References cited:

Parametrix. 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*. Prepared for Farmers Conservation Alliance by Parametrix, Puyallup, Washington. February 2026.

Attachments:

Attachment A: Bureau of Reclamation letter dated April 27, 2026, designating NRCS Lead Federal Agency (BOR #24-KBAO-006); US Fish and Wildlife Service letter dated September 22, 2023, designating NRCS Lead Federal Agency.

Attachment B: Parametrix 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*

Attachment C: Proposed Tule Lake Historic District - DPR523A form

USDA United States Department of Agriculture

June 29, 2026

Mark Miyoshi
Tribal Historic Preservation Officer
Winnemem Wintu Tribe
P. O. Box 774
Mount Shasta, CA, 96067

Via email: markmwinnemem@gmail.com

RE: Continued Section 106 Consultation for the Natural Resources Conservation Service Tulelake Irrigation District Modernization Project in Modoc and Siskiyou counties, California and Klamath County, Oregon – notice of *no adverse effect to historic properties*

Dear Mr. Miyoshi:

The Natural Resources Conservation Service California State Office (NRCS) is continuing consultation with you regarding the Tulelake Irrigation District Modernization Project. The NRCS plans to provide technical and financial assistance to the project Sponsor, Tulelake Irrigation District (TID), through the NRCS Watershed Protection and Flood Prevention Operations (WFPO) program. We previously communicated with you regarding this undertaking on January 30, 2024, and March 11, 2024. This letter and attached documentation is provided in support of our finding of *no adverse effect to historic properties* pursuant to 36 CFR § 800.5(b).

The TID Modernization project is a multi-agency undertaking between the NRCS, the Bureau of Reclamation (BOR), and the US Fish and Wildlife Service (USFWS). Pursuant to Stipulation IV.a of the NRCS Programmatic Agreement, the NRCS has been designated the LFA for the TID Modernization Project as documented in Attachment A of this letter (BOR letter dated April 27, 2026 [B24-KBAO-006]; USFWS letter dated September 22, 2023).

Description of the Undertaking

The purpose of the TID Modernization Project is to automate manual water control features within the TID system by installing Supervisory Control and Data Acquisition (SCADA) instrumentation along TID canals and laterals, upgrading pumping stations and debris screens that convey irrigation water through the system, and adding power sources to SCADA equipment locations lacking a current power source. As planned, the upgrades will be implemented throughout the TID system at approximately 146 individual, discontiguous locations.

Coordination with the National Environmental Policy Act (NEPA)

As required by NRCS WFPO policy, the Sponsor is preparing a Plan-Environmental Assessment (Plan-EA) document pursuant to the National Environmental Policy Act (NEPA) to analyze potential impacts to cultural and historic resources from the No Action (Project without Federal Funding) and the Modernization Project alternatives. The Plan-EA will fulfill the NRCS's Section

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106 review public participation responsibilities consistent with 36 CFR § 800.2(d)(3) in accordance with NEPA regulations and NRCS policy at Title 390, Part 500. The draft and final Plan-EA documents will be available for comment on the NRCS California website at https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/california/environmental-compliance-notices.

Area of Potential Effects (APE) Determination

Determination of an appropriate APE was coordinated with NEPA scoping efforts and resulted in development of a cultural resources workplan to guide archaeological and historic built environment identification. The Sponsor's cultural resources consultant, Parametrix, developed the workplan in accordance with a scope of work provided by the NRCS and coordinated with the BOR and USFWS who have jurisdiction over lands where some project activities are proposed. The workplan is included in the technical report (Parametrix 2026) attached to this letter (Attachment B) and includes maps of known cultural resources identified through a search of the California Historical Research Information System (CHRIS) and Oregon Archaeological Records Remote Access (OARRA) and Historic Sites Database as of August 2023.

Scoping and background research for the workplan resulted in the NRCS, as LFA and in consultation with the BOR and USFWS, defining the area of potential effects (APE) for this undertaking as 146 discontiguous locations, each with a 100-foot buffer, where the proposed SCADA equipment installations, pump upgrades, and power source installations for the Modernization Project are located, for an assessment of direct and indirect effects. The proposed APE is documented in the attached technical report (Parametrix 2026:Figures 2.1-2.18) (see Attachment B). Equipment transport and assembly, and construction staging, will utilize existing TID access roads and maintenance areas and are excluded.

Historic Properties Identification and Evaluation

The technical report prepared by the Sponsor's consultant Parametrix (2026) has been reviewed by the NRCS in accordance with 36 CFR § 800.2(a)(3) (see Attachment B). The report documents the results of background research, literature review, historic map review, and pedestrian survey of the APE, with identified resources evaluated for National Register of Historic Places (NRHP) eligibility. These include the historical infrastructure components of the TID system which will be modified for the undertaking and some of which are recommended as contributing resources of the Klamath Project Historic District (KPHD), discussed fully in the report.

The following resources were identified in or adjacent to the APE. All are fully discussed and evaluated in the technical report in Attachment B (Parametrix 2026) except for the Tule Lake Historic District (TLHD), a multi-component historic district identified herein by the NRCS through consultation and review of the technical report findings and treated as eligible for listing in the NRHP. Two archaeological resources, a lithic scatter and isolated artifact, also documented in the report, will be avoided by the undertaking and are not discussed below.

Klamath Project Historic District

The Klamath Project Historic District is an inter-state irrigation project that has been historically treated as eligible for listing in the NRHP by consensus by federal agencies and the Oregon and California SHPOs under criteria A and C for its for its engineering

features and association with federal reclamation efforts to develop agriculture in Oregon and California. The TID system is an integral part of the KPDH with many of its components evaluated as contributing resources of the district.

Tule Lake National Monument
The Tule Lake National Monument is comprised of the Tule Lake Segregation Center NHL and Camp Tule Lake, historical resources associated with the internment of American citizens during World War II. Agricultural parcels within the TID system are within the historical footprint of Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
Two of the TID system pumps that would be modernized for the undertaking are located within the boundary of the Lower Klamath National Wildlife Refuge. The Refuge is a national historic landmark established by President Theodore Roosevelt in 1908 as the Nation's first waterfowl refuge.

Tule Lake Historic District
The NRCS identified the Tule Lake Historic District through review of background research and reporting for the undertaking (e.g., Parametrix 2026) and the Agency's Native American consultation effort. The Tule Lake Historic District is a multi-component, multi-state district representing the deep and complex cultural history of former Tule Lake and vicinity. The district is geographically bounded by the former lakebed at approximately 4050 feet amsl and centered on the Tule Lake Irrigation District which spans California and Oregon. Archaeological and historic contributing resources present within the district include Petroglyph Point Archaeological District and Modoc Lava Beads Archaeological District; the Tule Lake National Monument; the Lava Beds National Monument; the Lower Klamath National Wildlife Refuge; the Klamath Project; and a possible Traditional Cultural Property/Place important to Native Americans. Significant historical events form the historic context of the district and include pre-and post-Contact indigenous use of Tule Lake; the 1872-73 armed conflict between the Modoc Nation and United States Army referred to as the Modoc War; the internment of Japanese Americans during World War II at Camp Tulelake and establishment of the Tule Lake Segregation Center; and the era of reclamation and federal irrigation/water management efforts beginning in 1902 and leading to construction of the Klamath Project, developed and operated by the U.S. Bureau of Reclamation, of which the Tule Lake Irrigation District is part.

For the purposes of this undertaking, the NRCS elects to treat the TLHD as eligible for listing in the NRHP under criterion A for its association with important events in California history. The proposed TLHD is documented herein as Attachment C; note that it is not included in the inventory of cultural resources presented in the technical report provided in Attachment B (Parametrix 2026).

Assessment of Effects to Historic Properties

The has reviewed and agrees with the recommended assessment of effects from the proposed undertaking documented in the technical report (Attachment B, Parametrix 2026), summarized below. The NRCS has considered the views of consulting parties in its assessment of effects.

Klamath Project Historic District
The NRCS has determined that the proposed TID system modifications installation of SCADA equipment and power sources, and pump station upgrades, would not alter, directly or indirectly, the characteristics that make the KPHD eligible for listing in the NRHP under criteria A and C.

Tule Lake National Monument
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Tule Lake Segregation Center NHL or Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Refuge.

Tule Lake Historic District
The NRCS has applied the criteria of adverse effect from the undertaking to the proposed TLHD which the NRCS elects to treat as eligible for listing in the NRHP under criterion A and determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, the TLHD's ability to convey its association with the historical events represented by the contributing resources of the district.

Request for Concurrence - No Adverse Effect to Historic Properties

Based on our review of the undertaking, the NRCS proposes a finding of *no adverse effect to historic properties*. We respectfully request that you convey any comment on the finding of effect to us within 30 calendar days of receipt of this letter. Please don't hesitate to contact me with any questions or concerns by phone at (530) 792-5621 or email at Christopher.Null@usda.gov. Thank you for helping the NRCS protect California's important cultural resources.

Sincerely,

CARLOS SUAREZ
State Conservationist, NRCS CA – Davis

cc: Christoper Null, State Archaeologist, NRCS CA – Davis
Jon Gustafson, State Resource Conservationist, NRCS CA – Davis
Denise de Joseph, WFPO Cultural Resources Specialist, NRCS CA – Davis

References cited:

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Attachments:

Attachment A: Bureau of Reclamation letter dated April 27, 2026, designating NRCS Lead Federal Agency (BOR #24-KBAO-006); US Fish and Wildlife Service letter dated September 22, 2023, designating NRCS Lead Federal Agency.

Attachment B: Parametrix 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*

Attachment C: Proposed Tule Lake Historic District - DPR523A form

United States Department of Agriculture

June 29, 2026

Bernold Pollard
Chairperson
Fort Bidwell Indian Community of Paiute
P.O. Box 129
Fort Bidwell, CA, 96112

Via email: calindn1977@yahoo.com

RE: Continued Section 106 Consultation for the Natural Resources Conservation Service Tulelake Irrigation District Modernization Project in Modoc and Siskiyou counties, California and Klamath County, Oregon – notice of *no adverse effect to historic properties*

Dear Chairperson Pollard:

The Natural Resources Conservation Service California State Office (NRCS) is continuing consultation with you regarding the Tulelake Irrigation District Modernization Project. The NRCS plans to provide technical and financial assistance to the project Sponsor, Tulelake Irrigation District (TID), through the NRCS Watershed Protection and Flood Prevention Operations (WFPO) program. We previously communicated with you regarding this undertaking on January 30, 2024, and March 11, 2024. This letter and attached documentation is provided in support of our finding of *no adverse effect to historic properties* pursuant to 36 CFR § 800.5(b).

The TID Modernization project is a multi-agency undertaking between the NRCS, the Bureau of Reclamation (BOR), and the US Fish and Wildlife Service (USFWS). Pursuant to Stipulation IV.a of the NRCS Programmatic Agreement, the NRCS has been designated the LFA for the TID Modernization Project as documented in Attachment A of this letter (BOR letter dated April 27, 2026 [B24-KBAO-006]; USFWS letter dated September 22, 2023).

Description of the Undertaking

The purpose of the TID Modernization Project is to automate manual water control features within the TID system by installing Supervisory Control and Data Acquisition (SCADA) instrumentation along TID canals and laterals, upgrading pumping stations and debris screens that convey irrigation water through the system, and adding power sources to SCADA equipment locations lacking a current power source. As planned, the upgrades will be implemented throughout the TID system at approximately 146 individual, discontiguous locations.

Coordination with the National Environmental Policy Act (NEPA)

As required by NRCS WFPO policy, the Sponsor is preparing a Plan-Environmental Assessment (Plan-EA) document pursuant to the National Environmental Policy Act (NEPA) to analyze potential impacts to cultural and historic resources from the No Action (Project without Federal

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Funding) and the Modernization Project alternatives. The Plan-EA will fulfill the NRCS's Section 106 review public participation responsibilities consistent with 36 CFR § 800.2(d)(3) in accordance with NEPA regulations and NRCS policy at Title 390, Part 500. The draft and final Plan-EA documents will be available for comment on the NRCS California website at https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/california/environmental-compliance-notices.

Area of Potential Effects (APE) Determination

Determination of an appropriate APE was coordinated with NEPA scoping efforts and resulted in development of a cultural resources workplan to guide archaeological and historic built environment identification. The Sponsor's cultural resources consultant, Parametrix, developed the workplan in accordance with a scope of work provided by the NRCS and coordinated with the BOR and USFWS who have jurisdiction over lands where some project activities are proposed. The workplan is included in the technical report (Parametrix 2026) attached to this letter (Attachment B) and includes maps of known cultural resources identified through a search of the California Historical Research Information System (CHRIS) and Oregon Archaeological Records Remote Access (OARRA) and Historic Sites Database as of August 2023.

Scoping and background research for the workplan resulted in the NRCS, as LFA and in consultation with the BOR and USFWS, defining the area of potential effects (APE) for this undertaking as 146 discontiguous locations, each with a 100-foot buffer, where the proposed SCADA equipment installations, pump upgrades, and power source installations for the Modernization Project are located, for an assessment of direct and indirect effects. The proposed APE is documented in the attached technical report (Parametrix 2026:Figures 2.1-2.18) (see Attachment B). Equipment transport and assembly, and construction staging, will utilize existing TID access roads and maintenance areas and are excluded.

Historic Properties Identification and Evaluation

The technical report prepared by the Sponsor's consultant Parametrix (2026) has been reviewed by the NRCS in accordance with 36 CFR § 800.2(a)(3) (see Attachment B). The report documents the results of background research, literature review, historic map review, and pedestrian survey of the APE, with identified resources evaluated for National Register of Historic Places (NRHP) eligibility. These include the historical infrastructure components of the TID system which will be modified for the undertaking and some of which are recommended as contributing resources of the Klamath Project Historic District (KPHD), discussed fully in the report.

The following resources were identified in or adjacent to the APE. All are fully discussed and evaluated in the technical report in Attachment B (Parametrix 2026) except for the Tule Lake Historic District (TLHD), a multi-component historic district identified herein by the NRCS through consultation and review of the technical report findings and treated as eligible for listing in the NRHP. Two archaeological resources, a lithic scatter and isolated artifact, also documented in the report, will be avoided by the undertaking and are not discussed below.

Klamath Project Historic District

The Klamath Project Historic District is an inter-state irrigation project that has been historically treated as eligible for listing in the NRHP by consensus by federal agencies

and the Oregon and California SHPOs under criteria A and C for its for its engineering features and association with federal reclamation efforts to develop agriculture in Oregon and California. The TID system is an integral part of the KPDH with many of its components evaluated as contributing resources of the district.

Tule Lake National Monument
The Tule Lake National Monument is comprised of the Tule Lake Segregation Center NHL and Camp Tule Lake, historical resources associated with the internment of American citizens during World War II. Agricultural parcels within the TID system are within the historical footprint of Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
Two of the TID system pumps that would be modernized for the undertaking are located within the boundary of the Lower Klamath National Wildlife Refuge. The Refuge is a national historic landmark established by President Theodore Roosevelt in 1908 as the Nation's first waterfowl refuge.

Tule Lake Historic District
The NRCS identified the Tule Lake Historic District through review of background research and reporting for the undertaking (e.g., Parametrix 2026) and the Agency's Native American consultation effort. The Tule Lake Historic District is a multi-component, multi-state district representing the deep and complex cultural history of former Tule Lake and vicinity. The district is geographically bounded by the former lakebed at approximately 4050 feet amsl and centered on the Tule Lake Irrigation District which spans California and Oregon. Archaeological and historic contributing resources present within the district include Petroglyph Point Archaeological District and Modoc Lava Beads Archaeological District; the Tule Lake National Monument; the Lava Beds National Monument; the Lower Klamath National Wildlife Refuge; the Klamath Project; and a possible Traditional Cultural Property/Place important to Native Americans. Significant historical events form the historic context of the district and include pre-and post-Contact indigenous use of Tule Lake; the 1872-73 armed conflict between the Modoc Nation and United States Army referred to as the Modoc War; the internment of Japanese Americans during World War II at Camp Tulelake and establishment of the Tule Lake Segregation Center; and the era of reclamation and federal irrigation/water management efforts beginning in 1902 and leading to construction of the Klamath Project, developed and operated by the U.S. Bureau of Reclamation, of which the Tule Lake Irrigation District is part.

For the purposes of this undertaking, the NRCS elects to treat the TLHD as eligible for listing in the NRHP under criterion A for its association with important events in California history. The proposed TLHD is documented herein as Attachment C; note that it is not included in the inventory of cultural resources presented in the technical report provided in Attachment B (Parametrix 2026).

Assessment of Effects to Historic Properties

The has reviewed and agrees with the recommended assessment of effects from the proposed undertaking documented in the technical report (Attachment B, Parametrix 2026), summarized below. The NRCS has considered the views of consulting parties in its assessment of effects.

Klamath Project Historic District
The NRCS has determined that the proposed TID system modifications installation of SCADA equipment and power sources, and pump station upgrades, would not alter, directly or indirectly, the characteristics that make the KPHD eligible for listing in the NRHP under criteria A and C.

Tule Lake National Monument
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Tule Lake Segregation Center NHL or Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Refuge.

Tule Lake Historic District
The NRCS has applied the criteria of adverse effect from the undertaking to the proposed TLHD which the NRCS elects to treat as eligible for listing in the NRHP under criterion A and determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, the TLHD's ability to convey its association with the historical events represented by the contributing resources of the district.

Request for Concurrence - No Adverse Effect to Historic Properties

Based on our review of the undertaking, the NRCS proposes a finding of *no adverse effect to historic properties*. We respectfully request that you convey any comment on the finding of effect to us within 30 calendar days of receipt of this letter. Please don't hesitate to contact me with any questions or concerns by phone at (530) 792-5621 or email at Christopher.Null@usda.gov. Thank you for helping the NRCS protect California's important cultural resources.

Sincerely,

CARLOS SUAREZ
State Conservationist, NRCS CA – Davis

cc: Christoper Null, State Archaeologist, NRCS CA – Davis
Jon Gustafson, State Resource Conservationist, NRCS CA – Davis
Denise de Joseph, WFPO Cultural Resources Specialist, NRCS CA – Davis

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Attachment C: Proposed Tule Lake Historic District - DPR523A form

USDA
United States Department of Agriculture

June 29, 2026

Ken Sandusky
Homelands Director
Modoc Nation
22 N. Eight Tribes Trail
Miami, OK 74354

Via email: kenneth.sandusky@modocnation.com

RE: Continued Section 106 Consultation for the Natural Resources Conservation Service Tulelake Irrigation District Modernization Project in Modoc and Siskiyou counties, California and Klamath County, Oregon – notice of *no adverse effect to historic properties*

Dear Mr. Sandusky:

The Natural Resources Conservation Service California State Office (NRCS) is continuing consultation with you regarding the Tulelake Irrigation District Modernization Project. The NRCS plans to provide technical and financial assistance to the project Sponsor, Tulelake Irrigation District (TID), through the NRCS Watershed Protection and Flood Prevention Operations (WFPO) program. This letter and attached documentation is provided in support of our finding of *no adverse effect to historic properties* pursuant to 36 CFR § 800.5(b).

The TID Modernization project is a multi-agency undertaking between the NRCS, the Bureau of Reclamation (BOR), and the US Fish and Wildlife Service (USFWS). Pursuant to Stipulation IV.a of the NRCS Programmatic Agreement, the NRCS has been designated the LFA for the TID Modernization Project as documented in Attachment A of this letter (BOR letter dated April 27, 2026 [B24-KBAO-006]; USFWS letter dated September 22, 2023).

Description of the Undertaking

The purpose of the TID Modernization Project is to automate manual water control features within the TID system by installing Supervisory Control and Data Acquisition (SCADA) instrumentation along TID canals and laterals, upgrading pumping stations and debris screens that convey irrigation water through the system, and adding power sources to SCADA equipment locations lacking a current power source. As planned, the upgrades will be implemented throughout the TID system at approximately 146 individual, discontiguous locations.

Coordination with the National Environmental Policy Act (NEPA)

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Funding) and the Modernization Project alternatives. The Plan-EA will fulfill the NRCS's Section 106 review public participation responsibilities consistent with 36 CFR § 800.2(d)(3) in accordance with NEPA regulations and NRCS policy at Title 390, Part 500. The draft and final Plan-EA documents will be available for comment on the NRCS California website at https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/california/environmental-compliance-notices.

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Determination of an appropriate APE was coordinated with NEPA scoping efforts and resulted in development of a cultural resources workplan to guide archaeological and historic built environment identification. The Sponsor's cultural resources consultant, Parametrix, developed the workplan in accordance with a scope of work provided by the NRCS and coordinated with the BOR and USFWS who have jurisdiction over lands where some project activities are proposed. The workplan is included in the technical report (Parametrix 2026) attached to this letter (Attachment B) and includes maps of known cultural resources identified through a search of the California Historical Research Information System (CHRIS) and Oregon Archaeological Records Remote Access (OARRA) and Historic Sites Database as of August 2023.

Scoping and background research for the workplan resulted in the NRCS, as LFA and in consultation with the BOR and USFWS, defining the area of potential effects (APE) for this undertaking as 146 discontiguous locations, each with a 100-foot buffer, where the proposed SCADA equipment installations, pump upgrades, and power source installations for the Modernization Project are located, for an assessment of direct and indirect effects. The proposed APE is documented in the attached technical report (Parametrix 2026:Figures 2.1-2.18) (see Attachment B). Equipment transport and assembly, and construction staging, will utilize existing TID access roads and maintenance areas and are excluded.

Historic Properties Identification and Evaluation

The technical report prepared by the Sponsor's consultant Parametrix (2026) has been reviewed by the NRCS in accordance with 36 CFR § 800.2(a)(3) (see Attachment B). The report documents the results of background research, literature review, historic map review, and pedestrian survey of the APE, with identified resources evaluated for National Register of Historic Places (NRHP) eligibility. These include the historical infrastructure components of the TID system which will be modified for the undertaking and some of which are recommended as contributing resources of the Klamath Project Historic District (KPHD), discussed fully in the report.

The following resources were identified in or adjacent to the APE. All are fully discussed and evaluated in the technical report in Attachment B (Parametrix 2026) except for the Tule Lake Historic District (TLHD), a multi-component historic district identified herein by the NRCS through consultation and review of the technical report findings and treated as eligible for listing in the NRHP. Two archaeological resources, a lithic scatter and isolated artifact, also documented in the report, will be avoided by the undertaking and are not discussed below.

Klamath Project Historic District

The Klamath Project Historic District is an inter-state irrigation project that has been historically treated as eligible for listing in the NRHP by consensus by federal agencies

and the Oregon and California SHPOs under criteria A and C for its for its engineering features and association with federal reclamation efforts to develop agriculture in Oregon and California. The TID system is an integral part of the KPDH with many of its components evaluated as contributing resources of the district.

Tule Lake National Monument
The Tule Lake National Monument is comprised of the Tule Lake Segregation Center NHL and Camp Tule Lake, historical resources associated with the internment of American citizens during World War II. Agricultural parcels within the TID system are within the historical footprint of Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
Two of the TID system pumps that would be modernized for the undertaking are located within the boundary of the Lower Klamath National Wildlife Refuge. The Refuge is a national historic landmark established by President Theodore Roosevelt in 1908 as the Nation's first waterfowl refuge.

Tule Lake Historic District
The NRCS identified the Tule Lake Historic District through review of background research and reporting for the undertaking (e.g., Parametrix 2026) and the Agency's Native American consultation effort. The Tule Lake Historic District is a multi-component, multi-state district representing the deep and complex cultural history of former Tule Lake and vicinity. The district is geographically bounded by the former lakebed at approximately 4050 feet amsl and centered on the Tule Lake Irrigation District which spans California and Oregon. Archaeological and historic contributing resources present within the district include Petroglyph Point Archaeological District and Modoc Lava Beads Archaeological District; the Tule Lake National Monument; the Lava Beds National Monument; the Lower Klamath National Wildlife Refuge; the Klamath Project; and a possible Traditional Cultural Property/Place important to Native Americans. Significant historical events form the historic context of the district and include pre-and post-Contact indigenous use of Tule Lake; the 1872-73 armed conflict between the Modoc Nation and United States Army referred to as the Modoc War; the internment of Japanese Americans during World War II at Camp Tulelake and establishment of the Tule Lake Segregation Center; and the era of reclamation and federal irrigation/water management efforts beginning in 1902 and leading to construction of the Klamath Project, developed and operated by the U.S. Bureau of Reclamation, of which the Tule Lake Irrigation District is part.

For the purposes of this undertaking, the NRCS elects to treat the TLHD as eligible for listing in the NRHP under criterion A for its association with important events in California history. The proposed TLHD is documented herein as Attachment C; note that it is not included in the inventory of cultural resources presented in the technical report provided in Attachment B (Parametrix 2026).

Assessment of Effects to Historic Properties

The has reviewed and agrees with the recommended assessment of effects from the proposed undertaking documented in the technical report (Attachment B, Parametrix 2026), summarized below. The NRCS has considered the views of consulting parties in its assessment of effects.

Klamath Project Historic District
The NRCS has determined that the proposed TID system modifications installation of SCADA equipment and power sources, and pump station upgrades, would not alter, directly or indirectly, the characteristics that make the KPHD eligible for listing in the NRHP under criteria A and C.

Tule Lake National Monument
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Tule Lake Segregation Center NHL or Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Refuge.

Tule Lake Historic District
The NRCS has applied the criteria of adverse effect from the undertaking to the proposed TLHD which the NRCS elects to treat as eligible for listing in the NRHP under criterion A and determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, the TLHD's ability to convey its association with the historical events represented by the contributing resources of the district.

Request for Concurrence - No Adverse Effect to Historic Properties

Based on our review of the undertaking, the NRCS proposes a finding of *no adverse effect to historic properties*. We respectfully request that you convey any comment on the finding of effect to us within 30 calendar days of receipt of this letter. Please don't hesitate to contact me with any questions or concerns by phone at (530) 792-5621 or email at Christopher.Null@usda.gov. Thank you for helping the NRCS protect California's important cultural resources.

Sincerely,

CARLOS SUAREZ
State Conservationist, NRCS CA – Davis

cc: Christoper Null, State Archaeologist, NRCS CA – Davis
Jon Gustafson, State Resource Conservationist, NRCS CA – Davis
Denise de Joseph, WFPO Cultural Resources Specialist, NRCS CA – Davis

References cited:

Parametrix. 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*. Prepared for Farmers Conservation Alliance by Parametrix, Puyallup, Washington. February 2026.

Attachments:

Attachment A: Bureau of Reclamation letter dated April 27, 2026, designating NRCS Lead Federal Agency (BOR #24-KBAO-006); US Fish and Wildlife Service letter dated September 22, 2023, designating NRCS Lead Federal Agency.

Attachment B: Parametrix 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*

Attachment C: Proposed Tule Lake Historic District - DPR523A form

USDA United States Department of Agriculture

June 29, 2026

Jonathan Smith
Chairman
Confederated Tribes of the Warm Springs Reservation of Oregon
P.O. Box C, Warm Springs, Oregon, 97761-3001

Via email: info@warmsprings.com

RE: Continued Section 106 Consultation for the Natural Resources Conservation Service Tulelake Irrigation District Modernization Project in Modoc and Siskiyou counties, California and Klamath County, Oregon – notice of *no adverse effect to historic properties*

Dear Chairman Smith:

The Natural Resources Conservation Service California State Office (NRCS) is continuing consultation with you regarding the Tulelake Irrigation District Modernization Project. The NRCS plans to provide technical and financial assistance to the project Sponsor, Tulelake Irrigation District (TID), through the NRCS Watershed Protection and Flood Prevention Operations (WFPO) program. We previously communicated with you regarding this undertaking on January 30, 2024, and March 11, 2024. This letter and attached documentation is provided in support of our finding of *no adverse effect to historic properties* pursuant to 36 CFR § 800.5(b).

The TID Modernization project is a multi-agency undertaking between the NRCS, the Bureau of Reclamation (BOR), and the US Fish and Wildlife Service (USFWS). Pursuant to Stipulation IV.a of the NRCS Programmatic Agreement, the NRCS has been designated the LFA for the TID Modernization Project as documented in Attachment A of this letter (BOR letter dated April 27, 2026 [B24-KBAO-006]; USFWS letter dated September 22, 2023).

Description of the Undertaking

The purpose of the TID Modernization Project is to automate manual water control features within the TID system by installing Supervisory Control and Data Acquisition (SCADA) instrumentation along TID canals and laterals, upgrading pumping stations and debris screens that convey irrigation water through the system, and adding power sources to SCADA equipment locations lacking a current power source. As planned, the upgrades will be implemented throughout the TID system at approximately 146 individual, discontiguous locations.

Coordination with the National Environmental Policy Act (NEPA)

As required by NRCS WFPO policy, the Sponsor is preparing a Plan-Environmental Assessment (Plan-EA) document pursuant to the National Environmental Policy Act (NEPA) to analyze potential impacts to cultural and historic resources from the No Action (Project without Federal Funding) and the Modernization Project alternatives. The Plan-EA will fulfill the NRCS's Section 106 review public participation responsibilities consistent with 36 CFR § 800.2(d)(3) in

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accordance with NEPA regulations and NRCS policy at Title 390, Part 500. The draft and final Plan-EA documents will be available for comment on the NRCS California website at https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/california/environmental-compliance-notices.

Area of Potential Effects (APE) Determination

Determination of an appropriate APE was coordinated with NEPA scoping efforts and resulted in development of a cultural resources workplan to guide archaeological and historic built environment identification. The Sponsor's cultural resources consultant, Parametrix, developed the workplan in accordance with a scope of work provided by the NRCS and coordinated with the BOR and USFWS who have jurisdiction over lands where some project activities are proposed. The workplan is included in the technical report (Parametrix 2026) attached to this letter (Attachment B) and includes maps of known cultural resources identified through a search of the California Historical Research Information System (CHRIS) and Oregon Archaeological Records Remote Access (OARRA) and Historic Sites Database as of August 2023.

Scoping and background research for the workplan resulted in the NRCS, as LFA and in consultation with the BOR and USFWS, defining the area of potential effects (APE) for this undertaking as 146 discontiguous locations, each with a 100-foot buffer, where the proposed SCADA equipment installations, pump upgrades, and power source installations for the Modernization Project are located, for an assessment of direct and indirect effects. The proposed APE is documented in the attached technical report (Parametrix 2026:Figures 2.1-2.18) (see Attachment B). Equipment transport and assembly, and construction staging, will utilize existing TID access roads and maintenance areas and are excluded.

Historic Properties Identification and Evaluation

The technical report prepared by the Sponsor's consultant Parametrix (2026) has been reviewed by the NRCS in accordance with 36 CFR § 800.2(a)(3) (see Attachment B). The report documents the results of background research, literature review, historic map review, and pedestrian survey of the APE, with identified resources evaluated for National Register of Historic Places (NRHP) eligibility. These include the historical infrastructure components of the TID system which will be modified for the undertaking and some of which are recommended as contributing resources of the Klamath Project Historic District (KPHD), discussed fully in the report.

The following resources were identified in or adjacent to the APE. All are fully discussed and evaluated in the technical report in Attachment B (Parametrix 2026) except for the Tule Lake Historic District (TLHD), a multi-component historic district identified herein by the NRCS through consultation and review of the technical report findings and treated as eligible for listing in the NRHP. Two archaeological resources, a lithic scatter and isolated artifact, also documented in the report, will be avoided by the undertaking and are not discussed below.

Klamath Project Historic District

The Klamath Project Historic District is an inter-state irrigation project that has been historically treated as eligible for listing in the NRHP by consensus by federal agencies and the Oregon and California SHPOs under criteria A and C for its for its engineering features and association with federal reclamation efforts to develop agriculture in Oregon

and California. The TID system is an integral part of the KPDH with many of its components evaluated as contributing resources of the district.

Tule Lake National Monument
The Tule Lake National Monument is comprised of the Tule Lake Segregation Center NHL and Camp Tule Lake, historical resources associated with the internment of American citizens during World War II. Agricultural parcels within the TID system are within the historical footprint of Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
Two of the TID system pumps that would be modernized for the undertaking are located within the boundary of the Lower Klamath National Wildlife Refuge. The Refuge is a national historic landmark established by President Theodore Roosevelt in 1908 as the Nation's first waterfowl refuge.

Tule Lake Historic District
The NRCS identified the Tule Lake Historic District through review of background research and reporting for the undertaking (e.g., Parametrix 2026) and the Agency's Native American consultation effort. The Tule Lake Historic District is a multi-component, multi-state district representing the deep and complex cultural history of former Tule Lake and vicinity. The district is geographically bounded by the former lakebed at approximately 4050 feet amsl and centered on the Tule Lake Irrigation District which spans California and Oregon. Archaeological and historic contributing resources present within the district include Petroglyph Point Archaeological District and Modoc Lava Beads Archaeological District; the Tule Lake National Monument; the Lava Beds National Monument; the Lower Klamath National Wildlife Refuge; the Klamath Project; and a possible Traditional Cultural Property/Place important to Native Americans. Significant historical events form the historic context of the district and include pre-and post-Contact indigenous use of Tule Lake; the 1872-73 armed conflict between the Modoc Nation and United States Army referred to as the Modoc War; the internment of Japanese Americans during World War II at Camp Tulelake and establishment of the Tule Lake Segregation Center; and the era of reclamation and federal irrigation/water management efforts beginning in 1902 and leading to construction of the Klamath Project, developed and operated by the U.S. Bureau of Reclamation, of which the Tule Lake Irrigation District is part.

For the purposes of this undertaking, the NRCS elects to treat the TLHD as eligible for listing in the NRHP under criterion A for its association with important events in California history. The proposed TLHD is documented herein as Attachment C; note that it is not included in the inventory of cultural resources presented in the technical report provided in Attachment B (Parametrix 2026).

Assessment of Effects to Historic Properties

The has reviewed and agrees with the recommended assessment of effects from the proposed undertaking documented in the technical report (Attachment B, Parametrix 2026), summarized below. The NRCS has considered the views of consulting parties in its assessment of effects.

Klamath Project Historic District
The NRCS has determined that the proposed TID system modifications installation of SCADA equipment and power sources, and pump station upgrades, would not alter, directly or indirectly, the characteristics that make the KPHD eligible for listing in the NRHP under criteria A and C.

Tule Lake National Monument
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Tule Lake Segregation Center NHL or Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Refuge.

Tule Lake Historic District
The NRCS has applied the criteria of adverse effect from the undertaking to the proposed TLHD which the NRCS elects to treat as eligible for listing in the NRHP under criterion A and determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, the TLHD's ability to convey its association with the historical events represented by the contributing resources of the district.

Request for Concurrence - No Adverse Effect to Historic Properties

Based on our review of the undertaking, the NRCS proposes a finding of *no adverse effect to historic properties*. We respectfully request that you convey any comment on the finding of effect to us within 30 calendar days of receipt of this letter. Please don't hesitate to contact me with any questions or concerns by phone at (530) 792-5621 or email at Christopher.Null@usda.gov. Thank you for helping the NRCS protect California's important cultural resources.

Sincerely,

CARLOS SUAREZ
State Conservationist, NRCS CA – Davis

cc: Christoper Null, State Archaeologist, NRCS CA – Davis
Jon Gustafson, State Resource Conservationist, NRCS CA – Davis
Denise de Joseph, WFPO Cultural Resources Specialist, NRCS CA – Davis

References cited:

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Attachments:

Attachment A: Bureau of Reclamation letter dated April 27, 2026, designating NRCS Lead Federal Agency (BOR #24-KBAO-006); US Fish and Wildlife Service letter dated September 22, 2023, designating NRCS Lead Federal Agency.

Attachment B: Parametrix 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*

Attachment C: Proposed Tule Lake Historic District - DPR523A form

USDA
United States Department of Agriculture

June 29, 2026

Garth Sundberg
Chairperson
Cher-Ae Heights Indian Community of the Trinidad Rancheria
P.O. Box 630
Trinidad, CA, 95570-0630

Via email: gsundberg@TrinidadRancheria.com

RE: Continued Section 106 Consultation for the Natural Resources Conservation Service Tulelake Irrigation District Modernization Project in Modoc and Siskiyou counties, California and Klamath County, Oregon – notice of *no adverse effect to historic properties*

Dear Chairperson Sundberg:

The Natural Resources Conservation Service California State Office (NRCS) is continuing consultation with you regarding the Tulelake Irrigation District Modernization Project. The NRCS plans to provide technical and financial assistance to the project Sponsor, Tulelake Irrigation District (TID), through the NRCS Watershed Protection and Flood Prevention Operations (WFPO) program. We previously communicated with you regarding this undertaking on January 30, 2024, and March 11, 2024. This letter and attached documentation is provided in support of our finding of *no adverse effect to historic properties* pursuant to 36 CFR § 800.5(b).

