Farmers Irrigation District Infrastructure Modernization Project

Draft Watershed Plan-Environmental Assessment

October 2023

Hood River Watershed

Hood River County, Oregon

Prepared by United States Department of Agriculture, Natural Resources Conservation Service – Lead Federal Agency in cooperation with Farmers Irrigation District

Draft Watershed Plan-Environmental Assessment for the Farmers Irrigation District Infrastructure Modernization Project: Hood River County, Oregon

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

Sponsoring Local Organization (SLO): Farmers Irrigation District (FID)

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 [USC] 43221 et seq.).

Abstract: This document is intended to fulfill requirements of the NEPA process and to be considered for authorization of PL 83-566 funding of the Farmers Irrigation District Infrastructure Modernization Project (project). The project seeks to improve water conservation and water delivery reliability for irrigation infrastructure in Oregon's Hood River Basin. The project would include installing 3.0 miles of buried pipe, six supervisory control and data acquisition (SCADA) sites, improving sediment management, and expanding Forebay 3. Total estimated project costs are $11,687,000 of which $2,769,000 would be paid by the sponsors and other nonfederal funding sources. The estimated amount to be paid through NRCS PL 83-566 funds is $8,918,000.

Comments: Comments must be submitted during the allotted Draft Public Review Period from October 25 to November 29 (within 30 days of the public release of the Draft Plan-EA) to become part of the Administrative Record. To submit comments and inquiries, email farmers.id.comments@gmail.com or via mail to: Farmers Conservation Alliance, Attention FID Watershed Plan-EA, 102 State Street, Hood River, OR 97031. Any questions can be directed to Kate Hart of FCA at 541-716-6085 or Gary Diridoni of NRCS at 503-414-3092.

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Office of Management and Budget Fact Sheet

Summary Watershed Plan-Environmental Assessment Document **For** **Farmers Irrigation District Infrastructure Modernization Project** **Subwatersheds in Planning Area: Eagle Creek, Grays Creek-Columbia River, Carson Creek-Columbia River, Lower West Fork Hood River, Odell Creek-Hood River, Indian Creek-Hood River, Herman Creek** **Hood River County, Oregon** **Oregon 2nd Congressional District**	
Authorization	P.L. 83-566 68 Stat. 666 as amended (16 U.S.C. Section 1001 et seq.) 1954
Lead Sponsor	Farmers Irrigation District
Proposed Action	The Farmers Irrigation District (FID) Infrastructure Modernization Project is an agricultural water conveyance efficiency project. The proposed action would pipe two open sections of the Farmers Canal, pipe the open Rainy Ditch, install Supervisory Control and Data Acquisition (SCADA) systems, improve sediment management by deepening the existing attenuation bay, and expand Forebay 3.
Purpose and Need for Action	Implementation of the proposed action would meet PL 83-566 Authorized Project Purpose (v)Agricultural Water Management through improved water delivery reliability and water conservation along District infrastructure. There is a need to improve water conservation and water conveyance in District-owned infrastructure and to improve operation efficiency to allow FID to better manage their irrigation water deliveries to patrons.
Description of the Preferred Alternative	Under the Preferred Alternative, project sponsors would install 3.0 miles of buried pipe, six SCADA systems, deepen the existing attenuation bay, and expand Forebay 3 to approximately 0.5 acres.
Project Measures	Under the Preferred Alternative, project sponsors would install 3.0 miles of buried pipe ranging from 8 to 48 inches in diameter; six SCADA systems to improve the control of water diversions and flows; deepen the existing attenuation bay by approximately 1,000 cubic feet (0.02 acre-feet[AF]) to remove sand from irrigation water; and expand Forebay 3 by 2 AF to decrease operational spills into Ditch Creek and the Hood River. Construction of the Preferred Alternative would occur in five project groups over the course of 5 years.

Resource Information

Subwatersheds	12-digit Hydrologic Unit Code	Latitude and Longitude	Subwatershed Size (acres)	Planning Area Within Subwatershed (acres)
Eagle Creek	170701051203	45.57826001, -121.869561	22,190	1,911
Grays Creek-Columbia River	170701051106	45.69743406, -121.673111	41,426	13,265

Carson Creek-Columbia River	170701051204	45.68777142, -121.8733069	23,025	2,906
Lower West Fork Hood River	170701050603	45.59583722, -121.7072393	22,858	8,127
Odell Creek-Hood River	170701050702	45.62659581, -121.5966906	20,902	8,556
Indian Creek-Hood River	170701050703	45.67596256, -121.5318917	10,016	5,588
Herman Creek	170701051201	45.63635077, -121.8107644	12,254	9,973
Subwatershed Total Planning Area Size	50,327 acres			
Farmers Irrigation District Size	11,000 acres			
Climate and Topography	The project is located along the eastern slopes of the Cascade Range in the Hood River Valley. Annual average precipitation in Hood River is 31 inches. The average high temperature for Hood River in July is 81 degrees Fahrenheit and the average low temperature for January is 28 degrees Fahrenheit. FID serves areas ranging from 180 to 2,250 feet in elevation.			
Land Use (Planning Area – 50,327 acres)	**Use**			**Acres**
	Irrigated Land			5,307
	Non-irrigated Land			45,020
Land Ownership (Planning Area – 50,327 acres)	**Owner**			**Percentage**
	Private			21%
	State-Local			23%
	Federal			56%
Population and Demographics	The Preferred Alternative would occur within Hood River County, Oregon. In 2020, the population of Hood River County was 25,640. The population growth rate of the county between 2011 and 2020 was 13.3 percent. The population of the State of Oregon grew by 10.6 percent over the same period.			

Population and Demographics		**Hood River County**	**Oregon**
	Population 2020	25,640	4,268,055
	Unemployment Rate (U.S. Bureau of Labor Statistics 2021)	2.6%	4.4%
	Median Household Income	$65,679	$62,818
Relevant Resource Concerns	Resource concerns identified through scoping are water conservation, water usage, and water quality; fish and aquatic resources; soil resources; cultural resources; socioeconomics and public benefits; wetlands; wildlife resources; public safety; land use; and vegetation resources.		
Alternatives			
Alternatives Considered	Eight alternatives were considered; six were eliminated from full analysis because they did not meet the purpose and need for action because of 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, construction activities associated with the project would not occur and FID would continue to operate and maintain its existing conveyance system in its current condition.		
Preferred Alternative	Under the Modernization Alternative, FID would convert the following 3.0 miles of open canals to pipelines: two sections of the Farmers Canal (total of 14,003 ft.) and Rainy Ditch (1,909 ft.); install six SCADA systems throughout FID's irrigation infrastructure to improve the control of water diversions and conveyance; to remove sand from irrigation water, deepen the existing attenuation bay by 0.02 AF; and expand Forebay 3 by 2 AF, which combined with SCADA would fully eliminate operational spills into Ditch Creek, a tributary to the Hood River. The Modernization Alternative has been identified as the National Economic Efficiency (NEE) Alternative and is also the Preferred Alternative.		
Mitigation, Minimization, and Avoidance Measures	National Wetlands Inventory (NWI) geographic information systems data (USFWS 2016) show sixteen wetland features near the proposed project area, although wetland determinations or delineations have not occurred at this time. 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, consultation with Oregon Department of State Lands (ODSL) and United States Army Corp of Engineers (USACE) would occur to determine exemption applicability to canals in the project area. Wetlands would be avoided to the extent practicable. Consultation was initiated between the District; NRCS as the lead federal agency; (November 9, 2022); Oregon State Historic Preservation Office (SHPO) (November 9, 2022); and consulting parties, including federally recognized tribes whose ancestral lands fall within the project area and archaeological area of potential effects (APE) tribes (November 10 2022), for compliance with Section 106 of the National Historic Preservation Act (NHPA) and would be completed prior to project implementation. Ground disturbances would be limited to only those areas necessary to minimize effects on soil, vegetation, 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 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.					
Project costs	**PL 83-566 funds**		**Other funds**		**Total**	
Construction	$7,296,000	75%	$2,492,000	25%	$9,788,000	100%
Engineering	$226,000	75%	$75,000	25%	$301,000	100%
SUBTOTAL COSTS	**$7,522,000**	**75%**	**$2,567,000**	**25%**	$10,089,000	**100%**
Technical Assistance	$1,083,000	100%	$0	0%	$1,083,000	100%
Relocation	Not Applicable					
Real Property Rights	Not Applicable					
Permitting	$0	0%	$202,000	100%	$202,000	100%
Project Administration	$313,000	100%	$0	0%	$313,000	100%
TOTAL COSTS	**$8,918,000**	**76%**	**$2,769,000**	**24%**	**$11,687,000**	**100%**

Project Benefits	
Project Benefits	Implementation of the Preferred Alternative would improve water delivery reliability to FID irrigators; conserve and restore approximately 6.9 cubic feet per second (cfs) of water in the Hood River during irrigation season in a normal water year (2,146 AF annually), improving streamflow in the Hood River; reduce discharges of operational spill by 100 AF per year; reduce FID's operation and maintenance (O&M) costs; reduce the sediment content in irrigation water, improving the water quality of irrigation water; and improve District operational flexibility to ensure patron water deliveries in the future.
Number of Direct Beneficiaries	1,932 patrons would directly benefit from the project.
Other Beneficial Effects-Physical Terms	Implementation of the Preferred Alternative would have long-term, beneficial effects on agricultural water availability, water quality, and fish and wildlife habitat.

Damage Reduction Benefit	**Average Annual Damage Reduction Benefit**
Other- Instream Value	$178,000
Other - Reduced OM	$140,000

Other - Social Value of Carbon (Avoided Carbon Emissions)	$65,000
Other – Hydropower Revenue	$124,000
Other – Avoided Infrastructure Failure	$22,000
Average Annual Total Quantified Benefits	$529,000
Net Economic Benefits	$196,000

Period of Analysis

Installation Period (years)	5
Project Life (years)	100
Period of Analysis (years)	105

Funding Schedule

Year	PL 83-566	Other Funds	Total
2025-2026	$7,815,000	$2,374,000	$10,189,000
2025-2026	$498,000	$153,000	$651,000
2026-2027	$171,000	$82,000	$253,000
2027-2028	$279,000	$105,000	$384,000
2028-2030	$155,000	$55,000	$210,000

Environmental Effects

The Preferred Alternative would be planned, designed, and installed to have long-term net beneficial effects to agricultural production, water quality, and ecosystem services.

Implementation of the Preferred Alternative would result in minor, short-term adverse effects on wildlife, recreation, public safety, and wetland and riparian resources due to construction activities in the project area. The Sponsor would work closely with partners, contractors, and affected landowners to incorporate measures to avoid and minimize short-term adverse effects. See Section 8.3 for additional information regarding BMPs that would be implemented as part of the project.

In limited areas of the project area there would be minor, long-term adverse effects on vegetation and soils due to the permanent removal of vegetation and localized excavation. This would occur along a portion of the Rainy Ditch, at the attenuation bay, and Forebay 3. However, following construction, BMPs for ecological restoration would be followed and there would be an increase in native, upland vegetation along piped areas of the project area, returning those areas to a more natural state. The Sponsor would implement BMPs and identified minimization measures to avoid adverse effects.

Major Conclusions	The Preferred Alternative would improve water delivery reliability for FID's farmers; reduce water lost to seepage from District-operated infrastructure; enhance fish and aquatic habitat through increased streamflow; and improve District operational efficiencies in a manner that would reduce FID's O&M costs.
Areas of Controversy	No areas of controversy have been identified. Request for wildlife guzzlers along pipeline has been identified as a disputed issue.
Issues to be Resolved	None
Evidence of Unusual Congressional or Local Interest	No comments on the Scoping Document, which was published during the scoping period, were received from federal, state, or local nongovernmental organizations.
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

Aging infrastructure, growing populations, shifting rural economies, and changing climate conditions have increased pressure on water resources across the western United States (U.S.). In Oregon's Hood River Basin, irrigated agriculture is the primary out-of-stream water use and relies on over 100-year-old irrigation infrastructure to deliver water to farms and orchards. Over the past 25 years, Farmers Irrigation District has worked to improve District infrastructure, operations, and systems, with the goal of addressing environmental needs for instream flows while fulfilling patron water deliveries (Figure 1-1).

Farmers Irrigation District (herein referred to as FID or the District) seeks federal funding through the U.S. Department of Agriculture (USDA) Natural Resrouces Conservation Service (NRCS) Watershed Protection and Flood Prevention Act, Public Law [PL] 83-566, to implement the proposed irrigation infrastructure modernization project to address the need to improve water conservation and conveyance (herein referred to as the project) within Hood River County, Oregon.

FID's delivery system was developed throughout the late 1800s and early 1900s. As with other irrigation infrastructure within the western United States, much of the District-operated infrastructure is aging; this results in higher maintenance costs and financial pressure. Outdated portions of FID's infrastructure contribute to water supply insecurity for agriculture and affect habitat and water quality in the Hood River and its tributaries. Additionally, the District's open canals present an ongoing public safety risk. The high natural sediment load in the Hood River Basin and FID's water sources presents an additional maintenance challenge for the District and its patrons. The District has made significant improvements to its infrastructure in recent decades. To date, FID has piped 70 miles of canal, reduced endspills and operational return flows, and installed limited supervisory control and data acquisition (SCADA)[1] sites for remote monitoring and control of irrigation water diversions (FID 2020). Although major improvements have been made to the District's infrasctructure, multiple water management challenges remain for the District.

FID is the lead sponsor for the FID Infrastructure Modernization Project, which would increase water conservation, improve water conveyance in District-owned infrastructure, and reduce operations and maintenance (O&M) costs for the District and its patrons.

[1] Sites may include water flow meters, solar power, and/or telemetry equipment.

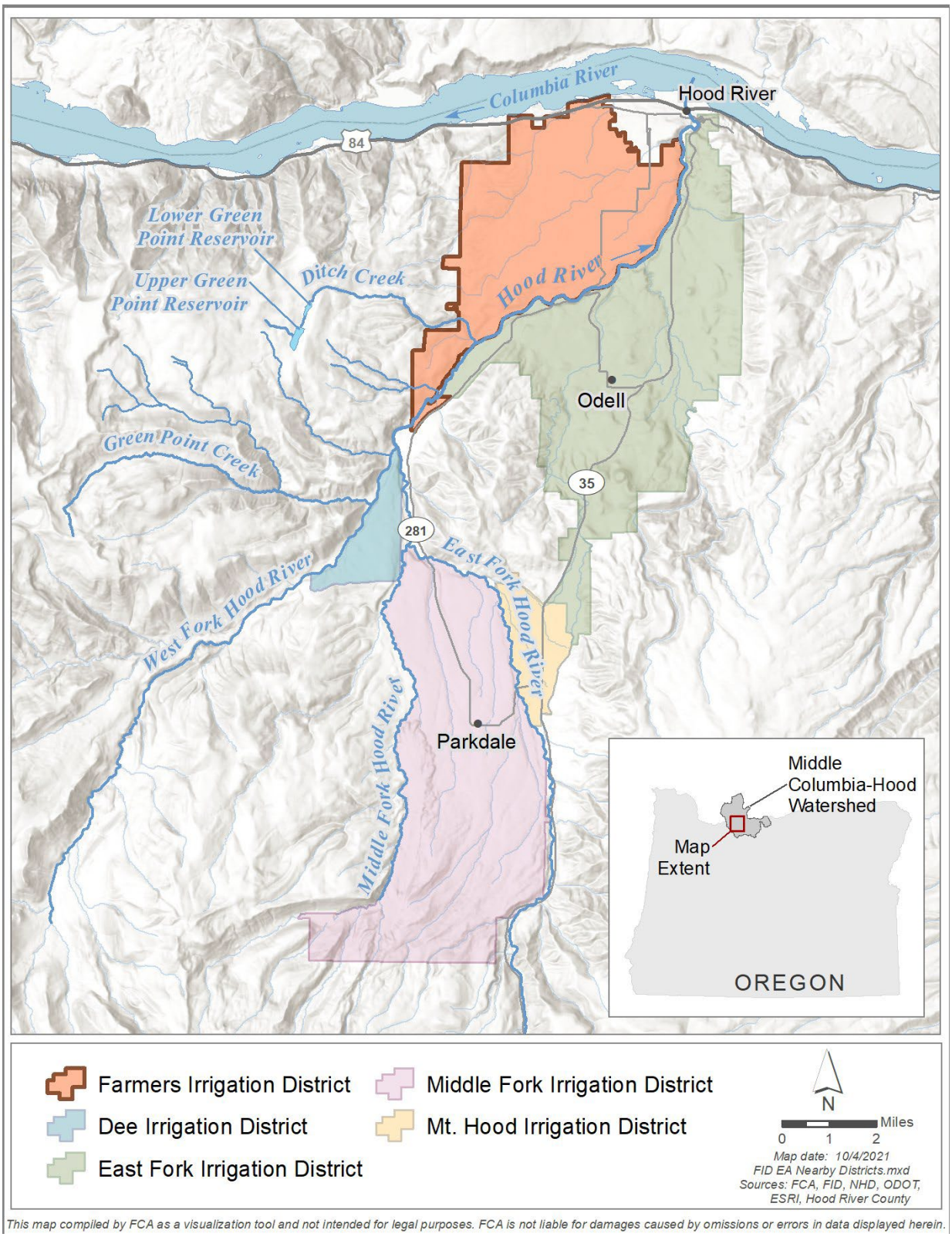


Figure 1-1. Irrigation districts within the Hood River Basin.

1.1 Planning Area

The District is located near the city of Hood River in Hood River County, Oregon. The District is over 11,000 acres in size, of which 5,888 acres are irrigated lands. FID diverts natural flow from the Hood River and its tributaries and releases stored water released from the Upper and Lower Green Point reservoirs. The planning area is based on the irrigation problem area and is defined as the entire District plus tax lots outside of the FID boundary that are within 50 feet of the proposed project area (see Table 1-1 and Appendix B).

Table 1-1. Farmers Irrigation District Watershed Area.

Middle Columbia-Hood Subwatershed Name	12-digit Hydrologic Unit Code	Planning Area Within Subwatershed (Acres)
Eagle Creek	170701051203	1,911
Grays Creek-Columbia River	170701051106	13,265
Carson Creek-Columbia River	170701051204	2,906
Lower West Fork Hood River	170701050603	8,127
Odell Creek-Hood River	170701050702	8,556
Indian Creek-Hood River	170701050703	5,588
Herman Creek	170701051201	9,973
	Total	**50,327**

1.2 Project Area

The project area is the portion of the planning area where the 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 easements where construction would take place.

1.3 Current Infrastructure

The District operates approximately 70 miles of pipelines, 3 miles of open canals, two hydroelectric plants, two reservoirs, and a centralized pumping and filtration station. The District also operates 11 diversions; all are equipped with horizontal fish screens. FID provides irrigation water to 5,888 acres, serving 1,932 agricultural and residential users. FID holds water rights to a variety of water sources for the purposes of irrigation, storage, hydropower, spray, fertilization, temperature control, and frost protection. In an ordinary water year, FID diverts water primarily from Rainy Creek, Gate Creek, Cabin Creek, Ditch Creek, North Fork Green Point Creek (NFGPC), Dead Point Creek, South Fork Pine Creek, North Fork Pine Creek, Winan Spring, and the Hood River (FID 2020). The District's two reservoirs, Upper and Lower Green Point reservoirs, provide supplemental irrigation water (FID 2020).

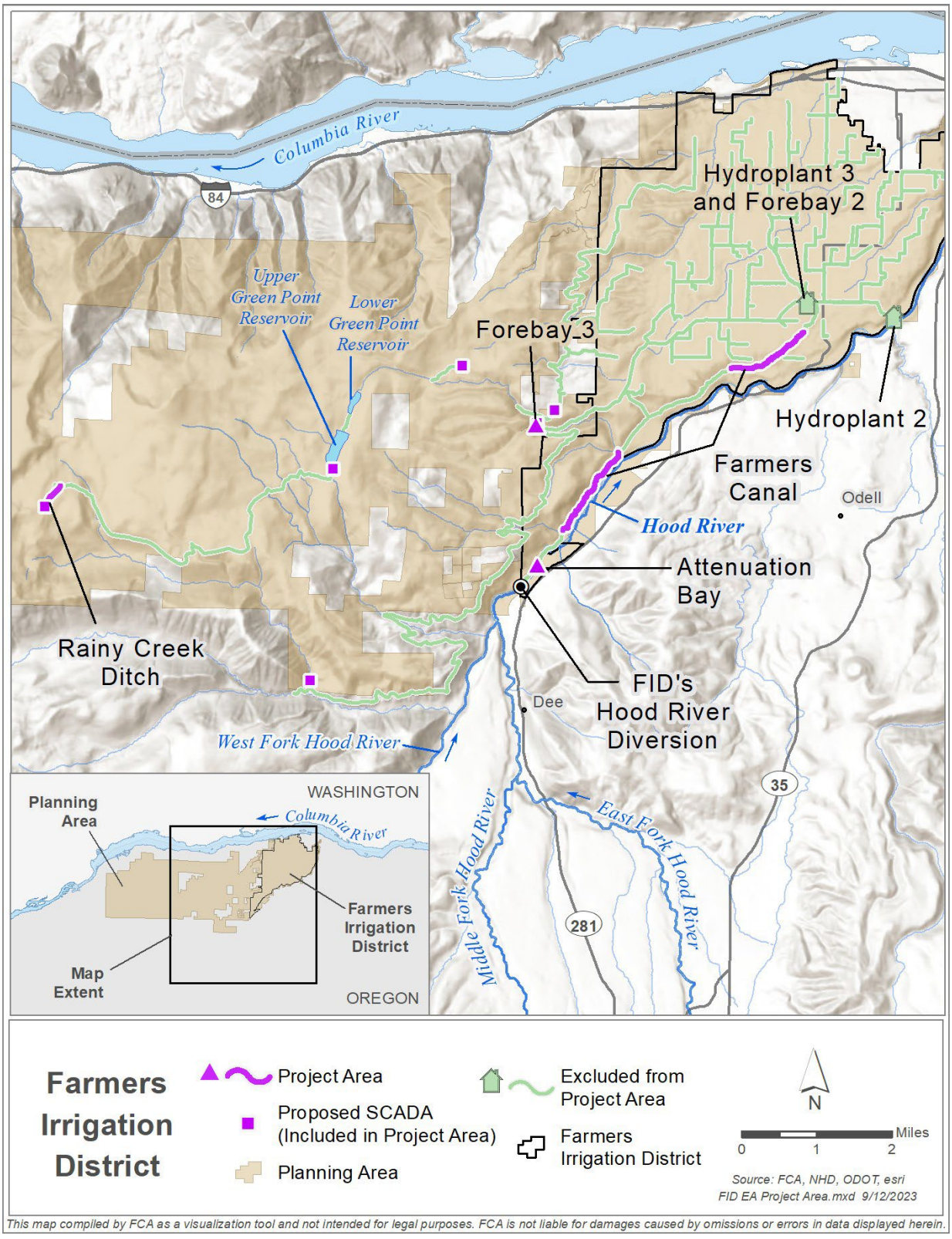


Figure 1-2. Farmers Irrigation District's Infrastructure and Irrigation Modernization project area.

The District has two hydroelectric plants: Plant 2 and Plant 3 (see Figure 1-2). Plant 2 is located adjacent to the Hood River at river mile (RM) 4.5, has a generation capacity of 2.6 megawatts, and operates year-round. Plant 3 is located off Peters Drive, has a generation capacity of 1.8 megawatts, and its operation varies by year, but it is online roughly September to June. FID's two hydroelectric plants are served by two forebays, which hold water and regulate flow. Forebay 3 has a capacity of about 1 acre-foot (AF) and is approximately 0.1 acres in size with an average depth of 10 feet. Forebay 3 delivers water to Plant 3 and then into Penstock 2 (a pressurized pipe) that services Plant 2. To meet the needs of patrons at peak demand, FID must spill water prior to and after peak demand at Forebay 3 into Ditch Creek. Water from the District's Hood River point of diversion is transported to Penstock 2 via the Farmers Canal. Water entering Penstock 2 is mixed in Forebay 2, which is next to Plant 3. Forebay 2 is approximately 0.15 acres in size with an average depth of 10 feet. FID currently manages a limited SCADA telemetry system, with several monitoring sites installed throughout the District.

The Hood River's heavy glacial sand and silt load requires that sediment be separated from irrigation water near the point of diversion. Currently, the District manages sediment below its Davenport Diversion on the Hood River with a spill gate, that directs heavy sediment back to the river, and an attenuation bay, which allows sand to settle out. The existing attentuation bay has a capacity of approximately 6,000 cubic feet (0.14 AF). When sediment loads are high, FID must dig out sediment from the attenuation bay on a daily basis. Silt tends to remain in the diverted water, and although the District uses an additional filter system, patrons must still use and maintain filters at their turnouts.

1.4 Decision Framework

This Watershed Plan-Environmental Assessment (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 P.L. 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 the National Environmental Policy Act (NEPA). NEPA requires that projects using federal funds be evaluated for potential effects on the quality of the human and natural environment (individually or cumulatively). When a proposed action 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. If it is determined by the federal agency that the project would result in significant effects on the human or natural environment, an Environmental Impact Statement must be prepared (see 40 Code of Federal Regulations [CFR] 1501.4 and 1508.9; 7 CFR 650.8).

NRCS has determined the need for a Plan-EA to implement the proposed action under P.L. 83-566 watershed authority. The proposed action is planned to be completed as five project groups phased over 5 years beginning in 2025 and ending in 2030.[2] 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 if that particular individual project meets applicable

[2] "Project group" refers to groupings of infrastructure that would undergo construction during the same period.

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 effects 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 Sponsoring Local Organization's 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 2015 NRCS National Watershed Program Manual (NWPM) (NRCS 2015) and guidance of the 2014 NRCS National Watershed Program Handbook (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[3] as well as the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies (PR&G) (CEQ 2014). 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 2017b, c).

[3] Principles and Requirements are established pursuant to the Water Resources Planning Act of 1965 (PL 89-8), as amended (42 U.S.C.] 1962a-2) and consistent with Section 2031 of the Water Resources Development Act of 2007 (PL 110-114).

2 Purpose and Need for Action

The purpose of this project is Agricultural Water Management[4,5] through improved water delivery reliability and water conservation along District infrastructure. There is a need to improve water conservation and water conveyance in District-owned infrastructure and to improve operation efficiency to allow FID to better manage its irrigation water deliveries to patrons.

Per the Federal Objective, water resource investments, including the proposed action put forth in this plan, 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).

The proposed action would be eligible for funding under P.L. 83-566 under "Authorized Project Purpose (v), Agricultural Water Management,"[6] due to the proposed action's focus on irrigation water conservation and more reliable agricultural water supply delivery.

2.1 Watershed Problems and Resource Concerns

Federal assistance is needed to support the District in addressing the following watershed problems and resource concerns. Regarding public safety, see Section 4.3.

2.1.1 Water Loss in District Conveyance Systems

The two open sections of the Farmers Canal lose a total of 6.9 cubic feet per second (cfs; 2,288 AF per year) from April 15 to September 30. Rainy Ditch loses 0.42 cfs (46.2 AF per year) from April 15 to September 30 (see Appendix E.6 for water loss details). Water losses due to an inefficient conveyance system reduce the District's ability to deliver to its irrigators the full rate and duty associated with each water right and require the District to divert more water than is needed for irrigation. The District has identified that modernization of the earthen canals is a high prioirty to both conserve water and improve operational efficiencies.

2.1.2 Water Delivery and Operations Inefficiencies

The District's operational inefficiencies include maintaining open canals, particularly those in remote locations; operational spills; high natural sediment load in pipelines and irrigation water from the Hood River and its tributaries; and the inability to monitor and adjust diversions in real time due to a lack of measurement devices at diversions. The District has piped most of its system; however, the remaining open canal sections lose water to seepage and evaporation. As a result, the District must divert more water than is required for irrigation. Seepage and fluctuations in water demand make it challenging for the District to manage and deliver the amount of water that patrons need when they need it. In order to meet patrons' demands, FID must discharge operational spill water at Forebay 3. To meet patron peak demand under anticipated future water shortages, the District aims to

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

[5] 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 be an authorized project purpose under Sections 3 and 4 of P.L. 83-566.

