Draft Watershed-Plan Environmental Impact Statement

for the Cove-East Fork Virgin River Watershed Project

Kane and Washington Counties, Utah
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Lead Federal Agency
Natural Resources Conservation Service

Date
September, 2026

Sponsoring Organizations
Kane County Water Conservancy District and Washington County Water Conservancy District

In cooperation with
National Park Service, Utah Trust Lands Administration, Utah Public Lands Policy Coordinating Office, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Bureau of Land Management

Draft

Cove Reservoir Watershed and

Environmental Impact Statement

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Kane and Washington Counties, Utah

Lead Agency: U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)

Sponsoring Local Organization: Kane County Water Conservancy District; Washington County Water Conservancy District

Cooperating Agencies: National Park Service (Zion National Park), Utah Trust Lands Administration, Bureau of Land Management (BLM), U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (EPA), and Utah Public Lands Policy and Coordinating Office

Congressional District: Utah Congressional District 2

Authority: This Watershed Plan and Environmental Impact Statement (Plan-EIS) for the Cove Reservoir Watershed has been prepared under the authority of the Watershed Protection and Flood Prevention Act of 1954 [Public Law 83-566 (PL 83-566) Stat. 666 as amended (and in accordance with the National Environmental Policy Act (NEPA) of 1969, PL 91-190, as amended (42 U.S.C. 4321 et seq.)). The Plan-EIS would be implemented under the PL 83-566 authorized purposes of agricultural water management, flood prevention, and public recreation.

This environmental document was initiated using the 40 CFR 1500-1508 (May 20, 2022) and 7 CFR 650 regulations. These regulations have recently been rescinded and replaced with U.S. Department of Agriculture (USDA) regulations found under 7 CFR 1b, published as a Final Rule in the Federal Register on April 3, 2026 (91 FR 17062). However, in a good-faith effort to fulfill NEPA's requirements, including Congressional timeline and considerations of fiscal restraints, the agency decided to continue to use 40 CFR 1500-1508 (July 31, 2023) and 1 CFR 650. This is permissible per the USDA policy guidance issued in the Final Rule's preamble. The Federal Register notice said: "if the NOI for an EIS [was] published more than 90 days prior to the publication of this final rule, the USDA subcomponent has discretion to continue applying the versions of NEPA regulations being applied before the publication of the NOI or to switch to applying 7 CFR 1b as published in this final rule."

Abstract: The Action Area for the Cove-East Fork Virgin River Project (Project) includes both Kane and Washington Counties. The proposed reservoir site Project is located near Orderville within the Upper Virgin Watershed in Kane County, Utah. Project implementation would enhance the reliability of agricultural water availability in the Orderville and Mt. Carmel areas of Kane County and the Hurricane area in Washington County, Utah.

Project development would also result in the creation of a public recreation opportunity at the proposed reservoir site and an increase of Municipal & Industrial (M&I) water to communities in Washington County. M&I water demand in the WCWCD service area is projected to exceed

existing capabilities as more municipal water providers join and receive water from the WCWCD system.

The need for this project is due to annual water shortages experienced by local agricultural users in the Orderville Mt. Carmel and Hurricane areas. Due to a difference in timing between the spring runoff within the watershed and the peak demand for agricultural water use, these users experience annual water shortages during the summer months. The NRCS preferred alternative (Alternative Two) for the Project is a 6,000-acre-foot reservoir. NRCS proposes constructing a 6,000-acre-foot reservoir and dam, along with principal and auxiliary spillways, recreational facilities, and necessary infrastructure. The dam would feature a 1,900-foot earthen embankment with a central clay core, at a maximum height of 90 feet. Two spillways would be installed. The total cost estimate for this alternative is $39,730,000 with NRCS contributing $24,889,000 and the Sponsors contributing $14,841,000. Water from the reservoir would be used by Orderville and Mt.

Carmel agricultural users in Kane County. Water would also be released downstream via the East Fork Virgin River for agricultural and M&I use in Washington County. The proposed action would comply with the Zion National Park Water Rights Settlement of 1996 (United States, Utah, Washington District, & Kane District).

Comments and Inquiries: Comments and inquiries must be received within 45 days of publication of the Notice of Availability (NOA) for the Draft Plan-EIS in the Federal Register (Regulations.gov). Submit comments and inquiries to: Ammon Boswell, Watershed Program Manager, USDA, NRCS, 1950 West Main Street, Tremonton, Utah, 84337; Telephone: (435) 459-1621; or email: ammon.boswell@usda.gov.

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Ancestral Land Acknowledgement

NRCS, through the review of the National Park Service Native American Graves Protection and Repatriation Act Native American Consultation Database (NACD), the U.S. Department of Housing and Urban Development Tribal Directory Assessment Tool (TDAT), the Bureau of Indian Affairs (BIA) website, and the Utah Division of Indian Affairs (UDIA) website, and previous National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA) consultations, identified 11 Federally Recognized Tribes. The Hopi Tribe, Kaibab Band of Paiute Indians of the Kaibab Indian Reservation, Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony, Moapa Band of Paiute Indians of the Moapa River Indian, Navajo Nation, Paiute Indian Tribe of Utah, Pueblo of Zuni, San Juan Southern Paiute Tribe of Arizona, Ute Indian Tribe of the Uintah & Ouray Reservation, Ute Mountain Ute Tribe, and White Mesa Ute Council have ancestral land, traditional use, and/or traditional cultural property claims within the project area and the immediate vicinities. Consultation with these 11 entities will continue throughout this plan's development. Refer to Appendix A for that correspondence.

WATERSHED PLAN AGREEMENT (TO BE INCLUDED IN FINAL PLAN–EIS)

Summary (Office of Management and Budget Fact Sheet)

Summary Watershed Plan-Environmental Impact Statement Document

For

Cove-East Fork Virgin River Watershed Project

Kane and Washington Counties Utah

Utah Congressional District 2

Authorization	Public Law 83-566 Stat. 666 as amended (16 U.S. Code Section 1001 et. Seq.) 1954
Sponsors	Kane County Water Conservancy District (KCWCD); Washington County Water Conservancy District (WCWCD)
Cooperating Agencies	National Park Service (Zion National Park); Utah Trust Lands Administration; Utah Public Lands Policy Coordinating Office; U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; U.S. Bureau of Land Management
Purpose and Need	The project purpose is to sustain agriculture and improve recreation opportunities in Long Valley, Utah, and to provide agricultural and Municipal & Industrial (M&I) water to Washington County, Utah. There is an existing need to increase water availability during the summer irrigation months due to persistent water shortages and provide water for an additional water-based recreation site and the existing hydroelectric power plant
Description of the Preferred Alternative Plan	The Preferred Alternative would consist of developing a 6,000-acre-foot reservoir with appurtenances, a recreation area, pipelines, and a booster pump station. Water from the proposed reservoir would be made available to existing agricultural fields near Mt. Carmel and Hurricane, and for M&I uses in Washington County.
Resource Information	**Watershed Name:** East Fork Virgin River Watershed **Latitude and Longitude:** 37.2875 degrees/-112.628 degrees **Eight-digit Hydrologic Unit Number:** 15010008 **Climate and Topography:** July average high/low: 90/55 degrees Fahrenheit (F) January average high/low: 47/20 degrees F, Semi-desert, low hills, 5,449 feet above sea level, 16.81 inches average annual precipitation. **Watershed Size (Acres):** 152 square miles (97,449 acres)

Land Uses (Acres): Irrigated lands within the project area in Kane County: 1,100 acres.

Irrigated lands within the project area in Washington County: 770 acres

Private residences, out buildings, livestock grazing, and limited recreation opportunities are also present within the proposed project area.

Land Ownership:

Private: 99.92 percent

State–Local: 0.07 percent

Federal: 0.01 percent

Population and demographics (Kane County): 8,425 people

White—93.9 percent; African American—1.0 percent; American Indian—1.8 percent; Asian—0.9 percent; Native Hawaiian/Pacific Islander—0.1 percent; Hispanic/Latino—5.6 percent; Two or More Races—2.4 percent[1]

Relevant resource concerns that have been identified through scoping: East Fork Virgin River (EFVR) flow reductions, nonnative vegetation, recreation, traffic and other impacts associated with construction, soils, streambank erosion, water budget and water quality, rare fish and other aquatic species, endangered species, wild and scenic rivers (WSR), Areas of Critical Environmental Concern (ACEC), designated wilderness, Wilderness Study Areas (WSA), Research Natural Areas (RNA), climate variation, groundwater, wetlands, cultural resources and agricultural water efficiency improvements

Alternative Plans

Two Action Alternatives and a No Action Alternative are being considered in the Watershed Plan Environmental Impact Statement (Plan-EIS). After careful examination, 10 other potential alternative reservoir sites were considered and eliminated from detailed study as they were infeasible, did not adequately meet the purpose and need for the project, had a greater negative environmental impact, presented safety concerns, or were cost prohibitive. These sites are Swapp, Lower Swapp, Lower Lydia's Canyon, Upper Lydia's Canyon, Dry Wash, Orderville, Lower Muddy Creek, Upper Muddy Creek, Lower Stout Creek, and Upper Stout Creek Sites. A non-structural alternative was also considered; however, it would not meet the purpose and need of the Preferred Alternative and is not analyzed in detail in the Plan-EIS.

Alternative 1: No Action	Under the No Action Alternative, construction activities associated Alternative with the project would not occur, and the KCWCD and WCWCD would continue to operate and maintain their existing systems. The need for the project would still exist. The two Districts would address continuing agricultural water and M&I shortages as other sources of funding became available.
Alternative 2: 6,000-acre Alternative	Alternative 2 would consist of a 6,000-acre-foot reservoir and earthen dam, two pipelines, a booster pump station, an access road, principal and auxiliary spillways, recreational facilities, and all necessary infrastructure. Three borrow pits outside of the reservoir basin would supply materials for the dam construction. Embankment material would be taken from within the reservoir basin. The reservoir would be located near Orderville in western Kane County, Utah.
Alternative 3: 3,000-acre Alternative	Alternative 3 would consist of a 3,000-acre-foot reservoir and earthen dam, principal and auxiliary spillways, a recreation area, pipelines, and a booster pump station. Three borrow pits outside of the reservoir basin would supply materials for the dam construction. Embankment material would be taken from within the reservoir basin. The reservoir would be located at the same location as the 6,000-acre-foot reservoir near Orderville in western Kane County, Utah
Mitigation Measures	Implementation of the Preferred Alternative would comply with all applicable federal and state laws and regulations, as well as local zoning and building ordinances. Appropriate Best Management Practices (BMPs) would be used. Consultation between the Natural Resources Conservation Service (NRCS), Individual Tribal Nations, Utah State Historic Preservation Officer (SHPO) regarding compliance with Section 106 of the National Historic Preservation Act has occurred. Construction activities would be limited to the smallest extent practicable within the project area. Construction personnel would adhere to all state and NRCS fire prevention and suppression requirements. Disturbed areas (excluding the reservoir, dam, and borrow pit sites) would be restored to preconstruction conditions after construction completion. No ground disturbance would occur during or immediately following precipitation events or under any wet conditions that would create deep ruts. Disturbed areas would be recontoured. A Stormwater Pollution Prevention Plan that contains erosion and sediment control/pollutant prevention BMPs would be required and implemented. To resolve adverse effects to National Register of Historic Places (NRHP)–eligible sites, an inadvertent discovery plan will be prepared and supplied to construction crews, in addition to the preparation and execution of a Memorandum of Agreement.

The KCWCD would be responsible for compliance with applicable local, state, and federal regulations related to the use, handling, storing, transporting, and disposing of hazardous materials on non-federal lands.

All federal, state, and local laws/regulations pertaining to pollution and contamination of the environment would be followed to prevent pollution of surface water, groundwater, soil, and air with any hazardous materials.

Table S.1. Project Costs.

Project Costs	**Public Law 83-566 Funds**	**Other Funds**	**Total**
Construction	$20,320,000	$13,893,000	$34,213,000
Engineering	$4,200,000	$0	$4,200,000
Real Property Rights	$135,000	$705,000	$840,000
Project Administration	$233,000	$233,000	$467,000
Permits	$0	$10,000	$10,000
TOTAL COSTS	**$24,889,000**	**$14,841,000**	**$39,730,000**

Project Benefits

The primary benefit of implementing the proposed project would be improved availability and distribution of agricultural water for local agricultural users in Kane and Washington Counties. Additional water is needed to offset annual shortages that occur during the summer months primarily due to a lack of storage capability. Additionally, a reliable source of water supply would improve the effectiveness of fire protection systems. The project would further provide improved hydroelectric energy production for the town of Orderville. New recreation opportunities (camping, fishing, boating, day-use, etc.) would be made available. The reservoir and surrounding riparian zone would also provide limited habitat for waterfowl. Finally, the project would provide additional M&I water for Washington County.

Number of Direct Beneficiaries (Onsite–Offsite)	There are 110 agricultural users in Glendale, 144 in Orderville, 15 in Bench Lake, and 52 in Mt. Carmel that would benefit from the proposed action. In Washington County, approximately 2,800 agricultural users would benefit from the agricultural water supply and approximately 800 private residences in Washington County would benefit from the M&I water supply.
Describe Other Beneficial Effects in Physical Terms	The Preferred Alternative would have beneficial effects on irrigation water availability, water quality, riparian habitat, recreation, economy, and public health and safety.
Benefit to Cost Ratio	1.03
Net Economic Benefits	$38,000
Funding Schedule	2026–2029 (budget year plus 5): Federal Funds: $24,889,000 Non-Federal Funds: $14,841,000 Total: $39,730,000
Period of Analysis	The period of analysis is the time required for installation of the project plus the life of the project. All structural alternatives were evaluated with a period of analysis of 103 years (100-year project life plus 3 years for construction). The 2026 discount rate of 3.25 percent was used for economic cost and benefit calculations.
Project Life	The life of the project is estimated to be 100 years following 3 years of construction.
Environmental Impacts	Table S-2 lists the resources of concern and associated environmental consequences associated with the Preferred Alternative. Resources that would not be impacted by the Preferred Alternative are not listed on this table.

Table S.2. Environmental Impacts.

Resource Concern	Summary of Concern	Consequence
Soil Resources	Potential sediment yield within the new watershed and increased erosion potential during construction activities	Direct short-term impacts to erosion potential on disturbed areas during construction would occur. Impacts would be minimized through implementation of BMPs that would be installed during and after construction. The short-term impacts would be minor based on implementation of BMPs and restoration/stabilization of disturbed

Resource Concern	Summary of Concern	Consequence
		areas following project construction. Anticipated indirect, long-term benefits include reduced sediment deposition in developed areas and within EFVR that are no longer exposed to flooding.
Water Resources	Impacts to water resources from Construction and operation activities	The Preferred Alternative would have direct, positive benefits on water resources by making 2,148 acre-feet of existing water available for water users in Kane and Washington County annually. Minor downstream impacts to the EFVR would occur.
Water Quality	Impacts to surface water quality during project operation	Minor direct, and negative impacts to water quality would occur during construction while crossing the EFVR; however, long-term, beneficial impacts would occur through the capturing of sediment in the reservoir during flash flooding events.
Floodplain Management	Impacts on floodplain areas from construction activities	The Preferred Alternative would have long-term beneficial impacts on downstream flooding, and long-term minor impacts on floodplain management. The proposed reservoir would capture runoff produced by flash floods out of Cove Canyon, thereby decreasing the amount of water and sediment entering the river and reducing potential loss of riparian vegetation. However, the proposed dam would also create a new inundation area, causing potential changes to floodplains.
Waters of the U.S., Wetlands, and Special Aquatic Sites	Disturbance to jurisdictional Waters of the U.S. located within the study area	The Preferred Alternative would impact approximately 0.21 acres of aquatic features and 0.17 acres of wetlands.
Regional Water Resources	Compliance with KCWCD and WCWCD Water Conservation Plans	The Preferred Alternative would comply with Regional Water Resource Plans through supporting both Kane County and Washington County's Water Resource Plans.
Wild and Scenic Rivers	Impacts to the EFVR in Zion National Park (ZNP) from project operation activities	The Preferred Alternative would have no impacts on the WSR values of the EFVR within ZNP, as it would also adhere to the stipulations required in the ZNP Agreement (1996). Therefore, changes in

Resource Concern	Summary of Concern	Consequence
		flow in the EFVR through ZNP would be minor, particularly when the natural variation of the EFVR is approximately 100 times the range of effect from proposed reservoir releases (Alpha Engineering 2025). The NPS notified the NRCS that the NPS will not be completing a Section 7 analysis on this project.
Air Quality	Emissions and fugitive dust from construction activities	Construction activities and the use of the borrow sites would cause minor, short-term, and direct increases in emissions concentrated around the construction site. Construction activities would not violate air quality standards, and BMPs would be implemented.
Threatened and Endangered Species	Disturbance to Endangered Species Act-listed, BLM-listed, and state-listed species/habitat	The Preferred Alternative would have **No Effect** on the Western yellow billed cuckoo, desert tortoise, Suckley's cuckoo bumble bee, Jones cycladenia, Shivwits milk-vetch, Siler's pincushion cactus, and Ute ladies'-tresses. The Action Alternatives are **Not Likely to Jeopardize the Continued Existence** of the monarch butterfly or the California condor outside of ZNP. The Action Alternatives **May Affect, but Not Likely to Adversely Affect** the California condor (within ZNP), Mexican spotted owl, southwestern willow flycatcher, Virgin River chub, and woundfin. The Action Alternatives **May Affect, but Not Likely to Adversely Affect** designated critical habitat for the Mexican spotted owl, Virgin River chub, and woundfin. The Action Alternatives would have **No Effect** on designated critical habitat for the California condor or southwester willow flycatcher as none has been designated in the study area.
Migratory Birds	Disturbance to migratory bird habitat during construction	Construction disturbance would have minor, direct, and short-term impacts that would disturb suitable breeding/nesting or foraging habitat for migratory birds and foraging habitat for migratory birds. Conservation measures would be implemented to avoid and minimize impacts to these species and disturbed areas would be restored after

Resource Concern	Summary of Concern	Consequence
		construction completion. Potential impacts would be minor due to the ample surrounding habitat available. The Operation & Maintenance activities would have minor, beneficial, long-term impacts to migratory birds. The riparian habitat surrounding the reservoir would provide long-term habitat opportunities for migratory birds.
Bald and Golden Eagles	Disturbance to bald and golden eagle habitat during construction	Construction would cause temporary, minor impacts to bald and golden eagles; however, no significant loss of foraging grounds would be expected due to the availability of nearby suitable habitat. The new riparian area surrounding the reservoir would have long-term, beneficial impacts to bald and golden eagles by providing additional roosting opportunities.
Ecologically Critical Areas	Impacts to the Parunuweap Canyon WSA, Zion Wilderness, and Parunuweap RNA during operational activities	No direct or indirect impacts to designated wilderness, WSA's. or RNAs would occur under the Action Alternatives.
Invasive Species	Introduction of invasive plant and animal species during construction and operational activities.	The Preferred Alternative would have minor, temporary impacts on invasive species during and immediately following construction; however, BMPs would be implemented to prevent the spread or introduction of noxious weeds and invasive animals. A Post-Construction Rehabilitation Plan would be developed and include mechanisms for addressing weed establishment and treatment and the prevention of the establishment of invasive animals.
Fish and Wildlife	Disturbance to fish and wildlife species/habitat	Construction activities would cause temporary, minor impacts to fish and wildlife species, including Species of Greatest Conservation Need, due to an increase in human presence and noise. There is ample surrounding habitat, and therefore, long-term impacts are not anticipated. The creation of the riparian area surrounding the reservoir would have beneficial, long-term impacts by providing

Resource Concern	Summary of Concern	Consequence
		new additional habitat for wildlife. State e fish Species of Greatest Conservation Need, including the desert sucker, flannelmouth sucker, and Virgin spinedace are known to exist in the EFVR. Changes in water flow from implementation of Alternative 2 would be minor, particularly when the natural variation of EFVR flows are approximately 100 times the range of effect from proposed Cove Reservoir releases (Alpha Engineering 2025), and therefore these species and their habitat would not be impacted.
Riparian Areas	Impacts to downstream riparian areas from changes in water flow	The Preferred Alternative would have minor, positive impacts to riparian vegetation through the creation of additional riparian habitat at the reservoir site. No impacts to existing riparian habitat in the EFVR would occur.
Cultural Resources	Impacts on historic/cultural resources that are present within the study area	The Preferred Alternative would result in **Adverse Effect to Historic Properties**. Indirect effects to cultural resources could arise from the increase in human activity in the area.
Social Issues	Impacts on local social conditions from project implementation	**Population** The Preferred Alternative would have indirect, positive benefits to the population by providing an additional needed recreation area. **Demographics** The Preferred Alternative would have no impact on demographics. **Employment and Income** The Preferred Alternative would provide 67 short-term jobs, 9 long-term jobs, and water to support 430 acres of agricultural land. **Housing** An increased risk of flooding from dam failure would cause indirect impacts to up to 275 residential parcels. **Economy** The Preferred Alternative would have a direct, beneficial impacts on the economy by attracting more visitors and supporting an additional 430 acres of existing agricultural land.

Resource Concern	Summary of Concern	Consequence
Public Health and Safety	Increased risks to public safety from dam failure and increased risk for construction-related traffic while construction is occurring	Short-term, minor risks to public health and safety would occur during construction due to an increase in traffic. Long-term risks to approximately 10 to 15 people would occur with properties in the new inundation zone of the dam. Long-term benefits to public health and safety include the reduction of stress from reliable water and the increased effectiveness of the fire suppression systems.
Scenic Beauty	Changes to the visual character of the immediate area	Short-term visual impacts would occur from the presence of construction equipment. Direct, long-term impacts to scenic values would occur from the conversion of 235 acres of arid land to a reservoir.
Significant Scientific Resources	Impacts on paleontological resources from construction activities	No impacts to significant paleontological resources are expected. A paleontological monitor would be present during new surface-disturbing activities associated with the Mt. Carmel irrigation improvements. A preconstruction paleontological training course with the construction contractor would occur prior to construction.
Land Use	Changes to land use from project implementation	Approximately 253.4 acres of land would be converted from undeveloped to developed resulting in minor, long-term impacts to land use within the project area.

Major Conclusion

Implementation of the Preferred Alternative would meet the purpose and need of the project while providing the greatest economic benefits. No significant adverse impacts to the human environment are anticipated (See Chapter 5.0 of the Plan-EIS for a detailed analysis); however, impacts resulting from project implementation would be cumulative to other actions identified in Chapter 5.0 of the Plan-EIS. Adverse construction effects would be short-term (approximately 15 months) and partially offset by avoidance/minimization measures and implementation of BMPs. Improved water availability and distribution for agricultural purposes and M&I uses would result. Additional hydroelectric energy would be produced by the extended use of the existing Orderville hydroelectric power plant. The reservoir and associated facilities would provide a new recreation opportunity.

	The Preferred Alternative is the most environmentally friendly alternative and has the greatest net economic benefits of all alternatives analyzed. This alternative represents both the Preferred Alternative and the National Economic Efficiency (NEE) Alternative. No measurable long-term adverse impacts are anticipated, and long-term environmental, social, and economic benefits would be realized from implementation of the Preferred Alternative.
Areas of Controversy	The scoping process for the Plan-EIS resulted in the identification of several issues and concerns associated with the proposed project. These include project cost, reduced downstream flow, project economics, alternative reservoir sites, non-reservoir alternatives, dam safety, invasive species, WSR-status, rare species, cultural resources, water use, and climate variation.
Issues to be Resolved	None
Evidence of Unusual Congressional or Local Interest	There has been interest in the proposed project expressed by the public, government, and non-government entities. A total of 66 public documents containing 249 specific comments were submitted during the public scoping period. An additional 9 agency-specific comment documents containing 57 specific comments also were submitted during the public scoping.
Compliance	Is this report in compliance with executive orders, public laws, and other statues governing the formulation of water resource projects? Yes X No___

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1.0 WATERSHED PLANNING BACKGROUND

As the lead federal agency for this proposed project, the Natural Resources Conservation Service (NRCS) is proposing to provide funding for project measures associated with Agricultural Water Management (AWM), Municipal & Industrial (M&I) Water Supply, and Public Recreation in the Cove-East Fork of the Virgin River. A Watershed Plan-Environmental Impact Statement (Plan-EIS) is required for NRCS to comply with the requirements of the National Environmental Policy Act (NEPA) of 1969, 42 U.S. Code (USC) 4321 et seq. and its implementing regulations, as set forth in 7 Code of Federal Regulations (CFR) 650. This environmental document was initiated using the 40 CFR 1500-1508 (May 20, 2022) and 7 CFR 650 regulations. These regulations have recently been rescinded and replaced with U.S. Department of Agriculture (USDA) regulations found under 7 CFR 1b, published as a Final Rule in the Federal Register on April 3, 2026 (91 FR 17062). However, in a good-faith effort to fulfill NEPA's requirements, including Congressional timeline and considerations of fiscal restraints, the agency decided to continue to use 40 CFR 1500-1508 (July 31, 2023) and 1 CFR 650. This is permissible per the USDA policy guidance issued in the Final Rule's preamble. The Federal Register notice said: "if the NOI for an EIS [was] published more than 90 days prior to the publication of this final rule, the USDA subcomponent has discretion to continue applying the versions of NEPA regulations being applied before the publication of the NOI or to switch to applying 7 CFR 1b as published in this final rule."

This chapter describes the general and specific planning backgrounds for NRCS Watershed Programs, and this proposed project.

1.1 Authority

This Plan-EIS has been prepared under the guidance of the NRCS Watershed Program, which authorizes fundings to help urban and rural communities protect, improve, and develop land resources in watersheds up to 250,000 acres in size. The Watershed Program is authorized under provisions of the Watershed Protection and Flood Prevention Act of 1954 (Public Law [PL] 83-566) Stat. 666 as amended (16 USC Section 1001 et seq.).

1.2 Sponsor

The proposed project Sponsoring Local Organizations (SLOs) are the Kane County Water Conservancy District (KCWCD) and the Washington County Water Conservancy District (WCWCD).

1.3 Cooperating Agencies

Cooperating agencies for this project include the U.S. Environmental Protection Agency (EPA), National Park Service (NPS) through Zion National Park (ZNP), U.S. Army Corps of Engineers (USACE), the Bureau of Land Management (BLM), Utah Trust Lands Administration (UTLA), and the Utah Public Lands Policy Coordinating Office (PLPCO).

1.3.1 Environmental Protection Agency

The EPA accepted Cooperating Agency status in a letter dated October 29, 2021 (Appendix A). The EPA is involved in this proposed project through their responsibilities under Section 102(2)(C) of the NEPA and Section 309 of the Clean Air Act (CAA) of 1970.

1.3.2 National Park Service

The portion of the East Fork Virgin River (EFVR) that traverses ZNP is designated as a Wild and Scenic River (WSR) (National Wild and Scenic Rivers System, 2024). ZNP also maintains water rights on the EFVR. As a result, the NPS and ZNP have an interest in the proposed project and accepted Cooperating Agency status by memorandum dated April 18, 2022.

1.3.3 U.S. Army Corps of Engineers

The USACE has jurisdiction over waters of the U.S. (WOTUS) under the authority of Section 404 of the Clean Water Act of 1972 (CWA) and accepted Cooperating Agency status in a letter dated November 15, 2021 (Appendix A).

1.3.4 Bureau of Land Management

The BLM's involvement in this project is limited as no surface disturbance would occur on public lands, and no BLM permits would be required. However, the EFVR flows through the BLM–managed Parunuweap Canyon WSA. As a result, the BLM signed an MOU accepting Cooperating Agency status on August 16, 2022 (Appendix A).

1.3.5 Utah Trust Lands Administration

The UTLA manages lands located within the proposed project area. The UTLA is the steward of Utah's trust lands and is responsible for generating revenue from them for the benefit of public schools and other state institutions now and for future generations. The UTLA accepted Cooperating Agency status by email correspondence dated October 25, 2021 (Appendix A).

1.3.6 Utah Public Lands Policy Coordinating Office

The PLPCO is the State agency responsible for coordinating, promoting, and implementing Utah's public land priorities. The PLPCO requested Cooperating Agency status by memorandum dated October 20, 2021 (Appendix A) Refer to the Memorandum of Understanding (MOU) included in Appendix A for the roles and responsibilities of each individual agency.

1.4 Planning Area

1.4.1 Selected Watershed

The proposed Watershed Area developed for this Watershed Plan consists of a compilation of three Hydrologic Unit Code (HUC) 12s (Table 1-1 and Figure B-1) totaling 97,449 acres that are intersected by the project area in Kane County, Utah (Figure B-1, Appendix B). The Watershed Area is comprised of all direct tributary drainageways and land from which, after project installation, water and sediment could adversely affect any proposed structural measure as defined in the National Watershed Program Handbook, Title 390 Part 606.80 (NRCS, 2014a).

Table 1.1. HUC 12s in the Watershed Area

Name	Hydrologic Unit Code Number	Acres
Headwaters East Fork Virgin River	150100080201	33,414
Lydias Canyon-East Fork Virgin River	150100080203	40,747
Muddy Creek	150100080202	23,287
Total	-	**97,449**

1.4.2 Study Area

The project area for the proposed project is approximately 712.46 acres in size and is located in the Long Valley area between the cities of Glendale and Mt. Carmel, Utah. The project area includes all areas where ground or surface disturbance would occur as a result of project implementation. Surface-disturbing activities would include construction of a reservoir, access roads, pipelines, spillways, staging areas, and borrow pits. A detailed description of the proposed project is included in Section 4.2.2.1. Although no surface disturbance would occur beyond the project area as defined above, water would be made available to Washington County users for agricultural and M&I purposes.

The study area for the proposed project includes the project area and the downstream areas in Washington County. The study area includes all areas where environmental impacts could potentially occur as a result of project implementation. Downstream areas include where water would be released from the new reservoir to the Quail Creek Reservoir Diversion site approximately 50 river-miles downstream via the EFVR and Virgin River. Water would then be diverted from the river for agricultural use by the Hurricane Canal Company and M&I use in Washington County. Washington County is approximately 2,430 square miles with an estimated population of 207,943 (Utah Demographics, 2026). Primary communities include the cities of St. George, Washington, Hurricane, Santa Clara, Ivins, Toquerville, La Verkin, and Virgin. Refer to Figure C-1 in Appendix C for a figure of the project area versus the study area.

Project alternatives considered for detailed analysis (No Action and 3,000-Acre-Feet Reservoir Alternatives) encompass the same study area as described above; however, both alternatives would entail a reduced construction footprint or surface disturbance area compared to the Preferred Alternative (6,000-Acre-Feet Reservoir).

1.4.3 Area of Potential Effects for National Historic Preservation Act Section 106 Compliance

The Area of Potential Effect (APE) has been refined throughout the watershed planning process. In December 2019, the APE was defined as 791.68 acres (152.18 acres BLM, 70.33 acres UTLA, and 569.17 acres of private land), which included the proposed reservoir area, hydroelectric plant locations, six proposed borrow pits, a pipeline, and powerline/utility corridors. In January 2023, an addendum APE of 68.83 acres of private land was added to include the addition of the Mt. Carmel pipeline. In February 2024, an addendum APE of 13.72 acres was added to include the Esplin Borrow Pit Site. Refer to Appendix C-2 for figures of the APE.

In August 2024, the project extents were further refined, removing three of the six borrow pit sites (keeping the Tait, Esplin, and Lamb Pits). The NRCS defined the final Direct area of the APE, in consultation with the EPA, USACE, BLM, NPS and applicable tribes as 712.46 acres, consisting of 0.23 acres BLM, 70.33 acres UTLA, and 641.9 acres of private land, encompassing all areas that may be disturbed or changed from their current conditions with potential to affect cultural resources (see Sections 1.4.2 and 5.5.1). This includes all construction sites, staging areas, access roads, borrow sources, inundation areas, and necessary buffer zones. The Indirect area of the APE was also defined in August 2024 with the above consulting parties as approximately 1,007.97 acres, including 17.05 acres of BLM, 0.51 acres of UTLA, and 990.41 acres of privately owned lands. In June 2026, an updated inundation area was provided, and an updated Indirect area of the APE Memo was sent for consultation on September 8, 2026, with the consulting parties listed above.

Additionally, the NRCS identified the Visual area of the APE as approximately 4,952.29 acres, including 245 acres of BLM, 1,698.01 acres of UTLA, and 3,009.28 acres of private lands (see Sections 3.2.5.1 and 5.5.1). These three sections under the APE partially overlap with each other.

Table 1.2. Total project Area of Potential Effect

Area of Potential Effect	BLM	USFS	UTLA	Tribal	Private	Total
Direct section of APE Acreage (Cove Reservoir with construction buffer, Pipes, Canals, Esplin Pit, Tait Pit, Lamb's Pit)	0.23	0.00	0.67	0.00	641.9	712.46
Indirect section of APE Acreage (Inundation Areas)	17.05	0.00	0.51	0.00	990.41	1,007.97
Visual section of APE Acreage (1 Mile Buffer of Cove Reservoir and Facilities)	245.00	0.00	1,698.01	0.00	3,009.28	4,952.29

1.5 Planning Process and Study Scope

The proposed project is authorized by the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566). The area wide planning process is outlined in Title 390, Parts 500 – 506 Watershed Program Management Manual (NRCS, 2024a). Other applicable laws for this proposed project include NEPA, NHPA, Endangered Species Act of 1973 (ESA), CAA, the Wild and Scenic Rivers Act of 1968 (WSRA), and the CWA. Other laws, rules and regulations may also apply and are identified in the NRCS Watershed Program Manual (NWPM), Section 500.32 (NRCS, 2024a).

The geographic area for the proposed project is the Long Valley drainage, which is part of the EFVR Watershed. Washington County is included in the larger Upper Virgin Watershed. Planning policy for watershed plans requires consideration of all natural resources within the planning area, as well as social and economic considerations. The plan evaluation process (Departmental Manual [DM] 9500-013) involves the following:

- Identify problems and opportunities.

- Inventory existing resources and conditions.
- Forecast future conditions.
- Develop an array of alternatives.
- Evaluate effects of individual alternatives.
- Compare alternatives.
- Identify Recommended Alternative.
- Implement and evaluate.

The format of this document follows the plan process that must be followed for watershed project plans as outlined in the NWPM Parts 500 through 506 (NRCS, 2024a), National Watershed Program Handbook (NWPH), Parts 600 through 606 (NRCS, 2014a), and National Environmental Compliance Handbook, Part 610 (NRCS, 2016). The planning and decision-making process followed Principles, Requirements, and Guidelines (PR&G) for Federal Investments in Water Resources (CEQ, 2013), NRCS DM 95000-013 (USDA, 2017a), the PR&G eight-step evaluation process (refer to the PR&G Analysis Report included in Appendix E-1), and the nine-step planning procedures from the National Planning Procedures Handbook (NPPH) (NRCS, 2013). The nine-step planning process is defined in Section 1.5.1 below.

1.5.1 Stepwise Planning Process

The NRCS planning process consists of nine steps, divided into three phases covering 1) Collection and Analysis, 2) Decision Support, and 3) Application and Evaluation. The nine-step planning process, as presented in the NPPH (NRCS, 2013), was considered and incorporated into this Plan-EIS, as explained below.

1.6 Phase 1—Collection and Analysis

Step 1—Identify Problems and Opportunities: Problems and opportunities were identified during the project scoping process and are included in Chapter 2.2. Input from the sponsors, agencies, the public, organizations, and Tribes were solicited as described in Section 1.5.5 and Chapter 7.3 to help identify problems and opportunities. Engineering analysis was completed to further identify and evaluate problems, as documented in the Preliminary Design Report included in Appendix E-1.

Step 2—Determine Objectives: The purpose and need statement for the project was formulated with the problems and opportunities associated with the proposed project. Where the "purpose" identifies the fundamental reason why the action is being proposed, and the "need" describes the problem(s) that the proposed action is intended to address and explains the underlying causes of the problem(s). The Purpose and Need were prepared by the project proponents in cooperation with the NRCS, EPA, NPS, USACE, UTLA, PLPCO, ZNP, and SLOs. Chapter 2.0 identifies the purpose, objectives, and need to support Step 2.

Step 3—Inventory Resources: Resources and ecosystem services relevant to the alternative actions were determined during the scoping process and other resource evaluations, as described in Chapter 3.1. The resource conditions determined to be relevant are described in Chapter 3.0.

Step 4—Analyze Resource Data: The environmental baseline conditions for resources to be evaluated against alternative actions were identified and are included in Chapter 3.2. The best available data and science were used to inventory the existing resource conditions at the level and scale of analysis determined reasonable for evaluating alternatives and impacts during the planning stage.

1.7 Phase 2—Decision Support

Step 5—Formulate Alternatives: Project alternatives were formulated in consideration of the federal objective set forth in the Water Resources Development Act of 2007, the PL 83-566 general purposes, and the project purpose and need. Alternatives were formulated following procedures outlined in the NWPM, NWPH, DM 95000-013, and PR&G. Alternatives formulated are described in Chapter 4.0.

Step 6—Evaluate Alternatives: The effects of alternatives analyzed in detail were determined for each resource relevant to the alternative actions. The evaluation of alternatives is included in Chapter 5.0 and assesses the proposed alternatives against the baseline data presented in Chapter 3.2.

Step 7—Make Decisions: A National Economic Efficiency (NEE) Alternative, also identified as the Preferred Alternative, was selected based on the evaluation performed. The selection was made for the alternative that best maximized public benefits (environmental, economic, and social) with appropriate consideration of costs. Chapter 6.0 provides information on the decision-making process for selection of the Preferred Alternative. The Preferred Alternative was also agreed upon in cooperation with the project SLOs, NRCS, EPA, NPS, ZNP, USACE, BLM, UTLA, and PLPCO.

1.8 Phase 3—Application and Evaluation (Future Work)

Step 8—Implement the Plan: The Plan-EIS is the first phase of three phases to be completed for implementation of the preferred alternative. After the Final Plan-EIS is completed, Phase Two would consist of final design, and Phase Three would consist of installation of the project measures.

Step 9—Evaluate the Plan: After the installation of measures from Phase Three, NRCS and the SLOs would evaluate the effectiveness of the plan in solving the resource concerns. Adjustments to the plan would be made as needed.

1.8.1 Ecosystem Services Framework

An ecosystem services framework is required by the PR&G and provides for an integrated approach that allows consideration and transparent evaluation of the benefits (both tangible and intangible) and tradeoffs of potential alternatives (DM 9500-013). Four categories of ecosystem services are described in the PR&G and are included below for reference.

- **Provisioning services** are tangible goods provided for direct human use and consumption, such as food, fiber, water, timber, or biomass.

- **Regulating services** maintain a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe—examples include flood and disease control, water filtrations, climate stabilization, or crop pollination.

- **Supporting services** refer to the underlying processes maintaining conditions for life on earth, including nutrient cycling, soil formation, and primary production.

- **Culture services** make the world a place in which people want to live—recreational use, spiritual, aesthetic viewsheds, or Tribal values.

The scoping process identified resources relevant to the proposed action that were considered for the determination of applicable ecosystem services (see Chapter 3.1). Ecosystem service benefits can be both monetary and non-monetary. Appropriate metrics should be based on current methodology to quantify impacted services over time for determination of project and/or regional-specific effects. For reference, a list of ecosystem service categories and their subcategories from Earthwise Aware is provided as Figure 1-1 (Earthwise Aware, 2024). The ecosystem service categories/subcategories relevant to this proposed project and the applicable resources pertinent to each subcategory that were analyzed in this document are provided in Table 3.2 of Chapter 3.1.



Figure 1.1. Ecosystem Services.

The applicable ecosystem services were evaluated as part of the PR&G eight-step evaluation process. This process includes consideration of the federal objective, PL 83-566 general purposes, guiding principles, and ecosystem services to assist in decision-making. Refer to the PR&G Analysis Report included in Appendix E-1 for documentation of the PR&G eight-step evaluation process used for decision-making.

1.8.2 Period of Analysis

The NRCS period of analysis is the time required for project development (design and construction) plus the evaluated life of the project. The evaluated project life is the time over which implementation of an alternative is functional and would have significant beneficial or adverse effects when the project successfully functions with prescribed operations, maintenance, and replacement. The evaluated life is used for discounting and amortizing project benefits and costs. It is also used to determine the duration of operation and maintenance (O&M) agreements for the project works of improvement.

The NRCS period of analysis for this project is 103 years, which includes 100 years for the evaluated life and three years to construct the proposed project.

1.8.3 Project Scope

Section 1 of PL 83-566 sets forth three general purposes for Watershed Program projects:

- Flood prevention (including structural and land treatment measures).
- The conservation, development, utilization, and disposal of water.
- The conservation and proper utilization of land in watershed or sub-watershed areas not exceeding 250,000 acres for the primary purpose of flood prevention (including structural works of improvement and land treatment measures); The project may not include any single structure which provides more than 12,500 acre-feet of floodwater detention capacity, and more than 25,000 acre-feet of total capacity.

This proposed project scope falls under the second purpose; “the conservation, development, utilization, and disposal of water.” The proposed project is intended to increase the availability of water for AWM, M&I, and recreational water supply.

1.8.4 External Scoping

An external scoping process was conducted to provide opportunity for individuals, agencies, Tribes, and other organizations interested in or potentially affected by implementation of any of the proposed alternatives to share concerns and provide input. Details of the scoping process and results are provided in Chapter 7.0 of this document. Project scoping questions, comments, and concerns were requested from the public, SLOs, stakeholders, tribes, organizations, and agencies during the external scoping period, both orally at a public meeting and via written submittal of comments. Tribal Scoping letters were mailed to 17 representatives of 11 Tribes as part of the original Watershed Plan Environmental Assessment (Plan-EA) scoping outreach process on January 9, 2020. A Notice of Intent (NOI) to prepare the Plan-EIS was published in the *Federal Register* on March 29, 2022. The open comment period was 209 days beginning October 7, 2021, and ending Thursday, April 28, 2022. A scoping letter and project fact sheet were sent directly to landowners who own parcels adjacent to or within the project area. Scoping activities were initiated under 40 CFR 1500-1508 (May 20, 2022) and 7 CFR 650 regulations. These regulations have recently been rescinded and replaced with USDA regulations found under 7 CFR 1b, published as a Final Rule in the Federal Register on April 3, 2026 (91 FR 17062). However, in a good-faith effort to fulfill NEPA’s requirements, including Congressional timeline and considerations of fiscal restraints, the

agency decided to continue to use 40 CFR 1500-1508 (July 31, 2023) and 7 CFR 650. This is permissible per the USDA policy guidance issued in the Final Rule's preamble. The Federal Register notice said: "if the NOI for an EIS is published more than 90 days prior to the publication of this final rule, the USDA subcomponent has discretion to continue applying the versions of NEPA regulations being applied before publication of the NOI or to switch to applying 7 CFR 1b as published in this final rule." For a full summary of scoping activities, see the Scoping Report in Appendix A.

A notification was published in the *Southern Utah News* on October 7 and October 14, 2021 (Appendix A). Project press releases were sent to the *Salt Lake Tribune*, *The Spectrum*, and the *Desert Sun News*. Non-governmental organizations were also contacted.

A public meeting was held in Orderville along with a virtual meeting via Zoom Webinar on Wednesday, October 20, 2021, from 6:00 p.m. to 7:30 p.m. Approximately 41 members of the public attended, based on the number of unique names/emails contained in the Zoom attendee report. A list of attendees is included in Appendix A. A total of 66 public comment documents were received, which were categorized and organized into 249 specific comments. A total of nine agency comment documents were received, which were categorized and organized into 57 specific comments. A single comment letter was received from the Hopi Tribe during Plan-EA) scoping, and a Hopi and Navajo letter was received during EA Notice of Availability (NOA). The NRCS responded directly to Hopi via letter (Appendix A). These comments were considered in preparation of the Plan-EIS. A Scoping Report was prepared summarizing the scoping process and is included in Appendix A. The scoping report includes documentation of the scoping announcements and activities that occurred during the external scoping process. A Draft Plan-EA for this proposed project was prepared and published for public review in 2020. In 2021, NRCS determined that a Plan-EIS would be required for the proposed project. The external scoping process for the Plan-EIS is in addition to the scoping process conducted for the Plan-EA. Individuals, agencies, Tribes, and other organizations who participated in the scoping and public comment process for the Draft Plan-EA were included on an email and/or hard copy mailing list for the Plan-EIS. Comments received on the Draft Plan-EA were considered during preparation of the Draft Plan-EIS.

1.9 Related Projects and Studies

Related past, present, and reasonably foreseeable projects and studies within the project vicinity were identified to help define the scope of issues to be addressed in this watershed plan. Those issues found relevant to this project were used to describe the resources in Chapter 3.0 and to determine direct, indirect, and cumulative impacts addressed in Chapter 5.0. Studies are referenced, where applicable, throughout the Plan-EIS. Chapter 8.0 provides information on the references and where they can be found.

2.0 PURPOSE AND NEED

2.1 Purpose

Pursuant to PL 83-566, the purpose of this proposed project is to enhance the efficiency and reliability of the current AWM in Long Valley, Kane County and Hurricane, Washington County, Utah (part of the EFVR watershed) while complying with the Zion National Park Water Rights Settlement Agreement of 1996 (ZNP Agreement) (United States, Utah, Washington District, & Kane District, 1996). Effective irrigation systems and water management strategies, including construction of a water storage reservoir, would support agriculture profitability amid constraints posed by scarce and costly water resources.

The project would also provide a public recreation opportunity in Long Valley and increase M&I water supply to communities in Washington County. The water demand in the WCWCD service area is projected to increase as summer agricultural water shortages continue, and more M&I water providers join and receive water from the WCWCD system. The WCWCD manages reservoirs, pipelines, wells, water storage tanks, treatment plants, hydroelectric power plants, and diversion dams. The majority of the district's water is sold wholesale to its municipal customers including the Cities of St. George, Washington, Hurricane, Santa Clara, Ivins, Toquerville, La Verkin, and Virgin (WCWCD, 2025). A figure of the Service Areas is provided in Figure C-3 in Appendix C.

2.1.1 Federal Objective

Water resource investments, as defined by the NWPM, shall reflect national priorities, encourage economic development, and protect the environment by:

- Seeking to maximize sustainable economic development.
- Seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used.
- Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

2.1.2 Project Objectives

Project objectives were formulated at the beginning of the planning process by project SLOs and NRCS based on a documented need for water availability in Kane and Washington Counties. The project objective is to enhance the efficiency and reliability of the current AWM in Long Valley and Washington County, Utah, while complying with the ZNP Agreement (1996). The objectives listed below were identified by SLOs, cooperating agencies, organizations, and the public during development of this Plan-EIS:

- Provide a reliable source and long-term availability of agricultural water during the summer months in the Glendale, Orderville, and Mt. Carmel areas of Kane County and the Hurricane area of Washington County.
- Provide M&I water to Washington County.

- Provide an additional recreation opportunity in Kane County.
- Increase annual visitation in the communities of Orderville, Glendale, and Mt. Carmel by establishing an additional recreational hub that supports growth in local business revenues and employment opportunities.
- Provide for the maximum utilization of renewable energy for local communities, whose populations are projected to rise in the near term (Utah PLPCO, 2017); releases of excess water and water delivered to WCWCD would supplement energy provided by the existing Orderville hydroelectric plant.
- Comply with the ZNP Agreement (1996).

2.1.3 Constraints and Considerations

Constraints that influenced the alternatives analysis were identified for the planning area. These constraints limited the extent to which the objectives could be achieved. A description of the constraints is provided below, and further detail is provided in Chapter 4.0.

- **Siting limitations:** Topography in the Long Valley area limits the number of sites (seven) that potentially meet the necessary criteria for a reservoir. Issues with these sites are discussed in Chapter 4.0. A majority of the land in the area is not suitable for reservoir development.
- **Public safety:** The majority of the potential alternative sites would put residential property within the breach inundation zone of a dam.
- **Environmental resources:** Development of certain sites would involve the loss of existing agricultural land and residences.
- **Geotech restrictions:** Some of the available sites would not support construction due to geological structural limitations.
- **Engineering challenges:** Development of some potential sites would require extensive engineering, such as re-routing existing roads around dams and reservoirs. Some of this re-routing would be in steep topography. There would be differences in dam size depending on the site location.
- **Economic constraints:** An economic analysis was completed to find the alternative which best meets the proposed project's purpose and need while providing economic benefit. It was determined that development of some potential sites would be more expensive than others. Development of some sites would be cost prohibitive.

2.2 Need

The need for this project arises from annual water shortages experienced by local agricultural users served by the Glendale, Orderville, and Mt. Carmel irrigation companies. Due to a difference in timing between the melting of snowpack within the watershed and the peak demand for agricultural water use, these users experience water shortages during the summer months. Contributing factors include variable precipitation patterns, EFVR flow trends, absence of sufficient water storage facilities, and inefficiencies in current irrigation systems, such as unlined ditches in

Mt. Carmel. These factors combine to result in insufficient agricultural water during summer, causing inconsistent agricultural production and limiting the potential for cultivation of water-dependent crops.

Agricultural water users in Washington County, served by the Hurricane Canal Company, experience summer water shortages when Virgin River flows decrease. Additionally, the ongoing drought and historical population growth has stressed existing M&I water availability.

2.2.1 Water Usage Trends

A review of water usage in the area upstream of Mt. Carmel (over the last 20 years) shows that an average of 20 cubic feet per second (cfs) is needed during the irrigation season, which exceeds the river's average summer capacity by approximately 9 cfs (Figure 2-1). The Glendale, Orderville, and Mt. Carmel irrigation companies only had enough water to provide for full irrigation of 302 acres of their 1,124 acres during 90 percent of the record years.

2.2.2 Irrigation Infrastructure

The current irrigation infrastructure in Long Valley lacks sufficient capacity for storage during periods of non-use and high flow. Consequently, the water that could be stored remains largely inaccessible to local users. This could be achieved by enhancing water availability through the collection and storage of excess water that could be used during the irrigation season (June through August) during non-use periods. Figure 2-1 shows the river discharge available for diversion, including tributary flows between the U.S. Geological Survey (USGS) gauging station and Mt. Carmel, in comparison to the irrigation demand for the three irrigation companies (Alpha Engineering, 2026).

