Investigation and Analyses Report for the Utaba Dam Rehabilitation Supplemental Watershed Plan-Environmental Assessment Project

Appendix D

North Fork Ogden River Watershed

Weber County, Utah

The purpose of the Investigation and Analysis Appendix is to present information that supports the formulation, evaluation, and conclusions of the Watershed Plan and Environmental Assessment (EA). Refer to the Administrative Record for the copies of the studies referred to in this Appendix.

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D.1.0 Introduction

This document summarizes the investigations and analysis completed for the planning and engineering of the dam rehabilitation activities in preparation for the Utaba Dam Rehabilitation Supplemental Watershed Plan–Environmental Assessment (Plan-EA). This information includes a summary of the design criteria, analysis for dam rehabilitation, hydrologic and hydraulics, alternatives formulation, and preferred alternative costs, economic evaluations, and economic benefits. Additional information relevant to each of the sections provided in this report is available as part of the administrative record for the project.

The Utaba Dam Rehabilitation Project (Proposed Project) is located within the North Fork Ogden River Watershed in Weber County, Utah. The Proposed Project seeks to rehabilitate Utaba Retarding Dam to bring it into compliance with NRCS and Utah State Dam Safety standards. See the Dam Rehabilitation Design technical memorandum, prepared by Franson Civil Engineers Inc., in Appendix E for more details on the Proposed Project.

D.2.0 Measures in the Proposed Project

Weber County aims to implement the following measures within the service area. The rehabilitation would upgrade Utaba Dam to meet Utah State and NRCS Dam Safety standards while maintaining water detention capacity. The dam would be raised 4 feet to provide additional freeboard to facilitate passing of the Probable Maximum Flood (PMF) event. The undersized and degraded principal spillway would be replaced, and the auxiliary spillway would be relocated to the left abutment. A downstream filter and drain system would address seepage issues, and a new principal spillway would prevent blockages from beaver activity while allowing full reservoir drainage. A chimney and blanket filter system would be installed to prevent soil migration. Sediment management measures include removing accumulated sediment and reducing sediment buildup by upgrading the principal spillway. A control gate on the principal spillway would allow water release to be restricted, enabling the reservoir to serve as a wildfire suppression resource as well as facilitate inspection of the principal spillway conduit.

D.3.0 Design Criteria

The Project will be designed to meet the NRCS and Utah state requirements and other applicable design requirements and standards, as shown in Table 3-1 by project purpose. See Appendix E, Design Criteria Technical Memorandum, prepared by Franson Civil Engineers Inc., for more details on the design criteria for the Proposed Project. Other Utah or NRCS codes as applicable would also be followed along with Weber County's Public Works standards for construction and stormwater management.

Table 3-1. Design Criteria Used for Each Project Element

Design Criteria & Practice Standards
Weber County Road and Bridge Design Standards
NRCS CPS 327: Conservation Cover
NRCS CPS 342: Critical Area Planting
NRCS CPS 373: Dust Control on Unpaved Roads and Surfaces

Design Criteria & Practice Standards
NRCS CPS 402: Dam
NRCS CPS 472: Access Control
NRCS CPS 560: Access Road
NRCS CPS 570: Stormwater Runoff Control
NRCS CPS 582: Open Channel
NRCS CPS 587: Structure for Water Control
NRCS National Engineering Handbook (NEH)
NRCS National Engineering Manual (NEM)
NRCS Title 210 Part 302 National Instruction
Utah Pollution Discharge Elimination System General Construction Permit
UDOT Drainage Regulations
Utah Division of Water Rights Dam Safety Rules
Utah Pollutant Discharge Elimination System MS4 Permit

D.4.0 Analysis

The following Technical Memoranda (TMs) have been prepared to document the current conditions and the effects of activities within the Project Area. Table 4-1 displays the number, name, and key information contained in the TMs in Appendix E.