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

minimize water losses and operational spills through its distribution systems and monitor and control water flow to transport and deliver water more precisely, accurately, and efficiently.

2.1.3 Instream Flow for Fish and Aquatic Habitat

The Hood River and its tributaries support threatened and sensitive species, including steelhead trout, bull trout, Chinook and coho salmon, Pacific lamprey, and many other fish, bird, and wildlife species. In the Hood River Basin, low streamflow is identified as a primary limiting factor for coho, steelhead, and Chinook populations, which are listed as threatened species under the Endangered Species Act (ESA; NMFS 2013).

Streamflow in the Hood River is insufficient to meet competing demands for water during the summer months. Low streamflow can limit the amount and quality of habitat for many fish and aquatic species, concentrate the proximity of predators and prey, increase competition for food and spawning sites, and contribute to warm water temperatures that are harmful to salmon and trout.

2.1.4 Sediment in Irrigation Water

Periodically, the Hood River has heavy glacial sand and silt content. Although FID removes sediment from irrigation water at multiple locations throughout its system (detailed below), the quality of irrigation water due to sediment is poor for weeks to months each year. Sediment in irrigation water erodes sprinkler heads and clogs drip emitters, reducing the efficiency of irrigation systems on farms and orchards. Sediment that settles in the Farmers Canal also reduces the volume of water that can be conveyed in the canal, limiting hydropower production at Plant 2.

Currently, the District uses a spill gate below its Hood River Diversion to direct heavy sediment and bedload traveling low in the water column back to the river. The District also has a sediment flush system that directs sediment back to the river, as well as an attenuation bay that allows some sediment to drop out before the Farmers Canal pipeline. When sediment loads are high, the District uses a track hoe to dig the accumulated sediment out from the bay on a daily basis. Additionally, on an annual basis, the District removes sediment from the Plant 2 forebay. FID uses a large filter system to remove as much of the remaining sediment as possible as water is delivered to patrons; however, patrons must still use filters at their turnouts, which require regular maintenance.

The sediment load in the Hood River is expected to increase in the future with glacial retreat, reduced snow cover, and extreme weather events that may cause more landslides in the Hood River and waterbodies associated with District operations (Huggel et al. 2012; U.S. Bureau of Reclamation Reclamation [Reclamation] 2015).

2.2 Watershed and Resource Opportunities

The following resource opportunities would be realized through the implementation of the project.

- Improved streamflow, water quality, and habitat in the Hood River and select tributaries within the planning area.
- Existing agriculture would be supported and maintained through enhanced water supply reliability and improved water management.
- Minimized potential for flooding, injury, and loss of life associated with the open Farmers Canal.
- Reduced District O&M required to deliver irrigation water to patrons.

- Increased water in the river for fish at specified locations, times, and quantities.
- Prevention of canal failure in the future to improve water delivery reliability.
- Increased water to fulfill water rights to improve water delivery reliability.
- Ability to better match diversion rates to patron water needs.
- Fulfillment of delivery of Rainy Ditch patron water rights to improve water delivery reliability.
- Upgrade or elimination of the few remaining individual pumps after piping the Farmers Canal.
- Increased water level in Upper Green Point Reservoir during the non-irrigation season.
- Reduced risks to public safety, particularly reduced risks of drowning in open canals.
- Reduced risks of failure of earthen or lined canals that can result in localized flooding of undeveloped and agricultural private lands, including nearby structures and roads.

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 newpaper in addition to multiple online locations including the NRCS 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 (NHPA), and its subparts, NRCS has initiated consultation and coordination with the State Historic Preservation Office (SHPO) (November 9, 2022), federally recognized tribes (November 10, 2022), and other consulting parties including Certified Local Governments on the Area of Potential Effects (APE) (November 10, 2022) prior to cultural resources surveys. Input received from these entities will be incorporated into the cultural resource identification survey and completed prior to implementation.

Per Executive Order (EO)13007, Indian Sacred Sites, NRCS will coordinate with federally recognized tribes whose ancestral lands are known to have been in the counties of the undertaking prior to conducting cultural resources surveys. Tribal input will be meaningfully incorporated into the cultural resource identification survey within the APE.

After completion of the cultural resources identification survey and subsequent NRCS review, a copy of the completed survey report will be 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 (MOA) is executed and signed by NRCS Oregon and relevant parties or by comment from the Advisory Council on Historic Preservation.

Tribal consultation was conducted in accordance with the NHPA and EO 13175, *Consultation and Coordination with Indian Tribal Governments*, to maintain NRCS's government-to-government relationship with Native villages and tribes. NRCS sent a letter to the Confederated Tribes of Warm Springs (CTWS) notifying them of the scoping process (June 3, 2021).

3.2 Scoping Meeting

A virtual public scoping meeting was held on June 16, 2021. Presenters at the meeting included Gary Diridoni, NRCS, and Kate Hart, Farmers Conservation Alliance (FCA). The presentations covered the financial assistance available through P.L. 83-566, the project purpose and need, the Plan-EA process, and ways in which the public could get involved. After the presentations, attendees asked questions and provided comments for the public record. A total of 15 people attended the meeting, excluding staff from FID, NRCS, and FCA.

3.3 Scoping Comments

Scoping comments were accepted from June 1 to July 15, 2021. Comments were submitted at the public meeting and via email.

Comments generally supported the proposed action. Table 3-1 presents comment topics received and where they are addressed in this Plan-EA.

Table 3-1. Public Scoping Comment Summary.

Comment Topic	Section Where Topic is Discussed
Concern for wildlife finding water sources once canals are piped	Section 6.11
Request for wildlife guzzlers along pipeline	Section 6.11; Section 6.12

3.4 Identification of Resource Concerns

Table 3-2 provides a summary of resource concerns identified through scoping and their relevance to the proposed action. Resources determined not relevant were eliminated from detailed study; resources determined to be relevant have been carried forward for analysis.

Table 3-2. Summary of Resource Concerns for the Irrigation District Infrastructure Modernization Project.

Resource	Relevant to the proposed action?		Justification
	Yes	No	
Air Quality		X	Oregon Department of Environmental Quality (ODEQ) air quality data indicate that the entire project area is in attainment for all criteria pollutants. Emissions from equipment associated with construction activities would occur; however, such emissions are considered negligible when compared to background levels and the application of best management practices (BMPs).
Coastal Zones		X	None present.
Coral Reefs		X	None present.
Cultural and Historic Resources	X		Consultation with SHPO, Tribal Historic Preservation Office (THPO), and other consulting parties including affiliated tribes is required for compliance with Section 106 of the NHPA.
Ecologically Critical Areas		X	The project area does not cross through any ecologically critical areas.
Endangered and threatened species: Animals	X		Four ESA-listed threatened fish species occur in the Hood River Basin: Hood River bull trout, Lower Columbia River Chinook, Lower Columbia River coho, and Lower Columbia River steelhead. All of these species are known to occur in the Hood River.

Resource	Relevant to the proposed action?		Justification
	Yes	No	
Endangered and threatened species: Plants		X	No ESA-listed endangered or threatened plant species, plant species of concern, candidate plant species, their designated critical habitats, or Oregon special status plant species are known to occur within the project area (ODA 2019).
Environmental Justice		X	The proposed project area is located near minority populations. However, no effects on these groups are anticipated as a result of the proposed action, and therefore, the proposed action would comply with EO 12898.
Essential Fish Habitat (EFH)	X		The National Oceanic and Atmospheric Administration (NOAA)'s Essential Fish Habitat Mapper tool identified Hood River County as essential fish habitat for Chinook and coho salmon (NOAA Fisheries 2021a).
Fish and Fish Habitat	X		The proposed action could affect fish habitat within waterbodies associated with District operations.
Floodplain Management	X		Construction and operation of the modified attenuation bay would occur in the 100-year floodplain (Hood River County 2021).
General Wildlife and Wildlife Habitat	X		Construction and operation of project components could affect wildlife near District operations.
Invasive Species/Noxious Weeds	X		Noxious weeds are known to occur within the project area.
Invasive Animal Species		X	No invasive animal species are known to occur within the project area.
Land Use	X		Construction and operation of the project could affect land use.
Migratory Birds and Eagles	X		Migratory birds and eagles could occur within the project area.
Natural Areas		X	The project area does not cross any natural areas.
National Parks, Monuments, and Parklands		X	The proposed action does not occur in any national parks, monuments, or parklands.
Noise		X	No relevant effect on noise.

Resource	Relevant to the proposed action?		Justification
	Yes	No	
Prime Farmlands	X		Prime farmlands occur in the project area and could be affected by the proposed action.
Public Safety	X		The proposed action could affect drowning risk in open canals.
Recreation	X		The proposed action could beneficially affect recreation.
Regional Water Resource Plans		X	The proposed action does not consider altering the management of any regional water resources.
Riparian Areas and Wetlands	X		Wetlands and riparian areas could be affected by project construction activities or changes in water levels.
Scenic Beauty and Visual Resources		X	Visual resources were not identified during scoping. Additionally, the project area is located in a rural setting, and few people would be able to see the project.
Scientific Resources		X	Scientific resources would not be affected by the project.
Soils	X		Construction of the project could affect soils.
Socioeconomics	X		The proposed action involves an expenditure of public funds that could affect the local and regional economy. An evaluation of the effects of providing NRCS funding is included.
Sole Source Aquifers		X	No sole source aquifers are present in or near the project area (USEPA 2020a).
Water: Groundwater Quantity, Aquifer Recharge	X		Construction and operation of the project could affect aquifer recharge.
Water: Surface Water Quality	X		Operation of the project could affect surface water quality.
Water: Surface Water Quantity	X		Operation of the project could affect surface water quantity.
Wild and Scenic River		X	No Wild and Scenic Rivers occur within the proposed project area. Portions of the Middle Fork and East Fork Hood River, which lie upstream of the project area, are designated Wild and Scenic Rivers.

Resource	Relevant to the proposed action?		Justification
	Yes	No	
Socioeconomics			
National Economic Efficiency (NEE)	X		A NEE analysis has been completed as required by PR&G's Interagency Guidelines.

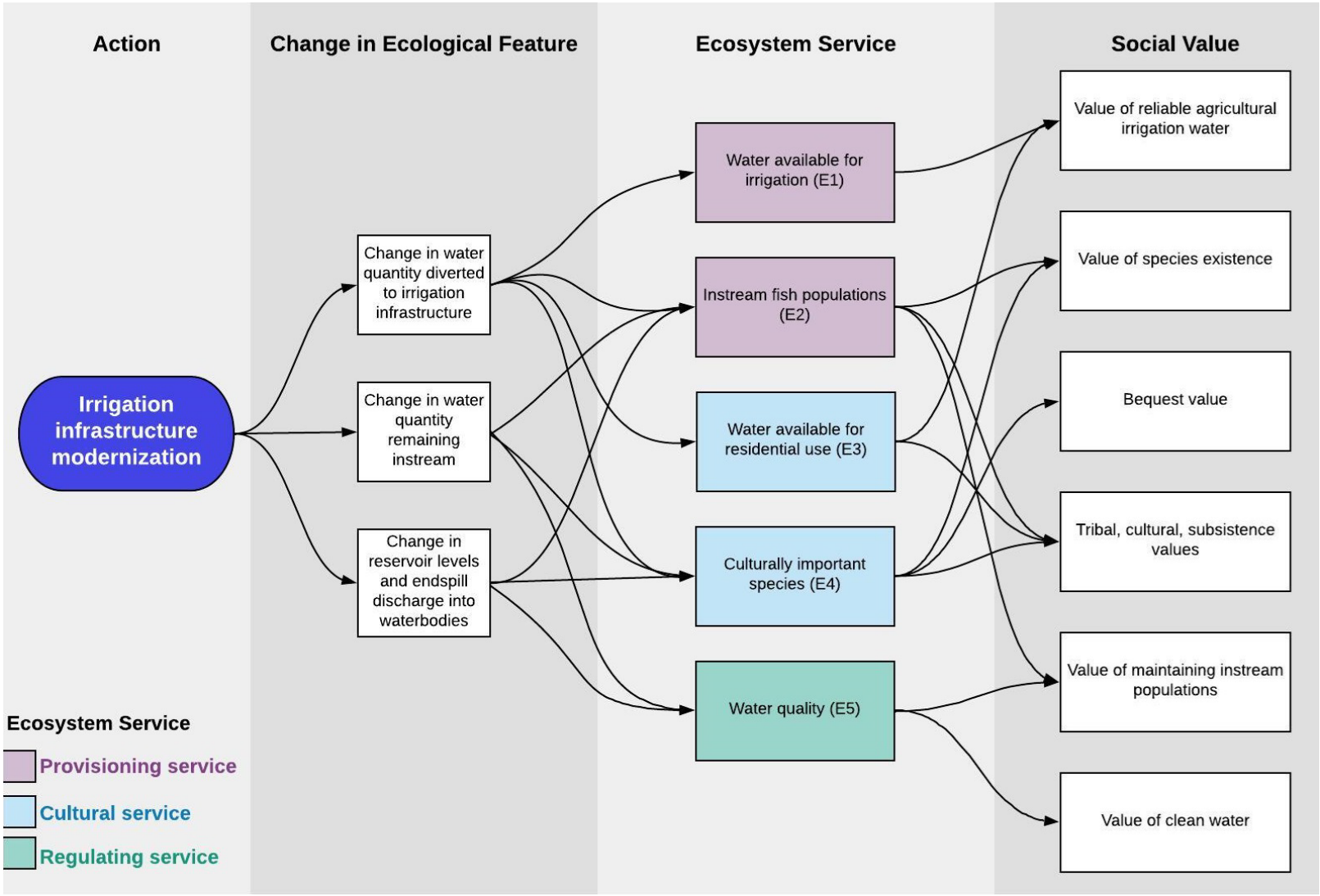
4 Affected Environment

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 FID system. The project area is defined in Section 1.2. Per the requirements of the PR&Gs, and 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. The 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 affect ecosystems and natural resources require an ecosystem services assessment to illuminate how management decisions will enhance, sustain, or degrade the benefits that nature provides (Olander et al. 2018; USDA 2017b). An assessment of links between ecological function and social well-being ensures that beneficial and detrimental ecological effects of a project are recognized and that detrimental effects 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 (USDA 2017b):

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.
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 4-1 is a concept diagram that highlights the ecosystem services associated with District operations and provides a baseline for discussion in Section 6. The diagram links an action that would modernize District infrastructure with potentially affected 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; USDA 2017b).



Note: 1) E1 through E5 refer to ecosystem services 1 through 5. These services are referenced and explained in more detail throughout Sections 4 and 6.
2) Ecosystem services concept diagram developed by FCA

Figure 4-1. Ecosystem services concept diagram for the Farmers Irrigation District Infrastructure Modernization Project.

4.1 Cultural Resources

Section 106 of NHPA requires federal agencies to consider the effects of federally funded projects on historic properties, commonly referred to as cultural resources, prior to the expenditure of federal funds. NHPA defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places, including artifacts, records, and material remains related to such a property or resource" (ACHP 2021).

FID started in the area of the former Hood River Irrigation District, which was formed in 1874. In 1906, the Farmer's Irrigation Company was organized. The Hood River Irrigation District constructed the Upper and Lower Green Point reservoirs in 1936 and 1937. The Farmer's Irrigation Company merged with the Hood River Irrigation District in 1978 to become FID. The District's irrigation infrastructure has been subject to extensive modifications or improvements since its original construction (FID 2021). The District's pipelines were built between 1906 and 2016. FID's hydroelectric Plant 2 was built in 1985, and Plant 3, a smaller facility, was added in 1987.

There are no National Register of Historic Places–listed historic properties within the project area based on a review of the Oregon Historic Sites Database (SHPO 2021). Cultural resource surveys of the project area have been completed, are in progress, or are scheduled to be completed before project implementation (see Table E-1 Appendix E.2). Consultation between NRCS, SHPO (November 9, 2022), and federally recognized tribes whose ancestral or ceded lands are within the project footprint (November 10, 2022) for compliance with Section 106 of NHPA has been initiated, and surveys would be completed prior to project implementation. For the purposes of NHPA tracking, the Oregon SHPO has assigned this project as case number 22-1601.

A cultural resource survey of FID's Farmers Canal was conducted on September 9, 2009. Although the Farmers Canal has been extensively modified and much of the canal has been piped, it was determined to be eligible for listing in the National Register of Historic Places in accordance with 36 CFR Part 60.4 (OR SHPO Case No. 09-2638). Subsequently, FID and SHPO entered a MOA under which photo and historic documentation of the Farmers Canal would occur. In accordance with the MOA, photo and historic documentation were completed during the winter of 2010 (OR SHPO Case No. 09-2638).

4.2 Land Use

4.2.1 Land Ownership

Approximately 0.4 miles of the project area crosses land managed by the U.S. Forest Service (USFS); 0.8 miles crosses Hood River County land; and 1.9 miles crosses privately owned land. (See Appendix C for a map of land ownership.) The District has legal right-of-way, easements, or acquisitions for all the existing infrastructure in the project area, except for areas along the Rainy Ditch and Forebay 3. For these locations, FID would secure easements or agreements before implementation.

4.2.2 Land Use

Land use within a majority of the project area consists of irrigation water conveyance and O&M of the conveyance system. The District accesses its infrastructure through maintenance roads in the right-of-way and easements.

The majority of the project area (80 percent) crosses and is adjacent to non-cultivated lands (predominantly evergreen forest). The remainder of the project area crosses and is adjacent to

agricultural land (17 percent) or developed use (3 percent; The National Land Cover Database 2019). FID irrigators primarily grow pears (47 percent) or are residential users (28 percent; see Appendix E.3).

4.3 Public Safety

The District has 3.0 miles of open canal. Although most of these canal sections are on private land, they may still be accessed by residents, farmworkers, and in some areas, by the public. Open canals pose a risk to public safety when they carry water. Water depths in the District's canals range from 2 to 4 feet during the irrigation season, with velocities up to 4 feet per second (L. Perkins, personal communication, November 4, 2021).

These conditions make it difficult for a healthy, strong adult to stand in or climb out of a canal without assistance. A child or non-/weak swimmer would have a higher risk of downing in a canal with these attributes. If a person or animal falls into a canal, they could have serious difficulty gaining a hold on the banks to climb out to safety. At least one drowning has occurred in a District-owned ditch. The canals also pose a threat to equipment. In 2014, a tractor fell into an open portion of the Farmers Canal (L. Perkins, personal communication, November 4, 2021). Barriers or fences are not currently installed on the banks of the canals.

The failure of earthen or lined canals and risk of localized flooding is also a concern for the District. There have been numerous canal failures throughout the District over the last century. While the most dangerous sections of canal have been piped, the remaining open canals are vulnerable to failure. If an open section of canal were to flood or fail, both undeveloped and agricultural private lands would be affected, including nearby structures and roads.

4.4 Recreation

Recreation within the project area and areas associated with District operations in the project area occurs at Upper Green Point Reservoir and Rainy Lake. Upper Green Point Reservoir and Rainy Lake are used for fishing and non-motorized boating during the non-winter months. Any use of the District's maintenance roads other than for O&M purposes is prohibited by the District.

4.5 Socioeconomic Resources

The project area falls within Hood River County, Oregon, and the socioeconomic region of influence includes the planning area as well the city of Hood River.

4.5.1 Population

Generally, the socioeconomic region of influence has seen consistent population growth over the past 10 years (2011 through 2020). Table 4-1 provides more information on the population and population growth within the socioeconomic region of influence and Oregon.

Ethnicity and race for the socioeconomic region of influence are listed in Table 4-2. Both Hood River County and the city of Hood River are majority white (around 93 percent of the population). Approximately 32 percent of Hood River County and 21 percent of the city of Hood River identify as Hispanic or Latino, exceeding the state average of 13.4 percent. As compared to the rest of Oregon, Hood River County ranks in the 76th percentile for linguistically isolated population.[7]

[7] A household in which all members aged 14 years and over speak a non-English language and also speak English less than "very well" (have difficulty with English) is linguistically isolated.

Ninety percent of the linguistically isolated households in Hood River County speak Spanish (USEPA 2020b).

Table 4-1. Population by State, County, and City.

Indicator	Oregon	Hood River County	City of Hood River
Population in 2020 (number of people)	4,268,055	25,640	8,565
Population growth 2011–2020	10.6%	13.3%	17%

Source: (Portland State University 2020)

Table 4-2. Race by State, County, and City.[1]

Indicator	Oregon	Hood River County	City of Hood River
Total Population Estimate in 2021 (number of people)	4,240,137	24,057	8,341
Two or More Races	4.2%	2.9%	9.0%
One Race	95.8%	97.1%	91.0%
White	86.2%	93.0%	79.9%
Black or African American	2.3%	0.8%	1.5%
American Indian and Alaska Native	1.9%	1.2%	0.0%
Asian	5.0%	1.8%	1.0%
Native Hawaiian and Other Pacific Islander	0.5%	0.3%	0.1%
Some Other Race	0.0%	0.0%	1.2%
Hispanic or Latino (of any race)	14.0%	32.0%	25.5%
Not Hispanic or Latino	86.0%	68.0%	74.5%

[1] Some estimates presented here come from sample data, and thus have sampling errors that may render some apparent differences between geographies statistically indistinguishable.
Source: (U.S. Census Bureau 2021)

4.5.2 Area Employment and Income

In 2019, the largest industries in Hood River County were "health care and social assistance" and "agriculture, forestry, fishing and hunting" (Data USA 2021). Household income and persons living below the poverty level are summarized in Table 4-3. Income in the socioeconomic region of

influence is within 5 percent of the state average. Persons in poverty are well below the state average in both the county and city of Hood River.

Table 4-3. Income and Poverty by State, County, and City.

Indicator	Oregon	Hood River County	City of Hood River
Median Household Income	$62,818	$65,679	$60,542
Persons in Poverty	11.4%	8.4%	6.2%

Source: (U.S. Census Bureau 2021)

4.5.3 Environmental Indicators/Environmental Justice

The U.S. Environmental Protection Agency's (USEPA) environmental justice screening tool, EJScreen, was reviewed for Hood River County. Table 4-4 summarizes the percentage of minority and low-income populations for Hood River County and the state. Hood River County has a higher proportion of minority population and a lower proportion of low-income population, as compared to the state percentage.[8]

Table 4-4. Minority and Low-Income Populations by State and County.

Group	Hood River County Percentage	State Percentage
Minority Population	36%	24%
Low-Income Population	30%	33%

Source: (USEPA 2020b)

According to the CEQ's Environmental Justice Guidance under NEPA, environmental justice communities should be identified where "(a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population."

4.5.4 Agricultural Statistics

Hood River County is the largest producer of pears in the country (Columbia Gorge Fruit Growers 2021). In 2017, the market value of agricultural products sold in Hood River County was approximately $126 million (USDA 2017a). Within FID, irrigators primarily grow orchard crops or are residential water users (see Appendix E.3 for more information on the total acreage of various crops grown in FID).

[8] CEQ defines minority as "Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (CEQ 1997)."

4.6 Soils

The District and project area are primarily made up of loamy soils, ranging from fine sandy loam to very cobbly loam. The parent material of these soils is a mixture of water-deposited clay, silt, sand, and gravel; pumice from volcanic explosions; and wind-transported silty material (USDA 1981).

4.6.1 Farmland Classification

NRCS has developed technical soil groupings which are associated with soil types and soil ratings for agricultural commodity production (NRCS 2019).[9] The District is predominantly made up of prime farmland and farmland of statewide importance. Within the project area, soils are generally classified as a mix of not prime farmland or farmland of statewide importance (see Appendix E.4).

4.7 Vegetation

4.7.1 General Vegetation

Vegetation within the lower elevations of the project area consists of grass and cultivated crops (mostly pear trees).[10] Orchards border a substantial portion of the project area. Typically, buried pipelines passing through orchards are overlain by mowed grass or a dirt track. Within the higher elevation, lesser-developed portions of the project area, a mix of shrublands, grasslands, Douglas fir, ponderosa pine, and white oak woodlands is common (ODA 2019). See Appendix E.5 for general vegetation species found within the project area.

4.7.2 Special Status Species

No ESA-listed endangered or threatened plant species, plant species of concern, candidate plant species, or their designated critical habitats or Oregon special status plant species are known to occur within the project area (ODA 2019).

4.7.3 Common and Noxious Weeds

The District manages terrestrial noxious weeds such as knapweed, reed canary grass, Scotch broom, and Himalayan blackberry with mechanical mowing. During the irrigation season, various species of hydrophytic vegetation grow within the canals. The District is able to manage vegetation within the canals via mechanical removal (L. Perkins, personal communication, November 22, 2021).

4.8 Water Resources

4.8.1 Water Rights and District Water Supply

The District holds irrigation, storage, hydropower, spray, fertilization, temperature control, and frost protection water rights to a variety of waterways (see Appendix E.6). This section discusses the water rights associated with the waterbodies in the project area. Within the project area, these water rights allow the District to first divert live flow from the Hood River and tributaries to the Hood River and West Fork Hood River. FID then supplements its live flow diversions with stored water from Upper and Lower Green Point reservoirs.

During the irrigation season from April 15 to September 30, the District releases up to 715 AF of water annually from Upper Green Point Reservoir as necessary to supply the water rights held by

[9] Farmland of statewide importance refers to "land that is available for farming, but could currently be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water" (NRCS 1985).

[10] Lower elevation areas include lands within the District boundary.

the District. The water is conveyed from Upper Green Point Reservoir through Ditch Creek to Lower Green Point Reservoir, where an additional 288 AF are stored, and then through Ditch Creek to the District's diversions. Peak irrigation demand within FID occurs in July and August.

The District has experienced drought years intermittently throughout its history. By following its curtailment plan, FID has been able to provide water through the irrigation season, with limited effects on crop quality. However, given the impacts of climate change, future water supplies are expected to decrease.

4.8.2 Surface Water Hydrology

The hydrology of the Hood River Basin is characterized by highly variable streamflow and rapid runoff. The primary sources for surface water and springs are snowpack and glacial melt on Mount Hood, with 50 to 70 percent of streamflow during late summer provided by glacial melt (Reclamation 2015). Many basin tributaries have very low summer flows, while tributaries with glacial sources maintain higher flows due to glacial melt.

Currently, streamflow in the basin is insufficient to meet competing demands for water during the summer. This imbalance is expected to be exacerbated by climate trends. Mount Hood's glaciers have been receding since the mid-1900s or earlier (Reclamation 2015). Glacial recession and declining snowpack are expected to continue as a result of the warmer air temperatures predicted with changing climate (Reclamation 2015). Peak streamflow in the Hood River is expected to shift to earlier in the year with a loss of flow during the summer months when water uses are greatest (Reclamation 2015; Salminen et al. 2016). Based on observations of declining streamflows in Rainy, Gate, and Cabin creeks, the District expects that flows in these tributaries will decrease in the future with changing climate (L. Perkins, FID, personal communication June 1, 2023).

Table 4-5 and Figure 4-2 present waterbodies associated with District operations in the project area.

Table 4-5. Waterbodies Associated with District Operations in the Project Area.

Name	Associated River Miles	Size	Tributary To	Project Nexus
Rainy Creek	FID diversion at RM 0.9 to confluence with NFGPC	N/A	NFGPC	FID's diversion at RM 0.9 affects downstream flow.
Gate Creek	FID diversion at RM 0.8 to confluence with NFGPC	N/A	NFGPC	FID's diversion at RM 0.8 affects downstream flow.
Cabin Creek	FID diversion at RM 0.9 to confluence with NFGPC	N/A	NFGPC	FID's diversion at RM 0.9 affects downstream flow.
Upper Green Point Reservoir	N/A	1,365 AF	Ditch Creek	FID holds 715 AF of water rights in this reservoir.[1]

Name	Associated River Miles	Size	Tributary To	Project Nexus
Lower Green Point Reservoir	N/A	288 AF	Ditch Creek	FID holds 288 AF of water rights in this reservoir.
Ditch Creek	Upper Green Point Reservoir to Lower Green Point Reservoir	N/A	Hood River	Releases from Upper Green Point Reservoir affect flow in this reach.
Ditch Creek	Lower Green Point Reservoir to confluence with Hood River	N/A	Hood River	Releases from Lower Green Point Reservoir affect flow in this reach. FID diverts from three locations along Ditch Creek. Operational spills at Forebay 3 discharge an estimated 300 AF/year of stored water to Ditch Creek and down to the Hood River.
NFGPC and Green Point Creek	Confluence of Rainy, Gate, and Cabin creeks with NFGPC to Green Point Creek confluence with West Fork Hood River	N/A	West Fork Hood River	FID's diversion at RM 1.1 affects downstream flow.
West Fork Hood River	Confluence with Green Point Creek at RM 1.4 to Hood River confluence	N/A	Hood River	FID's diversions on tributaries to the West Fork Hood River affect downstream flow.
Hood River	Confluence with West Fork Hood River at RM 12.5 to mouth	N/A	Columbia River	FID's diversions on tributaries to the West Fork Hood River and on the mainstem Hood River (RM 11.4) affect downstream flow.