The TID Modernization project is a multi-agency undertaking between the NRCS, the Bureau of Reclamation (BOR), and the US Fish and Wildlife Service (USFWS). Pursuant to Stipulation IV.a of the NRCS Programmatic Agreement, the NRCS has been designated the LFA for the TID Modernization Project as documented in Attachment A of this letter (BOR letter dated April 27, 2026 [B24-KBAO-006]; USFWS letter dated September 22, 2023).

Description of the Undertaking

The purpose of the TID Modernization Project is to automate manual water control features within the TID system by installing Supervisory Control and Data Acquisition (SCADA) instrumentation along TID canals and laterals, upgrading pumping stations and debris screens that convey irrigation water through the system, and adding power sources to SCADA equipment locations lacking a current power source. As planned, the upgrades will be implemented throughout the TID system at approximately 146 individual, discontiguous locations.

Coordination with the National Environmental Policy Act (NEPA)

As required by NRCS WFPO policy, the Sponsor is preparing a Plan-Environmental Assessment (Plan-EA) document pursuant to the National Environmental Policy Act (NEPA) to analyze potential impacts to cultural and historic resources from the No Action (Project without Federal Funding) and the Modernization Project alternatives. The Plan-EA will fulfill the NRCS's Section

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106 review public participation responsibilities consistent with 36 CFR § 800.2(d)(3) in accordance with NEPA regulations and NRCS policy at Title 390, Part 500. The draft and final Plan-EA documents will be available for comment on the NRCS California website at https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/california/environmental-compliance-notices.

Area of Potential Effects (APE) Determination

Determination of an appropriate APE was coordinated with NEPA scoping efforts and resulted in development of a cultural resources workplan to guide archaeological and historic built environment identification. The Sponsor's cultural resources consultant, Parametrix, developed the workplan in accordance with a scope of work provided by the NRCS and coordinated with the BOR and USFWS who have jurisdiction over lands where some project activities are proposed. The workplan is included in the technical report (Parametrix 2026) attached to this letter (Attachment B) and includes maps of known cultural resources identified through a search of the California Historical Research Information System (CHRIS) and Oregon Archaeological Records Remote Access (OARRA) and Historic Sites Database as of August 2023.

Scoping and background research for the workplan resulted in the NRCS, as LFA and in consultation with the BOR and USFWS, defining the area of potential effects (APE) for this undertaking as 146 discontiguous locations, each with a 100-foot buffer, where the proposed SCADA equipment installations, pump upgrades, and power source installations for the Modernization Project are located, for an assessment of direct and indirect effects. The proposed APE is documented in the attached technical report (Parametrix 2026:Figures 2.1-2.18) (see Attachment B). Equipment transport and assembly, and construction staging, will utilize existing TID access roads and maintenance areas and are excluded.

Historic Properties Identification and Evaluation

The technical report prepared by the Sponsor's consultant Parametrix (2026) has been reviewed by the NRCS in accordance with 36 CFR § 800.2(a)(3) (see Attachment B). The report documents the results of background research, literature review, historic map review, and pedestrian survey of the APE, with identified resources evaluated for National Register of Historic Places (NRHP) eligibility. These include the historical infrastructure components of the TID system which will be modified for the undertaking and some of which are recommended as contributing resources of the Klamath Project Historic District (KPHD), discussed fully in the report.

The following resources were identified in or adjacent to the APE. All are fully discussed and evaluated in the technical report in Attachment B (Parametrix 2026) except for the Tule Lake Historic District (TLHD), a multi-component historic district identified herein by the NRCS through consultation and review of the technical report findings and treated as eligible for listing in the NRHP. Two archaeological resources, a lithic scatter and isolated artifact, also documented in the report, will be avoided by the undertaking and are not discussed below.

Klamath Project Historic District

The Klamath Project Historic District is an inter-state irrigation project that has been historically treated as eligible for listing in the NRHP by consensus by federal agencies and the Oregon and California SHPOs under criteria A and C for its for its engineering

features and association with federal reclamation efforts to develop agriculture in Oregon and California. The TID system is an integral part of the KPDH with many of its components evaluated as contributing resources of the district.

Tule Lake National Monument
The Tule Lake National Monument is comprised of the Tule Lake Segregation Center NHL and Camp Tule Lake, historical resources associated with the internment of American citizens during World War II. Agricultural parcels within the TID system are within the historical footprint of Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
Two of the TID system pumps that would be modernized for the undertaking are located within the boundary of the Lower Klamath National Wildlife Refuge. The Refuge is a national historic landmark established by President Theodore Roosevelt in 1908 as the Nation's first waterfowl refuge.

Tule Lake Historic District
The NRCS identified the Tule Lake Historic District through review of background research and reporting for the undertaking (e.g., Parametrix 2026) and the Agency's Native American consultation effort. The Tule Lake Historic District is a multi-component, multi-state district representing the deep and complex cultural history of former Tule Lake and vicinity. The district is geographically bounded by the former lakebed at approximately 4050 feet amsl and centered on the Tule Lake Irrigation District which spans California and Oregon. Archaeological and historic contributing resources present within the district include Petroglyph Point Archaeological District and Modoc Lava Beads Archaeological District; the Tule Lake National Monument; the Lava Beds National Monument; the Lower Klamath National Wildlife Refuge; the Klamath Project; and a possible Traditional Cultural Property/Place important to Native Americans. Significant historical events form the historic context of the district and include pre-and post-Contact indigenous use of Tule Lake; the 1872-73 armed conflict between the Modoc Nation and United States Army referred to as the Modoc War; the internment of Japanese Americans during World War II at Camp Tulelake and establishment of the Tule Lake Segregation Center; and the era of reclamation and federal irrigation/water management efforts beginning in 1902 and leading to construction of the Klamath Project, developed and operated by the U.S. Bureau of Reclamation, of which the Tule Lake Irrigation District is part.

For the purposes of this undertaking, the NRCS elects to treat the TLHD as eligible for listing in the NRHP under criterion A for its association with important events in California history. The proposed TLHD is documented herein as Attachment C; note that it is not included in the inventory of cultural resources presented in the technical report provided in Attachment B (Parametrix 2026).

Assessment of Effects to Historic Properties

The has reviewed and agrees with the recommended assessment of effects from the proposed undertaking documented in the technical report (Attachment B, Parametrix 2026), summarized below. The NRCS has considered the views of consulting parties in its assessment of effects.

Klamath Project Historic District
The NRCS has determined that the proposed TID system modifications installation of SCADA equipment and power sources, and pump station upgrades, would not alter, directly or indirectly, the characteristics that make the KPHD eligible for listing in the NRHP under criteria A and C.

Tule Lake National Monument
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Tule Lake Segregation Center NHL or Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Refuge.

Tule Lake Historic District
The NRCS has applied the criteria of adverse effect from the undertaking to the proposed TLHD which the NRCS elects to treat as eligible for listing in the NRHP under criterion A and determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, the TLHD's ability to convey its association with the historical events represented by the contributing resources of the district.

Request for Concurrence - No Adverse Effect to Historic Properties

Based on our review of the undertaking, the NRCS proposes a finding of *no adverse effect to historic properties*. We respectfully request that you convey any comment on the finding of effect to us within 30 calendar days of receipt of this letter. Please don't hesitate to contact me with any questions or concerns by phone at (530) 792-5621 or email at Christopher.Null@usda.gov. Thank you for helping the NRCS protect California's important cultural resources.

Sincerely,

CARLOS SUAREZ
State Conservationist, NRCS CA – Davis

cc: Christoper Null, State Archaeologist, NRCS CA – Davis
Jon Gustafson, State Resource Conservationist, NRCS CA – Davis
Denise de Joseph, WFPO Cultural Resources Specialist, NRCS CA – Davis

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Attachment C: Proposed Tule Lake Historic District - DPR523A form

USDA United States Department of Agriculture

June 29, 2026

Alex Watts-Tobin
Tribal Historic Preservation Officer
Karuk Tribe
PO Box 282
Orleans, CA, 95556

Via email: atobin@karuk.us

RE: Continued Section 106 Consultation for the Natural Resources Conservation Service Tulelake Irrigation District Modernization Project in Modoc and Siskiyou counties, California and Klamath County, Oregon – notice of *no adverse effect to historic properties*

Dear Mr. Watts-Tobin:

The Natural Resources Conservation Service California State Office (NRCS) is continuing consultation with you regarding the Tulelake Irrigation District Modernization Project. The NRCS plans to provide technical and financial assistance to the project Sponsor, Tulelake Irrigation District (TID), through the NRCS Watershed Protection and Flood Prevention Operations (WFPO) program. We previously communicated with you regarding this undertaking on January 30, 2024. This letter and attached documentation is provided in support of our finding of *no adverse effect to historic properties* pursuant to 36 CFR § 800.5(b).

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Description of the Undertaking

The purpose of the TID Modernization Project is to automate manual water control features within the TID system by installing Supervisory Control and Data Acquisition (SCADA) instrumentation along TID canals and laterals, upgrading pumping stations and debris screens that convey irrigation water through the system, and adding power sources to SCADA equipment locations lacking a current power source. As planned, the upgrades will be implemented throughout the TID system at approximately 146 individual, discontiguous locations.

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Funding) and the Modernization Project alternatives. The Plan-EA will fulfill the NRCS's Section 106 review public participation responsibilities consistent with 36 CFR § 800.2(d)(3) in accordance with NEPA regulations and NRCS policy at Title 390, Part 500. The draft and final Plan-EA documents will be available for comment on the NRCS California website at https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/california/environmental-compliance-notices.

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Scoping and background research for the workplan resulted in the NRCS, as LFA and in consultation with the BOR and USFWS, defining the area of potential effects (APE) for this undertaking as 146 discontiguous locations, each with a 100-foot buffer, where the proposed SCADA equipment installations, pump upgrades, and power source installations for the Modernization Project are located, for an assessment of direct and indirect effects. The proposed APE is documented in the attached technical report (Parametrix 2026:Figures 2.1-2.18) (see Attachment B). Equipment transport and assembly, and construction staging, will utilize existing TID access roads and maintenance areas and are excluded.

Historic Properties Identification and Evaluation

The technical report prepared by the Sponsor's consultant Parametrix (2026) has been reviewed by the NRCS in accordance with 36 CFR § 800.2(a)(3) (see Attachment B). The report documents the results of background research, literature review, historic map review, and pedestrian survey of the APE, with identified resources evaluated for National Register of Historic Places (NRHP) eligibility. These include the historical infrastructure components of the TID system which will be modified for the undertaking and some of which are recommended as contributing resources of the Klamath Project Historic District (KPHD), discussed fully in the report.

The following resources were identified in or adjacent to the APE. All are fully discussed and evaluated in the technical report in Attachment B (Parametrix 2026) except for the Tule Lake Historic District (TLHD), a multi-component historic district identified herein by the NRCS through consultation and review of the technical report findings and treated as eligible for listing in the NRHP. Two archaeological resources, a lithic scatter and isolated artifact, also documented in the report, will be avoided by the undertaking and are not discussed below.

Klamath Project Historic District
The Klamath Project Historic District is an inter-state irrigation project that has been historically treated as eligible for listing in the NRHP by consensus by federal agencies and the Oregon and California SHPOs under criteria A and C for its for its engineering features and association with federal reclamation efforts to develop agriculture in Oregon and California. The TID system is an integral part of the KPDH with many of its components evaluated as contributing resources of the district.

Tule Lake National Monument
The Tule Lake National Monument is comprised of the Tule Lake Segregation Center NHL and Camp Tule Lake, historical resources associated with the internment of American citizens during World War II. Agricultural parcels within the TID system are within the historical footprint of Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
Two of the TID system pumps that would be modernized for the undertaking are located within the boundary of the Lower Klamath National Wildlife Refuge. The Refuge is a national historic landmark established by President Theodore Roosevelt in 1908 as the Nation's first waterfowl refuge.

Tule Lake Historic District
The NRCS identified the Tule Lake Historic District through review of background research and reporting for the undertaking (e.g., Parametrix 2026) and the Agency's Native American consultation effort. The Tule Lake Historic District is a multi-component, multi-state district representing the deep and complex cultural history of former Tule Lake and vicinity. The district is geographically bounded by the former lakebed at approximately 4050 feet amsl and centered on the Tule Lake Irrigation District which spans California and Oregon. Archaeological and historic contributing resources present within the district include Petroglyph Point Archaeological District and Modoc Lava Beads Archaeological District; the Tule Lake National Monument; the Lava Beds National Monument; the Lower Klamath National Wildlife Refuge; the Klamath Project; and a possible Traditional Cultural Property/Place important to Native Americans. Significant historical events form the historic context of the district and include pre-and post-Contact indigenous use of Tule Lake; the 1872-73 armed conflict between the Modoc Nation and United States Army referred to as the Modoc War; the internment of Japanese Americans during World War II at Camp Tulelake and establishment of the Tule Lake Segregation Center; and the era of reclamation and federal irrigation/water management efforts beginning in 1902 and leading to construction of the Klamath Project, developed and operated by the U.S. Bureau of Reclamation, of which the Tule Lake Irrigation District is part.

For the purposes of this undertaking, the NRCS elects to treat the TLHD as eligible for listing in the NRHP under criterion A for its association with important events in California history. The proposed TLHD is documented herein as Attachment C; note that it is not included in the inventory of cultural resources presented in the technical report provided in Attachment B (Parametrix 2026).

Assessment of Effects to Historic Properties

The has reviewed and agrees with the recommended assessment of effects from the proposed undertaking documented in the technical report (Attachment B, Parametrix 2026), summarized below. The NRCS has considered the views of consulting parties in its assessment of effects.

Klamath Project Historic District
The NRCS has determined that the proposed TID system modifications installation of SCADA equipment and power sources, and pump station upgrades, would not alter, directly or indirectly, the characteristics that make the KPHD eligible for listing in the NRHP under criteria A and C.

Tule Lake National Monument
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Tule Lake Segregation Center NHL or Camp Tule Lake.

Lower Klamath National Wildlife Refuge NHL
The NRCS has taken into consideration the special protections afforded National Historic Landmarks pursuant to 36 CFR § 800.10 and has determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, any of the characteristics or historical significance of the Refuge.

Tule Lake Historic District
The NRCS has applied the criteria of adverse effect from the undertaking to the proposed TLHD which the NRCS elects to treat as eligible for listing in the NRHP under criterion A and determined that the proposed TID system modifications (SCADA and power source installations, pump station upgrades) would not alter, directly or indirectly, the TLHD's ability to convey its association with the historical events represented by the contributing resources of the district.

Request for Concurrence - No Adverse Effect to Historic Properties

Based on our review of the undertaking, the NRCS proposes a finding of *no adverse effect to historic properties*. We respectfully request that you convey any comment on the finding of effect to us within 30 calendar days of receipt of this letter. Please don't hesitate to contact me with any questions or concerns by phone at (530) 792-5621 or email at Christopher.Null@usda.gov. Thank you for helping the NRCS protect California's important cultural resources.

Sincerely,

CARLOS SUAREZ
State Conservationist, NRCS CA – Davis

cc: Christoper Null, State Archaeologist, NRCS CA – Davis
Jon Gustafson, State Resource Conservationist, NRCS CA – Davis
Denise de Joseph, WFPO Cultural Resources Specialist, NRCS CA – Davis

References cited:

Parametrix. 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*. Prepared for Farmers Conservation Alliance by Parametrix, Puyallup, Washington. February 2026.

Attachments:

Attachment A: Bureau of Reclamation letter dated April 27, 2026, designating NRCS Lead Federal Agency (BOR #24-KBAO-006); US Fish and Wildlife Service letter dated September 22, 2023, designating NRCS Lead Federal Agency.

Attachment B: Parametrix 2026. *Cultural Resources Assessment for the Tulelake Irrigation District Infrastructure Modernization Project – Klamath County, Oregon, Siskiyou County and Modoc County, California*

Attachment C: Proposed Tule Lake Historic District - DPR523A form

United States Department of Agriculture

March 11, 2024

Phillip Del Rosa
Chairman
Alturas Rancheria of Pit River Indians
104 Arnold Lane Medford, OR 97501

Via email: air530@yahoo.com

RE: Continued Section 106 Consultation for the Natural Resources Conservation Service Tulelake Irrigation District Modernization Project in Modoc and Siskiyou counties, California, and Klamath County, Oregon

Dear Chairman Del Rosa:

The Natural Resources Conservation Service California State Office (NRCS) is reaching out to you again regarding initiation of Section 106 consultation for the Tulelake Irrigation District (TID) Modernization Project on January 30, 2024. Thirty days have passed and the NRCS would like to ensure that you have had the opportunity to comment or request further consultation regarding this undertaking if you wish to do so. We respectfully request that you convey any comments to us by March 25, 2024. If no reply is received, the NRCS will proceed with planning and notify you of our proposed finding of effect at a later date.

Please don't hesitate to contact me with any questions or concerns by phone at (530) 792-5621 or email at Christopher.Null@usda.gov. Thank you for helping the NRCS protect California's important cultural resources.

Sincerely,

Christopher Null
State Archaeologist, NRCS CA – Davis

cc:

Denise de Joseph, Watershed Program Cultural Resources Specialist, NRCS CA – Davis
Ernesto De La Riva, State Watershed Engineer, NRCS CA – Davis

Natural Resources Conservation Service
430 G St., #4164, Davis, CA 95616-5475
(530) 792-5600
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State of California • Natural Resources Agency
Gavin Newsom, *Governor*

DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION
Armando Quintero, *Director*

Julianne Polanco, State Historic Preservation Officer
1725 23rd Street, Suite 100, Sacramento, CA 95816-7100
Telephone: (916) 445-7000 FAX: (916) 445-7053
calshpo.ohp@parks.ca.gov www.ohp.parks.ca.gov

August 11, 2026

VIA EMAIL

In reply refer to: NRCS_2026_0707_002

Christopher C. Null, State Archaeologist
U.S. Department of Agriculture
California Natural Resource Conservation Service
430 G Street, #4164
Davis, CA 95616-4164

Subject: Initiation of Section 106 consultation for the Natural Resources Conservation Service Regional Conservation Irrigation District Modernization Project in Modoc and Siskiyou counties, California and Klamath County, Oregon.

Dear Mr. Null:

The State Historic Preservation Officer (SHPO) acknowledges receipt on July 07, 2026, of a consultation letter from the Natural Resources Conservation Service (NRCS) dated June 29, 2026 initiating consultation regarding the NRCS Watershed Protection and Flood Prevention Operation (WFPO) Project #749104252BK in Modoc, Siskiyou, and Klamath Counties. The undertaking involves coordinated actions by the NRCS, Bureau of Reclamation (BOR), and U.S. Fish and Wildlife Service (USFWS). Under Stipulation IV.a of the Programmatic Agreement, the NRCS has been designated the Lead Federal Agency (LFA) for the Tulelake Irrigation District (TID) Modernization Project, as documented in correspondence from BOR (April 27, 2026) and USFWS (September 22, 2023). The NRCS is therefore conducting environmental review, consultation, and related actions in compliance with Section 106 of the National Historic Preservation Act (NHPA), its implementing regulations at 36 CFR Part 800, and Stipulation V.b.1 of the NRCS Programmatic Agreement with the SHPO for conservation assistance under the Watershed Protection and Flood Prevention Act.

The purpose of the TID Modernization Project is to automate manual water-control features within the TID system through installation of Supervisory Control and Data Acquisition (SCADA) equipment, upgrades to pumping stations and debris screens, and installation of power sources at locations lacking electrical supply. Approximately 146 discrete locations throughout the TID system will be upgraded. In consultation with BOR and USFWS, the NRCS defined the Area of Potential Effects (APE) as the 146 discontiguous locations where SCADA equipment, pump upgrades, and power supply installations would occur. A 100-foot buffer was applied at each location to assess direct and indirect effects. Transport, assembly, and staging activities that utilize existing TID access roads and maintenance areas are excluded from the APE.

It is the SHPOs understanding that the NRCS initiated consultation with thirteen Native American consulting parties in California and Oregon on January 31, 2024. The NRCS sent a letter describing the project and maps showing the location of proposed project activities to the following tribes. Consultation is ongoing and the results will be incorporated into NRCS decisions regarding the finding of effect, Plan-EA findings, and installation of the proposed

project including NRCS policy Implementation Requirements or mitigation measures required by regulations.

NRCS supporting documentation indicates identification efforts included a California Historical Resource Information System (CHRIS) records review, background research, historic map analysis, and a pedestrian survey of the APE. Twenty-three archaeological resources were documented within 0.5 miles of the APE, none within it. BERD records note two water conveyance features—the R-1-B Lateral and R-1 Extension—outside but within 0.5 miles of the APE near the Q-2 SCADA site. The APE overlaps the NRHP-eligible Klamath Project Historic District. Three NRHP-listed properties occur outside the APE but within or adjacent to the TID: Lower Klamath National Wildlife Refuge NHL, Tule Lake Segregation Center, and Camp Tulelake.

Archaeological surveys conducted December 18–19, 2024 identified one surface site and one isolate; both pre-contact resources will be avoided. NRCS identifies the following resources as eligible for the National Register and has applied criteria of effects under 36 CFR § 800.5 and determined the following NRHP-eligible built resources would not be altered:

- Klamath Project Historic District – eligible under Criteria A and C; no direct or indirect effects.
- **Tule Lake National Monument**
    - Established in 2008 as part of the World War II Valor in the Pacific National Monument; its designated boundaries lie entirely outside the APE.
    - **Tule Lake Segregation Center NHL** (NRHP No. 06000210), listed under Criterion A for architecture, Asian ethnic heritage, law, politics/government, and social history (1942–1946) Located outside the APE, about 1.18 miles south of the nearest project activity.
    - **Camp Tulelake**, a World War II confinement site; no adverse effect under 36 CFR 800.10. Its NRHP boundary is outside the APE, approximately 0.3 miles west of project activities.
- **Lower Klamath National Wildlife Refuge NHL**, established in 1908 as the first U.S. waterfowl refuge; listed under Criterion A for conservation (1908–1949). Although one project location overlaps a contributing portion, the undertaking will not affect their historic associations given the distance away from the APE.
- **Tule Lake Historic District**, eligible under Criterion A; the undertaking does not affect its ability to convey historic associations.

Following review of the submittal the SHPO offer the following comments:

- Consultation: SHPO finds that Tribal consultation has been conducted in accordance with 36 CFR § 800.2(c)(2)(ii) and NRCS PA Stipulation II(c).
    - The NRCS is reminded that OHP/SHPO staff do not possess the unique cultural knowledge and expertise held by consulting tribes. Public and Tribal input is essential to determining whether properties of cultural, historical, or religious significance may be present within or near the APE.

Oregon
Tina Kotek, Governor

Parks and Recreation Department
Oregon Heritage/
State Historic Preservation Office
725 Summer St. NE, Suite C
Salem, OR 97301-1266
(503) 986-0690
Fax (503) 986-0793
oregonheritage.org

August 3, 2026

Christopher Null
USDA-NRCS
430 G St.
Davis, CA 95617

RE: SHPO Case No. 24-0347
USDA, Tulelake Irrigation District (TID) Modernization Project; NRCS Plan-EIS - WFPO TID Modernization
Install instrumentation along canals; proposes a finding of No Adverse Effect to Historic Properties pursuant to 36 CFR 800.5(b) for the project. Portions of two historic districts span the Oregon and California border.
42.0075 -1215332, Klamath County

Dear Christopher Null:

We chose not to comment on this project and it may continue as described.

If the scope of this project changes, please submit any new information, referencing the case number assigned below.

The assigned SHPO Case Number is 24-0347. Refer to this case number on all future correspondence or submitting any change to the scope of work for review using the provided SHPO case number. Please retain this email for your records.

If the SHPO chooses to not respond within 30 calendar days from receipt of this submittal your responsibilities under Section 106 of the National Historic Preservation Act of 1966 as amended, Oregon Revised Statute 358.653, local permitting process, and/or other similar request are complete and the project may proceed as described in the submitted scope of work. The 30-day SHPO response period for this project ends after 08/07/26.

Federal and state laws protecting cultural resources, local permitting requirements; and necessary consultation with Native American Indian Tribes for federal, state and local government projects still apply.

See https://www.oregon.gov/oprd/OH/Pages/lawsrules.aspx.

Sincerely,

Robert T. Olguin

Robert Olguin
Review and Compliance, Historian
(503) 602-2468
Robert.Olguin@oprd.oregon.gov

cc: Denise de Joseph, USDA NRCS - CA

- Pursuant to 36 CFR § 800.4(a)(1): **The SHPO does not object** to the APE as defined.
- Pursuant to 36 CFR § 800.4(b)(1**): The SHPO does not object** to identification efforts to identify historic properties.
- Determinations of Eligibility: Pursuant to 36 CFR § 800.4(c) and NRCS PA Stipulation V(b)(1):
  - NRCS has determined that Klamath Project Historic District is eligible for the NRHP under Criterion A and Criterion C. **The SHPO concurs**.
  - NRCS has indicated that it will consider the Tule Lake Historic District also a contributing resource to the Klamath Project Historic District eligible under Criterion A. **The SHPO concurs** for the purposes of this undertaking.
- Finding of Effect: Pursuant to 36 CFR § 800.5 (b), Based on the documentation provided the **SHPO agrees with the finding of no adverse effect** for the proposed undertaking.

Please consider that in the event of a post-review discovery or a project redesign, the USACE may have additional responsibilities pursuant to 36 CFR Part 800. If there is any assistance you require to move forward with this project or if you require further information, please contact Alvin S. Rosa-Figueroa, Associate State Archaeologist, at Alvin.RosaFigueroa@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer

A.2.2.1 Technical Report

The Technical Report has been omitted due to its size. A request to review the Technical Report can be made to Dylan Hickey at Dylan.Hickey@usda.gov

A.2.3 Section 7 Documentation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Southwest Region

Klamath Falls Fish and Wildlife Office
1936 California Avenue
Klamath Falls, Oregon 97601

In Reply Refer to:
ECOSphere Project Code #
2025-0040448

July 20, 2026
Sent Electronically

Dylan Hickey
State Environmental Compliance Coordinator
Natural Resources Conservation Service
430 G Street
Davis, CA 95616

Subject: Concurrence and Conference Concurrence for the Tulelake Irrigation District Infrastructure Modernization Project

Dear Mr. Hickey:

This responds to your letter dated and received on April 1, 2026, requesting concurrence and conference concurrence from the U.S. Fish and Wildlife Service (Service), pursuant to the requirements of section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.), for the Tulelake Irrigation District Infrastructure Modernization Project (Project). Our response to your request is based on the biological assessment accompanying your letter, the additional information provide May 27, 2026, and information in our files.

The Project is located within the Tulelake Irrigation District (TID or District), in the Upper Klamath Basin on the east side of the Cascade Mountain Range, in Siskiyou and Modoc Counties, California, and Klamath County, Oregon. The action area includes TID infrastructure that will be upgraded, TID operated Rights-of-Way (ROW) and easements where construction will take place or will be staged, terrestrial noise extending 0.25 mile from the project area, and the waterbodies (e.g., canals, laterals, and drains) that will be altered in volume and flow from the Project (Parametrix 2026, p. 12).

TID has requested financial and technical assistance from NRCS, and they are proposing to update irrigation infrastructure, including upgrading pumps and installing travel belt screens at 28 locations, and installing Supervisory Control and Data Acquisition (SCADA) and automation equipment at 74 locations over portions of a 5-year period (2026-2030 during non-irrigation season). The purpose of the project is to improve daily water management operations and enhance the reliability of water delivery for TID patrons and for the Tule Lake and Lower Klamath National Wildlife Refuges

Additionally, the Project includes avoidance and minimization measures (AMM) to proactively reduce environmental impacts therefore, reducing effects to species. The AMMs include

construction timing, staging, vegetation management, erosion control, spill prevention, preconstruction surveys for northwestern pond turtles, and the Service will be contacted if fish salvage is needed.

NRCS determined that the Project would have "no effect" on gray wolf (*Canis lupus*), yellow-billed cuckoo (*Coccyzus americanus*), California condor (*Gymnogyps californianus*), Monarch butterfly (*Danaus plexippus*), Suckley's cuckoo bumble bee (*Bombus suckleyi*), Greene's tuctoria (*Tuctoria greenei*), and slender Orcutt grass (*Orcuttia tenuis*), and critical habitats associated with these species. Additionally, NRCS determined the proposed project "may affect and is not likely to adversely affect" the federally endangered Lost River sucker (*Deltistes luxatus*; LRS) and shortnose sucker (*Chasmistes brevirostris*; *SNS*) and northwestern pond turtle (*Actinemys marmorata; NWPT*). The Service does not have the authority to provide concurrence for no effect determinations due to policy and the implementing regulations for section 7 of the Act. Therefore, our concurrence on the determinations made by NRCS is limited to the effects to the Lost River sucker, shortnose sucker, and northwestern pond turtle.

Effects to Lost River Sucker and Shortnose Sucker

The action area includes the project area, TID infrastructure, ROWs, staging areas, 0.25-mile terrestrial noise buffer to the project area, and the waterbodies (e.g., canals, laterals, and drains) that are impacted. Project construction is located within TID water conveyance infrastructure and adjacent to the Lost River and Tulelake Sumps 1A and 1B. TID's water conveyance system is part of the Bureau of Reclamation's (Reclamation) Klamath Project consultation (Ecosphere Project Code # 2022-0020519-S7; USFWS 2024). The Klamath Project biological opinion includes an incidental take statement for entrainment of LRS and SNS into Klamath Project diversions. Therefore, all LRS and SNS within TID's water conveyance system are already considered as take for the Klamath Project.

J-canal is the main canal directing water into TID's water conveyance system. The number of LRS and SNS entrained in canals varies annually therefore, the extent of sucker presence within TID's conveyance system is unknown. Given the interconnection of the system, the lack of fish screens or obstacles, and not all canals, laterals, and drains are completely dewatered, suckers are potentially present throughout the system but at low densities. Most TID irrigation canals are dewatered each year at the end of the irrigation season. During and after annual dewatering operations, Reclamation conducts fish salvage in canals where suckers are encountered in reliable numbers to decrease mortality associated with entrainment and dewatering which includes the J-Canal within TID. In 2023, Reclamation salvaged approximately 615 juvenile suckers from J-Canal and in 2024, only 8 juvenile suckers were salvaged from J-Canal (Reclamation 2024, Reclamation 2025).

Staging and storage areas for the proposed action will include vegetation clearing, weed management, and reseeding post construction. Vegetation clearing will be minimized to the extent practicable and site selection will ensure limited tree removal. Staging areas will be in the upland areas away from sensitive areas therefore, construction of staging and storage areas are expected to have no effect on LRS and SNS in the TID system.

SCADA and automation equipment will be installed at 74 locations. SCADA installation will not require in-water work and will be conducted during the non-irrigation season (Parametrix 2026). Prior to construction most canals will be dewatered and entrained LRS and SNS salvaged and

translocated at the end of the irrigation season, as part of the Klamath Project (USFWS 2024). Additionally, the proposed AMMs (construction timing, staging, erosion control, spill prevention) will reduce the risk of increased sedimentation, and accidental spills of hazardous material from entering the canal system. Therefore, SCADA installation will result in insignificant effects to LRS and SNS from impacts to water quality.

Pump upgrades and traveling belt screens will be installed at 28 locations in the project area. Prior to construction, water levels in canals will be at their lowest or dewatered, and entrained LRS and SNS salvaged and translocated as part of the Klamath Project (USFWS 2024). Absent or low water levels will minimize the potential for LRS and SNS to be present in the canals and construction worksites related to pump upgrades and installation of traveling belt screens. The Service recognizes that TID's water conveyance system is part of the Klamath Project therefore, all LRS and SNS within TID's system are already considered as "take" via entrainment (USFWS 2024). Given the population decline of LRS and SNS in the Klamath Basin, NRCS agreed to notify the Service prior to dewatering areas that potentially have suckers present and the Service will salvage and translocate suckers to conserve these species (D. Hickey, NRCS, personal communication, May 27, 2026). This will result in short-term behavioral disturbance due to elevated noise levels and herding fish out of the worksite. Increase sediment in the TID conveyance system due to runoff from ground disturbance will temporarily degrade water quality. However, the proposed AMMs (construction timing, staging, erosion control, spill prevention) will reduce the risk of increased sedimentation, and accidental spills of hazardous material from entering the canal system. Therefore, pump upgrades and installation of traveling belt screens will result in insignificant effects to LRS and SNS from impacts to water quality and behavioral disturbance.

Operation and maintenance of the installed traveling belt screens at each pump site have the potential to impact LRS and SNS; however, the number of LRS and SNS within TID's system is low and pump operations are seasonally variable and the disturbance from operations or maintenance activities would likely cause suckers to vacate the area. Additionally, the traveling belt screen will act as a barrier, blocking suckers from entering the pump intake. Therefore, operation and maintenance of the traveling belt screen will result in insignificant effects to LRS and SNS from disturbance and beneficial effects from blocking movement into the pump intake

Overall, implementation of the Project has the potential to impact water quality in the action area and LRS and SNS behavior. The Project will result in short-term spatial limited insignificant effects to water quality from sedimentation and turbidity. Additionally, the Project has the potential to result in long-term beneficial effects from blocking movement into pump intakes with the operation of traveling belt screens.

Effects to Northwestern Pond Turtle

The northwestern pond turtle is known to be present in irrigation canals adjacent to and along the Lost River and may occur throughout the Klamath Project's irrigation system (K. Adkins, ODFW, personal communication, January 12, 2024). NWPTs likely occur in low densities in TID's water conveyance system due to poor habitat quality (CDFW 2016), fragmentation from existing populations and ponded environments, lack of suitable upland habitat for overwintering and nesting, and a high degree of anthropogenic disturbance. NWPTs may be present in the Tule Lake sumps, as these areas offer suitable habitat for all life stages of the species.

Construction will occur late October through late March, when any NWPTs present in the project area will either be overwintering in pond bottom sediment or within natal nests in sparsely vegetated fill adjacent to permanently inundated drains. Project ground disturbing activities related to the installation of SCADA and automation equipment and pump upgrades have the potential to impact NWPT in these habitats.

Ground-disturbing activities associated with SCADA and automation equipment installation will occur in heavily vegetated areas adjacent to the canals, laterals, or drains. These areas are unsuitable for nesting due to the presence of dense vegetation. Laterals are fully dewatered annually during the non-irrigation season. Any water that might remain at these sites would be too shallow to provide suitable overwintering habitat. Therefore, installation of SCADA and automation equipment will not impact hatchlings overwintering in natal nests, juveniles and adults overwintering in substrate, or nesting habitat.

Pump sites are located at the shallow edge of permanently ponded water near sparsely vegetated fill material. Water depths within the ponded areas may get deep enough to provide suitable overwintering habitat for juvenile and adult NWPT. Ground disturbing activities related to pump upgrades will be implemented in the shallow water adjacent to pumps and may cause short-term increases in sediment and turbidity, temporarily impacting water quality. However, sediment and erosion AMMs will minimize sediment input, therefore not impacting overwintering NWPT by short term increased turbidity levels in overlying water.

Sparsely vegetated fill adjacent to pump upgrade locations may provide suitable nesting habitat. To avoid potential impacts to NWPT from ground disturbing activities, visual NWPT surveys will be conducted at all pump locations prior to nesting season during the spring preceding construction. Following each survey, if NWPT are observed, exclusionary fencing will be implemented to exclude nesting. Installed fencing will be removed in August after competition of the nesting season. Given the low density of NWPT in TID's water conveyance system combined with the widespread availability of potentially suitable nesting habitat in sparsely vegetation areas along the system, the temporary presence of exclusionary fencing is not expected to result in an appreciable increase in competition for suitable nest sites. Following ground disturbing activities, disturbed areas will be returned to original contours and fill material adjacent to pumps will continue to provide potentially suitable nesting habitat for NWPT. Therefore, there will be no ground disturbing impacts to hatchlings overwintering in natal nests and any impacts to gravid females and nesting habitat will be temporary and insignificant.

Installation of SCADA and other equipment and the upgrade of existing pumps will improve daily water management operations and enhance the reliability of water delivery for patrons and for the Tule Lake and Lower Klamath National Wildlife Refuges. While the project related alteration of flow volumes within the conveyance system will not affect NWPT habitat availability or water quality in the long term, periodic increased flow volumes to Tule Lake may improve NWPT habitat availability and water quality in TLNWR.

Overall, implementation of the Project has the potential to impact NWPT hatchlings overwintering in natal nests, gravid females, juvenile and adult NWPT overwintering in muddy substrate, and NWPT nesting habitat. However, based upon project design and the implementation of avoidance and minimization measures, including timing and the use of exclusion fencing, negative impacts from project related activities will be temporary and

insignificant. Therefore, implementation of this project may affect but is not likely to adversely affect NWPT.