Table 4-1. Technical Memoranda by Number, Name, and Key Information Content

Name	Key information Content
Existing Conditions	This memo provides a comprehensive evaluation of the current condition of the Utaba Dam in Weber County, Utah. It outlines structural and functional deficiencies, including sedimentation that has reduced storage capacity, erosion and seepage around the principal spillway conduit, severe degradation and undersizing of the auxiliary spillway, and an embankment crest that does not meet modern safety standards. Site investigations found variable sediment composition and strength, with beaver activity and sediment buildup leading to unintended long-term water detention. The dam was designed to control sediment and flood flows but no longer meets current NRCS and Utah dam safety criteria. The poor condition of the auxiliary spillway, in particular, poses the highest risk of dam failure. Downstream development, including campgrounds and homes, increases the potential hazard classification, reinforcing the urgency for rehabilitation to prevent catastrophic failure and protect public safety.

Name	Key information Content
Design Criteria	This memo outlines the design criteria and practice standards that will guide the planning and rehabilitation of the Utaba Retarding Dam in Weber County, Utah. It compiles applicable federal, state, and county standards—including NRCS Conservation Practice Standards (e.g., CPS 402 for dam design, CPS 560 for access roads), the NRCS National Engineering Handbook and Manual, Utah Division of Water Rights dam safety rules, and Weber County and UDOT drainage standards. These standards cover areas such as flood control, sediment and stormwater management, access infrastructure, environmental protection, and, if applicable, recreation improvements. The memo ensures that both 30% and final design phases of the project will conform to these regulatory frameworks, including permitting and environmental compliance through the Utah Pollutant Discharge Elimination System.
Hydrology	This tech memo presents the hydrologic analysis for the Utaba Dam Rehabilitation Watershed Plan-EA, detailing how water moves through the 9.5-square-mile mountain watershed in Weber County, Utah. It evaluates watershed characteristics (elevation, slope, precipitation, land cover, geology, soils), and identifies the governing codes, design storms, and required inflow design floods (IDFs) needed to size spillways and assess flood risk. Because the basin is subject to both snowmelt and intense summer thunderstorms, the analysis uses HEC-RAS modeling with calibrated curve numbers and hydrologic soil group data to simulate runoff from various storm events (2-year to probable maximum precipitation). Results show that while snowmelt dominates lower return periods, extreme rainfall events produce the highest peak flows, necessitating robust spillway and freeboard designs. The memo includes hydrograph development, baseflow estimates, and modeling comparisons to confirm that rain-driven flash floods, not snowmelt, control dam safety and infrastructure sizing.
Hydraulic Modeling & Flood Inundation	This memo documents the flood routing analysis for the Utaba Dam Rehabilitation Watershed Plan-EA, using HEC-HMS and HEC-RAS models to evaluate how flood flows pass through the dam system under existing and proposed conditions. It routes inflow hydrographs—developed in TM003, Hydrology—for various design storms (10-year to Probable Maximum Flood) through the current dam configuration, identifying major deficiencies in spillway capacity and freeboard protection. The analysis shows that under existing conditions, the dam overtops during the 100-year and larger events, with no capability to safely convey extreme floods. The memo then assesses several preliminary design alternatives, each modifying embankment height, principal spillway, and/or auxiliary spillway. The results indicate that