AF = acre-feet; N/A = not applicable; NFGPC = North Fork Green Point Creek; RM = river mile

[1] Historically, the upper reservoir had a storage capacity of 715 AF. FID expanded the reservoir to 1,365 AF in 2021. FID hopes to be able to store 1,365 AF of water beginning in the 2023-2024 non-irrigation season, with that water available for irrigation in 2024.

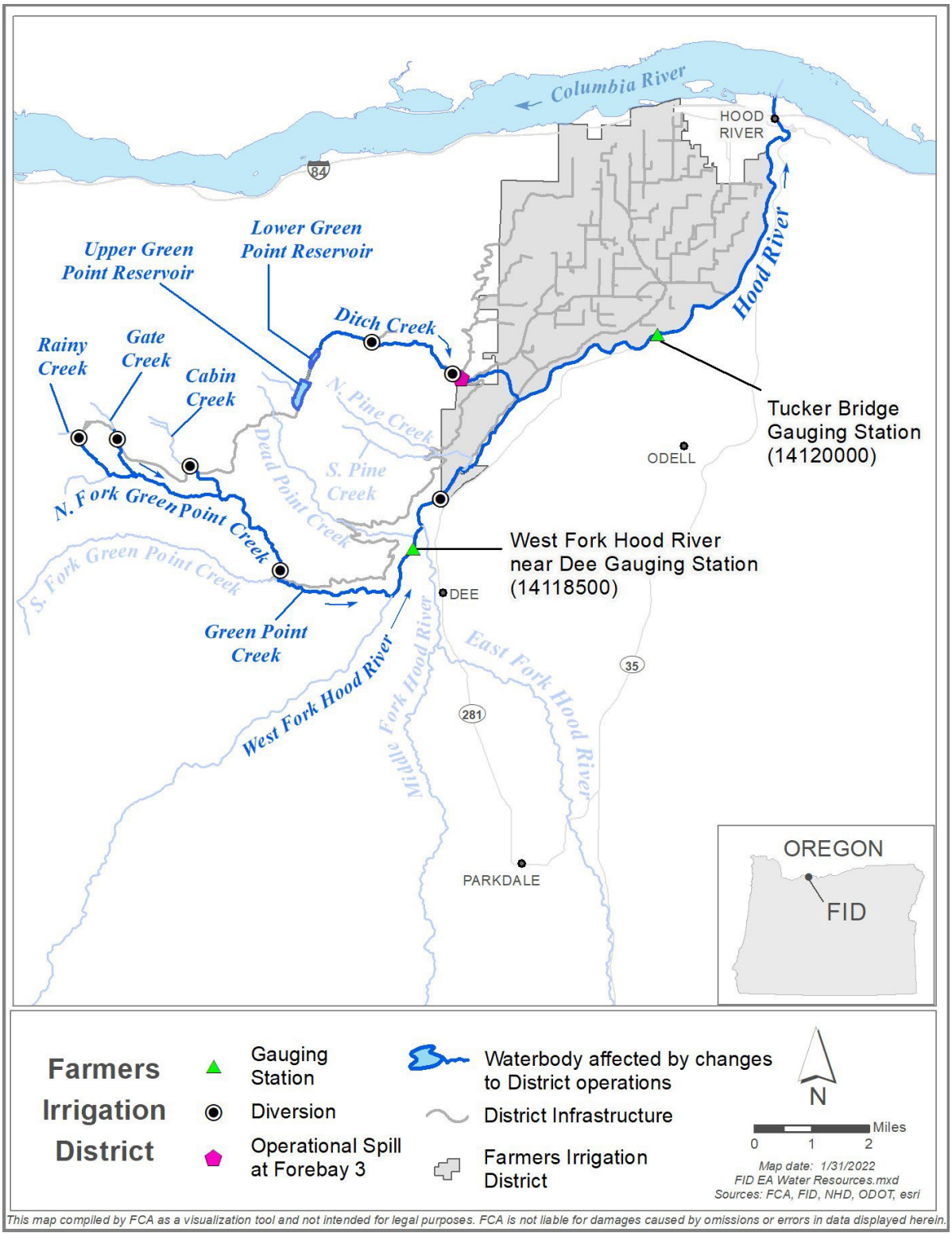


Figure 4-2. Waterbodies associated with District operations in the project area and locations of streamflow gaging stations.

4.8.2.1 Hood River from West Fork Hood River Confluence (RM 12.5) to Columbia River (RM 0.0)

Snowmelt, glacial melt, tributary inflows, irrigation diversions, and groundwater interactions drive streamflow patterns in the Hood River. For the years 2011 to 2021, the average monthly streamflow at the U.S. Geological Survey (USGS) gage No. 14120000 in Hood River at Tucker Bridge (RM 6.0) ranged from 312 cfs in September to 1,486 cfs in April (Figure 4-3). The lowest average monthly flow in the Hood River during this same period was 186 cfs in September 2020 during a drought year.

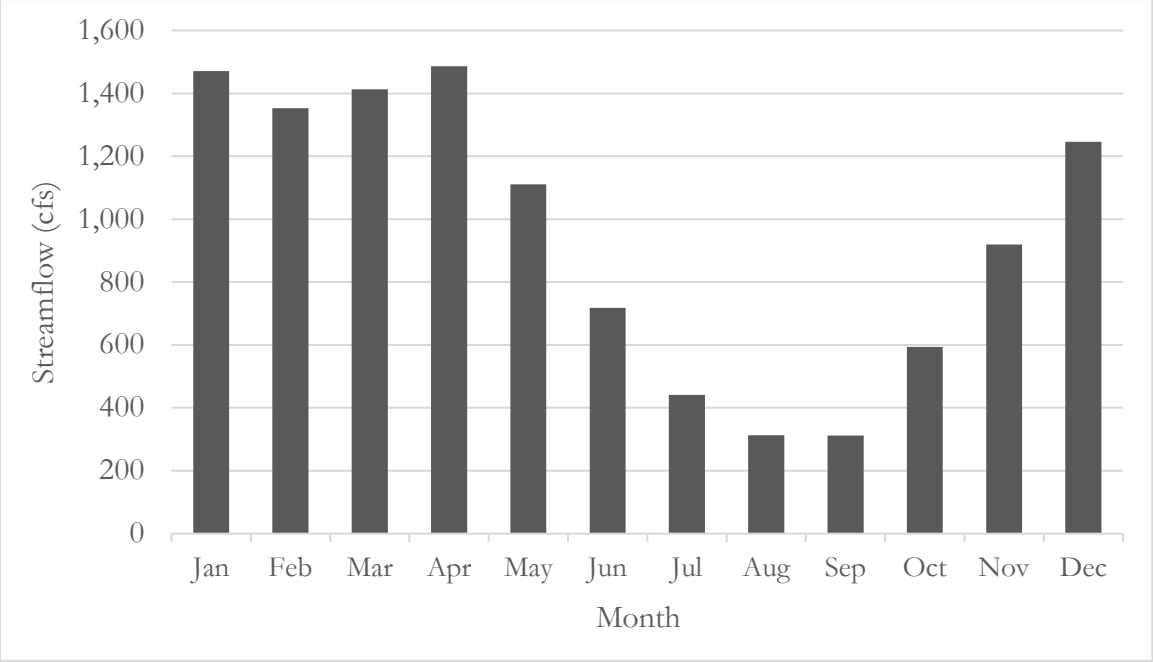


Figure 4-3. Average monthly streamflow in the Hood River at USGS Gage No. 14120000 from 2011 to 2021.

The Hood River has three junior Oregon Department of Fish and Wildlife (ODFW) instream water rights from the former Powerdale Dam site (RM 4.0) to the mouth at the Columbia River (RM 0.0). The District operates under an MOA with ODFW and the Oregon Department of Environmental Quality (ODEQ) related to Plant 2 hydropower operations to help maintain a minimum flow in the Hood River at Tucker Bridge (RM 6.0). If the daily mean flow in the river drops below 250 cfs for three consecutive days, diversion into FID's Farmers Canal will not exceed 40 cfs until the flow in the river exceeds 250 cfs (Christensen and Salminen 2013).

Four other irrigation districts divert water from the Hood River system: East Fork Irrigation District (EFID) and Mount Hood Irrigation District (MHID) from the East Fork Hood River; Middle Fork Irrigation District (MFID) from the Middle Fork Hood River; and Dee Irrigation District (DID) from the West Fork Hood River. FID and MFID have hydropower facilities and operate diversions year-round. The remaining irrigation districts generally divert during the irrigation season from April 15 to September 30. These irrigation diversions influence streamflow patterns in the Hood River.

FID diverts live flow for irrigation at its Hood River Diversion (RM 11.4). From 2014 to 2019, the District diverted an average of 46,040 AF per year[11] at this location (FID 2020). In a normal year, FID diverts irrigation water from the Hood River from April 15 to September 30. As noted above, when flow in the Hood River is below 250 cfs, FID cuts back its diversion to 40 cfs to help satisfy instream flow requirements (usually in July, August, and September).

4.8.2.2 West Fork Hood River from Green Point Creek Confluence (RM 1.4) to Mainstem Hood River Confluence

The West Fork Hood River contributes greater than 40 percent of the natural flow to the mainstem Hood River (Reclamation 2015). The West Fork Hood River joins the Hood River at approximately RM 12.5. For the years 2011 to 2021, the average monthly streamflow at the USGS West Fork Hood River near Dee gage (No. 14118500) ranged from 147 cfs in September to 857 cfs in January (Figure 4-4).

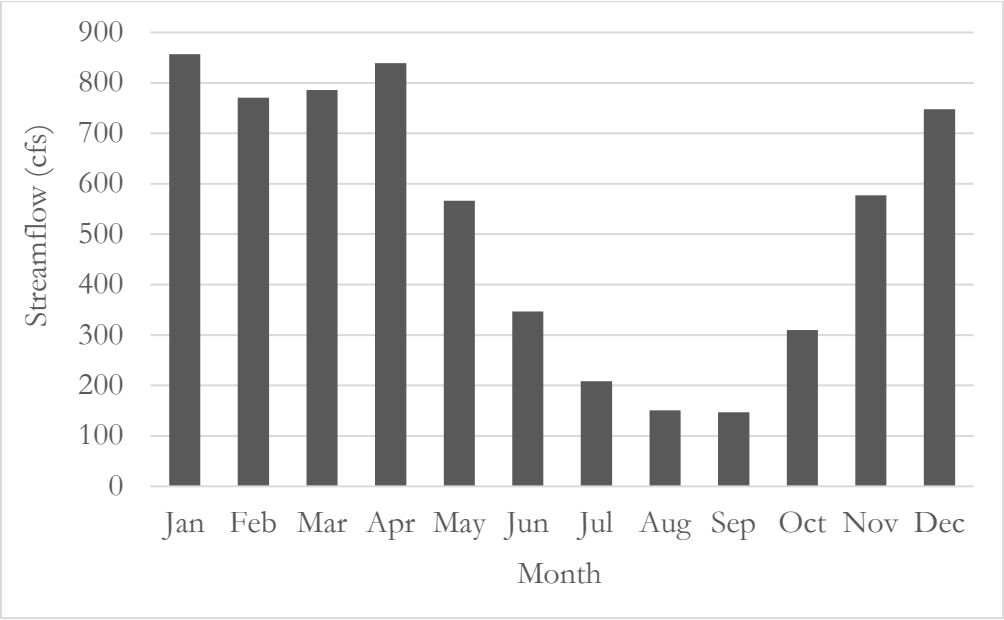


Figure 4-4. Average monthly streamflow in the West Fork Hood River at USGS Gage No. 14118500 from 2011 to 2021.

Within the waterbodies in the project area, FID diverts live flow from the following tributaries to the West Fork Hood River: Rainy Creek, Gate Creek, Cabin Creek, and NFGPC.

4.8.2.3 Rainy Creek, Gate Creek, and Cabin Creek from Diversions to NFGPC Confluences

Rainy, Gate, and Cabin creeks are tributaries to NFGPC, which is a tributary to the West Fork Hood River. Rainy Creek drains from Rainy Lake, and the District diverts water from Rainy Creek at the lake's outlet and conveys it in an open ditch to the Gate Creek drainage. FID usually diverts from Rainy Creek April to June; however, most of the diverted water is lost to seepage in the ditch. A water loss assessment performed in June 2021 found 100 percent loss (FCA 2021a). FID also

[11] This diversion total includes water used for irrigation, hydropower, fertilization, cooling, frost protection and orchard spray.

diverts from Rainy Creek in the winter to fulfill a storage water right in Upper Green Point Reservoir.

Rainy and Gate creek waters are conveyed from the Gate Creek point of diversion to Upper Green Point Reservoir via the Stanley Smith pipeline. Cabin Creek water is diverted into the Stanley Smith pipeline along this route. The District can divert from Gate and Cabin creeks year-round, though FID does not divert from around mid-July through October due to low streamflow. The waters of Rainy, Gate, and Cabin creeks are either stored in or passed through the Upper and Lower Green Point reservoirs (depending on the time of year and beneficial use[s]). Below the reservoirs, these waters are conveyed via Ditch Creek to Forebay 3.

FID's Rainy, Gate, and Cabin creek diversions are remote, at high elevation, and can be very difficult to access in the winter. To adjust the diversions, FID staff must drive for an hour or more on dirt roads. In winter, travel time is greatly increased as these diversions can only be accessed by track machines, such as snow cats or all-terrain vehicles with tracks, and often are not accessible due to depth of snow or snow conditions. Winter travel by track machine is also dangerous due to the miles of inaccessible terrain crossed to get to the diversions. An equipment failure or accident leaves an operator miles from vehicle access with several feet of snow to navigate through for several miles.

4.8.2.4 Upper and Lower Green Point Reservoirs

FID's two reservoirs, Upper and Lower Green Point, provide supplemental irrigation water to a portion of the District. The reservoirs rely on Rainy, Gate, and Cabin creeks and precipitation for inflow. All releases from the reservoirs are measured by FID. Historically, the upper reservoir had a storage capacity of 715 AF. FID expanded the reservoir to 1,365 AF in 2021. FID hopes to be able to store 1,365 AF of water beginning in the 2023–2024 storage season, with that water available for irrigation in 2024. The purpose of the reservoir expansion project was to provide drought resiliency. The additional storage in the reservoir will not be used for irrigation of new lands, but instead be used for additional capacity for dry or drought years when live streamflows are low and more supplemental water is needed to meet patron demands. Water released from Upper Green Point Reservoir is conveyed through Ditch Creek into Lower Green Point Reservoir. The Lower Green Point Reservoir is used to store 288 AF and to reregulate flows from the upper reservoir. Typically, water is stored in the Lower Green Point Reservoir in the final weeks before the irrigation season begins and is generally empty from October to mid-March. Water released from Lower Green Point Reservoir flows through Ditch Creek to the Highline diversion and Forebay 3. Operation and maintenance of the reservoirs is expected to continue for the 100-year project life.

4.8.2.5 Ditch Creek from Upper Green Point Reservoir to Hood River Confluence (RM 9.3)

Ditch Creek is a tributary to the Hood River that enters the Hood River at RM 9.3. Irrigation water and water for hydropower is conveyed via Ditch Creek from the outlet of Upper Green Point Reservoir to Lower Green Point Reservoir and from the outlet at Lower Green Point Reservoir to Forebay 3. Below Lower Green Point Reservoir, the District diverts water directly from Ditch Creek in three locations: the Parkertown Pipeline,[12] the Highline Pipeline, and Forebay 3. FID's operational spill at Forebay 3 spills approximately 200 AF of water per year into Ditch Creek, which then flows to the Hood River.

[12] The Parkertown Pipeline serves lands with a water right to Parkertown Springs. Water that is diverted into the Parkertown Pipeline is, therefore, sourced from Parkertown Springs that then flows into Ditch Creek.

4.8.2.6 NFGPC from Rainy Creek, Gate Creek, and Cabin Creek Confluences to Green Point Creek and West Fork Hood River Confluence

The District diverts water from Rainy, Gate, and Cabin creeks—tributaries to NFGPC. NFGPC is a tributary to the West Fork Hood River. FID also diverts directly from NFGPC (RM 2.5) year-round. This water is transported to Forebay 3 via the Lowline Pipeline. The District operates under an instream flow agreement with ODFW. Under this agreement, FID maintains a minimum flow of 40 cfs in Green Point Creek from January 1 to April 4 and 20 cfs from October 16 to December 31 (Christensen and Salminen 2013). FID also operates under an Allocation of Conserved Water in the Green Point Creek drainage related to one of its irrigation certificates.

4.8.2.7 Drainage Courses

The District does not allow its canal system to be intentionally utilized for stormwater management due to potential contamination of irrigation water from stormwater pollutants. Due to the proximity of springs and seeps, the open sections of the Farmers Canal and Forebay 3 intercept overland flow. Any interception of stormwater is incidental to the purpose of conveying water for irrigation and hydropower.

4.8.3 Surface Water Quality

Irrigation diversions in the Hood River Basin reduce streamflow in spring, summer, and early fall. Low streamflow can affect water quality by raising water temperatures, reducing dissolved oxygen, and increasing the concentration of pollutants.

The District manages one operational spill within the project area at Forebay 3; this operational spill discharges to Ditch Creek, a tributary to the Hood River. However, there are no associated effects on water quality in Ditch Creek or the Hood River; there are no agricultural activities upstream of Forebay 3, the discharged water contains no sediment, and the discharged water has no effect on water temperatures (L. Perkins, FID, personal communication December 2, 2021).

ODEQ maintains a list of all surface waters in the state that are considered impaired because they do not meet water quality standards under Section 303(d) of the Clean Water Act (CWA) (33 United States Code [U.S.C.] 1251 et seq.). Waterbodies associated with District operations in the project area are included on Oregon's Section 303(d) list for not meeting state water quality standards for iron, lead, thallium, copper, biological criteria, silver, and pH (Table 4-6). There are no known water quality issues in the Upper or Lower Green Point Reservoirs.

The open sections of the Farmers Canal provide an opportunity for contaminants such as herbicides and pesticides to enter the District's conveyance system. Any contaminants that enter would be conveyed to patrons with their irrigation water.

The Hood River's high glacial sediment load impacts the quality of diverted irrigation water. Sediment in irrigation water reduces the efficiency of irrigation systems on farms, increases District and patron O&M, and limits hydropower production (see Section 2.1.4, Sediment in Irrigation Water).

Table 4-6. Impaired Waterbodies Associated with District Operations in the Project Area.

Name	Listed Reach (River Miles)	Parameters Included on Oregon's Section 303(d) List
Hood River	Mouth at Columbia River to confluence with Middle Fork Hood River	Iron, lead, thallium (year-round)
Hood River	RM 0.7 to confluence with Middle Fork Hood River	Copper (year-round)
Hood River	Mouth at Columbia River to RM 1.4	Biological Criteria (year-round)
West Fork Hood River	Confluence with Hood River to RM 14.4	Silver (year-round), pH (Fall, Winter, Spring)
West Fork Hood River	Confluence with Hood River to RM 4.6	Thallium (year-round)

Source: ODEQ 2012
RM= River Mile

4.8.4 Groundwater

Groundwater is not extensively developed in the Hood River Basin; therefore, data regarding this resource are limited. Recharge of groundwater in the Hood River Valley is primarily from precipitation and is estimated to be several inches per year (Keller 2011; Reclamation 2015). The general direction of groundwater movement in the county is from south to north; movement is via discharge of groundwater at springs, seepage to streams and rivers, evapotranspiration in cases of a shallow groundwater table, and withdrawl from wells (Keller 2011).

Open irrigation canals can contribute to groundwater through seepage, and seepage rates can vary depending on the geology and permeability of soils surrounding the canal. A water loss assessment study in 2021 measured up to 2,334 AF per year of loss in the open canal sections of FID's Farmers Canal and Rainy Ditch during the irrigation season due to seepage and evaporation (Appendix E.6; FCA 2021a).

4.8.5 Ecosystem Services

Water flowing through the Hood River, and tributaries to the Hood River and West Fork Hood River, provide the following ecosystem services:

Provisioning service: Water available for irrigation (Figure 4-1, [E1]): As described in Section 1.3, water from the Hood River and its tributaries is diverted into the District's irrigation conveyance system and delivered to patrons for agricultural-related purposes. This water is used for food production, feed production, and maintenance of agricultural lands.

Regulating Service, Water quality (Figure 4-1, [E5]): The amount of water instream affects water quality, including temperature, turbidity, sediment, and pollutants. In general, low streamflow challenges a waterbody's ability to resist warming because less water heats faster than more water. Because of this property, greater instream flow can help to keep water cool—an important factor for temperature-sensitive aquatic species living in these stream habitats (Section 4.9). Given pollutant input, less water also leads to higher concentrations of pollutants as compared to more water. Therefore,

greater streamflow also helps to dilute pollutants. Section 4.8.3 describes surface water quality in the waterbodies associated with District operations.

Cultural Service, Residential use (Figure 4-1, [E4]): As described in Section 4.2.2, 28 percent of the irrigated acreage in FID is residential, which includes gardens and residential landscapes (see Appendix E.3). Ecosystem services associated with residential landscapes have been shown to include aesthetic appreciation, recreational enjoyment, water conservation, biodiversity protection, and others (Larson et al. 2016). In Hood River County, and in the west more broadly, where precipitation is limited in the summer, cultural services, including aesthetics, recreation, education, and spirituality, may be mediated by having sufficient water to meet users' recreational landscape goals.

4.9 Fish and Aquatic Resources

Since the development of irrigated agriculture in the late 1800s, the diversion of water, construction of reservoirs and other fish passage barriers, land drainage, and other activities have affected the aquatic environment in the Hood River Basin. Low streamflow and water quality impairments (see Section 4.8.3) are recognized as key limiting factors for fish populations in the basin (NMFS 2013; Shively 2006).

The Hood River Basin is part of 10 million acres of lands ceded to the United States by CTWS. Under rights reserved by federal treaty, tribal members harvest salmon and steelhead from the Hood River. Tribal fishing opportunity has become severely restricted because of low fish abundance and the need to protect weak or threatened stocks (Salminen et al. 2016). CTWS and ODFW are actively engaged in efforts to recover fish populations through habitat restoration, hatchery supplementation, research and monitoring, and harvest management.

The Hood River Basin has one of the most diverse assemblages of native anadromous and resident salmonids in Oregon (Salminen et al. 2016). It includes populations of both summer- and winter-run steelhead and spring and fall Chinook salmon. The original Hood River spring Chinook salmon population was extirpated in the 1970s, and a reintroduction effort from the neighboring Deschutes River stock has been underway since 1993. The abundance and range of anadromous fish in the Hood River Basin have declined compared to historical conditions due to mainstem Columbia River passage challenges related to large hydroelectric dams, pollution, and water temperature increases in the mainstem Columbia, as well as changing oceanic conditions such as water temperature increases and acidification related to climate change (Washington Department of Fish and Wildlife 2022; Overman 2017; Zhang et al. 2019). Three freshwater mussel species are native to the region: western ridged mussel (*Gonidea angulate*), western pearlshell mussel (*Margaritifera falcata*), and duck mussel (*Anodonta)* (personal communication, A. Gray, USFWS, April 13, 2022). Native mussel species, including the western pearlshell and western ridged mussel, are increasingly threatened due to warmer water temperatures and degraded habitat. USFWS is currently reviewing the status of the western ridged mussel for listing under ESA (personal communication, A. Gray, USFWS, April 13, 2022; Xerces Society for Invertebrate Conservation 2021).

4.9.1 General Fish and Aquatic Species

4.9.1.1 Within the Project Area

The District's conveyance system does not support anadromous fish or any threatened and endangered aquatic species. Fish screens are present on all stream diversions within the District. These fish screens pass water diverted for consumptive use into the District's irrigation conveyance system while preventing fish and debris from entering the system. Pacific lamprey are an exception;

they are an anadronomous fish that could be present in the District's conveyence system due to the extremely small, thread-like characteristic of their larvae, which allows them to potentially pass through fish screens. Lamprey have been observed in District infrastructure (L. Perkins, FID, personal communication November 4, 2021).

District canals provide limited habitat for fish and aquatic life primarily because the canals are dewatered for maintenance. The District has observed that a small number of stocked fish[13] enter the Farmers Canal from privately maintained ponds as a result of pond overflows (L. Perkins, FID, personal communication, November 4, 2021). These fish may be able to survive in the canal during shutdowns at locations where a spring or seep maintains a deep enough pool.

In addition to fish, other aquatic, semi-aquatic, and amphibious species occur in waterbodies that are associated with District operations. These likely include water shrew, water vole, newt, and salamander species, and may also include Pacific treefrog and Cascades frog (Hood River Watershed Group 2022; Jason Seals and Jeremy Thompson, ODFW, personal communication April 12, 2022). These species are native to Oregon and may be present in irrigation canals and adjacent banks in the project area at locations with suitable vegetation and hydrology.

4.9.1.2 Within Waterbodies Associated with District Operations

Twenty species of fish are documented in the waterbodies associated with District operations (see Appendix E.7). Fish are present, or potentially present, in the Hood River in the following tributaries to the Hood River: West Fork Hood River, Green Point Creek, and Ditch Creek (Jason Seals and Jeremy Thompson, ODFW, personal communication April 12, 2022). Rainbow trout are stocked in Upper Green Point Reservoir.

In addition to fish, other aquatic species are potentially found within or along waterbodies that are associated with District operations (Hood River Watershed Group 2022; J. Seals and J. Thompson, ODFW, personal communication April 12, 2022). These other aquatic species may include but are not limited to water shrew, water vole, frog, newt, and salamander species (J. Thompson, ODFW, personal communication, April 22, 2022).

Western pearlshell mussels were found in the Hood River Basin in a tributary to Trout Creek. Although Trout Creek and its tributaries are outside of the project area, the identification of this freshwater mussel may indicate that these and other mussel species may be present in waterbodies associated with District operations (A. Gray, FWS, personal communication, April 13, 2022).

4.9.2 Federally Listed Fish and Aquatic Species

The ESA (16 U.S.C. 1531 et seq.), as amended in 1988, establishes a national program for the conservation of species listed as threatened and endangered, and the preservation of habitats on which they depend. The ESA defines procedures for listing species, designating critical habitat for listed species, and preparing recovery plans. Section 7 of the ESA, as amended, requires organizations to consult with NOAA Fisheries and/or the U.S. Fish and Wildlife Service (USFWS) if listed species or designated critical habitat may be affected by a proposed federal action. If adverse effects could occur, the ESA requires federal agencies to evaluate the likely effects of the proposed action and ensure that it neither risks the continued existence of federally listed ESA species nor results in the destruction or adverse modification of designated critical habitat.

[13] Residents typically stock ponds with rainbow trout and perch (Les Perkins, FID, personal communication, February 4, 2022).

Four fish species that are listed as threatened under the ESA occur in the Hood River Basin (Table 4-7). All of these species occur in the Hood River. Coho (*Oncorhynchus kisutch*) and summer steelhead (*Oncorhynchus mykiss*) occur in Green Point Creek, and spring Chinook (*Oncorhynchus tshawytscha*), coho, and summer steelhead occur in the West Fork Hood River. (NOAA Fisheries 2021a,b; A. Gray, USFWS, April 13, 2022; T. Hausman, NMFS, April 4, 2013; Hood River Watershed Group 2022). No listed fish species occur in the District's canals or pipelines.