Summary and Conclusion

Based on the Service's review of the biological assessment, the overall description of the proposed action, and the avoidance and minimization measures that will potentially minimize the impacts to listed species, the Service concurs with the determination that the proposed action may affect, but is not likely to adversely affect LRS, SNS, and northwestern pond turtle.

This concludes informal consultation pursuant to section 7 of the Act for Lost River sucker, shortnose sucker, and their designated critical habitat. Reinitiation of consultation on this action may be necessary if: (1) new information reveals effects of the action that may affect species or critical habitats in a manner or to an extent not considered in the assessment; (2) the action is subsequently modified in a manner that causes an effect to species or critical habitats not considered in this analysis; or (3) a new species is listed or critical habitat designated that may be affected by the proposed action.

Thank you for your efforts to conserve federally listed species. If you have any questions about this document, please contact Margie Shaffer at margie_shaffer@fws.gov.

Sincerely,

ROBIN SNIDER Digitally signed by ROBIN SNIDER Date: 2026.07.20 08:21:16 -07'00'

Robin Snider, Acting for:

Jennie Land
Field Supervisor

References Cited

CDFW (California Department of Fish and Wildlife). 2016. Western Pond Turtle Predicted Habitat – CWHR R004 [ds2386]. California Department of Fish and Wildlife California Interagency Wildlife Task Group. Sacramento, CA.

Parametrix. 2026. Tulelake Irrigation District Infrastructure Modernization Project Biological Assessment Prepared for Natural Resources Conservation Service by Parametrix, Portland, Oregon. April 2026

Reclamation. 2024a. 2023 Annual Monitoring Report for the 2019 National Marine Fisheries Service and 2023 U.S. Fish and Wildlife Service Biological Opinions on the Klamath Project Operations.

Reclamation. 2025. 2024 Annual Monitoring Report for the 2019 National Marine Fisheries Service and 2023 U.S. Fish and Wildlife Service Biological Opinions on the Klamath Project Operations. Klamath Falls, Oregon

USFWS. 2024. Biological Opinion on the Effects of the Proposed Klamath Project Operations Plan, Effective November 15, 2024, through October 31, 2029, on Federally Listed Threatened and Endangered Species. Klamath Falls, Oregon

A.2.4 Section 12 Documentation

USDA United States Department of Agriculture

9/15/2024

Janet Whitlock
Regional Environmental Officer
Office of Environmental Policy and Compliance, Sacramento, Region IX 2800
Cottage Way, Room E-1712
Sacramento, CA 95825

Re: Notification of a planning process, per the Watershed Protection and Flood Prevention Act (P.L. 83-566) as amended through P.L. 115-334, Dec. 29, 2018, Section 12.

Ms. Whitlock,

This letter is to notify the Department of Interior of a "Small Watershed" PL 83-566 planning project in the Lost River Watershed (HUC 18010204), Modoc and Siskiyou Counties, California, and Klamath County, Oregon. The local sponsor is the Tulelake Irrigation District, headquartered in Tulelake, CA. The planned project activities are focused on the major irrigation distribution networks of the Tulelake Irrigation District.

Potential effects, including irrigation system upgrades and improved efficiency of irrigation water provision, are largely restricted to areas within the irrigation district, including existing canals built with assistance from the USDI Bureau of Reclamation, and areas managed by the Tulelake National Wildlife Refuge (USDI USF&WS – National Wildlife Refuge System). Local offices of the Bureau of Reclamation and of the National Wildlife Refuge System are cooperating with this planning effort.

Inquiries may be directed to State Watershed Programs Engineer, Liz Colby, liz.colby@usda.gov or 530-792-5613.

Sincerely,

GEORGE ROLFES Digitally signed by GEORGE ROLFES Date: 2024.09.13 14:24:43 -07'00' acting for:

Carlos Suarez
State Conservationist

Cc:
RaeAnn Dubay, Deputy State Conservationist, NRCS, Davis, CA
Ernesto De La Riva, State Conservation Engineer, NRCS, Davis, CA
Jenna Ganoung, Assistant State Conservationist for Field Operations, NRCS, Red Bluff, CA
Allison West, District Conservationist, NRCS, Tulelake, CA
John Rovai, Acting Area Engineer, NRCS, Red Bluff, CA

Natural Resources Conservation Service
430 G St., #4164, Davis, CA 95616-5475
Voice: (530)792-5600
USDA is an Equal Opportunity Provider, Employer and Lender.

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

March 27, 2026

Colonel Chad Caldwell
District Commander
U.S. Army Corps of Engineers
Sacramento District
1325 J Street,
Sacramento, CA 95814

Re: Notification of a planning process, per the Watershed Protection and Flood Prevention Act (P.L. 83-566) as amended through P.L. 115-334, Dec. 29, 2018, Section 12.

Dear Colonel Caldwell,

This letter is to notify the US Army Corps of Engineers of a "Small Watershed" PL 83-566 planning project in the Lost River Watershed (HUC 18010204), Modoc and Siskiyou Counties, California, and Klamath County, Oregon. The local sponsor is the Tulelake Irrigation District, headquartered in Tulelake, CA. The planned project activities are focused on the major irrigation distribution networks of the Tulelake Irrigation District.

Potential effects, including irrigation system upgrades and improved efficiency of irrigation water provision, are largely restricted to areas within the irrigation district, including existing canals built with assistance from the USDI Bureau of Reclamation, and areas managed by the Tulelake National Wildlife Refuge (USDI USF&WS – National Wildlife Refuge System). Local offices of the Bureau of Reclamation and of the National Wildlife Refuge System are cooperating with this planning effort.

Inquiries may be directed to State Conservation Engineer, Ernesto De La Riva, ernesto.delariva@usda.gov or 530-792-5680.

Sincerely,

Carlos Suarez
State Conservationist

Cc:
RaeAnn Dubay, Deputy State Conservationist, NRCS, Davis, CA
Ernesto De La Riva, State Conservation Engineer, NRCS, Davis, CA
Jenna Ganoung, Assistant State Conservationist for Field Operations, NRCS, Red Bluff, CA
Allison West, District Conservationist, NRCS, Tulelake, CA
John Rovai, Acting Area Engineer, NRCS, Red Bluff, CA

Natural Resources Conservation Service
430 G Street, Davis CA
PO Box 1197; Davis CA 95617
Voice: (530)792-5600
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Appendix B

Project Maps

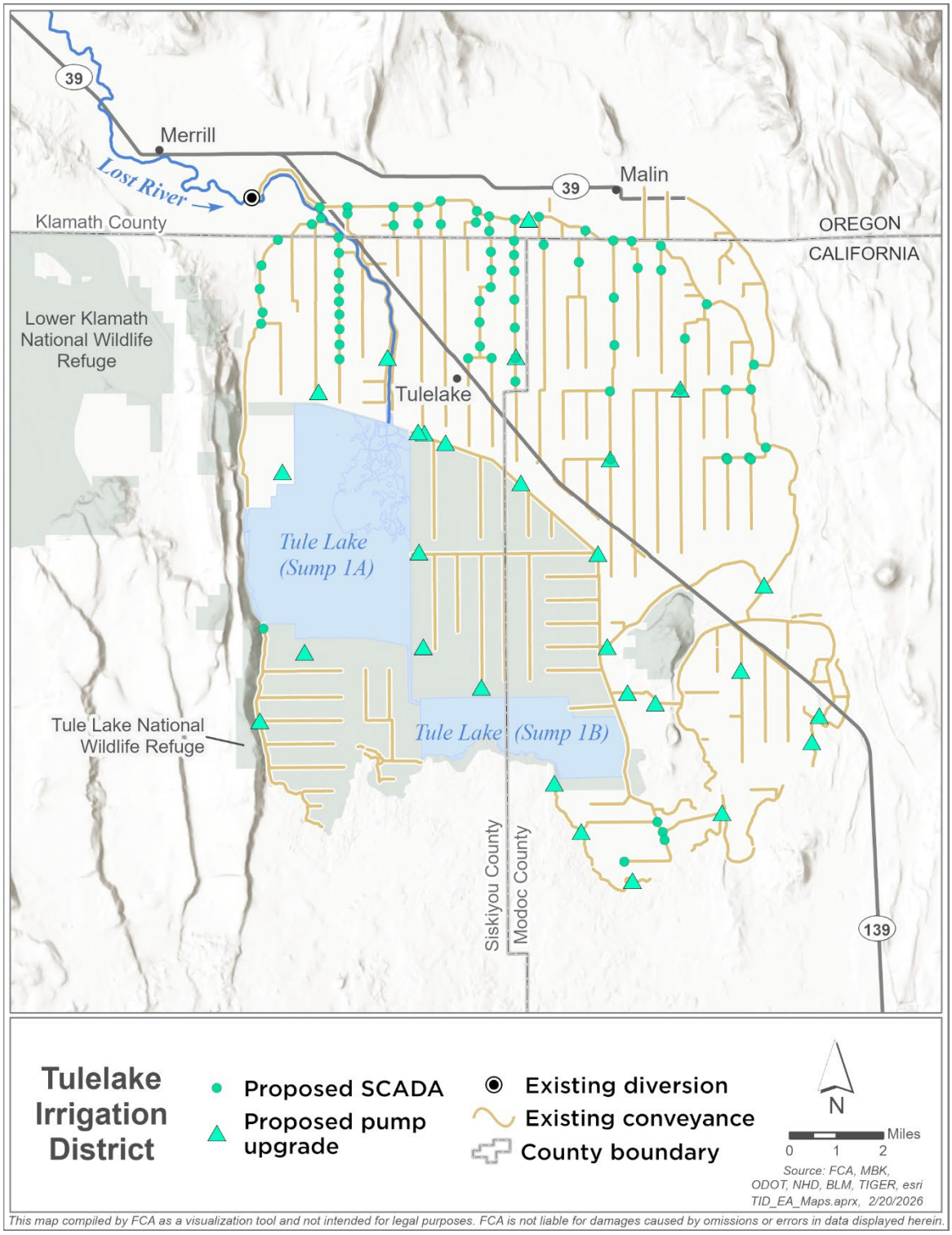


Figure B-1. Overview of the Potential Modernization Alternative for Tulelake Irrigation District Infrastructure Modernization Project.

Appendix C

Supporting Maps

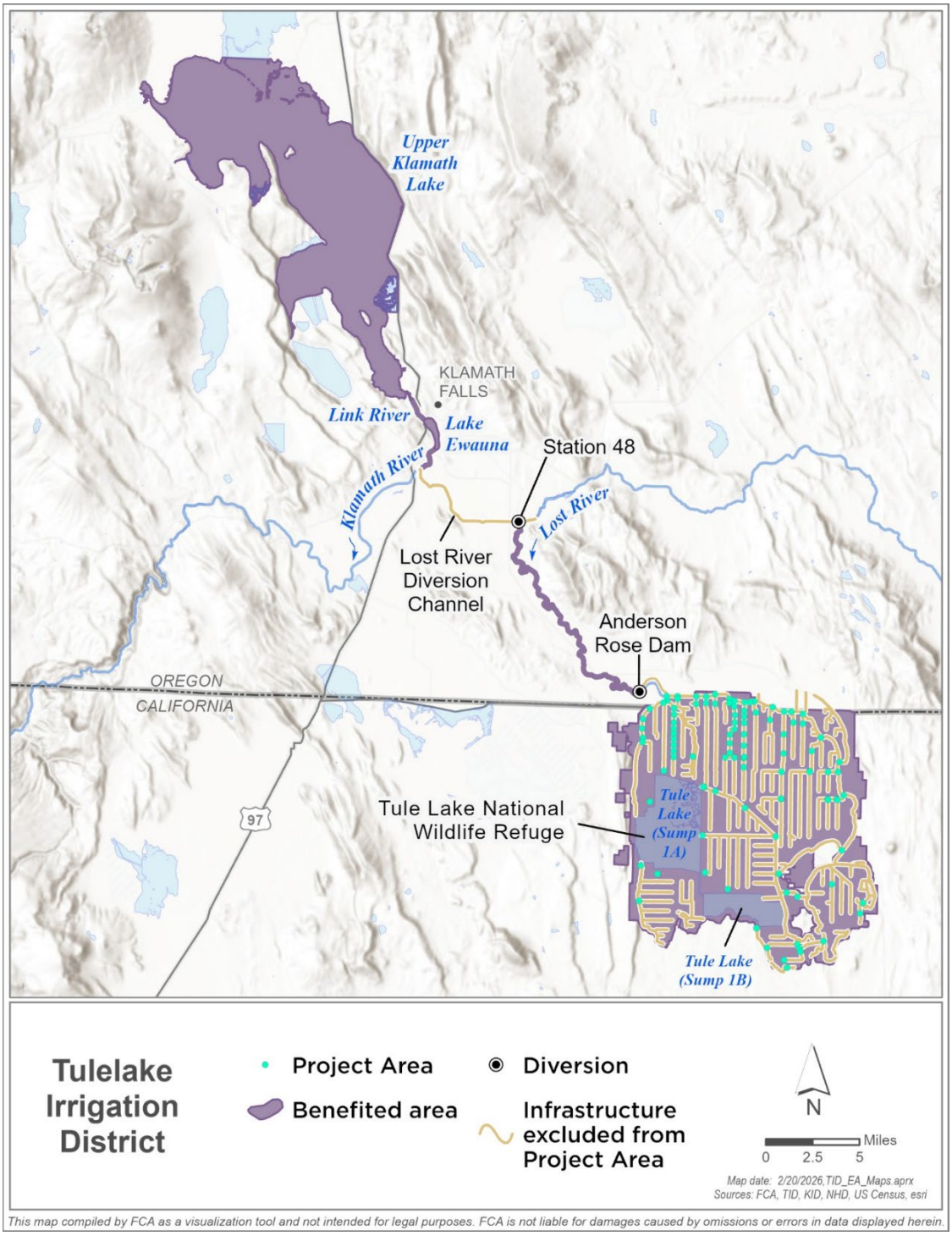


Figure C-1. Benefited Areas for the Tulelake Irrigation District Project.

Appendix D

Investigation and Analyses Report

D.1 Economic Analysis

Tulelake Irrigation District

July 20, 2026

1 Introduction

This appendix provides an Economic Analysis that evaluates the costs and benefits of the Modernization Alternative over the Future Without Project (FWOP/No Action) Alternative for the Tulelake Irrigation District (TID, or "District") Infrastructure Modernization Project ("Project"). The analysis uses Natural Resources Conservation Service (NRCS) guidelines for evaluating benefits as outlined in the NRCS Natural Resources Economics Handbook and the U.S. Department of Agriculture's (USDA) Guidance for Conducting Analyses Under the Principles, Requirements, and Guidelines (PR&Gs) for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments (DM 9500-013).

The Modernization Alternative represents the potential future with federal funding through P.L. 83-566. The FWOP/No Action Alternative represents the future if the District does not receive federal funding through P.L. 83-566. This economic analysis is divided into four sections. The first section describes the analysis parameters. The second section discusses the costs of the FWOP/No Action Alternative. The third section focuses on the costs and benefits of the Modernization Alternative. The fourth section summarizes the benefits and costs of the Modernization Alternative over the FWOP/No Action Alternative.

1.1 Project Location

The District represents approximately 84 percent of the Tule Lake Subbasin in Northern California along the Southern Oregon border, and delivers water supplies to agricultural land in three counties. The District consists of 243 miles of canals, 334 miles of drains, 26 miles of dikes, and 37 pumping plants, and provides water to 63,000 acres of irrigated land. TID diverts natural flow from the Klamath River made available by the Klamath Reclamation Project, and at times uses surface water from Lost River, groundwater wells, and tailwater from Klamath River water users north of the District in Oregon. The Planning Area is defined as the subwatersheds that intersect the TID Infrastructure Modernization Project. The project area, making up only a small proportion of the District's total system, consists of the District infrastructure to be modernized and areas where new infrastructure would be constructed, and associated rights-of-way and/or easements where construction would take place.

1.2 Current Conditions & Challenges

TID is one of several irrigation districts holding a contract with U.S. Bureau of Reclamation (Reclamation) in the Klamath Project. The Klamath Project, developed and administered by Reclamation, provides water to a service area of approximately 230,000 acres in Klamath County, Oregon; Siskiyou County, California; and Modoc County, California (Bureau of Reclamation, 2020). The Klamath Project includes reservoirs that store snow-fed winter and spring runoff, which is released during the spring/summer and fall/winter operating periods (Bureau of Reclamation, 2020).

Average annual precipitation in the area ranges from about 10 to 13 inches per year. This precipitation falls mainly in the winter months as snow (i.e., outside the primary crop growing season). In general, crops grown in the region require at least 20 inches of water to meet their evapotranspiration (ET) needs in an average year (Bureau of Reclamation, 2015). Given the low level of rainfall during the growing season, irrigation plays a critical role in crop production in the study area. In addition to irrigators, water in the Upper Klamath River Basin is vital to many interests and supports diverse economic, cultural, social, and environmental values. These include values related

to the agricultural economy, endangered species, and tribal treaty rights. All these values have been affected in recent years when the Basin has faced recurring and severe water shortages.

The Klamath Basin has experienced prolonged drought conditions in recent years that have reduced water allocations to the Klamath Project and left an insufficient water supply for aquatic habitats in Upper Klamath Lake, the Klamath River, the Lower Klamath National Wildlife Refuge (LKNWR), and the Tule Lake National Wildlife Refuge (TLNWR). These habitats and the fish and wildlife species they support are valued by tribes in the basin, including the Klamath Tribes, Yurok Tribe, Karuk Tribe, and Modoc Nation, and other residents and stakeholders in the basin.

In response to the recent history of surface water supply curtailments from the Klamath Project, irrigators in the Klamath Basin have invested in developing groundwater wells and have increased their pumping capacity to try to partially offset the reduced surface water supplies. However, groundwater extraction has exceeded sustainable yield, and groundwater levels have declined in the Basin in recent years, and many wells have gone dry.[1] Increased groundwater pumping to compensate for shortages in surface water is not sustainable in the long term.

Ecosystem restoration and enhanced water reliability in the Klamath Basin is a federal priority. In February 2024, the U.S. Department of the Interior reached a landmark agreement with Klamath Basin Tribes and Klamath Project irrigators to collaborate on Klamath Basin restoration goals, one of which is improving water and irrigation supply stability and reliability (U.S. Department of Interior, 2024). The Department announced $72 million in new investments in ecosystem restoration and agricultural infrastructure modernization to address resource and water management challenges in the Klamath Basin.

1.1.1. Existing Conditions in the Study Area

TID faces several water management challenges. The District is reliant on pumps to move water through its conveyance system and to conserve water by recirculation. At least 28 pump stations are near or past the end of their useful lives, resulting in high operations and maintenance (O&M) costs and risk of failure. Because of the District's limited budget, pumps that are past their useful lives are often repaired in a piecemeal fashion rather than replaced to keep costs low. This "Band-Aid" approach reduces pump efficiency and increases the probability of future catastrophic failures. Pump failures can incur costly repairs, result in interrupted water deliveries, and damage crops by inundating the adjacent land with unpumped water.

The District's antiquated system of delivering water causes several challenges. District canals accumulate large amounts of aquatic moss, which requires significant staff time to remove manually. The inability to precisely control water causes some areas to receive more water than the canal can contain, resulting in overtopping incidents that require the District to repair the failed canal bank. Imprecise control mechanisms result in an average of 25,000 acre-feet (AF) of unusable unintentional spill each year (Kirby, 2024). With better water infrastructure, this water could be controlled and managed to support agricultural production or wetland habitat in the TLNWR and LKNWR. In recent years, TID, the national wildlife refuges, and the Basin as a whole have faced

1 The amount of groundwater extraction varies every year. Based on publicly available information and input from local water managers, the maximum in-season groundwater production to meet irrigation demand within the Klamath Project is also estimated to not exceed 144,000 acre-feet per year. However, the U.S. Geological Survey estimates that the average sustainable yield (i.e., the level of withdrawal that can be maintained without over-drafting the aquifer and adversely affecting groundwater levels) is 54,000 acre-feet per year (US Geological Survey, 2016) .

severely limited water supplies and water shortages. These recurring and severe shortages of water have had adverse impacts on numerous economic, cultural, social, and environmental values. These include values related to the agricultural economy, endangered species, and tribal treaty rights. Irrigation is the primary consumptive use of water in the Basin, but water in the basin is also valuable to sustain habitat for fish and wildlife in Upper Klamath Lake and the Klamath National Wildlife Refuges.

1.1.2. Future Conditions in the Study Area

Without an upgrade to the District's infrastructure, TID's water management challenges will worsen. The existing pumps will continue to age and degrade, requiring higher levels and costs of O&M. The frequency and severity of pump failures will likely increase, raising the costs of repairs and increasing the amount of time water deliveries are interrupted and adjacent lands are inundated by unpumped water. This will likely lead to higher crop damage from either too little water or too much water.

Imprecise water conveyance will continue, resulting in future overtopping events and further costs to repair damaged canals. Unintentional spills will continue, diminishing the delivery of water for agricultural production.

1.1.3. Project Area Challenges and Opportunities

Modernizing TID's pump and water delivery infrastructure provides an opportunity to address the District's problems of high O&M costs, potential canal failures, and inefficient water deliveries. It also offers an opportunity to control and actively manage water for agricultural or habitat uses that is currently spilled unintentionally. These opportunities are constrained by the District's limited ability to finance the required upgrades.

1.3 Project Purpose and Need

The purpose of this project is to improve water management operations and energy efficiency in District-managed infrastructure. Federal assistance is needed to support TID in improving water conveyance efficiency and operation of District infrastructure to reduce water delivery operational challenges. In recent years, TID has faced droughts that have severely limited water supply to irrigators within the District and LKNWR. These water shortages and limited water deliveries are exacerbated due to constraints on the District's ability to efficiently deliver irrigation water to patrons and manage water within its system. Local agricultural economic sustainability depends on irrigation water, and implementation of this project would improve water management operations and increase efficiency of water delivery.

1.4 Watershed Plan-EA Alternatives

The formulation of alternatives followed USDA departmental regulation 7 CFR 1b, as well as the requirements of the PR&G. Additional information on the formulation and evaluation of alternatives can be found in Section 5 of the Plan-EA.

1.4.1 FWOP/No Action Alternative

Under the FWOP/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 and continue a routine pump replacement schedule over the period of analysis. Due to the District's limited budget, it would not purchase variable frequency drives

(VFDs) for the pumps or traveling screens. 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. The No Action Alternative is a near-term continuation of the standard operating procedures, which maximize the operational efficiency possible with the District's current infrastructure and planned pump replacements.

The No Action Alternative would not meet the purpose and need of the project. There would be no improvement to Agricultural Water Management or to District water management operations, water efficiency would not improve, and the District's O&M costs would remain high. Water delivery and operational inefficiencies would remain the same and could potentially worsen over time as equipment and infrastructure continue to age and replacement parts become more difficult to procure. This is especially true of the pumping infrastructure that the District relies on to move water to its patrons. Under the No Action Alternative, the effects of future water shortages and limited water deliveries to District patrons and LKNWR could be exacerbated. Water loss and excess drainage water due to pump failure, plugging, and ditch breaks would continue to reduce irrigation system efficiency and limit agricultural production. Aging pumps would continue to fail, causing flooding damage to nearby crops and interrupting water supplies to other crops.

1.4.2 Modernization Alternative

Under this alternative, federal funding through P.L. 83-566 would be available. The District would perform the following actions (See Appendix B of the Plan-EA for a map of actions):

- Upgrade pumps throughout the District at approximately 28 locations. These pump upgrades would include various improvements such as replacement of the pump and motor, variable frequency drive installation, and traveling screen installations.
- Install SCADA and automation equipment throughout the District at approximately 74 locations. SCADA installation would allow the District to more effectively measure and control water within the District.

1.5 Analysis Parameters

All economic values are presented in 2025 dollars rounded to the nearest $1,000. Unless otherwise noted, all values are presented in average annual values (following the approach described in the NRCS Water Resources Handbook for Economics) using the 3.25-percent planning rate for federal water projects for fiscal year 2026 (Bureau of Reclamation, 2026). Under this method, all costs and benefits are evaluated at the 2025 price level for all applicable years in the period of analysis, then converted to a present value using the 3.25-percent planning rate as the discount rate. Finally, each present value is amortized into average annual values over the 50-year evaluation period using the 3.25-percent rate.

1.5.1 Funding

In the absence of P.L. 83-566 funding under the FWOP/No Action Alternative, the District would use its own funds and seek other funding sources to implement the Alternative.

Under the Modernization Alternative, P.L. 83-566 funding would be awarded. P.L. 83-566 funds would cover $12,533,000 (77 percent) of the total project installation/construction cost, and the remaining $3,769,000 (23 percent) would be funded by TID (through its own funds or other outside funding sources).

1.5.2 Evaluation Unit

The proposed Project consists of two project groups, which are the evaluation units for this analysis. The project groups are described more fully in Section 5.3.2 of the Watershed Plan-EA. In this analysis, the project groups are referred to as:

1. Project Group (PG) 1 Pump Replacement
2. PG2 SCADA

An important note for the incremental analysis is that the costs for constructing any given project group would not change if it were the only project group to be constructed.

1.5.3 Project Implementation Timeline

Under the FWOP/No Action Alternative, the District anticipates that it would begin replacing pumps as soon as possible. Accordingly, this analysis assumes that the District begins financing pump replacement in Year 0. The District's anticipated annual budget enables ongoing O&M of pumps and investment in capital replacement of one pump station every 2.4 years on average and would take 68 years to replace all 28 pump stations (longer than the 55-year period of analysis).

If P.L. 83-566 funds are made available, District staff predict that the installation of the two project groups would likely be completed over approximately five years, with overlap in installation timing between project groups. The District expects that it could replace 10 pump units per year under the Project (Kirby, 2024). The Project pump stations contain between one and three pump units per station, which equates to an average replacement rate of 5.7 pump stations per year under the Modernization Alternative. Accordingly, installation of PG1 Pump Replacement would occur from Year 0 through Year 4. PG2 SCADA is expected to take one year of installation, which the District expects would occur in Year 1.

As completion of both alternatives takes place over multiple years, this analysis assumes that benefits would accrue the year after each portion of the installation is constructed. For example, under the FWOP/No Action Alternative, we project that the District would fully replace one pump station in Year 2. The benefits of this pump station would start to accrue in Year 3. Under the Modernization Alternative, we project that five pump stations would be replaced in Year 0, and the benefits of these pump stations would start to accrue in Year 1.

1.5.4 Period of Analysis

The period of analysis is defined as 55 years, which includes five years of project installation and 50 years of project life (the evaluation period), based on the expected life of replaced pumps (during which time they are expected to have significant beneficial effects). Accordingly, the study period extends from Year 0 (construction start) to Year 54 (last year of potential useful life for the project). The anticipated installation timing, as well as the life of each project group, is summarized in Table D-1 below.

Table D-1. Construction Timeline and Project Life for the Modernization Alternative, Tulelake Irrigation District, California.

Works of Improvement	Construction Start Year	Construction End Year	Project Life Start Year	Project Life End Year
PG1 Pump Replacement	0	4	5	54
PG2 SCADA	1	1	2	51

Prepared July 2026

2 FWOP/No Action Alternative

Under the FWOP/No Action Alternative, TID would replace pump stations as its budget allows. This section outlines conditions under the FWOP/No Action Alternative.

2.1 OMR Costs

The District estimates that, in the absence of P.L. 83-566 funding, it would dedicate approximately $50,000 per year toward replacing pump stations. TID would replace pump units as they are needed (i.e., after a failure requires it) and as the District can afford. Because of its limited budget and the high total cost of replacing all the pump stations that are near or past their useful lives, TID would not include VFDs or traveling screens as part of the pump replacements. Removing these components from the costs of PG1 Pump Replacement, as well as project administration and technical assistance, the total cost of replacing 28 pump stations would be roughly $3.35 million, or an average of $112,000 per pump station.[2] At $50,000 per year, it would take the District 64 years to replace all 28 pump stations. Since this is longer than the period of analysis, this analysis only models the expenditures within the 55-year period of analysis, which totals $2.75 million (undiscounted). During this time, the District could replace only 22 pump stations.

Accordingly, this analysis estimates OMR costs of $50,000 for each year in the period of analysis starting in Year 0. At this annual rate of investment, it would take the District 2.4 years to replace each pump station on average, which is the assumed No Action rate of replacement. The undiscounted cost of $2.75 million becomes $1.31 million when discounted, and when annualized, becomes $54,000. This is shown in the table below.

Table D-2. District OMR Costs under the FWOP/No Action Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Project Group	Annualized OMR Costs
PG1 Pump Replacement	$54,000
PG2 SCADA	$0
Total	**$54,000**

Note: Totals may not sum due to rounding. Prepared July 2026

1/ Price base: 2025 dollars amortized over 50 years at a discount rate of 3.25 percent.

[2] The total includes the estimated costs for freight, taxes (7.25%), installation (10%), and contingency (14%). Project administration and technical assistance costs associated with completing the Project through the P.L. 83-566 program are excluded.

2.2 Damages of Pump Failure

When pumps fail, they can incur costly repairs, interrupt water deliveries to growers, and damage crops by inundating land with water that would normally be pumped out. Replacing existing pump stations under the FWOP/No Action Alternative would increase their reliability and decrease the likelihood of failure, but some chance of failure would remain. This section examines the costs of pump failure under the FWOP/No Action Alternative.

According to TID, four out of a total of 29 pump stations have failed in the last 10 years and have required an average repair cost of around $41,700 per failure.[3] This equates to an annual failure rate of 1.4 percent. This analysis assumes this failure rate applies to the existing pump stations in Year 0. The District expects that this failure rate will increase under FWOP/No Action conditions for pumps that are not replaced; specifically, that the failure rate will double every 10 years (Kirby, 2024). This equates to an annual increase of 7.2 percent. Under these assumptions, there would be roughly one pump failure by the end of Year 3 and 16 pump failures in Year 54 if no pumps were replaced. This analysis assumes that once a pump station is replaced, its probability of failure drops to zero. Under this assumption, the number of pump station failures under the FWOP/No Action Alternative would rise from one in the first three years to roughly three failures in Year 54. Assuming an average repair cost of $41,700 per failure, the associated repair cost conditions would rise from approximately $17,300 in Year 1 to $145,700 in Year 54. When discounted and annualized, the potential cost of pump repairs under the FWOP/No Action Alternative would be roughly $54,000.

Another potential cost of pump failure is damage to crops resulting from an interrupted water supply. The damage depends on the crop, when the interruption happens in the crop's growth cycle, and the length of the interruption (which is determined by the time needed to repair the pump). Many of the District's pumps are antiquated and replacement parts are no longer available for them. When this is the case, the replacement parts require custom manufacturing, leading to repair times that last two months on average. The District estimates that, on average, 1,000 acres are cut off from irrigation during a catastrophic pump failure (Kirby, 2024).

To estimate the potential crop damage from water supply interruptions, this analysis uses a crop budget approach to estimate net income from irrigated land in the District and uses information from extension agents to estimate the likely loss in yield. We use three crops to represent irrigated cropland in the District: wheat (representing all grains), alfalfa (representing all hay), and potatoes (representing all high-value crops). Reclamation crop reports suggest that, on average, these crop types represent roughly 31, 47, and 22 percent of irrigated land in TID, respectively (Bureau of Reclamation, 2021). The results of the crop budget method (described in detail in the Economic Analysis Appendix) indicate that net income to wheat, alfalfa, and potatoes is $796; $1,730; and $5,968, respectively. Conversations with Oregon State University (OSU) and University of California Cooperative Extension (UCCE) agents in the Klamath Basin suggest that water supply interruptions lasting two months (the average length of time for a failed pump in the District) would result in yield losses of around 46 percent for wheat and alfalfa, and 33 percent for potatoes (Wilson R. , University of California Extension, Intermountain Research and Extension Center, 2024; Charlton,

[3] The District's original estimate was $40,000 per failure in 2023 dollars (Kirby, 2024). We adjusted this to 2025 dollars using the Reclamation's O&M Cost Index (Bureau of Reclamation, 2025).

2024).[4] In the event crop yield is reduced, some production activities will no longer be necessary for the damaged portions of the crop (e.g., harvest and post-harvest activities). Accordingly, this analysis reduces the harvest costs by the same proportion as the yield loss. The assumptions used to estimate the net income loss from water supply interruptions are summarized in Table D-3 below. The overall weighted average net income loss from water supply interruptions is estimated at approximately $776 per acre.[5]

Table D-3. Estimated Impact of Water Supply Interruptions on Net Income Per Acre, Klamath Watershed, Oregon, 2025 dollars

Crop	Proportion of Crop Mix[1]	Gross Revenues per Acre (full yield)[2]	Yield Loss[3]	Loss in Gross Income	Avoided Production Costs[4]	Reduction in Net Income[5]
Wheat	31%	$796	47%	$372	$62	$310
Alfalfa	47%	$1,730	46%	$800	$128	$673
Potatoes	22%	$5,968	33%	$1,953	$325	$1,628

1/ Estimated using Reclamation crop reports (Bureau of Reclamation, 2021) Prepared July 2026
2/ Estimated by crop budget method detailed in the Economic Analysis Appendix
3/ Weighted average of potential seasonal impacts estimated through conversations with agricultural extension agents (Wilson R. , University of California Extension, Intermountain Research and Extension Center, 2024; Charlton, 2024)
4/ Estimated as the harvest costs reduced by the same proportion as the yield loss
5/ Calculated as the loss in gross income minus the avoided production costs

Because some TID lands have groundwater wells (which could supplement irrigation during surface water supply interruptions) and some pump stations have more than one pump unit (which could potentially compensate for the failure of a co-located pump unit), a pump failure would not necessarily result in every affected field experiencing a water shortage and crop yield reduction. TID estimates that around 20 percent of pump stations do not have backup pumps and that 85 percent of TID lands do not have supplemental groundwater wells (Kirby, 2024). We assume water supply interruptions do not damage crop yields in cases where there are backup pumps and groundwater wells. However, impacts in these cases are still possible, as backup pumps and groundwater wells may not be capable of meeting all water demands under a pump failure scenario, which could result in a water shortage that reduces yields. For this reason, our estimates of crop damage from water supply interruptions may be conservative.

Considering only the 20 percent of pump stations that do not have backups, and assuming the same failure rates described above (1.4 percent in Year 0 growing 7.2 percent annually), the expected pump failure for the 13 pumps at risk increases from 0.04 in Year 1 to 0.23 in Year 54 under FWOP/No Action conditions. Given the District's estimate that 1,000 acres are impacted by each

[4] These percentages represent the weighted average of potential yield impacts that vary over the growing season. For example, two months of water interruptions would cause a 100-percent loss in a wheat crop if it occurred between April and mid-July, a 25 to 30-percent loss if it occurred in July, and no yield loss if it occurred between August and October (Wilson R. , University of California Extension, Intermountain Research and Extension Center, 2024). Weighting these averages over the growing season results in an average yield loss of 47 percent. A similar approach was used for alfalfa and potatoes.

[5] Calculated by summing the products of net income reductions by the proportion of the crop mix.

pump station on average, but only 85 percent of lands would be susceptible to crop yield damages during a water supply interruption (only those lands without supplemental groundwater), approximately 850 acres would lose water supply for each pump station failure. Further assuming that impacted lands experience damages averaging $776 per acre (as explained above), annual expected crop damages under FWOP/No Action conditions would rise from around $25,400 in Year 1 to $153,700 in Year 54. The discounted and annualized damages from water supply interruptions would be approximately $73,000.

Another potential cost of pump failure is crop damage due to soil inundation (also called "subbing") from water that would normally be removed by a functioning drainage pump. In the last 10 years, the District has experienced at least two incidents where a catastrophic pump failure resulted in water damage to crops (Kirby, 2024). Even if a pump failure is addressed in the same day, subbing can last three to four days, and impacts to crops can last up to two weeks (Kirby, 2024). Subbing can result in complete destruction of a crop if it lasts for periods exceeding one week, and during certain periods (such as the middle of the summer), can destroy a crop within two days (Wilson R. , 2024). The District estimates that, on average, 50 acres of crops would be impacted during a subbing event caused by drainage pump failure (Kirby, 2024). Because subbing would only occur during drainage pump failures (not with every pump), and drainage pumps comprise about 30 percent of all pumps (Kirby, 2024), this analysis assumes subbing damages occur during 30 percent of pump failures.

To estimate the potential future damages of subbing, this analysis uses the same crop budgeting method described above for interrupted water supplies. Through conversations with extension agents from OSU and UCCE, we estimate that, on average, a subbing event will reduce the marketable yield of wheat and alfalfa by 50 percent and potatoes by 100 percent (Charlton, 2024; Wilson R. , 2024). As with interrupted water supply, a subbing event could avoid some production costs by avoiding the need to harvest. We estimate these avoided costs using the same method described above for interrupted water supply. The estimated impacts of a subbing event are summarized in Table D-4. The estimated weighted average impact of a subbing event is around $1,772 per acre.

