USDA United States Department of Agriculture

Final Watershed Plan and Environmental Assessment

Colorado River Headwaters Connectivity Project

Windy Gap Watershed Grand County, Colorado

Lead Federal Agency:
USDA Natural Resources Conservation Services

Sponsoring Local Organizations:
Grand County | Trout Unlimited |
Municipal Subdistrict, Northern Colorado Water Conservancy District

Cooperating Agency:
U.S. Army Corps of Engineers

May 2022

Colorado State Office
Natural Resources Conservation Service
nrcs.usda.gov/

Final Watershed Plan and Environmental Assessment for the Colorado River Headwaters Connectivity Project Windy Gap Watershed Grand County, Colorado

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

Sponsoring Local Organization: Grand County, Trout Unlimited, and Municipal Subdistrict, Northern Colorado Water Conservancy District (Subdistrict)

Cooperating Agency: U.S. Army Corps of Engineers

Authority: This Watershed Plan and Environmental Assessment (Plan-EA) has been prepared under the authority of the NRCS Watershed Protection and Flood Prevention Act [Public Law 83-566 (PL 83-566) Stat. 666 as amended (16 U.S.C Section 1001 et seq.) 1954.

Abstract: The Colorado River Headwaters Connectivity Project (Project) is located within the proposed Windy Gap Watershed in Grand County, Colorado. The purpose of the Project is to provide watershed protection to the Windy Gap Watershed by implementing ecosystem restoration measures that would improve water quality, enhance aquatic habitat, and improve recreation resources by connecting the Colorado and Fraser Rivers upstream and downstream of Windy Gap Reservoir while maintaining the current water supply function of Windy Gap Dam. There is a need to provide connectivity for aquatic life and fish passage in the Colorado and Fraser Rivers, moderate elevated stream temperatures, improve sediment transport, enhance riparian and stream habitat, and allow public recreation access.

The New Channel with Wide Floodplain Southern Alignment – Lower Stage Spillway Raise Alternative is the Preferred Alternative for ecosystem restoration measures. The proposed modification would construct a new connectivity channel from the confluence of the Colorado and Fraser Rivers, upstream of Windy Gap Dam, to the Colorado River downstream of the dam to provide connectivity for sediment transport and aquatic species passage around the dam. Most of the connectivity channel would be open to the public for recreation. Construction of a new dam embankment would be required to reduce the reservoir area and allow room for the new connectivity channel. The existing spillway on the dam would be raised to partially compensate for the loss in reservoir volume. A new diversion structure would be installed to divert flows into the connectivity channel, off the Colorado River which flows through Windy Gap. This structure will control flows between the reservoir and the new connectivity channel. This alternative would also modify the Fraser River weir to provide fish and aquatic life passage. The installation cost estimate for this Alternative is $27,145,000.

Comments: NRCS has completed this Final Plan-EA in accordance with the National Environmental Policy Act (NEPA) and NRCS guidelines and standards. Reviewers provided their comments to NRCS during the allotted Draft Plan-EA review period. Further information may be obtained for this project by contacting the following NRCS personnel:

Todd Boldt, Assistant State Conservationist – NRCS Colorado State Office
PO Box 25426, Denver, CO 80225-0426
970-215-9897 office / 866-587-7516 fax / todd.boldt@usda.gov

and/or

Blongshia Cha, Watershed Programs Specialist – NRCS Colorado State Office
PO Box 25426, Denver, CO 80225-0426
719-649-1946 office / 866-587-7516 fax / blongshia.cha@usda

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Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at https://www.ascr.usda.gov/filing-program-discrimination-complaint-usda-customer and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

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WATERSHED PLAN AGREEMENT

(AN UNSIGNED VERSION OF THE AGREEMENT IS INCLUDED. THE AGREEMENT WILL BE SIGNED PRIOR TO AUTHORIZATION FROM THE CHIEF OF NRCS.)

Colorado River Headwaters Connectivity Project

Watershed Plan Agreement

between the

TROUT UNLIMITED

MUNICIPAL SUBDISTRICT, NORTHERN COLORADO WATER CONSERVANCY DISTRICT

GRAND COUNTY BOARD OF COMMISSIONERS
(Referred to herein as Sponsors)

and the

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
(Referred to herein as NRCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for works of improvement for the Windy Gap Watershed, State of Colorado, under the authority of the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. Sections 1001 to 1008, 1010, and 1012); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the Sponsors and NRCS a watershed project plan and environmental assessment for works of improvement for the Windy Gap Watershed, State of Colorado, hereinafter referred to as the watershed project plan or plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the Sponsors hereby agree on this watershed project plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this plan and including the following:

1. **Term.** The term of this agreement is for the installation period and evaluated life of the project (102 years) and does not commit NRCS to assistance of any kind beyond the end of the evaluated life.

2. **Costs.** The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the actual costs incurred in the installation of works of improvement.

3. **Real property.** The sponsors will acquire such real property as will be needed in connection with the works of improvement. The amounts and percentages of the real property acquisition costs to be borne by the Sponsors and NRCS are as shown in the Cost-share table in item 5 hereof.

   The sponsors agree that all land acquired for measures, other than land treatment practices, with financial or credit assistance under this agreement will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency which will continue to maintain and operate the development in accordance with the Operation and Maintenance Agreement

4. **Uniform Relocation Assistance and Real Property Acquisition Policies Act.** The sponsors hereby agree to comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. Section 4601 et seq. as further implemented through regulations in 49 CFR Part 24 and 7 CFR Part 21) when acquiring real property interests for this federally assisted project. If the sponsors are legally unable to comply with the real property acquisition requirements, they agree that, before any Federal financial assistance is furnished, they will provide a statement to that effect, supported by

an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance.

5. **Cost-share for Watershed Work Plan.** The following table shows cost-share percentages and amounts for Watershed Work Plan implementation.