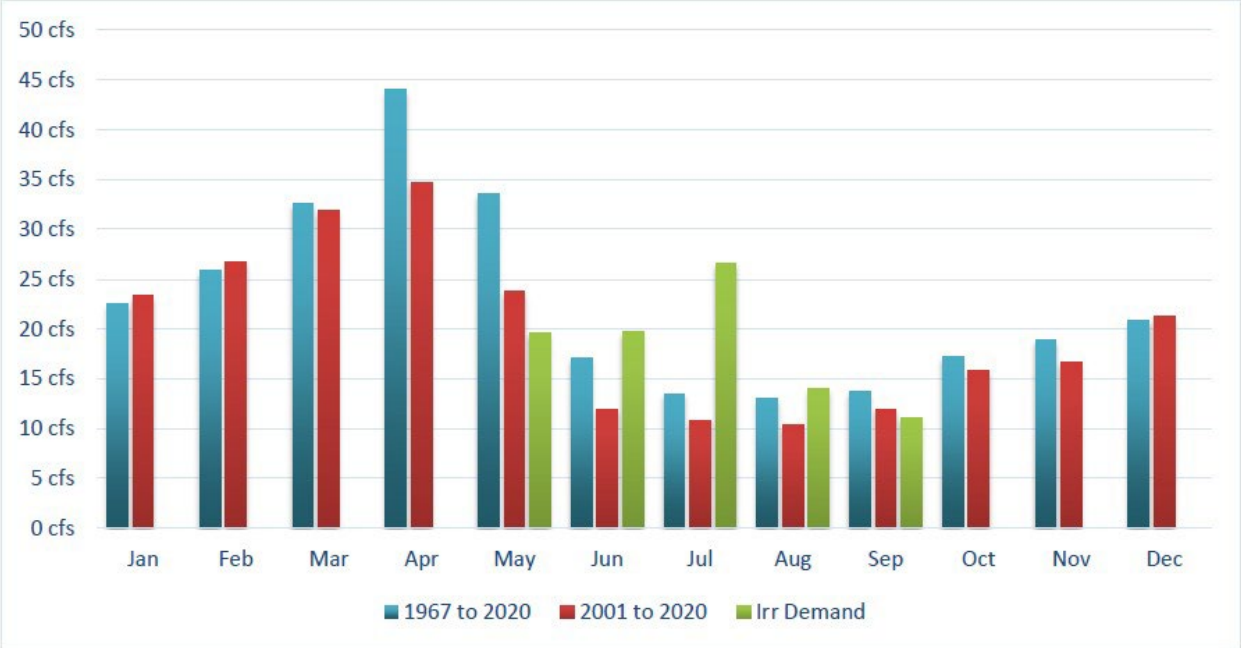

Figure 2.1. Average 09404450 Glendale USGS Gauge Data Compared to Irrigation Demand.

2.2.3 Problems

Despite using available water for irrigation with no new conveyance or storage, the EFVR's average flow is insufficient to meet annual crop demands in the critical months of June, July, and August. For example, to fully irrigate the existing agricultural acreage in Long Valley in July, an estimated flow of 26.9 cfs is required, which exceeds the river's average historic flow rates of approximately 10–14 cfs capacity (Figure 2-1).

There is a demand for new recreational facilities in Kane County and Utah in general. Frequently, recreational facilities exceed capacity with residents and non-resident tourists during peak travel seasons, particularly in the summer months. In 2023, the number of visitors to ZNP exceeded 5 million, which is an increase of 73.4 percent since 2010. Visitation at Bryce Canyon National Park (BCNP) to 2.5 million people in 2023, which is a 91.4 percent increase over 2010 visitation levels (NPS, 2024).

During the summer months, low flows in the Virgin River do not provide sufficient water to meet agricultural irrigation needs on land administered by the Hurricane Canal Company.

The extended drought has strained the existing M&I and agriculture water supply in Washington County resulting in implementation of enhanced conservation measures. Further, the historical increase in population for Washington County has increased demand for M&I water. Washington County is among the fastest-growing regions in the western U.S. and is located within an arid, hydrologically constrained basin. M&I water demand has increased substantially due to population growth, economic activity, and increases in equivalent residential connections, even under aggressive conservation implementation.

Despite implementing aggressive conservation measures, existing potable and secondary supplies are insufficient to meet the existing and future M&I demand. Local surface water sources within the Virgin River Basin are fully allocated, groundwater basins are closed to new appropriations, and supply diversification options are limited.

2.2.3.1 Agricultural Water Deficits of Long Valley Irrigation Companies

Although the Utah Division of Water Rights has revised the irrigation water duty from 6-acre-feet per acre to 5-acre-feet per acre, the analysis presented in this document uses the historical 6-acre-foot duty because it reflects the current water use under existing irrigation practices. The revised 5-acre-foot duty was negotiated between the Utah Division of Water Rights and the KCWCD for the Glendale, Orderville, and Mt. Carmel Irrigation Companies. Under this revision, the 5-acre-foot duty would only apply when irrigation rights are converted to another beneficial use. Accordingly, the historical 6-acre-foot duty was used throughout this document to evaluate existing agricultural demands and shortages because it represents current conditions.

Research, such as Utah State University Research Report 145, indicates that under certain technological applications, water usage could be optimized to 4-acre-feet per acre for crops like alfalfa in the Orderville area. With a conversion to pressurized systems and the current acreage, an average of 1,412 acre-feet of water is required to allow these irrigation companies to meet their full water right during the USGS period of record. Table 2.1 shows the water rights of the Glendale Irrigation Company, Orderville irrigation Company, and Mt. Carmel Irrigation Company. Refer to Appendix E-1 for more detail.

Table 2.1. Irrigation Company Acreage and Water Demand (Appendix E-1).

Irrigation Company	Total Combined Water Right (Acreage)	Maximum Allowable Diversion Rate (cfs)	Prescribed Water Duty (Acre-Feet per Year [afy])
Glendale Irrigation Company	434.0	7.2	2,170.0
Orderville Irrigation Company	286.0	4.7	1,430.0
Mt. Carmel Irrigation Company	404.0	6.7	2,020.0
Total	**1,124.0**	**18.5**	**5,620.0**

Note: The projected need for water in Washington County is 4.5 cfs or 1,350 afy.

2.2.3.2 Available Water within the EFVR Drainage Area

The portion of the EFVR drainage area extending above Mt. Carmel Junction to the Quail Creek Reservoir Diversion point is the primary focus of the water availability analysis. A water model, integrating historical USGS data, Utah Department of Water Rights records, and statistical inflow estimations from various drainage basins, was developed to assess water flow and diversions in the EFVR. This model, though not precise, is designed to reflect real-world water flow scenarios accurately.

Analysis of USGS gauge data over a 54-year period and a more recent 20-year period highlights the impact of persistent drought on river flows, especially during spring and summer. These data, along with statistical calculations for watershed drainage, help construct a comprehensive water budget for the area upstream of Mt. Carmel. Figure 2-2 illustrates the seasonal irrigation demands of the three irrigation companies versus the average river flow, translating crop water needs into equivalent cfs flow rates for comparison (Alpha Engineering, 2026).

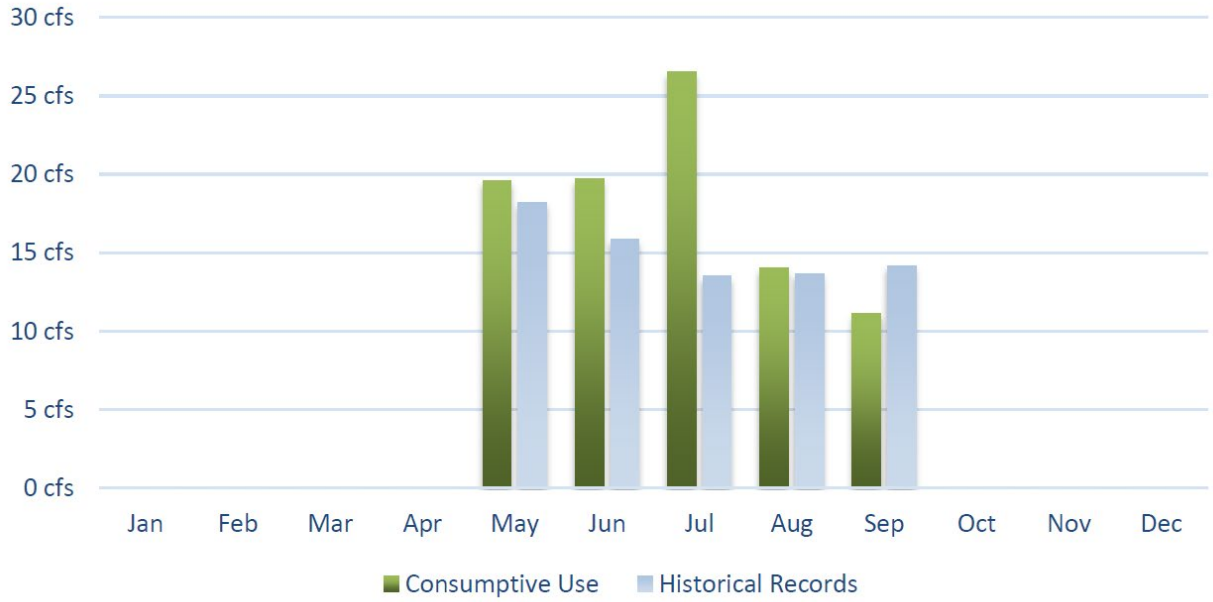

Figure 2.2. Modeled current average conditions of the EFVR drainage above Mt. Carmel Junction.

Despite converting all available water for irrigation with no conveyance or application losses, the EFVR's average flow is insufficient to meet the crop demands, particularly in the critical months of June, July, and August. To fully irrigate the necessary acreage in July, for instance, an estimated flow of 26.9 cfs is required, which nearly exceeds the river's average capacity.

A schematic representation of the EFVR drainage area (Figure 2.3) highlights the inflows from tributaries and outflows to irrigation diversions using data from USGS gauging station 09404450, located near Glendale, Utah (Alpha Engineering, 2026). This includes additional drainage areas (shown in blue) that contribute flow to the EFVR as the stream channel traverses between the various irrigation company diversion dams. Proposed connections to and from the Cove Reservoir are shown in red and green.

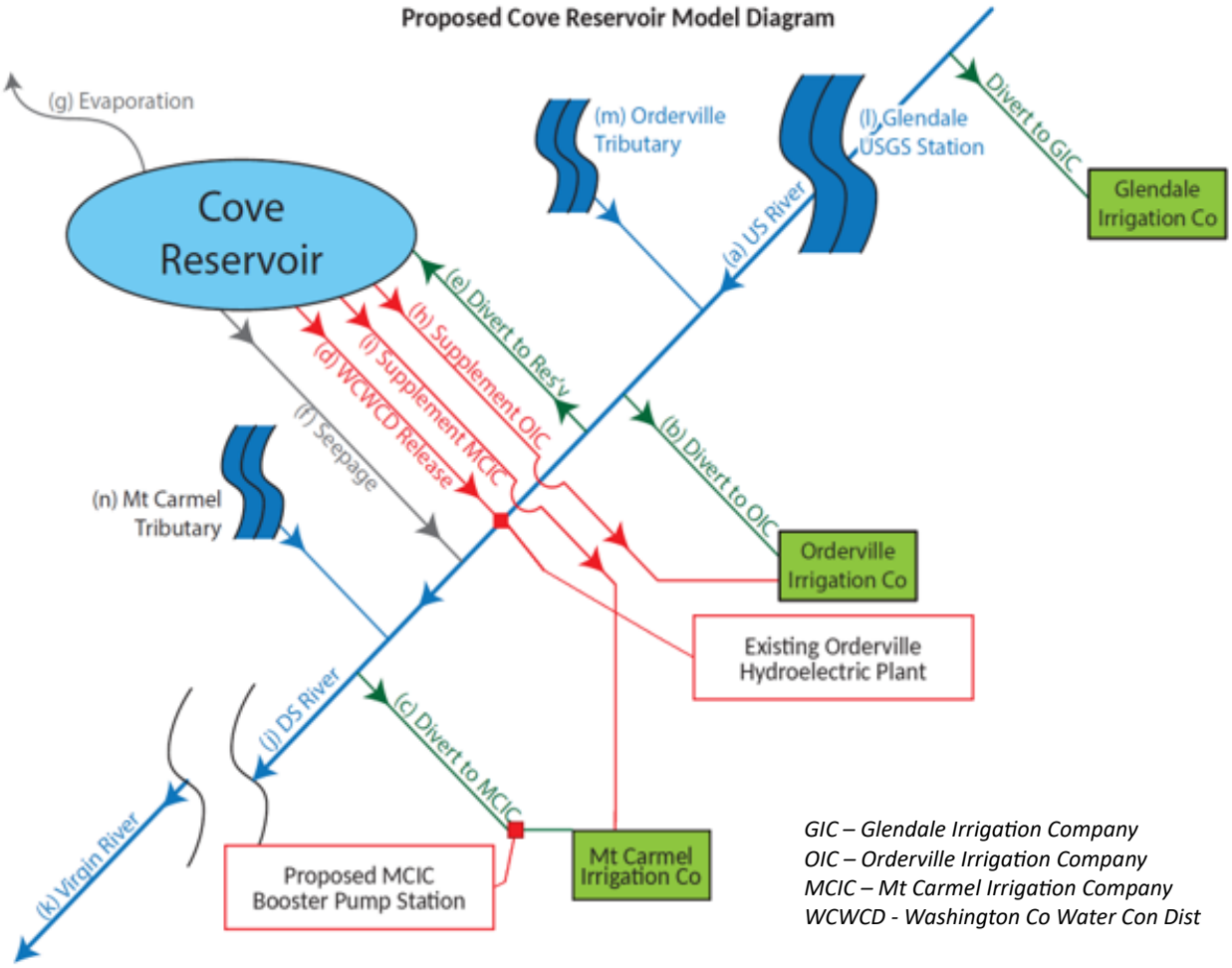

Figure 2.3. Proposed Cove Reservoir Model Diagram.

2.2.4 Opportunities

Project measures associated with AWM address deficiencies in drainage, ground water recharge, irrigation, water conservation, water quality and agricultural (including rural communities) water supply (NRCS, 2024a).

Project measures associated with M&I water supply provide storage capacity in reservoirs to increase the availability of water for present and future M&I use (NRCS, 2024a).

Project measures associated with Public Recreation provide a recreation opportunity in Kane County, addressing the currently overcrowded recreational facilities, particularly in the summer months.

This proposed project would provide the following long-term benefits:

- Increased water availability to local agricultural users in Kane and Washington Counties.
- Increased water availability for municipal users in Washington County.

- Increased water security for present and future residents in both Kane and Washington counties.
- Increased resilience to climate stressors, including potentially long-term extreme drought conditions.
- Added recreation opportunities for Kane County and the surrounding communities.

3.0 AFFECTED ENVIRONMENT: CURRENT AND FUTURE CONDITIONS

3.1 Resource Categories of Concern

A scoping process was completed to identify relevant resources, environmental concerns, and ecosystem services to be analyzed in detail and determine which items could be eliminated from the detailed study. These items were identified for the project based on required scoping concerns outlined in the 390 NWPM Section 501.24(B) (NRCS, 2024b), as well as additional concerns identified by the public, SLOs, stakeholders, Tribes, agencies, and cooperating agencies during the scoping process.

Table 3.1 provides a list of resources and their relevancy to the project. Items determined to be not relevant to the proposed action have been eliminated from the detailed study. Items determined to be relevant to the to the proposed action are detailed in Chapter 3.2 and Chapter 5.0.

Table 3.1. Resource Categories of Concern and Ecosystem Services Identified During Scoping.

Item/Concern	Relevant to the Proposed Action?	Rationale
Soil Resources **(Soil-Related Concerns)**	Yes	Soil resources are relevant for determining sediment yield and reservoir storage capacity within the watershed, and construction activities could increase erosion potential and change sediment transport conditions.
Prime and Unique Farmland, and Farmland of Statewide or Local Importance **(Soil-Related Concerns)**	No	No prime or unique farmland or farmland of statewide significance is located within the study area.
Water Resources **(Water-Related Concerns)**	Yes	Construction activities would occur in drainages and near water sources. Water would be made available for agricultural purposes during the summer months. The proposed action could affect downstream water flow.
Sole Source Aquifers **(Water-Related Concerns)**	No	There are no Sole Source Aquifer's in or near the study area according to the EPA Sole Source Aquifer interactive map (EPA, 2024a).
Water Quality **(Water-Related Concerns)**	Yes	Surface water quality could be affected. No measurable changes to groundwater quality are anticipated. Stream flow patterns could be altered.
Floodplain Management **(Water-Related Concerns)**	Yes	Construction activities could affect the floodplain in the project area.

Item/Concern	Relevant to the Proposed Action?	Rationale
Coastal Zone Management Areas **(Water-Related Concerns)**	No	There are no Coastal Zone Management Areas in the study area.
WOTUS, Wetlands, and Special Aquatic Sites **(Water-Related Concerns)**	Yes	Jurisdictional WOTUS are located within the study area. Two artificial wetlands were identified in the study area based on review of an aquatic resource survey conducted and included in Appendix E-1.
Coral Reefs **(Water-Related Concerns)**	No	There are no coastal reefs present in the study area.
Regional Water Resource Plans (including Coastal Plans) **(Water-Related Concerns)**	Yes	KCWCD and WCWCD have Water Conservation Plans for the study area. Coastal Plans are not applicable.
Wild and Scenic Rivers **(Water-Related Concerns)**	Yes	The EFVR has WSRs status for the portion that flows through ZNP that may be affected.
Air Quality **(Air-Related Concerns)**	Yes	Construction activities would produce emissions and fugitive dust. The proposed action would not generate long-term emissions (beyond the 15-month construction period). Permits would not be required.
Threatened and Endangered Species **(Plant and Animal-Related Concerns)**	Yes	Habitat for ESA-listed, BLM-listed, and state-listed Species of Greatest Conservation Need (SGCN) occur in the study area and may be affected.
Migratory Birds **(Plant and Animal-Related Concerns)**	Yes	Habitat for migratory birds is present within the study area and may be affected.
Bald and Golden Eagles **(Plant and Animal-Related Concerns)**	Yes	Habitat for bald and golden eagles is present within the study area and may be affected.
Essential Fish Habitat **(Plant and Animal-Related Concerns)**	No	There is no essential fish habitat located in the study area based on National Oceanic and Atmospheric Administration (NOAA) fisheries Essential Fish Habitat Mapper (NOAA, 2021)
Ecologically Critical Areas **(Plant and Animal-Related Concerns)**	Yes	The Parunuweap Canyon Wilderness Study Area (WSA), Zion Wilderness, and Parunuweap RNA are in the study area and may be

Item/Concern	Relevant to the Proposed Action?	Rationale
		impacted due to changes in water flows.
Invasive Species **(Plant and Animal-Related Concerns)**	Yes	The proposed action has potential for the introduction of invasive animal species. Construction disturbance increases the risk of invasive plant species becoming established.
Fish and Wildlife **(Plant and Animal-Related Concerns)**	Yes	The Utah Natural Heritage Program (UNHP) identified potential fish and wildlife habitat within the study area which may be affected.
Natural Areas **(Plant and Animal-Related Concerns)**	No	There are no protected natural areas or conservation areas located in the study area.
Riparian Areas **(Plant and Animal-Related Concerns)**	Yes	Changes in water flow may impact downstream riparian areas.
Forest Resources **(Plant and Animal-Related Concerns)**	No	There are no forest resources in or near the study area.
Cultural Resources and Tribal Consultation **(Human Use-Related Concerns)**	Yes	Historic/cultural resources are present within the study area and may be affected.
Social Issues **(Human Use-Related Concerns)**	Yes	The project is located near populated areas, and project implementation could impact local social conditions.
Local, Regional, and National Economy **(Human Use-Related Concerns)**	No	The project is not anticipated to have impact to the regional or national economy.
Public Health and Safety **(Human Use-Related Concerns)**	Yes	The proposed action has potential for increased risks to public safety due to dam failure and increased risk for construction-related traffic while construction is occurring.
Scenic Beauty **(Human Use-Related Concerns)**	Yes	The development of a reservoir and earthen dam would change the visual character of the immediate area. According to the National Trails System Map, there are no National Scenic and Historic Trails located in or near the study area (NPS, 2025)

Item/Concern	Relevant to the Proposed Action?	Rationale
Parklands (including National Parks, Monuments, and Historical Sites) **(Human Use-Related Concerns)**	No	According to the National Parks and Monuments Map (NPS, 2024), the Utah State Parks Map (Utah Department of Natural Resources, 2025) and the National Natural Landmarks Map (NPS, 2024), there are no parklands located within the project area. Zion National Park is located downstream of the project and is discussed throughout the document.
Significant Scientific Resources **(Human Use-Related Concerns)**	Yes	Paleontological resources exist near the project area and would not be disturbed. Resources found within the Project Area were determined to be invertebrate and non-significant
Land Use **(Human Use-Related Concerns)**	Yes	Alternative measures would affect land use.
Provisioning **(Scoped Ecosystem Services of Concern)**	Yes	Project measures could change flooding conditions on agricultural land that influence crop yield.
Regulating **(Scoped Ecosystem Services of Concern)**	Yes	Project measures include regulation for water, biology, and flooding that influence ecosystem processes. Climate variation also plays a role in flood conditions.
Supporting **(Scoped Ecosystem Services of Concern)**	Yes	Project measures could change surface water flow and water cycling.
Cultural **(Scoped Ecosystem Services of Concern)**	Yes	The project would improve the safety, wellbeing, and sustainability of the local community.

Consideration of ecosystem services that are relevant to the study area is required by the PR&G. This framework provides an integrated approach allowing consideration, transparent evaluation of the benefits (both tangible and intangible), and tradeoffs of potential alternatives. The four categories of ecosystem services are described in Section 1.8.1.

Ecosystem service categories overlap with resource concerns, and therefore, are not discussed separately from the resource concerns. The ecosystem service categories relevant to this project and the applicable resource concerns are provided in Table 3.2.

Table 3.2. Applicable Ecosystem Services and Related Resources.

Category	Service	Applicable Resources
Provisioning	Food/Biomass (crop yield)	Social Issues and Local Economy, Prime and Unique Farmland
Provisioning	Irrigation and livestock water	Water Resources, Social Issues and Local Economy
Regulating	Climate	Surface Water Quantity and Flow, Floodplain Management
Regulating	Water Regulation (quality and quantity)	WOTUS, Surface Water Quality, Surface Water Quantity and Flow, Floodplain Management
Regulating	Biological Regulation (plants and animals)	Plant and Animal Resources
Regulating	Natural Hazards Moderation (flood)	Floodplain Management, Public Health and Safety, Transportation Infrastructure
Supporting	Water Flow and Cycling	Surface Water Flow and Cumulative Affects
Cultural	Cultural/Historical Identity and Heritage	Historic/Cultural Resources/Native American Religious Concerns
Cultural	Peace and Sustainability	Social Issues and Local Economy, Public Health and Safety, Recreation, Visual Resources, Transportation Infrastructure, Noise and Vibration
Cultural	Well-Being and Safety	Floodplain Management, Public Health and Safety

The applicable ecosystem services were evaluated as part of the PR&G eight-step evaluation process. This process includes consideration of the federal objective, PL 83-566 general purposes, guiding principles, and ecosystem services to assist in decision making. Refer to the PR&G Analysis Report included in Appendix E-1 for documentation of the PR&G eight-step evaluation process used for decision-making.

3.2 Inventory of Existing Resources and Conditions

This chapter describes the resources that were determined to be relevant to the proposed action from Table 3.1 and the applicable ecosystem services from Table 3.2. Describing the affected environment defines the context in which the impacts could occur. The environmental analysis process has been conducted in compliance with applicable federal, state, and local regulations. Table S.1 (located in the Summary) provides a condensed overview of the resources that could potentially be influenced by consideration of the Alternatives. Further elaboration on these resources is provided within this chapter.

Each resource in this chapter includes the baseline environmental conditions in the project area and may extend beyond the project area, as applicable, to include the areas of potential impact (the study area). Refer to Section 1.4.2 for a description of the project area and study area.

Per requirements of the PR&G, where applicable, this chapter describes the ecosystem services associated with each resource. Refer to Section 1.8.1 for a definition of ecosystem services and service categories.

3.2.1 Soil

3.2.1.1 Soil Resources

The predominant soil types within the study area primarily consist of sand, sandy loams, upland clay loams, and shale. These soil types are classified by the NRCS Web Soil Survey as Bluesky family-Rock Outcrop complex, Catdraw-Quezcan-Vessilla complex, Marthaspeak-Ramps-Moonshine complex, Quezcan deep Sideshow-Orderville complex, Ramps-Modo-Kunz-Rock outcrop complex, Sili-Sideshow-Gypsic Haplustepts complex (upland clay loam), and Zigzag Family-Badland-Quezcan complex (upland clay loam and Naplene-Teromote-Arboles-Oxyaquic Ustifluvents complex) (NRCS, 2019).

The project area lies in an alluvial valley carved into Cretaceous and Tertiary sedimentary rocks, mainly comprising of sandstone and shale. Residual soils consist of silt and clay, with steep slopes adjacent to the site. Sediment rate studies conducted by Alpha Engineering and RB&G Engineering indicate that sediment volumes over the 100-year project lifespan would range from 253 acre-feet to 600 acre-feet, representing no more than 10 percent of the project reservoir's storage volume (Alpha Engineering and RB&G Engineering, 2020).

The project area is susceptible to occasional flash floods, leading to sheet, rill, and gully soil erosion following significant precipitation events. Although small retention dams have been constructed in the past, many are filled with sediment and provide minimal effectiveness.

Biological soil crusts are found in certain portions of the project area where surface disturbance is minimal. These crusts play an important role in retaining soil moisture and inhibiting the growth of certain annual weeds. They also contribute to reducing wind and water erosion, fixing atmospheric nitrogen into a form usable by plants, and enhancing soil organic matter. The absence of these crusts is a treatable resource concern and considered an indicator of physical disturbance (BLM, 2008)

The material at the three borrow sites that would be used for the proposed project contains either gravel (Lamb and Tait pits) or basalt (Esplin pit). All three pits have been previously used with topsoil removed and gravel or basalt removed on a total of approximately 24.7 acres (Tait pit 7.0 acres; Lamb pit 16.2 acres; Esplin pit 1.5 acres). The areas not disturbed at these sites have limited topsoil derived from sand/gravel or basalt sources. Source material for the embankment would be taken from the reservoir basin and would be covered by water once the reservoir is operational.

3.2.1.2 Ecosystem Services

Agricultural lands and associated soil resources in the study area provide ecosystem services categorized as provisioning services. Specifically, soil resources allow for the production of grasses (alfalfa and oats) and crops that feed cattle and humans. As described in Chapter 2.2, water from the EFVR is used by local agricultural users served by the KCWCD and WCWCD Service areas, including the Mt. Carmel, Orderville, Glendale, Washington, Hurricane, and La Verkin irrigation areas. Provision of this water allow lands to be maintained for agricultural production. Feed grasses,

including alfalfa and oats, contribute to the production of meat and dairy food; this water may also be used to grow food crops for people.

3.2.2 Water

3.2.2.1 Water Resources

Surface flows in the EFVR vary considerably, mainly in response to spring runoff or intense storm events, during which the river carries high sediment loads. From 1967 to 2020, the average monthly discharge of the river ranged from a high of 33.8 cfs in April to a low of 9.9 cfs in August. Gauge data (USGS gauging station 09404450) revealed that the last 20 years have exhibited drier hydrology and may be indicative of future conditions (Alpha Engineering, 2026).

A survey of the project area and surrounding land identified a total of two wetlands, 12 intermittent and/or perennial streams, five ephemeral streams, and three ephemeral ponds. Refer to the Aquatic Resource Delineation Report for more details (Appendix E-1).

The ZNP Agreement (1996) negotiates the settlement of reserved water right claims filed by ZNP (Appendix E-1). The agreement is signed by the U.S. Department of the Interior, the State of Utah, the KCWCD, and the WCWCD. Agreement stipulations include:

1. One or more new reservoirs with cumulative active storage capacity of up to but not exceeding 6,750 acre-feet may be constructed on Stout Creek, Lydia's Canyon, Muddy Creek or Cove Canyon (site of the proposed reservoir), East Fork above Stout Canyon, and on other tributaries of the East Fork upstream of Glendale.

2. New surface water diversions on the EFVR or its tributaries shall not cumulatively exceed 60 cfs.

3. The existing flow or 2 cfs, whichever is less, shall be maintained immediately below any new surface water diversions to reservoirs constructed.

4. The existing flow or 1 cfs (including seepage), whichever is less, shall be maintained immediately below any new reservoir constructed.

5. Cumulative releases from new reservoirs constructed on streams identified above shall not increase the flow measured at the USGS gage on the EFVR near Springdale (USGS No. 09404900), by more than 25 cfs during any 7-day period and shall not exceed the long-term monthly average at Springdale gage by more than 15 cfs. As measured at said gage, the maximum instantaneous flow attributable to releases from such reservoirs shall not exceed 50 cfs, except for matters involving dam safety.

6. Surface water diversions to new reservoirs described above shall not occur except during the period from November 1 to May 31, subject to the bypass flow requirements described above.

The use of EFVR water by the GIC, OIC, and the MCIC is monitored on a regular basis. The three companies divert water from the EFVR in different locations. A weir is present at each diversion site. Each weir has staff gages to read water elevation. Each weir is equipped with an electronic flow meter that sends information to a website to provide remote monitoring. The data collected

from these flow meters is used to determine the total amount of water diverted. Additionally, the Utah State Water engineer collects money from the GIC, OIC, and the MCIC to fund a water commissioner. The commissioner is responsible for monitoring the diversions and making certain that companies are using the correct amount of water according to their water right.

3.2.2.2 Water Quality

The State of Utah has designated the EFVR and its tributaries as High-Quality Waters (HQW) (BLM, 2008). Water quality standards are set by the State of Utah according to EPA guidelines and are reviewed and updated (if necessary) every three years. The water quality standards are intended to protect Utah's waters and improve the quality for beneficial uses (Utah Department of Environmental Quality, 2023). HQWs are protected against "new point source discharges of wastewater, treated or otherwise" (Utah Administrative Code Rule R317-2-3.2).

3.2.2.3 Floodplain Management

The portion of the EFVR within the study area is in a Federal Emergency Management Agency (FEMA) Zone A floodplain (Figure C-4, Appendix C). This designation signifies an area susceptible to inundation by the 1-percent-annual chance flood event, typically determined using approximate methodologies (FEMA, 2019).

The project area is prone to sporadic and occasionally intense flash floods. These floods, though brief, result in significant sediment movement, leading to localized sheet, rill, and gully erosion issues.

3.2.2.4 WOTUS, Wetlands, and Special Aquatic Sites

A desktop review of the study area was completed using National Wetlands Inventory (NWI) data provided by the U.S. Fish and Wildlife Service (USFWS) (USFWS, 2024). The review identified one wetland and sixteen riverine features. A full list of NWI feature types is included in Appendix E-1.

In 2018, qualified professionals with Eocene Environmental Group, Inc. (Eocene; formerly Transcon Environmental, Inc.,) conducted a survey of wetlands and other potentially jurisdictional WOTUS within the project area (Appendix E-1). Follow-up field visits to evaluate additional borrow pits were conducted in 2019, and a survey of the Mt. Carmel Improvement area was conducted in 2021.

Two small wetlands were documented on private land in the Long Valley portion of the project area. The first wetland (0.03 acres), located south of the proposed reservoir and access road, is an isolated, artificial structure consisting of cattail (*Typha latifoli*) and other hydrophytic vegetation. The second wetland (0.73 acres), also isolated and artificial, lies within the right-of-way (ROW) where the replacement of the existing irrigation pipeline would occur. This wetland supports willows and other hydrophytic species (Eocene, 2025). Refer to Appendix E-1 for a detailed description of aquatic resources. The field review also noted that prior anthropogenic disturbances had altered several streams that were identified by NWI, and these streams no longer exist or no longer exhibit connectivity to other aquatic features downstream.

The NRCS communicated with USACE (memorandum dated July 21, 2022, and updated February 18, 2026) requesting an Approved Jurisdictional Determination (AJD) for the project area. By

memorandum dated April 23, 2026, USACE concurred with the aquatic resources' delineation made for the project area. This includes approximately 7.43 acres of aquatic resources, consisting of 9,665 linear feet (3.43 acres) of ephemeral channels; 0.62 acres of irrigation/stock pond features; and 29,415 linear feet (3.38 acres) of irrigations ditches. The USACE memorandum also verified that the location and boundaries of wetlands were delineated consistent with the wetland definition at 33 CFR §328.3 §(16), the 1987 *Corps of Engineers Wetlands Delineation Manual* (Wetlands Research Program Technical Report Y-87-1) and the applicable regional supplements. The location and boundaries of non-tidal waters were found to conform with the ordinary high-water mark definition found at 33 CFR §328.3(c)(7), Regulatory Guidance Letter 05-05, and any applicable regional guides. The USACE AJD memorandum is included as Appendix A.

Flash floods in the EFVR drainage are a common occurrence during the summer monsoon season. While these events can be damaging, one effect of these high-pulse events (i.e., flash floods) is that benefits to the stream and associated riparian habitat also may occur. Willows are early successional plants that benefit from disturbances such as flash floods (PLPCO, 2026).

3.2.2.5 Regional Water Resource Plans

3.2.2.5.1 Colorado River Compact of 1922

The Colorado River Compact of 1922 is an agreement between the states of Arizona, California, Nevada, New Mexico, Utah, and Wyoming under the Act of the Congress of the U.S. of America. The major purposes of the compact are to "provide for the equitable division and appointment of the use of the waters of the Colorado River system; to establish the relative importance of different beneficial uses of water, to promote interstate comity; to remove causes of present and future controversies; and to secure the expeditious agricultural and industrial development of the Colorado River Basin, the storage of its waters, and the protection of life and property from floods" (43 USC 617l). The Virgin River is a Lower Basin tributary of the Colorado River, which connects at Lake Mead approximately 120 river miles away from the Quail Creek Reservoir Diversion site. Because the Virgin River is a Lower Basin tributary, Utah's water use on the Virgin River is not accounted for as part of the Upper Basin's non-depletion obligation. Water would be diverted to Cove Reservoir, then stored, released, conveyed, and applied to beneficial use in accordance with water rights and change applications approved by the Utah State Engineer's Office. Refer to Appendix E-1 for more information.

3.2.2.5.2 Kane County Resource Management Plan

As part of its overall General Plan, Kane County has adopted the Kane County Resource Management Plan to address the present and future needs of the county, as well as the growth and development of all or any part of the land within the unincorporated portions of the county (Kane County, 2018). As part of the Kane County Resource Management Plan, Kane County has addressed aspects of the health, general welfare, safety, transportation, prosperity, civic activities, recreational and cultural activities, natural resources, and the efficient economic use of the land within the unincorporated portions of the county. The plan outlines that Kane County "supports the development, adoption, and implementation of water collection, storage, and distribution" (Utah PLPCO, 2017). Kane County's water management goals include "cooperating with the State of Utah to achieve the provisions of the State of Utah water quality plan, while complying with Utah constitutional and statutory law as to vested water rights and control of in-stream flow. The

county will support efforts to maintain or improve riparian areas and aquatic habitat that represents a range of variability for functioning condition."

3.2.2.5.3 Washington County Water Conservancy District Water Conservation Plan

WCWCD has also adopted a Water Conservation Plan which outlines water conservation goals and programs to ensure the community has a safe, reliable water supply for current and future generations. Washington County is targeting a 14 percent reduction in per capita water use by 2030 (WCWCD, 2021). Key milestones to achieve the 2030 water conservation goal include:

- Continuing existing water conservation programs.
- Creating programs for residential landscape consultations, water audits for hotels/motels and a customized water-saving incentive program for high users.
- Developing rebate programs for turf removal, hot water on demand systems and leak devices/flow sensors.
- Working with municipal partners to pass and enforce new development standards.
- Hiring additional staff to promote, implement and track conservation programs.
- Increasing participation levels and conservation budgets.

3.2.2.6 Wild and Scenic Rivers

The EFVR enters ZNP approximately 20 river miles downstream and southwest of the project area. The river flows through ZNP from the east boundary to the west boundary. This portion of the river has been designated as wild under the WSRA (National Wild and Scenic Rivers System, 2024). This designation means that the river is free of impoundments and generally inaccessible, except by trail, and includes watersheds or shorelines that are essentially primitive as waters are unpolluted and represent vestiges of primitive America. Outstandingly remarkable values associated with this stretch of the river include cultural, geologic, ecological processes, wildlife, and fish. These designations were made possible by the Omnibus Public Land Management Act of 2009. The Omnibus Public Land Management Act also includes a savings clause in Section 1976 to ensure that the new wild and scenic river designations on the Virgin River would not conflict with the 1996 agreement. "SAVINGS CLAUSE—The amendment made by subsection (a) does not affect the agreement among the U.S., the State of Utah, the Washington County Water Conservancy District, and the Kane County Water Conservancy District entitled 'Zion National Park Water Rights Settlement Agreement' and dated December 4, 1996." Additionally, the EFVR was designated as a Research Natural Area in 2001. The area has been set aside for research purposes and is closed to recreation (NPS, 2013).

3.2.2.7 Ecosystem Services

Water flowing through the EFVR provides the following ecosystem services:

- **Provisioning Services**—As described in Chapter 2.2, the EFVR provides agricultural water for livestock feed and food as well as water for M&I purposes in Kane and Washington Counties.

- **Regulating Services**—The amount of water instream affects water qualities, including temperature, turbidity, sediment, and pollutants. Greater instream flow helps to regulate water temperature and decrease bank erosion/sedimentation in the water. Greater streamflow also helps to dilute pollutants. Section 3.2.2.2 describes surface water quality in the study area.

- **Supporting Services**—As described in Section 3.2.4, the EFVR provides fundamental ecosystem processes, such as providing habitat for plants and wildlife and maintaining genetic and biological diversity.

- **Cultural Services**—Water from the EFVR provides recreation opportunities for the local community.

3.2.3 Air

3.2.3.1 Air Quality

The CAA requires the EPA to set National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for six principal pollutants (known as criteria air pollutants) with potential to be harmful to public health and the environment. The CAA identifies two types of NAAQS: primary standards and secondary standards. Primary standards provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Any county within the U.S. classified as a nonattainment area (an area not meeting the national primary or secondary ambient air quality standards for NAAQS) is listed in the EPA Greenbook. Neither Kane County nor Washington County are classified as nonattainment areas (EPA, 2024b).

Air quality in the project area is typical of undeveloped regions of southern Utah and is generally very good. This is primarily due to the project's remote location and lack of any nearby large-scale developments or urban centers (EPA and Partners, 2024).

3.2.3.2 Ecosystem Services

Air quality provides the following ecosystem services:

- **Regulating Services**—Maintaining air quality standards promotes climate regulation as many sources of air pollutants are also greenhouse gases.

- **Supporting Services**—Nutrient cycling in the air involves abiotic components such as carbon, hydrogen, nitrogen, and oxygen. These elements are transferred to living organisms through the air when they breathe.

- **Cultural Services**—Air quality directly relates to the health of the local population. Air pollution can affect lung development and is associated with respiratory diseases such as emphysema, asthma, stroke, and heart disease.

3.2.4 Plants and Animals

3.2.4.1 Threatened and Endangered Species

The ESA was established to protect threatened and endangered species and their habitats. Section 7 of the ESA requires federal agencies to ensure that federal actions do not jeopardize the existence of any listed species. This is accomplished through Section 7 consultation with USFWS. A list of threatened, endangered, and candidate species for the study area was obtained from the USFWS Information for Planning and Conservation (IPaC) database. The USFWS list includes specific threatened and endangered species and designated/proposed critical habitat that may occur within or near the study area (Appendix E-1 and E-2). Table 3.3 presents federally listed species with the potential to occur in the project area, along with their preferred habitat and the potential for each species to occur (Eocene, 2025).

Table 3.3. Federally Listed Species Potentially Occurring in the Study Area.

Species and Scientific Name	Federal Listing Status	Range or Habitat and Potential for Species Occurrence
Birds California condor (*Gymnogyps californianus*)	Experimental Non-Essential; (Threatened in ZNP)	The California condor utilizes a variety of habitats for foraging and nesting, including caves and ledges of steep rocky terrain. The study area is located within the experimental non-essential range of the California condor (FR, 1996). Experimental non-essential species are treated as threatened within ZNP. The species is present in ZNP and may visit other parts of the study area (ZNP, 2025a). However, no surface disturbance would occur within known occupied California condor habitat. UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).
Birds Mexican spotted owl (MSO) (*Strix occidentalis lucida*)	Threatened	In Utah, the Mexican spotted owl (MSO) inhabits isolated mountain ranges and narrow canyons (USFWS, 2013; ZNP, 2025b). Occupied designated critical habitat is present in the Parunuweap Canyon WSA and ZNP, within the study area (FR, 2004). Protected Activity Centers (PACs) for the MSO are also present in the ZNP portion of the study area. No surface disturbance would occur within MSO habitat, and minor streamflow changes would not negatively affect riparian habitat. UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).
Birds Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered	The southwestern willow flycatcher (SWFL) breeds in riparian vegetation and nests where willows or tamarisk are present. Occupied habitat exists downstream in the Parunuweap Canyon WSA and ZNP within the study area (USFWS, 2002b). However, no surface disturbance would occur within SWFL habitat, and minor streamflow changes would not negatively affect riparian habitat. UNHP data identified the presence of the SWFL within 2 miles of the study area (UNHP, 2024).

Species and Scientific Name	Federal Listing Status	Range or Habitat and Potential for Species Occurrence
Birds Western yellow-billed cuckoo (WYBC) (*Coccyzus americanus*)	Threatened	The western yellow-billed cuckoo (WYBC) breeds in riparian habitat with wide floodplains and dense willow-cottonwood or mesquite forests. They rarely occupy areas less than 325 feet wide. No suitable breeding habitat is present in the Parunuweap Canyon WSA and ZNP areas within the study area (FR, 2014). Potential suitable stop-over habitat for migrating WYBC may be present in these areas. No surface disturbance would occur within WYBC habitat, and minor streamflow changes would not negatively affect riparian habitat. UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).
Reptiles Desert tortoise (*Gopherus agassizii*)	Threatened	The desert tortoise inhabits deserts, grasslands, and rocky hillsides, typically in desert shrub areas below 5,500 feet. The Upper Virgin River Recovery Unit extends from the Quail Creek Reservoir diversion to Springdale, Utah, outside of the study area (USFWS, 2011). UNHP data identified the presence of the desert tortoise within 2 miles of the study area (UNHP, 2024).
Fish Virgin River chub (*Gila seminuda*)	Endangered	The Virgin River chub is found below 4,500 feet in deep runs or pools with low to medium velocities, and in-stream cover over sandy substrate (USFWS, 1995a). In Utah, the Virgin River from the Arizona state line to the La Verkin Creek confluence, supports Virgin River chub populations. Virgin River chub has also colonized habitat upstream of the La Verkin Creek confluence following the establishment of population maintenance flows below Quail Creek Diversion. Virgin River chub distribution currently extends upstream to the old diversion structure in Timpoweap Canyon (2 miles upstream from Pah Tempe Springs, and 4 miles upstream from the La Verkin Creek confluence (PLPCO, 2025). In Utah, designated critical habitat extends from approximately 4.8 miles downstream from the Quail Creek Diversion, at the confluence of La Verkin Creek and the Virgin River, to the Utah-Arizona state line (USFWS, 2000). UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).

Species and Scientific Name	Federal Listing Status	Range or Habitat and Potential for Species Occurrence
Fish Woundfin (*Plagopterus argentissimus*)	Endangered	The woundfin is found in swift, turbid, warm streams over sand. Adult woundfin prefer depths of 8 to 18 inches and avoid quieter pools (USFWS, 1995a). Occupied habitat exists below the Quail Creek Reservoir Diversion. In Utah, designated critical habitat exists approximately 4.8 river miles downstream from the Diversion, beginning at the confluence of La Verkin Creek and the Virgin River to the Utah-Arizona state line (FR, 2000). UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).
Insects Monarch butterfly (*Danaus plexippus*)	Proposed Threatened	Adult monarch butterflies feed on various flowers but only breed where milkweed is present. Monarch caterpillars have been observed within portions of the proposed study area, primarily in ZNP; however, breeding is unlikely within the Long Valley portion of the study area due to a lack of milkweed presence. UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024). The Cove Reservoir area is likely a flyover area for migrating monarch butterflies but is not an over-wintering site.
Insects Suckley's cuckoo bumble bee (*Bombus suckleyi*)	Proposed Endangered	Suckley's cuckoo bumble bee is an obligate social parasite, dependent on host bumble bees for much of its life cycle. The species has a broad historical distribution across North America, and it has been found in various habitat types, including prairies, grasslands, meadows, and woodlands. Occurrence records were found at elevations ranging from approximately 6,000 to 10,500 feet. In the western portion of the range, Suckley's cuckoo bumble bee observations extend from the Yukon, to Arizona, and east to Minnesota. However, the species has not been observed within the western U.S. since 2016 (USFWS, 2024a). It is unlikely that the species is found within the study area. UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).
Plants Jones cycladenia (*Cycladenia humilis* var. *jonesii*)	Threatened	Jones cycladenia is found in sparsely vegetated desert scrub between 4,000 to 6,660 feet, typically on steep slopes with gypsiferous, saline soils of the Wasatch, Cutler, Summerville, and Chinle formations (USFWS, 2021). No suitable habitat exists in the study area. UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).

Species and Scientific Name	Federal Listing Status	Range or Habitat and Potential for Species Occurrence
Plants Shivwits milk-vetch (*Astragalus ampullariodies*)	Endangered	Shivwits milk-vetch grows at elevations of 3,018 to 4,367 feet on soft clay soils linked to the Petrified Forest member of the Chinle Formation. Occupied habitat is restricted to six isolated populations in Washington County, none of which are near the study area (USFWS, 2006). UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024).
Plants Siler's pincushion cactus (*Pediocactus sileri*)	Threatened	Siler pincushion is endemic to the Arizona/Utah border in Kane and Washington County, Utah, and grows in gypsiferous and calcareous soils from the Moenkopi, Chinle, and Kaibab Formations (USFWS, 2008). No occupied habitat exists in the study area. UNHP data did not identify any known occurrences of the species in the study area (UNHP 2024).
Plants Ute ladies'-tresses (*Spiranthes diluvialis*)	Threatened	The Ute ladies-tresses is found in wet meadows near springs, lakes, or streams at elevations of 4,300 to 7,000 feet (USFWS, 1995b). While the study area is in a Ute ladies'-tresses Analytical Unit, habitat as described above is not present (USFWS, 2023). Further, no surface disturbance would occur within any riparian habitat. UNHP data did not identify any known occurrences of the species in the study area (UNHP, 2024). A general habitat assessment was conducted in the vicinity of the proposed reservoir and borrow pits. No Ute ladies-tresses suitable habitat was located. The proposed reservoir site in located in dry, terrestrial habitat. Nearby riparian areas along the EFVR are generally woody, lack understory, and are often dry during summer low flow.

3.2.4.2 Migratory Birds

The protection of migratory birds is regulated by the Migratory Bird Treaty Act (MBTA [16 USC 703-711]). The MBTA prohibits the take of any migratory bird, part, nest, egg, or product thereof, with "take" being defined as to pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these activities. Most species of birds in the U.S. are legally protected under the MBTA. Exceptions to this statute include game and non-native species. A complete list of protected species is found in 50 CFR 10.13. All of the migratory bird species with potential to occur within the study area, with the exception of bald and golden eagles, are also considered to be Birds of Conservation Concern. These are migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities of the USFWS.

The USFWS IPaC identified 16 migratory bird species, including bald and golden eagles as potentially occurring within the study area (USFWS, 2025) (Table 3.4).

Table 3.4. Migratory Bird Species with Potential to Occur in the Study Area Identified by IPaC.

Common Name (*Scientific Name*)	**Highest Probability of Presence in Study Area**	**Breeding Season***
Bald eagle (*Haliaeetus leucocephalus*)	December–March, May	December–August
Black-chinned sparrow (*Spizella atogularis*)	March–September	April–July
Broad-tailed hummingbird (*Selasphorus Platycercus*)	April–September	May–August
California gull (*Larus californicus)*	February–March, August	March–July
Cassins's finch (*Haemorhous cassinii*)	October–April, July	May–July
Clark's nutcracker (*Nucifraga Columbiana*)	April-June, September–October	January–July
Evening grosbeak (*Coccothraustes vespertinus*)	April–May, September–November	May–August
Golden eagle (*Aquila chrysaetos*)	January–December	December–August
Grace's warbler (*Setophaga graciae*)	April–June	May–July
Lesser yellowlegs (*Triga flavipes*)	April, October	None

Common Name (*Scientific Name*)	Highest Probability of Presence in Study Area	Breeding Season*
Lewis's woodpecker (*Melanerpes lewis*)	January–February, April, September	April–September
Long-eared owl (*Asio otus*)	March, May–June, October	March–July
Olive-sided flycatcher (*Contopus cooperi*)	May, July, September	May–August
Pinyon jay (*Gymnorhinus cyanocephalus*)	November–August	February–July
Virginia's warbler (*Vermivora virginiae*)	April–June, August–September	May–July
Western grebe (*Aechmophorus occidentalis*)	May, July	June–August

*Breeding season may differ from actual exclusion periods that may be required should nesting birds inhabit the project area during construction.

3.2.4.3 Bald and Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protect Act (BGEPA) (16 USC 668). The act makes it illegal to take, possess, sell, purchase, barter, or transport any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. Under the BGEPA, the term "take" includes pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing species. Bald eagles (*Haliaeetus leucocephalus*) are listed on the IPaC report, and golden eagles (*Aquila chrysaetos*) are listed on the UNHP Report, indicating they have potential to occur within or near the study area (USFWS, 2025; UNHP, 2024).