Name	Key information Content
	without significant improvements, the dam cannot meet NRCS and Utah Dam Safety standards for hydrologic performance. Recommendations will inform the Preferred Alternative to ensure the dam can safely route the Inflow Design Flood without overtopping.
Dam Rehabilitation Design	The Dam Rehabilitation Design memo outlines the proposed rehabilitation concept for the Utaba Retarding Dam as part of the NRCS Watershed Plan-EA process. It presents a detailed description of the Preferred Alternative, which includes raising the embankment, replacing the principal spillway with a larger pipe and improved inlet, constructing a new concrete-lined auxiliary spillway, and implementing slope stabilization, access road upgrades, and erosion protection. The memo explains how the design meets current NRCS and Utah dam safety standards by ensuring adequate freeboard, spillway capacity, and structural stability under design storm events. Additionally, the document addresses construction considerations such as dewatering, staging, and access, while also noting that the design accommodates both environmental and safety concerns identified in earlier technical memos. The preferred design is intended to meet both current and future watershed protection goals, ensuring long-term functionality and public safety.
Economic I&A Report	The Economic Investigations and Analysis Report for the Utaba Dam Rehabilitation Watershed Plan-EA presents a thorough economic evaluation of the Preferred Alternative compared to the No Action scenario, in alignment with NRCS Watershed Program guidelines. The analysis concludes that the Preferred Alternative is economically justified, with average annual benefits of $893,358, average annual costs of $257,659, and a resulting Benefit-Cost Ratio (BCR) of 3.47. The primary economic benefits stem from flood damage reduction, sediment control, and protection of downstream infrastructure and land uses. The report uses NRCS National Watershed Program Manual (NWPM) economic tables, a 52-year period of analysis, and a 3.0% discount rate to calculate present value estimates. It also includes supporting documentation on land use, hydrologic modeling, damage functions, and cost estimates. Overall, the report confirms the Preferred Alternative meets the federal threshold for funding and provides strong economic support for proceeding with rehabilitation.
Geotechnical Memo	The Geologic and Geotechnical Technical Memorandum for the Utaba Dam Rehabilitation Watershed Plan-EA summarizes field and laboratory investigations conducted to assess the existing subsurface conditions and support design of the Preferred Alternative. It documents that the dam was constructed on native alluvial and colluvial materials overlying weathered bedrock, with

Name	Key information Content
	embankment soils consisting primarily of sandy lean clays and silts. Subsurface exploration included test pits, borings, and laboratory testing to characterize material properties such as strength, permeability, and grain size. Key findings include low-permeability foundation soils, variability in embankment compaction, and no evidence of active faulting at the site. The investigation confirms that the site is suitable for rehabilitation, but highlights considerations for seepage control, slope stability, and constructability. The data gathered inform critical design elements including spillway alignment, embankment raise feasibility, and the need for construction dewatering or stabilization measures.

D.5.0 Hydrologic and Hydraulic Analysis

The Utaba Dam watershed is located in Weber County, Utah, and drains an approximately 9.5-square-mile area originating from the Wasatch Mountains above the community of Liberty. The hydrologic and hydraulic analyses for this watershed, documented in Technical Memoranda 003 (Hydrology) and 004 (Flood Routing), were conducted to characterize current watershed behavior and evaluate dam performance under a range of storm events in support of the Watershed Plan-EA and rehabilitation design. TM003 details the watershed's physiographic and climatic characteristics, including steep mountainous terrain, variable land cover, and a bimodal precipitation pattern influenced by both snowmelt and summer thunderstorms. Using NRCS methods and the WinTR-55 and HEC-HMS models, the analysis determined curve numbers and time of concentration values for each subarea based on hydrologic soil groups, slope, and land use. Results showed that snowmelt dominates runoff during lower-frequency events (2-, 10-, 25-year), while intense rainfall is the primary driver of peak flows in the 50-, 100-, 500-year, and probable maximum precipitation (PMP) events.

TM004 presents a detailed routing of these inflow hydrographs through the existing dam infrastructure using HEC-RAS. The modeling evaluated flood behavior under a range of return intervals, confirming that the existing principal spillway and auxiliary spillway lack sufficient capacity to safely route design floods. Overtopping occurs as early as the 100-year event under current conditions, with increasing severity in larger storm events, posing a significant dam safety risk. The Probable Maximum Flood (PMF) far exceeds the available freeboard, indicating the need for structural improvements to both conveyance and embankment design. TM004 also evaluates preliminary design configurations for the Preferred Alternative, which demonstrate significantly improved flood routing performance, including sufficient capacity to safely pass the Inflow Design Flood (IDF) and meet current NRCS and Utah Dam Safety requirements. Further details are provided in TM003 Hydrology and TM004 Flood Routing, prepared by Franson Civil Engineers, Inc.

D.6.0 Alternative Formulation

The Utaba Dam Rehabilitation Plan-EA followed a structured seven-phase formulation and screening process aligned with the Principles, Requirements, and Guidelines (PR&G) and the National Watershed Program Manual (NWPM) to identify the most appropriate solution for addressing problems and opportunities in the watershed. This process was developed collaboratively by NRCS and project sponsors and aimed at ensuring a full range of feasible alternatives were evaluated.