Cost-share Table for Watershed Operation or Rehabilitation Projects					
Works of Improvement	**NRCS**		**Sponsors**		**Total**
	Percent	Cost	Percent	Cost	Cost
Cost-Shareable Items					
Watershed Protection Measures 1/	54	$12,182,000	46	$10,485,000	$22,667,000
Relocation 2/		$0		$0	
Subtotal: Cost-Sharable Costs	**54**	**$12,182,000**	**46**	**$10,485,000**	**$22,667,000**
Non-Cost-Sharable Items 3/					
NRCS Technical Assistance/Engineering	63	$1,745,500	37	$1,021,500	$2,767,000
Project Administration 4/	N/A	$453,000	N/A	$1,133,000	$1,586,000
Permits	0	$0	100	$100,000	$100,000
Real Property Rights 5/	0	$0	100	$25,000	$25,000
Subtotal: Non-Cost-Share Costs	**49**	**$2,198,500**	**51**	**$2,279,500**	**$4,478,000**
Total:	**53**	**$14,380,500**	**47**	**$12,764,500**	**$27,145,000**

1/ The cost-share rate is the percentage of the average cost of installing the practice in the selected plan for the evaluation unit. During project implementation, the actual cost-share rate must not exceed the rate of assistance for similar practices and measures under existing national programs.
2/ Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost-shared in accordance with the percentages shown.
3/ If actual non-cost-sharable item expenditures vary from these figures, the responsible party will bear the change.
4/ The sponsors and NRCS will each bear the costs of project administration that each incurs. Sponsor costs for project administration include relocation assistance advisory service.
5/ The sponsors will acquire with other than Watershed Protection and Flood Prevention Act funds, such real property as will be needed in connection with the works of improvement. The value of real property is eligible as in-kind contributions toward the sponsors' share of the works of improvement costs. In no case will the amount of an in-kind contribution exceed the sponsors' share of the cost for the works of improvement. The maximum cost eligible for in-kind credit is the same as that for cost sharing.

6. **Land treatment agreements.** The sponsors will obtain agreements from owners of not less than 50 percent of the land above each multiple-purpose and floodwater-retarding structure. These agreements must provide that the owners will carry out farm or ranch conservation plans on their land. The sponsors will ensure that 50 percent of the land upstream of any retention reservoir site is adequately protected before construction of the dam. The sponsors will provide assistance to landowners and operators to ensure the installation of the land treatment measures shown in the watershed project plan. The sponsors will encourage landowners and operators to continue to operate and maintain the land treatment measures after the long-term contracts expire, for the protection and improvement of the watershed. NRCS and sponsors agree that no land treatments will be required as part of this project.

7. **Floodplain Management.** Before construction of any project for flood prevention, the sponsors must agree to participate in and comply with applicable Federal floodplain management and flood insurance programs. The sponsors are required to have development controls in place below low and significant hazard dams prior to NRCS or the sponsors' entering into a construction contract.

8. **Water and mineral rights.** The sponsors will acquire or provide assurance that landowners or resource users have acquired such water, mineral, or other natural resources rights pursuant to State law as may be needed in the installation and operation of the works of improvement.

9. **Permits.** The sponsors will obtain and bear the cost for all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

10. **NRCS assistance.** This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

11. **Additional agreements**. A separate agreement will be entered into between NRCS and the sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement. No funds are committed in this agreement and funds to be committed in the additional agreements are subject to appropriations.

12. **Amendments.** This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may deauthorize or terminate funding at any time it determines that the sponsors have failed to comply with the conditions of this agreement or when the program funding or authority expires. In this case, NRCS must promptly notify the sponsors in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the sponsors or recoveries by NRCS must be in accordance with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the sponsors having specific responsibilities for the measure involved.

13. **Prohibitions.** No member of or delegate to Congress, or resident commissioner, may be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision may not be construed to extend to this agreement if made with a corporation for its general benefit.

14. **Operation and Maintenance (O&M).** The sponsors will be responsible for the operation, maintenance, and any needed replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with an O&M Agreement. An O&M agreement will be entered into before Federal funds are obligated and will continue for the project life (100 years). Although the sponsors' responsibility to the Federal Government for O&M ends when the O&M agreement expires upon completion of the evaluated life of measures covered by the agreement, the sponsors acknowledge that continued liabilities and responsibilities associated with works of improvement may exist beyond the evaluated life.

15. **Emergency Action Plan.** Prior to construction, the sponsors must prepare an Emergency Action Plan (EAP) for each dam or similar structure where failure may cause loss of life or as required by state and local regulations. The EAP must meet the minimum content specified in the NRCS Title 180, National Operation and Maintenance Manual (NOMM), Part 500, Subpart F, Section 500.52, and meet applicable State agency dam safety requirements. The NRCS will determine that an EAP is prepared prior to the execution of fund obligating documents for construction of the structure. EAPs must be reviewed and updated by the sponsors annually.

16. **Nondiscrimination Provisions**. In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

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By signing this agreement the recipient assures the Department of Agriculture that the program or activities provided for under this agreement will be conducted in compliance with all applicable Federal civil rights laws, rules, regulations, and policies.

17. **Certification Regarding Drug-Free Workplace Requirements** (7 CFR Part 3021). By signing this Watershed Agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. Section 812) and as further defined by regulation (21 CFR Sections 1308.11 through 1308.15);

Conviction means a finding of guilt (including a plea of *nolo contendere*) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of subrecipients or subcontractors in covered workplaces).

Certification:

A. The sponsors certify that they will or will continue to provide a drug-free workplace by—

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition.

(2) Establishing an ongoing drug-free awareness program to inform employees about—
(a) The danger of drug abuse in the workplace;
(b) The grantee's policy of maintaining a drug-free workplace;
(c) Any available drug counseling, rehabilitation, and employee assistance programs; and
(d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1).

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee must—
(a) Abide by the terms of the statement; and
(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction.

(5) Notifying the NRCS in writing, within 10 calendar days after receiving notice under paragraph (4)(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice must include the identification numbers of each affected grant.

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4)(b), with respect to any employee who is so convicted—

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6).

B. The sponsors may provide a list of the sites for the performance of work done in connection with a specific project or other agreement.

C. Agencies will keep the original of all disclosure reports in the official files of the agency.

18. **Certification Regarding Lobbying** (7 CFR Part 3018) (for projects > $100,000)

A. The sponsors certify to the best of their knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned must complete and submit Standard Form LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

(3) The sponsors must require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients must certify and disclose accordingly.

B. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by U.S. Code, Title 31, Section 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

19. **Certification Regarding Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions (7 CFR Part 3017).**

A. The sponsors certify to the best of their knowledge and belief, that they and their principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a 3-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement,

theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph A(2) of this certification; and

(4) (4) Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

B. Where the primary sponsors is unable to certify to any of the statements in this certification, such prospective participant must attach an explanation to this agreement.

20. **Clean Air and Water Certification.**

A. The project sponsoring organizations signatory to this agreement certify as follows:

(1) Any facility to be utilized in the performance of this proposed agreement is (__), is not (X) listed on the Environmental Protection Agency List of Violating Facilities.

(2) To promptly notify the NRCS-State administrative officer prior to the signing of this agreement by NRCS, of the receipt of any communication from the Director, Office of Federal Activities, U.S. Environmental Protection Agency, indicating that any facility which is proposed for use under this agreement is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.

(3) To include substantially this certification, including this subparagraph, in every nonexempt sub-agreement.

