricultural Damage Reduction	$61,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$61,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$61,000**	

Item	Damage Reduction Benefit, Average Annual	
	Agricultural-related	Non-Agricultural-related
PG13 Stukel Pump		
On-Site Damage Reduction Benefits		
Agricultural Production Value	$50,000	
Flood Damage Reduction	$0	
On-Site Subtotal	$50,000	
Off-Site Damage Reduction Benefits		
Off-Site Quantified Subtotal		$0
Total Quantified Benefits	**$50,000**	

Note: Totals may not sum due to rounding. Prepared November 2025

1/ Price Base: 2023 dollars amortized over 100 years at a discount rate of 2.75 percent.

Using the resulting benefits and costs from the previous two tables, Table 8- (NWPM 506.21, Economic Table 5) presents a comparison of the NEE average annual benefits and average annual costs.

Table 8-5. Economic Table 5 – Comparison of NEE Costs and Benefits of the Modernization Alternative, Klamath River Watershed, Oregon, 2023 dollars[1]

Works of Improvement	Agriculture-related		Average Annual Benefits	Average Annual Cost	Benefit cost ratio
	Agricultural Damage Reduction	Flood Damage Reduction			
PG1 Line D-Canal AP	$70,000	$22,000	$92,000	$79,000	1.2
PG2 Line D-Canal M2P	$113,000	$0	$113,000	$106,000	1.1
PG3 Pipe D-2	$20,000	$3,000	$23,000	$21,000	1.1
PG4 Line D-3	$72,000	$0	$72,000	$63,000	1.1
PG5 Pipe D-12	$105,000	$1,000	$106,000	$87,000	1.2
PG6 Pipe D-14	$44,000	$0	$44,000	$27,000	1.6
PG7 Pipe D-16	$228,000	$0	$228,000	$97,000	2.4
PG8 Pipe D-16A	$55,000	$0	$55,000	$48,000	1.1
PG9 Pipe D-18	$82,000	$0	$82,000	$53,000	1.5
PG10 Pipe D-19	$156,000	$0	$156,000	$64,000	2.4
PG11 Pipe D-20	$67,000	$0	$67,000	$54,000	1.2
PG12 Adams Pump	$61,000	$0	$61,000	$45,000	1.4
PG13 Stukel Pump	$50,000	$0	$50,000	$44,000	1.1
Total	**$1,123,000**	**$26,000**	**$1,149,000**	**$788,000**	**1.5**

1/ Price Base: 2023 dollars amortized over 100 years at a discount rate of 2.75 percent. Prepared November 2025

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10 List of Preparers

Under the direction of NRCS, FCA and its subcontractor Highland Economics primarily developed the Draft Watershed Plan-EA. The staff responsible for preparation of the Draft Watershed Plan-EA are included in Table 10-1.

Table 10-1. List of Preparers.

Name	Title	Education	Professional Experience	Area Responsible For
FCA Watershed Plan-EA Team				
David Mueller	District Lead	M.P.P. Public Policy B.A. Biology	4 years	General
Megan Christian	Project Manager	M.S. Environmental Sciences and Engineering B.S.P.H. Environmental Health Sciences	3 years	Project Manager; General
Alex Nagel	Natural Resource Specialist	Ph.D. Geography M.S. Geography B.A. International Studies; Geography	1 year	Introduction; Purpose and Need; Scope of the Plan-EA; Consultation, Coordination, and Public Participation
Raija Bushnell	Watershed Planning Program Manager	M.P.A. Natural Resource Policy M.S.E.S. Natural Resource Management B.A. Political Science	9 years	General
Clare McClellan	Natural Resource Specialist	M.E.M. Environmental Management B.A. Environmental Studies; Education	3 years	General
NRCS - Oregon				
Rachel Gebauer	NRCS State Archaeologist	M.A., Anthropology	30 years	Cultural Resources
Antonio Bentivoglio	NRCS Watershed Program	M.A., Biology	25 years	General NEPA compliance