Table D-4. Estimated Impact of Subbing on Net Income Per Acre, Klamath Watershed, Oregon, 2025 dollars

Crop	Proportion of Crop Mix[1]	Gross Revenues per Acre (full yield)[2]	Yield Loss[3]	Loss in Gross Income	Avoided Production Costs[4]	Reduction in Net Income[5]
Wheat	31%	$796	50%	$398	$61	$331
Alfalfa	47%	$1,730	50%	$1,314	$134	$1,180
Potatoes	22%	$5,968	100%	$5,968	$994	$4,974

1/ Estimated using Reclamation crop reports (Bureau of Reclamation, 2021) Prepared July 2026
2/ Estimated by crop budget method detailed in the Economic Analysis Appendix.
3/ Weighted average of potential seasonal impacts estimated through conversations with agricultural extension agents (Wilson R. , University of California Extension, Intermountain Research and Extension Center, 2024; Charlton, 2024)
4/ Estimated as the harvest costs reduced by the same proportion as the yield loss
5/ Calculated as the loss in gross income minus the avoided production costs

Assuming the same pump failure rate (1.4 percent in Year 0 growing 7.2 percent annually) but adjusting downward to include only drainage pumps (33 percent of all pumps), under the

FWOP/No Action Alternative, the subbing rate rises from 0.06 in Year 1 to 0.39 in Year 54, with associated expected damages rising from about $5,700 in Year 1 to $34,400 in Year 54. The discounted and annualized cost of subbing damages is approximately $16,000.

The total cost of pump failures under the FWOP/No Action Alternative (including $54,000 for repairs, $73,000 for water supply interruptions, and $16,000 for subbing) is $182,000. These are summarized in Table D-5 below.

Table D-5. Costs of Pump Failure under the FWOP/No Action Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Crop	Annualized Cost of Pump Repairs	Annualized Cost of Crop Damage from Interrupted Water Supplies	Annualized Cost of Crop Damage from Subbing	Total Annualized Cost of Pump Failures
PG1 Pump Replacement	$54,000	$73,000	$16,000	$182,000
PG2 SCADA	$0	$0	$0	$0
Total	**$54,000**	**$73,000**	**$16,000**	**$182,000**

Note: Totals may not sum due to rounding Prepared July 2026
1/ Price base: 2025 dollars amortized over 50 years at a discount rate of 3.25 percent.

3 Modernization Alternative

This section describes the costs and benefits of the Modernization Alternative above Baseline conditions.

3.1 Costs of the Modernization Alternative

The costs of the Modernization Alternative include the initial installation costs of each project group as well as replacement costs. All costs are presented in 2025 dollars and converted to present value in the current year (and not the construction year), so no inflation of construction costs was included.

3.1.1 Installation Costs

For PG1 Pump Replacement, project installation costs include the cost of the pumps and variable frequency drives (VFDs), traveling screens and concrete pads (when necessary), pipe, estimated freight, estimated installation of equipment, and contingency costs. In the case of PG2 SCADA, the project installation costs include the equipment (motors, gates, actuators, etc.), pipe, the SCADA units, solar power units, estimated taxes, estimated freight, estimated installation, contingency costs, and electrical routing. PG2 SCADA includes the costs of all SCADA units, including those that would be installed on pumps replaced under PG1 Pump Replacement.

The total cost of installation/construction of the Modernization Alternative is estimated at $16,302,000.[6] This includes the costs of materials and installation; engineering, construction

[6] The original construction estimate of $13,454,290 in 2023 dollars was adjusted for inflation to 2025 dollars. The cost of pumps and VFD upgrades was adjusted using the Reclamation Pumping Plant Cost Index (Bureau of

management, and survey costs (estimated at 10 percent of construction costs); contractor markup (estimated at 14 percent of construction costs); and contingency costs (estimated between 6 and 12 percent of construction costs).

The total costs of the project also include project administration costs for TID and NRCS (7 percent of the subtotal of previously mentioned cost components; 2 percent for TID, which will be covered by NRCS, and 5 percent for NRCS), and technical assistance from NRCS (estimated at 8 percent of the subtotal of previously mentioned cost components). Permitting costs are estimated at $32,000 for PG1 Pump Replacement, while PG2 SCADA is not expected to have any permitting costs.[7] The installation costs of the Modernization Alternative are summarized in Table D-6 and Table D-7.

Reclamation, 2026). Traveling screen costs were adjusted using the Engineering-News Record Construction Cost Index (Engineering News-Record, 2026). Freight costs were adjusted using the Bureau of Labor Statistics (BLS) Producer Price Index for Truck Transportation (Bureau of Labor Statistics, 2026). SCADA costs were adjusted using the Reclamation Machinery & Equipment Cost Index (Bureau of Reclamation, 2026).

[7] We adjusted the original estimate for permitting costs ($30,000 in 2023 dollars) to 2025 dollars using the IPDGDP (Bureau of Economic Analysis, 2023).

Table D-6. Estimated Installation Cost of the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars

Works of Improvement	Unit	Federal Land – Number	Non-Federal Land – Number	Total - Number	Pub. Law No. 83-566 Federal land NRCS	Pub. Law No. 83-566 Non-Federal land NRCS[3]	Pub. Law No. 83-566 Total	Other Funds Federal Land	Other Funds Non-Federal Land	Other Funds Total	Total
PG1 Pump Replacement	acres	9.7	20.5	30.2	$3,040,000	$6,424,000	$9,464,000	$917,000	$1,937,000	$2,854,000	$12,318,000
PG2 SCADA	acres	0.9	65.9	66.8	$41,000	$3,028,000	$3,069,000	$12,000	$903,000	$915,000	$3,984,000
Total	**acres**	**10.6**	**86.4**	**97.0**	**$3,081,000**	**$9,452,000**	**$12,533,000**	**$929,000**	**$2,840,000**	**$3,769,000**	**$16,302,000**

Note: Totals may not sum due to rounding. Prepared July 2026

Table D-7. Estimated Cost Distribution of the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars

Works of Improvement	Pub. Law No. 83-566 Construction	Pub. Law No. 83-566 Engineering	Pub. Law No. 83-566 Project Admin[2]	Pub. Law No. 83-566 Total	Other Funds Construction	Other Funds Engineering	Other Funds Real Property Rights	Other Funds Permitting	Other Funds Project Admin	Other Funds Total	Total
PG1 Pump Replacement	$7,541,000	$270,000	$1,653,000	$9,464,000	$2,514,000	$90,000	$0	$218,000	$32,000	$2,854,000	$12,318,000
PG2 SCADA	$2,447,000	$86,000	$536,000	$3,069,000	$815,000	$29,000	$0	$71,000	$0	$915,000	$3,984,000
Total	**$9,988,000**	**$356,000**	**$2,189,000**	**$12,533,000**	**$3,329,000**	**$119,000**	**$0**	**$289,000**	**$32,000**	**$3,769,000**	**$16,302,000**

Note: Totals may not sum due to rounding. Prepared July 2026
1/ Includes $772,000 in project administration costs and $1,467,000 in technical assistance costs.

3.1.2 OMR Costs

Under the Modernization Alternative, some Project components would need to be replaced during the period of analysis. VFDs and SCADA units have a useful life of around 20 years, and so will require replacement before the end of the period of analysis (in Year 54). Specifically, the VFDs in PG1 Pump Replacement will require replacement in Years 25 and 45, and PG2 SCADA will require replacement in Years 22 and 42 (20 years after installation and every 20 years thereafter). This analysis assumes the cost to replace the equipment is roughly the cost of installation minus electrical routing and contingency costs. For the VFDs, the cost is roughly $817,300 per replacement and approximately $988,500 per replacement for the SCADA units. For PG2 SCADA, the discounted and annualized cost of replacement would be around $30,000, which is shown in Table D-8 below.

For PG1 Pump Replacement, the annualized cost of replacement would be roughly $23,000, which is less than the pump replacement cost under the FWOP/No Action Alternative ($54,000, as described in Section 2.1 above). The Principles and Guidelines state that "when the project is an addition to or extension of an existing project for which the costs and benefits are not included or otherwise involved in the project analysis, include only the additional cost of operation, maintenance, or replacement necessitated by the addition or extension to the existing project."[8] PG1 Pump Replacement would not present additional OMR costs (OMR is less with the Project than under No Action), so the OMR costs of PG1 Pump Replacement are shown as $0 in the summary table below. The OMR cost savings for both project groups are discussed and accounted for in Section 3.2.1.1 below.

3.1.3 Summary of Costs of the Modernization Alternative over the FWOP/No Action Alternative

The costs of project installation are provided in Table D-8 below. The average annualized cost of installation of the Modernization Alternative is $628,000. As described in the previous section, the additional OMR costs of PG1 Pump Replacement are $0, while the additional OMR costs of PG2 SCADA are $30,000. The total annualized cost of the Modernization Alternative is $658,000. Table D-8 (NWPM 506.18, Economic Table 4) summarizes the annualized costs of the Modernization Alternative over the FWOP/No Action Alternative.

Table D-8. Estimated Average Annual Costs of the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Project Group	Project Outlays (Amortization of Installation Cost)	OMR Costs	Total
PG1 Pump Replacement	$471,000	$0	$471,000
PG2 SCADA	$157,000	$30,000	$187,000
Total	**$628,000**	**$30,000**	**$658,000**

Note: Totals may not sum due to rounding. Prepared July 2026
1/ Price base: 2025 dollars amortized over 50 years at a discount rate of 3.25 percent.

[8] Section 2.12.5(i) (U.S. Water Resources Council, 1983)

3.2 Benefits of the Modernization Alternative

This section presents on-site damage reduction benefits that would accrue to agriculture and the local rural community, including reduced agricultural damages, avoided damages from pump failure, and reduced production costs. Other benefits not included in the analysis that may result indirectly from the Modernization Alternative include support to wildlife habitat and the value of avoiding carbon emissions from energy use.

3.2.1 Benefits Considered and Monetized in the Analysis

3.2.1.1 OMR Cost Reduction Benefits

This section presents the reductions in OMR costs that would occur under the Modernization Alternative; these production cost savings are net benefits to patrons. The Principles and Guidelines state that crop damage reduction benefits include "reduced costs associated with using water and land resources for the production of crops on the basis of the changes in the costs of equipment ownership and operation; production materials; labor and management; and system operation, maintenance, and replacement."[9] These District water supply cost savings will ultimately benefit patrons by reducing irrigation water supply costs; however, as the District has not determined the per acre or per patron benefit of these cost savings, these benefits are analyzed in this section and not as part of the crop budget approach presented in Section D.3.2.2.2.

Under the Modernization Alternative, the District would experience OMR cost reductions in several ways. First, as under the FWOP/No Action Alternative, replacing old pumps with more efficient and reliable pumps would reduce electricity usage and costs. Traveling screens would automatically remove moss and other debris from the canals, which would require less labor than manual removal, as is currently required. SCADA is expected to reduce the need for ditch riding labor, lower repair costs associated with ditch breaks, and lower pump maintenance and energy costs. This section estimates these OMR cost reduction benefits of the Modernization Alternative.

Replacing pump stations under both the FWOP/No Action and Modernization Alternatives would reduce the District's current O&M costs by increasing pump efficiency and lowering electricity costs. Because the Modernization Alternative would replace more pumps than the FWOP/No Action Alternative (28 pumps versus 22) and replace them sooner, the Modernization Alternative would generate higher present value benefits of reduced production costs.

Engineering studies of TID found that the proposed new replacement pumps are 23 percent more energy efficient than the existing pumps (Cascade Energy, 2012; MBK Engineers, 2024). TID's records indicate that 25 pump stations included in the Project had average annual electricity usage of 1,740,556 kilowatt-hours (kWh) between 2015 and 2022. If spread across all 28 pump stations in

[9] Section 2.3.5(b)(ii) (U.S. Water Resources Council, 1983). This analysis estimates how the known, annually incurred OM&R costs incurred under the No Action Alternative would be reduced under the Modernization Alternative. These cost savings are not accounted for in the denominator of the benefit-cost ratio as the denominator is the cost of the Modernization Alternative. The cost savings in labor, materials, or any other OM&R expenditure frees up resources that can be productively reallocated elsewhere in the economy.

need of replacement, the average energy use would be 62,163 kWh.[10] If replacing these pump stations resulted in 23 percent energy savings, the average per-pump annual power consumption would be about 47,866 kWh, a savings of 14,298 kWh per pump.

Under the FWOP/No Action Alternative, total energy use would fall from 1,740 megawatt-hours (MWh) in Year 1 to 1,426 MWh in Year 54 (as a result of the District slowly replacing pumps). Under the Modernization Alternative, energy use would fall to 1,340 MWh once all pumps are installed (Year 5) and remain at that level through the end of the period of analysis. As a result, the Modernization Alternative would save an estimated 12,310 MWh over the FWOP/No Action Alternative during the entire period of analysis. At the District's current cost of electricity ($0.19 per kWh)[11], the undiscounted energy cost savings would be approximately $2.34 million. After discounting, the annualized savings in power costs would be roughly $50,000.

In addition to energy savings, the District expects that replacing pumps will reduce the costs of annual, ongoing pump maintenance. The District currently conducts maintenance on each pump every six years that involves inspection, replacing parts, cleaning, and performing other routine maintenance. The District anticipates that the cost of this maintenance every six years with a new pump would be, on average, $5,000 less than the maintenance on an old, existing pump (Kirby, 2024). This is equivalent to annual savings of around $870 per pump replaced, which is the savings modeled in this analysis.

Because the Modernization Alternative would replace more pumps and replace them sooner than the FWOP/No Action Alternative, it would generate present value benefits compared to the FWOP/No Action Alternative. Under the Modernization Alternative, the savings would grow from around $4,300 in Year 1, reach a maximum annual value of about $22,600 between Years 5 and 7 (when all pumps would be replaced under the Modernization Alternative) and then slowly decrease to roughly $5,200 in Year 54 (as pumps are slowly replaced under the FWOP/No Action Alternative). When discounted and annualized, the benefits of avoided pump maintenance under the Modernization Alternative would total $16,000.

The District expects that the traveling screens will reduce the amount of time staff spend removing moss by roughly one hour per day per pump station for 180 days of the irrigation season (Kirby, 2024). PG1 Pump Replacement would install traveling screens on 16 pump stations, which would save the District an estimated 2,900 hours of staff time per year. The District's cost of labor is roughly $27.24 per hour.[12] At this rate, the traveling screens would save the District approximately $65,400 in Year 5 once all pumps are installed under the Modernization Alternative. When discounted, the benefits of reduced traveling screen maintenance would be approximately $62,000. In total, PG1 Pump Replacement would reduce production costs by roughly $158,000 per year after

[10] Because TID's records did not include all 28 pump stations, this method results in an underestimate of the total energy used. As a result, the projected energy savings from pump replacement are likely also an underestimate.

[11] We adjusted the District's 2023 electricity costs ($0.18/kWh) to 2025 dollars using the Implicit Price Deflator for Gross Domestic Product (IPDGDP) (Bureau of Economic Analysis, 2023).

[12] The average wage rate in the District was $22 per hour in 2023 dollars (Kirby, 2024). We added an additional 20 percent to estimate the total costs of labor (which include non-wage costs such as benefits) and adjust the cost to 2025 dollars using the BLS Employment Cost Index for Local Government Labor (U.S. Bureau of Labor Statistics, 2026).

the project is completed. When discounted and annualized, the benefit of O&M reduction for PG1 Pump Replacement would be approximately $129,000.

By controlling water more precisely, PG2 SCADA is expected to reduce the frequency of canal overtopping by 90 percent (Kirby, 2024). Currently, overtopping causes an average of 12 ditch breaks per year in the District, which typically require seven to eight staff members working three to four hours per incident and necessitate two dump trucks making three trips at an average distance of five miles per trip (Kirby, 2024). Given the District's labor cost ($27.24 per hour), and assuming dump truck fuel efficiency of 6.5 miles per gallon and fuel costs of $3.91 per gallon,[13] each ditch break would cost roughly $720 in labor and equipment. If PG2 SCADA reduced these incidents by 90 percent (from 12 per year currently to around one per year), this would represent a savings of roughly $7,900 per year.

Switching to SCADA will reduce the need for ditch riders to manually adjust gates in TID. The District expects that SCADA will eliminate the need for two full-time (40 hours per week) ditch riding positions for six months (Kirby, 2024). This would equate to 1,920 labor hours per year. At the District's cost of labor ($27.24 per hour), the annual savings would be about $52,300.

Because SCADA would more precisely control water conveyance and reduce the amount of water moving through the pumps, the District expects that SCADA would lengthen the life of pumps and reduce the O&M costs. Specifically, the District expects that SCADA will reduce pump O&M by 20 percent over the lifetime of the pumps (Kirby, 2024). Current annual maintenance is roughly $2,660 per pump station.[14] A savings of 20 percent would represent about $530 per year for every replaced pump station, or about $14,300 per year for all 28 pump stations in the Project. In total, PG2 SCADA would reduce production costs by around $75,000 per year. When discounted and annualized, the benefit of reduced O&M for PG2 SCADA is approximately $72,000.

As described in Section 2.1, pump replacement costs under the FWOP/No Action Alternative ($54,000) would be higher than those under PG1 Pump Replacement ($23,000). In this way, PG1 Pump Replacement would present savings of roughly $31,000 over the FWOP/No Action Alternative ($54,000 minus $23,000). These savings are reflected in **Table D-9**. Because the replacement costs of PG2 SCADA would be higher than the FWOP/No Action Alternative, no benefits are presented in the table below (and the additional costs are included in Table D-8 above).

The total OMR cost savings benefits of the Modernization Alternative, including $200,000 in O&M savings and $31,000 in reduced replacement costs, are $231,000 as shown in the table below.

[13] This is the Average weekly price of diesel in the West Coast region from 2016-2025 (U.S. Energy Information Administration, 2026).

[14] The District's original estimate was around $2,550 in 2023 dollars (Kirby, 2024). We adjusted this estimate to 2025 dollars using Reclamation's O&M Cost Index (Bureau of Reclamation, 2025).

Table D-9. OMR Cost Reduction Benefits of the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Project Group	O&M Cost Reductions	Replacement Cost Reductions	Total OMR Cost Reduction Benefits
PG1 Pump Replacement	$129,000	$31,000	$160,000
PG2 SCADA	$71,000	$0	$71,000
Total	**$200,000**	**$31,000**	**$231,000**

Note: Totals may not sum due to rounding. Prepared July 2026
1/ Price base: 2025 dollars amortized over 50 years at a discount rate of 3.25 percent.

3.2.1.2 Avoided Damages of Pump Failure

As explained in Section 2.2, replacing the District's aging pumps would increase their reliability and decrease the probability of failures that incur repair costs and potentially damage crops through subbing and interrupted irrigation. Using the same assumptions described in Section 2.2, under the Modernization Alternative, the annual risk of pump failure would fall from 0.3 in Year 1 to 0.0 once all pump stations are replaced. Annual expected repair costs would fall from around $14,200 to $0. Compared to the FWOP/No Action Alternative, the annual savings would rise from around $3,100 in Year 1 to $145,700 in Year 54. The avoided pump failures would reduce the expected damage from interrupted water supplies by around $5,900 in Year 1 to $153,700 in Year 54. Avoided subbing damages would be reduced by $1,300 in Year 1 and $34,400 in Year 54. When discounted and annualized, the benefits of avoiding pump failures under the Modernization Alternative are approximately $140,000 compared to the FWOP/No Action Alternative.

Table D-10. Avoided Costs of Pump Failure under the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Project Group	Avoided Pump Repairs	Avoided Crop Damage from Interrupted Water Supplies	Avoided Crop Damage from Subbing	Discounted Annual Benefit of Avoiding Pump Failures
PG1 Pump Replacement	$53,000	$71,000	$16,000	$140,000
PG2 SCADA	$0	$0	$0	$0
Total	**$53,000**	**$71,000**	**$16,000**	**$140,000**

Note: Totals may not sum due to rounding. Prepared July 2026
1/ Price base: 2025 dollars amortized over 50 years at a discount rate of 3.25 percent.

3.2.1.3 Avoided Damage from Uncontrolled Spills

Installing SCADA and adding VFDs to District pumps under the Modernization Alternative would allow TID to reduce uncontrolled spills. In an average year, approximately 25,000 AF are unintentionally spilled and end up in the District's sumps where the water cannot be put to productive use for agriculture (Kirby, 2024). The District estimates that the Project will reduce unintentional spills by 80 percent, with SCADA reducing spills by 17,000 AF per year and VFDs in pumps reducing spills by 3,000 AF per year (Kirby, 2024). Reducing these spills will allow the District to conserve and store the water in Upper Klamath Lake where it can be effectively managed for beneficial use. This section examines the potential benefits of this water.

Avoiding uncontrolled spills would increase the delivery of water for agriculture or would increase the ability to manage and deliver water for habitat. If not immediately used by TID irrigators, water saved by the Project could be stored in Upper Klamath Lake for longer periods of time or it could be managed for delivery to Klamath Wildlife Refuges, which would benefit aquatic wildlife and migratory bird species.

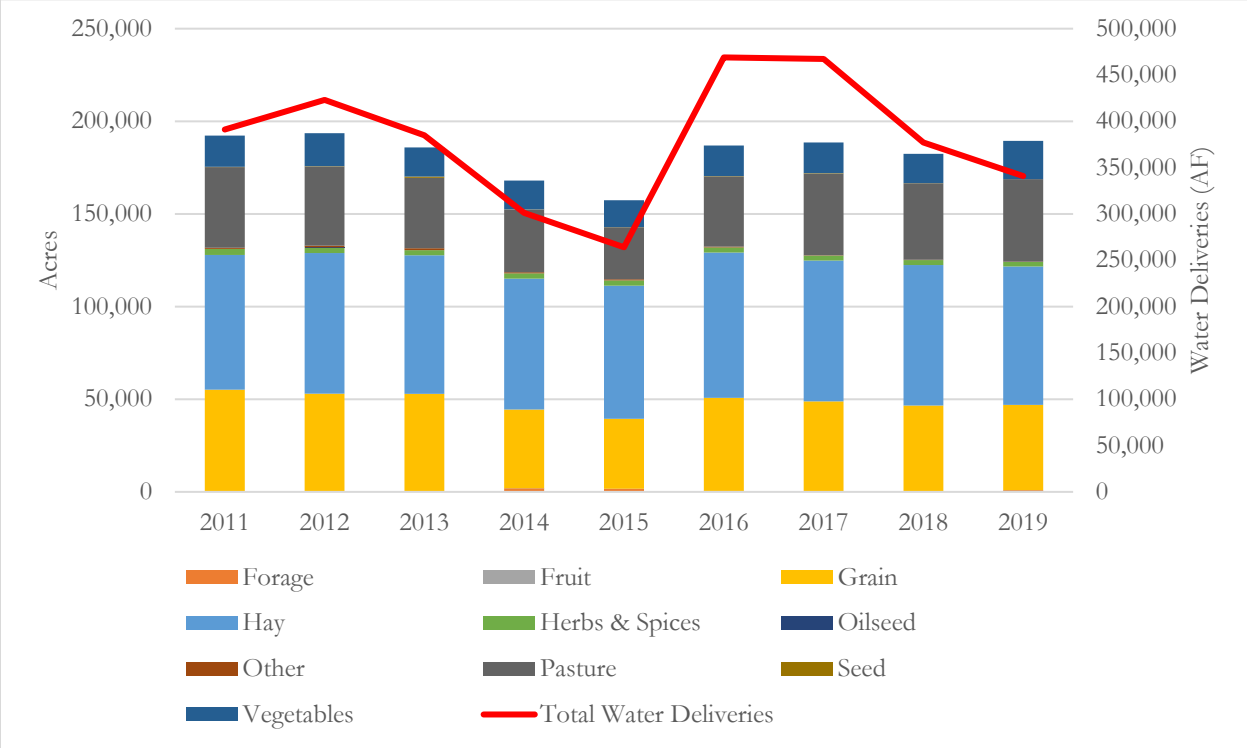
Currently, TID must remove excessive water in its sumps to prevent flood damage to the surrounding areas. To do this, TID pumps the sump water through D Plant into the LKNWR at the end of the growing season (late fall/early winter), after the primary fall migration of birds. According to TID, sump water pumped into the LKNWR at the end of the season is less useful to Refuge migratory species because it does not arrive when the water would be most beneficial. This analysis was not able to confirm whether spill water arriving at the LKNWR at the end of the season currently provides benefit. However, it is known that this uncontrolled spill water is not available for use by either agriculture or the Refuge during the summer or early fall season, when it is expected to be most beneficial for agriculture or habitat purposes.

It is not known whether the 20,000 AFY of avoided spill water will be used for agricultural production or for habitat enhancement; and the use may vary by year. As described below, the value of water for agriculture is estimated to be at least $145 per AFY. The value of water for habitat is expected to also be at least this valuable.[15] As such, we estimate the value of the 20,000 AFY of uncontrolled spill water, in either agricultural or habitat uses, at $145 per AFY.[16]

An analysis of cultivated acres and water deliveries in the Klamath Basin from 2011 to 2019 indicates that growers facing water shortages first fallow their acres of grains and pasture and, conversely, when there is more water, growers convert fallow land into grain and pasture acres (see Figure D-2 below). For this reason, we estimate the benefits of additional water as the additional net returns (profit) possible from cultivated irrigated grain versus fallowing lands.

[15] If conserved water is used for fish and wildlife enhancement, the value of water to fish and wildlife is likely as high as it is for irrigation. By prioritizing water use in the Basin to meet Endangered Species Act requirements and tribal trust obligations related to fish and wildlife, the federal government in its operation of the Bureau of Reclamation Klamath Project is implicitly indicating that the value to the public of water in the Basin for fish and wildlife is at least as high as the value of water for irrigation.

[16] This analysis does not model any costs of reducing the uncontrolled spill that accumulates in TID sumps. If this water does provide benefits currently, the Project could result in a cost that is not modeled in this analysis. However, because we could not confirm any benefits of this water currently, we did not model any opportunity cost of the water. If this water does have an opportunity cost, the benefits modeled in this analysis could be an overestimate. This effect may be offset by the fact that we used a conservative value of water to model the benefits of avoided spill water.



Source: (Bureau of Reclamation, 2020)

Figure D-1. Cropped Acres and Water Deliveries in the Klamath Basin

To model the difference in net returns between fallow and irrigated wheat, this analysis uses a crop budget approach, which estimates the costs and revenues from production on a typical farm in the study area. The results of the crop budget approach indicate that fallowing incurs variable costs of around $91 per acre, while irrigated wheat generates revenues of roughly $176 per acre above operating costs. Consequently, moving from fallow to irrigated wheat increases net returns by roughly $267 per acre ($91 in avoided costs of fallowing plus $176 in net income from wheat). Since wheat consumes about 1.8 AF of water per acre per year (Bureau of Reclamation, 2015), the additional water generates estimated net income of $145 per AFY.[17] This is the value we use to estimate the benefits of saved water under the Modernization Alternative. This value may be conservative given data from the 2024 Klamath Project No-Irrigation Program, in which the Klamath Project Drought Response Agency provides payments to local farmers in the Klamath Project who agree to not irrigate acreage during the entire irrigation season from March 1 through October 1 (Klamath Water Users Association, 2024). The Program expected to offer payments for 2024 up to $450 per acre to landowners for not irrigating during this irrigation season; assuming 2.5 to 3 AF per acre, this equates to $150 to $180 per AFY. This is also likely a conservative value as it does not consider possible effects of water shortages (and the value of increased water availability) on more valuable crops grown in TID.

[17] At 1.8 AF per acre, the total water saved under the No Action Alternative (20,000 AFY) would beneficially impact 8,182 acres. Past Klamath Basin crop reports indicate that grain acres decrease by more than 10,000 acres from an average to a dry water year (Bureau of Reclamation, 2020). This indicates it is reasonable to assume the water could beneficially impact all the acres modeled in this analysis.

After accounting for losses from evaporation, infiltration, and runoff (assumed to be 25 percent of the water applied to a field), VFDs are expected to provide an additional 2,250 AFY that contributes to crop growth and SCADA would provide 12,750 AFY. Using the value of $145 per AFY, the water savings would generate total annual benefits of $2,181,000. When discounted and annualized, the value of saved water under the Modernization Alternative would be $2,084,000, as shown in Table D-11 below.

Table D-11. Agricultural Damage Reduction Benefits of the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Project Group	Water Saved (AFY)	Water Contributing to Crop Production (AFY)[2]	Undiscounted Annual Increase in Net Income	Annualized Average Increase in Net Income
PG1 Pump Replacement	3,000	2,250	$327,000	$288,000
PG2 SCADA	17,000	12,750	$1,854,000	$1,796,000
Total	**20,000**	**15,000**	**$2,181,000**	**$2,084,000**

Note: Totals may not sum due to rounding. Prepared July 2026
1/ Price base: 2025 dollars amortized over 50 years at a discount rate of 3.25 percent.
2/ Based on an irrigation efficiency rate of 75 percent.

3.2.2 Non-monetized Benefits

3.2.2.1 Avoided Costs of Carbon Emissions

Changes in energy use are expected to result in changes in carbon dioxide emissions from power generation. Every MWh of reduced energy use is estimated to translate into an estimated reduction of 0.7525 metric tons (mt) of carbon emissions.[18] Both the Modernization and FWOP/No Action Alternatives would decrease carbon emissions by replacing old pumps with newer, more efficient pumps, thereby reducing energy use. As described in Section 3.2.1.1, each pump station replaced would result in annual energy savings of 14,298 kWh on average, and the Modernization Alternative would reduce total energy use by roughly 12,310 MWh over the FWOP/No Action Alternative. This would reduce annual carbon emissions by approximately 9,264 Mt over the period of analysis (approximately 12,310 MWh multiplied by 0.7525).

The social cost of carbon (SCC) estimates total cost to society of emitting carbon related to the expected damages associated with future climate variability. There are many estimates of the SCC, and the estimates vary based on what types of damages are included, the discount rate chosen, the geographic area under consideration (such as global damages versus U.S. domestic damages), and the projected level of global warming and associated damages. SCC damage values used by federal agencies have varied over the years. At first, federal agencies developed and applied their own

[18] This assumes that marginal changes in energy demand are met with fossil fuel-based production (renewable energy is typically used first and then fossil fuel powered generation is used), such that 100 percent of energy use reduction and green energy production result in reduced fossil fuel powered generation. Furthermore, this estimate assumes 0.7525 metric tons of carbon emitted from one MWh of fossil fuel powered electricity generation based on 1) the current proportion of fuel sources–oil, natural gas, and coal–for fossil fuel powered electrical power generation in the West, and 2) the associated metric tons of carbon dioxide produced per MWh powered by each fossil fuel source, as reported by the Energy Information Administration.

estimates. Then, the Office of Management and Budget convened an Interagency Working Group (IWG) on the Social Costs of Greenhouse Gases, which in 2013 developed a set of SCC estimates that could be used across federal agencies (Interagency Working Group on Social Cost of Greenhouse Gases, 2013). In February 2021, the IWG updated its estimates of the SCC. They estimated that in the year 2022, at a 3-percent discount rate, the SCC value was $51 per Mt in 2020 dollars (Interagency Working Group on Social Cost of Greenhouse Gases, 2021). If adjusted for inflation using the IPDGDP, the value would be roughly $62 per Mt in 2025 dollars. Note that this is a conservative value of the SCC as the Environmental Protection Agency, a member of the IWG, recently released a new estimate of the social cost of carbon in the year 2020 at $120 to $340 per Mt (in 2020 dollars) (Environmental Protection Agency, 2023).

However, in January 2025, by Executive Order 14154 the IWG was disbanded and in May 2025 the Office of Information and Regulatory Affairs in consultation with the U.S. Environmental Protection Agency issued guidance regarding greenhouse gases that federal agencies "should not monetize the impacts from such emissions". As such, this analysis does not quantify in dollar terms the value of reduced carbon emissions.

4 Summary of Benefits and Costs

This section summarizes the benefits and costs of the Modernization Alternative (described in Section 3) over the FWOP/No Action Alternative. Table D-12 (NWPM 506.20, Economic Table 5a) summarizes annual average project benefits of the Modernization Alternative that exceed the benefits under the FWOP/No Action Alternative.

Table D-12. Estimated Average Annual Damage Reduction Benefits of the Modernization Alternative Over the FWOP/No Action Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Project Group 1 (Pumps) On-Site Damage Reduction Benefits	**Agricultural-Related**	**Non-Agricultural Related**
Agricultural Damage Reduction	$288,000	$0
Production Cost Reductions	$160,000	$0
Avoided Pump Failure	$140,000	$0
On-site Subtotal	$588,000	$0
Project Group 1 (Pumps) Off-Site Damage Reduction Benefits	**Agricultural-Related**	**Non-Agricultural Related**
Off-site Quantified Subtotal	$0	$0
Total Quantified Benefits	$588,000	$0

Project Group 2 (SCADA) On-Site Damage Reduction Benefits	Agricultural-Related	Non-Agricultural Related
Agricultural Damage Reduction	$1,796,000	$0
Production Cost Reductions	$71,000	$0
Avoided Pump Failure	$0	$0
On-site Subtotal	$1,867,000	$0
Project Group 2 (Carnes Pipeline) Off-Site Damage Reduction Benefits	**Agricultural-Related**	**Non-Agricultural Related**
Off-site Quantified Subtotal	$0	$0
Total Quantified Benefits	$1,867,000	$0

Note: Totals may not sum due to rounding. Prepared July 2026
1/ Price base: 2025 dollars amortized over 50 years at a discount rate of 3.25 percent.

Table D-13 (NWPM 506.21, Economic Table 6) compares annual benefits and costs of the Modernization Alternative over those in the FWOP/No Action Alternative. Overall, the Modernization Alternative would generate benefits above costs totaling $1,797,000. The Project would have an overall benefit-cost ratio of 3.7.

Table D-13. Comparison of Costs and Benefits of the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Works of Improvement	Agricultural Damage Reduction	Agriculture-related O&M Cost Savings	Agriculture-related Avoided Pump Failure	Average Annual Benefits	Average Annual Cost [2]	Benefit Cost Ratio
PG1 Pump Replacement	$288,000	$160,000	$140,000	$588,000	$471,000	1.2
PG2 SCADA	$1,796,000	$71,000	$0	$1,867,000	$187,000	10.0
Total	**$2,084,000**	**$231,000**	**$140,000**	**$2,455,000**	**$658,000**	**3.7**

1/ Price base 2025 dollars. Prepared July 2026
2/ From Table D-8

4.1 Incremental Analysis

The Modernization Alternative is evaluated using an incremental analysis, which identifies how total costs and benefits change as project groups are added (or removed). The design of each project group is independent of the number of project groups included and the order in which they are installed. Table D-14 presents the incremental costs and benefits of the Modernization Alternative.

Table D-14. Incremental Analysis of Annual Costs and Benefits Under the Modernization Alternative, Klamath Watershed, Oregon, 2025 dollars[1]

Project Groups	Total Costs	Incremental Costs	Total Benefits	Incremental Benefits	Net Benefits
1	$471,000	N/A	$588,000	N/A	$117,000
1, 2	$658,000	$187,000	$2,455,000	$1,867,000	$1,797,000

1/ Price base: 2025 dollars. Prepared July 2026

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D.2 Economic Analysis Appendix

D.2.1 Crop Enterprise Budgets

This appendix presents the crop enterprise budgets used to estimate the benefits of agricultural damage reduction under the Modernization Alternative (described in Section 3.2.1.3) and the benefits of avoiding pump failures under the Modernization Alternative and Future Without Federal Investment (No Action) Alternative (described in Sections 2.2 and 3.2.1.3). The analysis uses a total of five crop budgets:

Table D-15. Summary of Crop Budgets

Crop	Production Phase	Budget Table
Alfalfa	Establishment	Table D-15
	Production	Table D-16
Wheat	All	Table D-17

Potatoes	All	Table D-18
Fallow	All	Table D-19

We estimate the costs and benefits of agricultural production using enterprise budgets that represent typical costs and returns of producing crops in the Klamath Watershed in Southern Oregon and Northern California. Enterprise budgets aim to reflect common practices and relevant costs for production in the region, but do not necessarily represent the conditions of any particular farm. As a starting point for the crop budgets in this analysis, we used five crop budgets: two for alfalfa hay developed by the University of California Cooperative Extension (UCCE), one for spring wheat from University of Idaho (UID), one for potatoes created by UCCE, and one for fallowing developed by Washington State University (WSU). We adjusted values in the budgets to account for changes in prices through time and local conditions in TID. The following sections outline the data and assumptions used in adjusting the budgets.