B. The project sponsoring organizations signatory to this agreement agrees as follows:

(1) To comply with all the requirements of section 114 of the Clean Air Act as amended (42 U.S.C. Section 7414) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, issued there under before the signing of this agreement by NRCS.

(2) That no portion of the work required by this agreement will be performed in facilities listed on the EPA List of Violating Facilities on the date when this agreement was signed by NRCS unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use their best efforts to comply with clean air standards and clean water standards at the facilities in which the agreement is being performed.

(4) To insert the substance of the provisions of this clause in any nonexempt subagreement.

C. The terms used in this clause have the following meanings:

(1) The term “Air Act” means the Clean Air Act, as amended (42 U.S.C. Section 7401 et seq.).

(2) The term “Water Act” means Federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et seq.).

(3) The term “clean air standards” means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110 of the Air Act (42 U.S.C. Section 7414) or an approved implementation procedure under section 112 of the Air Act (42 U.S.C. Section 7412).

(4) The term “clean water standards” means any enforceable limitation, control, condition, prohibition, standards, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. Section 1342), or by a

local government to assure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. Section 1317).

(5) The term “facility” means any building, plant, installation, structure, mine, vessel, or other floating craft, location or site of operations, owned, leased, or supervised by a sponsor, to be utilized in the performance of an agreement or subagreement. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location will be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

21. Assurances and Compliance. As a condition of the grant or cooperative agreement, the sponsors assures and certifies that it is in compliance with and will comply in the course of the agreement with all applicable laws, regulations, Executive orders and other generally applicable requirements, including those set out below which are hereby incorporated in this agreement by reference, and such other statutory provisions as a specifically set forth herein.

State, Local, and Indian Tribal Governments: OMB Circular Nos. A-87, A-102, A-129, and A-133; and 7 CFR Parts 3015, 3016, 3017, 3018, 3021, and 3052.

Nonprofit Organizations, Hospitals, Institutions of Higher Learning: OMB Circular Nos. A-110, A-122, A-129, and A-133; and 7 CFR Parts 3015, 3017, 3018, 3019, 3021 and 3052.

22. Examination of Records. The sponsors must give the NRCS or the Comptroller General, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to this agreement, and retain all records related to this agreement for a period of three years after completion of the terms of this agreement in accordance with the applicable OMB Circular.

23. Signatures.

SPONSOR: TROUT UNLIMITED	
By: Scott Yates	
Title: Director, Western Water and Habitat Program	
Date:	
Address: 1777 N. Kent Street, Suite 101, Arlington, VA	Zip Code: 22209
The signing of this plan was authorized by a resolution of the governing body of _____ *adopted at a meeting held on* _____.	
_____ Secretary [or other Title]	Address _____
Date*:* _____	

SPONSOR: MUNICIPAL SUBDISTRICT, NORTHERN COLORADO WATER CONSERVANCY DISTRICT	
By: Brad Wind	
Title: General Manager	
Date:	
Address: 220 Water Ave, Berthoud, CO	Zip Code: 80513
The signing of this plan was authorized by motion of the Municipal Subdistrict, Northern Colorado Water Conservancy District Board during its May 5, 2022 Board Meeting. _____ Address 220 Water Ave, Berthoud, CO 80513 General Manager Date*:* _____	

SPONSOR: GRAND COUNTY BOARD OF COUNTY COMMISSIONERS
By: Kristen Manguso
Title: Chair
Date:
Address: 308 Byers Avenue, PO Box 264, Hot Sulphur Springs, CO 80451:
Attest: *The signing of this plan was authorized by a resolution of the governing body of The Grand County Board of County Commissioners adopted at a meeting held on:* _____*.* _____ Grand County Clerk & Recorder Address: 308 Byers Avenue, P.O. Box 264 Hot Sulphur Springs, CO 80451 Date*:* _____

USDA-NATURAL RESOURCES CONSERVATION SERVICE

Approved by: Date: _____

_____

Clint Evans, State Conservationist
Natural Resources Conservation Service
Denver Federal Center Building 56, PO Box 25426
Denver, Colorado 80225-0426

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Summary (Office of Management and Budget Fact Sheet)

S-1.0 Title of Proposed Action

Final Watershed Plan and Environmental Assessment for the Colorado River Headwaters Connectivity Project (Project)

S-2.0 Watershed Name

Windy Gap Watershed

S-3.0 County, State

Grand County, Colorado

S-4.0 Congressional District

Colorado Congressional District 2

S-5.0 Sponsoring Local Organizations

The Sponsoring Local Organizations (SLOs) for the Project are Grand County, Trout Unlimited, and Municipal Subdistrict, Northern Colorado Water Conservancy District (Subdistrict).

S-6.0 Cooperating Agency

The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) is the lead federal agency on the Project and the U.S. Army Corps of Engineers has accepted cooperating agency status.

S-7.0 Authority

This Plan-EA has been prepared under the authority of NRCS Watershed Protection and Flood Prevention Act [Public Law 83-566 (PL 83-566) Stat. 666 as amended (16 U.S.C Section 1001 et. Seq.) 1954 and in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended.

S-8.0 Purpose and Need for Action

The purpose of the Project is to implement watershed protection measures within the proposed Windy Gap Watershed to improve water quality, enhance aquatic habitat, and improve recreation resources by connecting the Colorado and Fraser Rivers upstream and downstream of Windy Gap Reservoir while maintaining the existing function of Windy Gap Dam.

There is a need to provide connectivity for aquatic life and fish passage in the Colorado and Fraser Rivers, moderate elevated stream temperatures, improve sediment transport, enhance riparian and stream habitat, and allow public recreation access.

S-9.0 Description of Preferred Alternative

The Preferred Alternative (New Channel with Wide Floodplain Southern Alignment – Lower Stage Spillway Raise [New Channel – Spillway Raise] Alternative) would construct a new channel extending from a point upstream of Windy Gap Dam to the Colorado River downstream of the dam. A new dam embankment would be constructed to reduce the reservoir area and allow room for the new channel, and the spillway would be raised to partially compensate for the loss in reservoir volume. A new diversion structure would be installed to divert flows into the connectivity channel, off the Colorado River which flows through Windy Gap. This structure will control flows between the reservoir and the new connectivity channel. The Fraser River weir, upstream of the Colorado-Fraser River confluence, would be modified to allow for fish passage. The mainstem of the Colorado River will remain within the existing natural channel flowing into and through the Windy Gap Reservoir and the construction and operation of the Preferred Alternative does not modify the location of the Colorado River.