Name	Title	Education	Professional Experience	Area Responsible For
Gary Diridoni	NRCS Watershed Program Manager	B.S. Wildlife Management/Ecosystem Conservation	20 years	PL-566 and NEPA compliance
Louis Landre	NRCS Economist		30 years	Economics
Employees from Firms Under Contract with FCA				
Cassandra Dobson	Planner III, Parametrix	M.U.R.P., Land Use Specialization B.A. Political Science	6 years	Project Manager; Land Use Affected Environment and Environmental Consequences; Socioeconomics Affected Environment
Peter Geiger	Senior Planner, Parametrix	M.Sc. Physics B.S. Physics	35 years	Deputy Project Manager; Alternatives Analysis
Tad Schwager	Senior Scientist, Parametrix	M.Sc. Marine Resource Management B.A. Human Biology	17 years	Water Resources Affected Environment and Environmental Consequences
Colton Kyro	Scientist II, Parametrix	M.Sc. Aquatic Ecology B.S. Ecosystem Science	5 years	Vegetation, Fish and Aquatic Resources, Wetlands and Riparian Areas, and Wildlife Resources Affected Environment and Environmental Consequences.
Jason Medema	Environmental Planner, Parametrix	M.S. Environmental Studies B.A. International Affairs	18 years	Ecosystem Services Affected Environment and Environmental Consequences; Soils Environmental Consequences

Name	Title	Education	Professional Experience	Area Responsible For
Kelly Carini	Environmental Scientist II, Parametrix	M.A. Environmental Studies	8 years	Soils Affected Environment
Richard Malin	Senior Hydrogeologist, Parametrix	M.S. Geology/Geohydrology B.S. Geology	38 years	Review of Groundwater Affected Environment and Environmental Consequences

11 Distribution List

U.S. Bureau of Reclamation, Klamath Basin Area Office
U.S. Fish and Wildlife Service (USFWS) Lower Klamath National Wildlife Refuges

12 Acronyms, Abbreviations, and Short-forms

APE – Area of Potential Effects

BGEPA – Bald and Golden Eagle Protection Act

BMP – Best Management Practice

CEQ – Council on Environmental Quality

CFR – Code of Federal Regulations

CFS – Cubic Feet/Second

DM – Department Manual

EA – Environmental Assessment

EEA – European Environment Agency

EFH – Essential Fish Habitat

EFU-C – Exclusive Farmland Use-Cropland Zoning

EPA – Environmental Protection Agency

ESA – Endangered Species Act

FCA – Farmers Conservation Alliance

FEMA – Federal Emergency Management Agency

FONSI – Finding of No Significant Impact

FR – Forestry/Rangeland Zoning

GC – General Commercial Zoning

HDPE – High-Density Polyethylene

HP – Horsepower

HUC – Hydrologic Unit Code

KA – Klamath Adjudication

KDD – Klamath Drainage District

KID – Klamath Irrigation District

LKNWR – Lower Klamath National Wildlife Refuge

MBTA – Migratory Bird Treaty Act

NCRWQCB – State of California North Coast Regional Water Quality Control Board

NEE – National Economic Efficiency

NEPA – National Environmental Policy Act

NHPO – National Historic Preservation Act

NRHP – National Register of Historic Places

NMFS – National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric Administration

NRC – National Research Council

NRCS – Natural Resources Conservation Service

NWI – National Wetlands Inventory

NWPH – National Watershed Program Handbook

NWPM – National Watershed Program Manual

O&M – Operations and Maintenance

OM&R – Operations, Maintenance, and Replacement

OAR – Oregon Administrative Rule

ODA – Oregon Department of Agriculture

ODEQ – Oregon Department of Environmental Quality

ODFW – Oregon Department of Fish and Wildlife

ODOT – Oregon Department of Transportation

OR DSL – Oregon Department of State Lands

ORBIC – Oregon Biodiversity Information Center

ORS – Oregon Revised Statutes

OWRD – Oregon Water Resources Department

PIR – Preliminary Investigative Report

PL-566 – USDA NRCS Watershed Protection and Flood Prevention Act, Public Law [PL] 83-566

Plan-EA – Watershed Plan-Environmental Assessment

PR&G – Principles, Regulations, and Guidelines

Project – Klamath Irrigation District Infrastructure-Modernization Project

Reclamation – United States Bureau of Reclamation

ROW – Right-of-way

SCADA – Supervisory Control and Data Acquisition

SHPO – State Historic Preservation Office

SIP – System Improvement Plan

TID – Tulelake Irrigation District

TLNWR – Tulelake National Wildlife Refuge

THPO – Tribal Historic Preservation Office

UKL – Upper Klamath Lake

USBR – United States Bureau of Reclamation

USDA – United States Department of Agriculture

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

VFD – Variable Frequency Drive

WLA – Water Loss Assessment

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14 Appendix

Appendices are provided in a separate document

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Appendix B. Project Maps

Appendix C. Supporting Maps

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Appendix E. Other Supporting Information