3.2.4.4 Ecologically Critical Areas

WSAs are places that have wilderness characteristics, are of a minimum size, and contain naturalness and outstanding opportunities for recreation which make them eligible for designation as wilderness (BLM, n.d.) The 30,800-acre Parunuweap Canyon WSA is located immediately east of and adjoins ZNP. It contains recreation opportunities such as hiking, wildlife viewing, and landmark sight-seeing. Stunning canyon vistas and unique hiking opportunities are present. Landmarks in the WSA include Harris Mountain and Elephant Butte. Wildlife, including mule deer, mountain lions, rattlesnakes, and birds are common. The EFVR flows through the WSA. By following the EFVR, hikers can traverse over 10 miles through the canyon to the east side of ZNP (BLM, 2008; BLM, 2025).

The Zion Wilderness was designated by Congress in 2009 and comprises approximately 83 percent of ZNP. It is composed of a labyrinth of multicolored canyons carved out of the Markagunt Plateau. The wilderness area is located on the Colorado Plateau but borders the Great Basin and Mojave Desert provinces and is home to plants and animals from each of the three regions. A ribbon of

green marks the EFVR's approximately 7-mile course through the arid southernmost portion of the Zion Wilderness (ZNP, 2025).

The 4,625-acre ZNP Parunuweap Research Natural Area (RNA) was established in 2001 and includes Parunuweap and Shunes Canyons. The EFVR flows through the Parunuweap Canyon portion of the RNA. Surrounding lands include slickrock and old-growth pinyon-juniper woodlands. Ecological units present within the RNA include rock crevice and slickrock communities; riparian, fluvial, and aquatic habitats; springs and seeps; hanging gardens; hanging canyons; eolian landscapes; and riverine ancestral Puebloan people habitation sites (Lauren DeGennaro ZNP, 2025).

3.2.4.5 Invasive Species

Plant species listed under the Utah Noxious Weed Act known to be within or are likely to inhabit the project area include Russian olive (*Elaeagnus angustifolia*), tamarisk (*tamarisk*), wild morning glory (*Calystegia sepium*), puncture vine (*Tribulus terrestris*), tall whitetop (*Lepidium latifolium*), Scotch thistle (*Onopordum acanthium*), purple loosestrife (*Lythrum salicaria*), spotted knapweed (*Centaurea stoebe*), and Canada thistle (*Cirsium arvense*). Other invasive species not specified under the Utah Noxious Weed Act, such as cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola* spp.), have been observed within the project area.

These invasive species typically proliferate in disturbed areas where native vegetation has been substantially or entirely removed, including locations such as roadsides, livestock trails, and areas damaged by floods. Noxious weeds and invasive plant species often outcompete native vegetation, leading to reduced species diversity and ecosystem instability.

Invasive animal species that may inhabit the project area include bullfrog (*Rana catesbeiana*), European starling (*Sturnus vulgaris*), fathead/rosy red minnow (*Pimephales promelas*), mosquitofish (*Gambusia affinis*), muskrat (*Ondatra zibethicus)*, New Zealand mudsnail (*Potamopyrgus antipodarum*), nutria (*Myocastor coypus*), quagga mussel (*Dreissena rostiformis bugensis*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), red shiner (*Cyprinella lutrensis*), red swamp crayfish (*Procambrus clarkia*), signal crayfish (*Procambrus leniusculus*), white-tailed deer (*Odocoileus virginianus*), Zebra mussel (*Dreissena polymorpha*), and non-native non-sport fish (NRCS, 2012). Administrative Rule R657-60 identifies regulations and procedures designed to prevent and control the spread of aquatic invasive species in Utah. No surveys have been conducted for invasive animal species within the project area, but it can be assumed that some of these species are likely present.

3.2.4.6 Fish and Wildlife

Terrestrial wildlife species likely to inhabit or frequent the proposed project areas are typical of the Colorado Plateau physiographic province. Mammalian species include mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), jackrabbit (*Lepus californicus*), cottontail rabbit (*Sylvilagus* spp.), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), badger (*Taxidea taxus*), and weasel (*Mustela frenata*). Additionally, various species of small mammals such as voles, squirrels, chipmunks, mice, and bats are expected to be present (Eocene, 2025).

Upland game species likely to inhabit the project area include mourning dove (*Zenaida macroura*), band-tailed pigeon (*Patagioenas fasciata*), and chukar (*Alectoris chukar*). Other species are likely to inhabit the area. Fisheries and aquatic habitat are limited.

Habitat for greater sage-grouse extends into Kane County and is present within the Panguitch Priority Habitat Management Area (PHMA) (BLM, 2018). A project-related survey determined that no portion of the PHMA is located within the project area and that there is no sage-grouse habitat located outside of the PHMA.

Utah has developed a Wildlife Action Plan with the purpose of managing native wildlife species and their habitats to prevent additional ESA listings (UDWR, 2015). The Wildlife Action Plan identifies SGCN that are considered jurisdictional wildlife. A UNHP Online Species Search Report was completed for the study area, and SGCN or habitat within a 0.5- and 2.0-mile radius of the study area was identified (UNHP, 2024). Data from the UNHP site are summarized in Table 3.4.

The Virgin River Program (VRP) is a collaborative effort between local, state, and federal partners and was established to reconcile and avoid potential conflicts between water development and wildlife conservation. Actions implemented under the VRP help recover, conserve, enhance, and protect native species in the Virgin River Basin (such as the Virgin spinedace) while providing adequate water supplies for sustaining human needs. The Program simplifies regulatory processes for water users and landowners while ensuring that future generations can enjoy Utah's natural heritage (Virgin River Program, 2025).

Table 3.5. Species of Greatest Conservation Need Potentially Occurring in the Study Area.

Species and Scientific Name	State Status	Range or Habitat and Potential for Species Occurrence
Bird Bald eagle (*Haliaeetus leucocephalus*)	SGCN	Nests near coastlines, rivers, large lakes, or streams that support an adequate food supply. Nesting substrates often include mature or old-growth trees, snags, cliffs, rock promontories, on the ground (rarely), and on human-made structures (more frequently). Bald eagles occasionally nest in southern Utah but are more typically present during their winter migration. Suitable foraging habitat located within and adjacent to the project area supports a variety of raptors, including bald eagles. Bald eagles may utilize cottonwood trees adjacent to the EFVR for winter roosting and stopover habitat during migration periods. Historical records exist of eagle occurrence within 0.5 miles of the project area. The BGEPA prohibits the "taking" of the eagle without a special permit issued by the U.S. Department of the Interior.
Bird Band-tailed pigeon (*Patagioenas fasciata*)	SGCN	Typical habitat is coniferous forest. Primary concentrations in Utah are in the southern pine forests from the Pine Valley Mountains in the west to the La Sal and Blue Mountains in the east. Nesting in Utah takes place in May, June, and July. Normally only one egg is laid. The nest is usually a frail platform of dead twigs 8–20 feet above the ground in a coniferous tree. Food of the band-tailed pigeon consists mainly of acorns, berries, pine buds, seeds, and needles. Only a small portion of the diet is insects, although a few grasshoppers and other large insects may be taken. The band-tailed pigeon is migratory, and only limited breeding populations occur in southern Utah. Potential habitat is limited in the project area. The last occurrence record for the pigeon in the project area was in 1971.
Bird Burrowing owl (*Athene cunicularia*)	SGCN	Uncommon during the summer in proper habitat throughout Utah. Habitats are open grassland and prairies, as well as other open situations, such as golf courses, cemeteries, and airports. The nest is in a mammal burrow, usually that of a prairie dog, ground squirrel, badger, or armadillo; if a mammal burrow is not available, the owls will sometimes excavate their own nest burrow. Confirmed breeding occurrences are known in at least 17 counties, including Kane and Washington Counties. It eats mainly terrestrial invertebrates, but also consumes a variety of small vertebrates, including small mammals, birds, frogs, toads, lizards, and snakes. Habitat is limited within the project area; however, a historic occurrence was documented in 1987.

Species and Scientific Name	State Status	Range or Habitat and Potential for Species Occurrence
Bird Ferruginous hawk (*Buteo regalis*)	SGCN	Occurs throughout Utah in proper habitat. The hawk is found primarily in open lowland desert country. Pinyon-juniper woodland, barren cliffs and bluffs, sagebrush-rabbitbrush, and cold desert shrub (including saltbush and greasewood) are habitats utilized by this species in Utah during the breeding season. Mammals are the primary prey during the breeding season, although birds, amphibians, reptiles, and insects also are taken. Suitable habitats near agricultural lands and adjacent to pinyon-juniper woodland exist within the Cove Reservoir portion of the project area. However, occurrence of the ferruginous hawks would be expected to be very low and only migratory in nature. No occurrences of the ferruginous hawk have been documented within the project area.
Bird Flammulated owl (*Psiloscops flammeolus*)	SGCN	A common raptor in montane pine forests (especially ponderosa pine and aspen forests) in the western U.S. and Utah. Flammulated owls are strictly nocturnal and eat insects and other terrestrial invertebrates, such as spiders, centipedes, and scorpions. It is known to nest in woodpecker holes. Montane pine habitat is lacking within the project area; however, an occurrence was documented in 2020.
Bird Golden eagle (*Aquila chrysaetos*)	SGCN	Breeds across western North America, from southern Alaska to northern Mexico. Populations in the northern parts of the breeding range migrate south for winter, but most populations in the western U.S. are year-round residents of the same area. Typically found in open country and semi-open prairies, sagebrush, savannah or sparse woodland, and barren areas. Commonly found in Utah. It feeds mainly on small mammals, especially rabbits, marmots, and ground squirrels, but also eats insects, snakes, birds, juvenile ungulates, and carrion. Nests are most often found on rock ledges but sometimes in large trees. It is common in Utah and habitat is present within the project area. A historical record located the golden eagle within the project area in 2008. The BGEPA prohibits the “taking” of an eagle without a special permit issued by the U.S. Department of the Interior.

Species and Scientific Name	State Status	Range or Habitat and Potential for Species Occurrence
Bird Lewis's woodpecker (*Melanerpes lewis*)	SGCN	This species is widespread but is generally uncommon in Utah. The population may be declining. It is a cavity nester, excavating a hole in tall trees that are often dead or blackened by fire. It will also nest in utility poles or stumps, but prefers ponderosa pine, cottonwood, or sycamore trees. The major breeding habitat consists of open park-like ponderosa pine forests. The woodpecker is also attracted to burned-over Douglas-fir, mixed conifer, pinyon-juniper woodland, and riparian vegetation, especially riparian cottonwoods. Habitat for this species is present in the project area but has not been documented since 1985.
Bird Peregrine falcon (*Falco peregrinus*)	SGCN	Although the peregrine falcon is still rare in Utah, it has become more abundant throughout its range in recent years. In Utah, this species breeds mainly on the Colorado Plateau, and to a lesser extent, along the Wasatch Front. Breeding habitat is characterized as cliffs, bluffs, caves, and rock pockets (often near water). Habitat during migration includes water-based croplands; orchards; cold desert shrub (including saltbush and greasewood); and sagebrush-rabbitbrush (at lower elevations). Its wintering habitats in Utah include desert riparian woodlands (including Fremont cottonwood, willows, etc., at lower elevations), marshes and wet hummocks. Potential habitat is found within the project area, but the species has not been documented since 1985.
Bird Pinyon Jay (*Gymnorhinus cyanocephalus*)	SGCN	The pinyon jay occurs throughout much of the western U.S. and is a common bird of the pinyon-juniper woodland forests of Utah. Their diet consists primarily of pinyon and other pine seeds, but also includes berries, small seeds, grains, and insects. Nests are located in trees (usually conifers) 5–30 feet off the ground in the pinyon-juniper woodland but less frequently pine. Nests also occur in scrub oak and sagebrush. Habitat is found within the project area, and the jay is likely present.

Species and Scientific Name	State Status	Range or Habitat and Potential for Species Occurrence
Bird Yuma myotis (*Myotis yumanensis*)	SGCN	Uncommon to rare in in the state. The species is not overly abundant in Utah but occurs in the southwestern, central, and northeastern parts of the state. Records of this species occur in eight counties, including Washington and Kane counties. The Yuma myotis can be found in a variety of habitats but is almost always found near open water. Old buildings, caves, and bridges are used as roosting and nursery colony sites. It is also found in a wide variety of upland and lowland habitats, including riparian, desert scrub, moist woodlands, and forests near open water. Habitat is present in the project area, and a historical occurrence of the species was recorded in 2004.
Mammal Kit fox (*Vulpes macrotis*)	SGCN	Although the species is not overly abundant in Utah, it does occur in the western, east central, and southeastern areas of the state. Habitat is primarily open desert as well as shrubby and shrub-grass ecosystems, including creosote bush, shadscale, greasewood and sagebrush. Prey abundance and interference competition by coyotes may regulate fox populations. Habitat is present in the project area, and a historical occurrence of the species was recorded in 1975.
Reptile Arizona toad (*Anaxyrus microscaphus*)	SGCN	Found only in the southwestern portion of Utah. Common to streams, washes, irrigated crop lands, reservoirs, and uplands adjacent to water. Inactive in cold weather, adults are known to be primarily nocturnal; however, young are active during daylight hours. Eggs are laid on the bottoms of shallow, slow-moving streams. Suitable habitat exists within the project area. This habitat is found within washes in the Cove Reservoir portion of the project. Uplands within the project area adjacent to these aquatic features may also provide suitable habitat. Historical records identify an occurrence of the species in the project area in 2023.
Reptile Gila monster (*Heloderma suspectum*)	SGCN	Occurs in Utah only in southern Washington County, where urban expansion and collecting are the main threats to the species Utah provides the northern-most range for the gila monster. Preferred habitats include large rocky shelves, sandy areas, and creosote-sagebrush areas. Gila monsters in Utah are most active during the spring and summer months, although they do spend about 95 percent of the active season in burrows or under rocks. Populations usually occur in rocky areas, using cavities in basalt and sandstone formations for shelters. Very limited habitat is present in the project area, although a historical occurrence of the species was recorded in 2021.

Species and Scientific Name	State Status	Range or Habitat and Potential for Species Occurrence
Reptile Northern leopard frog (*Lithobates pipiens*)	SGCN	The northern leopard frog is common in Utah, but some reports indicate that its numbers may be declining. The species occurs in a variety of aquatic habitats, particularly near cattails and other aquatic vegetation, but it may be found foraging relatively far from water. During cold winter months, this species is inactive and takes cover underwater or in damp burrows. Suitable habitat may be found within the portion of the EFVR located within the project area. A historical occurrence of the species was recorded in 1982.
Reptile Western toad (*Anaxyrus boreas*)	SGCN	Occurs throughout most of Utah, and is found in a variety of habitats, including slow moving streams, wetlands, desert springs, ponds, lakes, meadows, and woodlands. Adults feed on numerous types of small invertebrates, such as ants, beetles, and grasshoppers, whereas larvae (tadpoles) filter algae from the water or feed on detritus. In Utah, the toad is known to occur from areas of high elevation, mainly the Wasatch Mountains and central high plateaus, from Rich and Daggett counties in the northeast to Washington and Kane counties in the southwest portion of the state. Habitat loss is a widely recognized contributing factor, and has played a role in population losses, especially populations formerly occupying what are now urban areas. Limited habitat may be present in the project area. A historical occurrence of the species was recorded in 2021.
Fish Desert sucker (*Catostomus clarkia*)	SGCN	Native to parts of the Colorado River system. Limited distribution occurs only in the Virgin River system in southwestern Utah. They are bottom dwellers (benthic); primarily eat algae, and occasionally insects and other invertebrates. Spawning occurs in riffles during winter and spring. Historical records of occurrence within 0.5 miles of the project area. Suitable habitat is found within the portion of the EFVR located within the project area.
Fish Flannelmouth sucker (*Catostomus latipinnis*)	SGCN	In Utah, the species occurs in the main-stem Colorado River, as well as in many of the Colorado River's large tributaries, including the Virgin River. Flannelmouth suckers are usually absent from impoundments. In recent times, Utah flannelmouth sucker populations have been reduced in both numbers and distribution, primarily due to flow alteration, habitat loss/alteration, and the introduction of nonnative fishes. Limited habitat is present in the project area, although a historical occurrence of the species was recorded in 2012.

Species and Scientific Name	State Status	Range or Habitat and Potential for Species Occurrence
Fish Virgin spinedace (*Lepidomeda mollispinis*)	SGCN	This species is endemic to the Virgin River system in a small area of Utah, Nevada, and Arizona; in Utah, it occurs only in Washington County. Most often associated with clear, cool, relatively swift streams comprised of [sic] pools, runs, and riffles. Feeds seasonally on insects, insect larvae, and plant material. Virgin spinedace populations have been reduced in recent times, and the species is now found only in portions of its historic range. The spinedace has been recovered to 90 percent of its historically occupied habitat (Virgin River Program 2026. Additionally, the species has been introduced into areas not previously occupied. The species known occupied habitat includes the EFVR within ZNP.
Insect Lyrate mountainsnail (*Oreohelix haydeni*)	SGCN	The distribution of this species in Utah is somewhat patchy and scattered through Cache, Rich, Weber, Morgan, Salt Lake, and Tooele counties. A 1921 report identified the species as occurring in Washington County. It is widely considered to be erroneous. It is highly unlikely that this species of snail occurs within the project area.
Insect Mitered Vertigo (*Vertigo Modesta concinnula*)	SGCN	This species has been reported historically, from montane habitat in four Utah counties: Salt Lake, Sevier, Box Elder, and San Juan. The Utah Division of Wildlife Resources (UDWR) website does not recognize this species as occurring in either Kane or Washington Counties even though the UNHP website notes a 1942 occurrence. It is highly unlikely that this species occurs within the project area.

Source: (UNHP, 2024)

3.2.4.7 Riparian Areas

Riparian areas exist in the transitional zone between aquatic and terrestrial ecosystems. They feature different vegetative species than the adjoining ecosystems and exhibit more vigorous growth due to shallow groundwater interaction. They generally consist of long strips of vegetation adjacent to streams, rivers, lakes, reservoirs, and other inland aquatic systems that affect or are affected by the presence of water (Fischer, Martin, Ratti, & Guidice, 2001) These areas typically harbor many wildlife species and perform numerous ecological functions. In Washington County, riparian species along the Virgin River include a dense layer of willow (*Salix* spp.), common reed grass (*Phragmites* spp.), cottonwood trees (*Populus* spp.), and invasive species, such as tamarisk (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*), as well as various grasses/forbs. Riparian vegetation along the EFVR in Long Valley is mature and consists of cottonwoods, Russian olive trees, tamarisk, willows, and various shrubs and forbs. This vegetation is spotty and lacking in some areas due to repeated disturbances, such as flooding.

3.2.4.8 Ecosystem Services

Plants and animals in the study area provide the following ecosystem services:

- **Provisioning services**: The EVFR provides fishing opportunities for various species of trout. Rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarki*), brown trout (*Salmo trutta*), and brook trout (*Salvelinus fontinalis*) have all been documented in portions of the EFVR.

- **Regulating services**: Riparian zones play an important role in water filtration, nutrient cycling, and providing habitat for fish and wildlife.

- **Cultural services**: Peoples values for species conservation may arise from personal use, personal beliefs and moral ethics, altruism, and/or a desire to preserve the resource for future generations.

3.2.5 Human

3.2.5.1 Cultural Resources and Tribal Consultation

Cultural resources encompass various elements such as archaeological sites, historic structures, sacred sites, and traditional cultural places (TCPs), which are all integral to a community's traditions, beliefs, and preserving its cultural identity. The NHPA of 1966, as amended (54 USC 300101), mandates that federal agencies consider the effects of their actions on historic properties. "Historic properties" denote cultural resources deemed significant to history by meeting specific criteria outlined in 36 CFR Part 60.4, and described below, for inclusion on the NRHP.

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possesses integrity of location, design, setting, material, workmanship, feeling, and association, and that they:

- Criterion A—Are associated with events that have made a significant contribution to the broad patterns of our history.

- Criterion B—Are associated with the lives of significant persons in or past.

- Criterion C—Have distinctive characteristics of a type, period, or methods of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction.

- Criterion D—Yielded or may be likely to yield information important in prehistory or history.

Section 106 of the NHPA requires federal agencies to consider the effect, including visual effects, of authorized undertakings on the ability of historic properties to convey their historic significance.

The APE for Section 106 of the National Historic Preservation Act of 1966 (NHPA) is the geographic area or areas where an undertaking may directly or indirectly cause alterations in the character or use of historic properties, as defined in 36 CFR Part 800.16(d). The APE for the proposed project was defined by the NRCS, as lead federal agency, and consulting parties, per 36 CFR 800.4. The NRCS established the project's APE to include all potential direct and indirect effects. The project APE consists of three sections; the Direct section of the APE (712.46 acres), Indirect section of the APE (1,007.97 acres), and Visual section of the APE (4,952.29 acres). The three APE sections partially overlap with each other. The Direct section of the APE consists of the proposed reservoir (buffered), pipelines, and three borrow pits. The Indirect section of the APE consists of the proposed reservoir and the unbuffered breach inundation zone below the reservoir. The Visual section of the APE consists of a 1-mile buffer around the proposed reservoir (Eocene, 2025). The Direct section of the APE consisted of a total of 874.23 acres, including an original Direct APE of 791.68 acres (identified in 2018), and addendum of 68.83 acres (identified in 2021) and 13.72-acres acres (identified in 2023). In 2024, the project extent changed to remove 3 borrow pits, reducing the Direct APE to 712.46 acres. This Direct section of the APE encompasses all areas that may be disturbed or changed from their current conditions with potential to affect cultural resources. See Section 1.4.3 for a detailed description of the APE development process and Figure C-2 in Appendix C for the APE figure.

Eocene archaeologists, meeting 36 CFR 61 Secretary of the Interior (SOI) qualification standards in archaeology, conducted Class II (reconnaissance) and III (intensive) cultural resources inventories of the original project Direct section of the APE. In October 2018, a comprehensive Class III cultural resources survey was conducted of the initial 791.68-acre APE. In November 2021, a Class III and Class II cultural resources inventory was conducted of the 68.83-acre Direct section of the APE addendum (Mt. Carmel pipeline). In October 2023, a Class III and Class II cultural resources inventory was conducted of the 13.72-acre Direct section of the APE addendum (Esplin Borrow Source Location). The total area surveyed was 874.23 acres.

All three surveys were conducted in 15-meter-wide transects, except for the Lambs pit, which is located on private property and was spot checked for any potential areas that may be previously undisturbed and may contain significant cultural resources. A total of 848.81 acres were surveyed to Class III standards. The remaining 25.42 acres were surveyed to Class II standards due to being in inaccessible areas.

The surveys revealed 17 cultural resource sites and 19 isolated occurrences (IOs) within the project Direct section of the APE. Additionally, two sites that were previously determined Not Eligible for the NRHP were previously mapped within but relocated outside of the project Direct section of the APE. Cultural Resources Inventory Reports (CRIRs) for each survey have been prepared, and

redacted copies are found in Appendix E-2. Table 3.6 summarizes the cultural resource findings and the NRCS' determination of site eligibility. Per 36 CFR 800.4, the NRCS consulted with the Utah State Historic Preservation Officer (SHPO), and the BLM, UTLA, and USACE as land managing agencies. Letters requesting concurrence on site eligibility were sent on January 9, 2020, January 23, 2023, and May 20, 2024. The SHPO concurred with site eligibility in letters dated January 17, 2020, February 6, 2023, and June 2, 2024 (Appendix A). No responses were received from the land managing agencies.

The NRCS also consulted with 12 Native American Tribes on the determination of site eligibility. The Kaibab Band of Paiute Indians of the Kaibab Indian Reservation responded with a statement of no comments on site eligibility on May 24, 2024. No other responses were received. Follow-up with the Tribes has been ongoing throughout the life of the project. Refer to Section 7.1.10 for a detailed description of all Tribal consultations conducted and Appendix A for a Tribal Consultation Summary Table.

In April 2025, Eocene submitted a Cultural Resources Review Memorandum to the NRCS addressing the Indirect and Visual section of the APE within the project area (Eocene, 2025). This desktop review identified 26 cultural resources and nine historic structures within the overlapping APEs. Of these cultural resources, the NRCS determined that 14 are eligible for the NRHP. Of the nine historic structures, five are eligible for the NRHP. Within the Visual section of the APE, there are three eligible buildings/structures (Property ID Nos., 32819, 50442, and 33219). Within the Indirect section of the APE breach inundation zone, there are three historic properties: Mt. Carmel School and Church (Property ID No. 37252); Dixon, Maynard, House and Studio (Property ID No. 40479); and Steven's Barn (Property ID No. 31786). Steven's Barn (Property ID NO. 31786) has likely been demolished. The NRCS consulted on the Indirect, Visual, and revised Direct section of the APE with SHPO via letter and with the cooperating agencies and 11 Tribes via email on June 4, 2025. SHPO responded by letter on June 6, 2025, stating concurrence with the findings. The Moapa Band of Paiute Indians Tribe responded on June 5, 2025, with an email regarding potential auditory effects. Resolution of these concerns are included in Section 5.5.1.2. No other responses were received. A copy of these correspondences is included in Appendix A.

A review of these previously recorded sites and structures within the Indirect and Visual section of the APE indicates that none would require a formal Visual Effects Analysis as they would not be subject to adverse visual or indirect impacts (Eocene, 2025). Refer to Appendix E-2 for the Redacted Cultural Resources Review Memorandum.

Table 3.6. Cultural Resources in the Direct section of the APE.

Survey Date	Site No.	Temporal Affiliation	Site Description	Eligibility
2018	42KA6331	Prehistoric	Lithic Scatter	Eligible
2018	42KA8900	Historic	Artifact Scatter	Not Eligible
2018	42KA8901	Multicomponent	Lithic and artifact Scatter	Not Eligible
2018	42KA8902	Historic	Artifact scatter	Not Eligible
2018	42KA8903	Historic	Artifact Scatter	Not Eligible
2018	42KA8904	Prehistoric	Artifact Scatter	Eligible
2018	42KA8972	Prehistoric	Lithic Scatter	Not Eligible
2018	42KA8973	Prehistoric	Artifact Scatter	Not Eligible
2018	42KA8974	Prehistoric	Artifact Scatter	Eligible
2018	42KA6331	Prehistoric	Lithic Scatter	Eligible
2021	42KA1157	Prehistoric	Artifact Scatter	Eligible
2021	42KA4538*	Historic	Historic bridge abutment	Not Eligible
2021	42KA4539*	Historic	Historic ditch/flume	Not Eligible
2021	42KA9490	Historic	Ditch	Eligible
2021	42KA9491	Historic	Ditch	Eligible
2021	42KS9492	Historic	Road	Not Eligible
2021	42KA9493	Historic	Road	Not Eligible
2023	42KA7537	Prehistoric	Cave and Artifact Scatter	Eligible
2023	42KA9789	Prehistoric	Artifact Scatter	Eligible

*Outside of the original and current Project APE

3.2.5.2 Social Issues

Socioeconomic baseline is characterized by population, demographics, employment, income, and housing. Socioeconomic baseline conditions of Kane County and Washington County are identified in the subsections below. For comparative purposes, baseline socioeconomic conditions for Utah are also provided.

3.2.5.2.1 Population

Table 3.7 shows the population trends from 2018–2022 for Kane County, Washington County, and the State of Utah. Growth rates are high in Washington County with an approximate 15 percent increase from 2018 to 2022 compared to an approximate 6 percent growth in Kane County and 7 percent in the State of Utah.

Table 3.7. Population Trends.

Year	Kane County	Washington County	Utah
2018	7,350	171,700	3,161,105
2019	7,484	177,556	3,205,958
2020	7,658	172,127	3,151,239
2021	7,635	191,226	3,337,975
2022	7,814	197,680	3,380,800
Percent change	6.3%	15.1%	6.9%

Source: (USCB, 2022)

3.2.5.2.2 Demographics

Demographic data from Table 3.8 shows that the percentage of minority populations in Kane County (6.8 percent) and Washington County (15.3 percent) are less than that of the State of Utah's (20.8 percent).

Table 3.8. Demographics.

-	Kane County	Washington County	Utah
Total Population	7,814	197,680	3,380,800
Percent White	93.2%	84.7%	79.2%
Percent Minority	6.8%	15.3%	20.8%

Source: (USCB, 2022)

3.2.5.2.3 Employment and Income

Low-income population include those making less than or equal to twice the federal poverty level. The median household income for the project study area is $84,861, which is higher than Kane County but comparable to the State of Utah. Limited English speakers in the study area represent less than 3 percent of the population, which is comparable to Kane County and much lower than in the State of Utah. The percentage of the population 65 years of age and older represent approximately 17 percent within the study area, which is comparable to Kane County and the U.S.

Table 3.9. Employment and Income.

-	Kane County	Washington County	Utah
Median Household Income	$70,327	$74,543	$89,168
Low Income/Poverty	12.9%	10.3%	8.2%

Source: (USCB, 2022)

3.2.5.2.4 Housing

Housing characteristics data shows Kane County and Washington County have more owner-occupied units than the State of Utah (Table 3.10).

Table 3.10. Employment and Income.

-	Kane County	Washington County	Utah
Total Households	3,225	71,891	1,129,660
Average household size	2.34	2.71	2.95
Percent Owner-occupied	78.0%	76.1%	71.2%
Percent Renter-occupied	22.0%	23.9%	28.8%

Source: (USCB, 2022)

3.2.5.2.5 Economy

The small communities of Glendale, Orderville, and Mt. Carmel, which are situated in western Kane County, make up the proposed project area. Livestock, farming, and tourism serve as the primary economic drivers for these communities. While livestock and farming have traditionally been the backbone of Kane County's economy, agricultural activities have faced challenges due to costly and limited agricultural water (Utah PLPCO, 2017). Irrigated lands within the study area primarily cultivate alfalfa with an oat cover crop planted every 7–9 years.

The study area includes communities within Washington County, primarily the towns of La Verkin, Hurricane, Washington, and St. George. Construction, retail trade, and healthcare/social services make up most of the labor profile in Washington County (EDCUtah, 2021).

Kane and Washington County's allure as a tourist destination stems from its abundant recreation opportunities. Well-known attractions like the Grand Canyon, ZNP, BCNP, Glen Canyon National Recreation Area, Grand Staircase-Escalante and Cedar Breaks National Monuments, and Coral Pink Sand Dunes State Park draw numerous visitors. However, many of these sites exceed capacity, particularly during the peak summer tourist season (Simmonds, et al., 2018). To help address visitor use, Secretarial Order 3424, *Strengthening Coordination with Gateway Communities*, was issued to improve coordination between the NPS and gateway communities such as Orderville, Mt. Carmel, Kanab, Rockville, Springdale, and other locations (USDI, 2025).

According to DWRe's water-related land-use data, crop acreage in the project area has declined by about 300 acres since 2009. The data show the urban area has increased by about that same acreage. Using average net crop ET, the resulting water requirement is roughly 1,000 acre-feet lower than the value shown in Table 2.1 due to the area's high elevation (5,460 feet above sea level), lower temperatures, and higher evapotranspiration demand. While irrigated agriculture is slowly declining, the population during that same period increased by roughly 10 percent, according to the Utah Division of Water Rights' public water supply data. The area's beauty and proximity to national parks drive that increase (PLPCO, 2026).

3.2.5.3 Public Health and Safety

The Long Valley area within Kane County relies heavily on agriculture to support local livelihoods and provide forage and feed for livestock operations. Existing limitations in water storage and delivery infrastructure results in reduced water availability during peak summer irrigation periods, leading to recurring agricultural water shortages. These shortages can reduce crop yields and forage production, resulting in financial losses for agricultural producers and ranching operations. For many local residents, agricultural production represents a primary source of household income, and uncertainty regarding water availability can create significant financial stress and anxiety. Research has shown that water shortages, drought conditions, and agricultural financial instability can contribute to increased stress, depression, and other mental health challenges among farming and ranching communities, particularly in rural areas where access to health services may be limited (RHIhub, 2026) (Elliott, n.d.).

Existing water supply limitations also affect operation of the Orderville hydroelectric facility during periods of peak summer demand. Available water flows are insufficient to fully meet hydropower generation needs during certain summer periods, reducing the amount of renewable electricity that can be generated (Alpha Engineering, 2026). While electrical service is provided through the broader regional power grid, reliable energy infrastructure is important for maintaining community services, communications systems, and emergency response capabilities.

The nearest hazardous or petroleum waste facility to the Project area is the Jenkins Oil Company Orderville Bulk Plant. This facility is located 0.72 miles north of Orderville and would not be affected by construction or operation of the proposed project (EPA 2026).

3.2.5.4 Scenic Beauty

The landscape in the study area is primarily desert shrub and pinyon-juniper woodland vegetation intersected with fences, unpaved roads, trails, and pastures. The EFVR runs through the east portion of the project area and is accompanied by mature riparian vegetation. However, no dominant artificial structures are present. U.S. Highway 89 (US-89) is approximately 0.5 mile east of the project area. The small towns of Glendale, Orderville, Mt. Carmel, and Mount Carmel Junction are present in the study area and provide a quiet, rural human-induced element to the general landscape. Pastures located along the EFVR also provide a human aspect to the landscape.

Though the project area is not located on BLM-administered public land, the BLM visual resource management (VRM) process was used to determine the landscape character of the area and the visual impact of the proposed project. Visual management objectives are developed through the BLM land-use planning process. BLM-administered public lands near the project area are currently identified as VRM Class IV which allows for major modifications to the existing landscape character (BLM, 2026; BLM, 2008). Under Class IV, the degree of visual change may be high, and modifications may attract attention, dominate the view, and become a major focus of viewer attention. Class IV is typically applied where land-use plans anticipate infrastructure development, resource use, or other activities that substantially alter landscape character, while still requiring consideration of visual design measures to support applicable land use objectives. For this project, the Area of Visual Effect includes areas from which the dam and reservoir may generally be visible, including portions of U.S. Highway 89, local roads, and downstream canyon viewpoints. Although the project would introduce a visible dam and reservoir in localized areas, these changes would be

consistent with the BLM VRM Class IV management intent, as they would be limited by topography and distance (Appendix E-2).

3.2.5.5 Significant Scientific Resources

A preliminary desktop review of potential paleontological resources near the project area was conducted by a qualified paleontologist to assess the potential number of resources that may exist. Paleontological resources are classified using the Potential Fossil Yield Classification (PFYC) system, which helps determine the likelihood of resource presence in the area. The PFYC classifications are as follows:

- PFYC 1—Very low potential.
- PFYC 2—Low potential.
- PFYC 3—Moderate potential.
- PFYC 4—High potential.
- PFYC 5—Very high potential.

The preliminary review indicated that areas classified as PFYC 3, PFYC 4, and of Unknown potential may exist near the project area (Figure C-5, Appendix C).

In Utah, the Utah Geological Survey (UGS) is responsible for managing all paleontological locality information. A paleontological record search was conducted with UGS on November 12, 2024. On November 21 and 22, 2024, and February 10, 2025, Eocene paleontologists conducted field surveys of the PFYC 4 to 5 geologic formations within the proposed project area. Although 12 new paleontological localities were documented during the survey, they were determined to be invertebrate and non-significant due to their commonality and poor preservation, and none were collected. (Eocene, 2025b). The survey results report was accepted and approved by NRCS Utah State Geologist Todd Sieber and is included in Appendix E-2.

3.2.5.6 Land Use

The project area is in Kane County, Utah. Kane County is a rural county in Southwestern Utah. The total land area of Kane County is approximately 2,629,760 acres (4,109 square miles). Kane County is sparsely populated with most of its 7,667 residents (United States Census Bureau [USCB], 2020) spread out among the various mountains, plateaus, and canyon lands that surround the City of Kanab, the largest city and county seat within Kane County. Kane County land is used predominantly for tourism, services, and agriculture with most of the land being federally owned. Other land uses include forest land, residential, light industrial, and commercial (Kane County, 2024).

The study area includes both Kane County and Washington County, Utah. The total land area of Washington County is 1,555,200 acres (2,430 square miles). Washington County is the fifth most populous county in Utah with 52 percent of the County's population (197,680 people) located in the City of St. George. Washington County land is used predominantly for grazing with much of the land managed by the BLM. Other land uses include residential and industrial development (Washington County, 2012).

Irrigated lands (6,896 acres in Kane County and 12,984 acres in Washington County) within the study area are primarily alfalfa fields and oats, which are used as a cover crop every 7–9 years (USDA, 2017b). Private residences, out buildings, livestock grazing, and limited recreation opportunities are also present.

3.2.5.7 Ecosystem Services

The human environment provides Cultural Services. Cultural resources, social status, public health and safety, scenic beaty, and land use all relate directly to non-material benefits such as spiritual enrichment, aesthetic experiences, recreation, sense of place, heritage, and development.

3.3 Forecast Future Conditions

The resource conditions were projected into the future, where applicable, to establish a baseline against which alternatives will be evaluated. This baseline is known as the No Action Alternative condition. This No Action Alternative forecast of future conditions is compared to the Action Alternative forecast of future conditions. Chapter 5.0 includes the No Action Alternative forecast of future conditions for each resource.

4.0 FORMATION OF ALTERNATIVES

4.1 Alternative Formulation Process

The alternative formulation process followed the eight-step watershed planning process for PR&G and the NRCS nine-step planning process, as described in Chapter 1.5. The PR&G eight-step evaluation process includes consideration of the federal objective (Section 2.1.1), PL 83-566 general purposes (Section 2.2.2), guiding principles (Section 4.11), and ecosystem services (Chapter 3.1). A framework was developed that included comparison of alternatives against guiding principles, ecosystem services, and economic benefits to select the alternative that maximizes public benefits (environmental, economic, and social goals). A PR&G analysis was completed to document the alternative formulation process and framework comparison for project decision-making (Appendix E-1).

4.1.1 Guiding Principles

Guiding principles were used to assist in decision-making and weighing tradeoffs of project alternatives. The guiding principles were included in a comparison framework, as documented in the PR&G Analysis (Appendix E-1), and are listed below:

1. Healthy and Resilient Ecosystems.
2. Sustainable Economic Development.
3. Floodplains (avoiding unwise use of floodplains).
4. Public Safety (reducing public health and safety risks).
5. Watershed Approach.

4.1.2 Alternative Formulation Criteria

The process of formulating alternatives for the project followed procedures outlined in the NRCS NWPM Parts 500 through 506; NRCS NWPH Parts 600 through 606; PR&G (DM 9500-013); and other NRCS watershed planning policy (NRCS, 2024a; NRCS, 2014a; NRCS, 2014b; USDA, 2017). Numerous alternatives were developed to meet the project Purpose and Need by the project team. The alternatives were developed considering problems and opportunities, as presented in Chapter **2.2.**, and objectives and constraints as presented in Chapter 2.1. Alternatives were formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability.

4.1.3 Risk and Uncertainty

During the planning process, decisions are made with information that is uncertain, including errors in measurements and climatic changes that could alter rainfall storm events. Assumptions made during the planning process are based on the best available science, technology, and information. Extended delays between the planning process and construction increase the degree of risk and uncertainty. Estimated alternative costs are based on computed work quantities multiplied by the appropriate unit cost for that type of work. Unit costs are based on current market prices from similar projects. Costs can be influenced by economic factors that cannot be predicted between

the planning process and construction that could increase the actual cost and decrease the availability of materials.

Additional risks and uncertainties associated with the project decision-making include the following:

- Erosion and Sedimentation: Erosion and sedimentation are dependent upon several unpredictable factors. Sedimentation could vary based on conditions in the drainage area, including construction activity, wildfires, storm events, climate variation, and off-highway vehicle/pedestrian traffic, among others. Erosion can vary based on climactic, hydrological, topographic, soil, geological, and vegetation conditions.

- Costs and Benefits: As with all projections of future costs and benefits, there is a degree of uncertainty assumed. Installation costs, O&M costs, crop yields, housing markets, labor markets, and commodity and input prices will all fluctuate.

- Flood Protection: Flood frequencies and magnitudes used in the analysis carry a degree of uncertainty. Economic estimates of flood control measures are not precise. The intention is that they are reasonably accurate and can assist in decision making.

- Recreation: Impacts associated with recreation-related projects can be uncertain and are dependent on external factors, including gas prices and availability, weather, construction, political status of other counties, etc. It can be assumed that recreation-related visitations would provide local economic benefits, but it is difficult to determine the extent.

4.2 Alternatives Considered

The project team considered two action alternatives and one no action alternative in detailed study. Multiple additional alternatives were formulated but eliminated from further study, as described in Chapter 4.3. The cooperating agencies were included in the alternative's formulation process described below.

The cost estimates for the alternatives provide an appropriate level of detail for the purpose of identifying the NRCS NEE Alternative among the alternatives considered. Project costs for alternatives selected for detailed study incorporate installation and O&M costs. Installation costs are those costs to be incurred for installing the works of improvement after the project is authorized. Installation costs include, as applicable, construction, engineering, real property rights, natural resource rights, permitting, replacement in-kind relocation payments, and project administration costs. Detailed construction cost estimates are provided in the PR&G Analysis Report included in Appendix E-1.

An analysis of feasible alternatives is required to determine potential actions that would meet the purpose and need of the proposed project (Chapter 2.0). After careful consideration, it was determined that two action alternatives would meet the purpose and need and would be analyzed in detail throughout the Plan-EIS. While the No Action Alternative does not meet the purpose and need of the project, it is also evaluated in detail to serve as a baseline for comparison and to meet NEPA requirements.

4.2.1 Alternative 1—No Action Alternative (Future Without Federal Investment)

The No Action Alternative considers the actions that would take place if no federal action or federal funding were provided for the project. Current irrigation facilities and existing environmental conditions in the project area would remain the same. Irrigation demand during summer months would continue to exceed water availability. Deficiencies in crop production would continue for the foreseeable future. Recreation and socioeconomic opportunities associated with the Preferred Alternative would not be realized. Due to the extended drought and historical population growth, current M&I water availability would continue to be stressed despite implementation of aggressive conservation measures. M&I water deficiencies would be exacerbated in the foreseeable future.

4.2.2 Action Alternatives

The action alternatives include measures to enhance the efficiency and reliability of the current AWM and to increase public recreation opportunities for Kane County, Utah, while increasing agricultural water, and M&I water supply for Washington County, Utah. Water need was calculated in the Cove Reservoir Water Model as part of the alternative formulation (Appendix E-1); several alternatives were developed to meet this water need. Based on the amount of water needed, alternatives for a 6,000-acre-foot and a 3,000-acre-foot reservoir were developed in detail and are described below.

4.2.2.1 Alternative 2—6,000-Acre-Foot Reservoir Alternative (Preferred Alternative)

4.2.2.1.1 Project Components

Alternative 2 consists of construction of a 6,000-acre-foot reservoir and earthen dam, principal and auxiliary spillways, recreation area, pipelines, and booster pump station (Figure B-2 through B-6, Appendix B). Access road improvements would be included as part of Alternative 2, and three borrow pit sites in addition to the reservoir basin were identified to supply material for dam construction (Figure B-1, Appendix B). Embankment material would be taken from the reservoir basin. The individual project components are discussed in detail in the following sections and in the Investigation and Analysis Report (Appendix D).

4.2.2.1.1.1 Reservoir and Dam

The proposed dam would be designed to meet current NRCS and Utah Dam Safety regulations (Utah Code Chapter 73-5a) and engineering standards. The structure, located near Orderville, Utah, would consist of a homogeneous earth-fill dam with an internal filter/drain. The length of the dam would be approximately 1,900 feet with a maximum dam height of 90 feet and a crest elevation of 5,552 feet above mean sea level (amsl). The reservoir would have a maximum capacity of approximately 6,000 acre-feet. The dam would be situated 0.6 miles from US-89 southwest of downtown Orderville (Figure B-1, Appendix B). This site was identified in the mid- to late- 1980s during a reconnaissance level inventory of potential dam sites associated with tributaries of the Virgin River.

4.2.2.1.1.2 Principal and Auxiliary Spillways

Two spillways, one principal, and one auxiliary would be constructed as part of the reservoir development. The principal spillway would be located at a lower elevation, and it would be

designed to route the principal spillway hydrograph and 100-year 24-hour average moisture condition flood through the reservoir without the use of the auxiliary spillway. The auxiliary spillway would also be designed to route larger flood events through the reservoir without overtopping the dam (Alpha Engineering and RB&G Engineering, 2024).

The principal spillway would be a 30-inch-diameter pipeline that is approximately 870 linear feet and would include a structure with an intake screen as well as an energy dissipater structure at the outfall. The pipeline would be located near the left abutment of the dam.

The auxiliary spillway would be approximately 1,070 linear feet and 30 feet wide. It would consist of a trapezoidal, earthen channel with a concrete weir structure near the reservoir. The auxiliary spillway would extend from the left abutment of the dam near the principal spillway, down the hillside, and enter an existing downstream drainage channel. Additional armoring or riprap would be installed to prevent erosion of the spillway or adjacent grades, as needed. See Figure B-3 in Appendix B for details on the principal and auxiliary spillways associated with Alternative 2.

4.2.2.1.1.3 Recreation Area and Boat Ramp

The Preferred Alternative would include the development of an approximately 4.1-acre outdoor recreation area. The recreation area would include a non-motorized boat ramp, two pit toilets, a pavilion, and 20 recreational vehicle site facilities (including a barbecue grill, table, and fire pit). No utilities would be extended to the recreation facilities. See Figure B-4 in Appendix B for details on the recreation area for Alternative 2.

4.2.2.1.1.4 Pipelines and Mt. Carmel Booster Pump Station

The installation of three water pipelines, the Reservoir Outlet Pipeline, the Glendale Irrigation Pipeline, the Mt. Carmel Irrigation Pipeline, and Booster Pump Station would be completed as part of the Preferred Alternative. The purpose of the Glendale Pipeline is to provide the additional capacity needed for the Glendale irrigation Company service area. This pipeline can also be used to convey water to the inlet of the Orderville Diversion by gravity flow which, with the extension of the Reservoir Outlet Pipeline, will convey water by gravity flow to the Cove Reservoir. The purpose of the Mt. Carmel Pipeline and booster pump station would be to pipe areas which are currently open canals and to provide pressurization to the existing and proposed piping. Water that is supplemented from the reservoir will have adequate pressure for the Mt. Carmel irrigation system without the need for the booster pump. The existing Mt. Carmel diversion dam does not provide enough elevation to service the system without the aid of a booster pump.

All pipelines would be bedded and buried to a minimum depth of 3 feet to the top of pipe and deeper under streambed crossings. The trench width and depth would vary depending upon the size of the pipe being installed; however, the trench would generally be 2 feet wider than the pipeline. It is anticipated that the material for the pipelines would be HDPE or PVC, depending on pipe size and cost of materials at the time the project is constructed. These materials have been found to be cost effective and durable for pressurized irrigation systems. The advantage of HDPE is that it can follow meandering canal alignments without the need for many fittings and thrust restraint. However, it is sometimes more difficult to repair. PVC has been found to also be a durable material and is used in many canal piping systems and has readily available repair couplings.

4.2.2.1.1.4.1 Reservoir Outlet Pipeline

The Reservoir Outlet Pipeline would include approximately 700 linear feet (0.13-mile) of new, large-diameter, concrete-encased, steel pipe. This new line would connect to the existing pipeline running from the Orderville irrigation diversion dam to just below the proposed dam site. The new line would access the proposed reservoir through the base of the dam. This new extension would provide water from the EFVR to fill the reservoir in the spring during high runoff. It would also be used to provide water from the reservoir to local irrigation users, as needed, during the summer months. Short-term surface disturbance would occur within the dam footprint. An inlet/outlet structure would be placed near the upstream toe of the dam with a control gate.

4.2.2.1.1.4.2 Glendale Irrigation Pipeline

The existing Glendale Irrigation Pipeline is a 4- to 8-inch pipeline that comprises the primary portion of the Glendale irrigation system. A new 8- to 16-inch pipeline would replace approximately 1.7 miles of the Glendale Irrigation Pipeline installed from the existing Glendale hydroelectric power plant to the Orderville Diversion Dam. Excess water from this pipeline would be combined with water diverted from the Orderville Diversion Dam to fill the proposed reservoir. The pipeline servicing Orderville's irrigation system was oversized by the KCWCD in agreement with the Orderville Irrigation Company in anticipation of the construction of the new reservoir. The existing irrigation pipeline would be used to fill the new reservoir during the non-irrigation season.

4.2.2.1.1.4.3 Mt. Carmel Pipeline and Mt. Carmel Booster Pump Station

The Mt. Carmel Pipeline would include the addition of approximately 24,000 linear feet of HDPE or PVC piping, varying in size from 8- to 16-inch diameters, to provide pressurized agricultural water to areas within the Mt. Carmel area. The proposed pipeline would be located entirely within existing roadways, open canals, or through existing fields and would not create permanent disturbance or require additional ROW.

The water demand for the Mt. Carmel Irrigation System varies from a low of 4 cfs to a high of 9.7 cfs. Depending on the year, this water is available from their diversion dam. The head of the proposed reservoir provides adequate pressure for pressurized irrigation in the Mt. Carmel area when supplemental water is required. However, when water is diverted from the existing Mt. Carmel Diversion Dam, it does not provide adequate pressure for sprinkler irrigation. In order to provide for pressurized irrigation, water diverted from the existing Mt. Carmel diversion dam needs to be boosted approximately 100 feet to provide the minimum pressure required for the irrigation system. It is proposed to install three pumps with variable frequency drives with approximate capacities of 1,450 gallons per minute per pump. Each pump would require approximately 50 HP or a total of 150 HP for the pump station. The pump station would be housed in a building approximately 25 feet by 25 feet and be constructed near the existing Orderville Hydroelectric Power Plant where an existing electrical transmission and substation are located.

Details regarding pipeline construction are presented in Appendix E-2 and E-3, and figures of the proposed pipelines and Mt. Carmel Booster Pump Station are presented as figures B-2, B-5, and B-6 in Appendix B.

4.2.2.1.2 Access Roads

Approximately 3.2 miles of new and existing access roads would be constructed and/or improved to provide access around the reservoir and to maintain access to properties surrounding the reservoir. See Figure B-3 in Appendix B for details on the access roads for Alternative 2.

- Approximately 1.2 miles of existing gravel roadway would be widened to 28 feet (currently 12–16 feet wide).
- Approximately 2.0 miles of new 2-lane roadway would be constructed at 28 feet wide.
- The access road would be covered with a graded and compacted road base material (gravel).