S-10.0 Resource Information

Table S-1 lists the relevant existing resource information for the Project:

Table S-1. Existing Resoure Information

Resource	Description
Latitude / Longitude (WGS84)	
Area 1 (Windy Gap Reservoir)	40.106981° / -105.983884°
Area 2 (Fraser River Weir)	40.081420° / -105.929931°
Area 3 (Borrow Area)	40.114406° / -105.978519°
Area 4 (Borrow Area)	40.122343° / -105.939882°
Area 5 (Borrow Area)	40.142289° / -105.923256°
Hydrologic Unit Number	14010001 (Colorado Headwaters)
Climate	July average high/low: 84°F / 36°F January average high/low: 41°F / -23°F
Topography	High Mountain Valley
Annual Precipitation	13.5 inches
Proposed Watershed Area	379.0 square miles (sq mi)
Reservoir Drainage Area	779.1 sq mi
Windy Gap Dam Reservoir Area (at spillway crest)	106 ac
Municipal Water Storage	240 acre-feet (ac-ft)
Sediment Storage	180 ac-ft
Total Storage	420 ac-ft
Dam Dimensions (earthen)	5,500 feet (ft) long / 25 ft in height / 20 ft wide (top)
Principal Spillway Dimensions (overflow concrete gravity structure)	345 ft long / 43,720 cubic feet per second (cfs) max. discharge

Resource	Description
Low-level Bypass (48-inch-diameter concrete pipe)	245 ft long/ 93 cfs normal minimum discharge/ 133 cfs normal maximum discharge
Auxiliary Outlet Facility	167 cfs normal minimum discharge/ 228 cfs normal maximum discharge
Land Uses (within Project area)	Roads/Utility Corridor/Graded Area 3.2% Windy Gap Dam and Pump Facilities 4% Water Supply Storage 24.6% Recreation 0.3% Gravel/Rock Mining 6.4% Residential 0.3% Open Space 61.2%
Land Ownership	Subdistrict, Private, Road and Railroad Right-of-Way
Population (Grand County[1])	Population 14,793
Demographics (Grand County[1])	White: 93.8% Black or African American: 0.4% American Indian and Alaska Native: 0.2% Asian: 2.0% Native Hawaiian and Pacific Islander: 0.7% Two or more races: 0.3% Other: 3.2%
Farms Present (Grand County[2])	290
Land in Farms (Grand County[2])	240,980 ac
Average Farm Size (Grand County[2])	831 ac

[1] Based on U.S. Census Bureau (Census Bureau) 2017 estimates
[2] Based on 2017 USDA Census of Agriculture

S-11.0 Alternative Plans Considered

Alternative plans considered in detailed study and evaluated in this Plan-EA include the No Action Alternative and the New Channel – Spillway Raise Alternative. The New Channel – Spillway Raise Alternative is the Preferred Alternative for the Project. Several other alternatives were considered during the planning process but were eliminated from detailed study due to environmental impacts; if they were considered infeasible, had exorbitant costs, or did not meet the purpose and need of the Project; or other critical factors. A description of the alternatives analyzed in detailed study and associated installation costs are included below. Installation costs are to include, as applicable, construction, engineering, real property rights, natural resource rights, permitting, replacement in-kind relocation payments, and administration costs.

- No Action Alternative: Under this alternative, the SLOs would not perform any modifications to Windy Gap Reservoir or the Fraser River weir. Pump storage operations and maintenance would continue unchanged. There are no installation costs for this alternative.

- New Channel – Spillway Raise Alternative: This alternative would construct a new connectivity channel from the Colorado River, upstream of Windy Gap Dam, to the Colorado River downstream of the dam. This would be accomplished by constructing a new dam embankment and decreasing the surface area of Windy Gap Reservoir to make room for the new connectivity channel that would run between the new embankment and current southern embankment leg. Habitat complexity would be incorporated into the new channel through installation of root wads, log vanes, large boulders, and riffle-and-pool complexes. The new channel corridor would be established with wetland and riparian vegetation to match the Colorado River riparian corridor upstream and downstream of the proposed new channel. To maintain adequate volume in the reduced reservoir area for operations of the existing pump station, the dam's low-stage principal spillway would be raised 1-foot. A new diversion structure would be installed to divert flows into the connectivity channel, off the Colorado River which flows through Windy Gap. This structure will control flows between the reservoir and the new connectivity channel. The Fraser River weir, located upstream Windy Gap Reservoir, would be modified to provide fish and aquatic life passage. Grade control structures and riffle-and-pool complexes would be installed along the modified stretch of the Fraser River. The installation cost for this alternative was estimated at $27,145,000.

S-12.0 Project Costs and Funding Source

The breakdown of the estimated installation cost for the Preferred Alternative (New Channel – Spillway Raise Alternative) is provided in Table S-2. NRCS provides PL 83-566 funding for construction and engineering. NRCS and the SLOs are responsible for their own administrative time. Natural resource rights and relocation payments have not been included in the table because there are no anticipated costs associated with these components.

Table S-2. Estimated Project Installation Cost

Item	PL 83-566 Funds		Other Funds[1]		Total	
Construction	$12,182,000	54%	$10,485,000	46%	$22,667,000	84%
Engineering	$1,745,500	63%	$1,021,500	37%	$2,767,000	10%
Permits	$0	0%	$100,000	100%	$100,000	0%
Real Property Rights	$0	0%	$25,000	100%	$25,000	0%
Project Administration	$453,000	29%	$1,133,000	71%	$1,586,000	6%
Total	**$14,380,500**	**53%**	**$12,764,500**	**47%**	**$27,145,000**	**100%**

1 – The SLOs have secured funding through various sources for $10,485,000 toward Project construction and $1,021,500 toward Project final engineering design.

S-13.0 Period of Analysis

The period of analysis is the time required for installation of the Project plus the evaluated life (Project life) of the Project. All alternatives were evaluated with a period of analysis of 102 years (100-year Project life plus 2 years for installation).

S-14.0 Project Life

The Project life over which the Project would perform the intended functions is 100 years.

S-15.0 Environmental Impacts

Table S-3 lists the resources of concern and associated environmental consequences associated with the Preferred Alternative. Resources that would not be impacted by the Project are not listed in this table.