The process began with a comprehensive identification of problems, opportunities, objectives, and constraints (Phase I), resulting in ten site-specific deficiencies related to dam safety, structural capacity, seepage, sedimentation, seismic stability, and nonstructural considerations. Based on these deficiencies, 36 management measures were proposed and qualitatively screened (Phase II) for feasibility and alignment with NEPA Purpose and Need; 15 measures advanced to the next phase.

In Phase III, the selected measures were assessed for pairwise compatibility—i.e., whether they could be combined into viable alternative plans. Fourteen of the 15 measures were generally compatible, enabling the creation of five distinct alternative plans in Phase IV: the No Action Alternative (required as an analytical baseline), a comprehensive Structural Rehabilitation Alternative, and three nonstructural alternatives (Decommissioning, Floodproofing, and Relocations/Buyouts).

These five alternatives entered Phase V, the first round of screening, which qualitatively evaluated their ability to meet project objectives and planning constraints. The Relocations/Buyouts Alternative was eliminated due to excessive cost and poor performance against objectives and constraints. The remaining four alternatives proceeded to Phase VI for a second screening that incorporated both qualitative assessments of ecosystem services and quantitative economic analysis (e.g., benefit-cost ratio and net economic benefits). The Floodproofing Alternative failed to meet ecosystem service thresholds and was eliminated. The No Action, Structural Rehabilitation, and Decommissioning Alternatives were carried forward into the Final Array.

Phase VII finalized these three alternatives. The No Action Alternative remained as the required baseline. The Structural Rehabilitation Alternative included 12 integrated management measures addressing the dam's spillways, seepage, sedimentation, and structural integrity. The Decommissioning Alternative involved complete dam removal and floodplain restoration.

In the final screening (Phase VIII), each alternative was evaluated using the PR&G CEEA criteria: Completeness, Effectiveness, Efficiency, and Acceptability. The No Action Alternative was found to be incomplete, ineffective, and unacceptable despite being cost-efficient. The Decommissioning Alternative was complete, efficient, and acceptable but not fully effective. The Structural Rehabilitation Alternative was the only plan that fully satisfied all four CEEA criteria, addressed all deficiencies, met project objectives, complied with federal requirements, delivered substantial ecosystem and economic benefits, and was deemed both locally and environmentally.

Accordingly, Alternative 2—Structural Rehabilitation—was selected as the Preferred Alternative and is recommended for implementation in the Plan-EA. This process and its rationale are fully

documented in Appendix E. The formulation process, including measure compatibility, screening matrices, and final alternative selection, is documented in detail in Appendix E and summarized in Appendix E in the *PR&G Alternative Formulation & Screening Matrix* and the *PR&G Ecosystem Services Worksheet*.

D.7.0 Economic Analysis

The Utaba Dam Rehabilitation Plan-EA Economic I&A Report and Ecosystem Services Framework documentation is included in Appendix E. Report findings are summarized here.

D.7.1 Federal Guidelines of National Economic Efficiency Analysis

The Benefit-Cost Analysis (BCA) conducted for the Utaba Dam Rehabilitation project adhered to the federal guidelines outlined in the USDA *Principles, Requirements, and Guidelines* (PR&G) (USDA 2017), the NRCS *Natural Resources Economics Handbook* (NRCS 1998), and the *National Watershed Program Manual* (NRCS 2024). These standards provided the framework for evaluating the economic justification of the No Action and Action Alternatives in compliance with NRCS watershed planning requirements.

While multiple ecosystem service categories were identified and considered as part of the broader planning effort, the economic analysis did not rely on monetizing these benefits to justify the project. The Action Alternatives demonstrated high Benefit-Cost Ratios (BCRs) based solely on quantifiable economic benefits—primarily flood damage reduction. As such, the project met the economic feasibility threshold under NRCS criteria without needing to include unquantified or non-market ecosystem service values.

D.7.1.1 Ecosystem Services

The Utaba Dam Rehabilitation Plan-EA integrates an ecosystem services framework consistent with the Principles, Requirements, and Guidelines (PR&G) for Federal Investments in Water Resources (USDA 2017), ensuring that economic, environmental, and social values are given equal standing in decision-making. The project emphasizes the importance of protecting and enhancing ecosystem functions as part of achieving national economic efficiency—not solely through monetary returns, but through a broader understanding of public value. This approach allows the proposed alternatives to be evaluated for their capacity to improve the well-being of people within the watershed while maintaining or restoring ecological integrity.