4.2.2.1.3 Borrow Material

Three existing borrow pit sites outside of the reservoir basin have been identified to provide gravel and riprap material: the Tait (29 acres), Lamb (17 acres), and Esplin (13.8 acres) pits. The project would use two of these three sites—the Esplin for riprap and either the Tait or Lamb pit for gravel. Because the final selection between the Tait and Lamb pits has not yet been determined, all three pits are analyzed as part of the project.

Use of the borrow pits would result in a maximum of 5.7 acres of disturbance, consisting of approximately 5 acres at the Esplin pit and either 0.5 acres at the Lamb pit or 0.7 acres at the Tait pit. Although only a portion of the pits would be disturbed, the entire area of each pit was included in the project area as the exact location of disturbance is unknown.

The Tait and Esplin pits contain avoidance areas for cultural and/or paleontological resources which are mapped in Figures C-6 and C-7 in Appendix C. Any disturbance within these pits would occur outside of these avoidance areas. The Tait and Lamb sites, located on private land near US-89 close to Mt. Carmel, Utah, would supply gravel while the Esplin site, located on private land east of Glendale near Glendale Bench Road, would supply riprap. Transportation to and from the three borrow pits would be on existing roads. See Figure B-1 in Appendix B for details on the borrow pit sites for Alternative 2.

4.2.2.1.4 Construction Staging and Access

Staging areas for the construction of the dam would be located within the footprint of the reservoir and would eventually be covered with water. An additional 200- to 300-foot buffer downstream of the dam would be used for instrumentation and additional staging. Construction would require staging large, earth-moving machinery, a portable gravel pit operation, water, and multiple personnel.

4.2.2.1.5 Schedule

Construction would begin after all necessary permits are obtained and plans are finalized. Construction of the reservoir, pipelines, associated recreation facilities, and access roads is estimated to take up to 15 months to complete. The spillway will be constructed simultaneously with the dam, as needed, for additional access to the left abutment. This will allow easier access during construction of the dam. The spillway ROW will be staked and cleared of all vegetation (Appendix E-2).

4.2.2.1.6 Operation and Maintenance

4.2.2.1.6.1 Water Diversions

Per the ZNP Agreement, water would be diverted from the EFVR at the Orderville Diversion and delivered by pipeline to the proposed reservoir between November 1 and May 31. No diversions are allowed outside of this period. During the summer months, up to 4.7 cfs would be diverted for OIC agricultural use, while MCIC would continue to divert up to 6.58 cfs (United States, Utah, Washington District, & Kane District, 1996).

The use of EFVR water by the GIC, OIC, and the MCIC is monitored on a regular basis. The three companies divert water from the EFVR at different locations. A weir is present at each diversion site with gages to read water elevation. Additionally, each weir is equipped with an electronic flow meter that sends information to a website to provide remote monitoring. The data collected from these flow meters are used to determine the total amount of water diverted. Additionally, the Utah State Water engineer collects money from the GIC, OIC, and the MCIC to fund a water commissioner. The commissioner is responsible for monitoring the diversions and making certain that companies are using the correct amount of water according to their water right.

4.2.2.1.6.2 Water Releases

Releases from the reservoir would be timed to supplement low, natural flows. Water for Long Valley agricultural purposes would be released into existing and proposed irrigation pipelines during the summer months, when natural flows are lowest. Water committed to Washington County for agricultural and M&I purposes could be released any time during the year to meet demand but would most likely be during the summer months for agricultural needs and during the fall and winter months for M&I needs.

The ZNP Agreement allows releases of up to 25 cfs for a 1-week period or 15 cfs continually (United States, Utah, Washington District, & Kane District, 1996). Releases would be managed to optimize irrigation efficiency and to meet M&I demands.

4.2.2.1.6.3 Monitoring

The use of EFVR water by the GIC, OIC, and the MCIC would continue to be monitored on a regular basis. The three companies divert water from the EFVR in different locations. A weir is present at each diversion site. Each weir has staff gages to read water elevation and an electronic flow meter that sends information to a website to provide remote monitoring. The data collected from these flow meters are used to determine the total amount of water diverted. A commissioner funded by the GIC, OIC, and MCIC is responsible for monitoring the diversions and making certain that companies are using the correct amount of water according to their water right.

Additional measuring devices would be installed to record flows into and out of the Cove Reservoir. Metering devices would be installed to record flows through the existing Orderville hydroelectric power plant that will release water rights owned by the WCWCD back into the EFVR, as well as water-right shortages being delivered from the reservoir to the Mt. Carmel and Orderville irrigation companies. These meter records would also be filed annually with the Utah State Division of Water Rights.

Water for Long Valley irrigation purposes would be used during the summer months. Water committed to Washington County for irrigation and M&I purposes could be released any time during the year to meet demand but would most likely be used during the fall and winter months. Releases to Washington County would be in compliance with the Zion Agreement (1996).

4.2.2.1.6.4 Maintenance

Routine maintenance and replacement actions would be required for the life of the proposed project. O&M measures that would be implemented through a signed O&M Agreement between the NRCS and the sponsor include:

- Regular inspection and maintenance of the dam and associated components.
- Grading of the spillways, as necessary, to maintain access and functionality.
- Annual inspection of the pipeline air valves to ensure that they are functioning properly.
- Annual cleaning of the pipelines with a polyurethane pig.
- Regular inspection and maintenance of the recreation area and non-motorized boat ramp to ensure hard surfaces and erosional protection and to keep the site free of debris.
- Regular O&M of the reservoir levels by agreement between the WCWCD and the KCWCD.

4.2.2.1.7 Costs

The average annual cost of implementing Alternative 2 is estimated to be approximately $1,359,000 and the total cost of implementing Alternative 2 is estimated to be approximately $39,730,000. The PR&G Analysis in Appendix E-1 describes how costs were calculated.

4.2.2.2 Alternative 3—3,000-Acre-Foot Reservoir Alternative

4.2.2.2.1 Project Components

Alternative 3 consists of a 3,000-acre-foot reservoir and dam, principal and auxiliary spillways, recreation area, pipelines, and booster pump station (Figure B-8, Appendix B). Access road improvements would be included under Alternative 3, and three borrow pit sites outside of the reservoir basin were identified to supply necessary materials for the dam construction (Figure B-1, Appendix B). Material for the embankment would be taken from within the reservoir basin. The individual project components are discussed in detail in the following sections below and in the Investigation and Analysis Report (Appendix D).

4.2.2.2.1.1 Reservoir and Dam

The proposed dam would be designed to meet current NRCS and Utah Dam Safety regulations and engineering standards. The structure would consist of a homogeneous earth fill dam with an internal filter/drain. The length of the dam would be approximately 1,700 feet with a maximum dam height of 70 feet and a crest elevation of 5,530 feet amsl. The reservoir would have a maximum capacity of approximately 3,000 acre-feet. The location for the reservoir and dam would be the same as described in Alternative 2 (Section 4.2.2.1.1.1).

4.2.2.2.1.2 Principal and Auxiliary Spillway

Two spillways, one principal, and one auxiliary would be constructed as part of the reservoir development. The principal spillway length would be the same as in Alternative 2; however, the auxiliary spillway would be slightly wider for Alternative 3 as there would be less surface area to attenuate storm water flows. See Figure B-8 in Appendix B for details on the principal and auxiliary spillways associated with Alternative 3.

4.2.2.2.1.3 Recreation Area and Boat Ramp

Alternative 3 would include the development of an approximately 2-acre outdoor recreation area. The recreation area would include a non-motorized boat ramp, one pit toilet, a pavilion, and 12 recreational vehicle site facilities (including a barbecue grill, table, and fire pit). No utilities would be extended to the recreation facilities.

4.2.2.2.1.4 Pipelines and Mt. Carmel Booster Pump Station

The installation of the three water pipelines (HDPE or PVC) and a booster pump station would be the same as described for Alternative 2 (Section 4.2.2.1.1.4). See Figures B-2, B-5, and B-6 in Appendix B for details on the pipelines associated with Alternative 3.

4.2.2.2.2 Access Roads

Access roads developed/improved for Alternative 3 would be the same as described for Alternative 2 (Section 4.2.2.1.2). See Figure B-8 in Appendix B for details on the access roads for Alternative 3.

4.2.2.2.3 Borrow Material

The same three existing borrow pit sites described for Alternative 2 would be used for Alternative 3 (Section 4.2.2.1.3). Embankment material would be taken from the reservoir basin. See Figure B-1 in Appendix B for details on the borrow pit sites for Alternative 3.

4.2.2.2.4 Construction Staging and Access

Staging areas for the construction of the dam would be located within the footprint of the reservoir and will eventually be covered with water. An additional 200- to 300-foot buffer downstream of the dam will be used for instrumentation and additional staging. Construction of the dam would require staging for large, earth-moving machinery; a portable gravel pit operation; water; and multiple personnel.

4.2.2.2.5 Schedule

Construction would begin after all necessary permits are obtained and plans are finalized. Construction of the reservoir, pipelines, associated recreation facilities, and access roads is estimated to take up to 15 months to complete. The spillway will be constructed simultaneously with the dam, as needed, for additional access to the left abutment. This will allow easier access for the construction of the dam. The spillway ROW will be staked and cleared of all vegetation (Appendix E-2 and E-3).

4.2.2.2.6 Operation and Maintenance

Operation and maintenance for Alternative 3 would be the same as those discussed for Alternative 2 under Section 4.2.2.1.6.

4.2.2.2.7 Costs

The average annual cost of implementing Alternative 3 is estimated to be approximately $1,017,000 and includes amortization of installation cost ($1,004,022) and OM&R ($13,000). The PR&G Analysis in Appendix E-1 describes how costs were calculated.

4.2.3 Nonstructural Alternative

Nonstructural alternatives, such as water conservation, water recycling, high pressure irrigation systems, replacing open irrigation ditches with pipelines, and other sources of water were considered. The KCWCD and WCWCD have implemented and continue to implement several conservation measures for water use in Kane and Washington counties, Utah. However, continued implementation of these conservation measures alone would not be sufficient to meet the purpose and need of the proposed project; therefore, the nonstructural alternatives were determined not feasible. The No Action Alternative, which would not include any structural measures, is considered the nonstructural alternative for the purposes of this Plan-EIS.

4.3 Alternatives Considered but Eliminated from Detailed Study

A full range of alternatives and options were considered for detailed study during project formulation and scoping, including alternative reservoir sites, alternative reservoir size, and non-structural measures. After careful examination, several alternatives were eliminated from detailed study as they were considered infeasible, did not adequately meet the purpose and need for the project, were environmentally more impactful, presented safety concerns, or were cost prohibitive (Appendix E-3).

The ZNP Agreement (1996) identifies allowable water use and depletion in the EFVR Basin east of ZNP (United States, Utah, Washington District, & Kane District, 1996). The Agreement establishes that new diversions or depletions of surface and ground water sources in the EFVR would not exceed a total depletion of 5,000 afy. It was also stipulated that one or more reservoirs constructed in the Basin could not exceed 6,750 acre-feet. For the purposes of this analysis and in addition to the Cove Reservoir site, seven other potential dam sites have been identified in the general vicinity of the project area and are discussed below.

4.3.1 Alternative Reservoir Sites

A 1988 publication titled “Inventory of Reservoirs and Potential Damsites in the Virgin River Basin” from the Utah Division of Water Resources (UDWRe) identified several potential reservoir sites in the Upper and Lower EFVR Subareas (UDWRe, 1988). These were cursory reviews, and the exact Cove Reservoir site was not identified in this document; however, two nearby sites (Orderville and Dry Wash) were located and reviewed. The report also identifies several sites downstream of the Cove (UDWRe, 1988). These sites are not considered feasible to meet the needs of the Preferred Alternative due to environmental and logistical concerns, including the distance of these sites from

the Glendale, Orderville, and Mt. Carmel agricultural fields, and the need to pump water upstream to access the fields.

Six sites from the UDWRe report and four sites from the ZNP Agreement (1996) were reviewed as potential alternatives and are described below.

4.3.1.1 Sites identified from the UDWRe Report

4.3.1.1.1 Swapp and Lower Swapp Sites

The Swapp and Lower Swapp sites partially overlap each other at the junction of US-89 and the paved Alton County Road, approximately 13 miles north of the proposed Cove Reservoir site. Of the potential sites reviewed, the Swapp site and Lower Swapp site are furthest from the proposed project site. Two small reservoirs exist in the area and would be inundated if this site were to be selected. A maximum dam height of about 97 feet would be required to store 6,000 acre-feet of water. This would be slightly higher than the height required for Alternative 2. Additionally, realignment between 0.8 and 1.0 mile of Alton Road, the primary access road to the town of Alton and surrounding area, would be required.

The required realignment of Alton Road would make the development of either of these sites more expensive, more environmental impacts, and less effective than the proposed Cove Reservoir site. Therefore, neither site was developed in further detail.

4.3.1.1.2 Lower and Upper Lydia's Canyon Sites

4.3.1.1.2.1 Lower Lydia Canyon

The lower Lydia's Canyon site is located approximately 0.33 miles up the canyon from US-89 and the upper site is located approximately 2.0 miles up the canyon from the highway. Both sites are located entirely on private land. Lydia's Canyon contains several private developments, including business, residential homes, ponds, and agricultural fields, which would all be inundated if a reservoir was developed at this site. The estimated required earthwork would be roughly 1.5 times the amount required to develop the Preferred Alternative. A 6,000-acre-foot reservoir would require a dam approximately 162 feet in height, 72 feet higher than the Preferred Alternative.

4.3.1.1.2.2 Upper Lydia Canyon

At the upper Lydia's Canyon site, development of a reservoir would result in inundation of one residential structure and agricultural land. The estimated required earthwork would be roughly twice the amount required to develop the Preferred Alternative as a 6,000-acre-foot reservoir would require a dam approximately 185 feet in height, more than twice the height of the proposed Cove Reservoir site.

Both reservoirs would be located on-stream to the perennial Lydia's Creek and would result in the loss of riparian and wetland habitat. This loss would likely be replaced by new habitat that would surround either reservoir. Both reservoirs would inundate the only access road in Lydia's Canyon, a maintained gravel county road. Re-routing would necessitate a major road realignment as the road would need to be cut into the side of the adjoining hillside.

No detailed cost evaluation has been completed for either of these two sites. However, development of either site would require the purchase of private land, including occupied residences and other structures, ponds, and developed agricultural lands. There would be additional costs resulting from rerouting the existing access road. These costs would be exacerbated by the need to construct the road on a hillside. These estimated additional costs would make the development of either of these sites prohibitive. The additional earthwork associated with either dam site would result in additional undetermined costs.

Based on the estimated high cost of additional earthwork for the dams, the cost of the purchase of private property, loss of existing agricultural fields, existing homes and other structures, the rerouting of the Lydia's Canyon Road, and environmental impacts from an on-stream reservoir, these sites were eliminated from detailed study and are not discussed further in this document.

4.3.1.1.3 Dry Wash Site

The Dry Wash site is located approximately 0.5 miles above Glendale in Dry Wash, a tributary to the EFVR. Two possible drawbacks to this site were identified in the 1988 report. The first drawback is that the site lies "…just west of the main Sevier fault and lies on at least two faults that might promote seepage from the reservoir." The second drawback was "…steep and narrow topography which would require a high and probably expensive dam" (UDWRe, 1988). A follow-up evaluation determined that the dam site would be founded on Cretaceous age Straight Cliffs formation or Tropic Shale bedrock. Multiple fault traces have been mapped within the Dry Wash area. Based on available information, these faults are inactive, and their presence would not necessarily preclude this site as a feasible location for a dam and water storage reservoir. However, it is likely that the bedrock formations in the area are fractured due to past faulting, and the faulting would increase the risk that seepage from the reservoir would be greater at this site compared to other sites (RB&G Engineering, 2021). A dam approximately 139 feet high would be required to store 6,000-acre-feet of water. This would be 49 feet higher than what would be required for the Preferred Alternative. Due to the cost and environmental concerns, this site was eliminated from detailed study and not considered further in this document.

4.3.1.1.4 Orderville Site

The Orderville site is located approximately 0.5 mile north of Orderville on the EFVR. However, the UDWRe determined that this site lies on a complex fault structure in the middle of the Sevier Fault zone. One major and two minor faults converge at the potential dam site axis and as a result, the site was determined to be a very unfavorable geologic setting for a dam. Additionally, the depth to bedrock was determined to be excessive (UDWRe, 1988). No additional studies have been conducted at this site due to unfavorable environmental conditions. Therefore, the site was eliminated from detailed study and not considered further in this document.

4.3.1.2 Sites identified from the ZNP Agreement (1996)

4.3.1.2.1 Lower and Upper Stout Creek Sites

The Lower Stout Creek reservoir site is located approximately 0.3 miles up Stout Canyon from US-89. The Upper Stout Creek site would overlap the upper portion of the lower reservoir and is located approximately 1.1 miles up the canyon from US-89. These sites are located on private and U.S. Forest Service (USFS) Dixie National Forest-administered lands, approximately 9.8 road miles

north of the proposed Cove Reservoir site. The dams at these sites would be off stream to the EFVR but would be on stream to the small, perennial tributary creek that flows down Stout Canyon into the EFVR. A review of topography at both sites indicates that a dam with a maximum height between 152 (upper site) and 158 feet (lower site) would need to be constructed to store 6,000 acre-feet of water (RB&G Engineering, 2021). Realignment of the Lower Stout Creek Rd and the Upper Stout Creek would be required to get around each reservoir. Given the steep topography surrounding the reservoir sites, this would be a substantial undertaking. Additionally, maintenance of this stretch of road would be difficult due to potential slope failures resulting from cutting into the steep canyon wall. The affected road runs through the Stout Canyon from US-89 to State Highway 14 and is a popular route for local users accessing ranches or recreating in the canyon. Sedimentation within the reservoirs would be a design concern as well, with an estimated average sedimentation rate of 1 acre-foot/yr/mi^2 (Appendix D) (Alpha Engineering and RB&G Engineering, 2024). Since these reservoirs are on stream there would be a loss of riverine and/or wetland habitat. This loss would likely be replaced by new habitat that would surround either reservoir. Since both sites are located primarily on private land, additional costs would be incurred to purchase the land for the reservoirs. Due to the increased costs and environmental impacts that would be associated with the road relocation and additional earthwork necessary to construct the dams as described above, these sites were eliminated from further study and are not discussed further in this document.

4.3.1.2.2 Lower Muddy Creek Site

The Lower Muddy Creek site is located approximately 2.5 miles south of the proposed Cove Reservoir site, approximately 0.16 miles up the cove from US-89. It would be situated on private, agricultural land. A review of topography at this site indicates that a dam with a maximum height of about 115 feet would need to be constructed to store 6,000 acre-feet of water. This is approximately 25 feet higher than that planned for the proposed Cove Reservoir dam (RB&G Engineering, 2021).

Geologic descriptions indicate that gypsum deposits within the upper portion of the Winsor member and lower portion of the Paria River member are present at this site (RB&G Engineering, 2021). A gypsum deposit with an exposed thickness of approximately 5 feet was observed near the base of the right abutment of the dam alignment (lower portion of Winsor member/upper portion of Paria River member). Additional gypsum deposits, several feet thick, were observed along the right side of the possible reservoir site and within the erosion channel near the center of the basin, particularly near the location of a historic flume. Defining the lateral and vertical limits of the gypsum deposits will require detailed foundation investigations. Depending on the extents of the gypsum deposits, it may not be feasible to construct a safe dam at the lower Muddy Creek site.

There are additional concerns with this site. An erosion channel visually estimated to be 20– 30 feet deep was observed within the center of the basin at this location. It is likely that a cutoff would need to be excavated to a depth of at least 30 feet to expose the bedrock formation prior to treating the foundation bedrock. Considering the availability of other potential reservoir sites, this site is not the preferred alternative for the project. Development of a reservoir at this site would result in the loss of active agriculture fields and would require the purchase of private property (RB&G Engineering, 2021).

The Lower Muddy Creek site is located at a lower elevation than most of the target agriculture fields within the project area; therefore, active pumping rather than gravity flow would be required to transport the water to the fields. Up to 1.8 miles of additional new pipeline beyond that needed for the Cove Reservoir site would be required to access the Glendale and Orderville fields. Additionally, studies conducted by Eocene cultural resource specialists determined that construction of a reservoir at this location would potentially result in the loss of historic cultural resources.

Due to safety concerns, engineering feasibility issues, the loss of agricultural land, additional costs associated with the purchase of private property, pipeline construction and maintenance, and cultural resource concerns, this site was eliminated from further study and is not discussed further in this document.

4.3.1.2.3 Upper Muddy Creek Site

The Upper Muddy Creek site is located approximately 1.8 miles up Muddy Creek from the lower site and 2.0 miles from US-89. Should a reservoir be constructed here, no irrigated agricultural land would be lost. However, the site is located on private land, and it would be necessary to purchase the property. Sedimentation would also be a concern, as an estimated 1,300 acre-feet of a reservoir at the upper Muddy Creek location would be filled with sediment after 50 years, resulting in a considerable loss of capacity (RB&G Engineering, 2021). The reservoir would also be on-stream to intermittent Muddy Creek. Approximately 3.6 miles of additional new pipeline would also be required to access the target agricultural fields.

The geology at the upper Muddy Creek site is believed to be like the lower Muddy Creek site. No gypsum surface deposits were observed during a field review, and a detailed geotechnical investigation would be required to determine if a dam could be safely constructed at this location. Gypsum deposits may be present at relatively shallow depths within the dam foundation area (RB&G Engineering, 2021). A review of topography at this site indicates that a dam with a maximum height of approximately 115 feet would need to be constructed to store 6,000 acre-feet of water. This would be approximately 25 feet higher than that planned for the Cove Reservoir site.

Due to potential safety concerns, engineering feasibility concerns, and additional environmental issues (e.g. larger dam, pipeline construction and maintenance), this site was eliminated from further study and is not discussed further in this document.

4.4 Final Array of Alternatives

Fourteen action alternatives were explored during the scoping process, including a nonstructural alternative. In accordance with NEPA (7 CFR 650), some initial alternatives were eliminated from further analysis due to exorbitant costs, logistics, environmental reasons, or other critical factors (see Chapter 4.3).

The feasibility of implementing the measures was assessed by evaluating various alternatives. This assessment involved examining each alternative's capacity to:

- Address the project's purpose and needs.
- Provide positive economic benefits.

- Ensure manageable land acquisition.
- Handle logistical requirements.
- Utilize existing technology.
- Avoid excessive costs.

Refer to the PR&G Analysis Report included in Appendix E-1 for further information.

The feasible alternatives determined from the screening process are being carried forward in detailed study. These include the 6,000-acre-foot reservoir and the 3,000-acre-foot reservoir. The No Action Alternative is also required to be evaluated in the Plan-EIS to provide a baseline comparison.

Table 4.1. Summary of Alternatives Preliminary Screening Evaluation

Plan Description	Purpose	Alternative 1 (No Action)	Alternative 2 (6,000-Acre-Foot Reservoir)	Alternative 3 (3,000-Acre-Foot Reservoir)
NEPA Purpose and Need	-	Alternative 1 would not meet the NEPA primary or secondary purpose and need to enhance the efficiency and reliability of the current AWM and recreation water in Long Valley, or increase agricultural and M&I water supply to communities in Washington County	Alternative 2 would meet the primary and secondary NEPA purpose and need by providing a reliable source of 6,000 acre-feet of water to be used for agricultural and recreation purposes in the Long Valley area, and agricultural and M&I purposes in Washington County.	Alternative 3 would meet the primary and secondary NEPA purpose and need by providing a reliable source of 3,000 acre-feet of water to be used for agricultural and recreation purposes in the Long Valley area, and agricultural and M&I purposes in Washington County.
Objective 1: Provide reliable source and long-term availability of agricultural water during the summer months in the Glendale, Orderville, and Mt. Carmel agricultural areas in Kane County and the Hurricane area in Washington County	Contribution to Planning Objectives	Alternative 1 would not provide a reliable and long-term available source of agricultural water.	Alternative 2 would provide agricultural water for up to 1,109.06 acres in Kane County and 67 acres in Washington County (Appendix E-3).	Alternative 3 would provide agricultural water for up to 750 acres in Kane County and 45 acres in Washington County (Appendix E-3).
Objective 2: Provide M&I water for Washington County	Contribution to Planning Objectives	Alternative 1 would not provide M&I water for Washington County.	Alternative 2 would provide up to 300 acre-feet of M&I water in Washington County (Appendix E-3).	Alternative 3 would provide up to 200 acre-feet of M&I water in Washington County (Appendix E-3).

Plan Description	Purpose	Alternative 1 (No Action)	Alternative 2 (6,000-Acre-Foot Reservoir)	Alternative 3 (3,000-Acre-Foot Reservoir)
Objective 3: Provide a recreation opportunity in Kane County	Contribution to Planning Objectives	Alternative 1 would not provide an additional recreation opportunity in Kane County.	Alternative 2 would provide a 6,000-acre-foot reservoir for non-motorized water-related enjoyment, a 4.1-acre recreation area with a non-motorized boat ramp, pavilion, and 20 RV sites at the reservoir site.	Alternative 3 would provide a 3,000-acre-foot reservoir for non-motorized water related enjoyment, a 2-acre recreation area with a non-motorized boat ramp, pavilion, and 12 RV sites in Kane County.
Objective 4: Present economic prospects for the communities of Orderville, Glendale, and Mt. Carmel by offering an extra recreational hub during the summer season	Contribution to Planning Objectives	Alternative 1 would not provide an additional recreational hub during the summer season and would therefore not increase economic prospects for the communities of Orderville, Glendale, and Mt. Carmel.	Alternative 2 would provide a reliable source of water for approximately 1,176.06 acres of farmland to support economic prospects.	Alternative 3 would provide a reliable source of water for approximately 795 acres of farmland to support economic prospects.
Objective 5: Provide for the maximum utilization of renewable energy for local communities whose populations are projected to rise	Contribution to Planning Objectives	Alternative 1 would not meet Objective 5 as no change in the utilization of renewable energy would occur.	Releases of excess water and water delivered to WCWCD would supplement the energy provided by the existing Orderville hydroelectric plant.	Releases of excess water and water delivered to WCWCD would supplement the energy provided by the existing Orderville hydroelectric plant.
Objective 6: Comply with the ZNP Agreement (1996)	Contribution to Planning Objectives	Alternative 1 would comply with the ZNP Agreement (1996)	Alternative 2 would comply with the ZNP Agreement (1996).	Alternative 3 would comply with the ZNP Agreement (1996).

Plan Description	Purpose	Alternative 1 (No Action)	Alternative 2 (6,000-Acre-Foot Reservoir)	Alternative 3 (3,000-Acre-Foot Reservoir)
Constraint 1: Siting limitations	Response to Planning Constraints	Alternative 1 has no siting limitations.	Alternative 2 would address siting limitation by using one of the limited number of sites that meet the necessary criteria for a reservoir.	Alternative 3 would address siting limitations by using one of the limited number of sites that meet the necessary criteria for a reservoir.
Constraint 2: Public safety	Response to Planning Constraints	Alternative 1 would put no additional risk to public safety.	Alternative 2 would minimize the risk put on residential property within the breach inundation zone at the Cove Reservoir site.	Alternative 3 would minimize the risk put on residential property within the breach inundation zone at the Cove Reservoir site.
Constraint 3: Environmental resources	Response to Planning Constraint	Alternative 1 would not cause the direct loss of existing agricultural land or residences.	The Cove Reservoir site would not require the direct loss of existing agricultural land or residences.	The Cove Reservoir site would not require the direct loss of existing agricultural land or residences.
Constraint 4: Geotechnical restrictions	Response to Planning Constraint	Alternative 1 has no geotechnical restrictions.	Alternative 2 has no geological structural limitations and would support construction.	Alternative 3 has no geological structural limitations and would support construction.
Constraint 5: Engineering Challenges	Response to Planning Constraint	Alternative 1 would have no engineering involved.	Alternative 2 would minimize the engineering requirements needed compared to the other reservoir sites evaluated.	Alternative 3 would minimize the engineering requirements needed compared to the other reservoir sites evaluated.
Constraint 6: Economic constraints	Response to Planning Constraint	Alternative 1 would have no construction costs.	Alternative 2 would have $39,730,000 in costs.	Alternative 3 would have $32,345,000 in costs.

Plan Description	Purpose	Alternative 1 (No Action)	Alternative 2 (6,000-Acre-Foot Reservoir)	Alternative 3 (3,000-Acre-Foot Reservoir)
Acceptability	Response to Evaluation Criteria	Alternative 1 would be consistent with existing federal and state laws, authorities, and public policies.	Alternative 2 would be consistent with existing federal and state laws, authorities, and public policies.	Alternative 3 would be consistent with existing federal and state laws, authorities, and public policies.
Completeness	Response to Evaluation Criteria	Alternative 1 would have no change to the current investments in Kane and Washington Counties.	Alternative 2 evaluates all necessary investments needed by Kane and Washington Counties to achieve the project.	Alternative 3 evaluates all necessary investments needed by Kane and Washington Counties to achieve the project.
Efficiency	Response to Evaluation Criteria	Alternative 1 would not address the water deficiencies or demand for recreational areas in Kane County, or the demand for M&I water in Washington County	Alternative 2 would have a cost of $6,622 per acre-foot in 2026 dollars.	Alternative 3 would have a cost of $10,782 per acre-foot in 2026 dollars.
Effectiveness	Response to Evaluation Criteria	Alternative 1 would not address the water deficiencies or demand for recreational areas in Kane County, or the demand for M&I water in Washington County.	Alternative 2 would effectively alleviate the specified problems and achieve the specified opportunities while providing minor impacts to the environment.	Alternative 3 would effectively alleviate the specified problems and achieve the specified opportunities while providing minor impacts to the environment.

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5.0 ENVIRONMENTAL CONSEQUENCES

A final array of alternatives was evaluated to compare the economic, environmental, and social effects that may result from each alternative. The final array of alternatives includes Alternative 1—No Action Alternative, Alternative 2—6,000-Acre-Foot Reservoir Alternative, and Alternative 3—3,000-Acre-Foot Reservoir Alternative. Refer to Chapter 4.0 for a detailed description of each alternative.

This chapter describes the potential effects of the alternatives within each resource category, as defined in Chapter 3.0. Ecosystem service categories are discussed for each resource category. For reference, the ecosystem service categories relevant to this project and the applicable resource concerns that discuss these categories are provided in Table 3.2 of Chapter 3.1. A summary and comparison of resource concerns for alternatives is provided as Table 5.11 in Section 5.7.2. A summary of ecosystem services is also provided as Table 5.6 in Section 5.7.3 to identify the ecosystem services tradeoffs between alternatives. The PR&G Analysis in Appendix E-1 also provides a detailed ecosystem services tradeoff analysis.

The following lists the specific terminology used to describe impacts associated with alternative measures, consistent with 7 CFR 650.

Type

- Direct Effect: Impacts caused by a proposed action occurring at the same time and place.
- Indirect Effect: Impacts caused by an action that are later in time or farther removed in distance but are still reasonably foreseeable.
- Cumulative Effect: The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person(s) is undertaking such other action, which may include both beneficial and detrimental effects.

Duration

- Temporary and Permanent Impacts: Temporary impacts are impacts that are not lasting and the affected resource will return or be restored to its previous (pre-project) state. Permanent impacts are those in which the affected resource will not return to its previous state within one's lifetime.
- Short- and Long-Term Impacts: Short-term impacts are those that last through the duration of construction and shortly after (duration of impact is approximately 3 to 4 years). Long-term impacts are those that last for an extended duration of time. For this evaluation, long-term impacts extend beyond Year 4 and up to the end of the 100-year project life.

Intensity

- No effect: Resource conditions would not change.

- Negligible: Resource condition changes would be so slight there would be no measurable or perceptible consequence to the resource.

- Minor: A measurable effect to the resource, but localized, small, and of little consequence to the resource. Mitigation measures, if needed to offset adverse effects, would be easily implemented and successful.

- Moderate: A measurable effect on the resource from the alternative actions. Mitigation measures would be needed to offset adverse effects and could be extensive and moderately complicated to implement but would be successful.

- Major: A large, measurable effect to the resource from the alternative actions. Mitigation measures would be needed to offset adverse effects and could be extensive and complicated to implement.

5.1 Soil

Refer to Section 3.2.1 for existing soil resource conditions within the study area.

5.1.1 Soil Resources

5.1.1.1 Alternative 1—No Action Alternative

The drainage area in the project area would remain vulnerable to occasional flash floods, that transport sediments into the EFVR. This risk is heightened by the limited effectiveness of existing small flood control structures. Without additional flood risk management, the area could continue to experience channel scour, erosion, sedimentation, short-term disruptions to agricultural production, long-term degradation of soil health, and agricultural viability.

During dry periods, wind erosion within the project area would persist on disturbed and cleared areas, leading to soil loss into the foreseeable future. Under Alternative 1, no surface disturbance would occur; however, this alternative would not provide long-term soil stabilization benefits.

5.1.1.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Approximately 259 acres of permanent disturbance and 64 acres of temporary disturbance would occur from implementation of Alternative 2 (Table 5.1). This disturbed area would be vulnerable to an indeterminate degree of soil erosion, mainly in the form of airborne dust, particularly on windy days or during heavy rainfall events. Direct impacts to soil resources would result from excavation and earthwork to build a dam, spillways, and access roads. It is anticipated that any soil needed for construction of the dam would be sourced from the reservoir footprint. If characteristics of excavated soils do not fully meet the specifications of design for the embankment upon the beginning of construction, additional soil resources would need to be taken from a nearby source.

Table 5.1. Permanent and Temporary Disturbance Under Alternative 2

Project Component	Permanent Disturbance (acres)	Temporary Disturbance (acres)
Reservoir	235	0
Principal Spillway	0.1	0.8
Auxiliary Spillway	0.2	0.6
Pipelines	0	37.9
Access Road	14	24.8
Borrow Area	5.7	0
Recreation Area	4.1	0
Total	259.1	64

The implementation of conservation and protective measures by the applicant, along with best management practices (BMPs) as detailed in Chapter 6.0, would mitigate but not entirely prevent this potential soil degradation. Once the planned reservoir is fully filled, approximately 190 acres of the affected land would be submerged, effectively preventing further soil erosion in that area, so long as the reservoir remains full. Thus, most of the soil loss at the reservoir site would be temporary and minor in extent. Given the relatively low amount of permanent soil disturbance for the execution of construction of the spillways, access roads, pipelines, and recreation area would likely lead to minor soil loss (18.4 acres, Table 5.1). The prolonged use of the newly constructed access road around the proposed reservoir would result in an unquantified amount of soil erosion caused by vehicle traffic, wind, and significant rainfall events. This would add to the soil loss already caused by existing roadways in the vicinity. However, this potential erosion would be partially mitigated by graveling and routine maintenance of the road.

While the exact amount of soil loss due to erosion is uncertain, all disturbed areas would remain susceptible to erosion as long as they remain barren or are not submerged, as in the case of the reservoir. Over time, soil erosion would likely decrease as vegetation gradually regrows or reclamation efforts take effect (i.e., the pipeline). The implementation of mitigation measures and BMPs (including revegetation and long-term weed control) committed to by the applicant would lessen, but not eliminate, the amount of soil lost. However, as the proposed project is in a region with limited summer rainfall, revegetation efforts would likely take several growing seasons to be fully successful.

Surface disturbance could cause a reduction in the biological soil crusts that exist in the project area. As mentioned in Section 3.2.1.1, this is a treatable resource concern. Treatment measures include artificial soil stabilization, cover crops, over-seeding, supplemental watering, shading, and wind erosion reduction. The implementation of mitigation measures and BMPS discussed in Chapter 6.0 would lessen the impacts biological soil crusts.

Use of the three existing borrow pits for construction of the earthen-fill dam is expected to result in the surface disturbance of an estimated 5.7 acres. Use of the Lamb Pit and Tait Pit would result in permanent disturbance of approximately 0.5 acres or 0.7 acres, respectively. Approximately 5 acres of permanent disturbance would result from use of the Esplin Pit (See Table 5.1). Embankment material would be taken from the reservoir basin. The basin would be covered by water when the reservoir is operational.

Direct impacts would include soil erosion through wind and water (dust and runoff) and the loss of native vegetation, which helps prevent erosion. Fugitive dust generated from borrow pit operations would be visible, particularly during windy conditions. While soil loss would be minor, it would be long term, lasting for the duration of the pits' operational period. Adherence to the BMPs outlined in Chapter 6.6 and the Standard BMPs and Standard Operating Procedures in Appendix E-3 would ensure that these effects are minimized.

Sediment would gradually accumulate in the proposed reservoir over time, primarily due to occasional flash floods in the area. If not removed, this sediment could reduce the reservoir's effectiveness for water storage or recreational use. Periodic maintenance, including dredging, may be necessary to maintain the reservoir's overall functionality. However, as stated in Appendix D, Section D.2.4 of the Plan-EIS, the estimated 100-year reservoir sedimentation is 418 acre-feet, which is less than 10 percent of the planned reservoir volume. The average depth of sediment within the reservoir after 100 years is expected to be 2.1 feet. The total estimated sediment volume equates to an average erosion of 1.7 inches of soil over the 4.7 square mile drainage area over a period of 100 years. Standard NRCS practice is to evaluate methods to reduce sedimentation if the sediment yield is greater than 2 inches in 50 years (4 inches in 100 years). The estimated sediment yield for Cove Dam site is less than 50 percent of the NRCS threshold for evaluation of sediment reduction. For the relatively low volume of expected sediment, storing the sediment in the reservoir is expected to be more cost efficient than implementing sediment reduction, particularly because sediment reduction would need to be combined with sediment storage since it is not practical to completely eliminate sediment transport into the reservoir. While this impact would be long-lasting, its overall effect would be negligible in scale.

Soil would be disturbed, vegetation would be cleared, and backfilling and grading would also be required during the short-term construction period. There is increased erosion and sedimentation potential during construction activities, which would be managed using BMPs during and immediately after construction. Post-construction monitoring would also be used to ensure successful reclamation of vegetated areas. No significant adverse impacts on soil would be anticipated with the implementation of BMPs.

5.1.1.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Earthwork quantities for the construction of the dam and reservoir in Alternative 3 would be reduced by approximately 40 percent; however, the excavation required for the spillway would be doubled due to the smaller surface area in the reservoir. Approximately 165.3 acres of permanent disturbance and 64.7 acres of temporary disturbance would occur from implementation of Alternative 3 (Table 5.2). Direct impacts to soil resources would be the same as those evaluated in Alternative 2, with a slightly smaller disturbance footprint for the reduced reservoir area. The disturbance area for the principal spillway, pipelines, access roads, borrow areas, and recreation area would be the same as Alternative 2.

Table 5.2. Permanent and Temporary Disturbance Under Alternative 3

Project Component	Permanent Disturbance (acres)	Temporary Disturbance (acres)
Reservoir	141	0
Principal Spillway	0.1	0.8
Auxiliary Spillway	0.4	1.2
Pipelines	0	37.9
Access Roads	14	24.8
Borrow Areas	5.7	0
Recreation Area	4.1	0
Total	165.3	64.7

The same BMPs described for Alternative 2 would be used for Alternative 3 to prevent impacts to soil resources (Chapter 6.6). Under Alternative 3, negligible long-term impacts to soil resources are anticipated.

5.1.2 Ecosystem Services

5.1.2.1 Alternative 1—No Action Alternative

Provisioning service, agricultural land—Under Alternative 1, Agricultural land users in the project area would continue to experience water shortages during summer months at an increasing rate.

5.1.2.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Provisioning service, agricultural land—Water from Alternative 2 would provide agricultural water the Hurricane Bench Lake area for maintaining agricultural production. Water could also be used to provide urban agricultural benefits to water users in St. George for personal food production through gardening or other enterprises that produce local food.

5.1.2.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Provisioning service, agricultural land—Implementation of Alternative 3 would have the same impacts on ecosystem services for soil resources as Alternative 2 (Section 5.1.2.2).

5.2 Water

Refer to Section 3.2.2 for existing water resource conditions within the study area.

5.2.1 Water Resources

5.2.1.1 Alternative 1—No Action Alternative

No direct or indirect effects to water resources would occur from implementation of Alternative 1. Surface flows in the EFVR would continue to vary considerably in response to spring runoff or intense storm events.

5.2.1.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would have direct, positive benefits on water resources by making 2,148 acre-feet of existing water available for agricultural water users in Kane and Washington County annually. Additional water would be made available for M&I use in Washington County.

Because the proposed reservoir location is located away from the EFVR, construction of the proposed project is not anticipated to negatively affect the river. There are no permanent pools or streams located within the proposed reservoir footprint.

A water modeling analysis was completed by Alpha Engineering to determine the downstream effects of Alternative 2 on the EFVR. The changes in river flow, width, and depth on an annual and average monthly basis are described below.

5.2.1.2.1 Water Modeling Results

5.2.1.2.1.1 Annual Changes

Modeling shows that reservoir operations would cause minor changes to EFVR flows. On an annual basis, modeled changes in EFVR flows were small, ranging from a decrease of 1.8 cfs under low-flow conditions to an increase of 0.9 cfs under high flow conditions (Table 5.3). Larger short-term operational changes may occur during specific release or diversion periods, as discussed in section 5.2.1.2.1.2.

Current seasonal EFVR flows can vary from less than 40 cfs to more than 2,000 cfs, representing a range of more than 1,960 cfs, or approximately a 4,900 percent increase from 40 cfs. By comparison, modeled project-related annual average changes are less than 2 cfs (Alpha Engineering, 2026).

Tables 5.3 through 5.5 summarize the modeled changes in flow, depth, and width (Alpha Engineering, 2026).

Table 5.3. Annual Changes to EFVR Flow

Scenario	Low-Flow Condition	High-Flow Condition
Pre-Project Flow	34.8 cfs	82.2 cfs
Post-Project Flow	33.0 cfs	83.1 cfs
Change	-1.7 cfs	+1.9 cfs
Percent Change	5.17% decrease	1.09% increase

Table 5.4. Annual Changes to EFVR Depth

Scenario	Low-Flow Condition	High-Flow Condition
Pre-Project Depth	1.13 ft	1.71 ft
Post-Project Depth	1.10 ft	1.72 ft
Change	-0.03 ft	+0.01 ft
Percent Change	2.65% decrease	0.5% increase

Table 5.5. Annual Changes to EFVR Width

Scenario	Low-Flow Condition	High-Flow Condition
Pre-Project Width	19.32 ft	22.31 ft
Post-Project Width	19.37 ft	22.36 ft
Change	+0.05 ft	+0.05 ft
Percent Change	0.25% increase	0.22% increase

These results show that changes in flow (-5.17% to +1.09%), depth (-2.65% to +0.5%), and width (+0.25% to +0.22%) would be minor. Downstream tributaries such as Meadow Creek in Mineral Gulch would not be affected, because they are hydrologically independent of EFVR baseflow and the project would not alter tributary inflow, sediment supply, or confluence hydraulics (UDWRe, 2000). Because the project would not include construction, diversion, or flow modifications within the Meadow Creek watershed, and because modeled changes are limited to EFVR mainstream flows, no effect to Meadow Creek inflow, sediment supply, or confluence hydraulics is anticipated.

5.2.1.2.1.2 Monthly Changes

An analysis was completed by Alpha to evaluate anticipated changes in river flow on a monthly basis associated with the Project. The analysis evaluated river flows at the Mount Carmel and Springdale gauges during average, driest, and wettest hydrologic conditions for each month of the year. Detailed results of the analysis are provided in the Water Model Report in Appendix E-1. A summary of findings at each gauge is provided in the following sections.

At the Mount Carmel Gauge, flow is projected to increase by approximately 35 to 97 percent during average conditions. Driest conditions exhibit the largest relative increases, with several months exceeding 75 percent and some low-flow periods exceeding 200 percent due to the relatively small existing flows.

Because of additional watershed inflows between Mount Carmel and Springdale, the relative changes at the Springdale gauge are generally smaller. Average monthly flows at the Springdale gauge increase approximately 7 to 41 percent. Driest conditions increase approximately 7 to 60 percent, while wettest conditions generally increase approximately 4 to 78 percent.

Modeled decreases occur primarily during the authorized diversion season, when flows are generally higher and ecological water stress is lower. Modeled increases occur primarily during

summer low-flow periods, when surface water availability and riparian vegetation stress are more limiting. This seasonal redistribution is the basis for concluding that the project would have only minor impacts on downstream flows.

The percent change in flows is higher when looking at the monthly change compared to the annual change because the Project would shift water timing from naturally low-demand seasons to periods when ecological needs are higher. Although some monthly percent changes appear large, particularly during dry low-flow periods, these percentages reflect small baseline flows; the absolute change in cfs remains within the modeled operational range and does not exceed authorized release limits.

5.2.1.2.2 Downstream Flow Impact Analysis

The proposed reservoir would store excess water during high-flow periods and release it during low-flow periods to meet irrigation and water conservancy demands. Although the timing of flows would change, modeled flow alterations would be small compared to natural seasonal variability of EFVR flows (Alpha Engineering, 2026). Yearly monitoring would continue to be required to regulate water flows on the EFVR as discussed in Sections 3.2.2.1, 4.2.2.1.6.3 and 5.2.6.2.1.1. and. Because of the small annual changes in flow and the positive benefits of seasonally adjusting water timing to align with ecological needs, impacts on downstream EFVR flow would be minor.

5.2.1.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would have direct, positive benefits on water resources by making 1,453 acre-feet of existing water available for agricultural water users in Kane County and Washington County annually. Additional water would be available for M&I use in Washington County. Downstream impacts to water resources under Alternative 3 would be similar to those of Alternative 2. Construction of the proposed project would require crossing the EFVR along existing roadway, resulting in temporary and minimal soil bank erosion and causing minor sediment deposition into the stream. Increases and decreases in downstream river flow and sediment loading would be negligible (Refer to Section 5.2.1.2.1 for more detail).

5.2.2 Water Quality

5.2.2.1 Alternative 1—No Action Alternative

There would be no direct or indirect effects to water quality from the implementation of Alternative 1. The existing water quality of the EFVR would not change, and the EFVR and its tributaries would continue to be designated as HQW.

5.2.2.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Construction activities associated with Alternative 2 are not expected to directly affect the water quality of the EFVR as no construction would occur within the river. Accessing the Lamb and Tait borrow pits would require crossing the EFVR along existing roadways, which could result in temporary, minimal and unquantifiable soil bank erosion and cause minor sediment deposition into the stream during construction. As discussed in the Investigation and Analysis Report in Appendix D, the proposed cove reservoir site is situated in an alluvial valley, which likely produces large sediment volumes during intense storm events. Water storage in the reservoir would allow

sediment to settle before leaving the reservoir, thereby improving downstream water quality conditions. A Site Erosion Analysis and Sediment Report were completed for the proposed reservoir (Appendix E-3), indicating that a sediment accumulation of approximately 6 afy would occur, of which 100 percent is expected to be contained in the reservoir.

Releases from the reservoir would regulate stream flow in the EFVR, which would also improve water quality for municipal and agricultural users, as well as improve aquatic habitat.

Through implementation of the BMPs listed in Chapter 6.6, Alternative 2 would have negligible temporary direct impacts on water quality and positive long-term impacts on water quality. Project design elements, including standard BMPs, would be implemented to reduce the quantity of sediment entering drainages, flowing downstream, and potentially violating any federal or state water quality rules and regulations. Under Alternative 2, the EFVR's designation as an HQW would not change.

The increase or decrease in streamflow during the summer months is expected to result in negligible changes to water quality in the EFVR. Flow regimes would continue to replicate natural variability to prevent alterations to sediment, channel morphology, and habitat structure, which are necessary for maintaining the "wild" character of the EFVR in ZNP, as designated by the NPS.

The ZNP Agreement (1996) ensures that water quality would benefit by maintaining controlled flow rates that prevent excessive sedimentation, nutrient loading, or changes in water temperature that could degrade the river's water quality and aquatic habitats. The change in water flow would not introduce pollutants or alter the river's chemistry in a way that would impact its designation as "wild". Water quality and the existing streamside vegetation would remain unchanged.

5.2.2.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Under Alternative 3, impacts to water quality would be similar to those described for Alternative 2. Accessing the Lamb and Tait borrow pits during construction would cause temporary and minor soil bank erosion along the EFVR; however, only existing roadways would be used to cross the river.

The proposed reservoir would capture sediment during storm events, which would prevent it from entering the EFVR, which would have beneficial impacts to water quality within the EFVR. Alternative 3 would have a smaller drainage area compared to Alternative 2, therefore collecting less sediment per year.

5.2.3 Floodplain Management

5.2.3.1 Alternative 1—No Action Alternative

Alternative 1 would result in no changes to floodplains.

5.2.3.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would have long-term beneficial impacts on downstream flooding, and long-term, minor impacts on floodplain management. The proposed reservoir would capture runoff generated by flash floods out of Cove Canyon, reducing the amount of water and sediment entering the EFVR and decreasing the potential for flood-related damage and loss of riparian vegetation. High-pulse

events (i.e., flash floods) originating from other tributaries and watershed within the EFVR basin would continue to occur under existing conditions. Although flash floods can cause localized damage, these disturbances can also provide ecological benefit to stream and associated riparian habitats. For example, willows are early successional species that benefit from periodic flood-related disturbances (PLPCO, 2026).

In the unlikely event of a dam breach, the project would create a projected breach inundation area of approximately 3,123 acres under sunny-day conditions or 3,893 acres under rainy-day conditions (Appendix E-3). The breach inundation area itself would not be expected to result in revisions to FEMA floodplains. However, the reservoir's attenuation of flood flows during larger storm events, including the 100-year flood event, could reduce downstream flood elevations and floodplain extents.

Portions of the new Glendale Irrigation Pipeline would be located within a FEMA-designated Zone A floodplain, which is periodically subject to flash flooding.

Construction and maintenance activities would have the potential to affect floodplain resources through accidental releases of hazardous materials or localized erosion. However, the applicant has committed to conservation measures and BMPs designed to minimize floodplain disturbance, reduce erosion, and prevent project-related pollutants from reaching the EFVR (Chapter 6.6).