D.2.2 Alfalfa Enterprise Budgets

The alfalfa hay enterprise budgets were based on a 2020 budget developed by UCCE for establishing and producing alfalfa hay in Siskiyou County, California (Wilson, Giuliano, & Sumner, 2020). We selected these budgets as the basis for TID crop production costs because they are the most recent crop budgets developed for producing alfalfa hay in an area that is close to the Klamath Watershed.

D.2.2.1 Modeled Farm

The modeled farm is 560 acres, of which 440 acres are dedicated to alfalfa production and 80 acres are under alfalfa establishment. The hay field is seeded in the fall and the first harvest occurs after the establishment year. Irrigation is delivered by both a center pivot and wheel-line sprinklers. The stand life is six years.

D.2.2.2 Input Costs

For fertilizers, we adjust the amount used proportionally according to differences in yield from the original budget. For example, the original budget calls for 250 pounds (lbs) of potassium to produce 6 tons of hay per acre; we model a yield of 6.5 tons per acre (108 percent of the original yield), so we increase the amount of potassium to 271 lbs (108 percent of 250 lbs).

All prices are adjusted from the original values in the UCCE budget. We used area-specific values for fuel prices and labor rates. For all other costs, we adjusted the value in the original budget using the national Producer Price Indices (PPI) produced by the National Agricultural Statistics Service (NASS), which are published for a variety of farm expenses (NASS, 2026). For example, there are price indices for fertilizer, herbicides, supplies, machinery, custom work, as well as one for the farm sector in general. The PPI cost adjustments range from an 18-percent increase in the price of Seeds & Plants to a 65-percent increase in Potash & Phosphate costs.

For land costs in the establishment budget, we use NASS data on rental rates for irrigated cropland in Klamath County for a normalized average value of $256 per acre (NASS, 2026).[19] Because alfalfa is seeded in the fall, we only ascribe 25 percent of the land costs to establishing alfalfa.

19 We use prices from 2014 to 2025 where data was available. We adjusted all prices for inflation using the IPDGDP prior to averaging. Calculating the normalized average involves dropping the minimum and maximum values and taking the mean of the remaining values.

D.2.2.3 Labor Costs

All production activities are done through on-farm hired labor except for fertilizer applications, which are done through custom hire. On-farm hired labor is categorized as either equipment operator labor or general labor. For the cost of equipment operator labor, we use the median hourly wage rate for the agricultural equipment operators in the region in 2024 and adjust to 2025 dollars using the "Labor, Wage Rates" PPI.[20] We further adjust this wage rate up by 20 percent to account for non-wage employment costs, such as health care and insurance.[21] This results in total costs of $26.28 per hour for equipment operator labor. For general farm labor, we use the wage for farmworkers in the region and make the same adjustments for inflation and non-wage costs, which results in a total cost of $23.22 per hour.[22] We adjusted the cost of custom work using the "Ag Services, Custom Rates" PPI.

D.2.2.4 Income

To estimate the gross revenues of alfalfa hay, we used a modified NRCS method for calculating normalized prices for alfalfa hay in Oregon.[23] For state-level data, we use prices from 2021 to 2023, and for national-level data, prices from 2021 to 2025. This method results in an average price of $266.18 per ton. For yields in TID, we use the normalized average yield in the Klamath Basin of California from 2013 to 2019: 6.5 tons per acre (U.S. Bureau of Reclamation, 2021).[24]

D.2.2.5 Alfalfa Enterprise Budget Tables

The tables below present enterprise budgets used to estimate the costs and returns of alfalfa in TID.

20 Based on the average wage for Agricultural Equipment Operators (occupation code 45-2091) in the North Valley-Northern Mountains Region nonmetropolitan area of California according to the Bureau of Labor Statistics' Occupational Employment and Wage Estimates data in May 2024 (U.S. Bureau of Labor Statistics, 2022).

21 This is roughly the average proportion of non-wage labor costs for all private, part-time workers in the U.S. in December 2018 (Bureau of Labor Statistics, 2018).

22 Based on the average wage for Farmworkers and Laborers, Crop, Nursery, and Greenhouse (occupation code 45-2092) in the North Valley-Northern Mountains Region nonmetropolitan area of California according to the Bureau of Labor Statistics' Occupational Employment and Wage Estimates data in May 2024 (U.S. Bureau of Labor Statistics, 2022).

23 The modified method differs from the NRCS method by using more recent price data, using price data specific to alfalfa, and adjust all prices to 2023 dollars prior to averaging using the IPDGDP.

24 Calculating the normalized average involves dropping the minimum and maximum values and taking the mean of the remaining values.

Table D-16. Costs Alfalfa Establishment

Item	Quantity	Unit	$/Unit	Total
VARIABLE COSTS				
Elemental sulfur	25	lb	$0.23	$5.64
Phosphorus 11-52-0	75	lb	$0.61	$45.92
Potassium 0-0-60	250	lb	$0.68	$169.33
Irrigation water	4.5	acin	$5.91	$26.61
Custom material application	4	acre	$11.01	$44.04
Herbicide - Raptor	5	floz	$5.08	$25.38
Adjuvant - Herbimax	6.4	floz	$0.29	$1.84
Seed - alfalfa	20	lb	$4.32	$86.36
Equipment Operator Labor	4.46	hrs	$26.28	$117.21
Irrigation Labor	0.6	hrs	$23.22	$13.93
Fuel - Gas	0.75	gal	$3.39	$2.54
Fuel - Diesel	14.12	gal	$3.91	$55.16
Lube	1	acre	$10.07	$10.07
Machinery Repair	1	acre	$18.03	$18.03
Interest on operating capital (5.25%)	1	acre	$9.03	$9.03
Total variable costs				$631.09
FIXED COSTS				
Liability insurance	1	acre	$3.09	$3.09
Office expenses	1	acre	$37.77	$37.77
Property taxes	1	acre	$54.84	$54.84
Property insurance	1	acre	$7.72	$7.72
Investment repairs	1	acre	$14.16	$14.16
Fuel tanks & pumps	1	acre	$1.37	$1.37
Hay barns (2)	1	acre	$19.76	$19.76
Land - Scott Valley (80 ac)	1	acre	$63.97	$63.97
Shop building	1	acre	$11.29	$0.00
Shop tools	1	acre	$2.82	$2.82
Wheel line sprinkler (2)	1	acre	$5.49	$5.49
Center pivot (1)	1	acre	$13.72	$13.72
Equipment	1	acre	$41.15	$41.15
Total fixed costs				$265.85
Total costs				$896.94

Table D-17. Alfalfa Net Income Per Acre of Production

Item	Quantity	Unit	$/Unit	Total
INCOME				
Alfalfa Hay	6.5	ton	$266.18	$1,730.17
VARIABLE COSTS				
Elemental sulfur	27	lb	$0.23	$6.11
Potassium 0-0-60	271	lb	$0.68	$183.44
Molybdenum	0.2	lb	$24.19	$5.24
Phosphorus 11-52-0	81	lb	$0.61	$49.75
Irrigation water	24	acin	$5.91	$141.93
Custom material application	5	acre	$11.01	$60.00
Rodenticide - ZP rodent bait AG	3	lb	$2.71	$6.78
Insecticide - Steward EC	9	floz	$3.32	$29.88
Herbicide - Gramoxone	2	pint	$5.96	$11.93
Herbicide - TriCor 75DF	1	lb	$26.19	$17.55
Adjuvant - Activator 90	16	floz	$1.16	$18.63
Equipment Operator Labor	5	hrs	$26.28	$124.57
Irrigation Labor	4	hrs	$23.22	$81.28
Fuel - Gas	3	gal	$3.39	$11.48
Fuel - Diesel	10	gal	$3.91	$39.96
Lube	1	acre	$7.55	$7.55
Machinery Repair	1	acre	$32.19	$32.19
Interest on operating capital (5.25%)	1	acre	$18.16	$18.16
Total operating costs				$846.43
FIXED COSTS				
Liability insurance	1	acre	$3.09	$3.09
Office expenses	1	acre	$37.77	$37.77
Property taxes	1	acre	$58.85	$58.85
Property insurance	1	acre	$9.26	$9.26
Investment repairs	1	acre	$14.16	$14.16
Fuel tanks & pumps	1	acre	$1.37	$1.37
Hay barns (2)	1	acre	$19.76	$19.76
Land - Scott Valley (80 ac)	1	acre	$255.86	$255.86
Shop building	1	acre	$11.29	$11.29
Shop tools	1	acre	$2.82	$0.00
Wheel line sprinkler (2)	1	acre	$5.49	$5.49
Center pivot (1)	1	acre	$13.72	$13.72
Establishment costs	1	acre	$166.95	$166.95
Equipment	1	acre	$68.59	$68.59
Total ownership costs				$666.16
Total costs				$1,512.59
NET INCOME PER ACRE				$217.58

D.2.3 Wheat Enterprise Budget

We based the wheat enterprise budget on a 2019 budget for spring wheat by UID (Eborn, 2019). We selected this budget as the basis for TID wheat production because it was recently published and is modeled on a region that is relatively close to southern Oregon. As in the alfalfa budgets, we updated the costs presented in the original budget to account for changing values over time and to reflect conditions specific to TID.

D.2.3.1 Modeled Farm

The modeled farm is 1,200 acres with 300 acres in wheat. The field is prepped in the fall after the harvest of another crop and planted in the spring. The field is corrugated once after planting. Fertilizer applications, harvest, and storage are done by custom hire. Irrigation is done six times per season.

D.2.3.2 Input Costs

We adjust input quantities and prices using the same methods described for alfalfa (Section D.2.2.2). We adjust the quantity of hauling to match the adjusted yield. We set land costs equal to those under the alfalfa budget ($256 per acre).

D.2.3.3 Labor Costs

As in the alfalfa budget, labor in the wheat budget is divided between equipment operators and general farm labor, as well as irrigation labor. We ascribe the same costs to these types of labor in the wheat budget ($26.28 per hour for equipment operators and $23.22 per hour for general farm labor) and use the same hourly cost for irrigation labor as general farm labor.

D.2.3.4 Income

To estimate the revenues of wheat production, we use the same modified NRCS method to generate normalized prices that is described for alfalfa in the above section. Because there is no consistent price data at the state level for spring wheat, we calculate the normalized price for all wheat and adjust it by the average premium for spring wheat at the national level from 2021 to 2025: 5.2 percent. This results in a price of $7.83 per bushel. For wheat yields, we use the normalized average of yields in California's Klamath Basin from 2013 to 2019: 101.6 bushels per acre (U.S. Bureau of Reclamation, 2021).

D.2.3.5 Wheat Enterprise Budget Table

The table below presents the enterprise budget used to estimate the net income per acre of wheat in TID.

Table D-18. Net Income Per Acre of Wheat Production

Income Items	**Quantity**	**Unit**	**$/Unit**	**Total**
Spring Wheat	101.6	bu	$7.83	$795.59
Variable Costs Items	**Quantity**	**Unit**	**$/Unit**	**Total**
Wheat Seed: SWS	150	lb	$0.26	$39.11
Dry Nitrogen	115	lb	$0.64	$73.60
Dry P2O5	46	lb	$0.63	$28.87
K2O	46	lb	$0.47	$21.83
Sulfur	44	lb	$0.34	$14.87
Bronate Advanced	0.8	pint	$6.65	$5.32
Affinity Broad Spectrum	0.6	oz	$8.47	$5.08
N-I Surfactant + UAN	1	acre	$0.88	$0.88
Custom Fertilize	1	acre	$13.00	$13.00
Custom Spraying	1	acre	$9.81	$9.81
Custom Combine	1	acre	$86.35	$86.35
Custom Haul	101.6	bu	$0.46	$46.51
Water Assessment	1	acre	$71.84	$71.84
Repairs - Conc. Ditch	1	acre	$5.23	$5.23
Fuel - Gas	1.28	gal	$3.39	$4.33
Fuel - Diesel	7.02	gal	$3.76	$26.37
Fuel - Road Diesel	0.1	gal	$3.91	$0.39
Lube	1	acre	$4.45	$4.45
Machinery Repair	1	acre	$16.13	$16.13
Equipment Operator Labor	1.76	hrs	$26.28	$46.25
General Farm Labor	0.3	hrs	$23.22	$6.97
Irrigation Labor	2.45	hrs	$23.22	$56.90
Interest on operating capital (7%)	1	acre	$16.79	$16.79
Crop Insurance	1	acre	$18.91	$18.91
Total operating costs				$619.79
Fixed Costs Items	**Quantity**	**Unit**	**$/Unit**	**Total**
General Overhead	1	acre	$18.39	$18.39
Land rent	1	acre	$255.86	$255.86
Management Fee	1	acre	$48.17	$48.17
Property Insurance	1	acre	$2.03	$2.03
Capital Recovery - Equipment	1	acre	$67.38	$67.38
Total ownership costs				$391.84
Total costs				$1,011.62
NET INCOME PER ACRE				-$216.04

D.2.4 Potato Enterprise Budget

We based the potato enterprise budget on a 2015 budget for spring potatoes by UCCE (Wilson, Klonsky, Sumner, Anderson, & Stewart, 2015). We selected this budget as the basis for TID potato production because it is modeled on potato production in the Klamath Basin. As in the other budgets, we updated the costs presented in the original budget to account for changing values over time and to reflect conditions specific to TID.

D.2.4.1 Modeled Farm

The modeled farm is 1,500 acres with 250 acres in potatoes. After the harvest of another crop that leaves its residue, the ground is prepped in the fall and potatoes are planted in the spring. Potato seeds are provided by custom service, as are fertilizer applications. Fumigation takes place in the fall and the spring. Irrigation is done from June to August.

D.2.4.2 Input Costs

We adjust input quantities and prices using the same methods described for alfalfa. We adjust the quantity of storage and assessment fees to match the adjusted yield. We set land costs equal to those under the alfalfa budget ($256 per acre).

D.2.4.3 Labor Costs

As in the wheat budget, labor in the potato budget consists of equipment operators, general farm labor, and irrigation labor. We ascribe the same costs to these types of labor as in the wheat budget ($26.28 per hour for equipment operators and $23.22 per hour for general farm and irrigation labor).

D.2.4.4 Income

To estimate the long-term price of potatoes, we use the same modified NRCS method to generate normalized prices that is described for alfalfa using state and national data from 2021 to 2025. This results in a price of $12.19 per hundredweight (cwt). For yields, we use the normalized average of yields in California's Klamath Basin from 2013 to 2019: 490 bushels per acre (U.S. Bureau of Reclamation, 2021).

D.2.4.5 Potato Enterprise Budget Table

The table below presents the enterprise budget used to estimate the net income per acre of potato production in TID.

Table D-19. Net Income Per Acre of Potato Production

Income Items	Quantity	Unit	$/Unit	Total
Fresh market potatoes	489.6	cwt	$12.19	$5,967.99
Variable Costs Items	**Unit**	**$/Unit**	**Total**	**Total**
16-20-0-24%S	100.9	lb N	$2.02	$204.05
10-34-0	20.2	gal	$2.83	$57.04
Potash	201.9	lb	$0.30	$60.52
UAN 32	100.9	lb N	$1.03	$103.88
Custom - Gypsum hauled-spread	0.25	ton	$124.70	$31.17
Custom - apply fertilizer	1	acre	$34.64	$34.64
Custom - air app spray 20g	3	acre	$27.02	$81.05
Custom - Petiole samples	1	acre	$13.86	$13.86
Seed potatoes-treated/cut/hauled	22	cwt	$21.48	$472.49
Contract - store potatoes	489.6	cwt	$0.86	$420.57
Insecticide - Vydate L	2	pint	$12.64	$25.28
Insecticide - Movento	4	floz	$7.12	$28.47
Fungicide - Quadris	10	floz	$2.03	$20.34
Fungicide - Ridomil Gold Bravo	2	lb	$14.80	$29.60
Fungicide - Luna Tranquility	10	floz	$2.71	$27.13
Fungicide - Tanos	10	oz	$1.77	$17.69
Fungicide - StorOx	4	pint	$4.40	$17.60
Herbicide - Eqtam 7E	1.75	pint	$5.76	$10.07
Herbicide - Prowl H2O	2	pint	$8.99	$17.97
Herbicide - Sencor 4	4	oz	$7.15	$28.59
Herbicide - Matrix SG	2	oz	$26.74	$53.47
Growth regulator - Royal MH-30	1	pint	$4.03	$4.03
Desiccant - Reglone Desiccant	1	pint	$19.06	$19.06
CPRAB assessment	489.6	cwt	$0.03	$13.57
Irrigation water	20.5	acin	$16.31	$334.46
Fumigant - Vapam HL	22.5	gal	$9.14	$205.62
Equipment operator labor	4.72	hrs	$26.28	$124.04
Irrigation labor	10	hrs	$23.22	$232.23
Non-machine labor	3	hrs	$23.22	$69.67
Fuel - gas	2.76	gal	$3.39	$9.35
Fuel - diesel	48.1	gal	$3.91	$187.90
Lube	1	acre	$33.43	$33.43
Machinery repair	1	acre	$76.38	$76.38
Interest on operating capital (5.75%)	1	acre	$72.47	$72.47
Total operating costs				$3,137.69

Fixed Costs Items	Quantity	Unit	$/Unit	Total
Field sanitation	1	acre	$2.67	$2.67
Field supervisor salary	1	acre	$89.14	$89.14
Land rent - potato	1	acre	$191.25	$191.25
Liability insurance	1	acre	$1.33	$1.33
Office expense	1	acre	$72.44	$72.44
GPS Auto-Trac Activation Fee	1	acre	$9.75	$9.75
Property Taxes	1	acre	$21.61	$21.61
Property Insurance	1	acre	$1.33	$1.33
Investment Repairs	1	acre	$5.66	$5.66
Fuel tanks & pumps 5000 gal (2)	1	acre	$1.49	$1.49
Land - potato	1	acre	$255.86	$255.86
Pipe trailer (10)	1	acre	$4.48	$4.48
125 hp booster pumps (2)	1	acre	$4.48	$4.48
Semi-truck & lowbed	1	acre	$7.35	$7.35
Shop building	1	acre	$1.59	$1.59
Shop tools	1	acre	$1.59	$1.59
Implement carrier	1	acre	$1.36	$1.36
GPS Guidance System	1	acre	$1.36	$1.36
1/4 mile wheel lines (2)	1	acre	$5.98	$5.98
Equipment	1	acre	$156.86	$156.86
Total ownership costs				$837.57
Total costs				$3,975.26
NET INCOME PER ACRE				$1,992.74

D.2.5 Fallow Enterprise Budget

We based the fallow enterprise budget on a 2002 budget for winter wheat-summer fallow by WSU (Nail, Young, Hinman, & Schillinger, 2004). We selected this budget as the basis for Klamath fallowing costs because it was the closest available to southern Oregon. As with the other budgets, we updated the costs presented in the original budget to account for changing values over time and to reflect conditions specific to the Klamath Basin.

D.2.5.1 Modeled Farm

The modeled farm is assumed to be the same size and have the same complement of machinery as the wheat budget.

D.2.5.2 Input Costs

Input costs for fallowing in the original budget include the cost of chemicals (herbicides and fertilizers) and the cost of running and maintaining the equipment to apply the chemicals. As in the wheat budget, we adjusted all costs in the fallowing budget from their original dollar year (2002) to 2025 dollars using the PPI.

D.2.5.3 Labor Costs

The only labor in the fallowing budget is equipment operator labor, which we assign the same total cost as the wheat budget: $26.28 per hour.

D.2.5.4 Income

Fallowing produces no saleable products and therefore generates no income.

D.2.5.5 Fallowing Enterprise Budget Table

The table below presents the fallowing enterprise budget used to estimate the costs of fallowing land in the Klamath Basin.

Table D-20. Variable Costs of Fallowing Per Acre

Variable Costs Items	Quantity	Unit	$/Unit	Total
Round-up	8	oz	$0.33	$2.64
Aqua N	50	lb	$0.83	$41.39
Thio-sulfate	5	lb	$0.17	$0.86
Machinery fuel/lube	1	acre	$12.32	$12.32
Machinery repairs	1	acre	$9.20	$9.20
Labor (trac/mach)	0.63	hour	$26.28	$16.56
Overhead	1	acre	$5.23	$5.23
Interest on operating capital	1	acre	$2.58	$2.58
Total variable costs				$90.79

D.3 Alternatives Considered During Formulation

This appendix section presents the alternatives considered in the formulation phase.

During the formulation phase, alternatives were evaluated based on meeting both NEPA and environmental review requirements specific to NRCS federal investments in water resources projects (PR&G). .According to NEPA, "agencies shall rigorously explore and objectively evaluate all reasonable alternatives" (40 CFR 1502.14). According to the PR&G DM9500-013, alternatives should reflect a range of scales and management measures and be evaluated against the Federal Objective and Guiding Principles; against the extent to which they address the problems and opportunities identified in the purpose and need; and against the criteria of completeness, effectiveness, efficiency, and acceptability:

1. Completeness is the extent to which an alternative provides and accounts for all features, investments, and/or other actions necessary to realize the planned effects, including any necessary actions by others. It does not necessarily mean that alternative actions need to be large in scope or scale.
2. Effectiveness is the extent to which an alternative alleviates the specified problems and achieves the specified opportunities.
3. Efficiency is the extent to which an alternative alleviates the specified problems and realizes the specified opportunities at the least cost.
4. Acceptability is the viability and appropriateness of an alternative from the perspective of the Nation's general public and consistency with existing Federal laws, authorities, and public policies. It does not include local or regional preferences for particular solutions or political expediency.

Alternatives eliminated during formulation are shown in Table D-21 and discussed below. Alternatives selected for further evaluation are discussed in the Plan-EA:

Table D-21. Alternatives Considered During the Formulation Phase.

Alternative	P/N	PR&G Criteria Achieved: Completeness	PR&G Criteria Achieved: Effectiveness	PR&G Criteria Achieved: Efficiency	PR&G Criteria Achieved: Acceptability	Selected for Further Evaluation
Piping Sections of the District	Yes	Yes	Yes	No	No	Yes
Lining Sections of the District	Yes	Yes	No	No	No	No
Additional SCADA Sites	Yes	Yes	Yes	Yes	No	Yes
No Action Alternative	No	No	No	No	No	Yes

Alternative	P/N	PR&G Criteria Achieved: Completeness	PR&G Criteria Achieved: Effectiveness	PR&G Criteria Achieved: Efficiency	PR&G Criteria Achieved: Acceptability	Selected for Further Evaluation
Modernization Alternative	Yes	Yes	Yes	Yes	Yes	Yes

D.3.1 Alternatives Not Selected for Further Evaluation

D.3.1.1 Lining

The capital cost of the Canal Lining Alternative was estimated by calculating the length of geotextile membrane for existing open canals, assuming an anchor of membrane extends 7 feet on either side. The membrane would be covered by a 1-inch-thick layer of shotcrete (fine-aggregate concrete sprayed in place). This estimate also includes fencing along both sides of the canal and safety ladders every 750 feet in channels deeper than 2.5 feet. Costs related to earthwork and labor were estimated by a construction cost multiplier of 2. Turnouts were estimated using the same assumptions as the piping alternative.

Canal lining was eliminated from further evaluation because it would not meet the proposed project's purpose and need; its effectiveness would be uncertain since lining limited canal sections would not meet goals for improving Agricultural Water Management to the extent of piping; and it would be inconsistent with public policy supporting and maintaining existing agricultural land use. Therefore, it would not achieve the Federal Objective and Guiding Principles.

D.3.1.2 Piping Sections of the District

The District would modernize a series of currently open laterals to fully pressurized systems. Proposed projects include modernizing the J-1 Lateral (Table D-15) by converting 26.2 miles of the currently open laterals to a fully pressurized pipeline system, installing one new centralized pump station, and tying in existing drain and groundwater pump stations to the piped system. The J-1 Lateral is separated from the rest of TID's delivery system by the Lower Lost River Improved Channel and is the first lateral on the J-Canal.

The District also would modernize a portion of the J-Canal system (up to and including Lateral J-9) by converting a total of 51.6 miles of the currently open laterals to a fully pressurized pipeline system, installing seven new centralized pump stations, and tying in existing drain and groundwater pump stations. The estimated capital costs eliminate the alternatives for further consideration because, for example, the J-1 Canal system alone would cost an estimated $65,206,200 for piping.

Additionally included in this alternative plan is the conversion of approximately 23.5 miles of the currently open laterals to a fully pressurized pipeline system along the Copic Bay Lateral (Table D-16). The fully pressurized pipeline system would be operated by one new centralized pump station with the supplemental pump augmenting the flows. Up to 17 private groundwater pumping stations would be tied in to augment the flows in the Copic Bay system. The Copic Bay piping alternative would be even more cost restrictive, at approximately $81,957,400.

The Dry Hole section of the District (J-14-18) would be converted to pressurized pipe. A large, pressurized pipe would be installed through the middle of the Dry Hole section and would be

designed to move water east-west in both directions based on demand. Piping sections J-15 and J-16 would alone cost approximately $4,386,904.

These alternatives would meet the project purpose of Agricultural Water Management by improving water management operations, increasing energy efficiency, and conserving water along district infrastructure. However, the costs to implement piping alternatives are very high and would not meet the efficiency criteria because it would not alleviate the specified problems and realize the specified opportunities at the least cost (see Appendix D.3 Capital Costs). Additionally, there would be complexities associated with integrating piping alongside current system operations.

D.3.1.3 Additional SCADA Locations

Under this alternative the District would install SCADA on 12 additional drains into the Lost River upstream of TID. These sites would allow the District to better understand inflow from upstream Klamath Project users into the District's system. Currently, inflows to the Lost River and return flows from KID are not well understood nor measured.

Implementation of these upgrades would meet the project purpose of Agricultural Water Management by improving water management operations within the District. However, due to environmental impacts it was determined that the installation of SCADA into the Lost River did not meet the acceptability criteria for the PR&Gs and therefore does not achieve the Federal Objective and Guiding Principles. Furthermore, the cost of these sites does not make the project feasible, as illustrated in the table in D.3.

D.4 Capital Costs

D.4.1 Alternative Eliminated Costs

The following are tables showing the costs of alternatives that were eliminated.

Table 22. District Piping (J-System) Alternative Costs

Project Group	Component	Proposed Pipe	Sum of Quantity	Quantity Units	Sum of Construction Cost	Sum of Engineering, CM, Survey	Sum of CGGC	Sum of Contingency	Sum of Total
J-1	Turnout	N/A	118	each	$944,000	$94,400	$132,200	$351,200	$1,521,700
DisJ-1	Piping	4DR32.5	6,113	ft	$25,100	$2,500	$3,500	$9,300	$40,500
J-1	Piping	10DR32.5	117	ft	$2,800	$300	$400	$1,000	$4,500
J-1	Piping	12DR32.5	1,275	ft	$42,200	$4,200	$5,900	$15,700	$68,000
J-1	Piping	14DR32.5	4,371	ft	$174,800	$17,500	$24,500	$65,000	$281,800
J-1	Piping	16DR32.5	6,708	ft	$350,000	$35,000	$49,000	$130,200	$564,100
J-1	Piping	18DR32.5	3,078	ft	$203,500	$20,400	$28,500	$75,700	$328,100
J-1	Piping	20DR32.5	4,125	ft	$336,300	$33,600	$47,100	$125,100	$542,100
J-1	Piping	24DR32.5	30,455	ft	$3,575,800	$357,600	$500,600	$1,330,200	$5,764,200
J-1	Piping	26DR32.5	16,268	ft	$1,869,600	$187,000	$261,700	$695,500	$3,013,800
J-1	Piping	28DR32.5	11,088	ft	$1,478,700	$147,900	$207,000	$550,100	$2,383,700
J-1	Piping	30DR32.5	4,282	ft	$655,200	$65,500	$91,700	$243,700	$1,056,100
J-1	Piping	32DR32.5	5,464	ft	$951,500	$95,200	$133,200	$354,000	$1,533,900
J-1	Piping	34DR32.5	3,040	ft	$597,400	$59,700	$83,600	$222,200	$963,000
J-1	Piping	36DR32.5	3,777	ft	$832,300	$83,200	$116,500	$309,600	$1,341,700
J-1	Piping	42DR32.5	12,230	ft	$3,666,700	$366,700	$513,300	$1,364,000	$5,910,700
J-1	Piping	54DR32.5	11,511	ft	$4,565,800	$456,600	$639,200	$1,698,500	$7,360,000
J-1	Piping	63DR32.5	8,561	ft	$4,619,700	$462,000	$646,800	$1,718,500	$7,447,000

Project Group	Component	Proposed Pipe	Sum of Quantity	Quantity Units	Sum of Construction Cost	Sum of Engineering, CM, Survey	Sum of CGGC	Sum of Contingency	Sum of Total
J-1	Piping	66DR32.5	984	ft	$665,900	$66,600	$93,200	$247,700	$1,073,500
J-1	Piping	84DR32.5	1,312	ft	$1,438,700	$143,900	$201,400	$535,200	$2,319,200
J-1	Pump Station	N/A	2,400	hp	$13,394,400	$1,339,400	$1,875,200	$4,982,700	$21,591,800
J-1	Groundwater Connection	N/A	5	each	$60,000	$6,000	$8,400	$22,300	$96,700
Grand Total					**$40,450,400**	**$4,045,000**	**$5,663,100**	**$15,047,500**	**$65,206,000**

Table 23. District Piping (Copic Bay) Alternative Costs

Project Group	Component	Proposed Pipe	Quantity Units	Sum of Quantity	Sum of Construction Cost	Sum of Engineering, CM, Survey	Sum of CGGC	Sum of Contingency	Sum of Total
Copic Bay	Junction	N/A	53	each	$424,000	$42,400	$59,400	$157,700	$683,500
Copic Bay	Piping	4DR32.5	13,706	ft	$56,300	$5,600	$7,900	$20,900	$90,800
Copic Bay	Piping	12DR32.5	11,918	ft	$394,700	$39,500	$55,300	$146,800	$636,200
Copic Bay	Piping	16DR32.5	8,394	ft	$437,900	$43,800	$61,300	$162,900	$706,000
Copic Bay	Piping	18DR32.5	5,488	ft	$362,900	$36,300	$50,800	$135,000	$585,000
Copic Bay	Piping	20DR32.5	10,652	ft	$868,500	$86,800	$121,600	$323,100	$1,399,900
Copic Bay	Piping	24DR32.5	16,289	ft	$1,912,500	$191,300	$267,800	$711,500	$3,083,000
Copic Bay	Piping	26DR32.5	10,396	ft	$1,194,700	$119,500	$167,300	$444,400	$1,925,800
Copic Bay	Piping	28DR32.5	7,743	ft	$1,032,600	$103,300	$144,600	$384,100	$1,664,500
Copic Bay	Piping	30DR32.5	2,473	ft	$378,300	$37,800	$53,000	$140,700	$609,800
Copic Bay	Piping	32DR32.5	5,977	ft	$1,041,000	$104,100	$145,700	$387,200	$1,678,100
Copic Bay	Piping	34DR32.5	9,250	ft	$1,817,300	$181,700	$254,400	$676,000	$2,929,500
Copic Bay	Piping	36DR32.5	4,084	ft	$900,000	$90,000	$126,000	$334,800	$1,450,800
Copic Bay	Piping	42DR32.5	9,622	ft	$2,884,800	$288,500	$403,900	$1,073,100	$4,650,200
Copic Bay	Piping	54DR32.5	1,566	ft	$621,100	$62,100	$87,000	$231,100	$1,001,300
Copic Bay	Piping	63DR32.5	2,212	ft	$1,193,900	$119,400	$167,100	$444,100	$1,924,600
Copic Bay	Piping	72DR32.5	4,539	ft	$3,657,600	$365,800	$512,100	$1,360,600	$5,896,100
Copic Bay	Pump Station	N/A	2,133	hp	$11,904,300	$1,190,400	$1,666,600	$4,428,400	$19,189,700
Supplemental	Piping	34DR32.5	6,480	ft	$509,100	$50,900	$71,300	$189,400	$820,600
Supplemental	Pump Station	N/A	535	hp	$2,985,800	$298,600	$418,000	$1,110,700	$4,813,200
Future Capacity	Piping	72DR32.5	22,907	ft	$9,228,500	$922,900	$1,292,000	$3,433,000	$14,876,400

Project Group	Component	Proposed Pipe	Quantity Units	Sum of Quantity	Sum of Construction Cost	Sum of Engineering, CM, Survey	Sum of CGGC	Sum of Contingency	Sum of Total
Future Capacity	Pump Station	N/A	1,250	hp	$6,976,300	$697,600	$976,700	$2,595,200	$11,245,700
Copic Bay	Groundwater Connection	N/A	each	17	$60,000	$6,000	$8,400	$22,300	$96,700
Grand Total					**$50,842,100**	**$5,084,300**	**$7,118,200**	**$18,913,000**	**$81,957,400**

Table 24. Additional SCADA Locations Alternative Costs

DRAIN LOCATIONS	EACH	EQUIPMENT TOTAL	ESTIMATED TAX (7.25 %)	ESTIMATED INSTALLATION COST (10% OF EQUIPMENT TOTAL)	CONTINGENCY (14% OF EQUIPMENT TOTAL)	TOTAL
Along Lost River	7	$52,801	$3,828	$5,280	$7,392	$70,001
Along J Canal	5	$37,715	$2,734	$3,772	$5,280	$50,001
Grand Total		**$90,516**	**$6,562**	**$9,052**	**$12,672**	**$120,002**

D.4.2 No Action Alternative Costs

Under the No Action Alternative, federal funding through PL 83-566 would not be available to implement the project. The District would continue to operate and maintain its existing system 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 Plan-EA, the No Action Alternative is a near-term continuation of the standard operating procedures.

The No Action Alternative would not meet the purpose and need of the project. There would be no improvement to Agricultural Water Management or to District water management operations, water and energy efficiency would not be increased, and the District's O&M costs would remain high. Water delivery and operational inefficiencies would remain the same and could potentially worsen over time as equipment and infrastructure continue to age, and replacement parts become more difficult to procure. This is especially true of the pumping infrastructure that the District relies on to move water to its patrons. Under the No Action Alternative, the effects of future water shortages and limited water deliveries to District patrons and the TLNWR and LKNWR could be exacerbated.

D.4.3 Modernization Alternative/Preferred Alternative Costs

This section presents capital costs for the Modernization Alternative, which is the Preferred Alternative.

The Modernization Alternative is TID's preferred alternative. Under this alternative, federal funding through P.L. 83-566 would be available. The District would perform the following actions:

- Upgrade pumps throughout the District at approximately 28 locations. These pump upgrades would include various improvements such as replacement of the pump and motor, variable frequency drive installation, SCADA[25] upgrades for individual pumps, and traveling screen installations.
- Install SCADA and automation equipment throughout the District at approximately 74 locations. SCADA installation would allow the District to more effectively measure and control water within the District.