The framework used follows the four recognized categories of ecosystem services: provisioning, regulating, cultural, and supporting. In the watershed, regulating services include flood attenuation, public safety, and wildfire suppression capabilities—functions which are essential as critical buffers against environmental catastrophe. Cultural services are affected through changes in visual quality, increased or restricted public recreation access, and youth camps. The provisioning services impacted include drinking water quality, food production/irrigation, and fish populations downstream of the reservoir. Supporting services—like soil retention, hydrologic connectivity, and aquatic habitat continuity—are foundational to sustaining long-term ecological health and enabling the provision of the other service types and thus were treated as an intermediate ecosystem service (i.e., tied into the other three).

Causal chains were developed for a wide array of measures to evaluate the links between physical changes to the landscape and downstream effects on ecosystem services and human well-being. Each alternative was assessed in terms of its effects on specific ecosystem functions. The final analysis characterized the anticipated positive and negative ecosystem service impacts of each alternative, even though the formal benefit-cost analysis (BCA) did not require monetized values from these services due to already favorable BCRs. Nonetheless, identifying and evaluating these ecosystem services adds transparency and depth to the decision-making process and provides a foundation for ensuring long-term sustainability of the watershed's resources.

The analysis found that several of the action alternatives would provide measurable benefits to regulating and cultural ecosystem services. For example, the structural rehabilitation alternative improves regulating services by reducing breach risk while also enhancing public safety. The structural rehabilitation Alternative also supports cultural services by protecting the cultural values available at downstream youth camps such as Camp UTABA. These effects, though not directly monetized in the final BCR calculations, illustrate the broader public value provided by the project in addition to its economic returns.

D.7.2 Alternatives Evaluated

This section provides a brief discussion of the alternatives and measures carried forward through the EA process. Each measure was incrementally evaluated for engineering efficacy, modeled hydrologically and hydraulically (H&H), and then evaluated in detail for economic feasibility as part of this process. Each measure was also evaluated as a complete part of an entire alternative package for these same conditions, as well as all of the PR&G and NEPA criteria and constraints. Additionally, all corridors and easements have been verified and confirmed, and property owner agreements are in place with the Sponsors.

D.7.2.1 No Action/Future Without Federal Investment (FWOFI)

Taking no action would consist of activities carried out if no federal action or funding were provided. This alternative would not address the deficiencies at Utaba Dam. There would be no improvements made to the current condition of the principal and auxiliary spillways, the inadequate crest width of the dam, or the uncontrolled seepage issues that exist at the outlet conduit of the principal spillway and at the toe of the dam. Furthermore, soil migration may continue to occur, and sediment would continue to accumulate, with no storage capacity being restored. Recent analyses confirm that the dam is stable. However, concerns would remain regarding seepage and inadequate spillway capacity under this alternative., and the risk of a breach would grow more likely over time. Under this alternative, it is reasonable to assume that a breach would become imminent. The No Action Alternative would include $1,069,987 in annual expected flood damages.

The No Action/FWOFI Alternative would not meet the project’s purpose and need and would not solve the problems or meet the opportunities identified in chapter 1 as the existing facility would continue to degrade and remain out of compliance with NRCS and Utah Dam Safety standards. This alternative would not meet the Federal Objective to protect the environment and promote sustainable economic development. Additionally, the No Action/FWOFI Alternative would not successfully meet the PR&G Guiding Principles of Healthy and Resilient Ecosystems, Sustainable Economic Development, Floodplains, Public Safety, or Watershed Approach.