5.2.3.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would have similar effects to floodplain and floodplain management as Alternative 2. The proposed reservoir would capture runoff produced by flash floods, causing a beneficial impact to downstream flooding. The construction of the reservoir and dam would create a new inundation area, which could cause changes to FEMA floodplains. Portions of the new Glendale Irrigation Pipeline would be constructed within a FEMA-designated Zone A floodplain, and potential risks to floodplains could occur during construction due to an accidental release of hazardous materials. BMPs would be followed to reduce these potential risks.

5.2.4 WOTUS, Wetlands, and Special Aquatic Sites

5.2.4.1 Alternative 1—No Action Alternative

There would be no impacts to WOTUS, wetlands, or other resource in the project area under Alternative 1. Intensity and frequency of precipitation events and snowmelt would continue to influence these water bodies throughout the project and planning areas.

5.2.4.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would temporarily impact 0.253 acres and permanently impact 0.021 acre of potentially jurisdictional intermittent and perennial streams, including the EFVR, and 3.056 acres of non-jurisdictional ephemeral streams. Additionally, Alternative 2 would impact wetland 2 where the ROW of the Glendale Pipeline portion of the survey area crosses through the wetland. However, after coordination with the USACE following initial review of the October 2018 survey results, it was determined that wetland 2 would not be considered jurisdictional or be included in the overall impact calculation for Alternative 2.

Therefore, the total possible temporary and permanent impacts to potentially jurisdictional WOTUS delineated in the survey area may be approximately 0.274 acres. Impacts to each potential WOTUS are summarized in Appendix E-1.

5.2.4.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would likely result in the same or very similar aquatic resource impacts and 404 permitting requirements as Alternative 2. The temporary impacts to aquatic features and wetlands from construction of the Glendale pipeline would be the same as described in Alternative 2.

5.2.5 Regional Water Resource Plans

5.2.5.1 Alternative 1—No Action Alternative

No changes to Kane County or Washington County's Water Resource Plans would occur under Alternative 1. Both counties would continue to seek water conservation goals and practices to enhance the efficiency and reliability of the current AWM.

5.2.5.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

5.2.5.2.1 Colorado River Compact of 1922

The Virgin River is a tributary of the Colorado River, which connects at Lake Mead approximately 120 river miles away from the Quail Creek Reservoir Diversion site. Refer to Appendix E-1 for the details of the Colorado River Compact. Alternative 2 would comply with the Colorado River Compact, as changes to the EFVR would not result in any reduction of flow to the Colorado River.

The requirements of the Compact, including "the equitable division and appointment of the use of the waters of the Colorado River system; establishment of the relative importance of different beneficial uses of water; promotion of interstate comity; the removal of causes of present and future controversies; the secure and expeditious agricultural and industrial development of the Colorado River Basin, the storage of its waters, and the protection of life and property from floods" (43 USC 617l), would continue to be met.

5.2.5.2.2 Regional and State Water Plans

Alternative 2 would support both Kane County and Washington County's Water Resource Plans by addressing the present and future water needs of the area while cooperating with the State of Utah water quality plan and Utah constitutional and statutory law, in regard to vested water rights and control of in-stream flow. Both the WCWCD and KCWCD have identified Alternative 2 as a key water development opportunity to serve as a buffer against droughts and climate variability.

5.2.5.2.3 Water Rights

Water-rights holders are encouraged to stay informed about the project and monitor their allocations closely. The State Engineer administers distribution systems in both the East Fork and Main Stem of the Virgin River to assure that water rights are delivered in priority and would continue to do the same after construction of the reservoir. Any potential changes to water rights are evaluated by the State Engineer and administered through their legislated authority.

5.2.5.2.4 Overall Impacts

Alternative 2 would be consistent with both regional water plans; therefore, long-term minor beneficial impacts would occur. Alternative 2 would comply with the Colorado River Compact because the Virgin River is a lower basin tributary.

5.2.5.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would have beneficial impacts on Regional Water Resource Plans for the reasons described in Section 5.2.5.2.

5.2.6 Wild and Scenic Rivers

5.2.6.1 Alternative 1—No Action Alternative

There would be no direct or indirect impacts to WSRs under Alternative 1. No changes to identified WSRs would occur.

5.2.6.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Congress created the National Wild and Scenic Rivers system in 1968 to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations (rivers.gov). To preserve these values, an analysis of the proposed projects' impacts to water quantity, quality, and habitat is described below.

5.2.6.2.1 Water Quantity and Quality

Under Alternative 2, up to 5.7 cfs of water would be released from the proposed Cove Reservoir into the EFVR during wet years. During dry years, approximately 11.6 cfs of water would be removed from the EFVR to supplement the reservoir as shown in Table 5.6. Dry and wet years were identified as the driest or wettest August and December on record (Alpha Engineering, 2024).

Table 5.6. Anticipated Streamflow Changes.

Scenario	Water Diverted From the EFVR[1]	Water Released into the EFVR[2]
Dry Year	11.6 cfs (Maximum)	0 cfs (Minimum)
Wet Year	0 cfs (Minimum)	5.7 cfs (Maximum)

[1]Water would be diverted from the EFVR during the winter months.

[2]Water would generally be released back into the EFVR during wet summer months.

Water modeling shows these streamflow changes would be minor, particularly when the natural variation of EFVR flows are approximately 100 times the range of effect from proposed Cove Reservoir releases (Alpha Engineering, 2025) on river depth and channel width and, therefore, no impacts to downstream river values would be anticipated (Refer to Section 5.2.1.2.1 and Appendix E-1). Additionally, the ZNP Agreement (1996) stipulates that water releases from a new reservoir

cannot exceed 25 cfs over any 7-day period, with a long-term monthly average of no more than 15 cfs. The proposed project would comply with these stipulations, and these controlled releases are designed to mimic natural flow patterns, minimizing potential disruptions to the EFVR's hydrology and ecological functions.

5.2.6.2.1.1 Monitoring Requirements

The current monitoring system, as described in Section 3.2.2.1, would continue to be used. A weir at each diversion site would continue to electronically send information to a website to provide remote monitoring data. The data collected from these flow meters would continue to be used to determine the total amount of water diverted. A water commissioner would continue to monitor the diversions to ensure that companies are using the correct amount of water according to their water right.

Additional measuring devices would be installed to record flows into and out of the Cove Reservoir. Metering devices would be installed to record flows through the existing Orderville hydroelectric power plant that will release water rights owned by the WCWCD back into the EFVR, as well as water-right shortages being delivered from the reservoir to the Mt. Carmel and Orderville irrigation companies. These meter records would also be filed annually with the Utah State Division of Water Rights.

The change in water flow would not disrupt the ongoing research activities within the Research Natural Area. The ZNP agreement (1996) stipulations would protect natural hydrological cycles, ensuring that the area's research value remains intact, and no research plots or sites would be affected. Research activities permitted by the ZNP would continue as usual, with no loss of research value.

Overall, Alternative 2 would have negligible impacts on the EFVR's WSR values within the ZNP. By adhering to the strict flow release guidelines set forth in the ZNP Agreement (1996) and implementing appropriate mitigation measures, the project would not impact the free-flowing character, water quality, or ecological integrity of the EFVR in its designated wild section.

The NPS evaluates impacts on designated rivers in accordance with Section 7 of the WSRA. On August 29, 2025, via email, the NPS stated that they will not be conducting a Section 7 analysis for this project (Appendix A). Coordination with the ZNP as a cooperating agency has been ongoing throughout the life of the project and is summarized in Chapter 7.0 (Consultation).

5.2.6.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Similarly to Alternative 2, Alternative 3 would have no impact on the WSR values of the EFVR within the ZNP, as it would also adhere to the stipulations required in the ZNP Agreement (1996). Therefore, the changes in flow to the EFVR would be minor, particularly when the natural variation of the EFVR is approximately 100 times greater than the releases associated with both Alternative 2 and Alternative 3 (Alpha Engineering, 2025).

5.2.7 Ecosystem Services

5.2.7.1 Alternative 1—No Action Alternative

Negative impacts to ecosystem services from water would occur under Alternative 1.

Provisioning services, agricultural water—In the summer months, water from the EFVR would continue to provide insufficient quantities of water for crop and feed irrigation, maintenance of agricultural lands in Kane County, and M&I purposes in Washington County.

Regulating services, water quality and quantity—No changes to water quality or quantity would occur under Alternative 1, and therefore, no changes to temperature, turbidity, sediment, or pollutants within the EFVR would occur. Instream flow would continue to regulate water temperature, decrease bank erosion/sedimentation, and dilute potential pollutants.

Supporting services, wildlife habitat—The EFVR would continue to provide habitat for plants and wildlife.

Cultural services, recreation—Water from the EFVR would continue to provide recreational opportunities to the public, including fishing, swimming, and intrinsic value from the natural scenic beauty.

5.2.7.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would provide positive benefits to ecosystem services from water.

Provisioning services, agricultural water—Alternative 2 would increase the available amount of irrigation and M&I water for Kane County and Washington County by approximately 2,148 acre-feet.

Provisioning services, livestock water—Alternative 2 would increase the available amount of livestock water for Kane and Washington County by approximately 2,148 acre-feet.

Regulating services, water quality and quantity—Alternative 2 would increase water quality in the EFVR by containing sediment within the reservoir during flash flooding events.

Supporting services, wildlife habitat—Alternative 2 would continue to provide habitat for plants and wildlife within the EFVR with the addition of new habitat within the Cove Reservoir.

Cultural services, recreation—Alternative 2 would have no impact on the recreational value of the EFVR while also providing new recreational opportunities at the Cove Reservoir site.

5.2.7.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would provide positive benefits to ecosystem services from water.

Provisioning services, agricultural water—Alternative 3 would increase the available amount of irrigation and M&I water for Kane County and Washington County by approximately 1,453 acre-feet.

Provisioning services, livestock water—Alternative 2 would increase the available amount of livestock water for Kane and Washington County by approximately 2,148 acre-feet.

Regulating services, water quality and quantity—Alternative 3 would increase water quality in the EFVR by containing sediment within the reservoir during flash flooding events.

Supporting services, wildlife habitat—Alternative 3 would continue to provide habitat for plants and wildlife within the EFVR with the addition of new habitat within the Cove Reservoir.

Cultural services, recreation—Alternative 3 would have no impact on the recreational value of the EFVR while also providing new recreational opportunities at the Cove Reservoir site.

5.3 Air

5.3.1 Air Quality

Refer to Section 3.2.3 for existing air quality conditions in the study area.

5.3.1.1 Alternative 1—No Action Alternative

Under Alternative 1, no direct or indirect effects to air quality would occur.

5.3.1.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

On-site construction activities and equipment traveling to and from the project area on gravel or dirt roads would generate localized fugitive dust. This impact would be short-term, lasting only during the estimated 15-month construction period. Conservation and protection measures, along with the BMPs outlined in Chapter 6.6 and Appendix E-3, would help minimize fugitive dust during the construction phase. Emissions from trucks and heavy-duty diesel-powered construction equipment would also be temporary and confined to the construction site. Beyond the 15-month construction period, there would be no long-term effects on local air quality from implementation of Alternative 2.

Similarly, the use of the three borrow pit sites would result in temporary, localized reductions in air quality due to fugitive dust and equipment emissions. However, these effects would be short-lived and limited to the 15-month construction period. Borrow pit use for unrelated activities may continue over the long term, but adherence to conservation measures and BMPs would ensure that air quality standards are not violated.

An estimation of fugitive dust was completed by the NRCS for the recently proposed Gould Wash project (Washington County) and shows the increase in fugitive dust from construction would be minor (NRCS, 2026). The calculations estimated a total increase in 48.85 tons of PM10 and 7.18 tons of PM2.5 for all construction (estimated 2 years). This is well under the threshold for violating air quality standards. The EPA classifies a “major source” of emissions from construction activities to be emitting more than 250 tons per year for PM10, and 10 tons per year for PM2.5 (EPA, 2024c). The Gould Wash project consists of a larger dam, larger surface disturbance, and longer construction timeline than that anticipated for the proposed Cove Reservoir. Additionally, the soils in the Gould Wash project consist of basalt (low erosion potential), alluvial stream deposits, and other loose and non-cohesive that are highly erosive (NRCS, 2026). The alluvial stream deposits and non-cohesive soils are similar to that found at the proposed Cove Reservoir site and would be

expected to emit similar rates of fugitive dust. Therefore, since the Cove Reservoir site would have a smaller surface disturbance area and a shorter construction period than the Gould Wash project, it is projected that Alternative 2 would have even less fugitive dust emissions, resulting in minor impacts. No air quality standards would be violated.

The construction activities are not expected to violate ambient air quality standards, contribute to any ongoing or future air quality violations, or expose sensitive species or humans to harmful pollutants. The project would fully comply with all relevant federal, state, and local air quality regulations. As a result, any short-term, localized impacts on air quality are expected to be minimal.

5.3.1.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Construction activities under Alternative 3 would result in impacts like those described for Alternative 2. Construction activities would cause a minor and temporary increase in localized fugitive dust for the 15-month construction period. Alternative 3 would fully comply with all relevant federal, state, and local air quality regulations, and BMPs would be followed to decrease the production of fugitive dust.

5.3.2 Ecosystem Services

5.3.2.1 Alternative 1—No Action Alternative

Under Alternative 1, no changes to ecosystem services for air would occur.

Regulating Services, climate regulation—All air quality standards would be maintained at current levels. Air quality standards directly impact climate regulation, as many sources of air pollutants are also greenhouse gases.

Supporting service, nutrient cycling—Nutrient cycling would continue to occur, as living organisms breathe in the abiotic components in the air.

Cultural Services, health—No impacts to air quality would occur, and therefore, no changes in human health from air quality would occur.

5.3.2.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would have no changes to ecosystems services provided by air quality.

Regulating Services, climate regulation—All air quality standards would be maintained at current levels. Air quality standards directly impact climate regulation, as many sources of air pollutants are also greenhouse gases.

Supporting service, nutrient cycling—Nutrient cycling would continue to occur, as living organisms breathe in the abiotic components in the air.

Cultural Services, health—The use of BMPs during construction would ensure no negative impacts to human health are caused from air quality changes.

5.3.2.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would have no changes to ecosystems services provided by air quality.

Regulating Services, climate regulation—All air quality standards would be maintained at current levels. Air quality standards directly impact climate regulation, as many sources of air pollutants are also greenhouse gases.

Supporting service, nutrient cycling—Nutrient cycling would continue to occur, as living organisms breathe in the abiotic components in the air.

Cultural Services, health—The use of BMPs during construction would ensure no negative impacts to human health are caused from air quality changes.

5.4 Plants and Animals

Refer to Section 3.2.4 for information regarding the existing plants and animals in the study area.

5.4.1 Threatened and Endangered Species

5.4.1.1 Alternative 1—No Action Alternative

Implementing Alternative 1 would not directly or indirectly affect any federally listed or candidate plant or animal species. No changes to the current conditions would occur.

5.4.1.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

A Biological Assessment (BA) was completed for Alternative 2 to document the potential effects to federally listed and proposed listed species and designated critical habitat. A draft BA was initially submitted to the USFWS for informal review on July 1, 2021, and their comments were incorporated into the BA and draft Plan-EA. An updated Final BA was submitted to the USFWS for informal Section 7 consultation on September 3, 2026. USFWS concurred with the determinations described in Table 5.7 in a letter signed September 9, 2026. Refer to Appendix A for copies of all consultations with USFWS. For more information on how these determinations were made, refer to the BA in Appendix E-1 and E-2.

Table 5.7. Effects Determinations of Listed Threatened and Endangered Species.

Species	Species Effect Determination	Designated Critical Habitat Effect Determination
Bird California condor	Not Likely to Jeopardize the Continued Existence outside of ZNP; May Affect, but is Not Likely to Adversely Affect within ZNP	Critical habitat has not been designated
Bird MSO	May Affect, but is Not Likely to Adversely Affect	May Affect, but is Not Likely to Adversely Affect
Bird Southwestern willow flycatcher	May Affect, but is Not Likely to Adversely Affect	No designated critical habitat is located within the study area

Species	Species Effect Determination	Designated Critical Habitat Effect Determination
Bird Western yellow billed cuckoo	No Effect	No designated critical habitat is located within the study area
Reptile Desert tortoise	No Effect	No designated critical habitat is located within the study area
Fish Virgin River chub	May Affect, but is Not Likely to Adversely Affect	May Affect, but is Not Likely to Adversely Affect.
Fish Woundfin	May Affect, but is Not Likely to Adversely Affect	May Affect, but is Not Likely to Adversely Affect
Insect Monarch butterfly	Not Likely to Jeopardize the Continued Existence	Critical habitat has not been designated
Insect Suckley's cuckoo bumble bee	No Effect	Critical habitat has not been designated
Plant Jones cycladenia	No Effect	Critical habitat has not been designated
Plant Shivwits milk-vetch	No Effect	No designated critical habitat is located within the study area
Plant Siler's pincushion cactus	No Effect	Critical habitat has not been designated
Plant Ute ladies'-tresses	No Effect	Critical habitat has not been designated

5.4.1.2.1 Determination of Effects

An analysis of potential impacts to listed threatened, endangered, or proposed listed species resulting from project development is required by the ESA. Surveys conducted for this project revealed that six Threatened, Endangered, and Proposed listed species occur within the project area (See Table 5.7). Additional detail regarding the presence/absence of these species and potential effects arising from project development are found in the BA included in Appendices E-1 and E-2.

5.4.1.2.1.1 California Condor

Alternative 2 (construction, operations, and maintenance activities) would not result in any surface disturbance in occupied California condor habitat. California condors are known to inhabit Parunuweap Canyon and surrounding area in ZNP. No surface disturbance would occur beyond the reservoir site, and no surface disturbance would occur within the EFVR or occupied condor habitat. Changes in EFVR flows below the proposed reservoir site would be minor (Alpha Engineering, 2025). Based on these factors, implementation of Alternative 2 **May Affect, but is Not Likely to Adversely Affect** the California condor within ZNP and is **Not Likely to Jeopardize the Continued Existence** of the species outside of ZNP due to insignificant or discountable effects (Appendices E-1 and E-2). No critical habitat has been designated for the California condor.

5.4.1.2.1.2 Mexican Spotted Owl

Alternative 2 (construction, operations, and maintenance activities) would not result in any surface disturbance in MSO occupied habitat, including designated critical habitat and PACs. The nearest habitat within the project area is located approximately 16 river-miles downstream from the proposed reservoir site. No surface disturbance would occur beyond the reservoir site, and no surface disturbance would occur within the EFVR. Minor changes in EFVR flows below the proposed reservoir site would be minor (Alpha Engineering, 2025). These minor changes in flows would not be sufficient enough to affect riparian areas, including overstory (cottonwoods, etc. used by the MSO). Potential increases in flow from the proposed reservoir during the summer could benefit stressed downstream riparian areas. No changes in habitat would occur beyond a 100-foot buffer from the EFVR. Based on these factors, it has been determined that Alternative 2 **May Affect, but is Not Likely to Adversely Affect** the MSO or designated critical habitat including PACs.

5.4.1.2.1.3 Southwestern Willow Flycatcher

Alternative 2 would not result in destruction or damage to SWFL habitat in Parunuweap Canyon. Surface-disturbing activities would only occur in the Long Valley portion of the study area. Based upon EVFR streamflow data, minor changes in stream flow resulting from project development would not result in a significant adverse effect to or loss of SWFL habitat, including riparian vegetation and overstory (cottonwoods, willows, etc.) No changes in habitat would occur beyond a 100-foot buffer from the EFVR. No harm or harassment would occur to SWFL because of reservoir-related streamflow changes; therefore, it has been determined that the Proposed Action **May Affect, but is Not Likely to Adversely Affect** SWFL due to insignificant or discountable impacts. No SWFL designated critical habitat is located within the project area.

5.4.1.2.1.4 Virgin River Chub/Woundfin

Alternative 2 would not result in any surface disturbance in Virgin River chub and/or woundfin occupied habitat as it is located approximately 4.8 miles below the project area in Washington County. The nearest surface disturbance would be more than 50 miles upstream, in the Long Valley area. Furthermore, no surface disturbance would occur within the EFVR in Long Valley. Changes in Virgin River flows below the Quail Creek Reservoir Diversion are not anticipated as diversions would not exceed releases from the proposed reservoir. Any unanticipated flow changes would be short-term and negligible and would not affect any habitat characteristics. Based on these factors, the implementation of Alternative 2 **May Affect, but Not Likely to Adversely Affect** the Virgin River Chub and woundfin or their habitats due to insignificant or discountable effects. Furthermore, it has been determined that Alternative 2 **May Affect, but is Not Likely to Adversely Affect** designated critical habitat based on negligible impacts on water flow below the Quail Hollow Reservoir Diversion (Appendix E).

5.4.1.2.1.5 Monarch Butterfly

The Study Area is located within the monarch butterfly's migrating fly zone and native flowering plants are present in the area. Therefore, it is possible that the species could be found migrating through the area. The potential for effect is negligible due to the considerable size of the monarch butterfly habitat and the limited duration of construction activities (15 months). Development of the proposed reservoir could provide a small amount of habitat for the monarch butterflies.

Therefore, a determination of **Not Likely to Jeopardize the Continued Existence of the species** has been made for this species due to insignificant effects (Appendix E-1 and E-2).

5.4.1.2.1.6 Other Species

Alternative 2 would have ***No Effect*** on the following species due to lack of suitable habitat in the project area or the species-specific buffers identified within the study area (Appendix E-1 and E-2):

- Western yellow-billed cuckoo.
- Desert tortoise.
- Suckley's cuckoo bumble bee.
- Jones cycladenia.
- Shivwits milk-vetch.
- Siler's pincushion cactus.
- Ute ladies'-tresses.

Implementation of Alternative 2 would also have **No Effect** on designated critical habitat for any of these species due to the reasons as stated above.

5.4.1.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

The effects determinations made for Alternative 3 would be the same as identified in Alternative 2 (Table 5.7), as the location of the project is the same.

5.4.2 Migratory Birds

5.4.2.1 Alternative 1—No Action Alternative

Alternative 1 would have no direct or indirect impacts to migratory birds.

5.4.2.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Construction activities would temporarily and directly disturb suitable breeding/nesting or foraging habitat for migratory birds. If present, foraging birds may be disturbed and displaced to adjacent foraging habitats during construction activities. See Chapter 6.6 for conservation measures and BMPs that would be implemented to avoid and minimize impacts.

Construction may overlap the nesting season for all 16 migratory birds potentially found in the project area, which could lead to nest abandonment and the loss of eggs or young. While it is difficult to quantify this impact, it is expected to be minimal given the project's limited scope (259.1 acres of permanent surface disturbance; 64 acres temporary disturbance) and the availability of abundant and adjacent alternative habitats. If construction occurs during the extended migratory bird breeding season (generally January 1 to August 31), site-specific surveys would be conducted within 5 days prior to any vegetation removal. Should active or occupied nests be found, buffer

zones would be established in consultation with the USFWS and UDWR. Nests containing eggs or young would remain undisturbed until fledglings have left, and follow-up surveys by a qualified, NRCS-approved biologist would confirm fledging before construction resumes in that area.

Similarly, the development and use of the three borrow pit sites are expected to have minor impacts on migratory birds. Birds may be displaced due to ongoing activity at these sites during the 15-month construction period or through long-term use. However, there is sufficient surrounding habitat to accommodate displaced birds, ensuring that the overall impact would remain localized and minor.

The long-term O&M activities for the reservoir, recreation area, and other facilities could disrupt foraging, nesting, and roosting habitats, potentially forcing birds to relocate to nearby areas. This impact is expected to be minor due to the limited extent of the disturbance and the amount of suitable habitat nearby.

Over time, the riparian vegetation surrounding the proposed reservoir is expected to provide a limited amount of additional cover and nesting opportunities for migratory birds and other wildlife. This new habitat could become a critical long-term refuge in the otherwise arid landscape of southern Utah.

5.4.2.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Impacts under this alternative would be like those described under Alternative 2. Construction activities would cause minor, temporary effects to migratory birds, while the increased traffic and human presence at the reservoir may cause minor, permanent effects to migratory birds. The creation of the riparian area surrounding the reservoir would provide permanent, beneficial impacts to migratory birds through the creation of new habitat.

5.4.3 Bald and Golden Eagles

5.4.3.1 Alternative 1—No Action Alternative

Alternative 1 would have no direct or indirect impacts to bald and golden eagles.

5.4.3.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Golden eagles have been observed foraging in and around the proposed project area. Due to the abundance of suitable foraging habitats, such as sagebrush, desert shrub, and agricultural fields, no significant loss of foraging grounds would be expected. Bald eagles pass through the area during migration and are likely to use the riparian zone of the EFVR as a winter roosting habitat. While construction activities may cause temporary disturbances to both species, the increased human presence in the area could result in longer-term disruption. However, the creation of the reservoir and surrounding riparian vegetation would offer new roosting opportunities for both bald and golden eagles.

5.4.3.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Impacts under this alternative would be like those described under Alternative 2. Construction activities may temporarily affect bald and golden eagles; however, no significant loss of foraging grounds would occur.

5.4.4 Ecologically Critical Areas

5.4.4.1 Alternative 1

No direct or indirect impacts to designated wilderness, WSAs, or RNAs would occur under Alternative 1, as no changes to the existing environment would occur.

5.4.4.2 Alternative 2

Minor, beneficial, indirect impacts to designated wilderness, WSAs, or RNAs would occur under Alternative 2 due to the minor changes in downstream flows which would more closely align with the natural seasons (Section 5.2.1).

Water timing that is more closely aligned with the natural season would generally benefit the Parunuweap Canyon WSA, the Zion Wilderness, and the ZNP Parunuweap RNA by supporting more natural hydrologic and ecological processes along the EFVR. Seasonal flow patterns that better reflect natural runoff timing would help maintain riparian, fluvial, and aquatic habitats; sustain vegetation along the EFVR; and support moisture dependent communities within the Canyons.

5.4.4.3 Alternative 3

Similarly to Alternative 2, minor and beneficial indirect impacts to the designated wilderness, WSAs, or RNAs would occur under Alternative 3.

5.4.5 Invasive Species

5.4.5.1 Alternative 1—No Action Alternative

As no changes would take place under this alternative, no impacts involving invasive species would occur under Alternative 1.

5.4.5.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would have minor, temporary impacts due to invasive plant species during and immediately following construction. The creation of a new reservoir would potentially provide habitat for invasive animal species, such as quagga mussels. While unlikely, some species could potentially migrate from the reservoir to the EFVR. BMPs would be implemented during the construction and operational phases to prevent the spread of invasive species and comply with Executive Order 13112. During construction and until restoration areas are fully established, invasive plant species would be monitored on a regular basis to prevent the establishment. Non-desirable plant species would be controlled by cleaning equipment prior to delivery to the project site and eradicating these species before the start and during construction, as discovered. In addition, a Post Construction Rehabilitation Plan (PCRP) would be developed and would include mechanisms for addressing weed establishment and treatment. Following the completion of construction, disturbed areas would be restored to preconstructions conditions or better. The increased risk for invasion of noxious and invasive weeds is anticipated to be short term and minor. Compliance with Administrative Rule R657-60 would prevent and control the spread of any aquatic invasive species in the project area. To further reduce the potential for invasive aquatic species from entering the reservoir or the EFVR, prior to stocking the proposed reservoir with fish, a

management plan would be developed to ensure that non-native fish species do not escape from the reservoir into the EFVR. Any fish stocking would adhere to state and federal regulations and would be the responsibility of the UDWR. Cooperating Agencies would have an opportunity to review this plan prior to its implementation. Additionally, the proposed reservoir intake would include a fish screen with a 1-inch maximum pore opening to prevent fish and debris from entering the pipeline to the Orderville Hydroelectric Power Plant. The hydroelectric facility utilizes two Turgo Impulse turbines, which focus water through small nozzles at high pressure and velocity into the turbines. The combination of the small nozzle size, high velocity, and sudden pressure drop would make it highly unlikely that any fish that might make it to the pipeline would survive.

Should BMPS and the developed PCRP be implemented, no long-term adverse impacts are anticipated from the alternative actions.

5.4.5.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

This alternative would have similar direct impacts as Alternative 2, which would put the project area at risk for future invasion of invasive plant and animal species. BMPs would be implemented during construction and operational phases to prevent the spread of invasive species and comply with Executive Order 13112 (Chapter 6.6). During construction and until restoration areas are fully established, invasive plants and animals would be monitored on a regular basis to prevent the establishment. Prior to delivery to the project sites, non-desirable plant species would be controlled by cleaning equipment and eradicating these species before the start and during construction, as discovered. In addition, a PCRP would be developed and include mechanisms for addressing weed establishment and treatment. Following the completion of construction, disturbed areas would be restored to preconstructions conditions. Should BMPS and a developed PCRP be implemented no long-term adverse impacts are anticipated from alternative actions.

5.4.6 Fish and Wildlife

5.4.6.1 Alternative 1—No Action Alternative

No changes to fish and wildlife resources would occur under Alternative 1.

5.4.6.2 Alternative 2–6,000-Acre-Foot Reservoir Alternative

During the 15-month construction period, there would be an increase in noise and human activity, which is likely to drive local wildlife, including Species of Greatest Conservation Need, away from the project area. The long-term increase in human presence and activities following the development of the reservoir and adjacent recreation area could prevent some wildlife from returning. However, there is ample habitat adjacent to the project area, and both short- and long-term activities associated with Alternative 2 would cause minor impacts. The creation of a riparian zone around the reservoir would provide a small amount of new habitat for species dependent on riparian environments.

Direct, short-term impacts on the EFVR or intermittent streams would be limited to construction activities for the Glendale Irrigation Pipeline. Any temporary increase in sediment in the river would be minimal and unlikely to affect wildlife, including the Species of Greatest Conservation Need identified in Table 3.5 in Section 3.2.4.6. Species of Greatest Conservation Need (fish), including the desert sucker, flannelmouth sucker, and Virgin spinedace, are known to exist in the EFVR.

Changes in water flow from implementation of Alternative 2 would be minor, and therefore these species and their habitat would not be impacted (Refer to Section 5.2.1.2.1 for more detail).

5.4.6.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Under Alternative 3, similar impacts to fish and wildlife species would occur as those identified in Alternative 2. Construction activities would cause temporary, minor impacts due to the increased human presence and noise. However, there is ample habitat surrounding the project area, and therefore, no long-term impacts are anticipated. Alternative 3 would also create a small riparian area surrounding the reservoir, providing additional habitat.

Species of Greatest Conservation Need may exist within the project area, and construction of the reservoir and pipelines may have temporary, minor, impacts on these species. For a full list of Species of Greatest Conservation Need that may exist in the project area, refer to Table 3.5. Species of Greatest Conservation Need (fish), including the desert sucker, flannelmouth sucker, and Virgin spinedace are known to exist in the EFVR. Changes in water flow from implementation of Alternative 3 would be minor, and therefore these species and their habitat would not be impacted (Refer to Section 5.2.1.2.1 for more detail).

5.4.7 Riparian Areas

5.4.7.1 Alternative 1—No Action Alternative

No direct or indirect effects to existing riparian areas in the study area would occur.

5.4.7.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would create additional riparian habitat surrounding the reservoir. No construction would occur in existing riparian habitats, and the seasonal changes to downstream flows could benefit existing riparian habitat surrounding the EFVR, as discussed in detail below.

5.4.7.2.1 Impacts on Riparian Vegetation

The EFVR riparian corridor is adapted to substantial natural variation in streamflow, including episodic flood events, spring runoff, and seasonal low flow periods. As described in Section 5.2.1.2.1, modeled project-related changes in flow, depth, and width would remain small relative to the river's existing natural variability, and no downstream reach of the EFVR would be dewatered as a result of the proposed project.

Reservoir operations would primarily change the timing of water availability rather than altering overall flow magnitude. Water would generally be diverted when flows are higher and released during lower-flow periods when irrigation demand and ecological water stress are greatest. Modeled summer releases would increase baseflows during the period when riparian vegetation is most vulnerable to drought stress and high evapotranspiration demand. Research indicates that increasing summer flows can support riparian vegetation (Holler, et al., 2025). Even small increases in summer flow can disproportionately improve riparian conditions by extending soil moisture availability and reducing drought stress (Stromberg, Beauchamp, Dixon, Lite, & Paradzick, 2007) (Rood, et al., 2005).

Mature overstory species, such as cottonwood and Russian olive, are generally supported by alluvial groundwater rather than direct uptake from short-term surface flows. Their deep root systems would not be affected by the minor changes in streamflow (Zimmerman, Pearce, Woodmnan, Rood, & Flanagan, 2023). Because the project would not dewater the EFVR and modeled changes in surface flow would be minor, the project is not expected to alter groundwater conditions supporting mature riparian vegetation. As a result, the project is not expected to adversely affect existing riparian overstory structure or associated habitat functions.

No new agricultural development is proposed as part of the project, and the project would not involve direct disturbance or vegetation removal within existing EFVR riparian habitat. Project effects would be limited to modeled changes in EFVR flow timing and magnitude. Because those changes would remain within the natural range of variability, would not cause dewatering, and would not decrease summer baseflows during low-flow conditions, adverse effects to riparian vegetation and riparian habitat are not anticipated.

5.4.7.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would create additional riparian habitat surrounding the reservoir. No construction would occur in existing riparian habitat, and the project would not impact downstream flows; therefore, no impacts on downstream riparian habitat would occur.

5.4.8 Ecosystem Services

5.4.8.1 Alternative 1—No Action Alternative

No changes to ecosystem services from plants and animals would occur under Alternative 1.

Provisioning Services, fishing—Alternative 1 would have no impact in aquatic habitat or species within the EFVR, and therefore, would have no impact on fishing opportunities within the EFVR.

Regulating services, Riparian zones—No impacts to riparian zones would occur under Alternative 1.

Cultural services, species conservation—Alternative 1 would have no impact on species habitat or existence.

5.4.8.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Positive changes to ecosystem services from plants and animals would occur under Alternative 2.

Provisioning Services, fishing—Alternative 2 would have no impact in aquatic habitat or species within the EFVR, and therefore, would have no impact on fishing opportunities within the EFVR. The reservoir would provide an additional but minor sport fishing opportunity.

Regulating services, Riparian zones—The creation of riparian vegetation under Alternative 2 would positively impact the ecosystem services, as riparian vegetation provides benefits like water filtration, nutrient cycling, and wildlife habitat.

Cultural services, species conservation—Alternative 2 would have no impact on species conservation. Minor, temporary impacts may occur during construction but would not result in the loss of species existence or abundance of suitable habitat.

5.4.8.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Positive changes to ecosystem services from plants and animals would occur under Alternative 3.

Provisioning Services, fishing—Alternative 3 would have no impact in aquatic habitat or species within the EFVR, and therefore, would have no impact on fishing opportunities within the EFVR.

Regulating services, Riparian zones—The creation of riparian vegetation under Alternative 3 would positively impact the ecosystem services, as riparian vegetation provides benefits like water filtration, nutrient cycling, and wildlife habitat.

Cultural services, species conservation—Alternative 3 would have no impact on species conservation. Minor, temporary impacts may occur during construction but would not result in the loss of species existence or abundance of suitable habitat.

5.5 Human

Refer to Section 3.2.5 for existing resources in the study area.

5.5.1 Cultural Resources and Tribal Consultation

5.5.1.1 Alternative 1—No Action Alternative

As no changes to the existing environment would occur, Alternative 1 would have no impacts on historic or cultural resources.

5.5.1.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

The three surveys of the Direct area of the APE identified 19 cultural resource sites and 19 IOs. The NRCS and SHPO concurrence on site eligibility are described in Table 3-6 in Section 3.2.5.1. Under Alternative 2, two historic ditches (Mt. Carmel East and West Ditches), both eligible for listing on the NRHP, would be converted from open ditch to buried pipe. The NRCS, in consultation with SHPO and Tribes/Tribal Historic Preservation Officers (THPOs), have determined that the conversion of the open ditch to pipe would result in an *Adverse Effect* to historic properties, per 36 CFR 800.5 (Table 5.8). An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5).

Pursuant to 36 CFR 800.5 of the NHPA (1966, as amended in 2000) and regulations of the Advisory Council on Historic Preservation (ACHP) implementing Section 106 of the NHPA (54 USC 306108), federal agencies must consider the potential effect of an undertaking on "historic properties," which refers to cultural resources listed in, or eligible for listing in, the NRHP. Consultation with SHPO, THPO, and other consulting parties including tribes to fulfill Section 106 obligations were completed. The CRIR, and subsequent addendums, were submitted to the Utah SHPO on January 9, 2020, January 23, 2023, and May 20, 2024, for concurrence with the determinations of site

eligibility and project effects. The Utah SHPO concurred in letters dated January 17, 2020, February 6, 2023, and June 2, 2024. The CRIR and addendum for the Esplin Pit were sent to THPOs and Tribal representatives on January 23, 2023, and May 22, 2024. Refer to Section 7.1.10 for a summary of NRCS consultation on the determination of effects with the SHPO, Tribes, and agencies and their received responses.

Historic properties within the Tait and Esplin Pit sites, as well as near the reservoir site, would be fenced off with buffers of at least 50 feet and avoided, and no cultural monitor would be required. Figures showing the avoidance areas within the Tait and Esplin Pit sites and reservoir site are included as Figures C-6 through C-8 in Appendix C.

The ACHP was also notified of the finding of *Adverse Effect* in an email dated March 28, 2024 (Appendix A). A letter response was received by email on April 12, 2024, stating that the ACHP does not believe their participation in the consultation to resolve adverse effects is needed per 36 CFR 800 (Appendix A).

Indirect and cumulative effects could arise from the projected increase in visitor activity at the reservoir recreation area. Visitors might access nearby private lands in search of viewpoints or other recreational opportunities. This concern was raised by a Kaibab Paiute representative, and a site visit was completed on January 25, 2019. A summary of this site visit is included in Appendix A. During this site visit, the Tait Pit was also visited due to its proximity to a cultural site. The NRCS and Kaibab Paiute discussed avoidance options. A figure of the Tait Pit avoidance locations is included in Figure C-6 in Appendix C.

On June 5, 2025, concerns about effects to the acoustic characteristics of site 42KA7537 were also raised by the Moapa Band of Paiute Indian Tribe's THPO. Consultation to address these potential effects continued throughout 2026. Voicemails were left on June 10 and June 20, 2025, and on February 12, 2026. The NRCS followed up via email on June 18, 2025, with additional background information and proposed avoidance measures, and the email was read on June 18, 2025. A third email was sent on July 15, 2025, and read by the THPO on July 15, 2025. NRCS emailed and left a voicemail for the THPO on August 24, 2026. In this email, the NRCS presented the extended avoidance measures that have been incorporated into the project to ensure acoustics coming from the site remain undisturbed, and that any noise from construction equipment reaching the site would be minimized. See Appendix A for redacted consultation and Appendix C for avoidance maps.

The redacted CRIRs can be found in Appendix E-2. Table 5.8 summarizes the effects findings and protective measures to all eligible sites in the APE.

Table 5.8. Summary of Effect Findings and Protective Measures to Eligible Cultural Sites.

Site Number	NRHP Eligibility*	Effects	Site Protective or Avoidance Measures
42KA6331	Eligible–D	No Adverse Effect to Historic Properties	Site would be avoided by at least 50 feet by all project activities. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.

Site Number	NRHP Eligibility*	Effects	Site Protective or Avoidance Measures
42KA8785	Eligible–D	No Adverse Effect to Historic Properties	Site would be avoided by at least 50 feet by all project activities. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.
42KA8904	Eligible–D	No Adverse Effect to Historic Properties	Site would be avoided by at least 50 feet by all project activities. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.
42KA8974	Eligible–D	No Adverse Effect to Historic Properties if the site is avoided	Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.
42KA1157	Eligible–D	No Adverse Effect to Historic Properties	The portion of the site within the project APE is heavily disturbed by previous road construction/maintenance, plowing, livestock, and one sewer line. It has also been previously tested and is non-contributing to the overall eligibility of the site.
42KA9490	Eligible–A, C, D	Adverse Effect to Historic Properties	An inadvertent discovery plan would be prepared, as well as a Memorandum of Agreement (MOA) to mitigate the adverse effects to the site.
42KA9491	Eligible–A, D	Adverse Effect to Historic Properties	An inadvertent discovery plan would be prepared, as well as a MOA to mitigate the adverse effects to the site.
42KA7537	Eligible–D	No Adverse Effect to Historic Properties	Avoid all ground disturbing activities within 15 meters of the site boundary; a cultural monitor must be present during all ground disturbance within 15 meters of the site boundary, and avoidance flagging must be placed 15 meters from the site boundary prior to any construction activities near the site area.
42KA9789	Eligible–D	No Adverse Effect to Historic Properties	Avoid all ground disturbing activities within 15 meters of the site boundary; a cultural monitor must be present during all ground disturbance within 15 meters of the site boundary, and avoidance flagging must be placed 15 meters from the site boundary prior to any construction activities near the site area.

*See Section 3.2.5.1

Twenty-six cultural resources and nine historic structures have been identified within the partially overlapping The Direct, Indirect, and Visual sections of the project APE. Some sites overlap more than one section within the APE. Two sites are overlapped by the Direct section of the APE. Four

sites are overlapped by the Indirect section of the APE. Two sites are overlapped by both the Direct and Visual sections of the APE. And two sites are overlapped by the Indirect and Visual sections of the APE. Only one site (a prehistoric cave and lithic scatter) meets the site type criteria for inclusion in a visual impact assessment. Since it is located in the Direct section of the APE, potential impacts to this site have been analyzed, and it was determined that no effect to the site would occur as it would be avoided by project development. Therefore, project implementation would not impact the character defining characteristics of any sites that would prevent them from conveying their significance since visual components are not the character defining feature that makes sites eligible. Three historic structures within the Indirect section of the APE (Mt. Carmel School and Church; Dixon Maynard house and studio; and Steven's barn) are unlikely to be affected due to distance from the proposed reservoir, elevation, and implementation of safety features that would be implemented as part of the project (Eocene, 2025).

Per 36 CFR 800.6, the NRCS would resolve these adverse effects through the preparation and execution of a MOA. To avoid effects to cultural resources during construction, the NRCS would also prepare an inadvertent discovery plan to be supplied to construction crews. A draft MOA has been prepared by the NRCS, in consultation with the Utah SHPO, tribes, and cooperating agencies (Appendix A).

If any previously undiscovered cultural features or deposits are encountered during project activities, work must immediately stop in the affected area, and an NRCS archaeologist (and BLM or UTLA, if applicable) must be contacted and the applicable agencies post-review discovery procedures followed (Chapter 6.6 for a list of BMPs to be used to protect Cultural and Tribal resources).

5.5.1.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would implement the same proposed components, except with a smaller reservoir size than Alternative 2 and, therefore, would result in the same Adverse Effect to Historic Properties, mitigated with the execution of an associated MOA. Consultation was completed on the larger reservoir footprint, and therefore, the smaller reservoir footprint of Alternative 3 was included in that consultation. Refer to Section 5.5.1.2 for a summary of all consultations completed. Like Alternative 2, indirect and cumulative effects could arise from the increase in human activity at the reservoir site and recreation area.

5.5.2 Social Issues

5.5.2.1 Alternative 1—No Action Alternative

5.5.2.1.1 Population

Alternative 1 would have no immediate impacts on population in the study area; however, as water availability continues to decrease, community members who rely on farming and agriculture may move out of the study area, as they would eventually be unable to maintain farming operations.

5.5.2.1.2 Demographics

Alternative 1 would have no impact on demographics.

5.5.2.1.3 Employment and Income

Alternative 1 would have long-term negative impacts to employment and income. As water availability continues to decrease, farmers and agricultural water users would have to decrease crop production, which much of the population of the communities of Glendale, Orderville, and Mt. Carmel rely on for employment and income. The WCWCD projects that water demand will outstrip supply by 2060 (WCWCD, 2023; WCWCD, 2025). The WCWCD's 40-year plan submitted to the Division of Water Rights indicates that, even with water reuse, its demand is projected to outstrip supply. The 2023 WCWCD 40-year plan projects a shortage of 61,625 to 96,722 acre-feet per year by 2060, depending on the success of conservation efforts (PLPCO, 2026).

5.5.2.1.4 Housing

Alternative 1 would have no impact on housing availability or costs.

5.5.2.1.5 Economy

Alternative 1 would have long-term negative impacts to the economy in the study area, as livestock and farming consists of much of the economy for the communities of Glendale, Orderville, and Mt. Carmel. Due to the high costs of the limited amount of agricultural water in the area, the agricultural challenges currently faced by the communities would continue. If no project were to occur, the limited water is expected to decrease over time, as described in the Cove Water Model (Appendix E-1).

5.5.2.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

5.5.2.2.1 Population

Alternative 2 would have no direct impacts on population in the study area. An increase in recreation-based users would visit the area but would likely not stay long term. The proposed reservoir would indirectly provide an alternative recreation site for the increased population, as the existing recreation sites are becoming overcrowded (Section 2.2.1). The recreation area would support approximately 20 RV’s a night (Appendices E-2 and E-3).

5.5.2.2.2 Demographics

Alternative 2 would have no impact on the demographic breakdown within the project area, as all populations would be affected equally (whether negatively or positively) by the implementation of Alternative 2.

5.5.2.2.3 Employment and Income

Construction under Alternative 2 would create job opportunities for approximately 67 people, as described in the Plan of Development (Appendices E-2 and E-3). Development of the reservoir and recreation area would also provide long-term employment opportunities to the local communities. O&M activities would require regular inspection to maintain the equipment and keep the site free of debris and excessive vegetation. Approximately nine people would be needed for O&M activities. The increase in available water would support local farmers and other agricultural water users who rely on farming as their main source of income. Under Alternative 2, A yield of approximately 2,148 acre-feet could be met during each of the 54 years of record. The agricultural

fields in the study area are primarily alfalfa, which require 5 acre-feet of water per acre per growing season. Therefore, Alternative 2 would support approximately 430 additional acres per growing season. The proposed reservoir would provide needed water to Washington County for M&I uses. Studies project that demand will exceed availability in the future and that additional water sources are needed (WCWCD, 2023; WCWCD, 2025; PLPCO, 2026).

5.5.2.2.4 Housing

Housing within the inundation zone of the dam would be at an increased risk for inundation if a dam failure were to occur. A high-level review of parcel data that would be affected by a dam breach on a rainy day and sunny day are shown in Table 5.9. Up to 275 residential parcels could be impacted by a dam breach.

Table 5.9. Parcels Touching the Modeled Inundation Zones

Parcel Type	Rainy Day Count	Sunny Day Count
Vacant	393	261
Residential	275	249
Unknown	98	55
Commercial	65	60
Agricultural	32	17
Mixed Use	30	30
Other (tax exempt)	12	12
Personal	8	8
Total	913	692

5.5.2.2.5 Economy

The reservoir and its accompanying recreational facilities would attract more visitors to the area, leading to increased local spending and long-term revenue growth for businesses. Agricultural water users in Kane County would also be able to support more crops (approximately 430 additional acres) with the increased water supply, which would further increase the local economy. Additionally, releases from the reservoir would supplement energy provided by the existing Orderville hydroelectric plant during the summer months when it is normally inactive. It is anticipated that the Orderville plant would produce approximately 440,000 kilowatt hours per year resulting in an average gross revenue of $19,000.

5.5.2.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

5.5.2.3.1 Population

Alternative 3 would have no direct impacts on population. Recreation-based users visiting the area would likely increase due to implementation of the project, however they would not stay long-term. Indirectly, the proposed reservoir would provide an alternative recreation site for the

increased population, as the existing recreation sites are exceeding capacity (Section 2.2.1). The recreation area would support approximately 12 RVs a night.

The Utah Government Office of Planning and Budget estimates that the population of the Orderville and Mt. Carmel service area will increase by 26 percent by 2050. In 2023, the area reported 303 acre-feet of M&I water use to the Division of Water Rights. The two water providers in the area, Orderville and Glendale, have rights to 2,241 acre-feet per year from wells and springs. The Division of Water Rights data also indicates that none of the municipal supplies in that area depend on the EFVR, suggesting that the proposed reservoir would not benefit local municipal water providers in Long Valley (PLPCO, 2026).

5.5.2.3.2 Demographics

Alternative 3 would have no impact on demographics. Whether negative or positive, impacts from the project would impact all demographics in the study area equally.

5.5.2.3.3 Employment and Income

Construction under Alternative 3 would create job opportunities for approximately 40 people. Development of the reservoir and recreation area would also provide long-term employment opportunities for the local communities. O&M activities would require regular inspection to maintain the equipment and keep the site free of debris and excessive vegetation. Approximately nine people would be needed for O&M activities. The increase in available water would support local farmers and other agricultural water users who rely on farming as their main source of income. A yield of approximately 1,453 acre-feet could be met during each of the 54 years of record under Alternative 3. The agricultural fields in the study area are primarily alfalfa, which require 5 acre-feet of water per acre per growing season for full crop yield. However, there is insufficient water available to support the full crop yield on properties already under cultivation. Alternative 2 would provide additional water to support approximately 290 additional acres per growing season.

5.5.2.3.4 Housing

Housing within the inundation zone of the dam would be at an increased risk for inundation if a dam failure were to occur. Up to 275 residential parcels could be impacted by a dam breach.

5.5.2.3.5 Economy

The reservoir and its accompanying recreational facilities would attract more visitors to the area, leading to increased local spending and long-term revenue growth for businesses. The recreational facilities would provide an additional and needed water-based source of recreation in the area. Agricultural water users in Kane County would also be able to support more crops (approximately 290 more acres) with the increased water supply, which would further increase the local economy. Additionally, releases from the reservoir would supplement energy provided by the existing Orderville hydroelectric plant during the summer months when it is normally inactive. It is anticipated that the Orderville plant would produce approximately 300,000 kilowatt hours per year, resulting in an average gross revenue of approximately $13,000.

5.5.3 Public Health and Safety

5.5.3.1 Alternative 1—No Action Alternative

Residents in Long Valley would continue to have adverse, indirect impacts to their health and safety from the stress of water shortages, loss of income, and threat to electricity production. Additionally, unreliable water systems can drastically decrease the effectiveness of fire protection systems, posing a greater risk to public health and safety in the study area.