[25] Supervisory Control and Data Acquisition

Table 25. Modernization Alternative Capital Costs for Pump Replacement

PUMP NAME	PUMP UPGRADE	VFD UPGRADE	SCADA UPGRADE	TRAVELING SCREEN UPGRADE	PIPE – SCADA UPGRADE	CONCRETE PAD UPGRADE	EQUIPMENT TOTAL	ESTIMATED TAX (7.25%)	ESTIMATED FREIGHT	ESTIMATED INSTALLATION COST (10% OF EQUIPMENT TOTAL)	CONTINGENCY (14% OF EQUIPMENT TOTAL)	TOTAL
A Plant	NA	NA	$7,160	$171,750	NA	$50,000	$228,910	$16,596	$1,000	$22,891	$32,047	$301,444
Pump 10	NA	$83,250	$7,176	$171,750	$550	$50,000	$312,726	$22,673	$2,100	$31,273	$43,782	$412,553
Pump 11	$176,932	$46,870	$7,176	$164,000	$550	$50,000	$445,528	$19,473	$2,100	$44,553	$62,374	$574,028
Pump 12	$88,466	NA	$7,176	$164,000	$550	$50,000	$310,192	$16,075	$1,100	$31,019	$43,427	$401,813
Pump 2	$88,466	$23,435	NA	NA	NA	NA	$111,901	$1,699	$1,000	$11,190	$15,666	$141,456
Pump 22	NA	$15,300	NA	NA	NA	NA	$15,300	$1,109	$1,000	$1,530	$2,142	$21,081
Pump 23	NA	$23,435	NA	NA	NA	NA	$23,435	$1,699	$1,000	$2,344	$3,281	$31,758
Pump 24	NA	$23,435	NA	NA	NA	NA	$23,435	$1,699	$1,000	$2,344	$3,281	$31,758
Pump 27	$88,466	$23,435	$7,176	NA	$550	NA	$119,627	$2,259	$1,100	$11,963	$16,748	$151,697
Pump 28	NA	$23,435	NA	NA	NA	NA	$23,435	$1,699	$1,000	$2,344	$3,281	$31,758
Pump 3	$176,932	$55,500	$7,176	$164,000	NA	$50,000	$454,158	$20,099	$2,100	$45,416	$63,582	$585,355
Pump 4	$88,466	$27,750	NA	$171,750	NA	$50,000	$337,966	$18,089	$2,000	$33,797	$47,315	$439,167
Pump 5	$176,932	$53,910	NA	$171,750	NA	$50,000	$452,592	$19,985	$2,000	$45,259	$63,363	$583,199
Pump 6	$88,466	NA	NA	NA	NA	NA	$88,466	NA	NA	$8,847	$12,385	$109,698
Pump 7	$176,932	$46,870	$7,176	$164,000	$550	$50,000	$445,528	$19,473	$2,100	$44,553	$62,374	$574,028
Pump 9	NA	$78,480	$7,176	$164,000	$550	$50,000	$300,206	$21,765	$2,100	$30,021	$42,029	$396,120
Pump B	$265,398	$70,305	$7,176	$164,000	$550	$50,000	$557,429	$21,172	$2,100	$55,743	$78,040	$714,484
Pump C	$88,466	$27,750	$7,176	$171,750	$550	$50,000	$345,692	$18,649	$2,100	$34,569	$48,397	$449,407
Pump G	$176,932	NA	$7,176	$164,000	$550	$50,000	$398,658	$16,075	$1,100	$39,866	$55,812	$511,511
Pump H	$88,466	NA	$7,176	$164,000	$550	$50,000	$310,192	$16,075	$1,100	$31,019	$43,427	$401,813
Pump J	$88,466	$23,435	NA	NA	NA	NA	$111,901	$1,699	$1,000	$11,190	$15,666	$141,456
Pump M	NA	NA	$7,176	$164,000	$550	$50,000	$221,726	$16,075	$1,100	$22,173	$31,042	$292,115
Pump N	$88,466	$55,500	$7,176	NA	$550	NA	$151,692	$4,584	$1,100	$15,169	$21,237	$193,782
Pump P	$88,466	$23,435	NA	NA	NA	NA	$111,901	$1,699	$1,000	$11,190	$15,666	$141,456

PUMP NAME	PUMP UPGRADE	VFD UPGRADE	SCADA UPGRADE	TRAVELING SCREEN UPGRADE	PIPE – SCADA UPGRADE	CONCRETE PAD UPGRADE	EQUIPMENT TOTAL	ESTIMATED TAX (7.25%)	ESTIMATED FREIGHT	ESTIMATED INSTALLATION COST (10% OF EQUIPMENT TOTAL)	CONTINGENCY (14% OF EQUIPMENT TOTAL)	TOTAL
Pump R	$176,932	$23,435	NA	$171,750	$0	$50,000	$422,117	$17,776	$2,000	$42,212	$59,096	$543,201
Pump U	$88,466	NA	NA	NA	NA	NA	$88,466	NA	NA	$8,847	$12,385	$109,698
Pump W	$88,466	NA	NA	NA	NA	NA	$88,466	NA	NA	$8,847	$12,385	$109,698
Pump V	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL	**$2,388,582**	**$748,965**	**$100,448**	**$2,506,500**	**$6,600**	**$750,000**	**$6,501,645**	**$298,197**	**$35,300**	**$650,165**	**$910,230**	**$8,395,537**

Table 26. Modernization Alternative Capital Costs for SCADA

SCADA SITE NAME	MOTOR, GATE, ACTUATOR, ETC. COST	MISC. MATERIALS COST (PIPE)	SCADA UPGRADE	SOLAR PANEL, BATTERY, CHARGE CONTROLLER, INVERTER, WIRING, ENCLOSURE, ETC.	EQUIPMENT TOTAL	ESTIMATED TAX (7.25%)	ESTIMATED FREIGHT	ESTIMATED INSTALLATION COST (10% OF EQUIPMENT TOTAL)	CONTINGENCY (14% OF EQUIPMENT TOTAL)	TOTAL
D Canal Spill	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-10-1 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-10-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-10-3 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-10-4 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-10-5 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-10-6 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-10-7 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-10-8 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-1 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-11-1 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
J-11-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295

SCADA SITE NAME	MOTOR, GATE, ACTUATOR, ETC. COST	MISC. MATERIALS COST (PIPE)	SCADA UPGRADE	SOLAR PANEL, BATTERY, CHARGE CONTROLLER, INVERTER, WIRING, ENCLOSURE, ETC.	EQUIPMENT TOTAL	ESTIMATED TAX (7.25%)	ESTIMATED FREIGHT	ESTIMATED INSTALLATION COST (10% OF EQUIPMENT TOTAL)	CONTINGENCY (14% OF EQUIPMENT TOTAL)	TOTAL
J-1-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-3 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-13-1 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
J-13-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-4 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-14-1 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-14-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-14-3 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-14-4 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-14-5 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-5 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-15-1 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
J-15-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-6 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-16-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
J-16-2 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-1-7 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-18-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
J-18-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-18-3 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-A-1-1 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
J-1-A-1-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-A-1-3 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295

SCADA SITE NAME	MOTOR, GATE, ACTUATOR, ETC. COST	MISC. MATERIALS COST (PIPE)	SCADA UPGRADE	SOLAR PANEL, BATTERY, CHARGE CONTROLLER, INVERTER, WIRING, ENCLOSURE, ETC.	EQUIPMENT TOTAL	ESTIMATED TAX (7.25%)	ESTIMATED FREIGHT	ESTIMATED INSTALLATION COST (10% OF EQUIPMENT TOTAL)	CONTINGENCY (14% OF EQUIPMENT TOTAL)	TOTAL
J-1-A-1-4 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-1-A-1-5 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-1-A-1-6 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-1-A-1-7 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-1-A-1-8 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-A-1-9 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-1-A-X SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-21-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
J-21-2 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-22-1 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
J-22-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-22-3 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-22-A SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-22-B SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-3-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
J-3-2 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-5-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
J-5-2 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-6-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
J-6-2 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-7-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127

SCADA SITE NAME	MOTOR, GATE, ACTUATOR, ETC. COST	MISC. MATERIALS COST (PIPE)	SCADA UPGRADE	SOLAR PANEL, BATTERY, CHARGE CONTROLLER, INVERTER, WIRING, ENCLOSURE, ETC.	EQUIPMENT TOTAL	ESTIMATED TAX (7.25%)	ESTIMATED FREIGHT	ESTIMATED INSTALLATION COST (10% OF EQUIPMENT TOTAL)	CONTINGENCY (14% OF EQUIPMENT TOTAL)	TOTAL
J-7-2 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-8-1 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
J-8-2 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-9-1 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
J-9-10 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
J-9-2 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-9-3 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-9-4 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-9-5 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-9-6 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-9-7 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-9-8 SCADA	NA	$550	$9,048	NA	$9,598	$696	$100	$960	$1,344	$22,295
J-9-9 SCADA	NA	$550	$9,048	$5,211	$14,809	$1,074	$100	$1,481	$2,073	$34,346
N-16 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
N-17 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
N-Extension 2 SCADA	$2,500	$550	$9,048	$5,211	$17,309	$1,255	$100	$1,731	$2,423	$40,127
N-Extension SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
Q-1 SCADA	$2,500	$550	$9,048	NA	$12,098	$877	$100	$1,210	$1,694	$28,077
TOTAL	**$47,500**	**$40,700**	**$669,552**	**$140,694**	**$898,446**	**$65,137**	**$7,400**	**$89,845**	**$125,782**	**$2,085,056**

Appendix E

Other Supporting Information

E.1 Additional Supporting Information for Cultural Resources

E.1.1 Regulatory Context

The National Environmental Policy Act (NEPA) requires federal agencies to consider effects of federally funded projects on cultural resources (40 CFR 1508.1(g)(4)). While NEPA does not define cultural resources, the term is understood to include "historic properties" as defined by Section 106 of the National Historic Preservation Act (NHPA), as well as sacred sites, archaeological sites not eligible for the National Register of Historic Places (NRHP), and archaeological collections (Council on Environmental Quality Executive Office of the President and Advisory Council on Historic Preservation and Advisory Council on Historic Preservation 2013). Under Section 106 of the NHPA, historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the NRHP, including artifacts, records, and material remains related to such a property or resource" (36 CFR 800.16(l)(1)). Consideration of historic properties under Section 106 supports NEPA consideration of effects on cultural resources but does not encompass all types of cultural resources under NEPA.

The study area for cultural resources consists of the area of potential effects (APE) that has been delineated to support consultation with regulatory agencies. This area includes sites where ground-disturbing work would occur under the proposed action, adjacent areas, and construction staging and access areas.

A project's Area of Potential Effects (APE) is defined in Section 106 of the NHPA as "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties" (36 CFR 800.16.c). Effects may be direct or indirect, with the former including any type of effect (i.e., physical, visual, auditory, etc.) resulting from an "undertaking at the same time and place with no intervening cause," and the latter including any type of effect "caused by the undertaking that is later in time or farther in distance but are still reasonably foreseeable" (Advisory Council on Historic Preservation 2019).

This project's APE for direct effects was delineated primarily to account for physical and visual effects. Direct effects from construction such as vibration, noise, and fugitive dust are also considered within the direct APE but are anticipated to be minor and temporary. The Project's physical APE will be limited to the vertical and horizontal footprint of the areas and/or structures where the proposed project activities would occur—that is, at the locations where pumps would be upgraded or where SCADA and other automation equipment would be installed, as well as staging and laydown areas needed for implementation of these actions. The project's visual APE includes a 100-foot buffer around the physical APE to account for effects on the viewsheds of historic properties resulting from alterations to select components of the Tulelake Drainage District. The APE for indirect effects is the same as the APE for direct effects, as reasonably foreseeable indirect effects are not anticipated to occur outside of the APE established for direct effects.

E.1.2 Ethnographic Context

The study area includes portions of the traditional territory of the Modoc peoples, who established permanent camps around Tule Lake, Lower Klamath Lake, and Clear Lake. These Modoc camps consisted of domed tule huts and associated sites. Known Modoc camp sites in the vicinity of Tule Lake include *Kumbatuash*, *Leush*, *Nakoshkeni*, *Pashka*, *Waisha*, *Wachamshwash*, *Welwashkeni*, and *Wukakeni*. The Modoc subsisted on seasonally available plant and animal resources, including gathered bird eggs, roots and berries, and fish from spring spawning runs. The Modoc moved to higher elevations during the summer, where they hunted mule deer and gathered pine nuts and

manzanita berries. Pictographs and petroglyphs present within the broader Klamath Basin are attributed in part to the Modoc peoples. (North State Resources, Inc. [NRS] 2011).

Though located outside the study area, the broader Klamath Basin also includes the traditional territories of the two other Native American peoples, the Klamath and Yahooskin. The Klamath are closely related to the Modoc, sharing similar linguistic, religious, subsistence, and settlement patterns. The traditional territories of the Klamath were concentrated around Klamath Marsh, Agency Lake, the Williamson River, Pelican Bay of Upper Klamath Lake, Klamath Falls, and the Sprague River Valley. The Yahooskin are a Yuman-speaking band of Shoshoni, whose traditional territories were concentrated around Goose, Silver, Warner, and Harney lakes, and in Surprise Valley and Klamath Marsh. (NRS 2011).

E.1.3 Historic Context

The purpose of this historic context is to illustrate pre-contact and post-contact land use and settlement patterns in the Klamath Basin and inform analysis of the potential for cultural resources within the study area.

E.1.3.1 Pre-contact Context

Archaeological evidence indicates that human occupation of the Klamath Basin dates to 12,000 to 13,000 years ago. The prehistoric period is divided into four distinct periods: the Paleoarchaic (12,000 to 7,000 years Before Present [B.P.]), Early Archaic (7,000 to 4,500 B.P.), Middle Archaic (4,500 to 2,500 B.P.), and Lake Archaic/Late Prehistoric (2,500 to 200 B.P.). The Paleoarchaic period is characterized by occupation of hunter-gatherers with high seasonal and annual mobility, low population density, and maximally flexible technologies and a broad subsistence economy of large game animals and supplemented by fish, birds, and plants. The Early Archaic period is distinguished by the first appearance of semisubterranean house pits indicative of a less mobile lifestyle, and includes artifacts such as large stemmed, lanceolate, leaf-shaped, and broad necked projectile points, knives, gravers, scrapers, cobble and ground stone tools, atlatls, and utilitarian items such as portable mortars, mullers, and stone bowls. Burial practices during this period consisted of supine burials placed in rock-covered pits.

The Middle Archaic period is characterized by a shift toward sedentary life, including increased exploitation of riverine and marsh environments and resources such as salmon and root species. Typical artifacts include milling stones and pestles, broad-necked, corner- and side-notched projectile points, bone and antler tools, and specialized fishing gear such as bone harpoon barbs and net sinkers. Additionally, burial practices transitioned to flexed burials. The Late Archaic/Late Prehistoric period is marked by the widespread appearance of pit houses, increased reliance on fishing and storage pits for salmon, camas cultivation, development of seasonal settlement and land use patterns, and adoption of the bow and arrow, indicated by small corner- and side-notched projectile points. Additionally, extensive trade networks were developed between Native American groups and burial practices shifted to cremation with associated grave goods during this period. (NRS 2011).

E.1.3.2 Post-contact Context

The earliest Euro-American exploration of the Klamath Basin occurred in 1825-1826, when a Hudson's Bay Company expedition traveled from Fort Vancouver on the Columbia River as far south as Klamath River. This early expedition was followed by John Charles Frémont's 1842 survey expedition north from California. The establishment of emigration routes through the Klamath Basin in the 1840s resulted in increased contact and conflict between Euro-American and Native

American groups. In the vicinity of Tule Lake, several instances of violent conflict occurred, including a Modoc attack in 1850 at Bloody Point that killed eighty people and retaliatory attacks on Modoc encampments led by Ben Wright in 1851 and 1852. A Modoc leader, Keintpoos (also known as Captain Jack), proposed the development of a treaty in the 1850s to the U.S. Office of Indian Affairs' appointed Indian Agent, Judge Elisha Steele. In the Treaty of 1864, the Modoc, Klamath, and Yahooskin Band of Northern Paiutes ceded their traditional territories in southern Oregon and northeastern California and were confined to the newly established Klamath Indian Reservation in exchange for thousands of dollars of supplies, which were ultimately not distributed fully or fairly among the signatory Tribes. Contemporaneous with treaty negotiations, the U.S. Army established Fort Klamath in the Wood River Valley north of Upper Klamath Lake.

Euro-American settlement of the Klamath Basin increased after the Treaty of 1864, as the settlers moved into former Native American territories, digging irrigation ditches and using the land for cattle grazing. However, small groups began leaving the Klamath Indian Reservation to return to their traditional areas or pursuing work on nearby ranches, including a band led by the Modoc leader Keintpoos. In 1872-73, the U.S. Army, at the behest of some ranchers, attempted to capture these groups and return them to the reservation, resulting in several battles between the U.S. Army and Modoc groups, known as the Modoc War. Ultimately, the bands of Keintpoos and another Modoc leader known as Hooker Jim were captured and sent to Fort Klamath for a military tribunal. Keintpoos and five other men were sentenced to death by hanging, while others were imprisoned or sent by train to the Indian Territory (now Oklahoma). (NRS 2011).

Trails and roads were further developed through the Klamath Basin in the latter half of the 19th century, including the Rancheria Trail across the southern Cascade Mountains north of Mount McLoughlin and the Applegate Trail through the Nevada desert, past Goose, Tule and Lower Klamath lakes, and across the Cascades into the Rogue River Valley, roughly following the modern alignment of Oregon State Highway 66. These rudimentary roads served as the primary transportation routes bringing settlers and supplies to the Klamath Basin from railheads along the Oregon-California border. 19th century settlers also made use of barges and small watercraft to transport people and goods along Upper Klamath Lake and its tributaries—in particular the Wood River, which ran north to Fort Klamath. As transportation infrastructure improved, logging became the increasingly dominant regional industry. While 19th century mills primarily produced lumber for local uses, the construction of rail lines to Klamath Falls at the turn of the century led to a substantial expansion of the timbering and lumber production in the Klamath Basin for wider markets, with at least thirteen companies establishing operations in the area between 1900 and 1920. Due to its reliance on timbering and lumber production, the area's economy in the 20th century largely mirrored national trends in the lumber industry, declining in the 1930s due to the Great Depression, rebounding during World War II and the post-war housing boom, and declining again in the 1960s amid a national economic slowdown and pressure from the emerging environmental and conservation movements that resulted in changing forest management practices and increased industry regulations. (NRS 2011).

E.1.3.2.1 Tule Lake Reclamation

Federal efforts to provide irrigation, flood control, land reclamation, and water storage for western homesteaders were initiated in 1902 through the passage of the Reclamation Act (Act of June 17, 1902, ch. 1093, 32 Stat. 388). Prior to the construction of the Klamath Reclamation Project, most of the lands within the current boundary of the Tulelake Irrigation District were submerged. The submergence of this land created a body of water known as Tule Lake. To reclaim this area and drain Tule Lake, two outlets were constructed in 1906-1909 at the southern end of the lake that

would direct the flow into lava beds. The flow to drain Tule Lake began in October 1909 and continued until 1912 when the lake level dropped below the elevation of the drains.

The study area includes portions of the traditional territory of the Modoc peoples, who established permanent camps around Tule Lake, Lower Klamath Lake, and Clear Lake. Prior to the construction of the Klamath Reclamation Project, most of the lands within the current boundary of the Tulelake Irrigation District were submerged. The submergence of this land created a body of water known as Tule Lake. To reclaim this area and drain Tule Lake, two outlets were constructed in 1906-1909 at the southern end of the lake that would direct the flow into lava beds. The flow to drain Tule Lake began in October 1909 and continued until 1912 when the lake level dropped below the elevation of the drains.

Construction of additional components continued during the early 1910s, including Clear Lake Dam, completed in 1910, and the Lost River Diversion Dam and Channel, completed in 1912. These facilities diverted water from the Lost River to the Klamath River and reduced flows into Tule Lake. By 1916, approximately 5,900 acres within the previously submerged region of Tule Lake had been exposed and work began on the Tule Lake portion of the Klamath Reclamation Project (Tule Lake Unit) with the construction of distribution and drainage systems for exposed lands along the northern portion of the lake. In 1917, the first Tule Lake lands opened to homestead entry. The construction of the Anderson-Rose Dam in 1920 and J-Canal in 1923 opened additional lands, with about 20,000 acres available for agricultural uses following these projects. During the 1920s and 1930s, work continued on the distribution, levee, and drainage systems within the Tule Lake Unit. By 1923, the continued diversion of Lost River water to the Klamath River and diversions for irrigation resulted in approximately 85,000 of the 90,000 previously submerged acres within the Tule Lake Unit being available for farming. During the late 1920s, as much as 50,000 acres were being farmed. A portion of the Tule Lake Project was reapportioned for the establishment of the Tule Lake Wildlife Refuge in 1928, reducing the amount of land available for agriculture. (NRS 2011).

In 1940, work began on the D-Pumping Plant. This pumping plant and the Tule Lake Tunnel were completed in November 1941. During World War II, Tule Lake was the site of the largest and longest running of the ten West Coast War Relocation Authority (WRA) concentration camps for Japanese Americans, with 18,000 detainees (NRS 2011). In 1943, the Tule Lake camp was converted to a maximum-security segregation center and detainees of the ten WRA camps identified as "disloyal" to the United States were held at the Tule Lake Segregation Center (NRS 2011). In 1952, the Tulelake Irrigation District was formed (MBK Engineers 2013). On September 10, 1956, the District entered into a contract with Reclamation for repayment of the construction charges and the transfer of the District operation and maintenance of the facilities used to deliver water to the District lands (MBK Engineers 2013).

E.1.4 Previously Identified Cultural Resources

In June 2023, a State of California Northeast Information Center records search for previously conducted cultural resource surveys and previously identified cultural resource records in the study area was conducted.

Nine cultural resource surveys have been previously conducted in the study area. These cultural resource surveys are summarized in Table E-1.

Table E-1. Previously Conducted Cultural Resource Surveys in the Study Area

Report No.	Year	Author(s)	Title	Resources
NEIC-001357	1990	Michael J. Moratto, Thomas L. Jackson, Richard Pettigrew, Randall F. Schalk, David Chavez, Eric C. Gibson, Claudia B. Hemphill, Christian J. Miss, Barry A. Price, Melinda Romano, C. Kristina Roper, Brian P. Wickstrom, Michael S. Burney, Clayton G. Lebow, Jon Silvermoon, and Michael K. Crist	Cultural Resources Assessment Report, PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California; Phase 1: Survey, Inventory, and Preliminary Evaluation of Cultural Resources	25-000077, 25-000119, 25-000128, 25-000129, 25-001205, 25-001206, 25-001207, 25-001461, 25-002555, 25-002556, 25-002557, 25-002558, 25-002559, 25-002560, 25-002561, 25-002562, 25-002563, 25-002564, 25-002565, 25-002566, 25-002567, 25-002568, 25-002569, 25-002570, 25-002571, 25-002572, 25-002573, 25-002574, 25-002575, 25-002663, 25-002664, 45-000068, 45-000420, 45-001081, 45-001474, 45-001834, 45-001835, 45-001836, 45-001837, 45-001838, 45-001839, 45-001840, 45-001841, 45-001842, 45-001843, 52-001350, 52-001527, 52-001528, 52-001529
NEIC-001357	1993	Barry Price, Timothy Canaday, Richard Pettigrew, Robert Bryson, Lou Ann Speulda, Ricky Atwell, and Michael Ostrogorsky	Archaeological Testing and Evaluation Report 1991 Field Season and Historic Properties Treatment Plan for 1992 Field Season, PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California	
NEIC-001357	1993	Melinda Romano, Lou Ann Speulda, Jill Onken, Robert Bryson, Pat Mikkelsen, Judith Willig, Fred Crisson, Lynda Sekora, Paul Bouey, Kurt Katsura, Dennis McDougall, Jessica Van der Feen, Barry Price, Craig Skinner, Nancy Sharp, Karl Benedict, and Nancy Stenholm	Archaeological Testing and Evaluation Report 1991 Field Season and Historic Properties Treatment Plan for 1992 Field Season, PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California - Vol. IID: Descriptive Reports and Data Compendia California	

Report No.	Year	Author(s)	Title	Resources
NEIC-001357	1994	Michael Moratto, Richard Pettigrew, Barry Price, Lester Ross, and Randall Schalk	Archaeological Investigations PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California - Vol. I: Project Overview, Research Design and Archaeological Inventory	
NEIC-001357	1995	William Hildebrandt, Patricia Mikkelsen, Amy Gilreath, Sharon Waechter, John Berg, Paul Bouey, C. Kristina Roper, Randall Milliken, Ricky Atwell, Andrew Bailey, Kelly McGuire, Clayton Lebow, Kurt Katsura, and Jill Onken	Archaeological Investigations PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California - Vol. IIC: Summary Reports: Prehistoric Sites California	
NEIC-001357	1995	Gary Bowyer, Lou Ann Speulda, Lynda Sekora, and Lester Ross	Archaeological Investigations PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California - Vol. III: Summary Reports: Historic Sites	
NEIC-001357	1995	Ricky Atwell, William Hildebrandt, Clayton Lebow, Patricia Mikkelsen, Michael Moratto, Richard Pettigrew, Lester Ross, Randall Schalk, Lynda Sekora, and Lou Ann Speulda	Archaeological Investigations PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California - Vol. IV: Synthesis of Findings	
NEIC-001357	1995	Robert Bryson, Craig Skinner, and Richard Pettigrew	Archaeological Investigations PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California - Vol. V: Technical Studies	
NEIC-001357	2003	Jay Lloyd, Sandra Flint, Barry Price, Randy Baloian, Douglas Harro, Philip Fulton, Terri Fulton, and Dina Coleman	Cultural Resources Investigations along Line 401 Capacity Loops 8 and 9, Modoc and Shasta Counties, California	

Fourteen cultural resource surveys have been previously conducted within 0.25-mile of the study area. These cultural resource surveys are summarized in E-2.

Table E-2. Previously Conducted Cultural Resource Surveys Within 0.25-mile of the Study Area

Report No.	Year	Author(s)	Title	Resources
NEIC-000606	1980	Inc. Wirth Associates	Western Leg- Alaska Highway Pipeline Project: Cultural Resources Volume II Pacific Gas Transmission Company, Pacific Gas and Electric Company, Evaluation of Previously Recorded Archaeological Sites	
NEIC-000711	1983	Richard E. Hughes	Exploring Diachronic Variability in Obsidian Procurement Patterns in Northeast California and Southcentral Oregon: Geochemical Characterization of Obsidian Sources and Projectile Points by Energy Dispersive X-ray Fluorescence	25-000197
NEIC-001258	1955	Robert J. Squire and Gordon L. Grosscup	Preliminary Report of Archaeological Excavations in Lower Klamath Basin, California	25-000027, 47-000002, 47-000108, 47-000223, 47-000239, 47-000242
NEIC-002270	1997	Janet P. Eidsness	Archaeological Survey of High Sensitivity Units 1 and 2 in the Northern Lakeshore Zone of Lava Beds National Monument, California	25-000039, 25-000044, 25-000045, 25-000186, 25-000190, 25-003293, 25-003478, 25-003481, 25-003482, 46-000047, 47-000077, 47-000080, 47-000081, 47-000082, 47-000083, 47-000084, 47-000090, 47-000091, 47-000093, 47-000118, 47-000119, 47-000131, 47-000146, 47-000299, 47-000302, 47-000308, 47-000320, 47-001334, 47-001426, 47-001575, 47-002205, 47-002206, 47-002207, 47-002208, 47-002209, 47-002210, 47-002211, 47-002212, 47-002213, 47-002214, 47-002215, 47-002216, 47-002217, 47-002218, 47-002219, 47-002220,

Report No.	Year	Author(s)	Title	Resources
				47-002221, 47-002222, 47-002223, 47-002224, 47-002225, 47-002226, 47-002227, 47-002228, 47-002229, 47-002230, 47-002231, 47-002232, 47-002233, 47-002234, 47-002235, 47-002236, 47-002242, 47-002243, 47-002244, 47-002245, 47-002246, 47-002247, 47-002256, 47-002376, 47-002377, 47-002378, 47-002379, 47-002381
NEIC-004392	1994	Anan W. Raymond	Cultural Resource Inventory for the Hill Road Paving Project, Tule Lake National Wildlife Refuge, Siskiyou County, California	47-000002, 47-000039, 47-000059, 47-000108, 47-000212, 47-000213, 47-000287, 47-000288, 47-003274
NEIC-005317	1998	Janet P. Eidsness	1998 Archeological Survey Sampling in Lava Beds National Monument, California	25-000029, 25-000030, 25-000032, 25-000035, 25-000037, 25-000038, 25-003291, 25-003292, 25-003499, 25-003500, 25-003501, 25-003502, 25-003503, 25-003504, 25-003505, 25-003506, 25-003507, 25-003508, 47-000004, 47-000005, 47-000033, 47-000038, 47-000151, 47-000271, 47-001586, 47-001587, 47-001598, 47-002349, 47-002350, 47-002351, 47-002352, 47-002353, 47-002354, 47-002355, 47-002356, 47-002357, 47-002358, 47-002373, 47-002374, 47-002439

Report No.	Year	Author(s)	Title	Resources
NEIC-010321	2009	Don Bignell, Breton Friel, and Paul Claeyssens	Tern Nesting Island Cultural Resources Study, Tule Lake, California	25-000040, 47-000088, 47-000089, 47-004397, 47-004398
NEIC-010629	1989	Roderick Sprague and Michael J. Rodeffer	The Tschirky Site and the Bloody Point Features, Modoc County, California	
NEIC-010637	2006	Meg Baker	Archeological Inventory of Fuel Management Projects, 2006 Field Season, Lava Beds National Monument, Siskiyou County, California	47-000004, 47-000007, 47-000031, 47-000032, 47-000048, 47-000049, 47-000050, 47-000077, 47-000101, 47-000106, 47-000107, 47-000111, 47-000112, 47-000113, 47-000117, 47-000118, 47-000120, 47-000121, 47-000122, 47-000123, 47-000125, 47-000126, 47-000128, 47-000129, 47-000130, 47-000131, 47-000133, 47-000134, 47-000135, 47-000136, 47-000137, 47-000142, 47-000143, 47-000147, 47-000150, 47-000300, 47-000304, 47-000305, 47-000313, 47-000316, 47-001325, 47-001331, 47-001332, 47-001424, 47-001425, 47-001477, 47-001478, 47-001554, 47-001555, 47-001556, 47-001557, 47-001558, 47-001559, 47-001560, 47-001561, 47-001562, 47-001563, 47-001564, 47-001565, 47-001566, 47-001567, 47-001568, 47-001569, 47-001575, 47-001585, 47-001586, 47-001587, 47-001588, 47-001589, 47-001590, 47-001591, 47-001592, 47-001594, 47-001595, 47-001597, 47-001598, 47-001599, 47-001600, 47-002233, 47-002235, 47-002244, 47-002247, 47-002352, 47-002353, 47-002354, 47-002355,

Report No.	Year	Author(s)	Title	Resources
				47-002356, 47-002357, 47-004255, 47-004256, 47-004257, 47-004258
NEIC-013725	1987	Sandra Flint	Negative Archaeological Survey Report for the Proposed Replacement of a Buried Telephone Communication Cable in the Right-of-Way of Highway 161, Siskiyou County, California	
NEIC-013996	2015	Robert McCann	A Cultural Resources Survey Report for NRCS Project 15FY25-0015: Woodhouse Irrigation Project, Modoc County, California	
NEIC-014075	2018	Jason Coleman	Cultural Resources Survey Report for the Northeastern California Wetland Habitat Project, Phase IV - Tule Lake NWR, Modoc County, California	
NEIC-014272	2018	Allison West	NRCS Project #18FY47-0003: Field Office Report of Cultural	

Report No.	Year	Author(s)	Title	Resources
			Resources Ground Survey Findings	
NEIC-014275	2016	Robert McCann	Cultural Resources Survey Report for NRCS Project #17FY47-0006: Proposed Seus Family Farms Irrigation Improvement Project, Modoc County, California	

No cultural resources have been previously identified in the study area. Twenty-three cultural resources have been previously identified within 0.25-mile of the study area. These archaeological resources are summarized in Table E-3.

Table E-3. Previously Identified Cultural Resources Within 1-mile of the Study Area

Primary No.	Trinomial	Type/Age	Reports
P-25-000035	CA-MOD-000035	Site/Prehistoric	NEIC-001120, NEIC-005317, NEIC-009104
P-25-000036	CA-MOD-000036	Site/Prehistoric	NEIC-001120
P-25-000037	CA-MOD-000037	Site/Prehistoric	NEIC-005317
P-25-000067	CA-MOD-000067	Site/Prehistoric	N/A
P-25-000080	CA-MOD-000080	Site/Unknown	N/A
P-25-000122	CA-MOD-000122	Site/Prehistoric	N/A
P-25-000185	CA-MOD-000185	Site/Prehistoric	NEIC-009104
P-25-000188	CA-MOD-000188	Site/Prehistoric	NEIC-009104
P-25-002653	CA-MOD-002653	Site/Prehistoric	NEIC-001201
P-25-003293	CA-MOD-003293	Site/Prehistoric	NEIC-002270, NEIC-009104
P-25-003505	CA-MOD-003505H	Site/Historic	NEIC-005317, NEIC-009104
P-25-006446	N/A	Site/Unknown	NEIC-009104
P-25-008297	N/A	District/ Prehistoric, Historic	N/A
P-47-000002	CA-SIS-000002	Site/Prehistoric	NEIC-001258, NEIC-004392
P-47-000012	CA-SIS-000012	Site/Prehistoric	NEIC-007362

P-47-000108	CA-SIS-000108	Site/Prehistoric	NEIC-001258, NEIC-004392
P-47-000208	CA-SIS-000208	Site/ Prehistoric, Unknown	N/A
P-47-000209	CA-SIS-000209	Site/Prehistoric	N/A
P-47-000215	CA-SIS-000215	Site/Prehistoric	N/A
P-47-000216	CA-SIS-000216	Site/Prehistoric	N/A
P-47-000233	CA-SIS-000233	Site/ Prehistoric, Unknown	N/A
P-47-000260	CA-SIS-000260	Site/ Protohistoric	N/A
P-47-001491	CA-SIS-001491	Site/Prehistoric	N/A

References

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North State Resources, Inc. (NRS). 2011. Klamath Basin NWR Complex Cultural Resources Assessment, May. Redding, CA. Prepared for U.S. Fish and Wildlife Service, Region 9, Pacific Southwest Klamath Basin National Wildlife Refuge Complex, Tule Lake, CA.

U.S. Department of the Interior, National Park Service (NPS). 2006. Tule Lake Segregation Center--National Register's Asian-Pacific American Heritage Month Feature. National Historic Landmarks Collection. U.S. Department of Interior. Washington, D.C.

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E.2 Additional Supporting Information for Soils and Land Use

E.2.1 Soil Series Descriptions

Tulebasin mucky silty clay loam makes up 28 percent of the project area. The Tulebasin series consists of very deep, very poorly drained soils that formed in lacustrine deposits derived from diatoms and volcanic ash. These soils are in lake basins and have slopes of 0 to 1 percent. Tulebasin soils are used as cropland and for hay and pasture. Crops commonly grown are irrigated wheat, barley, oats, potatoes, and alfalfa.

Laki fine sandy loam makes up 15 percent of the project area. The Laki series consists of deep, moderately well drained soils that formed in mixed sediments having small amounts of ash. Laki soils are on terraces and have slopes of 0 to 2 percent. The soils are used for irrigated crops including potatoes, alfalfa hay, barley, wheat, oats, pasture, and annual hay crops. They also are used for homesites and wildlife habitat. Native vegetation dominantly is rabbitbrush, greasewood, and saltgrass.

Fordney loamy fine sand makes up 15 percent of the project area. The Fordney series consists of very deep, excessively drained soils that formed in alluvium or lacustrine deposits derived from volcanic rocks with an influence of volcanic ash. Fordney soils are on lake terraces, stream terraces, and fan remnants. Slopes are 0 to 20 percent. Fordney soils are used mainly for irrigated crops, livestock grazing, and homesite development. The vegetation in rangeland is mainly antelope bitterbrush, basin big sagebrush, Thurber's needlegrass, Indian ricegrass, and bluebunch wheatgrass.

Poe loamy fine sand makes up 11 percent of the project area. The Poe series consists of moderately deep, somewhat poorly drained soils that formed in sediments weathered from tuff, basalt, diatomite, and ash. Poe soils are on terraces and have slopes of 0 to 2 percent. The soils are used for production of irrigated crops including potatoes, alfalfa hay, wheat, oats, barley, and pasture. They also are used for dwellings and for other community uses.

E.2.2 Land Use Supporting Information

Crops Grown in the Tulelake Irrigation District.

Crop	Total Acreage (2019)	Percentage Acreage (2019)
Cereals (wheat, barley, oats)	19,746	32.8%
Forage (alfalfa, hay, irrigated pasture)	27,527	45.7%
Vegetables (potatoes, onions, garlic, mint, horseradish, other)	12,968	21.5%
Total	**60,241**	**100%**

Source: Tulelake Irrigation District, Tulelake Irrigation District General Information Sheet.

E.3 Additional Supporting Information for Vegetation Resources

E.3.1 Special-Status Species

Federal and state databases of threatened, endangered, candidate, and other sensitive plant species protected under the federal Endangered Species Act (ESA) or by the states of California or Oregon were consulted to determine the potential for these species to be present within the TID (USFWS 2026; Oregon Biodiversity Information Center [ORBIC] 2023; CNDDB 2023a). No documented occurrences of special-status plant species were identified.

Greene's tuctoria (*Tuctoria greenei*), listed as endangered, and Slender Orcutt grass (*Orcuttia tenuis*), listed as threatened, were listed by USFWS (2026) to potentially occur within the study area. However, there are no records of these species in the study area and these species associate with a habitat type (vernal pools) that is absent from the study area. Applegate's milkvetch (*Astragalus*

applegatei), federally listed as endangered, has the potential to occur on TLNWR because of previous occurrences within the vicinity, but there are no known modern occurrences (USFWS 2016). Additionally, because the majority of the District's area is actively cultivated for agricultural crops, it is likely that ongoing disturbance would preclude suitable habitat availability. As a result, no federally or state-listed plant species or their habitats are considered likely to be present within the District or surrounding vicinity. The extensive area of cultivated crop land and the seasonally fluctuating hydrology of sumps, canals, and irrigated areas likely prevent suitable habitat for these species.