Table 4-7. Federally Listed Fish Species in the Hood River Basin.

Species Name (Endangered Species Unit or Distinct Population Segment)	Federal Status	Listing Date	Extinction Risk in the Hood River Basin
Hood River bull trout	Threatened	June 10, 1998	At risk
Lower Columbia River Chinook (includes spring and fall populations)	Threatened	March 24, 1999	Very high
Lower Columbia River coho	Threatened	June 28, 2005	Very high
Lower Columbia River steelhead (includes winter and summer populations)	Threatened	March 19, 1998	Very high – summer steelhead Moderate – winter steelhead

Source: NMFS 2013; NOAA Fisheries 2021b; J. Seals, ODFW, Personal communication, April 12, 2022

Critical habitat for coho salmon, Chinook salmon, steelhead trout, and bull trout (*Salvelinus confluentus*) is designated in the Hood River; critical habitat for steelhead trout and coho salmon is designated in Green Point Creek (see Figure E-1 in Appendix E.7). NOAA Fisheries has identified Primary Constituent Elements (PCEs) for critical habitat that represent the essential biological and physical features for the conservation of a species and describe habitat components that support one or more life stages of the species (70 Federal Register [FR] 52630, September 2, 2005). The PCEs for coho, Chinook, and steelhead describe habitat with water quantity and quality conditions supporting spawning, egg incubation, larval development, and migration; water quantity and floodplain connectivity supporting juvenile growth and mobility; shade; complex habitat structure and cover such as submerged and overhanging large wood; aquatic vegetation and boulders; and a sufficient food base supporting growth and maturation. USFWS has identified PCEs for bull trout critical habitat that include aquatic connectivity, complex habitat structure, water temperatures no greater than 59 degrees Fahrenheit, natural variability in streamflow, a sufficient food base, and the absence of nonnative predatory and competing fish (70 FR 56211, October 26, 2005).

An evaluation of the population viability status for ESA-listed fish species in the Hood River Basin concluded that coho salmon, spring Chinook salmon, and summer-run steelhead populations currently have a very high risk of extinction, while winter-run steelhead have a moderate risk of extinction (NMFS 2013; ODFW 2010). Low streamflow, including reduced flows due to irrigation withdrawals, is identified as a key or primary limiting factor to the recovery of listed salmon and steelhead in the basin (NMFS 2013).

4.9.3 State-Listed Species

ODFW maintains a list of native fish and wildlife species in Oregon determined to be threatened or endangered according to criteria set forth by Oregon Administrative Rule (OAR) 635-100-0105. Lower Columbia River coho salmon are listed by ODFW as endangered and are present in waterbodies associated with FID operations. There are no other Oregon-listed threatened, endangered, or candidate fish or aquatic species known to occur within the waterbodies associated with FID operations or in the irrigation canals within the project area.

4.9.4 Ecosystem Services

Fish and aquatic species in the Hood River and other tributaries provide the following ecosystem services:

Provisioning Service, Instream Fish Populations (Figure 4-1, [E2]): The Hood River and its tributaries within and downstream of the project area provide year-round fishing opportunities. Rainbow trout, other resident fish species, and when available, salmon and steelhead, provide recreational anglers with opportunities to harvest fish for consumption In addition, members of CTWS have fishing rights and rely on the Hood River Basin's fisheries resources for subsistence and ceremonial use.

Cultural Service, Threatened Species, Species of Concern (Figure 4-1, [E4]): Waterbodies in the Hood River Basin are home to federally listed threatened species of steelhead, coho, Chinook, and bull trout. Pacific salmon are a premier cultural icon of the Pacific Northwest, contributing to educational, recreational, and community values. Of particular importance are the contributions of Pacific salmon to Native traditions and religious practices (Bottom et al. 2009). The Hood River Basin is part of the ceded lands of CTWS with usual and accustomed fishing stations. The basin provides subsistence and ceremonial fisheries for tribal members under fishing rights reserved by the treaty with the U.S. government (Treaty with the Tribes of Middle Oregon 1855).

Spring Chinook salmon are a special part of the cultural and religious practices of CTWS and other Columbia River tribes. The First Salmon Feast is part of Columbia Basin tribes' traditional religious practices celebrating spring Chinook, the first salmon to return of the year, and the central role of salmon and water in tribal health and culture (CRITFC 2019a). Salmon and steelhead populations have declined in recent decades because of impacts to habitat and other factors; however, since 1991, CTWS has been working in the basin to rebuild these populations for conservation purposes and to provide consistent harvest opportunity (CTWS 2019).

The Hood River Basin is also home to Pacific lamprey. Like salmon, lamprey are a traditional food with cultural importance to CTWS members and are prized for their rich, fatty meat. They are often served alongside salmon at tribal feasts and celebrations (CRITFC 2019b). Populations of lamprey in the basin are currently low due to habitat impacts but appear to have increased in recent years following fish passage improvements in the Hood River and at Bonneville Dam on the Columbia River. Despite this improvement, the numbers of lamprey available for tribal harvest continue to be low. The effects of low population numbers have been documented as a loss of tribal culture. The decline in fishing opportunities in traditional areas has resulted in a break of the transfer of knowledge from older to younger tribal members about how to catch and prepare lamprey for drying and the loss of important myths and legends associated with lamprey (Close et al. 2002). Rebuilding Pacific lamprey in the Hood River Basin is a CTWS goal so that tribal harvest can occur and their tradition and culture can be preserved and continued.

4.10 Wetlands and Riparian Areas

Wetlands and riparian areas affected by District operations have the potential to occur in three locations: the project area, sporadically along approximately 10.25 miles of the Hood River downstream from the District's Davenport Diversion, and between Upper and Lower Green Point reservoirs.

Wetlands perform several valuable functions, including water storage, water filtration, and biological productivity. They can also support complex food webs that provide sources of nutrients to plants and animals, and specialized habitat for a wide variety of aquatic and terrestrial species. Wetlands in the area associated with the proposed action may be subject to federal or state regulations depending on their characteristics. Within the State of Oregon, wetlands are managed under two regulations: Section 404 of CWA and the Oregon Removal-Fill Law (OAR 141-085-0515(9)). Generally, the construction and maintenance of irrigation ditches is considered an exempt activity under Section 404 of the CWA. For more information about Section 404 of the CWA and the state's removal-fill law, see Appendix E.8.

4.10.1 Wetlands and Riparian Areas Along the Project Area

Wetlands adjacent to irrigation canals, laterals, and ditches are generally not regulated under Section 404 of the CWA, as long as the conveyance infrastructure was not constructed through previously existing jurisdictional waters. Hydrophytic plants are sometimes found along the banks of canals within the project area or in adjacent low-lying areas outside of the project area as the hydrology provided by canals can create favorable growing conditions during a portion of the year. However, the District actively keeps canal banks clear from vegetation, and therefore, riparian vegetation is limited.

Water flows through the Farmers Canal year-round, as it is used to deliver water for both irrigation (April 15 to September 30) and hydroelectric power generation (year-round). Water typically flows through Rainy Ditch during the irrigation season between April 15 and September 30. Water may also occasionally be present in Rainy Ditch outside of the irrigation season as standing water following rain or snow events.

Analysis of NWI[14] geographic information systems data (USFWS 2016) and aerial imagery has identified 16 wetland features in the project area. The NWI data were used as a first step in identifying and evaluating potential wetlands in the project area; however, at the time of writing this Plan-EA, a wetland delineation had not yet been performed.[15]

4.10.2 Wetland and Riparian Areas Along Natural Waterbodies Associated with District Operations

Based on NWI data, potential natural wetlands of varying size and quality are found sporadically along the Hood River and other waterbodies affected by District operations. Low summer streamflow associated with District diversions and upstream reservoir operations and irrigation withdrawals limits riparian vegetation and water availability to wetlands in these reaches. Because streamflow is strongly correlated with critical physical and biological characteristics of the river,

[14] The NWI code uses the Cowardin classification system. For further information about Cowardin classifications, refer to *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

[15] Consultation with ODSL and USACE would occur prior to project implementation to determine whether a wetland determination or wetland delineation would occur.

it influences the functions of associated riparian areas (National Research Council 2002). As riparian areas become hydrologically disconnected from their adjacent stream channels with reduced streamflow, they lose many of their ecological functions.

4.10.3 Floodplains

The District's Davenport Diversion is located within the 100-year floodplain of the Hood River based on the Federal Emergency Management Agency's Flood Insurance Rate Maps for Hood River County. This facility includes a diversion and fish screen. The modified fish screen attenuation bay included under the Modernization Alternative would be constructed below the Davenport Diversion and would also lie within the 100-year floodplain.

4.11 Wildlife Resources

4.11.1 General Wildlife

Generally, wildlife present within the project area consists of habitat generalists or edge species with the ability to adapt to or exploit the agricultural environment (Blair 1996; Ditchkoff et al. 2006). These species are generally tolerant to disturbance and include species such as deer, snakes, and hawks (McKinney 2002; L. Perkins, FID Manager, personal communication, November 3, 2021). Given the fragmented, disturbed nature of habitat within the project area, it likely supports a lower species diversity compared to native, intact, undisturbed habitat types (Blair 1996; Ditchkoff et al. 2006; McKinney 2002). The native wildlife species that are most likely to occur in the project area are shown in Appendix E.9.

Where not cleared, vegetation along the District's open canals may provide food, cover, and breeding sites for some wildlife species throughout the year. Additionally, wildlife may also use the 3.0 miles of the District's open canals as a water source and as a travel or dispersal corridor. Many alternative nearby water sources exist near the project area and will remain unaltered (L. Perkins, FID Manager, personal communication, November 3, 2021). Near the project area, other wildlife travel corridors are present along streams where riparian vegetation is dense or wide enough to provide hiding cover, and in forested areas that border the District.

4.11.2 MBTA/BGEPA Species

Multiple bird species have the potential to occur within or close to the project area, some of which are protected under the Migratory Bird Treaty Act (MBTA) or the Bald and Golden Eagle Protection Act (BGEPA). Although migratory birds are known to travel through the project area and its vicinity, limited habitat is provided within the project area and FID's right-of-way and easements due to maintenance activities that remove vegetation on an annual basis.

A list of MBTA and BGEPA species that occur or may occur in the project area was obtained from USFWS and is provided in Appendix E.9. Several of these species may be present in or near the project area for as little as 1 week during the year. No known bald or golden eagle nests are found in or near the project area based on available surveys.

4.11.3 Federally Listed Species

USFWS maintains a list of wildlife species protected under the ESA that may occur in Hood River County. A review of the USFWS Information for Planning and Consultation data indicated that only one federally listed species, the northern spotted owl (threatened), may occur in the project area (USFWS 2023). However, none of the project area overlaps with designated critical habitat for the northern spotted owl (A. Gray, USFWS, personal communication, May 6, 2022). Northern spotted

owl nesting, roosting, and foraging habitats are primarily contiguous areas of forest or stands with mature trees (A. Gray, USFWS, May 6, 2022).

Coordination with ODFW indicated that the gray wolf may occur in or near the project area (J. Thompson, ODFW, personal communication, April 12, 2022). The gray wolf is listed as federally endangered throughout the species' range, which includes areas in Oregon and Washington. The gray wolf is known in the vicinity of the project area and has potential to be in the project area (J. Thompson, ODFW, April 12, 2022).

Habitat for wolves is diverse and generally encompasses areas with adequate supply of prey. Wolves prey primarily on ungulates but may also prey on smaller mammals including beaver. Wolves breed in mid- to late February, and pups are usually born 2 months later. Dens are often in underground burrows, but they can occur in abandoned beaver lodges, hollow trees, and shallow rock caves. Dens are commonly located on southerly aspects of moderately steep slopes in well-drained soils (or rock caves/abandoned beaver lodges), usually within 1,200 feet of surface water and at an elevation overlooking surrounding low-lying areas. As pups grow older, they are taken from the den to a rendezvous site. One or more rendezvous sites are used over the summer until the pups are large enough to travel and hunt with the pack. Rendezvous sites are usually complexes of meadows and adjacent hillside timber, with surface water nearby (Ann Gray, personal communication, April 13, 2022).

4.11.4 State-Listed Species

ODFW maintains a list of native wildlife species in Oregon that have been determined to be either threatened or endangered according to criteria set forth by rule (OAR 635-100-0105; ODFW 2021). A state sensitive species refers to fish and wildlife that are facing one or more threats to their populations and/or habitats and are defined as having small or declining populations, are at risk, and/or are of management concern. Implementation of appropriate conservation measures to address existing or potential threats may prevent them from declining to the point of qualifying for threatened or endangered species status (ODFW 2021). Western pond turtles have been documented in the Hood River Basin; this species, in addition to other amphibians on the state sensitive list, may exist within the project area (J. Thompson, ODFW, personal communication, April 21, 2022; ODFW 2021).

5 Alternatives

5.1 Formulation Process

Seven action alternatives and one No Action Alternative were initially considered during the scoping process. The formulation of alternatives followed CEQ regulations for implementing NEPA and numerous USDA-NRCS watershed planning policies. Scoping comments were also incorporated into the formulation process for alternatives.

When formulating an alternative, it was first determined whether the alternative met the project's purpose and need (Section 2). The alternatives of piping Rainy Ditch in existing alignment, constructed wetland, automation at Gate and Cabin creeks, reregulation reservoirs, and market-based approaches to include voluntary duty reduction were initially considered during formulation.[16] After considering whether the alternatives met the project's purpose and need, these alternatives were eliminated from further analysis. More information on these alternatives and why they were eliminated during the formulation stage can be found in Appendix D.2.

5.2 Alternatives Eliminated from Detailed Study

The following subsection describes an alternative that met the formulation criteria but was not analyzed in detail as a viable alternative after further consideration.[17]

5.2.1 Canal Lining

Under the canal lining alternative, the bottom and sides of approximately 3.0 miles of the Farmers Canal and Rainy Ditch would be covered with a geomembrane liner and shotcrete to prevent water from seeping into the underlying soils and rock. This alternative would require earthwork with heavy equipment to modify and reshape the existing canal bed to accommodate the lining material. Earthwork would involve removing rock from the bed of the canal and shaping and smoothing the sides of the canal to ensure that their slopes meet NRCS engineering standards (NRCS 2017).

After reshaping the canal, a geomembrane liner would be installed to cover the bottom and sides of the canal. The liner would extend up beyond the edges of the canal to anchor trenches. These trenches would help to anchor the liner in place.

Trees and other vegetation within approximately 7 feet of the edge of the canal on both sides would be removed to install the membrane. An anchor trench approximately 1 foot wide by 1 foot deep would be dug along the canal approximately 7 feet beyond the edge of the canal. The liner would extend from the canal edge into the trench, where the liner would be covered and weighted by fill material to anchor the liner in place. Finally, a layer of shotcrete would be applied on top of the

[16] These alternatives were analyzed for four criteria: completeness, effectiveness, efficiency, and acceptability (PR&G). Some of the initial alternatives considered did not meet these formulation criteria and were eliminated from further analysis.

[17] Alternatives that do not address the purpose and need for action, do not achieve the Federal Objective (Section 2) and Guiding Principles (Appendix E.10), or become unreasonable because of cost, logistics, existing technology, or environmental reasons may be removed from consideration (NWPM 501.37; NRCS 2015; USDA 2017b).

geomembrane liner in the canal. The shotcrete would be 6 inches thick to protect the liner from freeze-thaw movement and damage from animals and debris.[18]

The canal lining alternative would meet the project purpose of conserving water. Water loss in a lined system where the geomembrane liner is covered with a shotcrete cover is estimated to be 5 percent based on studies of canal lining (Baumgarten 2019). Lined canals, however, are vulnerable to tears or cracks in the lining even with a shotcrete cover. Seepage from torn or cracked lined canals is similar to that from unlined canals. Assuming a 5 percent loss, lining would reduce water loss from seepage by up to approximately 2,130 AF annually.[19]

Canal lining has a varying lifespan and can require extensive maintenance to continue operating at high efficiency (Baumgarten 2019). For example, cracks in the shotcrete are likely to develop in the first few years following installation due to freeze-thaw cycles and would require a regular maintenance program to seal the cracks. The District would need to conduct regular maintenance, including sand blasting, removal of vegetation, and patching cracks with sealant. This maintenance would require equipment purchases, appropriate training, and recurring materials costs. Due to these additional costs, this alternative assumes a 25 percent increase in equipment, maintenance, and labor costs as compared to FID's current operating budget (L. Perkins, FID Manager, personal communication, April 13, 2022). Canal lining may be less expensive than piping to implement in its first installation cycle, however, the increased annual maintenance costs and replacement costs cause canal lining to exceed the cost of piping over a 100-year period.

The initial capital costs of canal lining were estimated based on the size of the existing open canal, earthwork to reshape the canal, materials, and installation of the liner and shotcrete. The estimated capital cost for canal lining Rainy Ditch and the two open sections of Farmers Canal is $8,233,000.

The present value of the estimated capital costs, replacement costs, and annual O&M costs are $18,382,000 (2022 dollars) over 100 years. This is $8,860,000 greater than the cost of piping the Farmers Canal and Rainy Ditch, as included in the Modernization Alternative, over 100 years. Based on this cost, canal lining was eliminated from further study (see Appendix D.3 for cost details). This alternative does not achieve the Federal Objective and Guiding Principles.

5.3 Alternatives Description

Of the project alternatives that were considered for FID's Infrastructure Modernization Project, two were selected for further evaluation and are discussed in the following sections. These alternatives include only FID-owned infrastructure.

5.3.1 No Action Alternative (Future without Federal Investment)

Under the No Action Alternative, federal funding through P.L. 83-566 would not be available to implement the project. The District would continue to operate and maintain its existing system in its current condition. 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

[18] Shotcrete thickness was recommended by Kevin Crew, P.E., of Black Rock Consulting based on experience (K. Crew, personal communication, November 29, 2021). This assumption also aligns with NRCS Conservation Practice Standard 468, Lined Waterway or Outlet (NRCS 2017).

[19] The water savings of approximately 2,130 AF annually was conservatively estimated as 95 percent of the total water loss measured in the Farmers Canal and Rainy Ditch during the water loss assessment performed in 2021 (2,292 AF annually; Appendix E.6; FCA 2021a).

Plan-EA, the No Action Alternative is a near-term continuation of the standard operating procedures. The District would operate diversions to continue to meet all instream flow requirements.

The No Action Alternative would not meet the purpose and need of the project. There would be no improvement to water loss from seepage in District infrastructure or water delivery reliability for patrons. Water delivery and operation inefficiencies would remain the same and could potentially worsen over time. Sediment in irrigation water deliveries would continue to reduce irrigation system efficiency and limit hydropower production. Under the No Action Alternative, low streamflow during the summer months would continue to limit the amount and quality of habitat for fish. Since no water would be conserved, the No Action Alternative would not accomplish the Federal Objective to protect the environment.

5.3.2 Modernization Alternative (Future with Federal Investment)

The Modernization Alternative is FID's desired alternative. Under this alternative, federal funding through P.L. 83-566 would be available. The District would perform the following actions (see Figure 5-1):

- Convert the two remaining open sections of the Farmers Canal to a dual pipeline (2.65 miles[20] [14,003 feet]).
- Deepen the existing attenuation bay by approximately 1,000 cubic feet (0.02 AF).[21]
- Install SCADA equipment at six sites.
- Expand Forebay 3 by approximately 2 AF.[21]
- Convert Rainy Ditch to a pipeline (0.36 miles [1,909 feet]).

[20] Within the project area, 2.61 miles of the Farmers Canal is open canal and 0.04 miles is existing pipeline that would be upgraded.

[21] The final designs of the modified attenuation bay and expanded Forebay 3 would follow all applicable NRCS engineering standards and NRCS Conservation Practice Standards 350, 378, and 436.

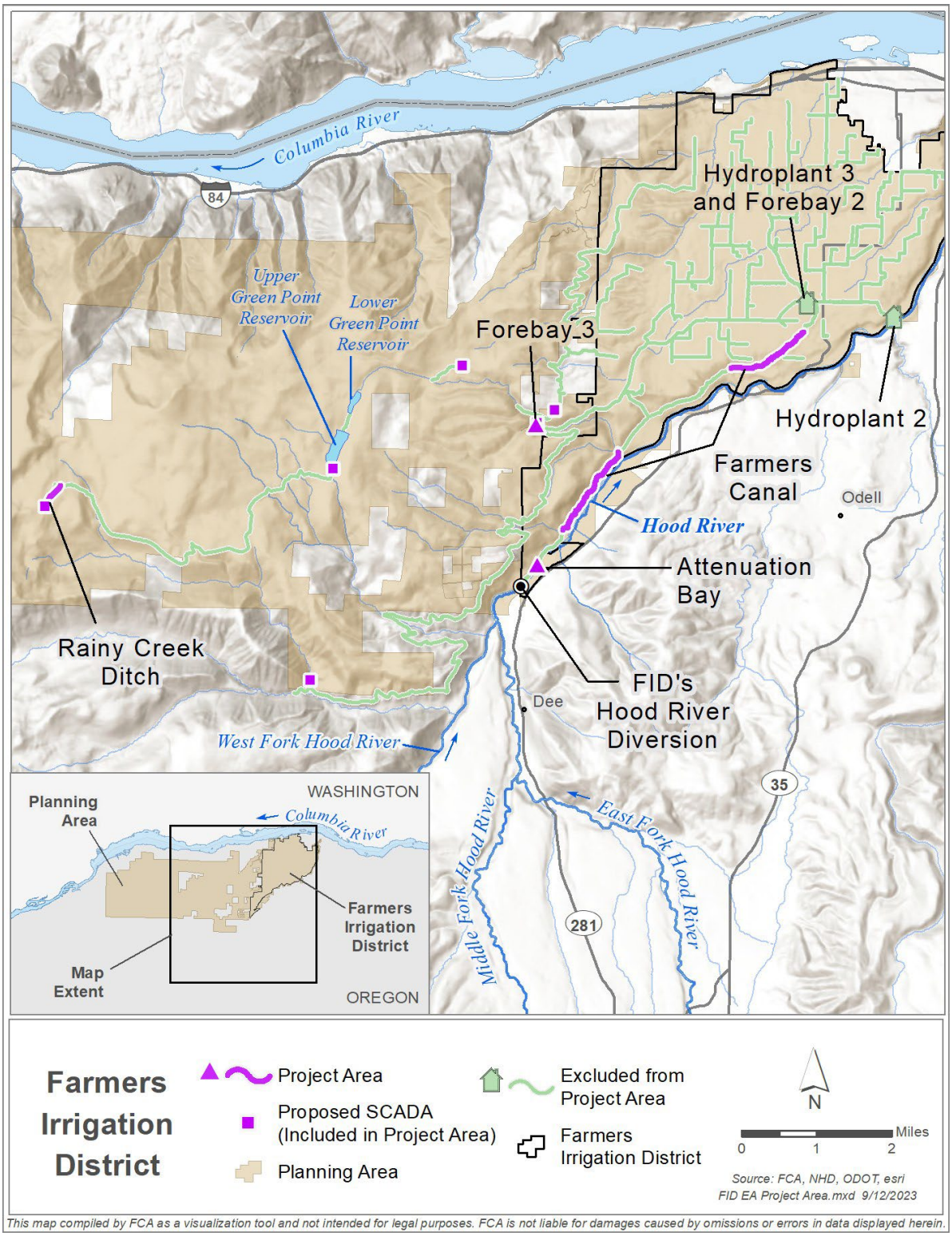


Figure 5-1. Overview of the Modernization Alternative for Farmers Irrigation District Infrastructure Modernization Project.

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 climate change. The project would support existing land use as well as support land use trends in the future. The Modernization Alternative would address the project's problems and opportunities (Section 2), which are discussed below.

Construction of the Modernization Alternative would occur in five project groups over the course of 5 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 8.6.2 for a project timeline. Patron deliveries would not be affected during construction.

Piping actions under the Modernization Alternative would include mobilization and staging of construction equipment, delivery of pipe to construction areas, excavation, fusing of pipelines, placement of pipe in trenches, removal of existing outdated pipe, compaction of backfill, and restoration and reseeding of the disturbed areas. In some locations, construction access would need to be created before delivering pipe or equipment into construction areas and could include vegetation removal within the construction area. Appropriately sized construction equipment would be used to minimize disturbance in the construction area. Pipe installation would likely require some borrow or fill material and storage areas for pipe, other materials, and construction equipment. These areas have not yet been identified and would be determined prior to construction. Areas that have been previously disturbed and are accessible through existing access routes would be selected.

Under the Modernization Alternative, the existing fish screen attenuation bay would be deepened to improve sediment management. Deepening of the attenuation bay would increase its volume by approximately 1,000 cubic feet (0.02 AF). The concrete floor of the existing bay would be removed, soil would be excavated, and a new, sloping concrete floor would be installed. A new return pipe with a larger diameter would be installed deeper underground, allowing the system to be self-flushing. All work would be done within the existing footprint of the structure, and it would require no instream work in the Hood River.

The final designs for the modified attenuation bay would follow all applicable NRCS engineering standards and applicable NRCS conservation practices. The modified attenuation bay would serve as the District's primary sediment management facility.

The expansion of Forebay 3 would increase capacity by 2 AF. The current area of the forebay would be expanded to about 0.5 acres, and the depth would be approximately 6 feet. The approximate total water capacity would be 3 AF (the current capacity is 1 AF). The final design would follow all applicable NRCS engineering standards and applicable conservation practices.

Depending on the site, each of the six SCADA sites would require the installation of a flow meter, solar panel, and/or radio antenna. At sites with existing SCADA infrastructure, no ground disturbance is expected during construction. At sites with no existing SCADA infrastructure, a ground disturbance of approximately 25 to 200 square feet would be expected during construction. See Table 8-1 for more details on the equipment needed and ground disturbance at each SCADA site.

Vegetation clearing before construction, vegetation and weed management during construction, and reseeding after construction would be completed according to FID's current vegetation management practices and NRCS's Oregon and Washington Guide for Conservation Seedings and Plantings (NRCS 2000). During construction, vegetation clearing would be minimized to the extent

practicable, and locations for vehicle and equipment access, staging, and storage would be selected to avoid trees. Trees would only be removed if there were no other alternatives to access the construction site or if they posed a safety threat to construction crews.

All project areas would be accessed from FID's existing maintenance roads or public roads, when possible. Existing maintenance roads and overland access routes commonly used for O&M may require some improvements for use during construction.

In some cases, temporary overland travel routes within FID's existing easements would be necessary to access certain portions of the project area that do not have established maintenance roads. To facilitate restoration, temporary travel routes would be left in their natural condition, with only minimal alterations when necessary to allow for travel during construction. The most direct route possible would be used to access the construction area. Any work needed to facilitate equipment access would occur prior to, or concurrently with, project construction. O&M under the Modernization Alternative would be performed on an as-needed basis.

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

- **Increase water conservation** – The Modernization Alternative would reduce water loss from seepage and evaporation in the Farmers Canal and Rainy Ditch and result in an estimated water savings of 2,242 AF annually during the irrigation season in normal water years. Of this total, FID would restore an estimated 2,196 AF per year of water instream in the Hood River below FID's Plant 2.[22] District-wide SCADA and expansion of Forebay 3 would improve control of irrigation water diversions and flows and reduce operational spills, conserving an additional estimated 250 AF per year in normal water years.
- **Improve water delivery reliability to patrons and farms** – Modernizing the Farmers Canal would improve water delivery for all patrons served by the canal—a majority of FID patrons. During dry years, 25 percent of the water savings from piping the Farmers Canal irrigation water would go to FID patrons to increase the reliability of its water supply and improve its resilience to projected climate impacts. Installing SCADA, enlarging Forebay 3, and piping Rainy Creek would help FID meet its stored water right in the Upper Green Point Reservoir, improving water delivery reliability for patrons. Lastly, modernizing District irrigation infrastructure would enable the District to be more resilient to environmental changes and maximize the efficiency of water conveyance, improving water delivery reliability for all patrons throughout the District.
- **Reduce O&M costs** – All proposed actions within the Modernization Alternative would reduce the costs for maintenance, repair, and replacement of District-owned infrastructure. Modernizing the Farmers Canal would eliminate the need to inspect, repair, and remove obstructions in the canal, as well as to manually adjust headgates. Improving operational efficiency from SCADA and expanding Forebay 3 would reduce the time needed for staff to adjust diversions. A deepened attenuation bay would reduce the labor and equipment costs currently needed to remove sediment from multiple locations along the Farmers Canal.