D.7.2.2 Proposed Action – Structural Rehabilitation Alternative

The Structural Rehabilitation Alternative would upgrade Utaba Dam to meet Utah State and NRCS Dam Safety standards while maintaining water detention capacity. The dam would be raised 4 feet to provide additional freeboard to facilitate passage of the Probable Maximum Flood (PMF) event. The undersized and degraded principal spillway would be replaced, and the auxiliary spillway would be relocated to the left abutment. A downstream filter and drain system would address seepage issues, and a new principal spillway would prevent blockages from beaver activity while allowing full reservoir drainage. A chimney and blanket filter system would be installed to prevent soil migration. Sediment management measures include removing accumulated sediment and reducing sediment buildup by upgrading the principal spillway. To meet safety standards, modifications could include flattening slopes, adding a stability berm, or replacing weak dam material. Although current analyses indicate that these additional modifications may not be necessary, they have been retained as potential options, with their necessity to be confirmed during final design and analysis. A control gate on the principal spillway would allow water release to be restricted, enabling the reservoir to serve as a wildfire suppression resource as well as facilitate inspection of the principal spillway conduit.

D.7.2.3 Proposed Action – Decommissioning Alternative

The PR&G requires at least one nonstructural alternative be evaluated in full detail for PL-566 REHAB projects such as this. Three nonstructural alternatives were evaluated in the initial array of alternative plans but only one was included in the final array as it was the only one that was deemed potentially feasible by the SLOs. This alternative recognizes that the potential failure of the existing dam without rehabilitation could create a greater risk to downstream properties and facilities than the benefits that are currently provided by the existing dam. The measures that would be included under this alternative would require the complete removal of the dam, removal and/or stabilization of accumulated sediment, reestablishment of channels through the reservoir area (a nature-based solution (NBS) to restore natural hydrology), and site restoration/revegetation (also an NBS). The disposal of the dam material and accumulated sediment represents a significant challenge associated with this alternative. Ultimately, the disposal of material and sediment would require the disturbance of additional areas which would need to be subsequently restored and revegetated. Although the Purpose and Need of the project would be met with a single measure (i.e., decommissioning) under this alternative, it would be costly and have substantial impacts as discussed in chapter 5. However, the option remains to implement this nonstructural alternative and decommission the existing dam.

Summary of Economic Justification

The Structural Rehabilitation Alternative was selected based on a robust economic analysis demonstrating high net public value. The Benefit-Cost Ratio (BCR) for the alternative is 3.47, with average annual benefits of $893,358 compared to costs of $257,659. This yields net benefits of over $600,000 annually, demonstrating that the project would provide a substantial return on federal investment.

Methodology for Benefit Quantification

During modeling the most probable mode of dam failure identified was failure of the auxiliary spillway. The benefits were estimated using a without-project versus with-project framework. The economic analysis employed probabilistic flood damage modeling across eight flood events,

applying a depth-damage function to estimate avoided losses to structures, contents, and vehicles. Values were grounded in local tax appraisal data and FEMA damage functions

The primary formula used to estimate annual expected benefits was:

$$\sum \underline{(PFED_{i-1} + FED_i)/2} * (PPFE_{i-1} - PFE_i)$$

Where:

- PFED = Previous Flood Event Damages
- FED = Flood Event Damages
- PPFE = Probability of Previous Flood Event
- PFE = Probability of Flood Event

Key Benefit Categories

Flood Damage Reduction Benefits

The Structural Rehabilitation Alternative provides significant protection to structures downstream of the dam. Under existing conditions, average annual flood damages total $1,069,988. Implementation of the Preferred Alternative reduces this figure to under $200,000, yielding approximately $893,000 in annual flood protection benefits.

Ecosystem Services Benefits

While not monetized, the Preferred Alternative supports important ecosystem services:

- **Provisioning Services:** Enhanced crop production, improved water quality, and protection of downstream fish species.
- **Regulating Services:** Reduced risk of flood damage and public safety hazards
- **Cultural Services:** Increased recreational access (e.g., North Fork Park), scenic open space, protection of downstream youth camps (e.g., Camp UTABA).

Socially, the most critical benefit is risk reduction to human life. Although not assigned a dollar value, federal planning policy (P&G and PR&G) allows life safety considerations to supersede strict economic calculations. Reducing loss of life potential from flooding was a central objective in the development of the preferred alternative.