Table S-3. Summary of Resource Concerns and Impacts

Resource Concern	Summary of Concern	Environmental Consequence
Soils		
Upland Erosion	Disturbance to soils	Proper Best Management Practices (BMPs) would be installed during and after construction and disturbed areas would be restored and/or stabilized. Short-term minor impacts during construction are anticipated until ground cover becomes established and areas have been stabilized.
Sedimentation	Modifications to stream sediment transport	Reduces sedimentation into Windy Gap from 2 ac-ft annually to 0.3 ac-ft annually. Reestablishes coarse-sediment transport to the Colorado River alleviating gravel depletion and streambed armoring downstream of Windy Gap and benefiting stream health. Long-term benefits for stream health and decreased sedimentation into Windy Gap are anticipated.
Prime and Unique Farmland	Disturbance to farmland of statewide importance	No prime farmland is present in the Project area. There is potential to disturb up to 6.75 ac of farmland of statewide importance. Impacts would be minor because the lands are not irrigated, there is no current or planned farming/grazing use, and most of the lands are located on steep slopes unsuitable for cultivation.
Water		
Surface Water Quality	Construction activities to occur in and around rivers and reservoirs	Construction activities may temporarily impact surface water quality during construction, but construction BMPs would be used to reduce sediment entering waters and limit the amount of turbid water leaving the site. Long-term benefits are anticipated from moderated water temperatures in the Colorado River due to decreased water travel times.
Surface Water Quantity and Flow	Change to surface waters and flow	There would be no change to water rights or Windy Gap pumping operations. The mainstem of the Colorado River will remain within the existing natural channel flowing into and through the Windy Gap Reservoir and the construction and operation of the Preferred Alternative does not modify the location of the Colorado River. Flow conveyance would change as a new diversion structure would be installed to divert flows into the connectivity channel, off the Colorado River, which flows through Windy Gap. This structure will control flows between the reservoir and the new connectivity channel. Water would enter the reservoir during pump operations through a new diversion structure off the connectivity channel. In normal operational scenarios, with river flows of 90 cfs and less, all flow (minus the low flow into the reservoir that is designed for fish passage and reservoir water quality) would be diverted down the connectivity channel. During pumping operations 90+ cfs would be diverted through the connectivity channel. During flood flows greater than a 5-year flood, flow would be roughly split between the connectivity channel and reservoir to reduce scour and erosion of the channel.

Resource Concern	Summary of Concern	Environmental Consequence
Waters of the U.S.	Disturbance to Waters of the U.S.	Approximately 34.38 ac of open water would be removed (33.8 ac removal from decreased reservoir size and 0.98 ac from removal of ponds), and approximately 2,710 linear feet (LF) of stream channel would be removed for construction of the connectivity channel. The connectivity channel would add 8,290 LF of stream (net increase of 5,580 LF of stream). Temporary disturbance to approximately 4,582 LF of stream would occur from grading for new flow conveyance/tying into the new channel; and narrowing of approximately 671 LF of stream would take place. Placement of concrete/ACB would occur on approximately 122 LF of streambed. Moderate short-term impacts to waters would occur. Alternative measures would result in an overall reduction of open water from a decrease in the Windy Gap Reservoir size; however, the new water flow regime would restore river connection to this section of the Colorado River, add a net of 5,580 LF of stream, and enhance stream function over the long-term.
Wetlands	Disturbance to wetlands	Approximately 13.72 ac of wetland (8.76 ac emergent and 4.96 ac scrub-shrub) would be permanently removed from alternative measures. Approximately 32 ac of new wetland would be created with 4.1 ac of emergent and 27.9 ac of mixed emergent/scrub-shrub, resulting in a net increase of approximately 18.28 ac of wetland. Moderate short-term impact to wetlands would occur from removal, but long-term beneficial impacts are anticipated from adding an additional 18.28 ac of wetland.
Floodplain Management	Change in surface flow	Alternative measures add additional volume through this river segment to convey flood flows by decreasing Windy Gap Reservoir and reestablishing the Colorado River corridor. The modified segment would have a wider floodplain and spread flood flows between the reservoir and connectivity channel resulting in overall lower flood surface elevations than the current condition. The alternative is anticipated to have a beneficial impact to flood conveyance capacity of this river section over the long-term. Impacts to floodplain capacity or flood surface elevations in other segments of the river (upstream or downstream of the project area) are anticipated to be negligible.
Air		
Air Quality	Emissions from construction activities	Short-term increases in emissions concentrated around the construction site are anticipated. Construction activities would not violate air quality standards and BMPs would be implemented.
Plants		
Noxious Weeds and Invasive Plant Species	Increased potential for establishment of invasive plant species on disturbed soils	Short-term impacts would occur during construction and until reestablishment of native vegetation that would put the area at risk for invasion of noxious weeds and invasive plants. A Post Construction Rehabilitation Plan (PCRP) would be developed in coordination with Grand County Division of Natural Resources and impacts would be minor with implementation of BMPs and development of a PCRP. Opening the channel up for public use could increase the potential for spread of invasive terrestrial and aquatic plants over the long-term.
Riparian Areas	Disturbance to riparian areas	Moderate short-term impacts to riparian areas would occur from removal of approximately 7.23 ac of riparian vegetation. Approximately 26.23 ac of riparian areas would be restored/created resulting in a net increase of approximately 19.0 ac of riparian vegetation, which is anticipated to have a long-term moderate beneficial impact.

Resource Concern	Summary of Concern	Environmental Consequence
Animals		
Wildlife and Wildlife Habitat (Aquatic)	Disturbance to aquatic habitat	The project is intended to improve stream health and benefit aquatic life by restoring connectivity of the Colorado River. Short-term moderate impacts to aquatic species and habitat are anticipated from 36.8 ac removal of open water and temporary disturbance in 73.7 ac of aquatic habitat. Temporary disturbed areas would be restored after construction completion. Modifications include restoring river connectivity with a net increase of 5,580 LF of stream and adding habitat complexity/cover. There would be a net loss of open water area; however, restoring channel connectivity along the Colorado River would improve stream health benefiting aquatic species and habitat in the Colorado River over the long-term.
Wildlife and Wildlife Habitat (Terrestrial)	Disturbance to general wildlife habitat	The project is intended to improve terrestrial habitat by restoring riparian corridor connectivity along the Colorado River. Moderate short-term impacts to terrestrial wildlife and habitat would occur from disturbance in up to approximately 139.1 ac of habitat during construction. Temporary disturbed areas would be restored. Restoration includes net increases to important riparian and wetland habitat, and it also restores Colorado River vegetative connectivity for terrestrial wildlife movement/cover along this segment. This is anticipated to have long-term moderate benefits to terrestrial wildlife species that use the area. Long-term indirect impacts may occur from disturbance to habitat or wildlife species from recreationists using Area 1. These impacts would be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of educational wildlife avoidance signage, and daily passing/varying human presence.
Special Status Animal Species	Construction disturbance in potential habitat for state sensitive species	There would be no impact to Endangered Species Act (ESA) animal species; however, suitable unoccupied habitat for yellow-billed cuckoo would be disturbed. Section 7 consultation was completed recommending a No Effect determination to listed species, except for yellow-billed cuckoo which had a May Affect, Not Likely to Adversely Affect determination. USFWS concurred with the determination on March 2, 2021 (Appendix A). Thirteen state-listed animal species have the potential to occur in the Project area. Preconstruction surveys would be performed, and spatial buffers would be established as necessary in coordination with U.S. Fish and Wildlife Service (USFWS) and CPW. Impacts to sensitive species and/or habitat would be short-term during construction and minor based on duration of construction, restoration of disturbed areas, and avoidance/ minimization measures in place. Because the project restores vegetative connectivity for the Colorado River and increases important riparian and wetland habitat, long-term beneficial impacts to special status species that use these habitats are anticipated. Long-term indirect impacts may occur from disturbance to habitat or species from recreationists using Area 1. These impacts would be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of educational wildlife avoidance signage, and daily passing/varying human presence.