[22] Piping Rainy Ditch would conserve 46 AF annually. This saved water would be used to fulfill patron water rights using live flow from Rainy Creek from April to June, decreasing the use of stored water from Upper Green Point Reservoir during this period.

The estimated project cost for the Modernization Alternative including NRCS Technical Assistance, Program Administration, and permitting would be $11,687,000 (2023 dollars). Additional information regarding the costs and the present value of the costs of the Modernization Alternative can be found in Appendix D.3.

Table 5-1 compares the No Action Alternative (Future without Federal Investment [Alternative 1]) and the Modernization Alternative (Future with Federal Investment [Alternative 2]). The table summarizes measures addressed and environmental, social, cultural, and economic effects.

5.4 Summary and Comparison of Alternatives

Table 5-1. Summary and Comparison of Alternatives.

Item or Concern	No Action Alternative (Future without Federal Investment)	Modernization Alternative (Future with Federal Investment)
Major Features	**Farmers Canal and Rainy Ditch remain open, SCADA is not installed, no improvements to sediment management or Forebay 3**	**Farmers Canal and Rainy Ditch are piped, SCADA is installed, sediment management is improved, Forebay 3 is upgraded**
Alternative Plans		
Locally Preferred		✓
National Economic Efficiency		✓
Socially Preferred		✓
Environmentally Preferred		✓
Guiding Principles Check marks indicate that the Guiding Principles have been met		
Healthy and Resilient Ecosystems	✓	✓
Sustainable Economic Development		✓
Floodplains	✓	✓
Public Safety		✓
Environmental Justice	✓	✓
Watershed Approach		✓

Item or Concern	No Action Alternative (Future without Federal Investment)	Modernization Alternative (Future with Federal Investment)
Major Features	**Farmers Canal and Rainy Ditch remain open, SCADA is not installed, no improvements to sediment management or Forebay 3**	**Farmers Canal and Rainy Ditch are piped, SCADA is installed, sediment management is improved, Forebay 3 is upgraded**
Provisioning Services - Trade-Offs		
Irrigation water	No effect on water reliability for FID patrons.	Modernizing infrastructure would enable FID to be more resilient to environmental changes, maximize the efficiency of water conveyance, and provide more secure and reliable irrigation water for FID patrons.
Instream fish species	No effect. Resident and anadromous fish populations would not be affected. Harvest of anadromous fish would continue to be available only when runs are sufficiently large to sustain fishing.	Approximately 2,196 AF of water would be restored instream in the Hood River annually during the irrigation season in normal water years below FID's Plant 2 (1,605 AF restored during dry years). This water would have beneficial effects on resident and anadromous fish populations and their habitat. Bolstering anadromous fish populations may allow for more consistent fishing for harvest and consumption.
Regulating Services - Trade-Offs		
Water quality	No effect.	Approximately 2,196 AF of water would be restored instream in the Hood River annually during the irrigation season in normal water years below FID's Plant 2 (1,605 AF restored during dry years). This would benefit water quality in the Hood River and help to meet water quality standards.

Item or Concern	No Action Alternative (Future without Federal Investment)	Modernization Alternative (Future with Federal Investment)
Major Features	**Farmers Canal and Rainy Ditch remain open, SCADA is not installed, no improvements to sediment management or Forebay 3**	**Farmers Canal and Rainy Ditch are piped, SCADA is installed, sediment management is improved, Forebay 3 is upgraded**
Cultural Services - Trade-Offs		
Culturally important species	No effect on habitat supporting populations of threatened fish species. Habitat limitations for culturally important anadromous fish would continue to affect fishing, community, health, cultural identity, subsistence, and religious tribal values.	Approximately 2,196 AF of water would be restored instream in the Hood River annually during the irrigation season in normal water years below FID's Plant 2 (1,605 AF restored during dry years). This would help improve threatened fish and aquatic species habitat and populations. Improving populations would enhance fishing, community, health, cultural identity, subsistence, and religious tribal values.
Installation Costs		
Federal PL 83-566	$0	$8,918,000
Local only or Matching PL 83-566	$0	$2,769,000
Total	$0	$11,687,000
Average Annual Cost		
Installation[1]	$0	$318,000
OM&R[2]	$0	$15,000
Total	$0	$333,000
Annual Benefits[3]	$0	$529,000
Annual Costs	$0	$333,000

Item or Concern	No Action Alternative (Future without Federal Investment)	Modernization Alternative (Future with Federal Investment)
Major Features	**Farmers Canal and Rainy Ditch remain open, SCADA is not installed, no improvements to sediment management or Forebay 3**	**Farmers Canal and Rainy Ditch are piped, SCADA is installed, sediment management is improved, Forebay 3 is upgraded**
Annual Net Benefits[4]	$0	$196,000

[1] The Modernization Alternative's average annual cost is the additional average annual installation costs above the No Action Alternative.
[2] Operation, maintenance, and replacement (OM&R) for the Modernization Alternative includes an increase in costs related to OM&R of the attenuation bay and SCADA. A decrease in O&M costs for the Modernization Alternative was included in the benefits, rather than the costs.
[3] Quantified benefits include instream flow benefits, reduced O&M, hydropower revenue, reduced carbon outputs, and avoided infrastructure failure of the Farmers Canal.
[4] Annual net benefits shown for the Modernization Alternative are the additional net benefits compared to the No Action Alternative.

Regional Economic Impacts		
Annual Jobs from Recreation	Not applicable	Magnitude/direction of recreation visitation effects not known, so no Regional Economic Impacts benefits quantified.
Local jobs during construction (Average over 5 years, including direct/indirect/induced)	Not applicable	25
Change in Annual Jobs from agriculture (including direct/indirect/induced)	Not applicable	Possible long-term benefits to agricultural employment if any water savings is used to avoid any future irrigation water shortages, not quantified.

Item or Concern	No Action Alternative (Future without Federal Investment)	Modernization Alternative (Future with Federal Investment)
Major Features	**Farmers Canal and Rainy Ditch remain open, SCADA is not installed, no improvements to sediment management or Forebay 3**	**Farmers Canal and Rainy Ditch are piped, SCADA is installed, sediment management is improved, Forebay 3 is upgraded**
Beneficial Effects Annualized[1] (Millions, 2023$)		
Region	Not applicable	$0.1
Rest of Nation	Not applicable	Some ripple income/employment effects expected, but not estimated.
Adverse Effects Annualized[2] (Millions, 2023$)		
Region (District OM&R Costs)	Not Applicable	-$0.3 (reduced OM&R costs and increased hydropower revenue compared to No Action Alternative)
Rest of Nation	Not Applicable	$0.3

[1] Beneficial effects include only those related to labor income and do not include the net economic benefits quantified in the NEE.
[2] Includes only direct costs (no indirect/induced costs are included). Negative adverse effect annualized indicates benefit.

6 Environmental Consequences

6.1 Cultural Resources

6.1.1 No Action (Future without Federal Investment)

The District's ongoing O&M activities are not expected to affect historic or archaeological resources, because these activities are expected to occur in previously disturbed areas.

6.1.2 Modernization Alternative

Cultural resources are being addressed under NHPA, and analysis is ongoing. The following describes the information known to date. NRCS has initiated consultation with federally recognized tribes and SHPO for the proposed action by providing a project description and a map identifying the APE. SHPO provided the case number 22-1601.

A previous cultural resource survey of FID's Farmers Canal was conducted on September 9, 2009. Although Farmers Canal has been extensively modified and much of the canal has been piped, it was determined to be eligible for the NRHP in accordance with 36 CFR Part 60.4 (OR SHPO Case No. 09-2638). Subsequently, an MOA was entered into between FID and SHPO under which photo and historic documentation of the Farmers Canal would occur. In accordance with the MOA, photo and historic documentation were completed during the winter of 2010 (OR SHPO Case No. 09-2638).

The District is in the process of having a cultural resource specialist complete site surveys for historic and archaeological resources in the remaining sections of the project area. Consultation and coordination among NRCS, the District, THPO, and SHPO has been initiated, is ongoing, and will be completed prior to implementation. If eligible resources are documented in the project area by a cultural resource specialist, consultation would occur between the District, NRCS, THPO, and SHPO to determine the effect on such resources and identify appropriate mitigation. Based upon previous mitigation measures implemented in FID, if mitigation were to be required, it could include actions such as working with the historic society to create photographic documentation and an archival research document of the canal. Mitigation measures, if required, would be identified before construction and completed concurrent with or after construction. The potential cost of mitigation for effects on cultural resources is included in the project cost.

If archaeological resources are inadvertently discovered during construction, an inadvertent discovery plan that complies with 36 CFR 800.13 would be implemented (see Appendix E.2). Construction would stop in the vicinity of the discovery, the area would be secured and protected, a professional archaeologist would assess the discovery, and consultation with tribes, SHPO, and NRCS cultural resources staff would occur. Continuation of construction would occur in accordance with applicable guidance and state and federal regulations.

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 or on lands served by the District.

6.2.1.2 Land Use

The No Action Alternative would have no direct effect on land use within the project area or on lands served by the District.

6.2.2 Modernization Alternative

6.2.2.1 Land Ownership

The Modernization Alternative would have a negligible to minor effect on existing land ownership within the project area. Any easements required for piping Rainy Ditch and upgrading Forebay 3 would be FID's responsibility and would be acquired prior to implementation. Prior to construction, FID would secure new easements from USFS for the short section of the new alignment of Rainy Ditch and for installing SCADA at the Rainy Ditch Diversion. FID would also secure a new easement or acquire land from Hood River County for the expansion of Forebay 3. The cost of securing new easements/acquisitions would be the responsibility of FID and has been included in the project costs.

6.2.2.2 Land Use

Overall, the Modernization Alternative would have a negligible to minor effect on land use because a majority of the construction would occur in the District's existing right-of-way and easements, and adjacent landowners would be notified prior to the start of construction. Effects would be negligible for the majority of the project area, as lands would continue to be used for the conveyance of irrigation water. Effects would be minor at the expanded Forebay 3 and a short section of the new alignment of Rainy Ditch because non-cultivated land would be used for placement of these projects. The District would obtain all necessary easements prior to construction. The Modernization Alternative would increase the reliability of the District's water supply during dry years and improve its resilience to projected climate impacts.

Ecosystem services of water for irrigation would be supported through the improvement of delivery infrastructure (see Section 6.8.2.5). During and after construction of the Modernization Alternative, there would be no direct effect on agricultural land use that is part of the project area or served by project canals and pipelines.

6.2.2.2.1 *Pipe Farmers Canal*

All construction would occur in the District's existing right-of-way and easements, and adjacent landowners would be notified prior to the start of construction. Any ground that was disturbed during construction would be reseeded with a mix of native grasses and forbs. There would be no long-term effects on these lands, as they would continue to be used for the conveyance of irrigation water.

Implementation of the Modernization Alternative would support existing zoning designations and agricultural land use. During dry water years, 25 percent of the water savings associated with piping the Farmers Canal irrigation water (estimated at 0.9 cfs or 313 AF per year) would be allocated to the District during the irrigation season. The District would use this water to increase the reliability of its water supply and improve its resilience to projected climate impacts. The proposed project would not affect projected land use trends.

6.2.2.2.2 *Update Attenuation Bay*

Effects are expected to be the same as those described in Section 6.2.2.2.1.

6.2.2.2.3 *Install SCADA*

Effects are expected to be the same as those described for Section 6.2.2.2.1.

6.2.2.2.4 *Expand Forebay 3*

Effects are expected to be the same as those described for Section 6.2.2.2.1. However, approximately 0.4 acres of non-cultivated land would be converted to the expanded Forebay 3.

6.2.2.2.5 *Pipe Rainy Ditch*

Effects are expected to be the same as those described for Section 6.2.2.2.1. However, approximately 0.2 miles of the pipeline would follow a new alignment through USFS land under a new easement or agreement.

6.3 Public Safety

6.3.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the existing open canal sections of Farmers Canal and Rainy Ditch would remain open, and the risk of drowning and injury would remain.

6.3.2 Modernization Alternative

Overall, the Modernization Alternative would result in a minor, short-term effect on public safety in the project area during construction due to the presence of and traffic related to construction equipment and vehicles entering and leaving the project area. Standard safety protocols and best management practices (BMPs) would be followed during construction to minimize risk to public safety.

Over the life of the project, the Modernization Alternative would have a beneficial effect on public safety in the project area. Piping the Farmers Canal would minimize or eliminate flood- and canal-related injury risks. See the National Economic Efficiency (NEE) Analysis in Appendix D.1 for a more-detailed discussion of how the project would reduce public safety risk in the District. There would be no effect on public safety from the other proposed activities under the Modernization Alternative.

6.3.2.1 Pipe Farmers Canal

During the construction process, vehicle and heavy equipment traffic would enter and leave the project area. Construction traffic could interact with motor vehicles, pedestrians, and bicyclists traveling through the project area. Standard safety protocols and BMPs would be followed during construction to minimize risk to public safety.

Once implemented, the project would eliminate the risk of canal-related injury because the open canals in the project area would be piped. If the public illegally accessed the piped areas, the public safety risk to private landowners and adjacent properties would be expected to be consistent with the general landscape and surrounding areas. This alternative would also eliminate potential flooding risk from canal breaches and overflow in the project area.

6.3.2.2 Update Attenuation Bay

The updated attenuation bay would be located on rural District property and accessed via private property. During construction, the public safety risk to the adjacent private landowner would be minimal and short-term. Standard safety protocols and BMPs would be followed during construction to minimize risk to public safety. After construction, the public safety risk to the private landowner would be expected to be consistent with the general landscape and surrounding areas.

6.3.2.3 Install SCADA

Effects during construction are expected to be negligible. Installation of SCADA equipment would require minimal use of large construction equipment as compared to the other projects in the Modernization Alternative. There would be no effect on public safety in the long term.

6.3.2.4 Expand Forebay 3

Forebay 3 is in a remote location on Hood River County land. During construction, the risk to public safety would be minor and short-term and BMPs would be followed to minimize risks. After expansion of Forebay 3, the public safety risk would be similar to the current level of risk.

6.3.2.5 Pipe Rainy Ditch

Effects are anticipated to be the same as those described in Section 6.3.2.1. However, because Rainy Ditch is remote and relatively inaccessible to the public, a very limited amount of pedestrian, bicycle, and vehicle traffic is anticipated.

6.4 Recreation

6.4.1 No Action (Future without Federal Investment)

There would be no effect on recreation under the No Action Alternative. The public would continue to use Upper Green Point Reservoir and Rainy Lake for boating and fishing.

6.4.2 Modernization Alternative

6.4.2.1 Pipe Farmers Canal

Piping the Farmers Canal would have no effect on recreation.

6.4.2.2 Update Attenuation Bay

Deepening of the attenuation bay would have no effect on recreation.

6.4.2.3 Install SCADA

The installation of SCADA within the District would have beneficial effects on water levels in Upper Green Point Reservoir. SCADA would improve water management in the District and reduce reservoir releases that would allow FID to hold more water in the reservoir later in the irrigation season. (see Section 6.8.2). Higher water levels in Upper Green Point Reservoir later in the irrigation season would be beneficial for boating and fishing.

6.4.2.4 Expand Forebay 3

Beneficial effects would be the same as described in Section 6.4.2.3.

6.4.2.5 Pipe Rainy Ditch

Piping Rainy Ditch would eliminate seepage along the ditch and allow FID to fulfill patron water rights using live flow from Rainy Creek from April to June. This would decrease the use of stored water from the reservoirs during this period and allow FID to hold more water in the reservoir later in the irrigation season. Higher water levels in Upper Green Point Reservoir later in the irrigation season would be beneficial for boating and fishing. There would be no effect on Rainy Lake from the Modernization Alternative.

6.5 Socioeconomic Resources

6.5.1 No Action (Future without Federal Investment)

Under the No Action Alternative there would be no effect on the value or economic impact of agricultural production or other socioeconomic resource.

There is no construction expenditure associated with the No Action Alternative, and therefore no construction economic development benefits. While there may be a long-term reduction in water reliability and associated agricultural production under the No Action Alternative, this potential adverse effect of the No Action Alternative on economic development is not quantified due to uncertainty regarding future hydrology. Under the No Action Alternative, FID anticipates increasing patron rates in the next few years to provide flexibility in funding for a variety of modernization, maintenance, and improvement projects.

6.5.2 Modernization Alternative

6.5.2.1 Regional Economic Development

The Modernization Alternative construction expenditures of $11.7 million would support construction-sector jobs and income and have economic ripple effects of increasing jobs and income in other economic sectors in Hood River 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 would also increase and generate increased economic activity in sectors such 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 $11.7 million in construction expenditure is spread over 5 years, supporting approximately 25 jobs and $1.1 million in average income over the 5-year construction period (annualized over 105 years[23] this equates to approximately $0.1 million in annualized average income benefits). Of these impacts, approximately 15 jobs and $0.8 million in annual income are in the construction sector (direct impacts), while the remaining 10 jobs and $0.2 million income are in other sectors. The Modernization Alternative may result in long-term preservation of agricultural production (avoided crop damages) due to increased water supply reliability in the face of climate change, but this potential benefit is not quantified due to uncertainty in hydrology.

The Modernization Alternative would also result in reduced OM&R expenses for FID and its patrons and increased hydropower production. However, there are not anticipated effects on District wages and employment. Reduced OM&R costs may largely result in an income transfer between FID patrons, FID staff, and the local construction, repair, and electricity sectors. As such, there are expected to be limited regional economic development effects of this reduced expenditure (i.e., less than the rounding margin of error) so effects are not quantified in this regional economic development analysis. To the extent that increased flows enhance recreation and support additional

[23] Note that each project has a 100-year life, but that since construction takes 5 years, benefits extend from year 0 to year 104, so the time period across all project groups is 105 years.

recreation visitation and spending in Hood River County, the long-term, positive regional economic contribution of the project would be larger, and vice versa.

6.5.2.2 National Economic Efficiency Benefits

A NEE benefit cost analysis was performed to evaluate the benefits of the Modernization Alternative (Appendix D.1). This evaluation includes an identification of the costs and benefits associated with the No Action Alternative and Modernization Alternative. The analysis used NRCS guidelines for the evaluation of NEE benefits as outlined in the PR&G and the NRCS Natural Resource Economics Handbook.

6.5.2.3 Environmental Justice

Although minority groups are present in Hood River County, negative effects are not anticipated as a result of project construction or implementation of the Modernization Alternative. As defined in EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, the proposed action would not cause adverse human health or environmental effects.

6.6 Soils

6.6.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the continued operation of the District's conveyance system would have no effects on soils. Ongoing erosion of open canals and maintenance along the District's irrigation system would have minor effects on soils.

6.6.2 Modernization Alternative

Overall, effects on soil resources in the project area would be minor because BMPs would be implemented and the effects would be localized to just the project area. In parts of the project area where the soil profile has been previously disturbed, such as along the Farmers Canal and at existing SCADA sites, effects would be minor and short-term. At new SCADA sites, Rainy Ditch realignment, the attenuation bay, and Forebay 3, the effects would still be minor because effects would be localized and BMPs would be implemented; however, these effects would be long-term because the soil profile has not yet been disturbed in these areas.

6.6.2.1 Pipe Farmers Canal

During project construction, soils adjacent to the canal would be affected due to construction equipment access and staging. Clearing, compaction, and construction would increase soil erosion and sedimentation potential. Excavation, backfilling, and grading associated with pipe installation would also increase erosion and sedimentation potential. BMPs would be implemented to minimize erosion and contain runoff on-site. BMPs could include silt fencing, straw wattles, geotextile filters, and applying water to disturbed soils to prevent wind erosion.

New pipelines would be buried, and all disturbed areas would be recontoured and planted with a seed mix of native grasses and forbs in consultation with NRCS. Bedding and backfill material would consist of native material or other certified clean fill.

Piping the Farmers Canal would remove the chance of canal wall failure, which could wash large amounts of sediment downslope into the Hood River. Additionally, piping the open canal would eliminate erosion of the canal banks and sedimentation within the Farmers Canal.

6.6.2.2 Update Attenuation Bay

During construction of the modified attenuation bay, excavation, compaction, and grading would occur, which could increase soil erosion and sedimentation potential. Effects would be apparent but localized to the project area. Effects on soil resources would be minimized through implementation of BMPs such as silt fencing, straw wattles, geotextile filters, and applying water to disturbed soils to prevent wind erosion. Existing maintenance roads would be used during construction to reduce potential effects on surrounding soils.

6.6.2.3 Install SCADA

During construction, an area of 25 to 200 square feet of ground would be disturbed at new sites depending on the SCADA and telemetry equipment required at each site. Sites with existing infrastructure would experience no soil disturbance. After installation, disturbed areas would be recontoured to blend in with the surrounding landscape and planted with a seed mix of native grasses and forbs in consultation with NRCS.

6.6.2.4 Expand Forebay 3

Effects are expected to be the same as those described in Section 6.6.2.2. An estimated 3,227 cubic yards of material would be excavated to expand Forebay 3.

6.6.2.5 Pipe Rainy Ditch

Effects associated with project construction and implementation are expected to be the same as those described in Section 6.6.2.1. In addition, 0.2 miles of the Rainy Ditch pipeline would follow a new alignment. The existing ditch along this section would be decommissioned.

6.7 Vegetation

6.7.1 No Action (Future without Federal Investment)

Under the No Action Alternative, there would be no effect on vegetation associated with open irrigation canals or on adjacent native upland vegetation. The District would continue to manage noxious weeds and in-canal vegetation through mowing and mechanical removal.

6.7.2 Modernization Alternative

Overall, construction of the Modernization Alternative would have a minor, short-term effect on vegetation because changes to vegetation would be localized to the project area. There would be a minor, long-term effect during construction of the expanded Forebay 3 because vegetation would be permanently cleared in limited areas. Disturbance would occur within a very small proportion of the District, and BMPs designed to minimize effects on vegetation, such as revegetating with natural grasses and forbs in consultation with NRCS, would be implemented.

After construction, the project area would be recontoured and planted with a seed mix of native grasses and forbs. Planting would be done in consultation with NRCS. In the long term, native terrestrial vegetation would be gained because 3.0 miles of open canal would be piped and then covered with topsoil and seeded. Over the project's life, planted vegetation within the District's easements would be maintained according to the NRCS *Oregon & Washington Guide for Conservation Seedings and Plantings* (NRCS 2000).

6.7.2.1 Pipe Farmers Canal

Vegetation would be disturbed during construction activities including clearing, trenching for pipe placement, and disturbance of lands adjacent to the canal where required for construction equipment access or staging of equipment and materials. Effects on vegetation would be localized to the project area. Existing maintenance roads within the District's easements would provide access to the project area. BMPs designed to minimize effects on vegetation would be implemented.

After pipeline installation, it is possible that some trees may not survive if they were dependent upon seepage from the open canals for water. A small net gain in native vegetation in the project area would occur because the overall project footprint after piping would be narrower than the footprint of the existing open canals with the adjacent maintenance tracks or roads. Trees would not be allowed to establish above the buried pipe because roots may interfere with future O&M activities.

6.7.2.2 Update Attenuation Bay

The majority of the area where construction would occur to update the attenuation bay has little existing vegetation. Minimal vegetation would be cleared for access to and construction in the area. Existing maintenance roads within the District's easements would provide access to the project area. BMPs designed to minimize effects on vegetation would be implemented.

6.7.2.3 Install SCADA

An area of approximately 0 to 200 square feet of vegetation per site would be expected to be cleared during the installation process; the area required would depend on the SCADA equipment installed. Full unit installation, including flow meter, solar panel, and radio antenna, would occur at Parkertown Pipeline. Minimal vegetation disturbance within a 100- to 200-square-foot area is expected at this site because it adjacent to a road, has previously been disturbed, and there is already existing infrastructure in place. Four additional sites would have only flow meters installed (Rainy Ditch diversion, Stanley Smith Pipeline outlet, three flow meters at Forebay 3, and NFGPC diversion); there would be no effects on vegetation. Flow meter installation at these sites would occur exclusively within existing easements on previously disturbed land. At Highline Pipeline, existing SCADA would be updated and there would be no effects on vegetation; all construction would occur on previously disturbed land within existing easements.

Effects on vegetation would remain after construction. The area around each SCADA site must remain free of vegetation for access, and the District would manage the 100-square-foot area to keep vegetation at a minimum.

6.7.2.4 Expand Forebay 3

An estimated 0.64 acres of trees and shrubs would be cleared to expand Forebay 3. BMPs designed to minimize effects on vegetation would be implemented.

6.7.2.5 Pipe Rainy Ditch

Effects associated with project construction and implementation are expected to be the same as those described in Section 6.7.2.1.

6.7.2.6 Noxious Weeds

Soils exposed during construction would temporarily create areas susceptible to weed establishment. The movement of construction vehicles could provide opportunities to transport weeds to new

locations. During construction, the contractor would use BMPs such as avoiding unnecessary ground disturbances and erosion control measures that are free of weeds and weed seeds.

In the project area where piping would occur, there would no longer be an opportunity for aquatic noxious weeds to be washed to other areas of the District. Growth of aquatic moss would also be eliminated in piped areas. The District would manage noxious terrestrial or aquatic weeds associated with the new retention ponds in accordance with the District's general practices and agreements between the District and landowners. During operation and maintenance, weeds would be managed according to the protocol in the NRCS *Oregon and Washington Guide for Conservation Seedings and Plantings* (NRCS 2000).

6.8 Water Resources

6.8.1 No Action (Future without Federal Investment)

6.8.1.1 Water Rights

Under the No Action Alternative, FID would maintain its existing water rights. Water in Rainy Ditch and the open sections of the Farmers Canal would continue to be lost to seepage and evaporation. This water would continue to be unavailable for agricultural production in the District. There would be no effect on District water rights.

6.8.1.2 Surface Water Hydrology

Under the No Action Alternative, there would be no effect on waterbodies associated with District operations in the project area. The District would continue to divert water at the same rates and volumes as it has previously, when that water is available, and continue to discharge operational spill. Summer streamflow in the Hood River is expected to decline as a result of climate change (see Section 4.8.2).

6.8.1.3 Surface Water Quality

The No Action Alternative would have no effect on surface water quality in the waterbodies associated with District operations in the project area (see Table 4-5). These waterbodies would continue to be included on Oregon's Section 303(d) list for not meeting iron, lead, thallium, copper, biological criteria, silver, and pH water quality standards. Contaminants could continue to enter the open sections of the Farmers Canal. Sediment management in irrigation water would continue to be an issue.

6.8.1.4 Groundwater

The No Action Alternative would have no effect on groundwater. Water lost to seepage in Rainy Ditch and the open sections of the Farmers Canal would continue to infiltrate into the groundwater.

6.8.1.5 Ecosystem Services

The No Action Alternative would not affect ecosystem services associated with water resources (see Section 4.8.5).

6.8.2 Modernization Alternative

6.8.2.1 Water Rights and District Water Supply

The Farmers Canal conveys water for irrigation and water used for hydropower generation at Plant 2. Piping the two remaining open sections of the Farmers Canal would eliminate evaporation

and seepage loss and would save an estimated 2,196 AF per year during a normal water year[24] in the irrigation season (April 15 to September 30; see Appendix E.6 for water loss information). Of the estimated 2,196 AF per year of water saved during the irrigation season, 1,254 AF per year would be associated with irrigation water and 942 AF per year would be associated with water for hydropower. Following the completion of the project in all water years and all seasons, there would be no change to irrigation or hydropower diversions at the Davenport Diversion.