A survey for species' presence and presence of suitable habitat was not conducted. Species' occurrence potential was evaluated based on available aerial imagery, background information (USFWS 2026; ORBIC 2023; CNDDB 2023a), and habitat types as represented by land cover types (USGS 2019).

E.3.2 Invasive and Noxious Weed Species

Plant pests within the TID are defined by law, regulation, and technical organizations, and are regulated by many different sources, including the California Department of Food and Agriculture (CDFA), Oregon Department of Agriculture (ODA), and the U.S. Department of Agriculture (USDA).

The CDFA uses an action-oriented pest-rating system. The rating assigned to a pest by the CDFA does not necessarily mean that one with a low rating is not a problem; rather, the rating system is meant to prioritize response by the CDFA and county agricultural commissioners.

The purpose of the ODA classification system is to act as the ODA's official guideline for prioritizing and implementing noxious weed control projects, assist the ODA in the distribution of available funds for Oregon State Weed Board grants and county noxious weed control requests, and serve as a model for the private and public sectors in developing noxious weed classification systems. The CDFA and ODA list categories are explained below. Invasive and noxious weeds known to occur within the vicinity of the District, and their respective status in each state, are listed below.

California Department of Food and Agriculture Categories (CDFA 2023)

- A-An organism of known economic importance subject to state (or commissioner when acting as a state agent) enforced action involving eradication, quarantine, containment, rejection, or other holding action.
- B-An organism of known economic importance subject to eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner; or an organism of known economic importance subject to state endorsed holding action and eradication only when found in a nursery.
- C-An organism subject to no state enforced action outside of nurseries except to retard spread at the discretion of the commissioner; or an organism subject to no state enforced action except to provide for pest cleanliness in nurseries.
- Q-An organism or disorder requiring temporary "A" action pending determination of a permanent rating. The organism is suspected to be of economic importance but its status is uncertain because of incomplete identification or inadequate information. In the case of an established infestation, at the discretion of the Assistant Director for Plant Industry, the Department will conduct surveys and will convene the Division Pest Study Team to determine a permanent rating.
- D-No action.

Oregon Department of Agriculture Categories (ODA 2022).

- A-Designated weed – a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur but its presence in neighboring states makes future occurrence in Oregon seem imminent. Recommended action: infestations are subject to eradication or intensive control when and where found.
- B-Designated weed – a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. Recommended action: limited to intensive control at the state, county, or regional level as determined on a case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control (when available) shall be the main control method.
- T-Designated weed – a priority noxious weed designated by the Oregon State Weed Board as a target on which the ODA will develop and implement a statewide management plan. "T" designated noxious weeds are species selected from either the "A" or "B" list.

Invasive and/or Noxious Weeds Occurring within Tulelake Irrigation District

Common Name	Scientific Name	ODA Classification	CDFA Classification
Bull thistle	*Cirsium vulgare*	B	C
Canada thistle	*Cirsium arvense*	B	B
Diffuse knapweed	*Centaurea diffusa*	B	A
Dyer's woad	*Isatis tinctoria*	B	B
Field bindweed	*Convolvulus arvensis*	B	N/A
Mediterranean sage	*Salvia aethiopis*	B	B
Musk thistle	*Carduus nutans*	B	A
Perennial pepperweed	*Lepidium latifolium*	B (T)	B
Poison hemlock	*Conium maculatum*	B	N/A
Puncturevine	*Tribulus terrestris*	B	C
Purple loosestrife	*Lythrum salicaria*	B	B
Scotch thistle	*Onopordum acanthium*	B	A
Spotted knapweed	*Centaurea stoebe*	B (T)	A
Taurian thistle	*Onopordum tauricum*	A (T)	N/A
Yellow flag iris	*Iris pseudacorus*	B	B
Yellow star thistle	*Centaurea solstitialis*	B	C
Whitetop (hoary cress)	*Lepidium draba*	B	N/A

Sources: ODA Oregon Weed Mapper
CAL-IPC CalWeedMapper

References

California Department of Food and Agriculture (CDFA). 2023. *Encycloweedia: Weed ratings.* **https://www.cdfa.ca.gov/plant/IPC/encycloweedia/winfo_weedratings.html.**

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Oregon Biodiversity Information Center (ORBIC). 2023. *Oregon Biodiversity Information Center.* Oregon State University Institute for Natural Resources and Portland State University. **https://inr.oregonstate.edu/orbic.** Accessed June 8, 2023.

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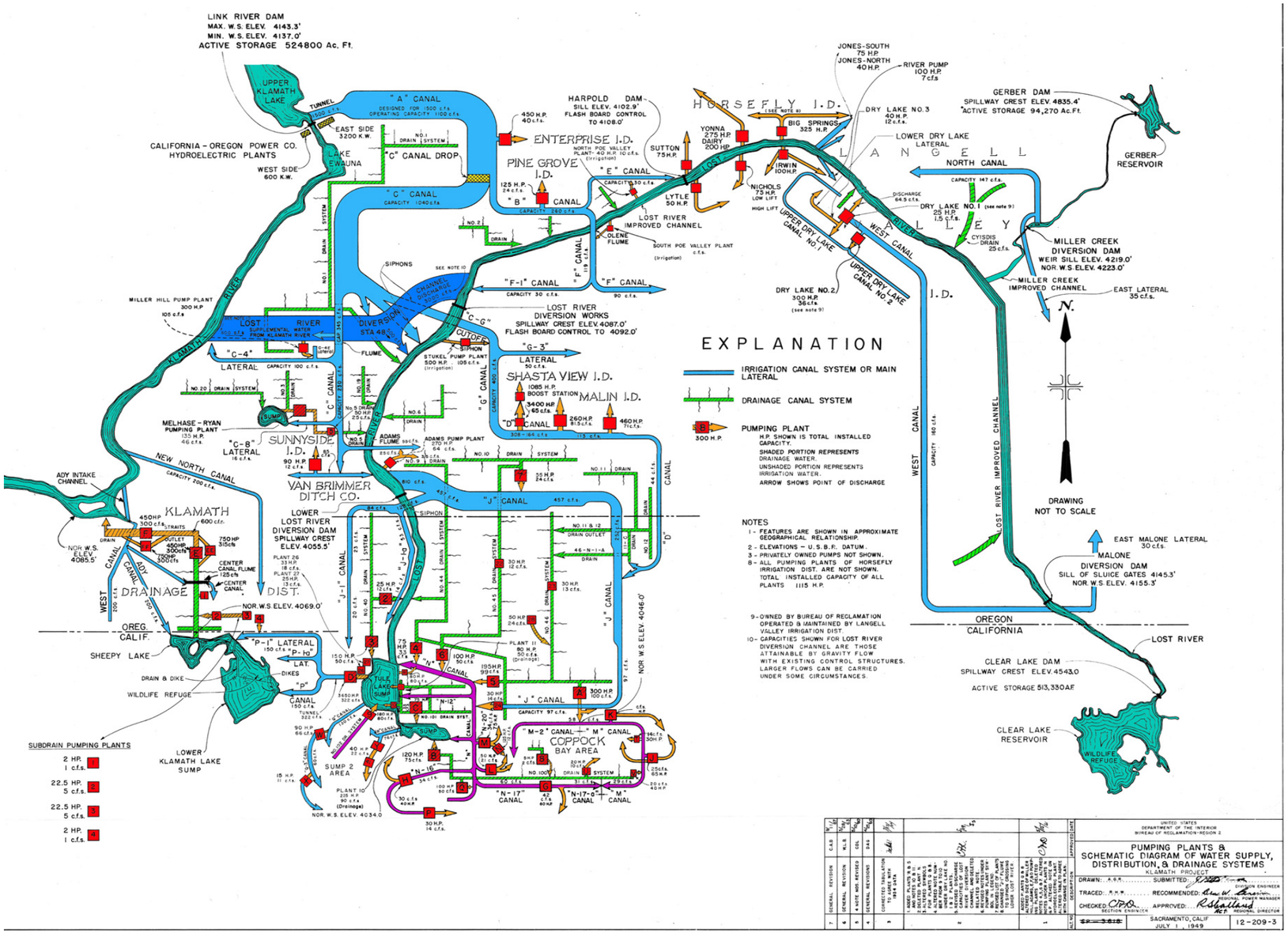
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E.4 Additional Supporting Information for Water Resources

E.4.1 Schematic Diagram of Klamath Project Water Supply, Distribution, and Drainage Systems

See figure on next page

.


LINK RIVER DAM
MAX. W.S. ELEV. 4143.3'
MIN. W.S. ELEV. 4137.0'
ACTIVE STORAGE 524800 Ac. Ft.
UPPER KLAMATH LAKE
TUNNEL
"A" CANAL
DESIGNED FOR 1500 c.f.s.
OPERATING CAPACITY 1100 c.f.s.
CALIFORNIA - OREGON POWER CO.
HYDROELECTRIC PLANTS
EAST SIDE
3200 K.W.
WEST SIDE
600 K.W.
LAKE EWAUNA
"C" CANAL DROP
"C" CANAL
CAPACITY 1040 c.f.s.
HARPOLD DAM
SILL ELEV. 4102.9'
FLASH BOARD CONTROL
TO 4108.0'
ENTERPRISE I.D.
PINE GROVE I.D.
"B" CANAL
CAPACITY 260 c.f.s.
"E" CANAL
CAPACITY 130 c.f.s.
SUTTON
LYTLE
IRWIN
NICHOLS
LOST RIVER IMPROVED CHANNEL
OLENE FLUME
SOUTH POE VALLEY PLANT
(Irrigation)
"F" CANAL
"F-1" CANAL
CAPACITY 30 c.f.s.
HORSEFLY I.D.
BIG SPRINGS
DRY LAKE NO. 3
YONNA DAIRY
JONES-SOUTH
JONES-NORTH
RIVER PUMP
LANGELL VALLEY I.D.
LOWER DRY LAKE LATERAL
NORTH CANAL
CAPACITY 147 c.f.s.
DRY LAKE NO. 1
DRY LAKE NO. 2
UPPER DRY LAKE CANAL NO. 1
UPPER DRY LAKE CANAL NO. 2
WEST CANAL
CYSIDS DRAIN
GERBER DAM
SPILLWAY CREST ELEV. 4835.4'
ACTIVE STORAGE 94,270 Ac. Ft.
GERBER RESERVOIR
MILLER CREEK DIVERSION DAM
WEIR SILL ELEV. 4219.0'
NOR. W.S. ELEV. 4223.0'
MILLER CREEK IMPROVED CHANNEL
EAST LATERAL
35 c.f.s.
MILLER HILL PUMP PLANT
300 H.P.
105 c.f.s.
KLAMATH RIVER
LOST RIVER
SUPPLEMENTAL WATER FROM KLAMATH RIVER
DIVERSION STA 48
LOST RIVER DIVERSION CHANNEL
LOST RIVER DIVERSION WORKS
SPILLWAY CREST ELEV. 4087.0'
FLASH BOARD CONTROL TO 4092.0'
"C-4" LATERAL
CAPACITY 100 c.f.s.
STUKEL PUMP PLANT
500 H.P.
105 c.f.s.
(Irrigation)
"G-3" LATERAL
50 c.f.s.
SHASTA VIEW I.D.
MALIN I.D.
"D" CANAL
"G" CANAL
"C" CANAL
MELHASE - RYAN PUMPING PLANT
135 H.P.
46 c.f.s.
"C-8" LATERAL
16 c.f.s.
SUNNYSIDE I.D.
90 H.P.
12 c.f.s.
ADAMS PUMP PLANT
270 H.P.
64 c.f.s.
ADAMS FLUME
ADY INTAKE CHANNEL
NEW NORTH CANAL
CAPACITY 200 c.f.s.
VAN BRIMMER DITCH CO.
"J" CANAL
457 c.f.s.
LOWER LOST RIVER DIVERSION DAM
SPILLWAY CREST ELEV. 4055.5'
"J-1" CANAL
"J-10" CANAL
"J" CANAL
CAPACITY 97 c.f.s.
NOR. W.S. ELEV. 4046.0'
KLAMATH DRAINAGE DIST.
WEST ADY CANAL
ADY CANAL
NOR. W.S. ELEV. 4085.5'
CENTER CANAL FLUME
CENTER CANAL
NOR. W.S. ELEV. 4069.0'
OREG. CALIF.
SHEEPY LAKE
DRAIN & DIKE
WILDLIFE REFUGE
"P-1" LATERAL
150 c.f.s.
"P-10" LAT.
DIKES
"P" CANAL
150 c.f.s.
LOWER KLAMATH LAKE SUMP
SUBDRAIN PUMPING PLANTS
2 HP. 1 c.f.s.
22.5 HP. 5 c.f.s.
22.5 HP. 5 c.f.s.
2 HP. 1 c.f.s.
SUMP 2 AREA
PLANT 10
225 H.P.
90 c.f.s.
(Drainage)
NOR. W.S. ELEV. 4034.0
"N" CANAL
"N-12"
"N-16"
"N-17" CANAL
"N-17-0" CANAL
"M" CANAL
"M-2" CANAL
COPPOCK BAY AREA
EXPLANATION
IRRIGATION CANAL SYSTEM OR MAIN LATERAL
DRAINAGE CANAL SYSTEM
PUMPING PLANT
H.P. SHOWN IS TOTAL INSTALLED CAPACITY.
SHADED PORTION REPRESENTS DRAINAGE WATER
UNSHADED PORTION REPRESENTS IRRIGATION WATER.
ARROW SHOWS POINT OF DISCHARGE
NOTES
1 - FEATURES ARE SHOWN IN APPROXIMATE GEOGRAPHICAL RELATIONSHIP.
2 - ELEVATIONS - U.S.B.R. DATUM.
3 - PRIVATELY OWNED PUMPS NOT SHOWN.
8 - ALL PUMPING PLANTS OF HORSEFLY IRRIGATION DIST. ARE NOT SHOWN. TOTAL INSTALLED CAPACITY OF ALL PLANTS 1115 H.P.
9 - OWNED BY BUREAU OF RECLAMATION OPERATED & MAINTAINED BY LANGELL VALLEY IRRIGATION DIST.
10 - CAPACITIES SHOWN FOR LOST RIVER DIVERSION CHANNEL ARE THOSE ATTAINABLE BY GRAVITY FLOW WITH EXISTING CONTROL STRUCTURES. LARGER FLOWS CAN BE CARRIED UNDER SOME CIRCUMSTANCES.
DRAWING NOT TO SCALE
EAST MALONE LATERAL
30 c.f.s.
MALONE DIVERSION DAM
SILL OF SLUICE GATES 4145.3'
NOR. W.S. ELEV. 4155.3'
OREGON
CALIFORNIA
LOST RIVER
CLEAR LAKE DAM
SPILLWAY CREST ELEV. 4543.0
ACTIVE STORAGE 513,330 A.F.
CLEAR LAKE RESERVOIR
WILDLIFE REFUGE
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION - REGION 2
PUMPING PLANTS & SCHEMATIC DIAGRAM OF WATER SUPPLY, DISTRIBUTION, & DRAINAGE SYSTEMS
KLAMATH PROJECT
DRAWN: A.G.K.
TRACED: R.M.P.
CHECKED: C.P.R.
SUBMITTED:
RECOMMENDED:
APPROVED:
REGIONAL POWER MANAGER
REGIONAL DIRECTOR
SACRAMENTO, CALIF.
JULY 1, 1949
12-209-3

E.5 Additional Supporting Information for Fish and Aquatic Species

E.5.1 General Fish and Aquatic Species

Fish documented in the Klamath Basin above Iron Gate Dam include the following (NRC 2004):

Fish documented in the Klamath Basin above Iron Gate Dam[1]

Common Name	Scientific Name	Native/Non-Native
Klamath River lamprey	*Lampetra similis*	Native
Klamath largescale sucker	*Catostomus snyderi*	Native
Miller Lake Lamprey	*Lampetra milleri*	Native
Klamath smallscale sucker	*Catostomus rimiculus*	Native
Pit-Klamath brook lamprey	*Lampetra lethophaga*	Native
Redband/Rainbow trout	*Oncorhynchus mykiss gairdneri*	Native
Klamath tui chub	*Siphatales bicolor*	Native
Bull trout	*Salvelinus confluentus*	Native
Blue chub	*Gila coerulea*	Native
Klamath Lake sculpin	*Cottus princeps*	Native
Klamath speckled dace	*Rhinichthys osculus klamathensis*	Native
Slender sculpin	*Cottus tenuis*	Native
Shortnose sucker	*Chasmistes brevirostris*	Native
Lost River sucker	*Deltistes luxatus*	Native
Upper Klamath marbled sculpin	*Cottus klamathensis*	Native
Goldfish	*Carassius auratus*	Non-Native
Brown trout	*Salmo trutta*	Non-Native
Golden shiner	*Notemigonus chrysoleucas*	Non-Native
Sacramento perch	*Archoplites interruptus*	Non-Native
Fathead minnow	*Pimephales promelas*	Non-Native
White crappie	*Pomoxis annularis*	Non-Native
Yellow bullhead	*Ameiurus natalis*	Non-Native
Black crappie	*Pomoxis nigromaculatus*	Non-Native
Brown bullhead	*Ameiurus nebulosus*	Non-Native
Green sunfish	*Lepomis cyanellus*	Non-Native
Black bullhead	*Ameiurus melas*	Non-Native
Bluegill	*Lepomis macrochirus*	Non-Native

Common Name	Scientific Name	Native/Non-Native
Channel catfish	*Ictalurus punctatus*	Non-Native
Pumpkinseed	*Lepomis gibbosus*	Non-Native
Kokanee salmon	*Oncorhynchus nerka*	Non-Native
Largemouth bass	*Micropterus salmoides*	Non-Native
Brook trout	*Salvelinus fontinalis*	Non-Native
Yellow perch	*Perca flavescens*	Non-Native

[1] Note: Removal of the Klamath River dams is expected to restore access for anadromous salmonids to the Klamath Basin. The list of species documented in this area may grow as post-removal monitoring occurs.

Native fish species occurring in the Klamath Basin National Wildlife Refuge Complex include the shortnose sucker and Lost River sucker, both federally listed as endangered species (see Federal and State Listed Species below), as well as lamprey (i.e., Pacific lamprey and Pit-Klamath brook lamprey), minnows (i.e., tui chub and blue chub), sculpin (i.e., Klamath Lake sculpin, marbled sculpin, and slender sculpin), and the Klamath redband trout. Steelhead, Chinook, and coho salmon once migrated up the Klamath River to within the vicinity of the study area where the upstream extent was limited by natural barriers. These anadromous runs have since been extirpated above Iron Gate Dam. However, with the removal of Iron Gate Dam along with J.C. Boyle, Copco 1, and Copco 2 dams in 2024, these anadromous species are anticipated to rapidly colonize historic habitat within the Upper Klamath Basin. Non-native fish species that have been introduced include fathead minnow in Upper Klamath Lake, Sacramento perch in Clear Lake, brown bullhead, green sunfish, bluegill, pumpkinseed, largemouth bass, white crappie, black crappie, and yellow perch. In addition, non-native bullfrog (*Lithobates catesbeianus*) populations have been increasing in the region, which represents a potential risk to native amphibian populations.

References

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E.6 Additional Supporting Information for Wildlife

E.6.1 General Wildlife

Wildlife species that may use habitats in TID are largely habitat generalists and other species that are able to adapt to or exploit the agricultural environment. Small mammals that are present in the District include several species of shrews, moles, squirrels, gophers, rabbits, mice, and bats. Large mammals potentially found include mule deer (*Odocoileus hemionus*), Roosevelt elk (*Cervus canadensis roosevelti), pronghorn* (*Antilocapra americana*), American badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), and coyote (*Canis latrans*). Amphibian species that may occur include the long-toed salamander (*Ambystoma macrodactylum*), rough-skinned newt (*Taricha granulosa*), Great Basin spadefoot (*Spea intermontana*), Cascades frog (*Rana cascadae*), western toad (*Anaxyrus boreas*), Pacific treefrog *(Pseudacris regilla), and bullfrog* (*Lithobates catesbeianus*) (USFWS 2016). Animals in the area commonly use the District's canals and drains as habitat and water sources. Larger mammals such as deer,

pronghorn, and elk are commonly seen grazing in the fields within the District's irrigated lands (NRCS 2022).

E.6.2 Migratory Bird Treaty Act / Bald and Golden Eagle Protection Act Protected Species

Approximately 80 percent of migratory waterfowl on the Pacific Flyway pass through the District and surrounding region during spring and fall migrations, connecting waterfowl breeding grounds in the north with major wintering grounds in California and Mexico. Waterfowl migration begins in early September with the arrival of northern pintails (*Anas acuta*) and greater white-fronted geese (*Anser albifrons*). Up to a million ducks, geese, and swans are typically present by early November with major species including mallard (*Anas platyrhynchos*), American wigeon (Mareca americana), green-winged teal (*Anas carolinensis*), snow geese (*Anser caerulescens*), Ross' geese (*Anser rossii*), Canada geese (*Branta canadensis*), and tundra swan (*Cygnus columbianus*) (NRCS 2022).

E.6.3 Federally Listed Species

A review of federally and state-listed and sensitive wildlife species that may potentially be present in TID and vicinity was performed using the USFWS Official Species list for the study area (USFWS 2026), the ORBIC data report (ORBIC 2023), and the CNDDB list of endangered, threatened, and rare animals (CNDDB 2023b). The identified ranges of two federally listed species overlap the study area. These are the gray wolf (*Canis lupus*) and the yellow-billed cuckoo (Coccyzus americanus occidentalis). No areas within the District boundaries have been designated or proposed for designation as critical habitat for any of these species.

Monarch butterfly (*Danaus plexippus*) and Suckley's cuckoo bumble bee, proposed to be listed as threatened and endangered (respectively) under the ESA, are potentially present in the study area (USFWS 2026). Suckley's cuckoo bumble bee is not anticipated to be present in the study area due to unsuitable habitat but monarch butterfly is known to be present throughout the Klamath Basin (USFWS 2023b) and is therefore assumed to be present from June 1 to September 30, which is the breeding season for the species within the region (Xerces Society 2018). However, construction activities would occur during the non-irrigation season, which is when monarch butterflies are absent from the region. Therefore, the Modernization Alternative would have no effect on monarch butterfly.

The northwestern pond turtle (*Actinemys marmorata*) is likely to be present in the TID and vicinity due to the presence of potentially suitable habitat (CDFW 2016; USGS GAP 2018). This species is currently proposed for listing under the ESA. There is no critical habitat designation for this species.

Gray Wolf

The USFWS issued a rule in January 2021 delisting the gray wolf everywhere it was listed in the Lower 48 United States. In February 2022, that delisting was vacated by the U.S. District Court for the Northern District of California, reinstating protection under the ESA for all gray wolves outside of the Northern Rocky Mountain region distinct population segment (DPS) as either endangered or threatened.

Wolves are habitat generalists and establish territories wherever sufficient food resources are present. Young individuals disperse on average 40 to 60 miles to establish new territories. The gray wolf has been known to occur within the boundaries of the Lower Klamath National Wildlife Refuge and TLNWR (USFWS 2016) and two breeding populations of gray wolves are documented to occur within 50 miles of the District (ODFW 2022). Given its large home range, this species could potentially occur within the District. However, because fragmented pockets of agriculture,

urbanized development, and transportation infrastructure provide barriers to movement for breeding wolf populations, it is unlikely that gray wolves use habitat within the District on an ongoing basis.

Yellow-billed Cuckoo

TID is located within the identified range of the yellow-billed cuckoo, federally listed as threatened. However, this species is unlikely to occur within District boundaries. The species is exceedingly rare in Oregon (78 FR 61621), there are no known observations in the District or surrounding region (ORBIC 2023; eBird 2023), and there is no suitable habitat. This species is also not on the official federal species list for the TLNWR or nearby wildlife refuges within the complex (USFWS 2016). Yellow-billed cuckoo is therefore not addressed further in this Plan-EA.

Northwestern Pond Turtle

Northwestern pond turtles are known to occur within the Tulelake Irrigation District Watershed Area (USFWS 2023c; CNDDB 2024) and in Tule Lake (USFWS 2016). The Oregon Biodiversity Information Center has no records of Northwestern pond turtle in or adjacent to the project area (ORBIC 2023). This species was proposed for listing under the ESA on October 3, 2023 (88 Federal Register 68370). The final listing decision is currently anticipated as early as fall 2024.

Northwestern pond turtles are semi-aquatic, using terrestrial and aquatic habitats for various life history phases. Terrestrial environments are needed for nesting and aestivation, and aquatic environments are used for breeding and feeding (USFWS 2023c). Both aquatic and terrestrial environments are used for basking, overwintering, and movement/dispersal (USFWS 2023c). Aquatic environments used by Northwestern pond turtles include intermittent streams, canals, lakes, and reservoirs. The species prefers aquatic environments that have standing or slow-moving water and that contain abundant basking sites and underwater shelter sites (USFWS 2023c). Northwestern pond turtles may be found in some larger rivers but are generally restricted to areas near the river bank or in adjacent backwater habitat where the current is slower and where basking sites exist (WDW 1994). Streams, rivers, and artificial small ponds with muddy bottoms, abundant basking sites, aquatic refugia, and slow-moving or standing water are the most common and preferred habitats for the species (Bury and Germano 2008; ODFW 2023). The northwestern pond turtle could potentially be present in the District's conveyance system based on the presence of potentially suitable habitat (CDFW 2016; USGS GAP 2018).

E.6.4 State-Listed Species

A list of wildlife species protected by the State of Oregon (Oregon Administrative Rules [OAR] 635-100-0105) that may be present within the District was compiled using the ORBIC data report (ORBIC 2023). Species protected by the State of California (CA Fish & Game Code § 2050 - 2115.5) were identified using the state's most current inventory of listed endangered and threatened animals (CNDDB 2023b).

The table below includes State-listed and sensitive wildlife species that may be present in the District vicinity, along with their respective listing status by state.

Summary of Federally and State-listed and Sensitive Wildlife Species Potentially Occurring in Tulelake Irrigation District and Vicinity.

Species Group	Common Name *(Scientific Name)*	Federal Listing	State Listing
Mammals	Gray wolf (*Canis lupus*)	Endangered	Oregon – Endangered California – Endangered
Birds	Northern goshawk (*Accipiter gentilis*)	No status	Oregon – Sensitive California – Not Listed
	Swainson's hawk (*Buteo swainsoni*)	No status	Oregon – Sensitive California – Threatened
	Greater sandhill crane (*Grus canadensis tabida*)	No status	Oregon – Not Listed California – Threatened
	Yellow-billed cuckoo (*Coccyzus americanus*)	Threatened	Oregon – Not Listed California – Endangered
	Bank swallow (*Riparia riparia*)	No status	Oregon – Not Listed California – Threatened
	Tricolored blackbird (*Agelaius tricolor*)	No status	Oregon – Not Listed California – Threatened
Insects	Monarch butterfly (*Danaus plexippus*)	Proposed for listing as Threatened	Oregon – Not Listed California – Not Listed
	Suckley's cuckoo bumble bee (*Bombus suckleyi*)	Proposed for listing as Endangered	Oregon – Not Listed California – Not Listed

Source: USFWS 2026; ORBIC 2023; CNDDB 2023b.

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E.7 Additional Supporting Information for Wetlands

Based on an analysis of the National Wetland Inventory (NWI) geographic information systems (GIS) data (USFWS 2023), the tabled below summarizes wetland types, and the acres of wetland within the project area that has the potential to be affected by the proposed project. A 50-foot radius for each project site was used. The figures below show the wetlands that are next to SCADA Sites J-22-1 and Q-1.

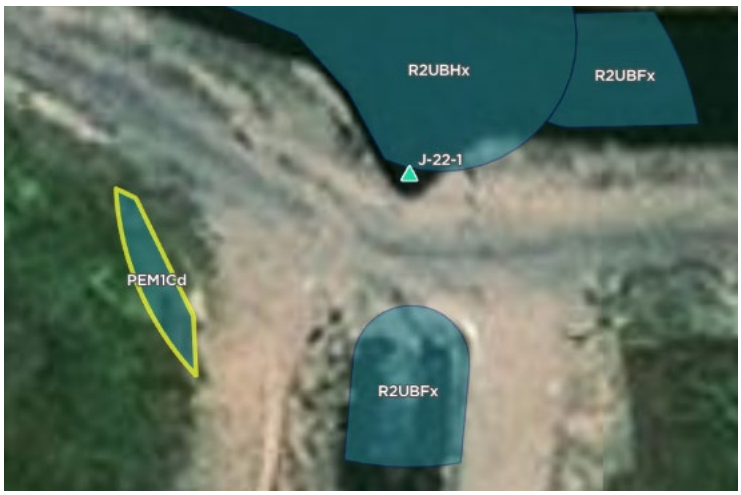
Project Sites and Associated Wetland Types

Project Component	Type of Wetland	Acres of Wetland within the Project Area (Acres)
A Plant	Riverine	0.06
D Canal Spill	Riverine	0.05
J-10-1	Riverine	0.03
J-10-2	Riverine	0.04
J-10-3	Riverine	0.04
J-10-4	Riverine	0.04
J-10-5	Riverine	0.04
J-10-6	Riverine	0.04
J-10-7	Riverine	0.06
J-10-8	Riverine	0.05
J-1-1	Riverine	0.07
J-11-1	Riverine	0.00
J-11-2	Riverine	0.06
J-1-2	Riverine	0.04
J-1-3	Riverine	0.07
J-13-1	Riverine	0.06
J-13-2	Riverine	0.05
J-1-4	Riverine	0.06
J-14-1	Riverine	0.08
J-14-2	Riverine	0.04
J-14-3	Riverine	0.04
J-14-4	Riverine	0.05

Project Component	Type of Wetland	Acres of Wetland within the Project Area (Acres)
J-14-5	Riverine	0.07
J-1-5	Riverine	0.06
J-15-1	Riverine	0.08
J-15-2	Riverine	0.05
J-1-6	Riverine	0.06
J-16-1	Riverine	0.05
J-16-2	Riverine	0.06
J-1-7	Riverine, Freshwater Emergent	0.08
J-18-1	Riverine	0.04
J-18-2	Riverine	0.05
J-18-3	Riverine	0.05
J-1-A-1-1	Riverine	0.00
J-1-A-1-2	Riverine	0.05
J-1-A-1-3	Riverine	0.05
J-1-A-1-4	Riverine	0.05
J-1-A-1-5	Riverine	0.06
J-1-A-1-6	Riverine	0.05
J-1-A-1-7	Riverine	0.03
J-1-A-1-8	Riverine	0.05
J-1-A-1-9	Riverine	0.05
J-1-A-X	Riverine	0.04
J-21-1	Riverine	0.09
J-21-2	Riverine	0.04
J-22-1	Riverine, Freshwater Emergent	0.06
J-22-2	Riverine	0.04
J-22-3	Riverine	0.04
J-22-A	Riverine	0.04
J-22-B	Riverine	0.04
J-3-1	Riverine	0.04

Project Component	Type of Wetland	Acres of Wetland within the Project Area (Acres)
J-3-2	Riverine	0.06
J-5-1	Riverine	0.05
J-5-2	Riverine	0.05
J-6-1	Riverine	0.01
J-6-2	Riverine	0.06
J-7-1	Riverine	0.04
J-7-2	Riverine	0.07
J-8-1	Riverine	0.03
J-8-2	Riverine	0.04
J-9-1	Riverine	0.03
J-9-10	Riverine	0.04
J-9-2	Riverine	0.04
J-9-3	Riverine	0.05
J-9-4	Riverine	0.05
J-9-5	Riverine	0.05
J-9-6	Riverine	0.07
J-9-7	Riverine	0.05
J-9-8	Riverine	0.08
J-9-9	Riverine	0.05
N-16	Riverine	0.09
N-17	Riverine	0.04
N-Extension	Riverine	0.06
N-Extension 2	Riverine	0.01
Q-1	Riverine	0.07
Pump 10	Riverine	0.15
Pump 11	Riverine	0.04
Pump 12	Riverine	0.10
Pump 2	Riverine	0.06
Pump 22	Riverine	0.05
Pump 23	Riverine	0.05
Pump 24	Riverine	0.04
Pump 27	NA	0.00

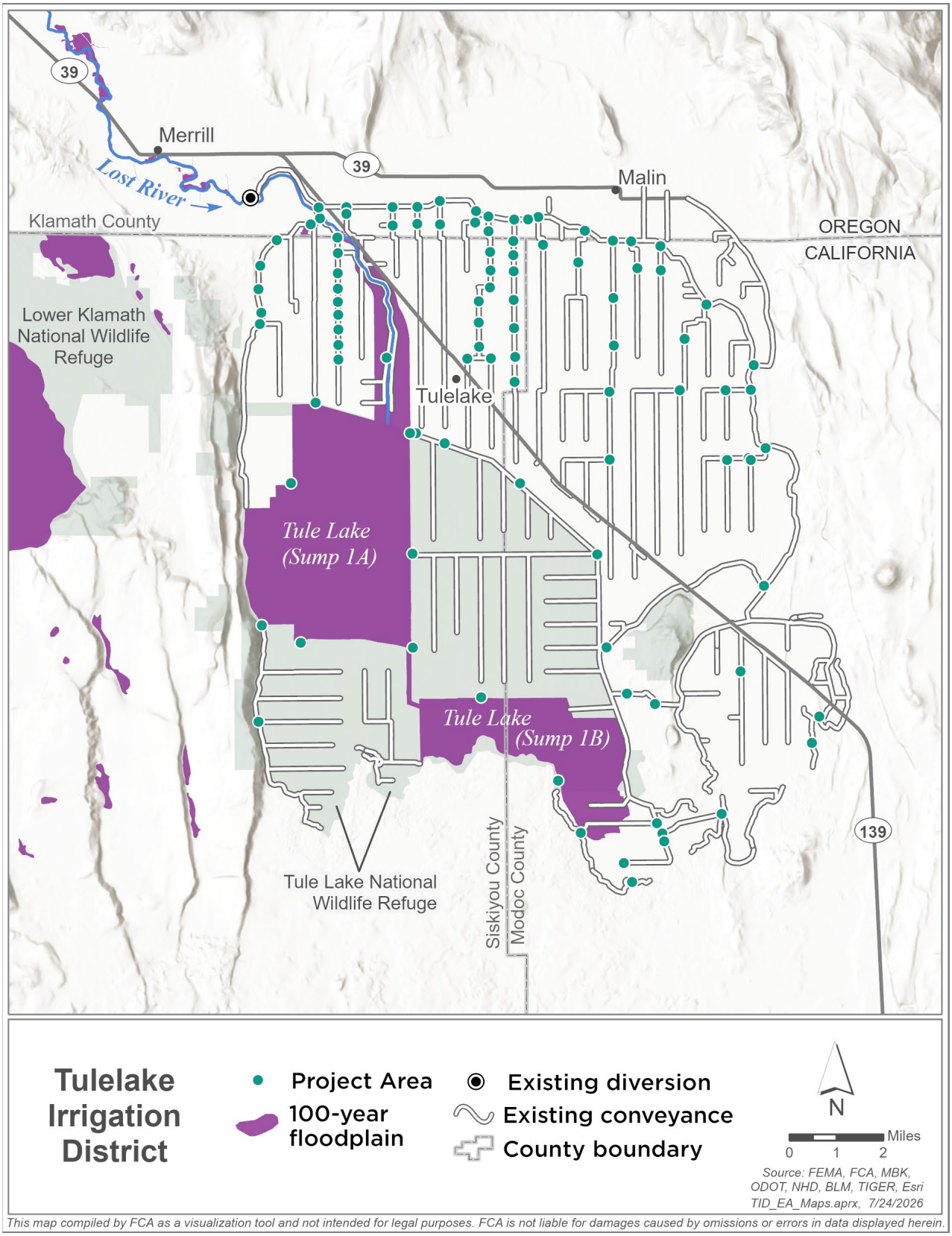
Project Component	Type of Wetland	Acres of Wetland within the Project Area (Acres)
Pump 28	Riverine	0.07
Pump 3	Riverine	0.14
Pump 4	Riverine	0.18
Pump 5	Riverine	0.12
Pump 6	Riverine	0.13
Pump 7	Riverine	0.04
Pump 9	Riverine	0.06
Pump B	Riverine	0.10
Pump C	Riverine	0.08
Pump G	Riverine	0.03
Pump H	Riverine	0.02
Pump J	Riverine	0.06
Pump M	Riverine	0.00
Pump N	Riverine	0.05
Pump P	Riverine	0.04
Pump R	Riverine	0.08
Pump U	Riverine	0.10
Pump V	Riverine	0.11
Pump W	Riverine	0.04
Total		**5.71**



SCADA Site J-22-1



SCADA Site Q-1


39
Merrill
Lost River
39
Malin
Klamath County
OREGON
CALIFORNIA
Lower Klamath
National Wildlife
Refuge
Tulelake
Tule Lake
(Sump 1A)
Tule Lake
(Sump 1B)
139
Tule Lake National
Wildlife Refuge
Siskiyou County
Modoc County
Tulelake
Irrigation
District
Project Area
100-year
floodplain
Existing diversion
Existing conveyance
County boundary
N
Miles
0 1 2
Source: FEMA, FCA, MBK,
ODOT, NHD, BLM, TIGER, Esri
TID_EA_Maps.aprx, 7/24/2026
This map compiled by FCA as a visualization tool and not intended for legal purposes. FCA is not liable for damages caused by omissions or errors in data displayed herein.