5.5.3.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Under Alternative 2, short-term risks to public health and safety would occur during construction due to the increase in construction related traffic. However, BMPs to reduce impacts would be used and the increased risk would be minor.

Long-term risks to the residences within the proposed dam inundation zone would also occur. Private residences and other infrastructures, including crop fields and roads, are situated downstream of the proposed reservoir dam site and lie within the breach inundation zone (see Appendix E-1). Additionally, US-89 passes through the project area between the proposed dam site and the EFVR. The dam would be classified as a high-hazard structure to safeguard downstream infrastructure. Further detailed analyses would be conducted beyond the preliminary design phase, which would include strategies for improving downstream flood attenuation for 100- and 500-year flood events. Additional maps and information are provided in the Preliminary Design Report (Appendix E-1). However, like all dams, the risk of failure exists and would be mitigated by an Emergency Action Plan (EAP), as required by the Utah Dam Safety office. The inundation zone encompasses up to 275 residential parcels on a rainy day. If a dam breach were to occur, up to 3,893 acres would be inundated. Most of this area would be habitat surrounding the EFVR, identified as vacant parcels. A feasibility study for the proposed reservoir dam site concluded that the site is appropriate for a dam and reservoir (RB&G, 2004). Refer to Appendix E-1 for more information.

Long-term benefits to human health and safety would also occur for the agricultural water users in Long Valley and those serviced by the Hurricane Canal Company, and the M&I water users in Washington County. Improving the reliability of agricultural water supplies would help reduce economic hardship and associated public health concerns related to mental and emotional well-being for those who rely on water usage for agricultural income. Additionally, increasing water storage capacity would improve operational flexibility and support more consistent hydropower generation, thereby contributing to the overall resilience and reliability of local infrastructure that supports public safety.

The new recreation area may also provide direct, positive benefits to mental health by enhancing quality of life and offering visitors opportunities to enjoy scenic views, engage in recreational activities, and experience nature.

5.5.3.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Under Alternative 3, short-term risks to public health and safety would occur during construction due to the increase in construction related traffic. However, BMPs to reduce impacts would be used and the increased risk would be minor.

Long-term risks to the residences within the proposed dam inundation zone (approximately 15) would also occur. Additionally, US-89 passes through the project area between the proposed dam site and the EFVR. The dam would be classified as a high-hazard structure to safeguard downstream infrastructure. Additional maps and information are provided in the Preliminary Design Report (Appendix E-1). However, like all dams, the risk of failure exists and would be mitigated by an EAP, as required by the Utah Dam Safety office. A feasibility study for the proposed reservoir dam site concluded that the site is appropriate for a dam and reservoir (RB&G, 2004)

Long-term benefits to human health and safety would also occur for the agricultural water users in Long Valley and those serviced by the Hurricane Canal Company, and the M&I water users in Washington County. Improving the reliability of agricultural water supplies would help reduce economic hardship and associated public health concerns related to mental and emotional well-being for those who rely on water usage for agricultural income. Additionally, increasing water storage capacity would improve operational flexibility and support more consistent hydropower generation, thereby contributing to the overall resilience and reliability of local infrastructure that supports public safety.

The additional recreation area may also provide direct, positive benefits to mental health by enhancing quality of life and offering visitors opportunities to enjoy scenic views, engage in recreational activities, and experience nature.

5.5.4 Scenic Beauty

5.5.4.1 Alternative 1—No Action Alternative

There would be no change to visual resources and scenic beauty under implementation of Alternative 1.

5.5.4.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Alternative 2 would have a direct, long-term impact on scenic values. The construction of the reservoir and its associated facilities would significantly alter the visual character of the proposed project area. Currently, the landscape is arid, dominated by pinyon-juniper woodlands, sagebrush, rabbitbrush, desert forbs, and grasses. Ephemeral washes and unimproved dirt roads run through the area. The development of the reservoir would introduce a long-term transformation, converting 235 acres of dry, arid land into a water-dominated landscape. Additionally, riparian vegetation surrounding the reservoir would create a contrasting visual environment compared to the surrounding arid upland vegetation. The proposed dam, approximately 1,900 feet in length and 90 feet in height (Appendix E-1), would become a prominent new feature in the landscape. The adjacent recreation area, including a non-motorized boat ramp, campsites, and related facilities, would also result in a notable but localized change to the current landscape (4.1 acres). Other project facilities, such as pipelines, would be placed along existing roads/ROWs and would not significantly impact the visual character of the surrounding area. Even though no BLM-administered public lands are located within the project area, the BLM VRM rating system was used to determine the visual quality of the project area. A VRM study conducted for this proposed project determined the project area was a VRM Class IV which allowed for major modifications to the existing landscape character (BLM, 2026). Implementation of the Proposed Action would introduce a reservoir, dam, recreation facilities, and roads resulting in moderate, localized, and long-term visual change. Although the project would be visible in localized areas, these changes would

be consistent with the BLM VRM Class IV management intent and as they would be limited by topography and distance. Therefore, project implementation would comply with any VRM guidelines that may apply to the area. During the 15-month construction period, short-term visual impacts would occur due to the presence of construction equipment and materials. However, once construction is completed, areas not occupied by permanent structures or roads would be restored, and the temporary visual impacts would not result in a lasting or significant change to the overall landscape. Refer to the VRM in Appendix E-1 for more detail.

5.5.4.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would have a direct, long-term impact on scenic values. The reservoir and associated facilities would convert approximately 141 acres of dry, arid, land into a water dominated landscape. Additionally, riparian vegetation surrounding the reservoir would create a contrasting visual environment compared to the surrounding arid upland vegetation. The proposed dam, approximately 2,900 feet in length and 70 feet in height, would become a prominent new feature in the landscape. The adjacent recreation area, including a non-motorized boat ramp, campsites, and related facilities, would also result in a localized change to the current landscape (4.1 acres). Other project facilities, such as pipelines, would be placed along existing roads/ROWs and would not significantly impact the visual character of the surrounding area.

During the 15-month construction period, short-term visual impacts would occur due to the presence of construction equipment and materials. However, once construction is completed, the temporary visual impacts would not result in a lasting or significant change to the overall landscape.

5.5.5 Significant Scientific Resources

5.5.5.1 Alternative 1—No Action Alternative

Under Alternative 1, no impacts to paleontological or other significant scientific resources would occur.

5.5.5.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Eocene paleontologists conducted a desktop review and subsequent paleontological field surveys for the EFVR Watershed Project. The desktop review identified PFYC 1–5 and Unknown potential geologic units within the project area. In coordination with the UGS and NRCS, it was determined that PFYC 4 to 5 (high to very high potential) units would be surveyed. The survey area included the Tropic Shale Formation (PFYC 4) and Naturita Formation (PFYC 5). A locality search was conducted with the UGS and there were no previously known paleontological localities within the project area, but there were known localities within 2 miles. Surveys were completed in the Tropic Shale Formation on November 21 and 22, 2024 and the Naturita Formation on February 10, 2025. While mapped within the Tait Pit area, there did not seem to be bedrock of the Naturita Formation present in the project area during the field survey. The paleontological survey documented 12 new localities in the survey area consisting of clams, oysters, gastropods, ammonites, petrified wood, and invertebrate burrows. These are all common invertebrates and plant fossils that are not considered scientifically significant. From what was observed during the field survey, no impacts to scientifically significant paleontological resources would occur from this project, but there is always the potential for underground paleontological resources to be unearthed during ground disturbing activities. If construction for the Mt. Carmel irrigation improvements stay within

previously disturbed areas, paleontological monitoring is not needed. If new disturbance is required outside of these boundaries, a paleontological monitor would be present. A preconstruction paleontological training course would occur prior to any construction activities within these areas.

5.5.5.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would implement the same proposed components, apart from the smaller reservoir size as Alternative 2, and therefore, would not result in any impacts to scientifically significant paleontological resources, as described in Section 5.5.5.2. Similarly to Alternative 2, the potential to unearth underground paleontological resources during ground disturbing activities exist, and therefore a paleontological monitor would present during ground disturbing activities in the Tropic Shale Formation and Naturita Formation. A preconstruction paleontological training course would occur prior to any construction activities within these areas.

5.5.6 Land Use

5.5.6.1 Alternative 1—No Action Alternative

There would be no change to land use under Alternative 1.

5.5.6.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

There would be no effect on land use designations under the implementation of Alternative 2, as the project would not affect how land use types are classified in Kane or Washington Counties. KCWCD is in the process of purchasing additional land, and property ownership for the properties downstream of the dam may occur, but there would be no change in downstream land use types. There would be minor, long-term changes to land use in the project footprint due to the development of the reservoir, dam embankment, recreation area, and access roads. Approximately 253.4 acres of undeveloped land would become developed.

5.5.6.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

There would be no effect on land use designations under implementation of Alternative 3, as the project would not affect how land use types are classified in Kane or Washington Counties. KCWCD is in the process of purchasing additional land, and property ownership for the properties downstream of the dam may occur; however, there would be no changes to downstream land use types. Alternative 3 would result in minor, long-term changes to land use in the project footprint due to the development of the reservoir, dam embankment, recreation area, and access roads. Approximately 159.6 acres of undeveloped land would become developed.

5.5.7 Ecosystem Services

5.5.7.1 Alternative 1—No Action Alternative

Cultural Services, non-material benefits—These include mental health, spiritual enrichment, aesthetic experiences, recreation, sense of place, heritage, and development. Alternative 1 would have negative impacts on mental health and recreation due to missed opportunities, such as the lack of an additional recreation opportunity, as they relate to ecosystem services as described in detail in Sections 5.5.2 and 5.5.3.

5.5.7.2 Alternative 2—6,000-Acre-Foot Alternative

Cultural Services, non-material benefits—Alternative 2 would benefit non-material ecosystem services such as mental health, aesthetic experiences, and recreation. The increase in available water would support the mental health of agricultural farmers in the Long Valley area who rely on agriculture for income. The reservoir and recreation area would provide a scenic landscape and recreation opportunities (fishing, boating, swimming) for visitors and residents to enjoy.

5.5.7.3 Alternative 3—3,000-Acre-Foot Alternative

Cultural Services, non-material benefits—Alternative 3 would benefit non-material ecosystem services such as mental health, aesthetic experiences, and recreation. The increase in available water would support the mental health of agricultural farmers in the Long Valley area who rely on agriculture for income. The reservoir and recreation area would provide a scenic landscape and recreation opportunities (fishing, boating, swimming) for visitors and residents to enjoy.

5.6 Cumulative Effects

A list of known past, present, or reasonably foreseeable future actions in the vicinity of the project area is provided below.

Cumulative effects result from "the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (7 CFR 650). This chapter of the Plan-EIS evaluates potential impacts to the environment that may result from implementation of the proposed project when added to other past, present, and reasonably foreseeable future actions. The following projects in the area are currently occurring or have recently been completed and may result in cumulative effects when combined with the proposed project.

5.6.1 Past and Present Actions

5.6.1.1 Lake Powell Pipeline

The proposed Lake Powell Pipeline would transport water through an approximately 140-mile-long, buried pipeline from Lake Powell to Washington and Kane counties, Utah. At full capacity, the project would deliver 82,249 acre-feet of water per year to Washington County. While not directly connected to the proposed Cove Reservoir project, the pipeline construction could result in an increased demand for materials, fuel, and labor. However, due to delays in projected development it is unlikely that the Lake Powell Pipeline would be constructed at the same time as the proposed Cove Reservoir; therefore, competition for materials, fuel, and labor would not occur.

5.6.1.2 US-89 Rehabilitation Project from Mt. Carmel Junction to Glendale, Utah

This project involved maintenance of bridge structures and a new layer of asphalt and road shoulder improvement on approximately 8.6 miles of US-89 roads. New curbs and gutters were installed in Orderville, and new sidewalks and pedestrian ramps were installed in Glendale. These activities resulted in improved highway conditions and safety for residents. The improved highway would increase traffic efficiency during project development. The features installed in Orderville and Glendale would increase safety conditions. The need for materials for the proposed reservoir would be additive to those used for this project.

5.6.1.3 Jackson Flat Reservoir near Kanab, Utah

The Jackson Flat Reservoir was completed in 2012. Its purpose was, like that of the proposed Cove Reservoir, to provide additional irrigation and agriculture water for agricultural users in the Kanab area and local recreation opportunities. The existing Jackson Flat Reservoir is a 4,228-acre-foot reservoir located near Kanab in Kane County, Utah.

5.6.1.4 Local Population Growth

Continued future growth has been projected for southern Utah, especially for portions of Washington County in the study area. Population growth in Kane County is also expected to continue to grow at a slower rate. No direct cumulative impact from construction and use of the proposed reservoir is anticipated. Recreation-based visitors would likely increase due to implementation of the proposed project; however, they would not stay long-term. Indirectly, the proposed reservoir would provide an alternative recreation site for the projected increased population, as existing sites are becoming overcrowded as described in Section 2.2.1.

5.6.1.5 Other Tourism-Related Projects

Construction of the proposed Cove Reservoir would result in an additional recreation site for western Kane County. Kane County's economy largely depends on the tourism brought in by the national and state parks in the area, many of which are often at or exceed visitor capacity. For example, the nearby Coral Pink Sand Dunes State Park recorded over 279,979 visitors in Fiscal Year (FY) 2024, representing a 303 percent increase from the 69,553 visitors in 2014 (State of Utah, 2024). Development of sites such as the existing Jackson Flat Reservoir and the proposed Cove Reservoir would provide additional areas for visitors to visit and enjoy. These tourists would also likely purchase local goods and services, thus benefiting the local economy even further.

5.6.1.6 Borrow Pit Use

Three borrow pits could be used to provide gravel and riprap for the proposed project. All sites are existing private pits. These pits would continue to be used for the long term on other local projects not associated with the proposed reservoir. Impacts associated with the use of these pits on other projects (including dust, loss of native vegetation, increased traffic, etc.) would be cumulative to those that would result from the extraction of gravel and riprap for the proposed project. The Esplin and Tait pits contain cultural resources that are eligible on the NRHP. These areas of the borrow pits would not be used for this project; however, the continued use of these pits for borrow material for future projects would risk destroying these cultural sites. Embankment material would be taken from within the reservoir basin.

5.6.2 Cumulative Effects Summary

5.6.2.1 Alternative 1—No Action Alternative

Implementation of Alternative 1 would not result in any cumulative effects to natural or human resources above those currently occurring within the project area, as previously described. Several actions would continue to occur under Alternative 1. Local water users would continue to experience shortages during summer months. As a result, agriculture production would continue to decrease. An additional recreation area would not be constructed, and potential users would

need to continue to look to other areas for water-based recreation and camping opportunities. This may result in a cumulative recreation demand in nearby areas, such as the existing Jackson Flat Reservoir. The potential for the proposed reservoir to capture flash floodwater and sediment also would not be realized. As a result, intermittent increases in flows and sediment load in the EFVR would continue.

5.6.2.2 Alternative 2—6,000-Acre-Foot Reservoir Alternative

Eight resources would most likely experience cumulative effects from the totality of the reasonably foreseeable actions discussed here. Impacts resulting from the proposed Cove Reservoir project would be cumulative to these projects.

5.6.2.2.1 Soils

The implementation of Alternative 2 would result in an increase in soil disturbance. As a result, the potential for an undetermined, but likely minor, amount of soil loss would occur. The proposed Cove Reservoir project would contribute an additional approximately 259.1 acres of surface disturbance to the cumulative total of disturbance currently occurring or projected to occur in western Kane County.

5.6.2.2.2 Water Resources

The existing Jackson Flat Reservoir provides irrigation water for agricultural use near Kanab while the proposed Cove Reservoir would provide additional water for local irrigation and agriculture water use in the Orderville, Mt. Carmel and in Hurricane area. Shortages in water availability during summer months is a common occurrence in Kane County and the two reservoirs, while not connected, would provide a needed and reliable source of water for local agricultural water users.

5.6.2.2.3 Air Quality

Emissions resulting from construction of the proposed project would be cumulative to other activities currently affecting air quality in southern Utah. Substantial future growth has been projected for this area, especially in Washington County, which is located immediately west of Kane County. Emissions from outside sources could continue to increase and affect the air quality of Kane County. Work during the 15-month construction period would be cumulative to these existing sources.

5.6.2.2.4 Migratory Birds

Migratory birds would be affected by the loss of habitat through clearing of vegetation and noise due to construction activities associated with the proposed project activities previously described. If these actions occur during the nesting season, some nest abandonment is expected. This disturbance would be cumulative to activities currently occurring or those that may occur in the foreseeable future. New migratory bird habitat would result from the development of riparian areas surrounding the new reservoirs.

5.6.2.2.5 Invasive Species

Invasive and noxious weeds are an ongoing resource management concern in Kane County. The disturbance of approximately 259.1 acres resulting from implementation of the Cove Reservoir

project would contribute to number of disturbed acres being potentially susceptible to invasive and noxious weed establishment. Once established, these species become difficult to eradicate.

5.6.2.2.6 Cultural Resources

Cultural resources are widespread in this portion of Kane County. The use of the existing Jackson Flat Reservoir and the proposed reservoir would bring additional recreational sites to the county and potentially expose cultural resources to vandalism and looting. Over time, this could result in a loss of cultural knowledge and context. Any potential losses that would result from the proposed Cove Reservoir project would be cumulative to those resulting from other recreation-related projects in the area.

5.6.2.2.7 Social Issues

Project developments in western Kane County would result in additional workers and visitors frequenting the area. The economies of local towns, such as Glendale, Orderville, Mt. Carmel, Mount Carmel Junction, and Kanab, would benefit from increased purchasing of services and goods. The existing Jackson Flat Reservoir near Kanab, Utah is currently experiencing approximately 1,200 visitors per month. Visitation at the proposed Cove Reservoir could approach that number. Some of these visitors would purchase goods and services in the local communities. These purchases would be cumulative to those from other recreation sites in the region.

The cumulative demand for materials, such as gravel and riprap, could contribute to increased prices for these materials, resulting in projects becoming more expensive to complete. The need to open new areas to access these materials would increase. Opening new areas would result in increased traffic on local highways and roads, resulting in occasional traffic congestion and increased repair needs.

Use of the existing Jackson Flat Reservoir and proposed Cove Reservoir would provide much needed, additional recreation opportunities for western Kane County. Current recreation sites in the county consistently reach or exceed capacity, especially during the summer months. These sites would provide important water-based recreation opportunities.

5.6.2.2.8 Scenic Beauty

The presence of the proposed Cove Reservoir and associated facilities would contribute to a visual alteration of the landscape, changing it from an upland, semi-desert to a water-based landscape. This landscape change would be cumulative to the existing water-based landscape at the Jackson Flat Reservoir located near Kanab, Utah.

As vegetation and borrow materials are removed, the use of the three borrow pits would result in visual resource changes up to 5.7 acres, altering the local landscape.

5.6.2.3 Alternative 3—3,000-Acre-Foot Reservoir Alternative

Alternative 3 would have similar cumulative impacts to Alternative 2, at a smaller scale. Many of the construction related impacts would be lessened under Alternative 3 due to the smaller scale of the project; however, the benefits to increased water would also be lessened with a smaller yearly production (approximately 48 percent less water). The smaller reservoir would also provide less

opportunity for recreation, with half the number of RV sites and a smaller surface area (122 acres versus 187 acres) available for water-based activities.

5.7 Summary and Comparison of Alternative Plans

The alternatives proposed for consideration and analyzed in detail in this Plan-EIS have been compared against each other to discern the merits and disadvantages of each alternative. This includes a side-by-side comparison of environmental, social, and economic effects.

Alternatives were compared to select one alternative that best maximized public benefits (environmental, economic, and social goals) with appropriate consideration of costs, guiding principles, the federal objective, PL 83-566 general purposes, and ecosystem services. This alternative is known as the NRCS NEE Alternative. Based on the performed alternative analysis, the NEE Alternative for the project was determined to be the 6,000-Acre-Foot Reservoir Alternative. A PR&G Analysis was completed in support of decision-making for the NEE Alternative and is included in Appendix E-1.

5.7.1 Evaluation of Alternatives through the Planning Process

Table 5.10 compares the alternatives on how well they resolve the problems identified, performance against the project objectives, their constraints, and evaluation criteria of completeness, acceptability, efficiency, and effectiveness.

Table 5.10. Summary and Comparison of Alternatives.

Item or Concern	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Public Recreation Reservoir	-	Alternative 2 would provide 187 acres of surface area for water recreation on the reservoir.	Alternative 3 would provide 122 acres of surface area for water recreation on the reservoir.
Public Recreation Recreation Site	-	Alternative 2 would provide a non-motorized boat ramp, 2 pit toilets, a pavilion, and 20 RV sites (including a barbecue grill, table, and fire pit). No utilities would be extended to these facilities	Alternative 3 would provide a non-motorized boat ramp, a pit toilet, a pavilion, and 12 RV sites (including a barbecue grill, table, and fire pit). No utilities would be extended to these facilities
AWM Reservoir	-	The proposed reservoir would provide an additional 2,148 acre-feet of water a year	The proposed reservoir would provide an additional 1,453 acre-feet of water a year

Item or Concern	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
M&I Water Supply Reservoir	-	The proposed reservoir would provide an additional 2,148 acre-feet of water a year	The proposed reservoir would provide an additional 1,453 acre-feet of water a year
Project Objectives Provide reliable source and long-term availability of agricultural water	Alternative 1 would not meet this project objective	Alternative 2 would provide 2,148 acre-feet of water for the 54 years evaluated	Alternative 3 would provide 1,453 acre-feet of water for the 54 years evaluated
Project Objectives Provide M&I water for Washington County	Alternative 1 would not meet this project objective	Alternative 2 would provide 2,148 acre-feet of water for the 54 years evaluated	Alternative 3 would provide 1,453 acre-feet of water for the 54 years evaluated
Project Objectives Provide a recreation opportunity for Kane County	Alternative 1 would not meet this project objective	Alternative 2 would provide a non-motorized boat ramp, pavilion, and 20 RV sites	Alternative 3 would provide a non-motorized boat ramp, pavilion, and 12 RV sites
Project Objectives Present economic prospects for the communities of Orderville, Glendale, and Mt. Carmel	Alternative 1 would not meet this project objective	Alternative 2 would support approximately 430 additional acres of farmland to support economic prospects	Alternative 3 would support approximately 290 additional acres of farmland to support economic prospects
Project Objectives Provide for maximum utilization of renewable energy for local communities	Alternative 1 would not meet this project objective	Releases of excess water and water delivered to WCWCD would supplement the energy provided by the existing Orderville hydroelectric plant	Releases of excess water and water delivered to WCWCD would supplement the energy provided by the existing Orderville hydroelectric plant

Item or Concern	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Project Objectives Comply with the ZNP Water Right Settlement of 1996	Alternative 1 would not meet this project objective	Alternative 2 would meet this project objective	Alternative 3 would meet this project objective
Constraints Siting limitations	N/A	The Cove Reservoir area is suitable for development	The Cove Reservoir area is suitable for development
Constraints Public safety	N/A	Alternative 2 would put up to 275 residential parcels in the breach inundation zone of the dam	Alternative 3 would put up to 275 residential parcels in the breach inundation zone of the dam
Constraints Environmental resources	N/A	The Cove Reservoir site would not require the direct loss of existing agricultural land or residences	The Cove Reservoir site would not require the direct loss of existing agricultural land or residences
Constraints Geotech restrictions	N/A	The Cove Reservoir site does not have geological structural limitations	The Cove Reservoir site does not have geological structural limitations
Constraints Engineering Challenges	N/A	Alternative 2 would not require extensive engineering	Alternative 3 would not require extensive engineering
Constraints Economic constraints	N/A	Construction of Alternative 2 would be approximately $39,730,000	Construction of Alternative 3 would be approximately $32,345,000
Evaluation Criteria Completeness	Evaluation criteria met	Evaluation criteria met	Evaluation criteria met
Evaluation Criteria Efficiency	Evaluation criteria met	Evaluation criteria met	Evaluation criteria met
Evaluation Criteria Effectiveness	Evaluation criteria met	Evaluation criteria met	Evaluation criteria met
Evaluation Criteria Acceptability	Evaluation criteria met	Evaluation criteria met	Evaluation criteria met

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5.7.2 Summary of Effects on Resource Concerns

A summary of effects for the resource concerns for the final array of alternatives is provided in Table 5.11. Those effects that are same across alternatives are grouped together; those that have different effects are separated. Impacts that were determined to be negligible, not measurable, or would not occur are not included in Table 5.11. Please refer to the detailed analysis in Chapters 5.1 through 5.6 for more detailed information on effects to resources.

Table 5.11. Summary and Comparison of Alternatives–Effects on Resource Concerns.

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Soil Resources	Upland erosion conditions would not change from existing conditions, and erosion would continue at the same rate it has historically occurred. Indirect long-term adverse impacts would occur from sediment deposition in the EFVR after flash flooding events.	Direct short-term impacts to erosion potential on disturbed areas during construction would occur. Impacts would be minimized through implementation of BMPs that would be installed during and after construction. The short-term impacts would be minor based on implementation of BMPs and restoration/stabilization of disturbed areas following project construction. Indirect long-term benefits are anticipated that would reduce sediment deposition in developed areas and the EFVR that are no longer exposed to flooding.	Direct short-term impacts to erosion potential on disturbed areas during construction would occur. Impacts would be minimized through implementation of BMPs that would be installed during and after construction. The short-term impacts would be minor based on implementation of BMPs and restoration/stabilization of disturbed areas following project construction. Indirect long-term benefits are anticipated that would reduce sediment deposition in developed areas and the EFVR that are no longer exposed to flooding.
Water Resources	No direct or indirect effects to water resources would occur from implementation of Alternative 1. Surface flows in the EFVR would continue to vary considerably as a response to spring runoff or intense storm events.	Alternative 2 would have direct, positive benefits on water resources by making 2,148 acre-feet of existing water available for water users in Kane and Washington County annually. Minor downstream impacts to the EFVR would occur due to changes in water timing.	Alternative 3 would have direct, positive benefits on water resources by making 1,453 acre-feet of existing water available for water users in Kane and Washington County annually. Minor downstream impacts to the EFVR would occur due to changes in water timing.
Water Quality	There would be no direct or indirect effects to water quality from implementation of Alternative 1. The existing water quality of the EFVR would not change, and the EFVR and its tributaries would continue to be designated as HQW.	Minor, direct, and negative impacts to water quality would occur during construction while crossing the EFVR; however, long-term, beneficial impacts would occur through the capturing of sediment in the reservoir during flash flooding events.	Minor, direct, and negative impacts to water quality would occur during construction while crossing the EFVR; however, long-term, beneficial impacts would occur through the capturing of sediment in the reservoir during flash flooding events.
Floodplain Management	No impacts to floodplains or floodplain management would occur.	The Action Alternatives would have long-term beneficial impacts on downstream flooding, and long-term minor impacts on floodplain management. The proposed reservoir would capture runoff produced by flash floods, thereby decreasing the amount of water and sediment entering the river and reducing potential loss of riparian vegetation. However, the proposed dam would also create a new inundation area, causing potential changes to FEMA floodplains.	The Action Alternatives would have long-term beneficial impacts on downstream flooding, and long-term minor impacts on floodplain management. The proposed reservoir would capture runoff produced by flash floods, thereby decreasing the amount of water and sediment entering the river and reducing potential loss of riparian vegetation. However, the proposed dam would also create a new inundation area, causing potential changes to FEMA floodplains.
WOTUS., Wetlands, and Special Aquatic Sites	There would be no impacts to WOTUS, wetlands, or other resource in the project area under Alternative 1.	Alternative 2 would impact approximately 0.21 acre of aquatic features and 0.17 acres of wetlands.	Alternative 3 would have the same or very similar impacts to aquatic features as Alternative 2.

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Regional Water Resource Plans	No changes to Kane County's or Washington County's Water Resource Plans would occur under Alternative 1. Both counties would continue to seek water conservation goals and practices to enhance the efficiency and reliability of the current AWM.	The Action Alternatives would comply with Regional Water Resource Plans through supporting both Kane County and Washington County's Water Resource Plans.	The Action Alternatives would comply with Regional Water Resource Plans through supporting both Kane County and Washington County's Water Resource Plans.
WSRs	There would be no direct or indirect impacts to WSRs under Alternative 1. No changes to identified WSRs would occur.	The Action Alternatives would have no impacts on the WSR values of the EFVR within ZNP, as it would also adhere to the stipulations required in the ZNP Agreement (1996). Therefore, changes in flow in the EFVR through ZNP would be minor, particularly when the natural variation of the EFVR is approximately 100 times the range of effect from proposed reservoir releases (Alpha Engineering 2025).	The Action Alternatives would have no impact on the WSR values of the EFVR within the ZNP, as it would also adhere to the stipulations required in the ZNP Agreement (1996). Therefore, changes in flow in the EFVR through ZNP would be minor, particularly when the natural variation of EFVR flows is approximately 100 times the range of effect from proposed reservoir releases (Alpha Engineering 2025).
Air Quality	There would be no change to air quality conditions.	Construction activities and the use of the borrow sites would cause minor, short-term, and direct increases in emissions concentrated around the construction site. Construction activities would not violate air quality standards, and BMPs would be implemented.	Construction activities and the use of the borrow sites would cause minor, short-term, and direct increases in emissions concentrated around the construction site. Construction activities would not violate air quality standards, and BMPs would be implemented.
Threatened and Endangered Species	No direct or indirect impacts to federally listed or candidate plant or animal species would occur.	The Action Alternatives would have **No Effect** on the WYBC, desert tortoise, Suckley's cuckoo bumble bee, Jones cycladenia, Shivwits milk-vetch, Siler's pincushion cactus, and Ute ladies'-tresses. The Action Alternatives are **Not Likely to Jeopardize the Continued Existence** of the monarch butterfly or the California condor outside of ZNP. The Action Alternatives **May Affect, but Not Likely to Adversely Affect** the California condor (within ZNP), MSO, SWFL, Virgin River chub, and woundfin. The Action Alternatives **May Affect, but Not Likely to Adversely Affect** designated critical habitat for the MSO, Virgin River chub, and woundfin. The Action Alternatives would have **No Effect** on designated critical habitat for the California condor or SWFL as none has been designated in the study area.	The Action Alternatives would have **No Effect** on the WYBC, desert tortoise, Suckley's cuckoo bumble bee, Jones cycladenia, Shivwits milk-vetch, Siler's pincushion cactus, and Ute ladies'-tresses. The Action Alternatives are **Not Likely to Jeopardize the Continued Existence** of the monarch butterfly or the California condor outside of ZNP. The Action Alternatives **May Affect, but Not Likely to Adversely Affect** the California condor (within ZNP), MSO, SWFL, Virgin River chub, and woundfin. The Action Alternatives **May Affect, but Not Likely to Adversely Affect** designated critical habitat for the MSO, Virgin River chub, and woundfin. The Action Alternatives would have **No Effect** on designated critical habitat for the California condor or SWFL as none has been designated in the study area.
Migratory Birds	Alternative 1 would have no direct or indirect impacts to migratory birds.	Construction disturbance would have minor, direct, and short-term impacts that would disturb suitable breeding/nesting or foraging habitat for migratory birds and foraging habitat for migratory birds. Conservation measures would be implemented to avoid and minimize impacts to these species and disturbed areas would be restored after construction completion. Potential impacts would be minor due to the ample surrounding habitat available. The O&M activities would have minor, beneficial, long-term impacts to migratory birds. The riparian habitat surrounding the reservoir would provide long-term habitat opportunities for migratory birds.	Construction disturbance would have minor, direct, and short-term impacts that would disturb suitable breeding/nesting or foraging habitat for migratory birds and foraging habitat for migratory birds. Conservation measures would be implemented to avoid and minimize impacts to these species and disturbed areas would be restored after construction completion. Potential impacts would be minor due to the ample surrounding habitat available. The O&M activities would have minor, beneficial, long-term impacts to migratory birds. The riparian habitat surrounding the reservoir would provide long-term habitat opportunities for migratory birds.

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Bald and Golden Eagles	Alternative 1 would have no direct or indirect impacts to bald and golden eagles.	Construction would cause temporary, minor impacts to bald and golden eagles; however, no significant loss of foraging grounds would be expected due to the availability of nearby suitable habitat. The new riparian area surrounding the reservoir would have long-term, beneficial impacts to bald and golden eagles by providing additional roosting opportunities.	Construction would cause temporary, minor impacts to bald and golden eagles; however, no significant loss of foraging grounds would be expected due to the availability of nearby suitable habitat. The new riparian area surrounding the reservoir would have long-term, beneficial impacts to bald and golden eagles by providing additional roosting opportunities.
Ecologically Critical Areas	No direct or indirect impacts to designated wilderness or WSA's would occur under Alternative 1, as no changes to the existing environment would occur.	Minor, beneficial, indirect impacts to ecologically critical areas would occur under the Action Alternatives.	Minor, beneficial, indirect impacts to ecologically critical areas would occur under the Action Alternatives.
Invasive Species	No impacts to invasive species would occur under Alternative 1, as no changes would take place under this alternative.	The Action Alternatives would have minor, temporary impacts on invasive plant species during and immediately following construction. Development of a new water source would potentially provide habitat for invasive aquatic species such as quagga mussels. However, BMPs would be implemented to prevent the spread of noxious weeds. A PCRP would be developed and include mechanisms for addressing weed establishment and treatment.	The Action Alternatives would have minor, temporary impacts to invasive plant and animal species during and immediately following construction; however, BMPs would be implemented to prevent the spread of noxious weeds. A PCRP would be developed and include mechanisms for addressing weed establishment and treatment.
Fish and Wildlife	No changes to fish and wildlife resources would occur under Alternative 1.	Construction activities would cause temporary, minor impacts to fish and wildlife species, including Species of Greatest Conservation Need, due to an increase in human presence and noise. There is ample surrounding habitat, and therefore, long-term impacts are not anticipated. The creation of the riparian area surrounding the reservoir would have beneficial, long-term impacts by providing new additional habitat for wildlife. State fish Species of Greatest Conservation Need, including the desert sucker, flannelmouth sucker, and Virgin spinedace are known to exist in the EFVR. Changes in water flow from implementation of Alternative 2 would be minor, particularly when the natural variation of EFVR flows are approximately 100 times the range of effect from proposed Cove Reservoir releases (Alpha Engineering 2025), and therefore these species and their habitat would not be impacted.	Construction activities would cause temporary, minor impacts to fish and wildlife species, including Species of Greatest Conservation Need, due to an increase in human presence and noise. There is ample surrounding habitat, and therefore, long-term impacts are not anticipated. The creation of the riparian area surrounding the reservoir would have beneficial, long-term impacts by providing new additional habitat for wildlife. State fish Species of Greatest Conservation Need, including the desert sucker, flannelmouth sucker, and Virgin spinedace are known to exist in the EFVR. Changes in water flow from implementation of Alternative 2 would be minor, particularly when the natural variation of EFVR flows are approximately 100 times the range of effect from proposed Cove Reservoir releases (Alpha Engineering 2025) and therefore these species and their habitat would not be impacted.
Riparian Areas	No direct or indirect effects to existing riparian areas in the study area would occur.	The Action Alternatives would have minor, positive impacts to riparian vegetation through the creation of additional riparian habitat. No impacts to existing riparian habitat would occur.	The Action Alternatives would have minor, positive impacts to riparian vegetation through the creation of additional riparian habitat. No impacts to existing riparian habitat would occur.
Cultural Resources and Tribal Consultation	Alternative 1 would have no impact on historic or cultural resources, as no changes to the existing environment would occur.	The Action Alternatives would result in **Adverse Effect to Historic Properties**. Indirect effects to cultural resources could also arise from the increase in human activity in the area.	The Action Alternatives would result in **Adverse Effect to Historic Properties**. Indirect effects to cultural resources could also arise from the increase in human activity in the area.

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Social Issues	Population Alternative 1 would have indirect, negative impacts on population, as farmers relocate due to the decreasing water availability. Demographics Alternative 1 would have no impact on demographics. Employment and Income Long-term, negative impacts to employment and income would occur, as water availability continues to decrease for agricultural farmers. Housing Alternative 1 would have no impact on housing. Economy Alternative 1 would have long-term, negative impacts to the economy, as water availability continues to decrease for agricultural farmers.	Population Alternative 2 would have indirect, positive benefits to the population by providing an additional needed recreation area. Demographics Alternative 2 would have no impact on demographics. Employment and Income Alternative 2 would provide 67 short-term jobs, 9 long-term jobs, and water to support 430 acres of agricultural land. Housing Direct impacts on up to 275 residential parcels would occur due to an increased risk of flooding from a dam breach. Economy Alternative 2 would have a direct, beneficial impacts on the economy by attracting more visitors and supporting an additional 430 acres of existing agricultural land.	Population Alternative 3 would have indirect, positive benefits to the population by providing an additional needed recreation area. Demographics Alternative 3 would have no impact on demographics. Employment and Income Alternative 3 would provide 40 short-term jobs, 9 long-term jobs, and water to support 290 acres of agricultural land. Housing Direct impacts on up to 275 residential parcels would occur due to an increased risk of flooding from a dam breach. Economy Alternative 3 would have direct, beneficial impacts on the economy by attracting more visitors and supporting 290 acres of agricultural land.
Public Health and Safety	Adverse, indirect impacts to public health and safety would occur from the stress of water shortages, loss of income, and threat to electricity production.	Short-term, minor risks to public health and safety would occur during construction due to an increase in traffic. Long-term risks to approximately 10 to 15 people would occur with properties in the new inundation zone of the dam. Long-term benefits to public health and safety include the reduction of stress from reliable water and the increased effectiveness of the fire suppression systems.	Short-term, minor risks to public health and safety would occur during construction due to an increase in traffic. Long-term risks to approximately 10 to 15 people would occur with properties in the new inundation zone of the dam. Long-term benefits to public health and safety include the reduction of stress from reliable water and the increased effectiveness of the fire suppression systems.
Scenic Beauty	There would be no change to visual resources and scenic beauty under Alternative 1.	Short-term visual impacts would occur from the presence of construction equipment. Direct, long-term impacts to scenic values would occur from the conversion of 235 acres of arid land to a reservoir.	Short-term visual impacts would occur from the presence of construction equipment. Direct, long-term impacts to scenic values would occur from the conversion of 141 acres of land to a reservoir.
Significant Scientific Resources	Under Alternative 1, no impacts to paleontological or other significant scientific resources would occur.	No impacts to significant paleontological resources are expected. A paleontological monitor would be present during new surface disturbing activities associated with the Mt. Carmel irrigation improvements. Preconstruction paleontological training with the construction contractor would occur prior to construction.	No impacts to significant paleontological resources are expected. A paleontological monitor would be present during new surface-disturbing activities associated with the Mt. Carmel irrigation improvements. Preconstruction paleontological training with the construction contractor would occur prior to construction.
Land Use	There would be no change to land use for this alternative.	Approximately 253.4 acres of land would be converted from undeveloped to developed resulting in minor, long-term impacts to land use within the project area.	Approximately 159.6 acres of land would be converted from undeveloped to developed resulting in minor, long-term impacts to land use within the project area.

5.7.3 Ecosystem Services Tradeoff

A comparison of ecosystem services covering long-term effects was performed for the final array of alternatives and is provided in Table 5.12. Ecosystem service effects overlap with the resource concerns effects. Refer to Table 3.2 of Chapter 3.1 for information on overlapping resource concerns used in determination of ecosystem service effects. Refer to Chapters 5.1 through 5.5 for detailed effects to resource concerns that include ecosystem services.

Table 5.12. Summary and Comparison of Alternatives - Ecosystem Services Tradeoff.

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Locally Preferred Alternative*	-	X	-
Non-structural Alternative*	X	-	-
Environmentally Preferred Alternative*	X	-	-
Maximum Net Monetized Benefits Plan Alternative*	-	X	-
Socially Preferred Alternative*		X	
Preferred Alternative (Maximum Net public benefits identified through tradeoff analysis)*	-	X	-
Healthy and Resilient Ecosystems	Alternative 1 would protect the functions of ecosystems by providing no change to current conditions	Alternatives 2 and 3 would protect and restore the functions of ecosystems by allowing water timing delivery to more naturally match the ecological needs of the seasons by storing water in the winter and releasing water in the summer	Alternatives 2 and 3 would protect and restore the functions of ecosystems by allowing water timing delivery to more naturally match the ecological needs of the seasons by storing water in the winter and releasing water in the summer
Sustainable Economic Development	Alternative 1 would not improve the economic well-being of the nation for current and future generations because agricultural users would continue to lose income due to the current water shortage and the monetized benefits from the recreation area would not be realized.	Alternative 2 would provide the highest economic well-being of the nation for current and future generations by providing job security for local agricultural users and by providing monetized benefits from the recreation area.	Alternative 3 would not improve the economic well-being of the nation for current and future generations because the smaller reservoir size would provide less water than is needed for the agricultural users and would provide less monetized benefits than costs ass discussed in Appendix D
Floodplains	Alternative 1 would not adversely affect self-sustaining floodplain function	Alternative 2 would not adversely affect self-sustaining floodplain function	Alternative 3 would not adversely affect self-sustaining floodplain function
Public Safety	Alternative 1 would not reduce the risks to public safety as the current local agricultural water users would continue to have stress and mental health problems from the uncertainty of the water availability and its impacts on income and food security	Alternative 2 would reduce the risks to public safety by providing water storage for agriculture, reducing stress related to income uncertainty.	Alternative 3 would reduce the risks to public safety by providing water storage for agriculture, reducing stress related to income uncertainty.

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Watershed Approach	Alternative 1 would have no impact on upstream or downstream impacts	Alternative 2 recognizes the potential upstream and downstream impacts as discussed throughout the Plan-EIS	Alternative 3 recognizes the potential upstream and downstream impacts as discussed throughout the Plan-EIS
Provisioning Services Agricultural land	Agricultural land users in the project area would continue to experience water shortages during the summer months at an increasing rate.	Approximately 430 acres of land would benefit from the increased water availability provided by the reservoir.	Approximately 290 acres of land would benefit from the increased water availability provided by the reservoir.
Provisioning Services Agricultural water	Water from the EFVR would continue to provide insufficient quantities of water in the summer for agricultural lands in Kane and Washington Counties and M&I purposes in Washington County.	Alternative 2 would increase the available amount of irrigation and M&I water by approximately 2,148 afy.	Alternative 3 would increase the available amount of irrigation and M&I water by approximately 1,453afy.
Provisioning Services Fishing	Alternative 1 would have no impact on aquatic habitat or species within the EFVR and, therefore, have no impact on fishing opportunities within the EFVR.	Alternative 2 would have no impact on aquatic habitat or species within the EFVR. The reservoir would provide a new fishing opportunity.	Alternative 3 would have no impact on aquatic habitat or species within the EFVR and, therefore, no impact on fishing opportunities within the EFVR. The reservoir would provide a new fishing opportunity.
Regulating Services Water quality and quantity	No changes to temperature, turbidity, sediment, or pollutants within the EFVR would occur. Instream flow would continue to regulate water temperature, decrease bank erosion/sedimentation, and dilute potential pollutants. No additional water would be available for agricultural use in Kane and Washington Counties or recreation use in Kane County.	Alternative 2 would improve water quality in the EFVR by containing sediment within the reservoir during flash flooding events. Additional water would be made available for agricultural use in Kane and Washington Counties and recreation use in Kane county.	Alternative 3 would improve water quality in the EFVR by containing sediment within the reservoir during flash flooding events. Additional water would be made available for agricultural use in Kane and Washington Counties and recreation use in Kane county.
Regulating Services Climate Regulation	All air quality standards would be maintained at current levels. Air quality standards directly impact climate regulation, as many sources of air pollutants are also greenhouse gases.	All air quality standards would be maintained at current levels. Air quality standards directly impact climate regulation, as many sources of air pollutants are also greenhouse gases.	All air quality standards would be maintained at current levels. Air quality standards directly impact climate regulation, as many sources of air pollutants are also greenhouse gases.
Regulating Services Riparian zones	No impacts to riparian zones would occur under Alternative 1.	The creation of riparian vegetation under Alternative 2 would benefit the ecosystem services that riparian habitat provides like water filtration, nutrient cycling, and wildlife habitat.	The creation of riparian vegetation under Alternative 3 would benefit the ecosystem services that riparian habitat provides like water filtration, nutrient cycling, and wildlife habitat.
Supporting Services Wildlife habitat	The EFVR would continue to provide habitat for plants and wildlife.	Alternative 2 would continue to provide habitat for plants and wildlife within the EFVR, while providing additional habitat within the Cove Reservoir.	Alternative 3 would continue to provide habitat for plants and wildlife within the EFVR, while providing additional habitat within the Cove Reservoir.

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Supporting Services Nutrient cycling	Nutrient cycling would continue to occur as living organisms breathe in the abiotic components in the air.	Nutrient cycling would continue to occur as living organisms breathe in the abiotic components in the air.	Nutrient cycling would continue to occur as living organisms breathe in the abiotic components in the air.
Cultural Services Recreation	Water from the EFVR would continue to provide recreational opportunities to the public, including fishing, swimming, and intrinsic value from the natural scenic beauty.	Alternative 2 would have no impact on the recreational value of the EFVR while providing new recreational opportunities at the Cove Reservoir site.	Alternative 3 would have no impact on the recreational value of the EFVR while providing new recreational opportunities at the Cove Reservoir site.
Cultural Services Health	No changes in human health from air quality would occur	The use of BMPs during construction would ensure no negative impacts to human health are caused from air quality changes. The additional recreation area may provide direct, positive benefits to mental health by enhancing quality of life and offering visitors opportunities to enjoy scenic views, engage in recreational activities, and experience nature.	The use of BMPs during construction would ensure no negative impacts to human health are caused from air quality changes. The additional recreation area may provide direct, positive benefits to mental health by enhancing quality of life and offering visitors opportunities to enjoy scenic views, engage in recreational activities, and experience nature.
Cultural Services Species conservation	Alternative 1 would have no impact on species' habitat or existence.	Alternative 2 would have no impact on species conservation. Minor, temporary impacts may occur during construction but would not result in the loss of species existence or abundance of suitable habitat.	Alternative 3 would have no impact on species conservation. Minor, temporary impacts may occur during construction but would not result in the loss of species existence or abundance of suitable habitat.
Cultural Services Non-material benefits	Alternative 1 would have negative impacts on mental health and recreation as they relate to ecosystem services, as described in detail in Sections 5.5.2 and 5.5.3.	Alternative 2 would benefit non-material ecosystem services such as mental health, aesthetic experiences, and recreation, as described in detail in Sections 5.5.2 and 5.5.3.	Alternative 3 would benefit non-material ecosystem services such as mental health, aesthetic experiences, and recreation, as described in detail in Sections 5.5.2 and 5.5.3.
Economic Analysis Costs Total Project Investment	-	$39,730,000	$32,345,000
Economic Analysis Costs Annual Project Investment	-	$1,346,000	$1,096,000
Economic Analysis Costs Annual O&M Costs	-	$13,000	$12,000
Economic Analysis Costs Total Annual Project Costs	-	$1,359,000	$1,108,000
Monetized Benefits for Ecosystem Services Provisioning	-	$1,397,000	$974,000

Resource Concern/Item	Alternative 1—No Action Alternative	Alternative 2—6,000-Acre-Foot Reservoir Alternative	Alternative 3—3,000-Acre-Foot Reservoir Alternative
Monetized Benefits for Ecosystem Services Regulating	-	-	-
Monetized Benefits for Ecosystem Services Cultural	-	-	-
Monetized Benefits for Ecosystem Services Supporting	-	-	-
Total Annual Monetized Costs for Ecosystem Services	-	$1,359,000	$1,108,000
Monetized Benefits for Ecosystem Services Benefit-Cost Ratio	-	1.03	0.89
Monetized Benefits for Ecosystem Services Annual Monetized Net Benefit	-	$37,000	-$127,000
Regional Economic Development/Economic Impact Assessment	-	-	-
Regional Economic Development/Economic Impact Assessment Regional Employment	-	-	-
Regional Economic Development/Economic Impact Assessment Regional Income	-	-	-
Regional Economic Development/Economic Impact Assessment Regional Impacts (Other)	-	-	-

*The alternative which best meets each identified criterion is indicated by an 'X'

Prepared: September 2026

6.0 PREFERRED ALTERNATIVE

6.1 Rationale for Preferred Alternative

Alternative 2—6,000-Acre-Foot Reservoir is the Preferred Alternative based on its ability to meet the project purpose and need, meet the federal objective, and provide the most beneficial effects on environmental, social, and economic resources. While both action alternatives meet the project purpose and need and funding requirements, the Preferred Alternative is the only alternative that meets the NEE benefit-cost ratio requirements (Appendix E-1). The Preferred Alternative is the alternative that would maximize net economic benefits. Refer to Figure B-7 in Appendix B for a figure showing the benefitted areas from the Preferred Alternative. The Cooperating Agencies and project sponsors support Alternative 2 as the Preferred Alternative. Refer to Appendix E-3 for Alternatives Memo prepared by Alpha.

Although the Preferred Alternative would have minor effects on various resources, those effects would be minimized or mitigated through implementation of BMPs and other compliance measures. As a tradeoff to those effects, the Preferred Alternative would permanently enhance the efficiency and reliability of AWM in Kane and Washington County. Additionally, as analyzed in the PR&G Analysis (Appendix E-1), there would be positive economic benefits to AWM, recreation, and M&I water supply. When compared to the No Action Alternative, which considers current conditions and future environmental changes, the Preferred Alternative would provide a more reliable and sustainable source of water for agricultural and M&I needs over the long term.

The UDWRe estimates that the proposed Cove Reservoir's average net evaporation (potential evaporation minus precipitation) would be 19.7 inches per year, as opposed to Quail Creek Reservoir’s 39.0 inches and Sand Hollow’s 40.5 inches net evaporation. This makes the proposed Cove Reservoir storage an efficient site for downstream and local uses (PLPCO, 2026).