During normal water years[24] under the Modernization Alternative, the District would convey 100 percent of the water savings associated with piping the Farmers Canal irrigation water (1,254 AF per year) and 100 percent of the water savings associated with piping the Farmers Canal hydropower water (942 AF per year) through the Farmers Canal to Plant 2 for additional hydropower generation during the irrigation season (April 15 to September 30). All of the saved water would return to the Hood River below Plant 2 at RM 4.5, increasing streamflow in the river by an estimated total of 6.9 cfs (2,196 AF per year). The District would legally protect 75 percent of the water savings associated with piping irrigation water (940 AF per year) in the Hood River below Plant 2. Piping the Farmers Canal would also improve water delivery reliability, as the potential for canal failure would be eliminated.

During dry water years,[24] FID would restore 75 percent of the water savings associated with piping irrigation water in the Farmers Canal (estimated at 940 AF per year) and 100 percent of the water savings associated with piping hydropower water (estimated at 665 AF per year[25]) in the Hood River. The total water savings restored, therefore, instream in the Hood River below Plant 2 during the irrigation season (April 15 to September 30) in dry years is estimated at 1,605 AF per year. The District would legally protect 75 percent of the water savings restored instream that are associated with piping irrigation water in the Hood River below Plant 2 (estimated at 705 AF per year). The remaining 25 percent of the water savings associated with piping the Farmers Canal irrigation water (estimated at 313 AF per year) would be allocated to the District during dry years in the irrigation season. The District would use this water to increase the reliability of its water supply and improve its resilience to projected climate impacts.

In the non-irrigation season, FID only diverts water for hydropower. Under the Modernization Alternative in all water years, water savings associated with piping Farmers Canal hydropower water would be used for additional hydropower production at Plant 2 and would be returned to the Hood River below Plant 2 at RM 4.5 (estimated at 6.9 cfs or 2,494 AF per year). There would be no change to diversions or water rights related to hydropower.

FID would not apply for additional out-of-stream water rights under this alternative. Installing SCADA, enlarging Forebay 3, and piping Rainy Creek would help FID meet its stored water right in the Upper Green Point Reservoir (Reservoir), improving water delivery reliability by ensuring a

[24] For the purposes of this project, dry water years are when the State of Oregon declares a drought declaration for the region. Hence, normal water years are when there is no drought declaration. From 1992-2023 (33 years) there were five drought declarations. For purposes of the NEE (see Appendix D), dry years over the project's 100-year lifespan are assumed to occur five times every 33 years, or 15 percent of the time, assuming future drought frequency would be the same as the historic drought frequency. This assumption was made because there are no future drought predictions for the basin.

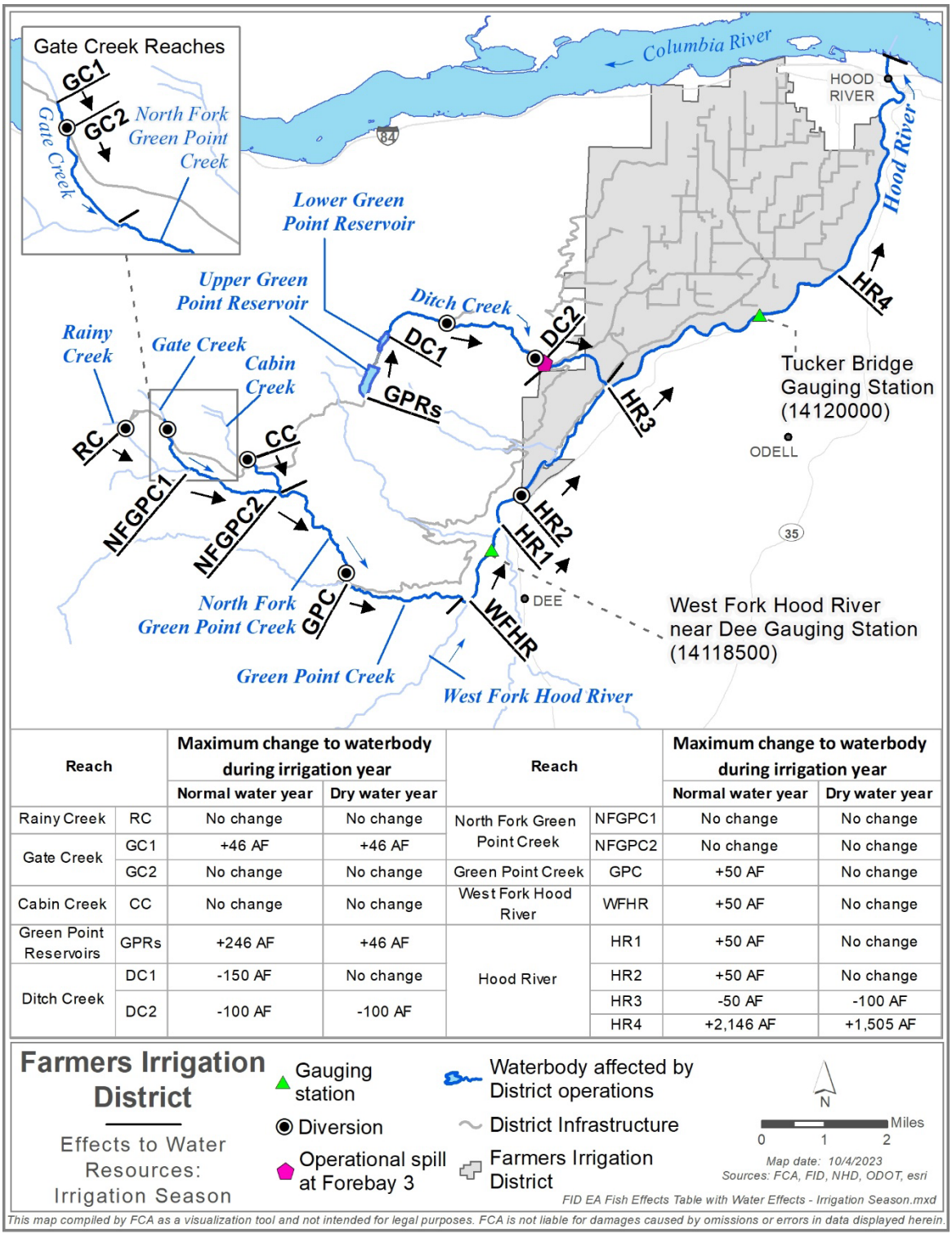
[25] The water savings associated with hydropower water are less in dry years because, under an existing MOA with ODFW and ODEQ to help maintain a minimum flow in the Hood River, FID ceases hydropower diversions at its Davenport diversion if the river drops below 250 cfs for three consecutive days. For this analysis, we assumed hydropower Davenport diversions would be off for August and September during dry years.

higher Reservoir level at the start of irrigation season. See the following sections for more details on how each project would affect Reservoir level, the volume of water conserved, and the seasonal timing of the beneficial effects.

Additionally, installing SCADA would improve operational efficiency through monitoring and control and reduce water releases from the Reservoir. SCADA would greatly enhance FID's ability to match diversion rates to water needs, maintain instream flows, and respond promptly to environmental changes, thereby improving water delivery reliability for patrons. SCADA and enlarging Forebay 3 would also enable FID to eliminate operational spill at Forebay 3.

6.8.2.2 Surface Water Hydrology

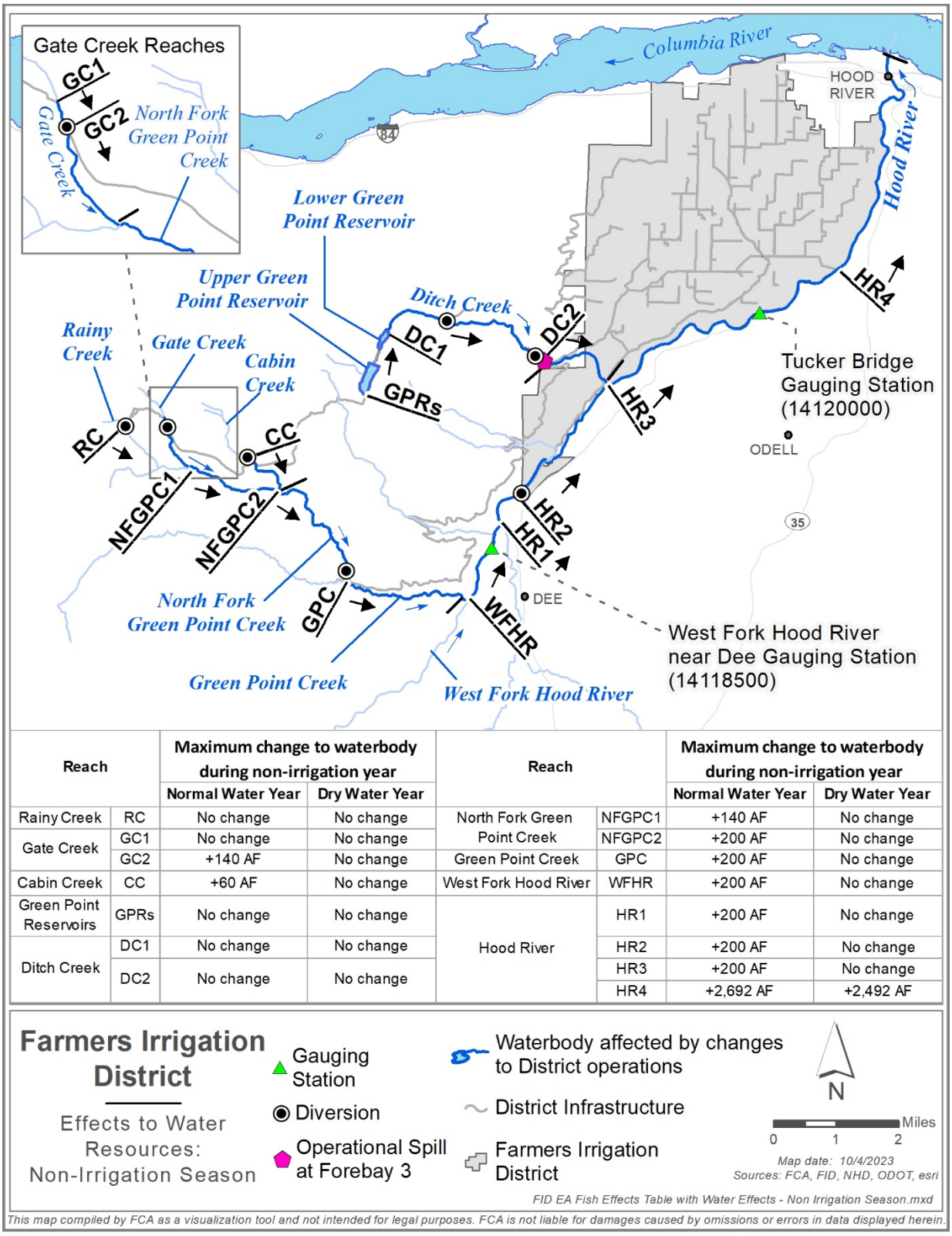
The Modernization Alternative would have a beneficial effect on surface water hydrology during the irrigation season in waterbodies associated with District operations. Figure 6-1 and Figure 6-2 show changes in waterbody volumes per year during the irrigation and non-irrigation seasons, respectively, as a result of the Modernization Alternative. The effects on reaches shown in Figure 6-1 and Figure 6-2 are discussed below in the following sections.



Reach		Maximum change to waterbody during irrigation year		Reach		Maximum change to waterbody during irrigation year	
		Normal water year	Dry water year			Normal water year	Dry water year
Rainy Creek	RC	No change	No change	North Fork Green Point Creek	NFGPC1	No change	No change
Gate Creek	GC1	+46 AF	+46 AF		NFGPC2	No change	No change
	GC2	No change	No change	Green Point Creek	GPC	+50 AF	No change
Cabin Creek	CC	No change	No change	West Fork Hood River	WFHR	+50 AF	No change
Green Point Reservoirs	GPRs	+246 AF	+46 AF	Hood River	HR1	+50 AF	No change
Ditch Creek	DC1	-150 AF	No change		HR2	+50 AF	No change
	DC2	-100 AF	-100 AF		HR3	-50 AF	-100 AF
					HR4	+2,146 AF	+1,505 AF

Figure 6-1. Summary of maximum volume change to waterbodies during the irrigation season per year as a result of the Modernization Alternative.[26]

[26] Following project implementation, more water would be maintained in the Reservoir, causing a reduction in streamflow in Ditch Creek (shown as negative values in the figure).



Reach		Maximum change to waterbody during non-irrigation year		Reach		Maximum change to waterbody during non-irrigation year	
		Normal Water Year	Dry Water Year			Normal Water Year	Dry Water Year
Rainy Creek	RC	No change	No change	North Fork Green Point Creek	NFGPC1	+140 AF	No change
Gate Creek	GC1	No change	No change		NFGPC2	+200 AF	No change
	GC2	+140 AF	No change	Green Point Creek	GPC	+200 AF	No change
Cabin Creek	CC	+60 AF	No change	West Fork Hood River	WFHR	+200 AF	No change
Green Point Reservoirs	GPRs	No change	No change	Hood River	HR1	+200 AF	No change
Ditch Creek	DC1	No change	No change		HR2	+200 AF	No change
	DC2	No change	No change		HR3	+200 AF	No change
					HR4	+2,692 AF	+2,492 AF

Figure 6-2. Summary of maximum volume change to waterbodies during the non-irrigation season per year as a result of the Modernization Alternative.

6.8.2.2.1 Rainy Creek Reach: Rainy Creek Diversion to North Fork Green Point Creek (NFGPC) Confluence

The Modernization Alternative would have no effect on the surface water quantity in Rainy Creek. FID would continue to divert the same amount of water from Rainy Creek.

6.8.2.2.2 Gate Creek Reaches

6.8.2.2.2.1 Gate Creek Reach 1: Junction of Rainy Ditch and Gate Creek to Gate Creek Diversion (RM 0.8)

The Modernization Alternative would increase streamflow in this reach of Gate Creek annually from April to June. Piping Rainy Ditch would capture approximately 0.42 cfs of water (approximately 46 AF per year) that is currently lost to seepage and evaporation (see Appendix E.6 for water loss information). From April to June in all water years, the District would convey this saved water through the new Rainy Pipeline and into Gate Creek to the Gate Creek Diversion at RM 0.8, thereby increasing flows in this reach of Gate Creek.

6.8.2.2.2.2 Gate Creek Reach 2: Gate Creek Diversion (RM 0.8) to NFGPC Confluence

Installation of SCADA and expansion of Forebay 3 would allow FID to better manage water diversions and releases from the Reservoir and eliminate operational spill at Forebay 3. During normal water years,[24] these improvements would reduce Reservoir releases by an estimated 200 AF per year during the irrigation season.

Of the 200 AF total, SCADA and Forebay 3 expansion would each reduce Reservoir releases by 100 AF, which would require 200 AF per year less water to be diverted from Gate and Cabin creeks in the non-irrigation season following normal water years to fill the Reservoir. During the non-irrigation season following a normal water year, FID would reduce the diversion of Gate Creek by an estimated 140 AF per year and decrease its Cabin Creek diversion by an estimated 60 AF per year, increasing streamflow in these creeks (see Section 6.8.2.2.3). Additionally, during the irrigation season, SCADA would allow FID to reduce its NFGPC diversion by an estimated 50 AF per year since patron water rights would be fulfilled with stored water in the Reservoir (see Section 6.8.2.2.8).

During dry water years,[24] there would be no effect and no change from current operations (i.e., the No Action Alternative). Approximately 50 AF would be diverted from NFGPC during the irrigation season to fulfill patron water rights, and the District would use the 200 AF of water stored in the Reservoir that was saved by SCADA and Forebay 3 expansion to serve patron water rights. In the non-irrigation season following dry water years, FID would operate its Gate Creek and Cabin Creek diversions as it currently does to fill the Reservoir; FID would divert an estimated 140 AF from Gate Creek and an estimated 60 AF from Cabin Creek.

6.8.2.2.3 Cabin Creek Reach: Cabin Creek Diversion (RM 0.9) to NFGPC Confluence

During normal water years, water savings from SCADA and Forebay 3 expansion that are sourced from Cabin Creek (estimated at 60 AF per year total) would be maintained in the Reservoir. This would result in a reduced Cabin Creek diversion the following non-irrigation season of an estimated 60 AF per year, thereby increasing streamflow in Cabin Creek during the non-irrigation season.

During dry water years, there would be no effect and no change from current operations (i.e., the No Action Alternative). The District would use the 60 AF of water savings from SCADA and Forebay 3 expansion that was sourced from Cabin Creek and stored in the Reservoir to fulfill patron

water rights. In the non-irrigation season following a dry water year, FID would divert 60 AF from Cabin Creek to fill the Reservoir, as it currently does.

6.8.2.2.4 Green Point Reservoirs Reach

The Modernization Alternative would have no effect on the Lower Green Point Reservoir and a beneficial effect on the Reservoir. Currently, the Reservoir is emptied nearly every year, and water levels are very low late in the irrigation season. SCADA, Forebay 3 expansion, and piping Rainy Ditch would allow for more stored water to be available later in the irrigation season. This change would have a beneficial effect on the Reservoir level, with a greater likelihood of having more water in the Reservoir at the end of the irrigation season. This would improve water delivery reliability for patrons, increase operational flexibility for FID should the District need the water during dry water years to fulfill patron water rights, and provide greater recreational opportunities at the Reservoir during the entire season (see Section 6.4).

FID would eliminate 200 AF per year of reservoir releases during the irrigation season following implementation of SCADA and expansion of Forebay 3 and would maintain this saved water in the Reservoir during normal water years. During dry water years, the District would use the 200 AF per year of saved water in the Reservoir to fulfill patron water rights. Piping Rainy Ditch would allow FID to fulfill patron water rights using live flow from Rainy Creek from April to June in all water years (46 AF per year), decreasing the use of stored water from the Reservoir during this period and maintaining this saved water in the Reservoir.

6.8.2.2.5 Ditch Creek Reaches

6.8.2.2.5.1 Ditch Creek Reach 1: Lower Green Point Reservoir Outlet (RM 4.6) to Forebay 3 (RM 1.6)

The Modernization Alternative would eliminate operational spill at Forebay 3 to Ditch Creek, a tributary to the Hood River. Elimination of operational spill and installation of SCADA would reduce reservoir releases and decrease flow in this reach of Ditch Creek by an estimated 200 AF per year during the irrigation season in normal water years (see Section 6.8.2.2). During normal water years, FID would release an estimated 50 AF per year of saved water stored in the Reservoir to serve patron water rights. Currently these rights are served by water diverted from NFGPC. The net effect of reduced releases from the Reservoir (200 AF per year) and the Reservoir release of 50 AF per year to serve patrons, would equate to a net reduction of 150 AF per year in this stretch of Ditch Creek during the irrigation season. This would move the creek towards a more natural hydrograph. During dry water years, there would be no change from current conditions.

6.8.2.2.5.2 Ditch Creek Reach 2: Forebay 3 (RM 1.6) to Hood River Confluence

During the irrigation season in all water years, SCADA systems and the expansion of Forebay 3 would reduce operational spills to this reach of Ditch Creek by an estimated 100 AF per year. Reduced discharges would decrease flow in Ditch Creek and move the creek towards a more natural hydrograph.

6.8.2.2.6 NFGPC Reaches

6.8.2.2.6.1 NFGPC Reach 1): Gate Creek Confluence (RM 4.0) to Cabin Creek Confluence (RM 2.4)

As described in Section 6.8.2.2.2, the Modernization Alternative would increase streamflow in Gate Creek, a tributary to NFGPC, during the non-irrigation season following normal water years.

NFGPC would experience an increase in streamflow below its Gate Creek confluence of about 140 AF per year. During the non-irrigation season following dry water years, there would be no effect. During all water years, there would be no effect during the irrigation season.

6.8.2.2.6.2 NFGPC Reach 2: Cabin Creek Confluence (RM 2.4) to NFGPC Diversion (RM 0.2)

As described in Section 6.8.2.2.2 and 6.8.2.2.6, the Modernization Alternative would increase streamflow in Gate and Cabin creeks, tributaries to NFGPC, during the non-irrigation season following normal water years. In total, streamflow would increase by about 200 AF per year in this stretch of NFGPC. During the non-irrigation season following dry water years, there would be no effect. During all water years, there would be no effect during the irrigation season.

6.8.2.2.7 Green Point Creek Reach: NFGPC Diversion (RM 0.2) to West Fork Hood River Confluence

The Modernization Alternative would increase streamflow in Green Point Creek during the irrigation season in normal water years by an estimated 50 AF per year because patron water rights would be fulfilled with 50 AF per year from stored water in the Reservoir and not from Green Point Creek. In dry water years, there would be no effect during the irrigation season.

During the non-irrigation season following a normal water year, streamflow in Green Point Creek would increase by an estimated 200 AF per year from SCADA and the expansion of Forebay 3 (see Section 6.8.2.2.2.2). Following a dry water year, there would be no effect during the non-irrigation season.

6.8.2.2.8 West Fork Hood River Reach: Green Point Creek Confluence (RM 1.4) to Hood River Confluence (RM 0.0)

The Modernization Alternative would have a beneficial effect on streamflow in this reach of the West Fork Hood River. See Section 6.8.2.2.7 for details on the volume and timing of streamflow effects.

6.8.2.2.9 Hood River Reaches

The Hood River would see beneficial effects as a result of increased streamflow from the Modernization Alternative. Additional flow in the Hood River would help to meet the targets for fish, wildlife, and their habitat quality, which are dependent on flow (Section 4.8.2). All species in the Hood River, including federally listed fish (Section 4.9.2 and 6.9.2.2), would benefit from increased streamflow.

6.8.2.2.9.1 Hood River Reach 1: West Fork Hood River Confluence (RM 12.5) to FID's Hood River Diversion (RM 11.4)

Installation of SCADA and Forebay 3 expansion would increase streamflow in this reach of the Hood River. See Section 6.8.2.2.7 for details on the volume and timing of streamflow effects.

6.8.2.2.9.2 Hood River Reach 2: FID's Hood River Diversion (RM 11.4) to Ditch Creek Confluence (RM 9.3)

Installation of SCADA and Forebay 3 expansion would increase streamflow in this reach of the Hood River. See Section 6.8.2.2.7 for details on the volume and timing of streamflow effects. Upgrading the attenuation bay would not involve any in-water work in the Hood River and would not affect Hood River streamflow.

6.8.2.2.9.3 Hood River Reach 3: Ditch Creek Confluence (RM 9.3) to FID's Plant 2 (RM 4.5)

During the irrigation season in normal water years, streamflow would increase by 50 AF per year in this reach of the Hood River (see Section 6.8.2.2.7). In addition, operational spill of 100 AF per year into Ditch Creek would be eliminated during the irrigation season in all water years. The net effect would be a decrease of 50 AF per year during the irrigation season in normal water years. In the irrigation season in dry water years, this reach would experience a reduction of 100 AF due to the elimination of operation spill to Ditch Creek.

During the non-irrigation season in normal water years, streamflow would increase in this reach of the Hood River by 200 AF per year (Section 6.8.2.2.7). In dry water years, there would be no effect.

6.8.2.2.9.4 Hood River Reach 4: FID's Plant 2 (RM 4.5) to Columbia River Confluence (RM 0.0)

Streamflow would increase in this reach of the Hood River due to the Modernization Alternative. In a normal water year during the irrigation season, FID would restore an estimated 2,146 AF per year in the Hood River below Plant 2. During the irrigation season in a dry water year, FID would restore 1,505 AF per year in the Hood River below Plant 2 (see Section 6.8.2.1, Section 6.8.2.2.7, and Section 6.8.2.2.9.3 for details).

During all water years in the non-irrigation season, an estimated 6.9 cfs (2,492 AF per year) in water savings associated with piping Farmers Canal water for hydropower would be restored in the Hood River below Plant 2. In the non-irrigation season following normal water years, FID would restore an additional 200 AF annually (Section 6.8.2.2.7), for an estimated total of 2,692 AF. On average, Hood River winter streamflows range from 600 cfs to 1,500 cfs (see Section 4.8.2.1). The addition of approximately 7 cfs would, therefore, likely be below the level of detection.

6.8.2.2.10 Drainage Courses

The conversion of Rainy Ditch and the two open sections of the Farmers Canal to piped systems would return the landscape along the ditch and canal to its original grade and to the natural surface runoff patterns that existed prior to the presence of the open ditch and canal. Along the Farmers Canal, this change could present stormwater management challenges during winter to areas downgradient of the newly installed pipeline, as there would be no open canal to capture stormwater. Currently, intercepted stormwater in the canal is returned to the Hood River below Plant 2. Upon conversion to pipe, the stormwater and drainage would enter the Hood River at various locations above Plant 2, where natural drainages enter the Hood River. Engineering designs and coordination between the District and landowners in the area would mitigate potential unintended consequences. Rainy Ditch is on undeveloped National Forest lands and would have no stormwater concerns. Due to the unlikely chance that piping the Farmers Canal would cause drainage issues, the elimination of the open canal sections would result in a minor, long-term adverse effect on drainage courses.

6.8.2.3 Surface Water Quality

The Modernization Alternative would increase streamflow in Gate Creek, Cabin Creek, NFGPC, Green Point Creek, West Fork Hood River, and the Hood River (see Section 6.8.2.2). However, improved streamflow in Gate Creek, Cabin Creek, NFGPC, Green Point Creek and the West Fork Hood River would likely be below the level of detection.

Hood River streamflow below Plant 2 would increase during the irrigation season by an estimated 2,146 AF per year and 1,505 AF per year in a normal water year and dry water year, respectively (see Section 6.8.2.1, Section 6.8.2.2.7, and Section 6.8.2.2.9.3). In late summer, this represents an increase

in Hood River streamflow of approximately 2.7 percent maximally. This section of river currently does not meet water quality standards under Section 303(d) of the CWA (33 U.S.C. 1251 et seq.) (see Section 4.8.3).

During the non-irrigation season (October to April 14), the Modernization Alternative would increase streamflow in the Hood River below Plant 2 by an estimated 6.9 cfs. However, since Hood River average winter streamflows range from 600 cfs to 1,500 cfs, increases in streamflow would likely be below the level of detection.

Piping the Farmers Canal would prevent contaminants such as sediment, herbicides, and pesticides from entering the irrigation conveyance system and discharging into the Hood River at RM 4.5 after flowing through Plant 2. Piping the Farmers Canal would also prevent contaminants from entering the irrigation system and being delivered to FID's patrons and applied on-farm. Upgrading the attenuation bay would reduce sediment in irrigation water and improve the quality of water delivered to FID patrons.

The Modernization Alternative would also decrease reservoir releases from Upper Green Point Reservoir. This would result in more water in the Reservoir later in the irrigation season most years and a greater likelihood of having more water in the Reservoir at the end of irrigation season. More water in the Reservoir, particularly later in the irrigation season, may possibly reduce temperatures. No adverse effects are anticipated to water quality in Ditch Creek as a result of eliminating operational spill from Forebay 3.

During construction, soil that could erode from construction sites could be carried to nearby waterbodies; however, the effect of construction activities on water quality is expected to be minor and short-term because BMPs to control soil erosion would be used. Construction associated with upgrading the attenuation bay would not involve in-water work and would have no effect on water quality.

In summary, the proposed action would have a beneficial effect on water quality during the irrigation season due to increased streamflow in the Hood River below Plant 2. Effects on water quality from construction would be minor and short-term.

6.8.2.4 Groundwater

The Modernization Alternative would have a long-term, negligible effect on groundwater in the project area. Piping the two sections of Farmers Canal and Rainy Ditch would eliminate an estimated 2,242 AF of seepage and evaporation annually from the District's conveyance system in a normal water year and an estimated 1,964 AF per year in a dry water year. These changes to water seepage would have negligible effects on groundwater because the vast majority of aquifer recharge in the basin is from precipitation (as previously noted in Section 4.8.4).

6.8.2.5 Ecosystem Services

The Modernization Alternative would affect ecosystem services provided by irrigation water and by water in Upper Green Point Reservoir and the Hood River in the following ways:

Provisioning Service, Irrigation Water (Figure 4-1, [E1]): Implementation of the Modernization Alternative would have a beneficial effect on irrigation water deliveries for FID patrons. Modernizing District irrigation infrastructure would enable the District to be more resilient to environmental changes and maximize the efficiency of water conveyance, thus improving water delivery reliability (Sections 4.8 and 6.8). In dry water years, a portion of the water savings from the Modernization Alternative

would be allocated to the District during the irrigation season. The District would use this water to increase the reliability of its water supply and improve its resilience to projected climate impacts.