Summary of Benefits (Preferred Alternative)

Benefit Type	Increment Name	Annual Benefit
Flood Damage Reduction	Structures, Contents, Vehicles	$893,358
Total Annual Benefit		**$893,358**

D.7.3 Costs of the Preferred Alternative

Project costs include all expenses incurred as part of the development, installation, operation, and maintenance of a project. Costs were estimated for each work of improvement included as part of

the action alternatives. The Preferred Alternative—Structural Rehabilitation Alternative—was costed by Franson Civil Engineers in 2025. Cost estimates were developed following NRCS protocols in the *Resource Economics Handbook* (2014) and cost allocation was performed in accordance with NRCS funding rules as described in the *National Watershed Program Manual* (2024). All cost figures reflect the Fiscal Year 2025 price base, using a 3.00% discount rate over a 52-year period of analysis.

Project Cost Components

The Preferred Alternative includes both capital (installation) and annual operation and maintenance (O&M) costs across multiple functional areas. Each project increment was assigned to the NRCS PL 83-566 authorized purpose of watershed structure rehabilitation, which is cost-shared at 65% federal and 35% non-federal.

Using NRCS cost allocation methods, expenditures were converted to present values and then annualized across the project life. No replacement costs were required, as all structures were assumed to last the full 50-year design life.

Summary of Annualized Costs

Total average annual costs for Alternative 1 amount to $257,659, comprising $6,204,000 in amortized installation and roughly $8,559 in annual O&M. These costs reflect investments in various measures intended to meet the project's purpose and need and bring Utaba Retarding Dam into compliance with NRCS and Utah Dam Safety standards.

Cost Comparison Across Alternatives

For context, the non-preferred Alternative (Decommissioning) would deliver significantly less public value.

Benefit-Cost Outcomes

The Structural Rehabilitation Alternative demonstrates strong cost efficiency. It produces net annual benefits of $893,358 and a Benefit-Cost Ratio (BCR) of 3.47, far exceeding the minimum required for federal investment. In contrast, the Decommissioning Alternative's BCR is 4.30, but with unpopular and unfeasible upfront costs.

Alternative	Avg. Annual Benefits	Avg. Annual Costs	B/C Ratio	Net Benefits
Alt. 1: Structural Rehabilitation	$893,358	$257,659	3.47	$635,699
Alt. 2: Decommissioning	$819,767	$190,600	4.30	$629,167

Fiscal Responsibility and Implementation

All cost estimates were developed in coordination with design engineers, with careful attention to phasing, O&M feasibility, and NRCS cost-sharing structures. The Preferred Alternative meets not only the financial criteria of NRCS and federal partners but also aligns with long-term community goals for resilience, sustainability, and recreational access.

D.7.4 Economic and Structural Tables

All Economic and Structural Tables prepared for the Preferred Alternative are listed below and follow the format and definitions found in Title 390 – National Watershed Program Manual, Subpart B – Economic and Structural Tables (the tables themselves may be found in chapter 6 of the Plan-EA and/or in Appendix E):

- Economic Table 1 (NWPM 506.11) – Estimated Alternative Installation Cost
- Economic Table 2 (NWPM 506.12) – Estimated Alternative Cost Distribution
- Economic Table 4 (NWPM 506.18) – Estimated Average Annualized Costs by Increment (above No Action baseline)
- Economic Table 5 (NWPM 506.20) – Estimated Average Annualized Watershed Protection Damage Reduction Benefits
- Economic Table 6 (NWPM 506.20) – Additional Detail on Damage Reduction Benefits
- Economic Table 7 – Comparison of Average Annual NEE Benefits and Costs

The economic analysis shows that the Preferred Alternative would generate average annual benefits of $893,358 and average annual costs of $257,659, resulting in net benefits of $635,699 and a Benefit-Cost Ratio (BCR) of 3.47. These costs and benefits are assessed above the No Action baseline. In contrast, the Decommissioning Alternative (Alternative 2) yields average annual benefits of $819 767 and costs of $190,600 producing net benefits of $629,167 and a BCR of 4.30.

These results confirm that the Preferred Alternative is the most economically efficient investment and fulfills the federal objective to maximize national economic efficiency while addressing the project's authorized purposes of flood prevention, agricultural water management, and recreation.

D.8.0 Sources

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