6.2 Measures to be Installed

Alternative 2 consists of constructing a 6,000-acre-foot reservoir and dam, along with principal spillway with inlet structure and auxiliary spillway with control structure, a gated inlet/outlet control structure at the upstream toe of the dam with concrete encased outlet pipe, recreational facilities, and necessary infrastructure. The dam would feature a 1,900-foot earthen embankment with a central clay core, at a maximum height of 90 feet. Two spillways would be installed: a principal spillway to route the PSH and 100-year flood events through the reservoir without the use of the auxiliary spillway, and an auxiliary spillway to route larger design storm events through the reservoir without overtopping the dam (See Section 4.2.2.1.1.2 for details). The principal spillway pipeline would be 30 inches in diameter. The auxiliary spillway would comprise a trapezoidal, earthen channel, including a concrete weir structure. The project also includes the development of a 4.1-acre recreation area with amenities such as a non-motorized boat ramp, picnic facilities, and RV sites.

To support water conveyance, two pipelines would be constructed: the Reservoir Outlet Pipeline, extending approximately 700 feet, to facilitate water transfer from an existing irrigation system, and the Glendale Irrigation Pipeline, including 1.7 miles of new pipeline to replace old infrastructure. Additionally, the Mt. Carmel Irrigation Pipeline would be developed to provide pressurized agricultural water to areas within the Mt. Carmel area and would include approximately 24,000 linear feet of piping.

Approximately 3.2 miles of access roads would be constructed or improved to ensure mobility and connectivity around the reservoir. Material for construction would be sourced from three designated borrow pits. Refer to Appendices E-2 and E-3 for details on the access road construction.

More details on construction and O&M for the Preferred Alternative are provided in Section 4.2.2.1.

The proposed reservoir would be constructed in compliance with Title 210-TR-60. TR-60 identifies minimum design criteria for dams, with the exception of low-hazard potential dams and appurtenances (USDA, 1990).

Table 6.1. Alternative 2 Measures to be Installed

Project Measures	Description
Reservoir & Dam	Construct a 6,000-acre-foot reservoir and a 1,900-foot earthen embankment dam with a central clay core, max height 90 feet.
Spillways	Install two spillways: (1) principal spillway with 30-inch pipeline for excess flow, (2) auxiliary trapezoidal earthen channel with concrete weir.
Recreation Area	Develop a 4.1-acre recreation area with non-motorized boat ramp, picnic facilities, and RV sites.
Pipelines	Construct multiple pipelines: 700-foot Reservoir Outlet Pipeline; 1.7-mile Glendale Irrigation Pipeline replacement; 24,000-foot Mt Carmel Irrigation pipeline.
Access Roads	Construct or improve 3.2 miles of access roads for connectivity.
Borrow Pits	Source construction material from three designated borrow pits.
Design Standards	Construct in compliance with title 210-TR-60 dam criteria (USDA 1990).

6.3 Irreversible or Irretrievable Commitment of Resources

NEPA requires that environmental analyses include identification of any "…irreversible and irretrievable commitments of resource which would be involved in the Preferred Alternative should it be implemented" (7 CFR 650). Such commitments pertain to situations where environmental resources are dedicated to a specific use that cannot be reversed or recovered once the action is taken. Irreversible effects mainly arise from the use or destruction of specific resources that once used for a project or purpose are an irretrievable commitment and cannot be recovered for future use (e.g., fossil fuels or minerals). Irretrievable resource commitments refer to the loss of value in a

resource that cannot be restored due to an action taken (e.g., the extinction of a threatened species or the disturbance of a cultural site).

Choosing to implement the Preferred Alternative would entail a commitment to various natural, physical, human, and financial resources. Fossil fuels, labor, and construction materials would be consumed. Furthermore, labor and natural resources would be required for the production and preparation of construction materials, which are generally not recoverable. However, these materials are not in short supply, and their use is not expected to negatively impact their continued availability for other uses. Additionally, construction would necessitate a one-time expenditure of federal and cost-share funds that would also be non-recoverable. The commitment of these resources is predicated on the expectation that residents in the local area, state, and region would benefit from the improved conditions post-construction. These anticipated benefits are generally expected to outweigh the permanent commitment of resources described as irreversible or irretrievable. Refer to figure B-7 for a figure showing the benefitted areas from the Preferred Alternative.

6.4 Areas of Controversy

Implementation of the Preferred Alternative is not expected to result in any significant issues or controversies.

During the Plan-EA process, several areas of controversy were identified by the public and have been addressed throughout this Plan-EIS. They are summarized below.

- **Concern**: Plan-EA Adequacy - A more thorough analysis is required.
    - This Plan-EIS has been developed to further analyze the potential effects of the Preferred Alternative. Updates are found throughout the document.
- **Concern**: Purpose and Need - There is no need for a reservoir.
    - A water model was completed for the Preferred Alternative that shows the lack of available water in the summer months to meet the documented needs. Reference Chapter 2.0 and the Cove Water Model in Appendix E-1 for supporting information.
- **Concern**: Recreation - Necessity of recreational opportunities.
    - Current local recreational facilities often become overcrowded with tourists. Reference Section 2.2.1 and Section 3.2.5.2.5 for supporting information.
- **Concern**: Water Rights - Concern with water right ownership.
    - The combined water rights of the Glendale, Orderville, and Mt. Carmel Irrigation Companies allows for the diversion of water year-round. Refer to the Cove Water Model for details on water rights ownerships and consumptive use history. Reference the Cove Water Model in Appendix E-1 for supporting information.

- **Concern**: Dam Safety - Downstream home and property safety.
    - The Cove Reservoir site provides the least amount of damage to downstream properties as evaluated in the alternatives analysis. KCWCD is also in the process of purchasing downstream properties to mitigate public safety impacts. These purchased properties would not be affected by any project development. Reference Chapter 4.3 and Section 5.5.3 for supporting information.
- **Concern**: Downstream Impacts.
    - A water model was completed for the Preferred Alternative which shows minor impacts to downstream river flows. Reference Chapter 5.0, the BA. and the Cove Water Model in Appendix E-1 for supporting information.
- **Concern**: Water Availability - There is not enough water available for a reservoir.
    - A water model was completed for the Preferred Alternative which shows minor impacts to EFVR flows. Reference Chapter 5.0 and the Cove Water Model in Appendix E-1 for supporting information.
- **Concern**: Borrow Pits - Sedimentation in the EFVR from driving to the borrow pits.
    - Access to the existing borrow pits would be along existing roadways and would cause minor, temporary fugitive dust and sediment deposition during construction. Reference Section 5.2.2 and the Cove Plan of Development in Appendix E-1 for supporting information.
- **Concern**: WSR Values - Concern with effects to the W&S status of the river.
    - An analysis on impacts to the wild and scenic values of the EFVR are included in Section 5.2.6.
- **Concern**: Public Values of designated wilderness, WSA, or RNAs areas.
    - No impacts to designated wilderness, WSA's, or RNAs would occur from implementation of the Preferred Alternative. Reference Section 5.4.4 for supporting information.
- **Concern**: Riparian/Ecological Values - Changes to river flow may impact the downstream ecosystem.
    - The Preferred Alternative is anticipated to have positive benefits on riparian values due to the creation of new habitat surrounding the reservoir. Reference Section 5.4.7 and the Cove Water Model in Appendix E-1 for supporting information.
- **Concern**: Economic Issues - The costs outweigh the benefits.
    - A full cost-benefit analysis was completed per the DM 9500-013 and resulted in a cost-benefit ratio of greater than 1. Reference the PR&G in Appendix E-1 for supporting information.

- **Concern**: Threatened and Endangered Species and Species of Greatest Conservation Need - Damage to the Virgin spinedace.

    - The Virgin spinedace is a State fish Species of Greatest Conservation Need with potential to occur within the ZNP portion of the project area. Changes in water flow within the EFVR would be minor, particularly when the natural variation of EFVR flows are approximately 100 times the range of effect from proposed Cove Reservoir releases (Alpha Engineering 2025), and therefore, no long-term impacts are anticipated. Reference Section 5.4.6 for supporting information.

- **Concern**: Crop Production - Alfalfa uses too much water.

    - Alfalfa is a critical rotation crop in the U.S. as a major animal feed source and has numerous environmental benefits including high water use efficiency, low chemical inputs, high resiliency, crop rotation benefits, reduction in soil erosion, and agro-ecosystem benefits. Refer to the Importance of Alfalfa Hay memo in Appendix E-3 for supporting information. Alfalfa was selected to determine the benefits for this project because of its importance as a major feed source, its economic value, and its suitability to Utah's local climate and growing season.

- **Concern**: Climate Variation - Water flow in relation to climate variation.

    - Water availability is anticipated to continue to decrease over time as climate variation occurs. The Preferred Alternative would provide a reliable source of water for agriculture and M&I benefits and would not contribute to variations in climate. Reference the Cove Water Model in Appendix E-1 for supporting information.

6.5 Permits and Compliance

The federal, state, and local permits and compliance actions described in this chapter would be required for construction of the Preferred Alternative.

6.5.1 Federal

6.5.1.1 USFWS

The project area has been evaluated for the potential occurrence of federally listed threatened, endangered, or candidate plant and animal species or their habitat. The USFWS IPaC site was accessed, and a BA has been completed for the study area (Appendices E-1 and E-2). Thirteen federally listed species were identified as potentially occurring within or near the project area. Based on the analysis conducted in the BA, a determination of **May Affect, but is Not Likely to Adversely Affect** was made for five federally listed species from implementation of the Preferred Alternative (Appendices E-1 and E-2). A determination of **No Effect** was made for the remaining federally listed species and their habitat. Finally, a determination of **May Affect, but Not Likely to Adversely Affect** was made for designated critical habitat for three species. Informal consultation for Section 7 of the ESA was completed on September 9, 2026, with a concurrence from USFWS received (Appendix A). No permits from USFWS would be required.

6.5.1.2 USACE

Under Section 404 of the CWA, a USACE permit would be required for discharge of dredge or fill materials in WOTUS, including wetlands. Consultation with the USACE has determined that a Nationwide Permit and a Utah Stream Alteration Permit would be required for this project.

6.5.1.3 NPS

As a water resources project requiring federal assistance located upstream of a designated WSR, this project must be evaluated in accordance with Section 7 of the WSRs Act, to determine if it would invade the river area or unreasonably diminish the river's scenic, recreational, fish, or wildlife values. On August 29, 2025, via email, the NPS stated that they will not be conducting a Section 7 analysis for this project (Appendix A). Coordination with the ZNP as a cooperating agency has been ongoing throughout the life of the project and is summarized in Chapter 7.0 (Consultation).

6.5.2 State of Utah

6.5.2.1 Utah Division of Water Rights and Dam Safety

Approval would be required for the final design report, construction drawings, and specifications by the Utah State Assistant Engineer.

6.5.2.2 Utah Division of Water Quality

Under Section 401 of the CWA, approval would be required from the UDWQ so that the project does not violate state water quality standards. Additionally, certification is obtained as part of the Section 404 Permit review process with USACE. Under Section 402 of the CWA, a Utah Pollutant Discharge Elimination System (UPDES) Storm Water General Permit for Construction Activities is required for construction activities that disturb more than 1.0 acre and discharge pollutants to surface waters. A Stormwater Pollution Prevention Plan (SWPPP) would be developed, including submitting an NOI to the Utah Division of Water Quality.

6.5.2.3 Utah State Historic Preservation Office

Consultation has been performed with the Utah SHPO during this Plan-EIS process, and the results are summarized in Section 7.1.10. If, during construction, previously unevaluated cultural resources are discovered, work would be stopped, the area of discovery would be given adequate protection, and the NRCS and SHPO would be notified immediately. Procedures for discoveries outlined in the cultural resources USDA NRCS State Level Agreement (NRCS Agreement No. A-8D43-15-15) would be followed (Appendix E-3).

6.5.2.4 Utah Division of Oil, Gas, and Mining

If riprap for dam and spillway construction would be obtained from a source that does not have an existing mining permit, then a mining operations permit would be required to mine the riprap.

6.5.3 Local

A Watershed Agreement and an MOU would be completed and signed by the NRCS and SLOs prior to the obligation of construction funds for the Preferred Alternative. Any additional county and local permits that would be required for this project would be obtained prior to construction.

6.6 Mitigation of Potential Effects

The following are applicant-committed mitigation and protection measures that would be implemented as part of the Preferred Alternative. Additional BMPs and Standard Operating Procedures are identified in Appendix E-3. The impact analysis in Chapter 5.0 assumes that all these measures would be fully implemented during construction and maintenance of the Preferred Alternative.

6.6.1 General Measures

- Implementation of the Preferred Alternative would comply with all applicable federal and state laws and regulations, as well as local zoning and building ordinances during all phases of the project.
- Construction activities would be limited to the smallest extent practicable within the project area.
- During construction activities, vehicle parking and material stockpiles would be located within designated staging areas.
- Construction personnel would adhere to state and NRCS fire prevention and suppression requirements; construction personnel will always have fire tools and extinguishers available.
- Disturbed areas not used as part of the reservoir dam, recreation site, road or dam infrastructure would be restored to preconstruction conditions after construction was completed.
- Borrow sites would be cleaned, recontoured, and any debris removed, per instructions of the owner.
- An Emergency Action Plan would be developed prior to construction of the Proposed Action.

6.6.2 Soil

- No ground disturbance would occur during or immediately following precipitation events or under any wet conditions that would create deep ruts.
- Upon completion of construction activities, the disturbed areas would be recontoured to:
    - Minimize erosion and compaction.
    - Restore natural ground cover.

  - Reestablish plant growth.
  - Allow natural surface drainage.

- Silt fences, straw bales, and/or other appropriate BMPs (Appendix E-3) would be used to minimize erosion of disturbed areas, as needed.

6.6.3 Water

- A SWPPP that contains erosion and sediment control/pollutant prevention BMPs would be required and implemented. The BMPs would include, but are not limited to:
  - Silt fences.
  - Fiber wattles.
  - Earth berms.
- Construction and staging areas would be assessed to determine the feasibility of appropriate sediment control BMPs to prevent entry of sediment and other contaminants into downstream drainages.
- Petroleum-based fuels and other hazardous materials (including fuel for construction machinery) would be restricted to approved, designated staging/batch plant areas to ensure that accidental spills do not enter waters.
- Federal and state water quality standards and toxic effluent standards would be implemented to minimize potential adverse effects from discharges into WOTUS.
- Fueling of vehicles and equipment would be prohibited within 100 feet of any riparian area.
- The amount of waste material would be minimized to the furthest extent possible. Any excess material would be transported to an approved landfill at the earliest opportunity.
- Additional measuring devices would be installed to record flows into and out of the Cove Reservoir. Metering devices would be installed to record flows through the existing Orderville hydroelectric power plant that will release water rights owned by the WCWCD back into the EFVR, as well as water-right shortages being delivered from the reservoir to the Mt. Carmel and Orderville irrigation companies. These meter records would also be filed annually with the Utah State Division of Water Rights.

6.6.4 Air Quality

- Water or an approved dust suppression/soil binder would be applied to areas disturbed during construction activities, as necessary, to reduce fugitive dust and to limit visual and air quality impacts.
- Adequate freeboard in all trucks transporting material would be maintained to reduce dust during transportation/handling. Additionally, watering or covering loads to reduce emissions during material transportation/handling would be used, as necessary.

- A stabilized construction entrance (track-out pad), wheel washers, and/or other similar BMPs at construction site access points would be provided to reduce track-out of site materials onto the adjacent roadway network.

- Material stockpiles would be watered, as necessary, to prevent windblown dust.

- Vegetation cover would be established in disturbed areas as soon as possible to reduce windblown dust.

- Appropriate emission control devices on all construction equipment would be required.

- Use of clean burning fuels would be required.

- Only properly operating, well-maintained, construction equipment would be used.

6.6.5 Plants and Animals

- The minimum vegetation necessary would be removed for construction or maintenance activities.

- An NRCS-approved, weed-free, native seed mix would be used where seeding is required.

- Established cottonwood trees in riparian areas would be left in place for fish and wildlife habitat.

- A detailed weed control plan would be provided by the NRCS for approval before construction.

- All equipment would be cleaned of soil, seeds, vegetation matter, and other debris prior to entering or reentering the project area to avoid any introduction of non-native plants and weeds.

- Vegetation would be monitored periodically for the potential establishment of noxious weeds.

- Use of herbicides would comply with NRCS requirements.

- A post-construction period weed control plan would be developed by KCWCD.

- Any use of herbicides would comply with all federal and state requirements.

- Prior to stocking the proposed reservoir with fish, a management plan will be developed to ensure that non-native fish species do not escape from the reservoir into the EFVR. The management plan would meet nonnative stocking and control requirements. Cooperating Agencies would have an opportunity to review this plan prior to its implementation.

- Any fish stocking would adhere to state and federal regulations and would be the responsibility of the Utah Division of Wildlife Resources.

- Any unexpected encounters with a protected species would be immediately reported to UDWR, USFWS, and NRCS.

- Coordination would be maintained with WCWCD regarding construction activities and potential impacts to downstream Virgin River habitat.

- Native milkweed (*Asclepias* spp.) and other monarch butterfly (*Danaus plexippus*) pollinator-friendly native plant species would be included in reclamation seed mixes per NRCS and USFWS guidance.

- Disturbance of any encountered milkweed habitat would be avoided to the extent possible.

- All open pits or trenches would be monitored throughout construction to prevent entrapment of wildlife.

- Excavated holes more than 2 feet deep would be covered at the close of each day or provided with one or more escape ramps. Alternatively, fencing may be erected around open pits or trenches.

- Before pits or trenches are filled, they would be inspected for trapped animals. If found, they would be moved by a qualified biologist approved by the UDWR and NRCS.

- No rodenticides would be used on the project site.

- Where possible, construction activities, including habitat alteration and noise, would be conducted outside of Utah's migratory bird primary nesting season (April 1 to July 15). In Utah, the migratory bird nesting season can extend from January 1 to August 31 (especially for raptors). Therefore, a preconstruction survey for nesting birds would be conducted by a qualified biologist approved by the UDWR and NRCS no more than 5 days prior to the beginning of on-site work. If an active nest is identified, a no-activity buffer, as approved by the UDWR and NRCS, would be established around the nest site and would remain in place until the young have fledged and/or the nest becomes non-active (USFWS 2002a). Follow-up surveys to confirm that all young have successfully fledged would be conducted by a qualified biologist prior to construction in that area.

- After such surveys are performed and disturbance occurs, no additional disturbance during the avian breeding season would occur without first conducting an additional avian survey.

- If the existing topography limits line-of-sight between an active nest and construction activities, spatial and seasonal buffers may be reduced.

- Should an active migratory bird nest be discovered, the appropriate UDWR and NRCS agency biologist would be notified, and an appropriate buffer would be established around the nest until the migratory bird nesting period is over or young have fledged.

- No mature riparian trees would be removed during construction activities unless approved by UDWR and NRCS.

- No machinery would be permitted in the EFVR except for along existing roadways.

- Refuse and trash, including stakes and flags, would be removed and properly disposed of on a regular basis.

6.6.6 Human

- To resolve adverse effects to NRHP eligible sites, an inadvertent discovery plan will be prepared and supplied to construction crews, in addition to the preparation and execution of a MOA.

- If cultural resources are discovered during construction activities, all ground disturbing activities within 50 feet of the discovery shall cease and the NRCS and/or BLM or UTLA archaeologist would be notified.

- Avoidance fencing will be installed using a 50-foot buffer around existing sites.

- If the location of any ground disturbing activities changes be beyond those previously surveyed/analyzed, a new cultural resources evaluation would be conducted, and the NRCS and/or BLM or UTLA archaeologist would be consulted.

- If human remains are discovered under any circumstances, all work in the immediate vicinity (100 feet) would immediately halt, and the Kane County Sheriff, the NRCS and/or BLM or UTLA archaeologist, and the Utah State History's Human Remains Program would be contacted. The location of the discovery would be secured and monitored to prevent further impacts, and the location would be kept confidential. The remains would be treated in accordance with the requirements of the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.) and its implementing regulations (43 CFR 10). The NRCS and/or BLM or UTLA shall consult, pursuant to 43 CFR 10.5, to develop a written plan of action to manage the discovery. After approval of the plan by the consulting parties, mitigation would proceed. Construction near the remains may need to be halted throughout the review process. Continuation of work following a discovery would be contingent upon approval by the NRCS archaeologist in consultation with the Utah SHPO, Native American Tribes, and other consulting parties. Construction at this location would not resume until NRCS and/or BLM or UTLA consultation has been completed and approval to proceed has been given.

- Construction personnel would be instructed to be observant for cultural/historic objects. Training would be conducted by a qualified archaeologist approved by the NCRS.

- Visible structures (including metal structures) would be painted or otherwise treated to not be shiny or reflective. Facilities would be of a color that blends into the surrounding landscape (no bright colors such as red, yellow, or orange would be used).

- Areas disturbed during construction activities would be restored to preconstruction conditions. This would be accomplished by grading to match natural contours and stabilizing through establishment of ground cover. These areas would be reestablished by seeding with an herbaceous plant seed mixture and revegetation with NRCS-approved plant species to match the surrounding native plant community.

- Signs would be posted in local communities regarding the schedule for construction in the project area.
- Construction haul trucks would use caution and maintain safe travel speeds and distances.
- Construction noise levels would be minimized to the extent possible with proper maintenance of construction equipment and the use of approved noise mufflers.
- All federal, state, and local laws/regulations pertaining to pollution and contamination of the environment would be followed to prevent pollution of surface water, groundwater, soil, and air with any hazardous materials.
- Construction sites, staging areas, and access roads would be kept orderly during construction.
- Refuse and trash, including stakes and flags, would be removed and properly disposed of on a regular basis.
- Portable toilets would be used on-site and maintained on a regular schedule.
- No equipment oil or fuel would be drained on the ground; oils or chemicals would be hauled to an approved site for disposal.
- Diesel fuel, hydraulic fluids, and engine oil products would be the only hazardous material liquids used on site.
- All toxic substances (e.g., oil, gas, antifreeze) would be always stored in closed containers.
- Accidental spills would be cleaned immediately.
- NRCS and other regulatory agencies would be immediately notified in the event of a fuel/oil or hazardous material spill. Actions would be taken to minimize the amount of, and spread of, the spill material including straw bale plugs, earthen berms, and the use of absorbent materials. If necessary, soil remediation would be conducted including the removal of contaminated soils to an approved facility and soil sampling to verify successful site remediation.
- The KCWCD would be responsible for compliance with applicable local, state, and federal regulations related to the use, handling, storing, transporting, and disposing of hazardous materials on non-federal lands.
- During construction, all personnel would be required to conform to contractor safety procedures.
- All personnel would be adequately trained to perform their tasks.
- Heavy equipment would be outfitted with Occupational Safety and Health Administration-required safety devices such as backup warnings and seat belts.

- Hard hats, safety boots, ear/eye protection, and other personal protective equipment would be used on-site.

- All accidents and injuries would be reported to the appropriate contractor safety officer.

- The KCWCD would work with the Southwest Utah Public Health Department and Southwest Mosquito Abatement District regarding the testing of waters or habitat areas for presence of disease vectors. The KCWCD would notify the public regarding any such concerns.

- If significant scientific resources are discovered during construction activities, all ground-disturbing activities within 100 feet of the discovery shall cease, and the project paleontologist would be notified.

- Construction personnel would be instructed to observe for fossils. Training would be conducted by the project paleontologist.

6.7 Costs and Cost-Sharing

Table 6.3 presents the total project cost of $39,730,000 for the Preferred Alternative. The PL 83-566 funds would support $24,889,000 (62.6%) of the total project cost, whereas the remaining $14,841,000 (37.4%) amount would be contributed by other, non-federal funds. Table 6.4 itemizes the costs for each project measure and the distribution of how the costs would be shared by the sponsors and NRCS for each cost item.

- Construction costs account for all material, labor, and equipment necessary for the installation of piping associated with the Preferred Alternative. These costs were estimated based on similar installations at irrigation districts in Southern Utah. The planning construction costs are estimated using the best available information about the project without having detailed design information.

- Engineering costs were estimated as a percentage of construction costs.

- The costs presented are planning level estimates and do not reflect final costs. Detailed designs and construction cost estimates would be completed prior to initiating the project. Final construction costs would only reflect the time and materials to perform the work.

6.8 Ecosystem Services Benefits

The Preferred Alternative would provide the following ecosystem services benefits:

- **Provisioning services, agricultural land**—Approximately 430 acres of land would benefit from the increased water availability provided by the reservoir.

- **Provisioning services, agricultural water**—The Preferred Alternative would increase the available amount of agricultural, and M&I water by a maximum of approximately 2,148 afy.

- **Regulating services, water quality and quantity**—The Preferred Alternative would improve water quality in the EFVR indirectly by containing sediment within the reservoir during flash flooding events.

- **Regulating services, riparian zones**—The creation of riparian vegetation under Alternative 2 would benefit the ecosystem services that riparian habitat provides like water filtration, nutrient cycling, and wildlife habitat.

- **Supporting services, wildlife habitat**—The Preferred Alternative would continue to provide habitat for plants and wildlife within the EFVR while providing additional habitat within the Cove Reservoir.

- **Cultural services, recreation**—The Preferred Alternative would provide new recreational opportunities at the Cove Reservoir site.

- **Cultural services, non-material benefits**—The Preferred Alternative would benefit non-material ecosystem services such as mental health, aesthetic experiences, and recreation.

See Chapter 5.0 for detail on ecosystem service benefits from the Preferred Alternative.

6.9 Installation and Financing

This chapter provides further details regarding installation and financing for the Preferred Alternative.

6.9.1 Installation

The Preferred Alternative would be implemented in a planned sequence as discussed in the Cove Reservoir Plan of Development (Appendices E-2 and E-3). The NRCS and sponsor responsibilities of the project are outlined in Section 6.9.2. No preconditions are anticipated for installing the project.

6.9.2 Responsibilities

The NRCS is responsible for leading the planning efforts, providing engineering design and construction oversight assistance, and certifying project completion. The KCWCD along with the WCWCD are responsible for engineering design, project administration, environmental permitting, contracting, and construction implementation. The KCWCD and WCWCD have the needed authority as water irrigation districts, governed by Utah Code 17B-2A-1002, and has agreed to exercise those authorities to implement the actions described in this Plan-EIS.

6.9.3 Contracting

The water delivery pipelines would be completed using NRCS funding mechanisms. The KCWCD and WCWCD would be primarily responsible for overseeing and administering project construction in coordination with NRCS.

6.9.4 Real Property Rights

Approximately $840,000 would be spent on real property rights, with 16 percent of funding covered by PL 83-566 and the remaining 84 percent covered by other funds. Real property acquisition or relocations would be required for the Preferred Alternative. All construction would be completed within existing ROWs or easements.

6.9.5 Financing

The NRCS would provide 62.6 percent of the total project cost for the Preferred Alternative through PL 83-566. The KCWCD along with WCWCD are responsible for the remaining 37.4 percent of the costs, including funds that are not eligible under the National Watershed Program (e.g., administration and technical assistance). Table 6.1 includes annual installation costs and the proportion of funding through PL 83-566.

The required match funding would be expected to be provided through a mix of grants, loans, and patron assessments. For financing, the project sponsor would apply for funding. The KCWCD and WCWCD do not anticipate changing per-acre annual rates or the overall base assessment fee because of any capital improvement project that is fully funded through grants.

The O&M costs after project completion would be provided through the revenues of Cove Reservoir. The O&M costs would not increase due to the project and would be budgeted on an annual basis.

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

6.10 Operation, Maintenance, and Replacement

Operation includes the administration, management, and performance of other actions needed to keep the proposed Cove Reservoir and associated facilities safe and functioning as planned. Maintenance includes performance of work, preventing deterioration, and repairing damage or replacement of structures if one or more of their components fail. Damage to any of the completed structures caused by normal deterioration, droughts, flooding, or vandalism, is considered maintenance.

Measures in this Plan-EIS would be operated and maintained by the KCWCD with technical assistance from appropriate federal, state, and local agencies in accordance with their delegated authority. A specific O&M Plan would be prepared using the NRCS National O&M Manual. The KCWCD's liability for O&M would extend throughout the actual life of the structure.

A separate O&M Agreement would be developed before construction that would provide inspections, reports, and procedures for performing the maintenance items. The agreement would include specific provisions for retention, use, and disposal of property acquired or improved with PL 83-566 assistance. The term of this new O&M Agreement would be for a period of 100 years, which is the life expectancy of the project. The overall average amortization and O&M costs after initial construction would be approximately $13,000 annually.

The structures would be inspected by the KCWCD on a regularly scheduled basis and during, or immediately following, major storms, earthquakes, or other occurrences that may adversely affect the structures and appurtenant works.

6.11 Emergency Action Plan

Due to the high-hazard classification of the proposed dam, an EAP would be developed by the sponsor and other local groups before initiating construction.

6.12 Economic Tables and Structural Tables

The installation cost estimate for the Preferred Alternative is $39,730,000 as indicated in Table 6.2 (Economic Table 1). The following economic and structural tables include information relevant to the costs and benefits that would result from the implementation of the Preferred Alternative. Total costs are rounded to the nearest $1,000.

Table 6.2. (Economic Table 1) Estimated Installation Cost—East Fork Virgin Watershed, Utah, 2026 Dollars.

Works of Improvement	Units	Number of Federal Land	Number of Non-Federal Land	Number Total	PL 83-566 Funds Federal Land (Dollars)	PL 83-566 Funds Non-Federal Land (Dollars)	PL 83-566 Funds Total (Dollars)	Other Funds Federal Land (Dollars)	Other Funds Non-Federal Land (Dollars)	Other Funds Total (Dollars)	Grand Total (Dollars)
Reservoir and Dam[1]	Cubic Yards	-	1	1	-	$20,889,301	$20,889,301	-	$13,206,200	$13,206,200	**$34,096,000**
Glendale Irrigation Pipeline	Linear Feet	-	1	1	-	$597,537	$597,537	-	$174,475	$174,475	**$772,000**
Mt. Carmel Irrigation Pipeline	Linear Feet	-	1	1	-	$2,170,775	$2,170,775	-	$633,844	$633,844	**$2,805,000**
Recreational Facilities	Cubic Yards	-	1	1	-	$416,207	$416,207	-	$335,069	$335,069	**$751,000**
Access Roads	Linear Feet	-	1	1	-	$815,109	$815,109	-	$490,991	$490,991	**$1,306,000**
Total Project	-	-	**5**	**5**	-	**$24,889,000**	**$24,889,000**	-	**$14,841,000**	**$14,271,000**	**$39,730,000**

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The Estimated Cost Distribution (Table 6.3 Economic Table 2) shows the estimated costs to be charged to the PL 83-566 funds along with other costs. These costs include those that would be associated with the reservoir and dam, Glendale Irrigation Pipeline, Mt. Carmel Irrigation Pipeline, recreational facilities, and access roads. No cost would be associated with the Washington County portion of the project. Total costs are rounded to the nearest $1,000.

[1] Includes Dam Construction and Land Rights ($840,000)

Table 6.3 (Economic Table 2). Estimated Cost Distribution—Water Resource Project Measures—East Fork Virgin Watershed, Utah, 2026 Dollars

Works of Improvement	Installation Cost—PL 83-566 Construction[2]	Installation Cost— PL 83-566 Engineering[3]	Installation Cost— PL 83-566 Real Property Rights	Installation Cost— PL 83-566 Project Admin	Installation Cost— PL 83-566 Total	Installation Cost—Other Funds Construction	Installation Cost—Other Funds Engineering	Installation Cost—Other Funds Real Property Rights	Installation Cost—Other Funds Project Admin	Installation Cost—Other Funds Total	Grand Total Cost
Reservoir and Dam	$16,962,912	$3,591,594	$135,261	$199,534	**$20,889,000**	$12,301,927	$0.00	$704,739	$199,534	**$13,206,000**	**$34,096,000**
Mt. Carmel Irrigation Pipeline	$1,851,048	$302,899	$0.00	$16,828	**$2,171,000**	$617,016	$0.00	$0.00	$16,828	**$634,000**	**$2,805,000**
Glendale Irrigation Pipeline	$509,528	$83,377	$0.00	$4,632	**$598,000**	$169,843	$0.00	$0.00	$4,632	**$174,000**	**$772,000**
Recreational Facilities	$330,561	$81,138	$0.00	$4,508	**$416,000**	$330,561	$0.00	$0.00	$4,508	**$335,000**	**$751,00**
Access Roads	$666,213	$141,059	$0.00	$7,837	**$815,000**	$483,154	$0.00	$0.00	$7,837	**$491,000**	**$1,306,00**
Total	**$20,320,000**	**$4,200,000**	**$135,000**	**$233,000**	**$24,889,000**	**$13,903,000**	$0.00	**$705,000**	**$233,000**	**$14,841,000**	**$39,730,000**

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Cost allocation and cost sharing summary for the Preferred Alternative are presented in Table 6.4 (Economic Table 2a). The proposed dam and associated recreation facilities are included.

[2] Includes $175,000 of PL 83-566 funds and $0 of other funds for cultural resource protection and mitigation measures.
[3] Engineering services contract cost to be borne: $4,200,000 by PL 83-566 funds and $0 by other funds.

Table 6.4 (Economic Table 2a). Cost Allocation and Cost Sharing Summary for Multipurpose Watershed Project Plans—East Fork Virgin Watershed, Utah, 2026 Dollars.

Works of Improvement*	Cost Allocation Purpose Ag Water Mgmt.	Cost Allocation Purpose Recreation	Cost Allocation Purpose M&I Water Supply	Cost Allocation Purpose Total	Cost Sharing PL 83-566 Ag Water Mgmt.	Cost Sharing PL 83-566 Recreation	Cost Sharing PL 83-566 M&I Water Supply	Cost Sharing PL 83-566 Total	Cost Sharing Other Ag Water Mgmt.	Cost Sharing Other Recreation	Cost Sharing Other M&I Water Supply	Cost Sharing Other Total
Multi-Purpose Structure Reservoir and Dam	32%	32%	36%	**100.0%**	-	-	-	**-**	-	-	-	**-**
Multi-Purpose Structure Construction	$9,321,970	$9,424,742	$10,518,128	**$29,265,000**	$6,991,477	$4,712,371	$5,259,064	**$16,963,000**	$2,330,492	$4,712,371	$5,259,064	**$12,302,000**
Multi-Purpose Structure Project Admin	$127,118	$128,519	$143,429	**$399,000**	$63,559	$64,260	$71,715	**$200,000**	$63,559	$64,260	$71,715	**$200,000**
Multi-Purpose Structure Engineering	$1,144,060	$1,156,673	$1,290,861	**$3,592,000**	$1,144,060	$1,156,673	$1,290,861	**$3,592,000**	$0.00	$0.00	$0.00	**$0.00**
Multi-Purpose Structure Real Property Rights	$267,572	$270,522	$301,906	**$840,000**	$0.00	$135,261	$0.00	**$135,000**	$267,572	$135,261	$301,906	**$705,000**
Multi-Purpose Structure Subtotal	**$10,861,000**	**$10,980,000**	**$12,254,000**	**$34,096,000**	**$8,199,000**	**$6,069,000**	**$6,622,000**	**$20,889,000**	**$2,662,000**	**$4,912,000**	**$5,633,000**	**$13,206,000**
Mt. Carmel Pipeline Construction[43]	$2,468,065	$0.00	$0.00	**$2,468,000**	$1,851,048	$0.00	$0.00	**$1,851,000**	$617,016	$0.00	$0.00	**$617,000**
Mt. Carmel Pipeline Project Admin	$33,655	$0.00	$0.00	**$34,000**	$16,828	$0.00	$0.00	**$17,000**	$16,828	$0.00	$0.00	**$17,000**
Mt. Carmel Pipeline Engineering	$302,899	$0.00	$0.00	**$303,000**	$302,899	$0.00	$0.00	**$303,000**	$0.00	$0.00	$0.00	**$0.00**
Mt. Carmel Pipeline Subtotal	**$2,805,000**	**$0.00**	**$0.00**	**$2,805,000**	**$2,171,000**	**$0.00**	**$0.00**	**$2,171,000**	**$634,000**	**$0.00**	**$0.00**	**$634,000**
Glendale Irrigation Pipeline Construction[5]	$679,371	$0.00	$0.00	**$679,000**	$509,528	$0.00	$0.00	**$510,000**	$169,843	$0.00	$0.00	**$170,000**

[4] Includes $175,000 of PL 83-566 funds and $0 of other funds for cultural resource protection and mitigation measures.

[5] Includes $10,000 for permits.

Works of Improvement*	Cost Allocation Purpose Ag Water Mgmt.	Cost Allocation Purpose Recreation	Cost Allocation Purpose M&I Water Supply	Cost Allocation Purpose Total	Cost Sharing PL 83-566 Ag Water Mgmt.	Cost Sharing PL 83-566 Recreation	Cost Sharing PL 83-566 M&I Water Supply	Cost Sharing PL 83-566 Total	Cost Sharing Other Ag Water Mgmt.	Cost Sharing Other Recreation	Cost Sharing Other M&I Water Supply	Cost Sharing Other Total
Glendale Irrigation Pipeline Project Admin	$9,264	$0.00	$0.00	**$**9,000	$4,632	$0.00	$0.00	**$5,000**	$4,632	$0.00	$0.00	**$5,000**
Glendale Irrigation Pipeline Engineering	$83,377	$0.00	$0.00	**$83,000**	$83,377	$0.00	$0.00	**$83,000**	$0.00	$0.00	$0.00	**$0.00**
Glendale Irrigation Pipeline Subtotal	**$772,000**	**$0.00**	**$0.00**	**$772,000**	**$598,000**	**$0.00**	**$0.00**	**$598,000**	**$174,000**	**$0.00**	**$0.00**	**$174,000**
Recreational Facilities Construction	$0.00	$661,122	$0.00	**$661,000**	$0.00	$330,561	$0.00	**$331,000**	$0.00	$330,561	$0.00	**$331,000**
Recreational Facilities Project Admin	$0.00	$9,015	$0.00	**$9,000**	$0.00	$4,508	$0.00	**$5,000**	$0.00	$4,508	$0.00	**$5,000**
Recreational Facilities Engineering	$0.00	$81,138	$0.00	**$81,000**	$0.00	$81,138	$0.00	**$81,000**	$0.00	$0.00	$0.00	**$0.00**
Recreational Facilities Subtotal	**$0.00**	**$751,000**	**$0.00**	**$751,000**	**$0.00**	**$416,000**	**$0.00**	**$416,000**	**$0.00**	**$335,000**	**$0.00**	**$335,000**
Access Roads Construction	$366,117	$370,154	$413,096	**$1,149,000**	$274,588	$185,077	$206,548	**$666,000**	$91,529	$185,077	$206,548	**$483,000**
Access Roads Project Admin	$4,993	$5,048	$5,633	**$16,000**	$2,496	$2,524	$2,817	**$7,837**	$2,496	$2,524	$2,817	**$8,000**
Access Roads Engineering	$44,933	$45,428	$50,698	**$141,000**	$44,933	$45,428	$50,698	**$141,000**	$0.00	$0.00	$0.00	**$0.00**
Access Roads Subtotal	**$416,000**	**$421,000**	**$469,000**	**$1,306,000**	**$322,000**	**$233,000**	**$260,000**	**$815,000**	**$94,000**	**$188,000**	**$209,000**	**$491,000**
Grand Total	**$14,853,000**	**$12,152,000**	**$12,724,000**	**$39,730,000**	**$11,289,000**	**$6,718,000**	**$6,882,000**	**$24,889,000**	**$3,564,000**	**$5,435,000**	**$5,842,000**	**$14,841,000**

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Details of the estimated costs for the recreational facilities are presented in Table 6.5 (Economic Table 2b).

Table 6.5 (Economic Table 2b). Recreational Facilities—Estimated Construction Costs—East Fork Virgin Watershed, Utah, 2026 Dollars[6].

Works of Improvement	Number	Estimated Unit Cost	Total Construction Cost
Mobilization at 5%	1 (lump sum)	$28,620.00	$28,620
Excavation and Subgrade Prep	88,000 SF[8]	$2.00	$176,000
6" Reinforced Concrete (non-motorized Boat Ramp)	6,500 SF	$12.50	$81,250
6" Untreated Base Course (non-motorized Boat Ramp)	6,500 SF	$1.50	$9,750
6" Untreated Base Course (Parking)	28,500 SF	$1.50	$42,750
6" Untreated Base Course (Roads)	53,000 SF	$1.50	$79,500
Camp/RV Site Facilities (Barbeque Grill, Table, Fire Pit)	20 (each)	$1,320.00	$26,400
Pavilion	1 (each)	$66,000.00	$66,000
Signage	5 (each)	$550.00	$2,750
Restroom Facility (Assume Pit Toilet System)	2 (each)	$44,000.00	$88,000
Subtotal	-	-	$601,020
Contingency (10%)	-	-	$60,102
Project Administration (1.5%)	-	-	$18,031
Engineering, legal, and fiscal (13.5%)	-	-	$72,122
Total Recreation	-	-	$751,275

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Table 6.6 depicts important physical characteristics for the proposed Cove Reservoir.

[6] Price base: FY 2026
[7] Estimated Quantity, subject to minor variation at the time of detailed planning
[8] Square Feet

Table 6.6. Structural Data—Dams with Planned Storage Capacity—East Fork Virgin Watershed, Utah.

Item	Unit	Total
Class of structure	-	High
Peak Ground acceleration	G	0.41
Uncontrolled drainage area	$Mile^2$	4.7
Controlled drainage area	$Mile^2$	0
Total drainage area	$Mile^2$	4.7
Runoff curve no. (1-day) (AMC II)	-	78
Time of concentration	Hours	1.58
Elevation top dam	Feet	5,552.0
Elevation crest auxiliary spillway	Feet	5,549.0
Elevation crest high stage inlet	Feet	5,545.5
Elevation crest low stage inlet	Feet	N/A
Auxiliary spillway type	-	Earth, trapezoidal
Auxiliary spillway bottom width	Feet	30
Auxiliary spillway exit slope	Percent	15
Maximum height of dam	Feet	90
Volume of fill	$Yard^3$	1,806,900
Total capacity[9]	Acre-feet	6,775
Sediment submerged	Acre-feet	403
Sediment aerated	Acre-feet	15
Beneficial use Irrigation	Acre-feet	4,618 (1,360 Yield)
Beneficial use M&I	Acre-feet	1,019 (300 Yield)
Beneficial use Recreation	Acre-feet	300
Floodwater retarding	Acre-feet	720
Between high and low stage	Acre-feet	n/a
Surface Area–Sediment pool[10]	Acre	39
Surface Area–Beneficial use pool Irrigation, M&I, Recreation	Acre	90
Surface Area–Floodwater retarding	Acre	201
Principal Spillway Design–Rainfall volume (1-day)	Inches	3.5
Principal Spillway Design–Rainfall volume (10-day)	Inches	6.8
Principal Spillway Design–Runoff volume (10-day)	Inches	2.9

[9] Crest of auxiliary spillway

[10] If reservoir contains beneficial storage or if sediment capacity will not store water, show area in parenthesis and footnote accordingly.

Item	Unit	Total
Principal Spillway Design–Capacity of low stage (maximum)	Cubic feet/second	N/A
Principal Spillway Design–Capacity of high stage (maximum)	Cubic feet/second	127
Principal Spillway Design–Dimensions of conduit	Feet/inch	30
Principal Spillway Design–Type of conduit	-	Concrete encased welded steel
Principal Spillway Design–Frequency operation-auxiliary spillway	Percent chance	0.2% annually
Auxiliary Spillway Hydrograph–Rainfall volume	Inches	5.8
Auxiliary Spillway Hydrograph–Runoff volume	Inches	3.4
Auxiliary Spillway Hydrograph–Storm duration	Hours	24
Auxiliary Spillway Hydrograph–Velocity of flow	Feet/second	6.5
Auxiliary Spillway Hydrograph–Max. reservoir water surface elevation	Feet	5,549.6
Freeboard Hydrograph–Rainfall volume	Inches	10.2
Freeboard Hydrograph–Runoff volume	Inches	7.4
Freeboard Hydrograph–Storm duration	Hours	72
Freeboard Hydrograph–Max. reservoir water surface elevation	Feet	5,551.8
Capacity Equivalents–Sediment volume	Inches	1.7
Capacity Equivalents–Floodwater retarding volume	Inches	2.9
Capacity Equivalents–Beneficial volume (identify use)	Inches	6.5

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The estimated Average Annual National Economic Development Costs in Table 6.7 (Economic Table 4) are the anticipated annual costs of the Preferred Alternative facilities.

Table 6.7 (Economic Table 4). Estimated Average Preferred Alternative Annual Costs—East Fork Virgin Watershed, Utah, 2026 Dollars.[11]

Works of Improvement	Amortization of Installation Costs	O&M and Replacement Cost[12]	Other Direct Costs	Total
AWM Proportion of Reservoir and Dam	$367,999	$367	-	**$368,000**
AWM Mt. Carmel Pipeline	$95,030	-	-	**$95,000**
AWM Glendale Irrigation Pipeline	$26,158	-	-	**$26,000**
AWM Proportion of Access Roads	$14,097	-	-	**$14,000**
Total AWM	**$503,000**	**$367**	**-**	**$504,000**
Recreation Proportion of Reservoir and Dam	$359,059	-	-	**$359,000**
Recreation Facilities	$38,322	$13,000	-	**$51,000**
Recreation Proportion of Road	$14,252	-	-	**$14,000**
Total Recreation	**$412,000**	**$13,000**	**-**	**$425,000**
M&I Water Proportion of Reservoir and Dam	$415,351	-	-	**$415,000**
M&I Water Proportion of Access Roads	$15,906	-	-	**$16,000**
Total M&I Water	**$431,000**	**-**	**-**	**$431,000**
Grand Total	**$1,346,000**	**$13,000**	**-**	**$1,360,000**

Prepared: September 2026

[11] Price base: Fiscal year 2026, amortized over 100 years at a discount rate of 3.25%
[12] Includes $13,000 for operation, maintenance, and replacement for recreation development

Table 6.8 (Economic Table 6) compares the benefits and costs for different works of improvements under the Preferred Alternative.

Table 6.8 (Economic Table 6). Comparison of Preferred Alternative Benefits and Costs—East Fork Virgin Watershed, Utah 2026 Dollars.

Works of Improvement	**Average Annual Benefits Ag Water Management**	**Average Annual Benefits Recreation**	**Average Annual Benefits M&I Water Supply**	**Total Average Annual Benefits**	**Average Annual Costs**[13]	**Benefit Cost Ratio**
Ag Water Management Proportion of Reservoir and Dam	-	-	-	-	$367,999	-
Ag Water Management Mt. Carmel Irrigation Pipeline	-	-	-	-	$95,030	-
Ag Water Management Glendale Irrigation Pipeline	-	-	-	-	$26,158	-
Ag Water Management Proportion of Access Roads	-	-	-	-	$14,097	-

[13] From Table 6-3 and 6-5

Works of Improvement	Average Annual Benefits Ag Water Management	Average Annual Benefits Recreation	Average Annual Benefits M&I Water Supply	Total Average Annual Benefits	Average Annual Costs[13]	Benefit Cost Ratio
Ag Water Management Annual OM&R	-	-	-	-	$367	-
Total Ag Water Management	**$389,000**	**-**	**-**	**$389,000**	**$504,000**	**0.77**
Recreation Proportion of Reservoir and Dam	-	-	-	-	$359,056	-
Recreation Facilities	-	-	-	-	$38,322	-
Recreation Proportion of Access Road	-	-	-	-	$14,252	-
Recreation Annual OM&R	-	-	-	-	$13,000	-
Total Recreation	**-**	**$414,000**	**-**	**$414,000**	**$425,000**	**0.97**
M&I Water Proportion of Reservoir	-	-	-	-	$415,351	-
M&I Water Proportion of Access Road	-	-	-	-	$15,906	-
Total M&I Water	**-**	**-**	**$594,000**	**$594,000**	**$431,000**	**1.38**
Total Project	**$389,000**	**$414,000**	**$594,000**	**$1,397,000**	**$1,360,000**	**1.03**

Prepared: September 2026

7.0 CONSULTATION, COORDINATION, AND PUBLIC PARTICIPATION

This chapter describes the coordination efforts with the public, agencies, Tribes, stakeholders, and the SLO for the proposed project. Communication with these agencies and groups has been ongoing since 2018 when early coordination was initiated by the NRCS for the project Plan-EA. Input from these agencies and organizations has been incorporated into the Plan-EIS analysis. All consultations, comments, and responses, including a Scoping Summary Report and the Cooperating Agency MOU are included in Appendix A. A summary of consultation, key action, and dates is provided in Table 7.1. A summary of consultation efforts specific to the NHPA Section 106 process is included as Table 7.2.

Table 7.1. Summary of Consultation Efforts.