Regulating Service, Water Quality (Figure 4-1, [E5]): The Modernization Alternative would reduce releases from the Reservoir, improving water quality within the Reservoir. Water conserved by piping the Farmers Canal would also be restored instream in the Hood River. The addition of water instream during the irrigation season would benefit water quality in the Hood River and help to meet water quality standards (Sections 4.8.3 and 6.8.2.3). Overall, the Modernization Alternative would have a beneficial effect on water quality.

Cultural Service, Residential Use (Figure 4-1, [E3]): Implementation of the Modernization Alternative would have a beneficial effect on irrigation water deliveries for FID patrons' residential landscapes. The Modernization Alternative would enable the District to be more resilient to environmental changes and maximize the efficiency of water conveyance, thus improving water delivery reliability (Sections 4.8 and 6.8).

6.9 Fish and Aquatic Resources

6.9.1 No Action (Future without Federal Investment)

6.9.1.1 General Fish and Aquatic Species

The No Action Alternative would have no effect on fish and aquatic species in the project area because the District's fish screens would continue to exclude fish from FID's conveyance system. Residential pond overflow would continue to be a potential source of fish entering the District's open canals (Section 4.9.1.1). The No Action Alternative would also have no effect on fish and aquatic species or their habitats in the waterbodies affected by District operations because streamflow would not change as a result of District operations (Section 4.9).

6.9.1.2 Federally Listed Fish and Aquatic Species

The No Action Alternative would have no direct or indirect effects on federally listed fish and aquatic species or their habitat in the Hood River and its tributaries associated with the project area. Because no change would occur to streamflow, habitat supporting bull trout, steelhead, Chinook, and coho populations would not change from baseline conditions as a result of District operations (Section 4.9).

6.9.1.3 Ecosystem Services

Ecosystem services provided by fish and aquatic species in waterbodies associated with District operations in the project area would not be affected by District operations in the No Action Alternative.

6.9.2 Modernization Alternative

Overall, the Modernization Alternative would benefit fish and aquatic species because of increased water instream in the Hood River (see Section 6.8.2.2). Unavoidable effects on fish and aquatic species during construction would be minimized using BMPs (see Section 8.3).

Figure 6-1 and Figure 6-2 show changes in waterbody volumes by year during the irrigation season and non-irrigation season, respectively, as a result of the Modernization Alternative.

6.9.2.1 General Fish and Aquatic Species

6.9.2.1.1 Within Waterbodies Associated with District Operations

The Modernization Alternative would likely indirectly benefit resident and anadromous fish and aquatic life within the Hood River because increased streamflow would improve fish and aquatic habitat conditions within the planning area (see Section 6.8.2.2). Increased streamflow generally benefits fish and aquatic habitat conditions (United States Environmental Protection Agency 2020).

The District would restore water saved by piping the Farmers Canal in the Hood River below Plant 2 (RM 4.5), which would increase streamflow and improve water quality in the Hood River (see Figure 6-1 and Figure 6-2). This action may indirectly benefit fish and aquatic species because increased water instream may help reduce stream temperatures, particularly in the latter summer months when streamflow is naturally low (see Section 4.8.2).[27]

Piping the Farmers Canal would prevent contaminants such as sediment, herbicides, pesticides, and animal waste from entering the irrigation conveyance system and discharging into the Hood River after flowing through Plant 2. Piping the Farmers Canal would also prevent contaminants from entering the irrigation system and being delivered to FID's patrons and applied on-farm.

6.9.2.1.2 Project Area

As a result of the Modernization Alternative, there would be minor short-term and long-term effects on fish and aquatic species in the project area.

The effects of the Modernization Alternative on aquatic, semi-aquatic, and amphibious species in the Farmers Canal would be minor. Piping the remaining open sections of the Farmers Canal would cause unavoidable, direct mortality to amphibians or other aquatic species that may overwinter along the canal and within the project area. Because the habitat function provided by the canal is low given the annual mortality resulting from routine canal maintenance activities, and because construction activities would have no effect on these populations at the broader watershed or basin level, the effects on macroinvertebrates and amphibians would be minor and long-term.

The District's fish screen at its Hood River Diversion would continue to prevent fish from entering the Farmers Canal. A small number of trout and perch may occur within the Farmers Canal due to overflow from nearby private ponds (see Section 4.9.1). The District would coordinate with ODFW and CTWS prior to piping the canal to determine if a fish salvage effort would be required to capture any fish in the canal and return them to the Hood River. Project construction would have no effect on these fish at the broader watershed or basin level. Because a fish salvage effort would be conducted in the canal prior to construction, if needed, and because construction activities would have no effect on these populations at the broader watershed or basin level, the effects to the small number of fish in the Farmers Canal would be minor and short-term.

Construction in the project area would also result in a short-term increase in the potential for sediment loading into project area waterways, which may temporarily affect water quality (see Section 6.8.2.3). This action would have a minor, short-term effect on fish and aquatic species. Construction would follow BMPs (see Appendix E.10).

[27] Water quality improvements may be seen with potential water temperature decrease with increased flow; however, water temperature decrease also depends on groundwater, riparian shade, and other factors.

6.9.2.2 Federally Listed Fish and Aquatic Species

The Modernization Alternative could affect four federally listed threatened fish species including Lower Columbia River coho salmon (fall populations), Chinook salmon (spring and fall populations), steelhead trout (summer and winter populations), and Hood River bull trout.

Each of the four federally listed species occurs, or has critical habitat designated, within the waterbodies affected by the project (Section 4.9.2). The increase in streamflow as a result of implementation of the Modernization Alternative is expected to have beneficial effects, or beneficial but below the level of biological detection, on coho salmon, Chinook salmon, bull trout, steelhead, and their critical habitats.

Water saved from the project as a result of the Modernization Alternative would increase streamflow (Section 6.8.2). It may incrementally reduce summer stream temperatures and may potentially increase riparian vegetation and shade levels along the Hood River in reaches that provide habitat for federally listed fish and aquatic species. The Modernization Alternative may increase availability of aquatic habitat for migration, spawning, and rearing of listed species, with the largest benefit occurring in the Hood River during the low flow period from late July through September. The increased streamflow may improve upstream migration conditions.

Coordination with USFWS and NMFS has been initiated for technical assistance (A. Gray, USFWS, August 24, 2023; T. Hausman, NMFS, August 24, 2023).[28] Following the public comment period, and after feedback from that comment period has been incorporated into this Plan-EA, NRCS will formally initiate informal consultation with USFWS and NMFS and write a joint Biological Assessment in compliance with Section 7 of the ESA. The outcome of that consultation will be incorporated into the Final Plan-EA.

6.9.2.3 State-Listed Fish and Aquatic Species

Because Lower Columbia River coho salmon are listed by ODFW as endangered and are present in waterbodies associated with FID operations (see Section 4.9.3), coordination with ODFW for technical assistance has been initiated (J. Seals and J. Thompson, ODFW, April 12, 2022) and is ongoing.

6.9.2.4 Ecosystem Services

The Modernization Alternative would affect the ecosystem services provided by fish and aquatic resources in the following ways:

Provisioning Service, Instream fish species (Figure 4-1, [E2]): Over the long term, increased streamflow as a result of the Modernization Alternative would improve habitat for resident and anadromous fish species. Although data are not available to quantify improvements in fish populations with increased streamflow, the benefits of restoring water instream are evaluated in Appendix D.1. Furthermore, additional water instream would likely assist in the recovery efforts of Pacific salmon and lamprey by ODFW and CTWS. Bolstering anadromous fish populations may allow for more consistent fishing for harvest and consumption.

Cultural Service, Culturally important fish (Figure 4-1, [E4]): Following the project, the water restored instream would have a beneficial effect on instream habitat for Pacific salmon, a tribal trust and treaty fisheries resource of CTWS, and the Pacific lamprey, a tribal icon, which have been in decline

[28] Coordination with USFWS and NMFS has been completed as required by the provision of PL 83-566 Section 12.

for many decades. Instream habitat improvement would assist CTWS efforts to ensure that Pacific salmon and lamprey are not lost from local rivers and that cultural traditions would continue to be passed from one generation to another. At this time, quantification of these cultural ecosystem services is not available; however, benefits to Pacific salmon and lamprey would positively contribute to CTWS goals to enhance fishing, community, health, cultural identity, subsistence, and religious tribal values (Close et al. 2002; CTWS 2019).

6.10 Wetland and Riparian Areas

6.10.1 No Action (Future without Federal Investment)

Under the No Action Alternative, wetland and riparian vegetation associated with District infrastructure and operations would persist. Seepage supporting wetland and riparian features adjacent to canals and District infrastructure would remain in its current condition. The District would continue to limit riparian vegetation by keeping canal banks clear from vegetation.

6.10.2 Modernization Alternative

6.10.2.1 Project Area

Overall, the Modernization Alternative would have a minor effect on wetlands and riparian areas in or near the project area. Minor, localized disturbances associated with construction activities would be short-term, and a potential reduction in water availability to areas adjacent to piping projects from reduced seepage would have long-term effects. The District mechanically clears vegetation within and surrounding canals and other District infrastructure. NWI geographic information systems data identified 16 potential wetland features near the project area. Wetland determinations or delineations at sites identified as wetlands have not occurred at this time.

Construction would disturb soils along canals and pipelines in the project area, as well as adjacent to Forebay 3 and the area of the proposed deepened attenuation bay. Seasonal, opportunistic hydrophytic plants that sporadically occur within and directly adjacent to canals and other District infrastructure would be removed or buried during excavation, fill, placement of pipe, or other construction activity. However, all wetlands within or adjacent to the project area would be avoided to the extent practicable, and BMPs would be implemented to limit effects from construction. The District would also follow appropriate NRCS procedures to revegetate disturbed areas as uplands.

In locations where piping would occur along the Farmers Canal and Rainy Ditch, seepage losses would be eliminated, potentially limiting the water available to adjacent wetlands that may be dependent upon canal seepage for hydrology. Additionally, wetlands in the project area may provide wildlife habitat that would be permanently changed to upland areas after project construction.

Rainy Ditch piping could have beneficial effects on wetlands and riparian areas along Gate Creek. Piping Rainy Ditch would put more water in the approximately 0.75-mile section of Gate Creek between where Rainy Ditch joins Gate Creek and the District's diversion on Gate Creek, supplying more water to nearby wetlands. Other activities associated with the Modernization Alternative are anticipated to have no measurable effect on wetland and riparian areas.

6.10.2.2 Wetlands and Riparian Areas along Natural Waterbodies Associated with District Operations

The Modernization Alternative would result in improvements in water quality and habitat function in the Hood River from FID's Plant 2 at RM 4.5 to its mouth at the Columbia River as a result of increased streamflow during the irrigation season. The Modernization Alternative would increase

streamflow by an estimated 2,146 AF per year during the irrigation season in normal water years below Plant 2. During the irrigation season in dry years, an estimated 1,505 AF per year would be restored. This added streamflow would contribute to a more natural flow regime for natural riverine wetlands and greater access to water to support hydrophytic riparian plants. Studies of semi-arid watersheds have found a positive relationship between seasonal or annual streamflow and the growth, abundance, and diversity of riparian vegetation (Harris et al 1987; Stromberg and Patton 1990; Caskey et al. 2015). In another study, riparian vegetation abundance and stand width increased most with streamflow volume during the spring and summer (Stromberg 1993).

Piping Rainy Ditch, the expansion of Forebay 3, and SCADA installation could have beneficial effects on wetland and riparian areas near Upper and Lower Green Point reservoirs. The elimination of seepage associated with Rainy Ditch, improved control of water flows within the District associated with SCADA, and eliminating operational spills by expanding Forebay 3 would allow the District to conserve stored water in the reservoirs and hold more water in the reservoirs later in the irrigation season. Higher water levels in Upper and Lower Green Point reservoirs later into the irrigation season could provide additional water to nearby wetland and riparian areas through seepage and fringe wetland development.

6.10.2.3 Floodplains

Based on the available Federal Emergency Management Agency Flood Insurance Rate Maps for Hood River County, the proposed modified attenuation bay would fall within the 100-year floodplain. The attenuation bay would be deepened within its existing footprint. Construction activities for the attenuation bay would include excavation and fill, as well as potential removal of trees and shrubs. The area that would be affected by these activities has been repeatedly altered by past District construction and maintenance activities, and much of the area is currently used as a storage site for sediment that has been removed from the attenuation bay. The proposed action would not directly or indirectly support additional floodplain development. The attenuation bay would be reviewed by all applicable local, state, and federal agencies to comply with floodplain rules and with EO 11988,[29] and mitigation requirements would be employed as required to address any floodplain effects. The attenuation bay improvements would not require a county building permit; however, the Hood River County Planning Department would review the project for compliance with both Floodplain and Stream Protection overlay zoning rules.

6.10.2.4 Permitting and Compliance

The memorandum signed by the USACE and USEPA on July 24, 2020, in reference to the exemption of construction and maintenance activities on irrigation ditches, states that if the proposed activity does not occur in Waters of the U.S., the proposed activity is not prohibited nor regulated under Section 404 of the CWA (Section 4.10). Under this exemption, it would be expected that no permit would be required for the disturbance to wetlands within the project area. Coordination and consultation with ODSL and USACE would occur prior to implementation of each site-specific project to determine whether a wetland delineation is necessary and to ensure the proposed action either meets exemption criteria or that the proper permitting and construction activities are conducted in accordance with the permits' requirements.

[29] EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term effects associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

6.11 Wildlife Resources

6.11.1 No Action (Future without Federal Investment)

The No Action Alternative would have no effect on wildlife resources because wildlife that use the project area as habitat would continue to do so.

The No Action Alternative would have no effect on the way in which wildlife use the river and riverbanks of waterbodies associated with District operations. Wildlife would continue to use the river for water and riverbanks as habitat as specified by the wildlife's life history.

6.11.2 Modernization Alternative

Overall, the Modernization Alternative would have minor, short-term effects to general wildlife in the project area due to construction activities. There would be no long-term effects on wildlife in the project area; very little wildlife habitat currently exists in the project area due to vegetation clearing, and wildlife in the project area consists of habitat generalists or edge species that are generally tolerant to disturbance (Blair 1996; Ditchkoff et al. 2006; McKinney 2002; L. Perkins, FID Manager, personal communication, November 3, 2021; Shochat et al. 2006). Unavoidable effects on wildlife during construction would be minimized using BMPs (see Section 8.3).

Outside of the project area, the effects on streamflow in waterbodies affected by District operations as a result of the Modernization Alternative would be below the level of detection for wildlife that interact with the river and riverbanks. Therefore, there would be no effect on wildlife that are present or interact with these riverbanks.

6.11.2.1 Pipe Farmers Canal

During construction, terrestrial wildlife could experience noise disturbance due to heavy equipment operation, habitat removal due to limited vegetation removal, injury due to collision with construction equipment, and/or an increase in human presence.

While some wildlife may use the Farmers Canal as a water source, many alternative water sources exist nearby (L. Perkins, FID Manager, personal communication, November 3, 2021). Additionally, the canal provides poor habitat due to regular vegetation clearing (Section 4.7).

Wintering or migrating birds would be negligibly affected during construction because they have the flexibility to move away from disturbances to other suitable areas. There would be no to negligible expected effect on breeding migratory songbirds or waterbirds as construction activities would generally occur outside the nesting season and the District would continue to coordinate with USFWS to minimize effect. To comply with MBTA, clearance surveys would be completed prior to construction to ensure that project activity would not disturb the nests of non-raptor species, and early coordination with USFWS is ongoing (A. Gray, USFWS, April 13, 2022). Generally, there would be no to negligible effect on migratory song or water birds because construction activities would occur generally outside of the nesting season; however, the District would continue to work with USFWS to follow BMPs to minimize effects.

The District would follow USFWS guidelines to ensure minimal disturbance to bald or golden eagles nesting near the project area. The critical nesting period for bald and golden eagles is January 1 through August 31. No known nesting sites of bald or golden eagles are within proximity of the project area (L. Perkins, FID Manager, personal communication, December 2, 2021; Ann Gray, Personal Communication, April 13, 2022). To comply with BGEPA, the District would coordinate with USFWS should a nesting site be established in proximity of the project area.

After installation, all disturbed areas would be recontoured and planted with a seed mix of native grasses and forbs in consultation with NRCS. Outside of the project area, the effects on streamflow in waterbodies affected by District operations as a result of the Modernization Alternative (Figure 4-2) would be below the level of detection for wildlife that interact with the river and riverbanks. Therefore, there would be no effect on wildlife that are present or interact with these riverbanks.

6.11.2.2 Update Attenuation Bay

Effects of updating the attenuation bay are expected to be the same as those described in Section 6.11.2.1.

6.11.2.3 Install SCADA

Effects during construction are expected to be the same as those described in Section 6.11.2.1. However, there would be no long-term effect on potential water sources for SCADA installations.

SCADA sites would experience approximately 25 to 200 square feet of disturbance, based on the SCADA and telemetry equipment required at the individual sites (see Section 8.2). Due to their small footprint size and siting near existing irrigation infrastructure, SCADA installations would not result in appreciable wildlife habitat loss.

6.11.2.4 Expand Forebay 3

Effects are expected to be the same as those described in Section 6.11.2.1.

6.11.2.5 Pipe Rainy Ditch

Effects are expected to be the same as those described in Section 6.11.2.1.

6.11.2.6 Federally Listed Wildlife Species

The Modernization Alternative would have no effect on northern spotted owl (threatened). Although gray wolf have not been observed in the Hood River Basin, the species' range is assumed to be expanding to the area; however, due to the nature of the construction and implementation of the Modernization Alternative, it would not interfere with the normal behavior, feeding, and reproduction of gray wolf and would have no effect or would not likely adversely affect gray wolf (A. Gray, USFWS, personal communication, April 13, 2022; J. Thompson, ODFW, April 12, 2022). As noted in Sections 4.11.3 and 4.11.4, no federally designated critical habitat or state-listed species occur within the project area. Effects on federally or state-designated species or federally designated critical habitats within waterbodies affected by District operations are discussed in Section 6.9.2.2.

6.12 Cumulative Effects

Cumulative effects are defined by CEQ's regulations in 40 CFR 1508.7 (1978) as the "impact on the environment which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time."

Cumulative effects may be additive or interactive. Additive effects are the sum of the effects on a resource; for example, diversions from surface water sources for agricultural irrigation and domestic consumption, which contribute incrementally and additively to surface water flow reductions. Interactive effects may be either countervailing—where the net adverse cumulative effect is less than the sum of the individual effects—or synergistic—where the net adverse cumulative effect is greater

than the sum of the individual effects. This section includes a description of past, current, and reasonably foreseeable future actions, as well as cumulative effects organized by resource.

6.12.1 Past Actions

Past actions are summarized as land development activities that include irrigated agriculture (consisting of construction of the canal system, previous piping projects, and diversions), urban and suburban development, industrial land and water uses, commercial development, water diversions for nonagricultural uses, and transportation infrastructure. The nature and extent of these past actions and how they have influenced the existing environment are described for each resource in Section 4.

FID started as the former Hood River Irrigation District in 1874. The District constructed the Green Point Reservoirs in 1936 and 1937. FID's irrigation infrastructure has been subjected to extensive modifications and/or improvements (FID 2021). The District's pipelines and hydroelectric plants were built from 1906 to 2016. FID expanded the Upper Green Point Reservoir from 715 AF to 1,365 AF in 2021. FID hopes to begin using the additional storage in the 2023–2024 non-irrigation season.

Four other major irrigation districts were developed within the Hood River Basin during this timeframe, collectively altering the natural hydrology of the Hood River and its tributaries. These other irrigation districts are MHID, EFID, DID, and MFID. These districts have invested numerous resources to modernize their systems to piped and pressurized water delivery.

6.12.2 Current and Reasonably Foreseeable Future Actions

Current actions are those projects, developments, and other actions that are presently underway, either because they are under construction or are occurring on an ongoing basis. Reasonably foreseeable future actions generally include those actions formally proposed or planned, or 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.

6.12.2.1 Land Use Development

Ongoing agricultural activities including fruit orchards and pasture in the project area are not expected to change from current conditions. Land use development in the project area would continue to be managed according to the Hood River County Comprehensive Plan and Hood River County zoning regulations. Under current zoning, the majority of land in or near the project area is USFS or Hood River County land, although residential or other development activities are expected to increase in the future where allowed. Public lands would continue to be maintained for their intended uses.

6.12.2.2 Other Farmers Irrigation District Modernization Goals

The District has had a longtime goal to work with patrons to improve water application efficiency through installation of more efficient irrigation systems, improved irrigation water management, and incentivization and education related to both avenues to reduce its reliance on natural streamflow and better meet future water supply needs given a highly variable snowpack and climate trends. The District also plans to replace its remaining non-modernized fish screens to Farmers Screens, and would work with patrons to upgrade or eliminate the few remaining individual pumps following Farmers Canal piping.

6.12.2.3 Basin-wide Irrigation District Modernization Goals

The four other major irrigation districts, EFID, MFID, MHID, and DID, in the Hood River Basin are either fully piped and pressurized or working to complete full pressurization of their infrastructure at this time. EFID has an authorized Plan-EA and is working to fully pipe its system. DID has recently finished modernizing its system and has allocated water saved as result of recent modernization projects to instream use. MFID is working to complete fish passage improvements and improve dam safety at its Laurence Lake Reservoir. These districts have begun to pursue the necessary funding and permitting for these projects, which are scheduled for completion over the next 10 years. Each of these projects is contingent on the availability of funding.

6.12.3 Cumulative Effects by Resources

Cumulative effects are considered for each resource using the intensity threshold matrix (Appendix E.1) in combination with past, present, and reasonably foreseeable future actions.

6.12.3.1 Cultural Resources

Cultural resources in the project area have been affected by past, present, and ongoing development activities such as agriculture, land development, forestry, and other ground-disturbing projects. Like the proposed action, other reasonably foreseeable future actions in the vicinity of the project area have the potential to disturb previously undiscovered cultural resources. If necessary, mitigation measures will be identified through consultation with SHPO and federally recognized tribes to address adverse effects to cultural resources. Mitigation measures would be formalized in an MOA with NRCS, SHPO, and FID. Tribes would be considered consulting parties and not signatories as this project will not be implemented on lands held in tribal trust.

6.12.3.2 Land Use

The project area has been substantially altered over the past century by a variety of human activities, including agricultural development, development of irrigation infrastructure, and timber harvest activities. The proposed action and future irrigation modernization actions would support existing land uses. Since these actions would collectively support existing land use (predominantly agriculture), the proposed action would have negligible cumulative effects on land use.

6.12.3.3 Public Safety

Irrigation piping would improve public safety by eliminating the risk of drowning in open canals and reducing the risk of localized flooding from the failure of earthen canals. In combination with past, present, and reasonably foreseeable future actions, the proposed action is anticipated to have no cumulative effects on public safety.

6.12.3.4 Recreation

The Modernization Alternative would have beneficial effects on water levels in Upper Green Point Reservoir, including recreational benefits for boating and fishing on Upper Green Point Reservoir. Effects on recreation from the proposed action would be negligible, and the cumulative effects on recreational resources are expected to be negligible.

6.12.3.5 Socioeconomic Resources

Past actions, including agricultural and other land development, and recently completed projects have established the socioeconomic setting of the Hood River Basin by supporting development and agriculture. Current and reasonably foreseeable future actions will continue to support agriculture

through improved infrastructure and economic development. Since the proposed action would also support socioeconomics through construction expenditures and improved agricultural production, it would contribute to a cumulative benefit to socioeconomic resources in the area.

6.12.3.6 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 compared to the area affected by other past, present, and reasonably foreseeable future actions in the area; the proposed action would therefore have a minor contribution to cumulative effects on soils.

6.12.3.7 Vegetation

Agriculture, forest management, transportation, and rural residential development have affected vegetation in the project area since the late 1800s. Agricultural activities have altered habitat in the region by removing native vegetation communities in some areas and replacing it with crops and fields, and by activities such as stream channelization. These ongoing activities would continue to affect vegetation. Agricultural activities, forest management, livestock grazing, vegetation control along roads, and urban and suburban development are responsible for most of the past and ongoing effects on vegetation in the project area. In addition, vegetation control activities generally include herbicide applications to control vegetation and noxious weeds, and mechanical cutting of vegetation. The amount of vegetation that would be affected by the proposed action is small compared to the area affected by past and ongoing agricultural and forest management activities, livestock grazing, and vegetation control along roads and other utility corridors in the area. In addition, these past actions are not expected to change measurably from current conditions, resulting in minor cumulative effects.

6.12.3.8 Water Resources

Past actions over the last 149 years, since the first water rights were developed in the basin, have affected water resources. These actions include urban and agricultural land development, road construction, reservoir development, reservoir expansion, water diversion, canal construction, and other land use practices and irrigation projects. The earliest water right priority date in the Hood River Basin is August 1, 1870, held by the City of The Dalles for municipal supply. Since the late 1990s, there has been increasing interest in conserving water in the Hood River Basin. The District and other Hood River Valley irrigation districts have implemented various water conservation projects including piping existing irrigation canals, outreach and partnerships promoting on-farm conservation, and water management changes that have contributed to increased streamflow in the Hood River. Water savings from infrastructure improvements and on-farm water use efficiency measures have increased the amount of water that is managed for instream use.

Further measures in FID that are likely to occur following the proposed action include improvement of water application efficiency through installation of more efficient irrigation systems and improved irrigation water management. These actions together with the proposed action would affect streamflow and irrigation water supply in the Hood River.

Planned actions by other irrigation districts and water utilities may affect streamflow and water supply in the basin. EFID has an authorized Plan-EA and is working to fully pipe its system (NRCS and EFID 2020). Voluntary cost-sharing, education, and technical assistance programs are ongoing in the basin to increase on-farm water use efficiency. These actions, accompanied by the proposed action, are expected to help mitigate the effects of water diversion and climate trends on summer

streamflow while increasing the resiliency of irrigation water supplies. The City of The Dalles is nearly completed with expanding the capacity of its Dog River Pipeline to meet future water demand (Gibson 2021). In the short term, water in Dog River, a tributary to East Fork Hood River, will increase. Water will increase because as part of the pipeline's permitting process, the City committed to providing bypass flows in the Dog River in August through September, which does not currently occur. In the long term, if the City develops additional storage capacity, the pipeline would be used to divert more spring flows from Dog River, thus decreasing spring flows in Dog River. Increased well development for residential or irrigation use in the basin may result in a minor local reduction in groundwater levels.

Water quality could be affected due to nonpoint source pollution such as erosion and runoff associated with ongoing and potential construction and land development activities, including the proposed action. The proposed action would be constructed when there is no water in the canal system, and construction BMPs would be used to avoid or minimize water quality effects; construction practices for other potential construction and development projects are anticipated to be similar. The proposed action is anticipated to contribute to water quality improvements during the irrigation season in the Hood River from increased streamflow.

The proposed action and other reasonably foreseeable future actions are anticipated to have a beneficial cumulative effect on water resources. Irrigation piping projects would eliminate water loss and increase the amount of water that is conserved in the Hood River Basin throughout the entire year and improve water quality during the irrigation season.

6.12.3.9 Fish and Aquatic Species

Past actions including agricultural development, railroad construction, road construction, road maintenance, timber harvest, and urban and residential development would have minor effects on fish in combination with the proposed action. The potential effects from these past projects in FID and the Hood River Basin, such as sediment entering waterbodies or aquatic habitat disturbance, would be temporary and likely complete before construction of the proposed action.

Because FID's irrigation diversions are screened and the conveyance system does not provide functioning habitat for fish and aquatic species, the Modernization Alternative would not have a direct effect on fish and aquatic species in the irrigation infrastructure itself. Irrigation diversions are responsible for most of the past and ongoing direct and indirect effects on water quantity and quality for aquatic life and riverine habitat in the area affected by District operations.