Resource Concern	Summary of Concern	Environmental Consequence
Migratory Birds/Bald and Golden Eagles	Construction disturbance in potential habitat	Migratory birds and bald/golden eagles could be present in the Project area. Preconstruction surveys would be performed, and spatial buffers would be established as necessary in coordination with USFWS and CPW. Impacts to migratory birds and bald/golden eagles and associated habitat would be short-term and minor to moderate during construction based on the duration of construction, restoration of disturbed areas, abundant suitable habitat in the surrounding area, and avoidance/ minimization measures in place. Because the project restores connectivity for the Colorado River and increases important riparian and wetland habitat, long-term beneficial impacts to bird species that use these habitats are anticipated. Long-term indirect impacts may occur from disturbance to habitat or birds from recreationists using Area 1. These impacts would be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of educational wildlife avoidance signage, and daily passing/varying human presence.
Human		
Socioeconomics	Economic and social implications to the local community	Long-term beneficial impacts to the local economy are expected from an increase in public recreation use and associated spending. Short-term economic benefits are also anticipated from construction crew expenditures and additional employment necessary during construction.
Historic Properties/ Cultural Resources	Historic and Cultural Resources located in the Project area	The Project was determined to have No Adverse Effect to any identified sites and no historic properties would be affected. The State Historic Preservation Office (SHPO) concurred with the determination on April 2, 2021 (Appendix A). Tribal consultation was initiated to 21 federally recognized tribes with interest in Colorado to comply with Executive Order 13175 and the National Historic Preservation Act. Four responses were received and there were no concerns regarding the preferred alternative.
Hazardous Materials	Equipment and associated fuels present during construction	Contractors would comply with all federal, state, and local laws and regulations pertaining to pollution and contamination of the environment to prevent pollution by hazardous materials. Construction activities would have a negligible impact of introduction of hazardous materials in the Project area, based on adherence to applicable laws and regulations.
Public Health and Safety	Inhabitants located downstream of a dam planned for modifications	A dam breach is not anticipated to result in loss of life for either existing or alternative conditions; therefore, there is no expected change to the threat to public safety when compared to existing conditions for this alternative.
Recreation	New recreation access and opportunities	A long-term direct beneficial impact to public recreation is anticipated from opening approximately 99.5 ac of land for public access that includes approximately 7,050 LF of stream for public fishing. The official opening for public access will depend on the success of vegetation establishment and may occur one or two years after construction completion. An additional 62.2 ac of land that includes 5,300 LF of stream would be opened for public recreation 10 years after construction completion.
Land Use	Changes to Land Use	Long-term land use changes would occur with the largest change consisting of conversion of water supply storage areas to open space and adding recreation use. These changes are not anticipated to have adverse consequences to land use.
Visual Resources and Scenic Beauty	Construction disturbance and change in land features	Short-term impacts to scenic views are anticipated during construction from disturbed grounds and equipment parked or operating in the Project area. Impacts would be moderate during construction, but disturbed areas would be restored. Overall long-term beneficial impacts are anticipated from development of the new riparian corridor and public access to visual resources and

Resource Concern	Summary of Concern	Environmental Consequence
		scenic beauty of the corridor.
Noise	Construction activities would produce noise	Short-term minor impacts are anticipated during construction, but BMPs would be in place.

S-16.0 Major Conclusions

The Preferred Alternative meets the purpose and need of the Project, as well as the goals and objectives. The adverse effects from alternative actions are short-term and/or minor and long-term beneficial effects are anticipated (See Table S-3).

S-17.0 Areas of Controversy and Issues to be Resolved

There are no known areas of controversy. The following are issues to be resolved for the Project:

- Operation and Maintenance (O&M) Agreements would be developed with the SLOs and the new O&M Agreement would be signed before the Project Agreement is signed.
- The SLOs would be responsible for updating the Preferred Alternative Emergency Action Plan prior to construction and would review and update annually with local emergency response officials.

S-18.0 Evidence of Unusual Congressional or Local Interest

Congress has provided written support for the Colorado River Headwaters Project indicating that it is an important project for Colorado. They have further stated the following (Congress of the United States 2017):

> *"The Colorado River Headwaters Project represents a collaborative approach that brings together an important partnership among water suppliers, ranchers, local communities, and conservation groups in a common effort to improve the health of the Colorado River and its fisheries, while allowing for continued reliance on the river for water supplies."*

S-19.0 In Compliance

Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? ☒ Yes ☐ No

1.0 Actions Requiring Preparation of a Watershed Plan

1.1 Introduction

As the lead federal agency, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), in cooperation with the Sponsoring Local Organizations (SLOs) (Grand County, Trout Unlimited, and Municipal Subdistrict, Northern Colorado Water Conservancy District [Subdistrict]), are proposing improvements within the Windy Gap Watershed to provide stream connectivity for aquatic life and fish passage, improve water quality, enhance aquatic habitat, and provide recreation opportunities. This Watershed Plan and Environmental Assessment (Plan-EA) evaluates alternatives for modifications of the Windy Gap Dam and Fraser River weir (Fraser weir) to improve watershed health while maintaining the current functions for both features.

The Colorado River Headwaters Connectivity Project (Project) is partially funded under the Watershed Protection and Flood Prevention Act (PL 83-566), which authorizes funding to help urban and rural communities protect, improve, and develop land resources in watersheds of up to 250,000 acres (ac) in size. Because this Project is partially funded by NRCS, a National Environmental Policy Act (NEPA) analysis has been initiated in the form of a Plan-EA to analyze impacts to the environment from Project actions. The Plan-EA will comply with the Council on Environmental Quality's regulations in 40 CFR Parts 1500-1508, which require an evaluation of potential environmental impacts associated with federal project and actions. The format of this document follows the plan format outline that must be followed for all Watershed Project Plans as described in the NRCS National Watershed Program Manual (NWPM), Parts 500 through 506 (NRCS 2015), and NRCS National Watershed Program Handbook (NWPH), Parts 600 through 606 (NRCS 2014). The Plan-EA assists NRCS in determining if the selected alternative would have a significant impact on the quality of the environment and if preparation of an Environmental Impact Statement is required.