Key Action	Date
USACE Cooperating Agency Plan-EA Request and Acceptance	February 12, 2018; June 7, 2018
USACE Cooperating Agency Plan-EIS Request and Acceptance	October 15, 2021; November 15, 2021
USACE Request submitted for concurrence with jurisdictional determinations	Memorandum dated July 21, 2022, and updated February 18, 2026
USACE Site Visit	September 28, 2022
USACE Agency Scoping Meeting Attendance	May 24, 2018
USACE Preliminary Aquatic Resource Report Submittal	October 2020
USACE Coordinated EFVR water flow aspects; comments addressed pre-Draft Plan-EIS	July 2026
USACE Draft 404(b)(1) Alternatives Analysis Submittal	July 11, 2025
USACE Concurrence with aquatic resources' delineation for the Project area.	Memorandum dated April 23, 2026
USFWS Cooperating Agency Plan-EA Request (no response received)	February 12, 2018; no response
USFWS Cooperating Agency Plan-EIS Request (no response received)	October 15, 2021; no response
USFWS Informal consultation initiated	February 2018
USFWS Initial IPaC list received	2018

Key Action	Date
USFWS Threatened, endangered and migratory species letter from the USFWS	December 13, 2018
USFWS Meeting between USFWS, NRCS, and Eocene to discuss potential effects	April 2019
USFWS Biological Evaluation for Plan-EA	February 2020
USFWS IPaC list updated	July 2022
USFWS Site visit	September 28, 2022
USFWS BA for Plan-EIS submitted (Informal Section 7 Consultation)	September 3, 2026
USFWS Concurrence with BA Determinations Issued	September 9, 2026
WCWCD Cooperating Agency Plan-EA Request and Acceptance	February 4, 2019; February 8, 2019 (MOU)
WCWCD Cooperating Agency Plan-EIS Request and Acceptance	January 27, 2022; August 16, 2022 (MOU)
WCWCD Site visit	September 28, 2022
WCWCD Coordinated EFVR water flow aspects; comments addressed pre-Draft Plan-EIS	July 2026
EPA Cooperating Agency Plan-EIS Request and Acceptance	October 15, 2021; October 29, 2021
EPA Site visit	September 28, 2022
EPA Comments addressed pre-Draft Plan-EIS issuance	July 2026
BLM Cooperating Agency Plan-EA Request and Acceptance	February 11, 2019; February 27, 2019 (MOU)
BLM Cooperating Agency Plan-EIS Request and Acceptance	October 15, 2021; August 16, 2022 (MOU)
BLM Site visit	September 28, 2022
BLM Interdisciplinary Team Analysis Record Checklist prepared	September 24, 2019

Key Action	Date
BLM Borrow site evaluation completed for Plan-EA; removed for Plan-EIS	2019 through 2024
NPS Cooperating Agency Plan-EA Request and Acceptance	February 12, 2019; February 12, 2019 (MOU)
NPS Cooperating Agency Plan-EIS Request and Acceptance	October 15, 2021; April 18, 2022 (MOU)
NPS Site visit	September 28, 2022
NPS Comments addressed pre-Draft Plan-EIS issuance	July 2026
NPS Cooperating Agency Coordination	Ongoing
USFS Cooperating Agency Plan-EIS Request (no response received)	October 15, 2021; no response
USFS Coordination throughout planning	Ongoing
PLPCO Cooperating Agency Plan-EIS Requests and Acceptance	October 20, 2021, and February 2, 2022; April 18, 2022 (MOU)
PLPCO Site visit	September 28, 2022
PLPCO Comments addressed pre-Draft Plan-EIS issuance	July 2026
UTLA Cooperating Agency Plan-EIS Request and Acceptance	October 15, 2021; October 25, 2021
UTLA Site visit	September 28, 2022
UTLA Comments addressed pre-Draft Plan-EIS issuance	July 2026

7.1 Consultation

7.1.1 U.S. Army Corp of Engineers

The NRCS sent a formal request to be a Cooperating Agency for the project Plan-EA to the USACE on February 12, 2018 (Appendix A). The agency accepted Cooperating Agency status on the project Plan-EA in a letter dated June 7, 2018 (Appendix A).

A formal request to be a Cooperating Agency for the project Plan-EIS was sent on October 15, 2021 (Appendix A). The USACE accepted Cooperating Agency status in a letter dated November 15, 2021 (Appendix A). This letter also requested consultation on the study area for the purposes of Section 106 and Section 7 determination. USACE was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants,

and other cooperating agencies. Resource concerns, project purpose and need, alternatives for detailed study, and selection of the Preferred Alternative were coordinated with input and approval from the USACE. The USACE was provided with copies of the preliminary Plan-EIS for review prior to the issuance of the Draft Plan-EIS to the public. The USACE's report comments or concerns were addressed prior to the issuance of the Draft Plan-EIS to the public.

The USACE representatives attended the agency scoping meeting held on May 24, 2018, in Kanab, Utah. The agency indicated the presence of intermittent and ephemeral streams within the footprint of the proposed project, which likely holds jurisdictional status as WOTUS. Eocene confirmed this finding during a desktop and subsequent field study conducted in fall 2018 to delineate all potential WOTUS. Following the completion of field studies, Eocene and the NRCS personnel attended a meeting at the USACE Bountiful Field Office on November 15, 2018, with USACE to discuss the preliminary findings and to inquire about expected permitting and reporting requirements. Following agency guidance and using all data gathered, Eocene wetland specialists developed a Preliminary Aquatic Resource Delineation Report (Appendix E-1). The NRCS submitted the report to the USACE Bountiful Field Office in October 2020.

It is anticipated that a Nationwide Permit would be required for potential impacts that could occur to jurisdictional features which traverse the project area. A revised version of the Aquatic Resource Delineation Report with updated determinations of impacts was submitted to the USACE on July 3, 2025, and a request for an Approved Jurisdictional Determination was submitted on August 21, 2025. Consultation with the USACE for the Nationwide Permit and Approved Jurisdictional Determination is ongoing.

Under Section 404 of the CWA, the USACE must identify the Least Environmentally Damaging Practicable Alternative which represents the alternative with the least adverse impact on the aquatic ecosystem, while still fulfilling the project Purpose and Need. A Draft 404(b)(1) Alternatives Analysis was submitted to the USACE on July 11, 2025. The USACE responded August 13, 2025, stating that no additional detailed alternatives analysis would be necessary for the project. This email is included in Appendix A.

USACE has concurred with the aquatic resources' delineation made for the project area and has verified that the location and boundaries of wetlands were delineated consistent with agency manuals and guidance (See Section 4.2.2.4 WOTUS, Wetlands, ad Special Aquatic Sites).

7.1.2 U.S. Fish and Wildlife Service

The NRCS sent a formal request to be a Cooperating Agency to USFWS on February 12, 2018, for the project Plan-EA (Appendix A), and October 15, 2021 (Appendix A), for the project Plan-EIS, but no responses were received. Informal consultation with USFWS was initiated in February 2018 for the Plan-EA. On December 13, 2018, the USFWS submitted a letter regarding the project containing a list of threatened and endangered species and migratory bird species that may occur in the project area or may be affected by the implementation of the project (USFWS, 2018a). This letter confirmed the findings of a desktop review previously conducted using the USFWS IPaC web site (USFWS, 2018b). As part of continuing consultation efforts, an updated IPaC list was accessed in July 2022. In April 2019, a follow-up meeting between USFWS, NRCS, and Eocene biologists provided additional information regarding potential impacts to federally listed species within and downstream of the project area. Using this information, a Biological Evaluation was compiled to support the analysis for the project Plan-EA in February 2020. This information has been included

in Chapter 3.0 of the Plan-EIS, refer to Section 3.2.4 and Chapter 5.4 for a detailed analysis. The USFWS was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants, and other cooperating agencies.

Section 7 consultation under the ESA has continued during Plan-EA and Plan-EIS development. A letter dated June 26, 2025, containing a list of threatened and endangered species that may occur in the proposed project area was submitted to the team preparing the Plan-EIS. The data contained in this letter has formed the basis of the development of the project BA. The BA was completed for the project Plan-EIS and was submitted for informal consultation to the USFWS in compliance with Section 7 of the ESA on September 3, 2026, with concurrence received in a letter signed September 9, 2026 (Appendix A).

7.1.3 Washington County Water Conservancy District

The WCWCD was sent a formal request to be a Cooperating Agency for the project Plan-EA via letter on February 4, 2019 (Appendix A), and the Cooperating Agency MOU was signed on February 8, 2019 (Appendix A). On January 27, 2022, the WCWCD requested Cooperating Agency Status for the Plan-EIS via email (Appendix A), and the Cooperating Agency MOU was signed in August 2022 (Appendix A). The WCWCD was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants, and other cooperating agencies. Coordination has been maintained with WCWCD personnel regarding aspects of the project that could affect the EFVR water flow in Washington County. WCWCD's report comments or concerns were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.1.4 U.S. Environmental Protection Agency

The NRCS sent a formal request to the EPA for Cooperating Agency status for the project Plan-EIS on October 15, 2021 (Appendix A). The EPA accepted Cooperating Agency status in a letter dated October 29, 2021 (Appendix A). The EPA was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants, and other cooperating agencies. Resource concerns, project purpose and need, alternatives for detailed study, and selection of the preferred alternative were coordinated with input and approval from the EPA. The EPA was provided with copies of the preliminary Plan-EIS for review prior to the issuance of the Draft Plan-EIS to the public. The EPA's report comments or concerns were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.1.5 U.S. Bureau of Land Management

The NRCS submitted a letter to the BLM Kanab Field Office Manager to formally request Cooperating Agency status for the Plan-EA on February 11, 2019 (Appendix A). On February 27, 2019, the BLM Kanab Field Office Manager signed an MOU, formalizing Cooperating Agency status for the project (Appendix A). A formal request to be a Cooperating Agency for the project Plan-EIS was submitted to the BLM on October 15, 2021 (Appendix A). On August 16, 2022, the BLM signed an MOU accepting Cooperating Agency status for the Plan-EIS (Appendix A). The BLM was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants, and other cooperating agencies.

Three of the six potential borrow sites that were identified during preliminary development to supply aggregate material for project construction are located on BLM-administered public lands, two existing pits (Elbow and Bald Knoll) and one new pit (Black Knoll). A Kanab Field Office BLM Interdisciplinary Team Analysis Record Checklist was prepared for the BLM portion of the project during the Plan-EA (Appendix E-3). The use of the borrow sites on BLM lands was eliminated from the project for the Plan-EIS; however, the BLM has remained a Cooperating Agency. Resource concerns, project purpose and need, alternatives for detailed study, and selection of the preferred alternative were coordinated with input and approval from the BLM. The BLM was provided with copies of the preliminary Plan-EIS for review prior to issuance of the Draft Plan-EIS to the public. The BLM's report comments or concerns were addressed prior to issuance of the Draft Plan-EIS to the public. During the Plan-EA process, a Kanab Field Office BLM Interdisciplinary Team Analysis Record Checklist was prepared for the BLM portion of the project on September 24, 2019. The Plan-EIS no longer includes a BLM portion of the project, and therefore an updated Interdisciplinary Team Analysis Record Checklist was not required.

7.1.6 National Park Service through Zion National Park

The EFVR is a designated WSR where it flows through ZNP. The river enters the Park approximately 20 river miles downstream from the proposed reservoir site. Because of potential changes in streamflow, a formal request to be a Cooperating Agency for the project Plan-EA was submitted to the NPS on February 12, 2019 (Appendix A); the NPS signed the Cooperating Agency MOU on the same date (Appendix A). The NRCS sent a formal request to be a Cooperating Agency for the project Plan-EIS on October 15, 2021 (Appendix A). The NPS accepted Cooperating Agency status in a letter dated April 18, 2022 (Appendix A). The NPS also provided comments on the NOI for the Plan-EIS in that same letter. The NPS was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants, and other cooperating agencies. Resource concerns, project purpose and need, alternatives for detailed study, and selection of the Preferred Alternative were coordinated with input and approval from the NPS.

The NPS was provided with copies of the preliminary Plan-EIS for review prior to issuance of the Draft Plan-EIS to the public. In a letter dated March 6, 2026, the NPS provided comments on the preliminary Plan-EIS. The NPS Western Region submitted an updated comment letter dated June 12, 2026, which superseded previous correspondence. On August 18, 2026, via email, the NRCS provided a comment response table and updated preliminary Plan-EIS to the NPS. On August 31, 2026, NPS acknowledged receipt and stated that they had no further comments. See Appendix A for all consultations between NRCS and the NPS.

The NPS evaluates impacts on designated rivers in accordance with Section 7 of the WSRA. On August 29, 2025, via email, the NPS stated that they will not be conducting a Section 7 analysis for this project (Appendix A). Coordination with the ZNP as a cooperating agency has been ongoing throughout the life of the project.

7.1.7 U.S. Forest Service

A formal request to be a Cooperating Agency for the project Plan-EIS was submitted to the USFS on October 15, 2021, and no response was received. Although the USFS did not elect to accept the request to participate as a Cooperating Agency, coordination with the USFS has been ongoing throughout the planning process for the project.

7.1.8 Utah Public Lands Policy Coordinating Office

The PLPCO is the state agency responsible for coordinating, promoting, and implementing Utah's public land priorities. The PLPCO requested Cooperating Agency status on the Plan-EIS by two memoranda, the first dated October 20, 2021 (Appendix A), and the second dated February 2, 2022 (Appendix A). The PLPCO was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants, and other cooperating agencies. Resource concerns, project purpose and need, alternatives for detailed study, and selection of the Preferred Alternative were coordinated with input and approval from the PLPCO. The PLPCO was provided copies of the preliminary Plan-EIS for review prior to issuance of the Draft Plan-EIS to the public. The PLPCO's report comments or concerns were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.1.9 Utah Trust Lands Administration

UTLA manages lands located within the proposed project area. UTLA is the steward of Utah's trust lands and is responsible for generating revenue from them for the benefit of public schools and other state institutions now and for future generations. A formal request to be a Cooperating Agency for the project Plan-EIS was submitted to the UTLA on October 15, 2021 (Appendix A), and the UTLA accepted Cooperating Agency status on the Plan-EIS by email correspondence dated October 25, 2021 (Appendix A). The UTLA was provided with an opportunity to conduct a site visit on September 28, 2022, along with NRCS project staff, KCWCD, project consultants, and other cooperating agencies. Resource concerns, project purpose and need, alternatives for detailed study, and selection of the Preferred Alternative were coordinated with input and approval from UTLA. UTLA was provided copies of the preliminary Plan-EIS for review prior to the issuance of the Draft Plan-EIS to the public. UTLA's report comments or concerns were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.1.10 NHPA Section 106 Consultation

Consultation with various agencies, including Utah SHPO, the ACHP, USACE, BLM, Utah Department of Transportation (UDOT), and Tribes was completed to comply with 36 CFR 800 – Protection of Historic Properties. Consultation is ongoing throughout the life of the Plan-EIS, and this section will be updated as consultation occurs. The following sections detail the efforts completed for each section of 36 CFR 800. Table 7.2 summarizes all Section 106 consultations for the Plan-EA and Plan-EIS. All consultation letters and responses are included in Appendix A.

Table 7.2. Summary of Section 106 Consultation.

Agency/Tribe	Date	Type of Consultation
Ute Indian Tribe of the Uintah & Ourary Reservation	May 23, 2018	Tribal Scoping Letter for Plan-EA
Paiute Indian Tribe of Utah	May 23, 2018	Tribal Scoping Letter for Plan-EA
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	May 23, 2018	Tribal Scoping Letter for Plan-EA
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	May 23, 2018	Tribal Scoping Letter for Plan-EA

Agency/Tribe	Date	Type of Consultation
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	May 23, 2018	Tribal Scoping Letter for Plan-EA
Navajo Nation	May 23, 2018	Tribal Scoping Letter for Plan-EA
Ute Mountain Ute Tribe	May 23, 2018	Tribal Scoping Letter for Plan-EA
Councilwoman, White Mesa	May 23, 2018	Tribal Scoping Letter for Plan-EA
San Juan Southern Paiute Tribe of Arizona	May 23, 2018	Tribal Scoping Letter for Plan-EA
Pueblo of Zuni	May 23, 2018	Tribal Scoping Letter for Plan-EA
Hopi Tribe	May 23, 2018	Tribal Scoping Letter for Plan-EA
Hualapai Tribe	May 23, 2018	Tribal Scoping Letter for Plan-EA
Hopi Tribe	June 11, 2018	Response to Plan-EA Scoping Letter requesting hard copies of the Plan-EA
SHPO	January 9, 2020	First CRIR and finding of effect
BLM	January 9, 2020	First CRIR and finding of effect
USACE	January 9, 2020	First CRIR and finding of effect
Pueblo of Zuni	January 9, 2020	First CRIR and finding of effect
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	January 9, 2020	First CRIR and finding of effect
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	January 9, 2020	First CRIR and finding of effect
San Juan Southern Paiute Tribe of Arizona	January 9, 2020	First CRIR and finding of effect
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	January 9, 2020	First CRIR and finding of effect
Navajo Nation	January 9, 2020	First CRIR and finding of effect
Councilwoman, White Mesa (Ute Council)	January 9, 2020	First CRIR and finding of effect
Ute Indian Tribe of the Uintah & Ourary Reservation	January 9, 2020	First CRIR and finding of effect
Hualapai Tribe	January 9, 2020	First CRIR and finding of effect
Ute Mountain Ute Tribe	January 9, 2020	First CRIR and finding of effect
Hopi Tribe	January 9, 2020	First CRIR and finding of effect
Paiute Indian Tribe of Utah	January 9, 2020	First CRIR and finding of effect
SHPO	January 17, 2020	SHPO Concurrence with the First CRIR and finding of effect
Paiute Indian Tribe of Utah	January 21, 2020	Paiute Concurrence with the First CRIR and finding of effect
Hopi Tribe	January 28, 2020	Hopi Tribe Concurrence with the First CRIR and finding of effect
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	November 20, 2020	NOA of Plan-EA
Navajo Nation	November 20, 2020	NOA of Plan-EA
Councilwoman, White Mesa (Ute Council)	November 20, 2020	NOA of Plan-EA

Agency/Tribe	Date	Type of Consultation
Ute Indian Tribe of the Uintah & Ourary Reservation	November 20, 2020	NOA of Plan-EA
Hualapai Tribe	November 20, 2020	NOA of Plan-EA
Ute Mountain Ute Tribe	November 20, 2020	NOA of Plan-EA
Pueblo of Zuni	November 20, 2020	NOA of Plan-EA
Hopi Tribe	November 20, 2020	NOA of Plan-EA
Paiute Indian Tribe of Utah	November 20, 2020	NOA of Plan-EA
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	November 20, 2020	NOA of Plan-EA
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	November 20, 2020	NOA of Plan-EA
San Juan Southern Paiute Tribe of Arizona	November 20, 2020	NOA of Plan-EA
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	December 1, 2020	NRCS email to Tribe with NOA of Plan-EA and invitation to the public meeting on December 9, 2020
Navajo Nation	December 4, 2020	Response to NOA stating no concern with the project
Hopi Tribe	December 7, 2020	Response to NOA requesting hard copies of the Plan-EA and a request for a Plan-EIS to be prepared
Hopi Tribe	December 15, 2020	NRCS delivery of hard copies per request
Hopi Tribe	January 4, 2021	Tribal concern with riprap from Bald Knoll borrow pit site and request for the preparation of a Plan-EIS
Hualapai Tribe	March 1, 2021	Hualapai Tribe stated this project is outside of their area of interest and requested to be removed from project consultation
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Ute Indian Tribe of the Uintah & Ourary Reservation	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Pueblo of Zuni	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Ute Mountain Ute Tribe	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Hopi Tribe of Arizona	January 14, 2022	Tribal Scoping Letter for Plan-EIS
White Mesa Ute Council	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Paiute Indian Tribe of Utah	January 14, 2022	Tribal Scoping Letter for Plan-EIS

Agency/Tribe	Date	Type of Consultation
Navajo Nation	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	January 14, 2022	Tribal Scoping Letter for Plan-EIS
San Juan Southern Paiute Tribe of Arizona	January 14, 2022	Tribal Scoping Letter for Plan-EIS
Hopi Tribe	February 7, 2022	Response to Plan-EIS Scoping requesting hard-copies
Moapa Band of Paiutes	March 31, 2022	Response to Plan-EIS Scoping stating no comments
Ute Indian Tribe of the Uintah & Ourary Reservation	May 3, 2022	NOI for the Plan-EIS
San Juan Southern Paiute Tribe of Arizona	May 3, 2022	NOI for the Plan-EIS
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	May 3, 2022	NOI for the Plan-EIS
Paiute Indian Tribe of Utah	May 3, 2022	NOI for the Plan-EIS
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	May 3, 2022	NOI for the Plan-EIS
Moapa Band of Paiutes	May 3, 2022	NOI for the Plan-EIS
Navajo Nation	May 3, 2022	NOI for the Plan-EIS
Pueblo of Zuni	May 3, 2022	NOI for the Plan-EIS
White Mesa Ute Council	May 3, 2022	NOI for the Plan-EIS
Ute Mountain Ute Tribe	May 3, 2022	NOI for the Plan-EIS
Hopi Tribe of Arizona	May 3, 2022	NOI for the Plan-EIS
BLM	May 5, 2022	Draft SHPO Package review for the second CRIR and finding of effect
UTLA	May 5, 2022	Draft SHPO Package review for the second CRIR and finding of effect
UDOT	May 5, 2022	Draft SHPO Package review for the second CRIR and finding of effect
UDOT	June 1, 2022	Cultural and Paleo clearance with Tier 1 screening form
SHPO	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Navajo Nation	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Ute Indian Tribe of the Uintah & Ourary Reservation	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Moapa Band of Paiutes	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Pueblo of Zuni	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Hopi Tribe of Arizona	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Ute Mountain Ute Tribe	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA

Agency/Tribe	Date	Type of Consultation
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
White Mesa Ute Council	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Paiute Indian Tribe of Utah	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
San Juan Southern Paiute Tribe of Arizona	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	January 23, 2023	Second CRIR and finding of effect with preparation of an MOA
SHPO	February 6, 2023	SHPO Concurrence with Second CRIR and finding of effect with preparation of an MOA
ACHP	March 28, 2024	Section 106 consultation and notification of Adverse Effect to Historic Properties
ACHP	April 12, 2024	Email response declining interest in consultation
SHPO	May 20, 2024	Third CRIR with finding of effect
Navajo Nation	May 22, 2024	Third CRIR with finding of effect
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	May 22, 2024	Third CRIR with finding of effect
Ute Indian Tribe of the Uintah & Ourary Reservation	May 22, 2024	Third CRIR with finding of effect
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	May 22, 2024	Third CRIR with finding of effect
Pueblo of Zuni	May 22, 2024	Third CRIR with finding of effect
Paiute Indian Tribe of Utah	May 22, 2024	Third CRIR with finding of effect
Ute Mountain Ute Tribe	May 22, 2024	Third CRIR with finding of effect
Hopi Tribe of Arizona	May 22, 2024	Third CRIR with finding of effect
White Mesa Ute Council	May 22, 2024	Third CRIR with finding of effect
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	May 22, 2024	Third CRIR with finding of effect
San Juan Southern Paiute Tribe of Arizona	May 22, 2024	Third CRIR with finding of effect
Kaibab band of Paiute Indians of the Kaibab Indian Reservation	May 24, 2024	Response to Third CRIR stating no comments
SHPO	June 2, 2024	SHPO Concurrence with Third CRIR and finding of effect
Hopi Tribe of Arizona	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Kaibab Band of Paiute Indians of the Kaibab Indian Reservation	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	June 4, 2025	Indirect/Visual Memorandum with finding of no effect

Agency/Tribe	Date	Type of Consultation
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
White Mesa Ute Council	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Navajo Nation	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Paiute Indian Tribe of Utah	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Pueblo of Zuni	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
San Juan Southern Paiute Tribe of Arizona	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Utah Division of Indian Affairs	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Ute Indian Tribe of the Uintah & Ouray Reservation	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Ute mountain Ute Tribe	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
USACE	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
U.S. EPA	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
ZNP	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
SHPO	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
UTLA	June 4, 2025	Indirect/Visual Memorandum with finding of no effect
Navajo Nation	June 5, 2025	Response to Indirect/Visual Memorandum stating no comments and request to proceed with the project without further consultation with the Navajo Nation
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	June 5, 2025	Response to Indirect/Visual Memorandum stating concern about the effects to the acoustic characteristics of site 42KA7537
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	June 10, 2025	A voicemail was left by the NRCS to the Moapa Band of Paiute Indian Tribe's THPO proposing avoidance measures for site 42KA7537
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	June 18, 2025	An email was sent by the NRCS to the Moapa Band of Paiute Indian Tribe's THPO proposing avoidance measures for site 42KA7537

Agency/Tribe	Date	Type of Consultation
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	June 20, 2025	A second voicemail was left by the NRCS to the Moapa Band of Paiute Indian Tribe's THPO proposing avoidance measures for site 42KA7537
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	July 15, 2025	A second email was sent by the NRCS to the Moapa Band of Paiute Indian Tribe's THPO proposing avoidance measures for site 42KA7537
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	February 12, 2026	A third voicemail was left by the NRCS to the Moapa Band of Paiute Indian Tribe's THPO proposing avoidance measures for site 42KA7537
Moapa Band of Paiute Indians of the Moapa River Indian Reservation	August 24, 2026	A final email and voicemail were left by the NRCS to the Moapa Band of Paiute Indian Tribe's THPO presenting the extended avoidance measures that have been incorporated into the project to ensure acoustics coming from the site remain undisturbed

7.1.10.1 Initiation of the Section 106 process

As part of the project's initial planning for both the Plan-EA and Plan-EIS, NRCS initiated consultation with appropriate Tribal representatives/THPOs during the scoping process (Appendix A). Tribes who hold ancestral land, traditional use, and/or TCP claims in and near the project area were identified using the Native American Graves Protection and Repatriation Act, Native American Consultation Database, a database through which any federally recognized Tribe could identify those counties in Utah where they have consultation interests. The BLM Kanab Field Office Tribal Consultation List, the U.S. Department of Housing and Urban Development Tribal Directory Assessment Tool, the U.S. Bureau of Indian Affairs, and the Utah Division of Indian Affairs websites were also used as supplemental sources to identify Tribes with consultation interests. The assembled list of Tribes is included in Table 7.2 and individual THPOs consulted with are included in Appendix A.

Tribes were consulted to comply with EO 13007 (American Indian Religious Freedom Act) (May 24, 1996), EO 13175 (Consultation and Coordination with Indian Tribal Governments) (November 6, 2000), the American Indian Religious Freedom Act of 1978, and the NHPA. A reasonable and good faith effort was made per 36 CFR pt. 800(f)(2) to consult with these Tribes via letter, email, and telephone. During the scoping process, the NRCS communicated with the Tribes regarding known historic properties or places of traditional religious and cultural importance near the project area.

Tribes were invited to comment on the project during the Plan-EA scoping period in letters dated May 23, 2018, and one response was received from the Hopi Tribe on June 11, 2018, requesting

hard copies of the Plan-EA and requesting the preparation of a Plan-EIS for the project (Appendix A). The Hopi Tribe re-requested their preference for a Plan-EIS in letters dated December 7, 2020 (Appendix A), and January 4, 2021 (Appendix A). A list of specific Tribes and THPOs consulted with, and the dates letters were sent and received is included in Appendix A.

On January 18, 2019, the Kaibab Paiute indicated concern about the effects of the increase in visitors to nearby private lands, and a site visit was completed on January 25, 2019, by a representative from the Kaibab Paiute, NRCS, and Eocene. The group examined site 42KA8904 near the proposed project activities, and the Kaibab Paiute stated that they were not concerned about the effects to the site from the proposed project. The group also visited site 42KA8785 due to its proximity to a proposed gravel source. A summary of this site visit is included in Appendix A, and a figure of the gravel pit avoidance area is included in Figure C-6 in Appendix C.

Tribes were also invited to comment on the project during the Plan-EIS scoping period in letters dated January 14, 2022, and responses from the Hopi and Moapa Tribes were received (Appendix A). The Hopi Tribe responded by letter dated February 7, 2022, requesting consultation on the project, including being provided with a copy of any proposed treatment plans for review and comment (Appendix A). The Moapa Band of Paiutes responded by email dated March 31, 2022, stating that they do not have any questions or comments concerning the project (Appendix A).

As part of compliance with 36 CFR 800, a Cultural and Paleo Clearance with Tier 1 Screening Form was completed on June 1, 2022, by the UDOT and to keep them informed of proposed project activities that may take place within the UDOT ROW or affect its transportation facilities through the NHPA Section 106 notification process.

7.1.10.2 Identification of historic properties

Per 36 CFR 800.16(d), the NCRS established the project's APE to include all potential direct and indirect effects. During the Plan-EA planning, the original project APE consisted of a total of 791.68 acres. A survey of this area was completed in October 2018 with supplemental field work completed in June, July, and September of 2019. The Class III (intensive pedestrian) survey was conducted by Eocene archaeologists, meeting 36 CFR 61 SOI qualification standards and was conducted in 15- meter-wide transects. This survey identified a total of 9 new cultural resource sites, 1 previous cultural resource site, and 15 IOs in the project APE (Appendix E-2). Four of these cultural resource sites are eligible for listing on the NRHP. As part of NHPA Section 106 compliance, this CRIR was submitted to the Utah SHPO, Tribes, THPOs, and other stakeholders for concurrence with the determinations of site eligibility (Table 7.2). SHPO, Tribes, THPOs, and other stakeholders were consulted with in a letter dated January 9, 2020. SHPO concurred in a letter dated January 17, 2020, the Paiute Tribe concurred in a letter dated January 21, 2020, and the Hopi Tribe concurred in a letter dated January 28, 2020.

In 2021, as part of the EIS, an Addendum project APE of 68.83 acres was added to include the addition of the Mt. Carmel pipeline. A Class III (intensive) and Class II (reconnaissance) inventory of the Addendum project APE was conducted in November 2021 and March 2022 by Eocene archaeologists, meeting 36 CFR 61 SOI qualification standards. This survey identified a total of 1 previously identified and 4 newly recorded cultural resource sites, and 3 IOs located within the Addendum project APE (Appendix E-2). Three of these cultural resource sites are eligible for listing on the NRHP. As part of NHPA Section 106 compliance, this CRIR was submitted to the Utah SHPO, Tribes, THPOs, and other stakeholders for concurrence with the determinations of site

eligibility (Table 7.2). SHPO, Tribes, THPOs, and other stakeholders were consulted with in a letter dated January 23, 2023. SHPO concurred in a letter dated February 6, 2023.

In 2023, a second Addendum project APE of 13.72 acres was identified to include the addition of the Esplin Pit. A Class III (intensive) and Class II (reconnaissance) inventory of the second Addendum project APE was conducted in October 2023 by Eocene archaeologists, meeting 36 CFR 61 SOI qualification standards. This survey identified a total of one previously identified and one newly recorded cultural resource site, and 1 IO was identified within the second Addendum project APE (Appendix E-2). Both cultural resource sites are eligible for listing on the NRHP. As part of NHPA Section 106 compliance, this CRIR was submitted to the Utah SHPO, Tribes, THPOs, and other stakeholders for concurrence with the determinations of site eligibility (Table 7.2). SHPO, Tribes, THPOs, and other stakeholders were consulted with in a letter dated May 20, 2024. The Kaibab Band of Paiute Indians of the Kaibab Indian Reservation responded with no comments in a letter dated May 24, 2024, and SHPO concurred in a letter dated June 2, 2024.

Table 3.6 summarizes the cultural resource findings and the NRCS' determination of site eligibility for all three surveys, and Table 7.2 summarizes the consultation that was completed for all three surveys.

A total of 874.23 acres was surveyed for the Project APE. In 2024, the project extent changed to remove 3 borrow pits, reducing the total Direct section of the APE to 712.46 acres. Figure C-2 in Appendix C shows the areas surveyed and the current Direct section of the APE. This section of the APE encompasses all areas under the current project extents that may be disturbed or changed from their current conditions with potential to affect cultural resources. See Section 1.4.3 for a detailed description of the APE development process, Appendix E-2 for the redacted CRIRs, and Figure C-2 in Appendix C for the APE figure.

In April 2025, Eocene completed a Cultural Resources Review Memorandum to identify potential impacts to the Indirect and Visual sections of the APE within the project area. This desktop review identified 26 cultural resources and nine historic structures within the overlapping sections. The NRCS determined that none of these resources would require a formal Visual Effects Analysis, as they would not be subject to adverse visual or indirect impacts (Eocene, 2025). Refer to Appendix E-2 for the Redacted Cultural Resources Review Memorandum.

Consultation was completed with the applicable Tribes, agencies, and the SHPO on June 4, 2025. Copies of the letters sent, and concurrences received are included in Appendix A. Consultation with the Moapa Band of Paiutes is ongoing.

7.1.10.3 Assessment of adverse effects

The 3 cultural resource surveys revealed a total of 9 historic properties within the original project APE. CRIRs for each survey have been prepared and redacted versions are included in Appendix E-2. Table 5.4 summarizes the effects findings and protective measures on all eligible sites in the APE. Implementation of the proposed project would result in Adverse Effect to Historic Properties. As part of NHPA Section 106 compliance, the CRIR, and subsequent addendums, were submitted to the Utah SHPO, Tribes, THPOs, and other stakeholders for concurrence with the project effects (Table 7.2).

The proposed project would have an Adverse Effect to historic properties, as concurred with by SHPO on February 6, 2023, and June 2, 2024. The ACHP was notified of the finding of Adverse Effect to historic properties in an email dated March 28, 2024 (Appendix A). A letter response was received via email on April 12, 2024, stating that the ACHP does not believe participation in the consultation to resolve adverse effects is needed per 36 CFR 800 (Appendix A).

7.1.10.4 Resolution of adverse effects

To resolve adverse effects, a draft MOA was prepared in July of 2026 and a final MOA will be executed following the public comment period for this project. The draft MOA was prepared in consultation with the Utah SHPO, KCWCD, WCWCD, interested THPOs, Tribes, and other organizations, and is included in Appendix A.

On private land, the NRCSs inadvertent discovery procedures, as described in the Prototype Programmatic Agreement with the Utah SHPO, would be followed. For non-private land, the applicable land managing agency's inadvertent discovery plan would be followed. If undocumented cultural/archaeological resources are found during construction activities, construction would stop, and the appropriate agency officials would be notified, per procedures described in the NRCS Prototype Programmatic Agreement (Appendix E-3).

7.2 Coordination

7.2.1 Stakeholders

Coordination was conducted with private landowners having a stake in the project. These include landowners of parcels where temporary and permanent easements are required to install alternative measures, Non-Government Organizations (NGOs) with interest in the project Area, and National, state, and local agencies who may be impacted by the project. A list of all stakeholders coordinated with for the project is included in Appendix A. Coordination included invitation to comment on the scoping process for both the Plan-EA and the Plan-EIS, public scoping meetings held on December 5, 2019, and October 20, 2021.

Contact has been ongoing with local private landowners and NGOs throughout the Plan-EA and Plan-EIS development process. The gravel would come from the Lamb and Tait borrow sites located on private lands. The KCWCD has been negotiating with the owners of these sites for use of this material. During the public scoping process for the Plan-EIS, letters were sent to 35 agency representatives, 8 NGOs, 212 private landowners, and 24 Tribal representatives. See Chapter 1.5 and the Scoping Summary Report for details (Appendix A).

7.2.2 Sponsoring Local Organizations

The SLOs for the proposed project are KCWCD and WCWCD. Financial assistance for the project was requested by the SLOs from NRCS through Standard Form 424-Application for Federal Assistance. Initial coordination was conducted with the SLOs regarding the project and the proposed measures. Meetings were conducted throughout the planning and engineering process to discuss the project measures and identify potential concerns. The SLOs were provided copies of the preliminary Plan-EIS for review prior to issuance of the Draft Plan-EIS to the public. The SLOs report comments or concerns were addressed prior to issuance of the Draft Plan-EIS to the public.

7.2.3 Utah Department of Transportation

The UDOT was notified during early coordination for the project Plan-EA in June 2018 and for the project Plan-EIS in June 2021. As part of compliance with 36 CFR 800, a Cultural and Paleo Clearance with Tier 1 Screening Form was completed on June 1, 2022, for the UDOT to keep them informed of proposed project activities that may take place within the UDOT ROW or affect its transportation facilities through the NHPA Section 106 notification process.

7.2.4 Utah Division of Wildlife Resources

During the Plan-EA analysis, the UDWR was consulted regarding a proposed conservation pool and fishery at the proposed reservoir. Additionally, negotiations with UDWR resulted in the maintenance of a continuous streamflow between existing Glendale hydroelectric power plant site and the return flow site near the existing Orderville hydroelectric power plant (KCWCD, 2001). Neither of these two project components are included in the current proposed project, and their discussion is not included in this Draft Plan-EIS.

Coordination with the UDWR was conducted in 2018 to identify state-sensitive species of concern relevant to the Plan-EA analysis for the project. The UDWR did not have any immediate concerns for species or habitat for the project. The UDWR was also invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.5 Utah Division of Emergency Management

Coordination with the Utah Division of Emergency Management (UDEM) was conducted throughout the planning process of the Plan-EA and Plan-EIS. The UDEM provided comments during the scoping period that a Letter of Map Revision or Conditional Letter of Map Revision may be required for the project and that it should be reviewed by Washington County and Hurricane City floodplain administrators. Project information and floodplain modeling data was shared with the UDEM for their coordination with Hurricane City. The UDEM was also invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.6 U.S. Bureau of Reclamation

Coordination with the U.S. Bureau of Reclamation (BOR) was conducted throughout the planning process of the Plan-EA and Plan-EIS. The BOR requested copies of the draft Plan-EA via email on June 22, 2018. The BOR was also invited to review the Plan-EIS purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.7 Utah Natural Heritage Program

A letter was sent to UNHP on September 25, 2018, requesting a list of species of special concern for the project Plan-EA. A letter was received from the UNHP on October 1, 2018, confirming that

no federally listed species were documented as potentially occurring within 0.5-2.0 miles of the Long Valley portion of the project area. An online species search report was obtained from the UNHP on July 21, 2022, that identified three state species of concern that have been documented within a 0.5–2.0-mile radius of the project area, including the Arizona toad, bald and golden eagles, band-tailed pigeon, desert sucker, and northern leopard frog (UNHP, 2024). These species are analyzed in Section 5.4.1 and 5.4.6. The UNHP was also invited to review the purpose and need of the project on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.8 Utah Department of Natural Resources, Utah Geological Survey

A Paleontological Resources Locality Search was requested from the Utah Department of Natural Resources, UGS on September 25, 2024, to identify potential paleontological resources in the project area. The request was completed on September 26, 2024, via email and a recommendation to complete surveying/monitoring of the PFYC areas was given. Surveying was completed in November 2024 and February 2025 and a summary of findings is included in Section 5.5.5.

7.2.9 Federal Emergency Management Agency

Coordination with FEMA was conducted throughout the planning process of the Plan-EA and Plan-EIS. FEMA was also invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.10 Utah State Clearinghouse

Coordination with the Utah State Clearinghouse was conducted throughout the planning process of the Plan-EA and Plan-EIS. State Notification per Executive Order 12372 – Funding for start of PL 566 Planning was posted on November 17, 2017. The Utah State clearinghouse was also invited to review the purpose and need of the project on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.11 Utah Division of Water Resources

Coordination with UDWRe was conducted throughout the planning process of the Plan-EA and Plan-EIS. UDWRe was invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.12 Utah Department of Environmental Quality

Coordination with Utah Department of Environmental Quality (UDEQ) was conducted throughout the planning process of the Plan-EA and Plan-EIS. UDEQ was invited to review the purpose and need of the project on October 4, 2024, via email. A virtual agency meeting was held on October

17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.13 Utah Division of Water Quality

Under Section 401 of the CWA, approval would be required so that the project does not violate state water quality standards. Certification is obtained as part of the USACE Section 404 Permit review process. Under Section 402 of the CWA, a UPDES Storm Water General Permit for Construction Activities is required for construction activities that disturb more than 1 acre and discharge pollutants to surface waters. A SWPPP will be developed, including submitting an NOI to the Utah Division of Water Quality.

Coordination with the UDWQ was conducted throughout the planning process of the Plan-EA and Plan-EIS. UDWQ was invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.14 Utah Division of Water Rights

Coordination with the Utah Division of Water Rights was conducted throughout the planning process of the Plan-EA and Plan-EIS. Utah Division of Water Rights was invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

Approval will also be required for the final design report, construction drawings, and specifications by the Utah State Assistant Engineer.

7.2.15 Utah Department of Cultural and Community Engagement

The Utah Department of Cultural & Community Engagement was invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.16 Utah Department of Agriculture and Food

The Utah Department of Agriculture and Food was invited to review the project purpose and need on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.2.17 Utah Department of Public Safety

Coordination with the Utah Department of Public Safety was conducted throughout the planning process of the Plan-EA and Plan-EIS. The Utah Department of Public Safety was invited to review the purpose and need of the project on October 4, 2024, via email. A virtual agency meeting was held on October 17, 2024, to discuss comments on the project purpose and need. Any comments received were addressed prior to the issuance of the Draft Plan-EIS to the public.

7.3 Public Involvement

7.3.1 Public Outreach Plan

A Public Outreach Plan was prepared to outline effective procedures for engaging with the public, recreationists, Tribes, local businesses and associations, stakeholders, affected landowners, and affected government agencies. The main goal of public participation is to involve a diverse group of public and government agency participants to solicit input and provide timely information throughout the NEPA review process. As part of the public participation process, the plan seeks to meaningfully engage minority, low-income, and traditionally under-represented populations during the NEPA review process.

7.3.2 Project Scoping

Public participation is a vital component of the project that provides those who are interested in or potentially affected by proposed alternatives with an opportunity to share their concerns and provide input regarding the project during the planning stages of the Plan-EIS.

Project scoping questions, comments, and concerns were requested from the public and government agencies during the preliminary scoping period, both orally at public meetings, and via written submittal of comments. The project Scoping Summary Report outlines the efforts and comments received from the agencies and public during the scoping process. Refer to Chapter 1.5 for a description of the projects planning process.

7.3.3 Public Outreach

Table 7.3 lists the project's public outreach activities. The public, Tribes, agencies, and organizations were notified of activities as described below and provided with opportunities to comment on the project. See Appendix A for a copy of all public outreach activities

Table 7.3. Public Outreach Activities.

Date	Item
November 21, 2017	Utah State Clearinghouse Notification
October 29, 2019	Project Kickoff Meeting
February 12, 2018	NRCS sent formal requests to be a Cooperating Agency for the project Plan-EA to agencies (Appendix A)
May 23, 2018	Tribal Scoping Letter mailed to 21 representatives of 12 Tribes (Appendix A)
May 24, 2018	Public and Agency Scoping Letters mailed (sent to 21 private landowners and 31 agency reps)
May 24, 2018, and May 31, 2018	Scoping Notice, Meeting Announcements, and Scoping Notice Posted in the Southern Utah News
May 24, 2018	Scoping – Public Comment Period Open

Date	Item
May 24, 2018	Agency Scoping Meeting #1 held in Kanab, Utah
June 6, 2018	Public Scoping Meeting held in Orderville, Utah
June 6, 2018	Agency Scoping Meeting #2 held in Kanab, Utah
June 7, 2018	Early Coordination - Agencies
June 25, 2018	Scoping – Public Comment Period Close (4 public comments and 5 agency comments received)
July 2018	Scoping Summary Report
January 9, 2020	Tribal scoping letters mailed to 18 representatives of 12 Tribes for Plan-EA Scoping Outreach Process (Appendix A)
November 20, 2020	Plan-EA NOA letters mailed to 21 representatives of 12 Tribes (Appendix A)
June 7, 2021	Email announcement of NOI and updated comment period close date sent
February 2021	Scoping letter and fact sheet sent to landowners within or adjacent to the project area (Appendix A)
October 7, 2021-April 28, 2022 (209 days)	Scoping Public Comment Period Open: October 7, 2021 Close: April 28, 2022
October 7, 2021, and October 14, 2021	Notice published in the Southern Utah News on October 7, 2021, and October 14, 2021. Project press releases were sent to the Salt Lake Tribune, The Spectrum, and the Desert Sun News. NGOs were also contacted. (Appendix A)
October 20, 2021	Scoping Public Meeting (virtual) was held in Orderville
January 14, 2022	Plan-EIS Tribal Scoping letters sent to 17 representatives of 11 Tribes. The Hualapai Tribe was removed from consultation for the Plan-EIS per their request on March 1, 2021 (Appendix A)
March 29, 2022	NOI to Prepare an EIS for the Cove-EFVR Watershed Plan, Kane County, Utah (Docket No. NRCS–2022–0002) published.
May 3, 2022	Copy of NOI sent to 18 representatives of 11 Tribes (Appendix A)
January 23, 2023	Second CRIR and notification of Adverse Effect and the preparation of an MOA sent to 21 representatives of 11 Tribes (Appendix A)
May 22, 2024	Third CRIR sent to 21 representatives of 11 Tribe (Appendix A)
October 17, 2024	Agency Meeting (virtual) to provide comment on the draft purpose and need
September 18, 2026	Draft Plan-EIS Open Comment Period and NOA
September 30, 2026	Draft Plan-EIS Public Meeting

Date	Item
November 2, 2026	Draft Plan-EIS Comment Period Closed
November 2026	Final Plan-EIS and NOA
November 2026	Record of Decision (ROD)

7.4 Plan Development and Review

7.4.1 Cooperating Agencies

The Cooperating Agencies, consisting of the EPA, NPS, USACE, UTLA, PLPCO, and BLM, were involved in the development of the Plan-EIS and provided technical expertise where appropriate. Concurrence was received from Cooperating Agencies during the scoping process and Plan-EIS development on the project purpose and need, resource concerns, alternatives included/eliminated from detailed study, and selection of the preferred alternative. A preliminary Plan-EIS was provided to Cooperating Agencies for review, and all comments or concerns were addressed prior to issuance of the Draft Plan-EIS to the public.

7.4.2 NRCS Plan-EIS Reviews

The following NRCS reviews occurred prior to issuance of the Draft Plan-EIS to the public, in accordance with the NWPM process.

1) NRCS Utah review.
2) NRCS National Water Management Center review.
3) NRCS Headquarters review.
4) Issue the Draft Plan-EIS for public review.

7.4.3 Draft Plan-EIS Public Comment

This portion will be completed in the Final Plan-EIS to document the Draft Plan-EIS public comment process. Comments and responses on the Draft Plan-EIS will be included in Appendix A of the Final Plan-EIS.

7.4.4 Final Plan-EIS and Record of Decision Public Comment

When the Final Plan-EIS and ROD are issued, an NOA will be published in the *Federal Register* and locally to notify the public of the finding and copies made available on the project website.

7.4.5 Distribution List

Table 7.4 lists the government agencies and organizations that are included on the project distribution list for scoping notice and/or NOA for the Draft Plan-EIS. Private parties are not listed to maintain privacy for those individuals.

Table 7.4. Distribution List–Federal Government

USDA-NRCS	USACE
USFWS	EPA
BLM	NPS/ZNP
USFS	BOR
FEMA	Utah U.S. House of Representatives
U.S. Senators Mike Lee and John Curtis	-

Table 7.5. Distribution List–State Government

Utah PLPCO	UTLA
Utah SHPO	UDOT
UDWR	UDEM
UNHP	Utah Department of Natural Resources
Utah State Clearinghouse	UDWRe
UDEQ	UDWQ
Utah Division of Water Rights	Utah Department of Cultural and Community Engagement
Utah Department of Agriculture and Food	Utah Department of Public Safety
Utah House of Representatives, District 2	Utah State Senate, District 2

Table 7.6. Distribution List–Local Government

Orderville, Utah	Mt. Carmel, Utah
Glendale, Utah	Kane County Commission
Kane County, Utah	Washington County, Utah
KCWCD	WCWCD

Table 7.7. Distribution List–Business and Organizations

Orderville Irrigation Company	Glendale Irrigation Company
Mt. Carmel Irrigation Company	-

Table 7.8. Distribution List–Non-Governmental Organizations

Utah Rivers Council	Utah Council of Trout Unlimited
American Rivers	Grand Canyon Trust
Conserve Southwest Utah	National Parks Conservation Association
American Whitewater	Great Basin Water Network
The Center for Biological Diversity	Living Rivers

Table 7.9. Distribution List–Tribes

Hopi Tribe of Arizona	Kaibab Band of Paiute Indians of the Kaibab Indian Reservation
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	Moapa Band of Paiute Indians of the Moapa River Indian Reservation
Navajo Nation	Paiute Indian Tribe of Utah
Pueblo of Zuni	San Juan Southern Paiute Tribe
Ute Indian Tribe of the Uintah & Ouray Reservation	Ute Mountain Ute Tribe
White Mesa, Ute Council	-

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10.0 ACRONYMS

Table 10.1. List of Acronyms.

ACHP	Advisory Council on Historic Preservation
afy	Acre-Feet per Year
amsl	Above mean sea level
APE	Area of Potential Effects
BA	Biological Assessment
BCC	Birds of Conservation Concern
BCNP	Bryce Canyon National Park
BGEPA	Bald and Golden Eagle Protection Act
BLM	U.S. Bureau of Land Management
BMPs	Best Management Practices
BOR	U.S. Bureau of Reclamation
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CRIR	Cultural Resources Inventory Report
CWA	Clean Water Act of 1972
DM	Departmental Manual
EAP	Emergency Action Plan
EFVR	East Fork Virgin River
Eocene	Eocene Environmental Group, Inc.
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
F	Fahrenheit
FEMA	Federal Emergency Management Agency
HQW	High-Quality Waters
IOs	Isolated occurrences
IPaC	Information for Planning and Conservation
KCWCD	Kane County Water Conservancy District
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSO	Mexican Spotted Owl
M&I	Municipal and Industrial
NAAQS	National Ambient Air Quality Standards
NEE	National Economic Efficiency
NEPA	National Environmental Policy Act
NGOs	Non-Government Organizations

NHPA	National Historic Preservation Act of 1966
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPPH	National Planning Procedures Handbook
NPS	U.S. National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWPH	National Watershed Program Handbook
NWPM	National Watershed Program Manual
O&M	Operation and Maintenance
PCRP	Post Construction Rehabilitation Plan
PFYC	Potential Fossil Yield Classification
PHMA	Priority Habitat Management Area
PL	Public Law
Plan-EA	Watershed Plan Environmental Assessment
Plan-EIS	Watershed Plan Environmental Impact Statement
PLPCO	Utah Public Lands Policy Coordinating Office
PR&G	Principles, Requirements, and Guidelines
ROD	Record of Decision
ROW	Right-of-way
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SLOs	Sponsoring Local Organizations
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Property
TES	Threatened and Endangered Species
THPO	Tribal Historic Preservation Officer
UDEM	Utah Division of Emergency Management
UDEQ	Utah Department of Environmental Quality
UDOT	Utah Department of Transportation
UDWR	Utah Division of Wildlife Resources
UDWRe	Utah Division of Water Resources
UGS	Utah Geological Survey
UNHP	Utah Natural Heritage Program
UPDES	Utah Pollutant Discharge Elimination System
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture

USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
US-89	U.S. Highway 89
UTLA	Utah Trust Lands Administration
WCWCD	Washington County Water Conservancy District
WOTUS	Waters of the U.S.
WSA	Wilderness Study Area
WSR	Wild and Scenic Rivers
WSRA	Wild and Scenic Rivers Act of 1968
WYBC	Western Yellow Billed Cuckoo
ZNP	Zion National Park
ZNP Agreement (1996)	Zion National Park Water Rights Settlement Agreement of 1996