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 indirect 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, reasonably foreseeable future actions would either improve aquatic habitat conditions or have a neutral effect. These future actions include upgrading FID's diversions to Farmers Screens.

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 steelhead, Chinook, coho, and other species. Implementation of other irrigation modernization actions and water conservation-related projects in the basin could have an additive effect on the amount of water conserved (see Section 6.12.2.3). This would provide additional flexibility in managing water rights in the Hood River Basin and may help to mitigate the effects of climate trends on streamflow and aquatic life.

6.12.3.10 Wetland and Riparian Areas

Past actions that may have affected wetlands, riparian areas, and floodplains consist of the original construction of the irrigation canals, as well as agricultural activities, livestock grazing, vegetation control, and development. Reasonably foreseeable future actions in the project area that could affect vegetation along irrigation canals include agricultural activities and vegetation control along roads and utility corridors. Changes to riparian vegetation in the project area caused by the proposed action would be minor compared to these activities. The cumulative effect of the proposed action and other past, present, and reasonably foreseeable future projects on wetlands and opportunistic hydrophytic vegetation is expected to be minor.

6.12.3.11 Wildlife

Past and ongoing land use activities, including agriculture and urban and suburban development, have affected wildlife and wildlife habitat in the region. Agricultural activities have substantially altered the habitat in the region by removing native vegetation communities in some areas and diverting streamflow. These ongoing activities would continue to affect wildlife and wildlife habitat in the project area.

Effects on wildlife due to implementation of both the proposed action and past, current, and future irrigation modernization projects would be localized, temporary, and limited to disturbance during construction. Implementation of the proposed action would cause wildlife to find other water sources. Since the effects on wildlife would happen over a period of time in which animals would be able to adapt, the cumulative effect on wildlife from implementation of the proposed action would be minor.

In addition, vegetation control activities, including herbicide applications to control noxious weeds and mechanical cutting of vegetation, are ongoing actions that contribute to wildlife habitat changes. The amount of wildlife habitat 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, and urban and suburban development in the area. In addition, the intensity of these ongoing actions is not expected to change measurably in the future, resulting in minor additional cumulative effects.

6.12.3.12 Ecosystem Services

All reasonably foreseeable actions regarding modernization of irrigation infrastructure in the Hood River Basin would work in concert to improve water conservation and water availability to irrigators. Past and ongoing actions described in the sections above have contributed to water availability for irrigators and instream flow. Past, ongoing, and reasonably foreseeable actions in the Hood River Basin could all affect ecosystem services in the watershed. When combined with other future actions, the proposed action 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 interested parties to ensure transparency and cooperation towards a solution that fits within the framework of the purpose and need for action.

A Preliminary Investigative Feasibility Report (PIFR) was prepared to provide sponsors, local partners, agencies, and the public with information to evaluate the goals and objectives of the project (FCA 2021b). During the development of the PIFR, project sponsors conducted initial coordination with natural resource agencies and stakeholders in the Hood River Basin.

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

Public Announcements

- Natural Resources Conservation Service public notice (June 1, 2021) https://www.nrcs.usda.gov/wps/portal/nrcs/detail/or/newsroom/pnotice/?cid=nrcseprd1784831
- Hood River News – three public notices (June 2, June 9, June 16, 2021)
- District website notice (June 1, 2021) https://www.fidhr.org/index.php/news
- Postcard to District patrons (June 1, 2021)
- Natural Resources Conservation Service news release (June 1, 2021) https://www.nrcs.usda.gov/wps/portal/nrcs/detail/or/newsroom/releases/?cid=NRCSEPRD1784832

Public Involvement Website

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

- Overview of NRCS's PL 83-566 funding program
- Overview of NEPA and the EA public participation process
- Frequently asked questions about the EA process
- Background on the District, the Draft Plan-EA and appendices, the PIFR 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

A virtual public scoping meeting was held on June 16, 2021. Presenters at the meeting included Gary Diridoni, NRCS, and Kate Hart, FCA. The presentations covered the financial assistance available through PL 83-566, the project purpose and need, the Plan-EA process, and ways in which the public could get involved. After the presentations, attendees had the opportunity to ask questions and provided comments for the public record.

7.1 List of Persons and Agencies Consulted

Table 7-1 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.

Table 7-1. Agency Consultation and Communication Record.

Date	Contact, Agency	Communication
April 4, 2022	Tom Hausmann, NOAA	FID's Infrastructure Modernization Project and federally listed fish species were discussed.
April 12, 2022	Jason Seals, ODFW; Jeremy Thompson, ODFW	FID's Infrastructure Modernization Project, and potential effects to fish and wildlife were discussed.
April 13, 2022	Ann Gray, USFWS	FID's Infrastructure Modernization Project, and potential effects to fish and wildlife were discussed.
May 26, 2022	Bobby Bruno and Brad Houslet, CTWS	FID's Infrastructure Modernization Project was discussed.
August 24, 2023	Tom Hausmann, NOAA	FID's Infrastructure Modernization Project and federally listed fish species were discussed.
August 24, 2023	Ann Gray, USFWS	FID's Infrastructure Modernization Project, and potential effects to fish and wildlife were discussed.

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[30] based on its ability to meet the purpose and need for the project, best address the Federal Objective and Guiding Principles, and provide the most beneficial effects on environmental, social, and economic resources.

Section 6 of this Plan-EA describes effects on resources in detail. In summary, the Modernization Alternative would have minor, long-term effects on soils and vegetation resources because of localized excavation activities associated with Forebay 3 expansion and piping a short section of Rainy Ditch that would follow a new alignment. Effects on land use would be minor and long-term at the expanded Forebay 3 and new alignment section of Rainy Ditch because non-cultivated land would be used for the proposed project. Effects on wildlife, recreation, public safety, and wetland and riparian resources would be short-term and minor because the effects would only occur in a localized area and only during the construction period. All adverse effects would be mitigated through BMPs and other compliance measures.

In the long term, the Modernization Alternative would benefit several of the resources assessed. As analyzed in the NEE (see Appendix D.1), this alternative would yield positive economic benefits, including increased instream flows in the Hood River and select tributaries, reduced O&M costs, increased hydropower production value, reduced carbon emissions, and avoided infrastructure failure of the Farmers Canal. Elimination of water loss related to seepage and evaporation in open canals would provide higher flows in the Hood River, benefitting fish and aquatic species. SCADA would improve operation efficiency through remote monitoring and reduce operational spills, thus decreasing irrigation diversions and increasing instream flow. Also, when considering trade-offs of the effects on ecosystem services, the Modernization Alternative would have more beneficial effects (see Table 5-1 for more information). When compared to the No Action Alternative, in the face of current conditions and future environmental changes, the Modernization Alternative would support the agricultural resiliency of District patrons and the health and resiliency of the Hood River.

8.2 Measures to be Installed

The District would convert 2.65 miles of the Farmers Canal to buried, dual 48-inch-diameter pipelines. Approximately 0.36 miles of Rainy Ditch would be converted to a buried 8-inch-diameter pipe. The District would deepen the existing attenuation bay by 0.02 AF to remove sand from diverted water and improve water quality for patrons. Forebay 3 would be expanded, adding 2 AF in water retention capability. Six SCADA sites would be installed throughout the District (Table 8-1), which, along with Forebay 3, would allow for greater control of water diversions and flows.

The modernization actions would be constructed in five project groups with construction occurring over 5 years. Sections 8.6 and 8.7 provide more information about construction and O&M of the Preferred Alternative. Appendix D.3 includes a detailed breakdown of project costs.

[30] The "Preferred Alternative" is defined in the National Watershed Program Handbook as, "The option and course of action that the SLO and NRCS agree best addresses the stated purpose and need" (NRCS 2014).

Table 8-1. Proposed SCADA Installation Sites.

Site Name	Equipment to be Installed	Construction Disturbance (square feet)
Rainy Ditch Diversion	Flow meter	0
Stanley Smith Pipeline Outlet	Flow meter	0
Parkertown Pipeline	Flow meter, solar panel, radio antenna	100–200
Highline Pipeline[1]	Flow meter, solar panel, radio antenna	0
Forebay 3[1]	Three flow meters[2]	0
NFGPC Diversion[2]	Flow meter	0

[1] These sites have existing SCADA infrastructure. At Highline Pipeline, the existing SCADA infrastructure would be updated.
[2] Three flow meters would be installed at Forebay 3: Ditch Creek inflow, Lowline Pipeline inflow, and at the outflow to Penstock 3.

Construction[31] of the Preferred Alternative would include mobilization and staging of construction equipment, delivery of piping to construction areas, excavation of trenches and basins, fusing of pipelines, removal of existing pipe in certain areas, placement of pipe, compaction of backfill, and restoration and reseeding of the disturbed areas. In some locations, construction access would need to be created prior to bringing pipes or equipment into construction areas. This could include removal of vegetation within the construction area. Appropriately sized construction equipment would be used to minimize disturbance in the construction area. Borrow material may be needed to backfill the trench surrounding pipelines if insufficient native material is available from excavation projects and prior dredging activities.

Construction would begin as early as the 2025 non-irrigation season and is anticipated to take 5 years to complete. Farmers Canal piping and modifying the attenuation bay would occur during the non-irrigation season (October to April), while construction of the remaining projects could occur partially or fully during the irrigation season. Patron deliveries would not be affected during construction.

8.3 Minimization, Avoidance, and Compensatory Mitigation Measures

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

8.4 Permits and Compliance

See Appendix E.11 for local and county, state, and federal permits and compliance requirements for planning and implementation.

[31] The costs of the following construction activities are included in the project installation costs.

8.5 Costs

Table 8-2 presents the total project cost of $11,687,000 for the Preferred Alternative. P.L. 83-566 funds would support $8,918,000 of the total project cost, and $2,769,000 would be contributed by other, nonfederal funds.

Table 8-2. Construction Timeline and Installation Costs by Funding Source for the Modernization Alternative, Middle Columbia-Hood Watershed, Oregon, 2023$[1]

Action[2]	Construction Years	PL 83-566 Funds	Other, Nonfederal Funds	Total Construction Costs
PG 1 Pipe Farmers Canal	2025–2026	$7,815,000	$2,374,000	$10,189,000
PG 2 Modify Attenuation Bay	2025–2026	$498,000	$153,000	$651,000
PG 3 Install SCADA	2026–2027	$171,000	$82,000	$253,000
PG 4 Expand Forebay 3	2027–2028	$279,000	$105,000	$384,000
PG 5 Pipe Rainy Ditch	2028–2030	$155,000	$55,000	$210,000
Total Project		**$8,918,000**	**$2,769,000**	**$11,687,000**

[1] Price Base: 2023 dollars

[2] PG = Project Group

Table 8-3 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. Construction costs account for all material, labor, and equipment necessary for installation of the Preferred Alternative. These costs were estimated based on costs for similar installations at other irrigation districts in Oregon. The planning construction costs are estimated using the best available information about the 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 project. Final construction costs would only reflect the time and materials to perform the work.

8.6 Installation and Financing

8.6.1 Framework for Carrying out the Plan

The Preferred Alternative would be implemented in a planned sequence as discussed in Section 8.6.2. The responsibilities of NRCS and the sponsors for the project are outlined in Section 8.6.3. No cost-shared on-farm measures are involved with this project; therefore, the

responsibilities of individual participants do not need to be discussed. No preconditions are anticipated for installing the project.

8.6.2 Planned Sequence of Installation

The District would obtain all approvals and permits for the project prior to the start of construction. The entire project would be completed over a 5-year period commencing in 2025 and ending by 2030 (Table 8-2). The District developed an appropriate construction phasing schedule that addresses District priorities while working within engineering and funding constraints to meet District, patron, and community development needs.

8.6.3 Responsibilities

NRCS is 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. The District has the needed authorities as an irrigation district organized under ORS 545 and has agreed to exercise those authorities to implement the actions described in the EA.

NRCS would be responsible for preparing a Finding of No Significant Impact (FONSI) statement as well as preparing categorical exclusions or other such instruments for implementation. Further site-specific environmental compliance may be required for specific implementation activities.

8.6.4 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.

8.6.5 Real Property and Relocations

The majority of construction would take place in FID's existing easements. Prior to construction, FID would obtain a new easement agreement from USFS to pipe Rainy Ditch. Because county forest property cannot be purchased, the District would most likely trade land with Hood River County in order to expand Forebay 3 by purchasing a forest parcel elsewhere within the county. This would be completed prior to construction. FID has previously traded land with Hood River County for reservoir-related work.

8.6.6 Financing

NRCS would provide 75 percent of the total project cost for the Preferred Alternative through P.L. 83-566.[32] The District is responsible for securing funding for the remaining 25 percent of the costs, including funds that are not eligible under the National Watershed Program (i.e., project administration and technical assistance). Table 8-3 and Table 8-4 present annual installation costs of the project and the proportion of funding through P.L. 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. A smaller portion would be funded through an increase in patron rates. FID anticipates increasing patron rates in the next few years to provide flexibility in funding for a variety of modernization, maintenance, and improvement projects. O&M costs after project completion would be provided through

[32] NRCS reserves the authority and right to discontinue or reduce program benefits based on changes in agency priorities, funding availability, or the failure of FID to fulfill the provisions of their agreement.

FID's revenues. O&M costs would not increase due to the project and would be budgeted on an annual basis.

8.6.7 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 acts on behalf of the Secretary of Agriculture to ensure the project meets 16 U.S.C. 1005.

8.7 Operations and Maintenance

The District would be responsible for O&M of the project 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 and NRCS would make 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 responsible for any necessary work. The District's O&M would consist of an inspection program that would systematically inspect all modernization actions of the 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. SCADA/telemetry system maintenance would occur on a regular schedule and on an as-needed basis throughout the year. During the winter months, outside of the irrigation season, the District would perform major system maintenance including maintaining pumps, hydroelectric plants, pipelines, and fish screens and completing miscellaneous maintenance and repair work. The District would expand its current vegetation and weed management to include the areas on top of the newly piped system. All procedures would be followed as specified in the O&M agreement between the project sponsor and NRCS.

8.8 Economic and Structural Tables

A summary of the economic analysis of the Preferred Alternative (NEE Alternative) and Future Without Project is provided in Section 5.4. The full NEE analysis can be found in Appendix D.1. The costs and benefits associated with the project are detailed in the following tables in this section. Table 8-3 (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 project.

Table 8-4 (NWPM Economic Table 2, 506.12) presents the project's cost as well as the proportion of P.L. 83-566 funding and other funding sources. The average annual NEE costs are shown in (NWPM 506.18, Economic Table 4).

Table 8-3. Economic Table 1 – Estimated Installation Cost of the Modernization Alternative, Water Resource Project Measures, Hood River Watershed, Oregon, 2023$.[1,2]

Works of Improvement[3]	Unit	Number			Estimated Cost						
					PL 83-566 Funds			Other Funds			
		Federal Land	Non-federal Land	Total	Federal Land NRCS	Non-federal Land NRCS[4]	Total	Federal Land	Non-federal Land	Total	Total
PG 1 Pipe Farmers Canal	Miles	0.000	2.650	2.650	$0	$7,815,000	$7,815,000	$0	$2,374,000	$2,374,000	$10,189,000
PG 2 Modify Attenuation Bay	Miles	0.000	0.080	0.080	$0	$498,000	$498,000	$0	$153,000	$153,000	$651,000
PG 3 SCADA	Miles	0.004	0.013	0.017	$40,000	$131,000	$171,000	$19,000	$63,000	$82,000	$253,000
PG 4 Expand Forebay 3	Miles	0.000	0.040	0.040	$0	$279,000	$279,000	$0	$105,000	$105,000	$384,000
PG 5 Pipe Rainy Ditch	Miles	0.360	0.000	0.360	$155,000	$0	$155,000	$55,000	$0	$55,000	$210,000
Total	**Miles**	**0.364**	**2.783**	**3.147**	**$195,000**	**$8,723,000**	**$8,918,000**	**$74,000**	**$2,695,000**	**$2,769,000**	**$11,687,000**

Notes: Totals may not sum due to rounding. Prepared: September 2023

1/ Price base: 2023 dollars.

2/ Project cost as identified in Anderson Perry & Associates, Inc. 2013 and FCA 2021c, updated to 2023 dollars with additional engineering considerations, project administration, and technical assistance costs based on NRCS-OR guidance.

3/ PG = Project Group

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

Table 8-4. Economic Table 2 – Estimated Modernization Alternative Cost Distribution, Water Resource Project Measures, Hood River Watershed, Oregon, 2023$.[1,2,3]

Works of Improvement[4]	Installation Costs – P.L. 83-566 Funds				Installation Cost – Other Funds				Total
	Construction	Engineering	Project Admin[5]	Total P.L.83-566	Construction	Engineering	Project Admin[5]	Total Other	
PG 1 Pipe Farmers Canal	$6,414,000	$193,000	$1,208,000	$7,815,000	$2,138,000	$64,000	$172,000	$2,374,000	$10,189,000
PG 2 Modify Attenuation Bay	$403,000	$15,000	$80,000	$498,000	$134,000	$5,000	$14,000	$153,000	$651,000
PG 3 SCADA	$133,000	$5,000	$33,000	$171,000	$75,000	$2,000	$5,000	$82,000	$253,000
PG 4 Expand Forebay 3	$222,000	$9,000	$48,000	$279,000	$94,000	$3,000	$8,000	$105,000	$384,000
PG 5 Pipe Rainy Ditch	$124,000	$4,000	$27,000	$155,000	$51,000	$1,000	$3,000	$55,000	$210,000
Total	**$7,296,000**	**$226,000**	**$1,396,000**	**$8,918,000**	**$2,492,000**	**$75,000**	**$202,000**	**$2,769,000**	**$11,687,000**

Notes: Totals may not sum due to rounding. Prepared: September 2023

1/ Price base: 2023 dollars.

2/ Project cost as identified in Anderson Perry & Associates, Inc. 2013 and FCA 2021c updated to 2023 dollars with additional engineering considerations, project administration, and technical assistance costs based on NRCS-OR guidance.

3/ Percentages for Engineering, Construction Contractor, and Contingency vary across project features and are included in total costs.

4/ PG = Project Group

5/ Project Admin includes project administration, technical assistance costs, and permitting costs.

Table 8-5. Economic Table 4 – Estimated Average Annual NEE Costs, Hood River Watershed, Oregon, 2023$.[1]

Works of Improvement[2]	Project Outlays (Amortization of Installation Cost)	Operation, Maintenance, and Replacement Costs[3]	Total Cost
PG 1 Pipe Farmers Canal	$278,000	$1,000	$279,000
PG 2 Modify Attenuation Bay	$18,000	$5,000	$23,000
PG 3 SCADA	$7,000	$9,000	$16,000
PG 4 Expand Forebay 3	$10,000	$0	$10,000
PG 5 Pipe Rainy Ditch	$5,000	$0	$5,000
Total	**$318,000**	**$15,000**	**$333,000**

Notes: Totals may not sum due to rounding. Prepared: September 2023

1/ Price base: 2023 dollars, amortized over 100 years at a discount rate of 2.5 percent.

2/ PG = Project Group

3/ Operation, maintenance, and replacement (OM&R) for the Modernization Alternative includes an increase in costs related to OM&R of the attenuation bay and SCADA. A decrease in O&M costs for the Modernization Alternative was included in the benefits, rather than the costs.

The Preferred Alternative damage reduction benefits include increased instream flow, reduced O&M costs, increased hydropower production, and avoided carbon emissions. Table 8-6 (NWPM 506.20, Economic Table 5a) presents the average annual watershed protection damage reduction benefits.

Table 8-6. Economic Table 5a – Estimated Average Annual Watershed Protection Damage Reduction Benefits Farmers Irrigation District Watershed Plan, Hood River Watershed, Oregon, 2023$.[1]

	Damage Reduction Benefit, Average Annual	
Item	**Agricultural-Related**	**Nonagricultural-Related**
Project Group 1 – Pipe Farmers Canal		
On-Site Damage Reduction Benefits		
Other – Reduced OM&R	$56,000	$0
Other – Avoided Infrastructure Failure	$22,000	$0
Other – Hydropower Revenue	$63,000	$0
Subtotal	$141,000	$0
Off-Site Damage Reduction Benefits		
Avoided Carbon Emissions	$0	$33,000
Instream Flow	$0	$172,000
Subtotal	$0	$205,000
Total Quantified Benefits		**$346,000**
Project Group 2 – Modify Attenuation Bay		
On-Site Damage Reduction Benefits		
Other – Reduced OM&R	$45,000	$0
Other – Hydropower Revenue	$61,000	$0
Subtotal	$106,000	$0
Off-Site Damage Reduction Benefits		
Avoided Carbon Emissions	$0	$32,000
Instream Flow	$0	$0
Subtotal	$0	$32,000
Total Quantified Benefits		**$138,000**

	Damage Reduction Benefit, Average Annual	
Item	**Agricultural-Related**	**Nonagricultural-Related**
Project Group 3 - SCADA		
On-Site Damage Reduction Benefits		
Other – Reduced OM&R	$17,000	$0
Other – Hydropower Revenue	$0	$0
Subtotal	$17,000	$0
Off-Site Damage Reduction Benefits		
Avoided Carbon Emissions	$0	$0
Instream Flow	$0	$3,000
Subtotal	$0	$3,000
Total Quantified Benefits		**$20,000**
Project Group 4 – Expand Forebay 3		
On-Site Damage Reduction Benefits		
Other – Reduced OM&R	$20,000	$0
Other – Hydropower Revenue	$0	$0
Subtotal	$20,000	$0
Off-Site Damage Reduction Benefits		
Avoided Carbon Emissions	$0	$0
Instream Flow	$0	$0
Subtotal	$0	$0
Total Quantified Benefits		**$20,000**

Item	Damage Reduction Benefit, Average Annual	
	Agricultural-Related	Nonagricultural-Related
Project Group 5 – Pipe Rainy Ditch		
On-Site Damage Reduction Benefits		
Other – Reduced OM&R	$2,000	$0
Other – Hydropower Revenue	$0	$0
Subtotal	$2,000	$0
Off-Site Damage Reduction Benefits		
Avoided Carbon Emissions	$0	$0
Instream Flow	$0	$3,000
Subtotal	$0	$3,000
Total Quantified Benefits		**$5,000**

Notes: Prepared: September 2023

1/ Price base: 2023 dollars amortized over 100 years at a discount rate of 2.5 percent.

Using the resulting benefits and costs from the previous two tables, Table 8-7 (NWPM 506.21, Economic Table 6) presents a comparison of the NEE average annual benefits and average annual costs.

Table 8-7. Economic Table 6 – Comparison of Average Annual NEE Costs and Benefits, Farmers Irrigation District Watershed Plan, Hood River Watershed, Oregon, 2023$.[1]

	Agriculture-Related		Non-agricultural					
Works of Improvement[2]	**Reduced OM&R**	**Hydropower Revenue**	**Instream Flow**	**Carbon Value**	**Avoided Infrastructure Failure**	**Average Annual Benefits**	**Average Annual Cost[3]**	**Benefit-Cost Ratio**
PG 1 Pipe Farmers Canal	$56,000	$63,000	$172,000	$33,000	$22,000	$346,000	$279,000	1.2
PG 2 Modify Attenuation Bay	$45,000	$61,000	$0	$32,000	$0	$138,000	$23,000	6.0
PG 3 SCADA	$17,000	$0	$3,000	$0	$0	$20,000	$16,000	1.3
PG 4 Expand Forebay 3	$20,000	$0	$0	$0	$0	$20,000	$10,000	2.0
PG 5 Pipe Rainy Ditch	$2,000	$0	$3,000	$0	$0	$5,000	$5,000	1.0
Total	**$140,000**	**$124,000**	**$178,000**	**$65,000**	**$22,000**	**$529,000**	**$333,000**	**1.6**

Notes

Prepared: September 2023

1/ Price base: 2023 dollars amortized over 100 years at a discount rate of 2.5 percent.

2/ PG = Project Group

3/ From Economic Table 4 (Table 8-5)

9 References

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10 List of Preparers

The Draft Watershed Plan-EA was prepared jointly by staff at NRCS Oregon and FCA. 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				
Kristin Alligood	Program Specialist	Ph.D. Biology B.A. Neuroscience	4 years	Fish and Aquatic Species
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Raija Bushnell	Watershed Planning Program Manager	M.P.A. Natural Resource Policy M.S.E.S Natural Resource Management B.A. Political Science	7 years	General
Brett Golden	Program Director	M.E.M Environmental Management A.B. Environmental and Evolutionary Biology	15 years	General
Kate Hart	Program Specialist	Education	7 years	Water Resources, Alternatives, General
Amanda Schroeder	Program Specialist	B.S. Natural Resource Management	6 years	Water Resources
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Name	Title	Education	Professional Experience	Area Responsible For
NRCS - Oregon				
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Anne Timm	Watershed Planner	Ph.D. Fisheries and Wildlife M.S. Environmental Science B.S. Biology	21 years	General
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Employees from Firms Under Contract with FCA				
Company	**Name**	**Education**	**Years of Experience**	**Area of Responsibility**
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Highland Economics	Winston Oakley	M.S. Applied Economics B.S. Environmental Sciences, Policy, and Management	4 years	Economic Analysis

11 Distribution List

A Notice of Availability for the Draft Plan-EA would be distributed to federal, state, and local agencies, community representatives, and area nongovernmental organizations. The agencies, representatives, and organizations on the mailing list include the following:

- Bonneville Power Administration
- Business Oregon
- City of Hood River
- Columbia Gorge Fruit Growers
- Confederated Tribes of Warm Springs
- Hood River County
- Hood River Soil and Water Conservation District
- Hood River Watershed Group
- Mid-Columbia Agricultural Research and Extension Center
- National Marine Fisheries Service
- National Oceanic and Atmospheric Administration Fisheries
- Oregon Department of Agriculture
- Oregon Department of Energy
- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife
- Oregon Department of State Lands
- Oregon Department of Transportation
- Oregon Farm Bureau
- Oregon Governor's Office
- Oregon Water Resources Department
- Oregon Water Resources Congress
- Oregon Watershed Enhancement Board
- State Historic Preservation Office
- Thrive Hood River
- Trout Unlimited
- U.S. Army Corps of Engineers
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- WaterWatch of Oregon
- Weyerhaeuser

In compliance with Section 106 of the NHPA, NRCS has identified and will consult with federally recognized tribes whose ancestral lands are within the project area.

The names of private stakeholders and members of the public who would receive notice of the Draft Plan-EA are not listed for privacy.

12 Acronyms, Abbreviations, and Short-forms

AF	Acre-feet
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 per second
CTWS	Confederated Tribes of Warm Springs
CWA	Clean Water Act
DID	Dee Irrigation District
EA	Environmental Assessment
EFH	Essential Fish Habitat
EFID	East Fork Irrigation District
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FCA	Farmers Conservation Alliance
FID	Farmers Irrigation District
FONSI	Finding of No Significant Impact
MBTA	Migratory Bird Treaty Act
MFID	Middle Fork Irrigation District
MHID	Mood Hood Irrigation District
MOA	Memorandum of Agreement
N/A	Not Applicable
NEE	National Economic Efficiency
NEPA	National Environmental Policy Act
NFGPC	North Fork Green Point Creek
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service

NWI	National Wetlands Inventory
NWPM	National Watershed Program Manual
O&M	operation and maintenance
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODSL	Oregon Department of State Lands
OM&R	operation, maintenance, and replacement
ORS	Oregon Revised Statute
OWRD	Oregon Water Resources Department
P&G	Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies
PCE	Primary Constituent Element
PIFR	Preliminary Investigative Feasibility Report
P.L. 83-566	Watershed Protection and Flood Prevention Program, Public Law 83-566
Plan-EA	Watershed Plan-Environmental Assessment
PR&G	Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies
Project	Farmers Irrigation District Infrastructure Modernization Project
RM	river mile
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SLO	Sponsoring Local Organization
THPO	Tribal Historic Preservation Office
U.S./US	United States
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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14 Appendices

Appendices are provided in a separate document.

Appendix A. Comments and Responses

Appendix B. Project Maps

Appendix C. Supporting Maps

Appendix D. Investigation and Analyses Report

Appendix E. Other Supporting Information