1.2 Project Overview

The proposed Windy Gap Watershed developed for the Watershed Plan consists of a compilation of four sub-watersheds (Table 1-1). A portion of one sub-watershed (Lower Willow Creek) was removed from the Windy Gap Watershed area, which consists of the controlled drainage area upstream of Willow Creek Reservoir dam. The total proposed watershed area consists of 379 square miles (sq mi) (242,572 ac) and includes the drainage area of the Fraser River and portions of the drainage areas of the headwaters of the Colorado River (Appendix B – Map B2). Windy Gap Dam is located within the proposed watershed. The contributing drainage area of the dam is approximately 779.1 sq mi (Appendix B – Map B-3) and consists of controlled (444.8 sq mi) and uncontrolled (334.3 sq mi) drainage areas.

Table 1-1. Sub-watersheds of Windy Gap Watershed

Sub-watershed Name	HUC	Acres
Fraser River	1401000102	193,473
Smith Creek – Colorado River	140100010309	14,563
Lower Willow Creek	140100010104	5,339
Drowsy Water Creek – Colorado River	140100010501	29,197
Total		**242,572**

HUC = Hydrologic Unit Code

Two structures are being considered for modifications along the Colorado and Fraser Rivers (Windy Gap Dam and Fraser weir) to meet the Project purpose and need and to accomplish the Project goals and objectives. Modifications would need to maintain the existing functions that each structure provides. Both structures are barriers inhibiting aquatic species passage, and Windy Gap also impedes natural stream sediment transport. These structures and their associated components are described in detail below.

1.2.1 Windy Gap Reservoir

Windy Gap Dam (Windy Gap) is located in Grand County, Colorado, approximately 4 miles west of the town of Granby (Appendix B – Map B1). The facility is owned and operated by the Subdistrict, a water provider to Front Range communities in northeastern Colorado. Construction of the dam, as part of the larger Windy Gap Project, began in July 1981. The Windy Gap Project has a contract to use facilities of a larger water storage and delivery system called the Colorado-Big Thompson (C-BT) Project to deliver Windy Gap Project water to the northern front range of Colorado. The Windy Gap Project consists of the Windy Gap diversion dam and reservoir on the Colorado River, a pumping plant, and a 6-mile pipeline to Lake Granby. Windy Gap water is pumped and stored in Lake Granby before it is delivered to water users via the C-BT Project's East Slope distribution system pursuant to a contract with the United States Bureau of Reclamation and the Northern Colorado Water Conservancy District.

Windy Gap completed constructions in 1985 and began delivering water to Subdistrict allottees - the cities of Boulder, Estes Park, Greeley, Longmont, Loveland, and Platte River Power Authority - in July of that year. The cities envisioned that Windy Gap would provide "water for the future". They also regarded it as a partial solution for meeting the water supply needs of the rapidly growing northern Front Range area through the year 2000 and beyond (Northern Colorado Water Conservancy District [NCWCD] 2003).

Windy Gap consists of the following components within the Project area, which are described in detail in Sections 1.2.1.1 through 1.2.1.6 and depicted in Appendix B – Map B4.1. Note that all elevations provided in this document are North American Vertical Datum 1988 (NAVD88).

- Reservoir
- Dam Embankment
- Principal Spillway
- Low-Level Bypass Outlet
- Auxiliary Outlet
- Pumping Plant

1.2.1.1 Reservoir

The existing reservoir covers approximately 106 ac and has a volume of 420 acre-feet (ac-ft) below the lower-stage principal spillway crest (elevation 7831.5 feet[ft]) and 520 ac-ft below the upper-stage principal spillway crest (elevation 7832.5 ft). The contributing drainage area feeding into the reservoir is approximately 779.1 sq mi. The reservoir is wet to the lower-stage principal spillway crest for most of the year, except during seasonal runoff and precipitation events. There is 180 ac-ft of sediment storage available below the pumping plant minimum operating pool (elevation 7828.5 ft), leaving 240 ac-ft of volume for storage of municipal water between the minimum operating pool and lower-stage principal spillway crest. There is no floodwater storage volume associated with this structure. Figure 1-1 and Figure 1-2 depict the existing reservoir conditions.

Figure 1-1. Reservoir
(Aerial view of reservoir looking southeast)

Figure 1-2. Reservoir
(Standing on the southern dam embankment looking north across the reservoir)

1.2.1.2 Dam Embankment

The dam embankment is constructed of earth fill (clay core with silty sand, gravel, and cobble shell along with a slurry trench foundation cutoff) and extends for approximately 5,500 ft. The dam crest elevation is approximately 7842.5 ft with a structural height of 25 ft and a crest width of 20 ft. The upstream and downstream embankment slopes approximately 2.5 horizontal to 1 vertical (i.e., 2.5H:1V). The dam embankment surface cover consists of gravelly materials on the downstream side and rock riprap on the upstream side. Figure 1-3 and Figure 1-4 depict the current condition of the dam embankment.

Figure 1-3. Upstream Dam Embankment
(Standing on the southern dam embankment leg looking northwest)

Figure 1-4. Downstream Dam Embankment
(Standing on the western dam embankment leg looking south)

1.2.1.3 Principal Spillway

The principal spillway is a 345-foot-wide (from training wall to training wall) concrete gravity structure with an ogee crest located on the dam embankment. There are two stages associated with the principal spillway: lower stage and upper stage. The lower-stage crest is 42.5 ft wide at elevation 7831.5 ft. The upper-stage crest is 302.5 ft wide at elevation 7832.5 ft. This spillway transports the Colorado River downstream of the dam, and a roller bucket energy dissipator located at the base diffuses flows. The design flood[1] (31,500 cubic feet per second [cfs]) water surface elevation resides 2.5 ft below the dam embankment crest. The maximum discharge capacity of the principal spillways is approximately 46,720 cfs. Figure 1-5 depicts the existing principal spillway structure.