E.8 Minimization, Avoidance and Compensatory Mitigation Measures for the Preferred Alternative

E.8.1 Temporary Access

Prior to construction, the District would contact adjacent landowners to discuss the project. Landowners would be provided a construction schedule before construction begins. Work would be confined to existing easements. In addition, construction limits would be clearly flagged to preserve existing vegetation and prevent trespass on private property. Access to residences and farms would be maintained during construction. Construction would occur during the daytime and in the non-irrigation season to minimize disturbance to landowners or other individuals in the construction area vicinity. Following project completion in an area, temporary construction access routes would be decommissioned, restored to original contours, and reseeded.

E.8.2 Staging, Storage, and Stockpiling

Mechanized equipment and vehicles would be selected, operated, and maintained in a manner that minimizes adverse effects on the environment. Construction staging areas would be selected and used to minimize effects on vegetation and avoid tree removal. The use of construction vehicles and equipment within 150 feet of streams would be minimized to the greatest extent practicable. Fueling and maintenance operations would be performed on flat surfaces, away from moving equipment, and at least 150 feet away from any water source.

E.8.3 Roads and Traffic Control

Standard construction safety procedures and traffic control measures would be employed to reduce the risk of collisions between construction vehicles and other vehicles while construction is ongoing. Lane closures on roadways would be avoided during peak travel periods to the greatest extent possible to reduce potential traffic delays from construction vehicles.

E.8.4 Erosion Control

Silt fencing, straw wattles, geotextile filters, straw bales, or other erosion control measures would be used to minimize soil erosion and prevent eroded soil from entering waterbodies during construction. Erosion control measures would be free of weeds and weed seeds. To minimize impacts during construction, vehicles would park on existing watermaster or other access roads. After construction, disturbed soils would be recontoured or regraded in consultation with NRCS.

E.8.5 Spill Prevention, Control, and Countermeasures

Spill kits would be located at fuel storage areas, and construction crews would have adequate absorbent materials and containment booms on hand to enable rapid cleanup of spills. Immediately upon learning of any spills of fuel, oil, or hazardous material, or upon learning of conditions that could lead to an imminent spill, the person discovering the situation would initiate actions to contain the fluid or eliminate the source of the spill and notify the spill coordinator or crew foreman immediately. If it is determined that a spill is beyond the scope of on-site equipment and personnel, an environmental emergency response contractor would be contacted immediately to contain or clean up the spill. Any spill into a waterbody or along the adjacent streambed would be reported immediately to the Oregon Emergency Response Service at 1-800-452-0311 and the National Response Center at 1-800-424-8802. The spill coordinator would complete a spill report form for each release of a regulated substance, regardless of volume.

No wet or uncured concrete will come in contact with water. If water is present at any sites where concrete pad installation is needed for pump replacements, a cofferdam will be installed upstream of the project site and water will be pumped out of the work area.

E.8.6 Invasive Species Control

The following measures would be taken to avoid the introduction of invasive plants and noxious weeds into project areas.

- Inspect gear and equipment to be used in or near water for aquatic invasive species.
- Limit ground disturbance to those areas necessary to safely implement the Preferred Alternative.
- Begin activities in areas not characterized by invasive plants or noxious weeds before operating in infested areas.
- Use areas that are free of invasive plants or noxious weeds for staging, parking, and cleaning equipment. Avoid or minimize all types of travel through infested areas and restrict travel to those periods when the spread of seed or plant reproductive parts is least likely.
- Schedule soil work in infested roadsides or ditches during periods when seeds or propagules are least likely to be viable and spread.
- Monitor disturbed areas for at least three growing seasons following completion of activities. Provide for follow-up treatments based on inspection results.
- Inspect material sources at their site of origin to ensure that they are free of invasive plant material before transport and use to the extent practicable. If possible, treat contaminated material before any use.

E.8.7 Revegetation

During excavation, topsoil would be saved and replaced as the top layer after trenches are filled. Areas disturbed for access purposes or during construction would be regraded to their original contours. When necessary, compacted areas such as access roads, stream crossings, staging, and stockpile areas would be loosened to facilitate revegetation and improved infiltration. Disturbed areas would be planted with a native seed mix appropriate to the habitat. Revegetation practices would follow the NRCS *Oregon and Washington Guide for Conservation Seedings and Plantings* (NRCS 2000). Costs of revegetation are included in project installation cost estimates. Pruning and tree removal would occur entirely within the ditch easement and would not exceed what is required for equipment clearance.

E.8.8 Wildlife

Construction would occur outside of the primary nesting period for migratory birds of concern. For rare occasions where construction would occur during the primary nesting period, pre-construction nest surveys would be performed prior to ground disturbance and/or vegetation removal. Should an active nest be found, construction would be paused and consultation with a local USFWS biologist would occur to determine the following steps.

E.8.9 Cultural Resources

Before project construction begins at any given site, a cultural resource survey would be conducted by a qualified archaeologist in areas where ground disturbance will occur, consistent with Bureau of Reclamation cultural resource management policies. This survey would include the identification and

evaluation of cultural resources present within those areas, and, if necessary, the development of measures to avoid, minimize, or mitigate for impacts to those resources.

If archaeological resources are inadvertently discovered during construction, an Inadvertent Discovery Plan would be followed. Construction would stop in the vicinity of the discovery, the area would be secured and protected, a professional archaeologist would assess the discovery, consultation with SHPO and NRCS cultural resources staff would occur as appropriate, and the appropriate tribes would be notified. Continuation of construction would occur in accordance with applicable guidance and law.

E.8.10 Water Resources

Concurrence on jurisdictional determinations would be obtained from applicable state and federal agencies prior to construction.

Coordination with the U.S. Army Corps of Engineers (USACE), the Oregon Department of State Lands (DSL), the Natural Resources Agency, the California Department of Fish and Wildlife (CDFW), and the California Environmental Protection Agency (CalEPA) would be conducted prior to implementation of each site-specific action where wetland and water impacts would occur to ensure the Modernization Alternative either meets exemption criteria (see Appendix E.7) or that the proper permitting is completed. Permits from USACE and DSL, consultation with CDFW, a Section 401 Water Quality Certification from the State Water Resources Control Board (State Water Board) and the Regional Water Quality Control Boards (Regional Water Boards) would be required to confirm that the project meets federal and state regulatory requirements. During the construction, contractors would be required to follow strict BMPs.

All work would be performed in compliance with the applicable terms and conditions of permits issued by local, state, and federal agencies with permitting authority, as described in the following section.

E.8.11 Timing

Construction of the Modernization Alternative would occur during the non-irrigation season (late October through late March) when water is either absent or at its lowest and when laterals are dewatered.

E.8.12 Dewatering

If water is present at any sites where ground-disturbing work is needed for pump replacements, a cofferdam would be installed upstream of the project site and water would be pumped out of the work area.

References

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E.9 Potential Local, State, and Federal Permit and Compliance Requirements for the Preferred Alternative

E.9.1 Local and County

Klamath County Planning Department – Under OAR Chapter 340, Division 18, a Land Use Compatibility Statement would be submitted for County approval prior to construction. The Land Use Compatibility Statement is required supporting documentation for various State permits from DEQ and DSL.

Modoc County Planning Department – Under the Modoc County Code, irrigation is an allowed use in both the Agricultural Exclusive (AE) and Agricultural General (AG) zones.

Siskiyou County Planning Department – Under the Siskiyou County Code, irrigation is an allowed use in both the Prime Agricultural District (AG-1) and Rural Residential Agricultural (R-R-B-40) zones.

E.9.2 State of Oregon

Department of Environmental Quality – The National Pollutant Discharge Elimination System program, implemented by DEQ, would require a permit for construction activities including clearing, grading, excavation, dewatering, and materials and equipment staging and stockpiling that would disturb one acre or more of land and have the potential to discharge into a public waterbody. The proposed project would meet these conditions; therefore, prior to project construction, as appropriate, a 1200-C permit would be applied for.

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

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

Per Oregon Removal-Fill statute, OAR 141-085-0515(9), an irrigation ditch is not jurisdictional under Oregon Removal-Fill permitting if it meets both of the following criteria:

- The ditch is operated and maintained for the primary purpose of irrigation.
- The ditch is dewatered outside the irrigation season except for isolated puddles in low areas.

Per OAR 141-085-0515(8), a non-exempt irrigation ditch is jurisdictional under Oregon Removal-Fill permitting if it meets one of the following criteria:

- Created in wetlands, estuaries, tidal rivers, or other waters of this state; or
- Created from upland and meet the following conditions:
    - The ditch contains food and game fish; and
    - The ditch has a free and open connection to waters of this state.

Canals and laterals that contain water year-round and that are found in hydric soils would be considered jurisdictional. Although fish are found in the canals, it is undetermined if they are considered game fish or food fish. However, the irrigation conveyance system does not provide a free and open connection to waters of the state, such as the Lost River. Pumps, fish screens, drains, and dam spill gates prevent the free movement of fish throughout the system.

Before project implementation begins, the District would be required to consult with DSL. Consultation would entail wetland determinations at project sites and to determine the jurisdictional status of canals and laterals in the project area.

E.9.3 State of California

Water Resources Control Board and Regional Water Quality Control Board – The National Pollutant Discharge Elimination System program, implemented by the local Regional Water Quality Control Board (RWQCB), would require a permit for construction activities including clearing, grading, excavation, dewatering, and materials and equipment staging and stockpiling that have the potential to discharge into waters of the United States. The proposed project would meet these conditions; therefore, prior to project construction, as appropriate, a waste discharge requirements permit would be applied for.

Under jurisdiction of the State of California, wetlands are managed under five regulations: Section 401 of the CWA; Executive Order W-59-93, State Wetland Conservation Policy; the Lake and Streambed Alteration Program; Porter-Cologne Water Quality Control Act; and the Wetland and Riparian Area Protection Policy (2014).

CWA Section 404 permits issued by USACE are subject to Section 401 water quality certification under the CWA. In California, Section 401 programs are administered by the State Water Resources Control Board (State Water Board) and the Regional Water Quality Control Boards (Regional Water Boards) with the oversight of the EPA. State law specifies that a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a Section 401 water quality certification is issued or certification is waived. Tribal environmental departments or EPA may also administer water quality certifications for projects on tribal lands. Once the Section 401 water quality certification is issued, the EPA then has 30 days to provide a neighboring jurisdiction determination to determine if the discharge "may affect…the quality of the waters of any other state" or tribe with "treatment in a manner as a state" status.

In California, the Natural Resources Agency and the California Environmental Protection Agency (CalEPA) administer Executive Order W-59-93, State Wetland Conservation Policy. This policy establishes state policy guidelines for wetland conservation. The primary objective of this policy is to ensure no overall net loss and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage in California.

Under Section 1600 of California's Fish and Game Code, the Lake and Streambed Alteration Program, it is required that any person, state or local governmental agency, or public utility must notify California Department of Fish and Wildlife (CDFW) prior to beginning any activity that may do one or more of the following:

- Divert or obstruct the natural flow of any river, stream, or lake;
- Change the bed, channel, or bank of any river, stream, or lake;
- Use material from any river, stream, or lake; or

- Deposit or dispose of material into any river, stream, or lake.

This includes rivers, streams, and lakes that are dry for periods of time, as well as those that flow year-round.

The Porter-Cologne Water Quality Control Act designates the State Water Resources Control Board as the primary authority for water rights and water quality protection. It also directs the nine Regional Water Quality Control Boards to develop and enforce water quality standards within their respective jurisdictions. The control boards are also responsible for regulating any activity, including waste discharges, that would, or that have the potential to, impair the beneficial uses of water bodies.

The State Water Resources Control Board implements a Wetland and Riparian Area Protection Policy (2014). In 2021, the State Water Resources Control Board adopted a resolution to confirm the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Water Code) as state policy. Under the Water Code, an area is considered a wetland if, under normal circumstances, it meets the following:

- The area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both;
- The duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and
- The area's vegetation is dominated by hydrophytes, or the area lacks vegetation.

The Water Code defines *waters of the state* broadly to include any surface water or groundwater within the boundaries of the state.

Ditches used for agricultural purposes are exempt from permitting if they:

- Have ephemeral flow and are not a relocated water of the state or excavated in a water of the state;
- Have intermittent flow and are not a relocated water of the state or excavated in a water of the state;
- Have intermittent flow and do not drain wetlands other than (a) artificially irrigated areas that would revert to dry land should application of waters to that area cease or (b) artificial, constructed lakes and ponds created in dry land such as farm and stock watering ponds, irrigation ponds, and settling basins; or
- Do not flow, either directly or through another water, into another water of the state.

Canals and laterals in the project area are not relocated waters of the state, nor do they act to drain adjacent wetlands. Although much of the project area is within the former lakebed of Tule Lake, these ditches are unlikely to be considered excavated in a water of the state because Tule Lake was drained and dried before the excavation of the ditches. According to the Water Code, a wetland is considered a water of the state if it was created by modifying an area that was a surface water of the state at the time of such modification. A wetland is not considered a water of the state if it was created in a location where a water of the state had existed historically but had already been eliminated before the creation of the wetland. Based on these criteria, ditches with ephemeral or intermittent flow would likely be exempt from permitting.

Ditches with permanent flow that have some downgradient connection with a water of the state (e.g., Tule Lake, the Lost River, or natural wetlands) would be subject to permitting.

E.9.4 Federal

National Historic Preservation Act Section 106 – Pursuant to 36 C.F.R. 800 of NHPA (1966, as amended in 2000) and the regulations of the Advisory Council on Historic Preservation implementing Section 106 of the NHPA (54 U.S.C. 306108), federal agencies must take into account the potential effect of an undertaking on "historic properties," which refers to cultural resources listed in or eligible for listing in the National Register of Historic Places.

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

Under Section 404(f)(1)(C) of the CWA, discharges of dredged or fill material associated with construction or maintenance of irrigation ditches, or with the maintenance (but not construction) of drainage ditches, are not prohibited by or otherwise subject to regulation under Section 404, as long as the canal was not constructed through previously existing jurisdictional wetlands or other waters. Discharges of dredged or fill material associated with siphons, pumps, headgates, wingwalls, weirs, diversion structures, and such other facilities as are appurtenant to and functionally related to irrigation ditches are included in the exemption for irrigation ditches. Under 33 C.F.R. 323.4(a)(1)(iii)(C)(1)(i), "construction and maintenance of upland (dryland) facilities such as ditching and tiling, incidental to the planting, cultivating, protecting, or harvesting of crops, involve no discharge of dredged or fill material into waters of the U.S., and as such never require a Section 404 permit."

EPA and USACE are in receipt of the U.S. Supreme Court's May 25, 2023, decision in the case of *Sackett v. Environmental Protection Agency*. As a result, EPA and USACE are developing a rule to amend the final "Revised Definition of Waters of the United States" rule to reflect the decision that "the CWA extends to only those 'wetlands with a continuous surface connection to bodies that are "waters of the United States" in their own right,' so that they are 'indistinguishable' from those waters."

On July 24, 2020, USACE and EPA signed a memorandum providing a clear, consistent approach regarding the application of exemptions from regulation under Section 404(f)(1)(C) of the CWA for construction or maintenance of irrigation ditches and the maintenance of drainage ditches. The guidance in the joint memorandum applies regardless of the definition of waters of the United States.

As defined in the 2020 joint memorandum, an *irrigation ditch* is a ditch that either conveys water to an ultimate irrigation use or place of use or that moves and/or conveys irrigation water away from irrigated lands. Construction and maintenance of irrigation ditches are considered exempt activities under Section 404 of the CWA. However, if construction or maintenance of irrigation ditches "represents a *new use*, and the activity would result in a *reduction in reach or impairment of flow or circulation of* jurisdictional waters, including wetlands," the activity does not meet this exemption.

All waters at the proposed project sites are irrigation ditches. Proposed infrastructure modernization does not represent a new use, nor would it impair flow to jurisdictional waters. If any wetlands are

present in the project area, they would be exempt from federal permitting requirements, as the infrastructure modernization would be considered maintenance or construction of irrigation ditches.

Before construction activities begin, coordination and consultation with USACE would occur and measures would be taken as required to identify and mitigate impacts to potential jurisdictional wetlands and other waters of the U.S.

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

Endangered Species Act – The ESA establishes a national program for the conservation of threatened and endangered species and the preservation of the ecosystems on which they depend. The ESA is administered by USFWS for wildlife and freshwater species and by NMFS for marine and anadromous species. The ESA defines procedures for listing species, designating critical habitat for listed species, and preparing recovery plans. It also specifies prohibited actions and exceptions. Section 7 of the Act, called Interagency Cooperation, is the mechanism by which federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. Under Section 7, federal agencies must consult with USFWS when any action the agency carries out, funds, or authorizes (such as through a permit) may affect a listed endangered or threatened species.

The Modernization Alternative may affect but is unlikely to adversely affect Lost River sucker, shortnose sucker, and northwestern pond turtle. Construction of the project would result in ground disturbance adjacent to canals and laterals that may contain these species. Construction timing, sediment and erosion control BMPs, and exclusionary fencing would minimize and avoid impacts to these species. In the long term, the project may increase outflow into TLNWR, which could improve habitat quality and availability and water quality for Lost River sucker, shortnose sucker, and northwestern pond turtle occurring in this area.

Although northwestern pond turtle is not currently listed, the species is anticipated to be listed, consultation for the species was included in the biological assessment. Informal Section 7 consultation and conferencing under the ESA as amended has been completed. USFWS concurred with the "may affect, not likely to adversely affect" and a letter of concurrence was issued on July 20, 2026. No ESA-listed species under the protection of NMFS are known to occur in the project area and thus coordination and Section 7 consultation with NMFS was not required.

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

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

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

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

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

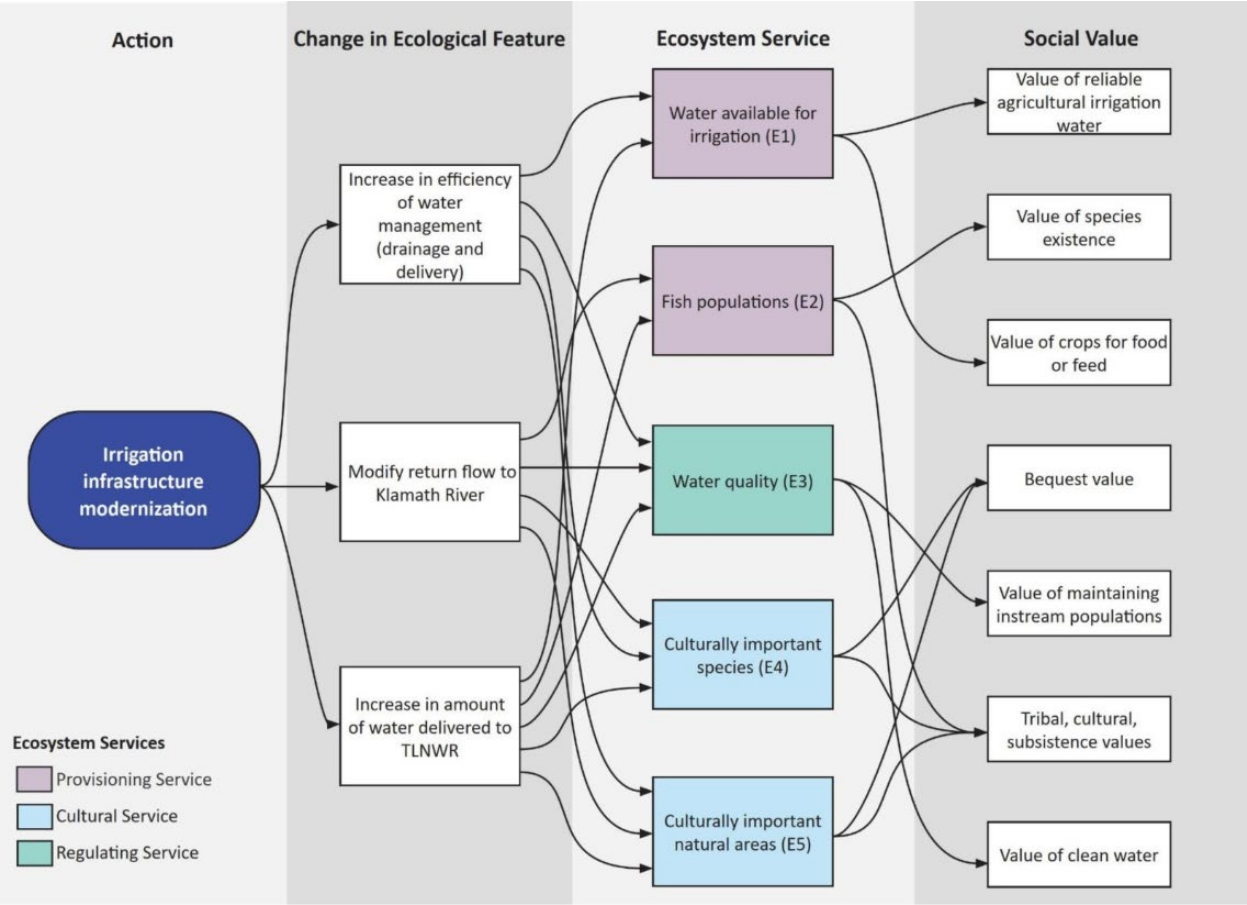
E.9.5 Summary of Permits

The following summarizes a list of potential permits (drawn from the sections above) that the District may need to move forward with construction:

- Land Use Compatibility Statement (Klamath County)
- NPDES Construction Stormwater Permit (1200-C) – Oregon DEQ
- Clean Water Act Section 401 Water Quality Certification – Oregon DEQ
- Removal-Fill Permit – Oregon Department of State Lands (DSL)
- NPDES / Waste Discharge Requirements Permit – Regional Water Quality Control Board
- Clean Water Act Section 401 Water Quality Certification – State/Regional Water Boards
- Clean Water Act Section 404 Permit – U.S. Army Corps of Engineers

E.10 Supporting Information for Ecosystem Services

The following figure shows a concept diagram that highlights the ecosystem services that interact with District operations and provides a baseline for discussion in Section 6. The diagram links an action that would modernize District infrastructure with potentially impacted ecosystem features and the provisioning, regulating, and cultural services that these ecosystems provide to people.



Notes: 1) E1 through E5 refer to ecosystem services 1 through 5.
2) Ecosystem services concept diagram developed by Farmers Conservation Alliance.

E.11 Net Present Value of the Preferred Alternative

This section presents the estimated net present value of the Preferred Alternative and the Canal Lining Alternative. This analysis compared installation and operation of pipes and canals only.

Discount Rate: 3.25%

Period of Analysis: 55 years

Net Present Value of the Preferred Alternative and the Canal Lining Alternative.

Item	Preferred Alternative
Design Life	50 years
Capital Costs	$14,212,000
Net Present Value of Replacement Costs[1]	$780,000
Annual O&M Costs[1]	$0
Percent Change in O&M	Not available
Net Present Value of O&M Costs	Not available
Total Net Present Value of Project	$14,992,000

Totals rounded to nearest $1,000. Notes: Prepared July 2024
N/A = not applicable; O&M = operation and maintenance
[1] Under the Preferred Alternative, there would be no additional O&M costs. Thus, O&M was included as a benefit and annual O&M costs are shown here as $0.

E.12 List of Persons and Agencies Consulted

Agency Consultation and Communication Record.

Date	Contact, Agency	Communication
8/30/2023	Greg Austin, USFWS Ernesto De La Riva, Denise DeJoseph, Steve Hill, NRCS Brandon Young, Kate Kaiser, Brandee Bruce, Reclamation	Discussed agency coordination for Section 106 consultation.
6/28/23	Mike Neuman, Reclamation	Requested to be a cooperating agency on the project given its nexus with the District.
6/22/23	Greg Austin, USFWS	Requested to be a cooperating agency on the project given its nexus with the District and the connection of the Tule Lake National Wildlife Refuge.
04/01/2026	USFWS	Section 7 Consultation with USFWS
9/15/2024	DOI	Section 12 notification
1/29/2024	Russell Attebery, Karuk Tribe	Letter from NRCS initiating Section 106 consultation
1/29/2024	Yatch Bamford, Pit River Tribe of California	Letter from NRCS initiating Section 106 consultation
1/29/2024	Harold Bennett, Quartz Valley Indian Community	Letter from NRCS initiating Section 106 consultation
1/29/2024	Cyndie Childress, Nor-Rel-Muk Wintu Nation	Letter from NRCS initiating Section 106 consultation
1/29/2024	Janice Crow, Shasta Indian Nation	Letter from NRCS initiating Section 106 consultation

Date	Contact, Agency	Communication
1/29/2024	Phillip Del Rosa, Alturas Rancheria of Pit River Indians	Letter from NRCS initiating Section 106 consultation
1/29/2024	Clayton Dumont, Klamath Tribe	Letter from NRCS initiating Section 106 consultation
1/29/2024	Natalie Forrest-Perez, THPO, Pit River Tribe of California	Letter from NRCS initiating Section 106 consultation
1/29/2024	Cindy Hogue, Wintu Tribe of Northern California	Letter from NRCS initiating Section 106 consultation
1/29/2024	Carla Keene, Cow Creek Band of Umpqua Indians	Letter from NRCS initiating Section 106 consultation
1/29/2024	Mark Miyoshi, THPO, Winnemem Wintu Tribe	Letter from NRCS initiating Section 106 consultation
1/29/2024	Bernold Pollard, Fort Bidwell Indian Community	Letter from NRCS initiating Section 106 consultation
1/29/2024	Jonathan Smith, Confederated Tribes of the Warm Springs Reservation of Oregon	Letter from NRCS initiating Section 106 consultation
1/29/2024	Garth Sundberg, Cher-Ae Heights Indian Community of the Trinidad Rancheria	Letter from NRCS initiating Section 106 consultation
1/29/2024	Robert Burkybile, Modoc Nation	Letter from NRCS initiating Section 106 consultation
1/29/2024	Richard Lash, Cedarville Rancheria of Northern Paiute Indians	Letter from NRCS initiating Section 106 consultation
1/30/2024	Alex Watts-Tobin, THPO, Karuk Tribe	Letter from NRCS initiating Section 106 consultation

Date	Contact, Agency	Communication
2/7/2024	Christine Curran, OR SHPO	Letter from NRCS initiating Section 106 consultation (undertaking description, APE, known cultural resources); requested comment within 30 days
2/12/2024	OR SHPO	Confirmed receipt of Section 106 submittal from OR SHPO, assigned Case No. 24-0347; 30-day response period ended 3/7/24
3/26/2024	Jeanne Spaur, Margie Shaffer, Elizabeth Willy, USFWS	Discussed the northwestern pond turtle and its potential nexus with watershed planning activities occurring in the Klamath Basin
9/15/2024	DOI	Section 12 notification from NRCS
3/27/2026	USACE	Section 12 notification from NRCS
6/29/2026	CA SHPO	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	OR SHPO	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairman Attebery, Karuk Tribe	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairman Bamford, Pit River Tribe of California	Letter continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairperson Bennett, Quartz Valley Indian Community	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairman Crow, Shasta Indian Nation	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence

Date	Contact, Agency	Communication
6/29/2026	Chairman Del Rosa, Alturas Rancheria of Pit River Indians	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairman Dumont, Klamath Tribe	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Ms. Forrest-Perez, THPO, Pit River Tribe of California	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Secretary Councilwoman Hogue, Wintu Tribe of Northern California	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairman Keene, Cow Creek Band of Umpqua Indians	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairperson Lash, Cedarville Rancheria of Northern Paiute Indians	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Mr. Miyoshi, THPO, Winnemem Wintu Tribe	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairperson Pollard, Fort Bidwell Indian Community	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Mr. Sandusky, Homelands Director, Modoc Nation	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Chairman Smith, Confederated Tribes of the Warm Springs Reservation of Oregon	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence

Date	Contact, Agency	Communication
6/29/2026	Chairperson Sundberg, Cher-Ae Heights Indian Community of the Trinidad Rancheria	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
6/29/2026	Mr. Watts-Tobin, THPO, Karuk Tribe	Letter from NRCS continuing Section 106 consultation and providing finding of no adverse effect to historic properties for concurrence
8/03/2026	OR SHPO	Letter from SHPO choosing "not to comment on this project and it may continue as described"
8/11/2026	CA SHPO	Letter from SHPO agreeing with the finding of no adverse effect

E.13 List of Preparers

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

Organization	Name	Title	Education	Professional Experience (years)	Area Responsible For
NRCS – California	Richard Rivas	Environmental Compliance Specialist	Bachelor of Science in Biology, emphasis: Ecology, CA State University of Fresno	26	Environmental Compliance & NEPA Lead
NRCS – California	Ernesto De la Riva, PE	State Engineer	Bachelor of Science in Civil Engineering, CA State University Chico Master of Civil Engineering, Norwich University	16	State Conservation Engineer & Program Manager Watershed Protection and Flood Prevention Operations

Organization	Name	Title	Education	Professional Experience (years)	Area Responsible For
NRCS – California	Chris Null	State Archaeologist	Master of Arts in Archaeology, emphasis bio-archaeology, University of Oklahoma	30+	Cultural Resources Management Team
NRCS – California	Denise de Joseph	Cultural Resource Specialist	M.S., Archaeological Science	25	Cultural Resources
NRCS – California	Dylan Hickey	State Environmental Compliance Coordinator	Bachelor of Science, Wildlife and Fish Conservation Biology; UC Davis	10	Environmental Compliance & NEPA
Farmers Conservation Alliance	Raija Bushnell	Watershed Planning Program Manager	M.P.A. Natural Resource Policy M.S.E.S. Natural Resource Management B.A. Political Science	9	General
Farmers Conservation Alliance	David Mueller	District Lead	M.P.P. Public Policy B.A. Biology	4	General
Farmers Conservation Alliance	Megan Christian	Project Manager	M.S. Environmental Sciences and Engineering B.S.P.H. Environmental Health	3	Project Management
Farmers Conservation Alliance	Clare McClellan	Natural Resource Specialist	M.E.M. Environmental Management B.A. Environmental Studies; Education	2	General
Highland Economics	Barbara Wyse	Head Economist	M.S. Environmental and Natural Resource Economics B.A. Environmental Sciences and Policy	14	Economic Analysis

Organization	Name	Title	Education	Professional Experience (years)	Area Responsible For
Highland Economics	Winston Oakley	Economist	M.S. Applied Economics B.S. Environmental Sciences, Policy, and Management	5	Economic Analysis
Parametrix	Peter Geiger	Senior Planner	M.Sc. Physics B.S. Physics	36	Project Management, Alternatives
Parametrix	Mike Hall	Senior Scientist	B.A. Music History	32	Project Management, Endangered Species Act Compliance
Parametrix	Tait Elder	Senior Consultant	M.A. Anthropology B.A. Anthropology (Geology minor)	21	Cultural Resources
Parametrix	Corey Lentz	Cultural Resources Specialist	M.S. Historic Preservation	6	Cultural Resources
Parametrix	Cassandra Dobson	Planner	M.U.R.P., Land Use Specialization B.A. Political Science	7	Land Use, Socioeconomic Resources
Parametrix	Kelly Carini	Scientist	B.A. Environmental Studies	9	Soils
Parametrix	Jason Medema	Environmental Planner	M.S. Environmental Studies B.A. International Affairs	19	Vegetation, Wildlife, Ecosystem Services
Parametrix	Tad Schwager,	Senior Scientist	M.S. Marine Resource Management B.A. Human Biology	17	Water Resources, Fish and Aquatic Resources

Organization	Name	Title	Education	Professional Experience (years)	Area Responsible For
Parametrix	Colton Kyro	Scientist	M.S., Systems Ecology B.S., Ecosystem Science and Restoration	5	Wetlands and Riparian Areas, Endangered Species Act Compliance
Parametrix	Taya Maclean	Senior Scientist	M.S. Biology B.S. Natural Resources Management	25	Senior reviewer, Wetlands and Riparian Areas, Endangered Species Act
Parametrix	Becky Mellinger	Publications Supervisor	M.S. Geosciences B.S. Geology	20	Technical Editing

E.14 Distribution List

City of Tulelake, CA
Siskiyou County, CA
Modoc County, CA
Modoc County Flood Control & Water Conservation District
Siskiyou County Flood Control & Water Conservation District
Modoc Resource Conservation District
Siskiyou Resource Conservation District
Klamath County, OR
Klamath County Soil and Water Conservation District
Klamath Irrigation District
Klamath Drainage District
Malin Irrigation District
Shasta Butte Irrigation District
California Department of Fish and Wildlife (CDFW)
California Department of Food and Agriculture (CDFA)
California Department of Transportation (Caltrans)
California Department of Water Resources (CDWR)
California State Lands Commission (SLC)
California Water Resources Control Board (CWB) - North Coast Regional Water Quality Control Board
California State Office of Historic Preservation
Oregon Department of Agriculture (ODA)
Oregon Department of Environmental Quality (ODEQ)
Oregon Department of Fish and Wildlife (ODFW)
Oregon Department of State Lands (ODSL)
Oregon Department of Transportation (ODOT)
Oregon Water Resources Department (OWRD)
Oregon Watershed Enhancement Board (OWEB)
Oregon State Historic and Preservation Office (SHPO)
Oregon Regional Solutions Office
U.S. Army Corps of Engineers (USACE)
U.S. Bureau of Land Management (BLM)
U.S. Bureau of Reclamation, Klamath Basin Area Office
U.S. Environmental Protection Agency Region 9
U.S. Fish and Wildlife Service (USFWS) Lower Klamath National Wildlife Refuges
National Oceanic and Atmospheric Administration (NOAA) Fisheries
USDA NRCS-CA Offices
Klamath Tribes
Yurok Tribe
Karuk Tribe
Modoc Nation
Hoopa Valley Tribe
Klamath Water Users Association
Klamath Watershed Partnership
Intermountain West Joint Venture
California Waterfowl Association

California Farm Bureau
Trout Unlimited
Lost River Ranch
Ducks Unlimited
American Rivers
California Trout
California Special Districts Association
Oregon Water Resources Congress
Family Farm Alliance
Cal-Ore Wetlands
PacifiCorp
California Senator Alex Padilla
California Senator Dianne Feinstein
California Representative Doug LaMalfa (1st District)
California State Senator Brian Dahle (1st District)
California State Assembly Megan Dahle (1st District)
Oregon State Senator Dennis Linthicum (District 28)
Oregon State Representative Werner Reschke (District 56)
Oregon Representative Cliff Bentz (2nd District)
Oregon Senator Ron Wyden
Oregon Senator Jeff Merkley

E.15 Acronyms, Abbreviations, and Short Forms

Acronym	Definition
AE	Agricultural Exclusive
AG-1	Prime Agricultural District
APE	Area of Potential Effect
BA	Biological Assessment
BLM	U.S. Bureau of Land Management
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CDWR	California Department of Water Resources
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWB	California Water Resources Control Board
DEQ	Oregon Department of Environmental Quality
EA	Environmental Assessment
EEA	European Environment Agency
EFH	Essential Fish Habitat
EFU-C	Exclusive Farm Use – Cropland
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAC	California Food and Agriculture Code
FCA	Farmers Conservation Alliance
GAP	Gap Analysis Project
KID	Klamath Irrigation District
LKNWR	Lower Klamath National Wildlife Refuge

Acronym	Definition
MBTA	Migratory Bird Treaty Act
NCRWQCB	North Coast Regional Water Quality Control Board
NED	National Economic Development
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRC	National Research Council
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWPH	NRCS National Watershed Program Handbook
NWPM	NRCS National Watershed Program Manual
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
ODSL	Oregon Department of State Lands
OMB	Office of Management and Budget
ORBIC	Oregon Biodiversity Information Center
OWEB	Oregon Watershed Enhancement Board
OWRD	Oregon Water Resources Department

Acronym	Definition
PIFR	Preliminary Investigation Feasibility Report
Plan-EA	Watershed Plan-Environmental Assessment
RED	Regional Economic Development
ROW	right-of-way
R-R-B-40	Rural Residential Agricultural
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Officer
SLC	California State Lands Commission
SLO	Sponsoring Local Organization
TID	Tulelake Irrigation District
TLNWR	Tule Lake National Wildlife Refuge
UKL	Upper Klamath Lake
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
VFD	Variable Frequency Drive

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