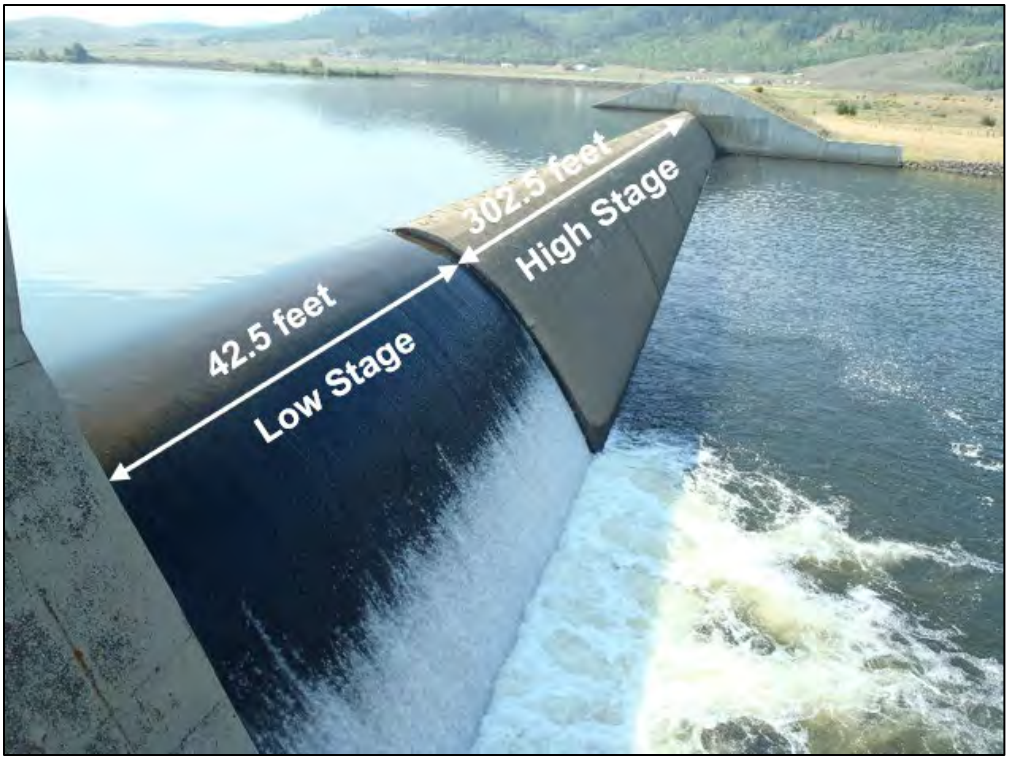

Figure 1-5. Principal Spillway
(Standing on the dam embankment looking south)

[1] The original design flood (31,500 cfs) for this structure was determined to be one-half the Probable Maximum Flood event (63,000 cfs).

1.2.1.4 Low-Level Bypass Outlet

The low-level bypass outlet is a 48-inch-diameter concrete cylinder pipe approximately 245 ft long that passes through the embankment near the right abutment. The invert of the conduit is at elevation 7807.5 ft and has a 0.2% slope to the outlet. Energy dissipation is facilitated by an impact stilling basin. The discharge capacity of low-level bypass is approximately 133 cfs with a water surface elevation corresponding to the low-stage principal spillway crest elevation of 7831.5 ft. Figure 1-6 depicts the low-level bypass outlet.

Figure 1-6. Low-Level Bypass Outlet
(Standing on the dam embankment looking west/downstream)

1.2.1.5 Auxiliary Outlet

The auxiliary outlet is used to supplement the low-level bypass outlet to convey flows downstream to the Colorado River. The outlet is a concrete intake with a 48-inch by 48-inch gate adjacent to the principal spillway. The flow discharges through the gate into a concrete open-channel drop chute with a flip bucket to dissipate energy. The discharge capacity of auxiliary outlet is approximately 228 cfs with a water surface elevation corresponding to the low stage principal spillway crest elevation of 7831.5 ft. Figure 1-7 depicts the existing auxiliary outlet adjacent to the principal spillway.

Figure 1-7. Auxiliary Outlet
(Standing at the base of the dam looking southeast)

1.2.1.6 Pumping Plant

The pumping plant is located adjacent to the embankment dam along the right abutment. Pumping is facilitated by four vertical-shaft centrifugal pumps set about 20 ft below the floor of the reservoir. The combined capacity of the pumps is about 600 cfs. A pipeline extends from the pumping plant approximately 30,000 ft to Lake Granby. It consists of a 9-foot-diameter conduit constructed of both welded steel and pre-stressed concrete cylinder pipe. Figure 1-8 depicts the existing pumping plant.

Figure 1-8. Pumping Plant
(Standing on the dam embankment looking east)

1.2.2 Fraser Weir

The Frasier weir is located just upstream of the Colorado River and Frasier River confluence (Appendix B – Map B4.1). The weir is an approximately 70-foot-wide (from training wall to training wall) by 95-foot-long concrete structure that spans the entire Fraser River channel for purposes of measuring flow in the river. A 35-foot-wide low-flow notch in the center of the weir has a drop from the weir crest to the downstream river pool of 2.2 ft (Tetra Tech 2015a). Figure 1-9 and Figure 1-10 depict the Fraser River weir.

Figure 1-9. Fraser River Weir
(Standing on the left wall looking east)

Figure 1-10. Fraser River Weir
(Standing on the right wall looking north/downstream)

2.0 Purpose and Need

2.1 Purpose and Need Statement

The purpose of the Project is to provide watershed protection to the Windy Gap Watershed by implementing ecosystem restoration measures that would improve water quality, enhance aquatic habitat, and improve recreation resources by connecting the Colorado and Fraser Rivers upstream and downstream of Windy Gap Reservoir while maintaining the current water supply function of Windy Gap Dam.

There is a need to provide connectivity for aquatic life and fish passage in the Colorado and Fraser Rivers, moderate elevated stream temperatures, improve sediment transport, enhance riparian and stream habitat, and allow public recreation access.

2.2 Goals and Objectives for Purpose and Need

The following are goals and objectives identified by SLOs, agencies, organizations, and the public during development of the Plan-EA to address problems recognized within the watershed (see Section 2.3 for Watershed problems). Windy Gap and Fraser weir were identified for improvements to accomplish the items listed below while maintaining the existing functions that each structure provides.

- Improve bedload sediment transport through Windy Gap to enhance downstream aquatic habitat and decrease streambed armoring.
- Moderate elevated stream temperatures.
- Provide connectivity for upstream aquatic life and fish passage at Windy Gap and Fraser weir.
- Enhance aquatic habitat.
- Provide recreation opportunities and recreation access to the public.

2.3 Watershed Problems

The watersheds upstream of Windy Gap Dam have been modified by a wide range of activities, which in turn have resulted in disruption of normal streamflow dynamics. Windy Gap Dam has contributed to these effects, which include degradation of aquatic habitat, reduced sediment transport, increased water temperature, blockage of fish passage, and increased streambed armoring downstream of Windy Gap (Tetra Tech 2015a). The following sections describe this watershed degradation in greater detail.

2.3.1 Impaired Stream Function

Stream function is driven by hydrology and hydraulic (H&H) processes from the water supplied to the stream within its watershed. Other functions such as sediment transport, water quality, and biological conditions are influenced by H&H processes. Hydrologic records from 1962 to the present, 1908-1911, and 1934 to 1953, collected at a U.S. Geological Survey (USGS) gage station located along the Colorado River between the present-day Granby Dam and Windy Gap, show a decline in median flow from 1,090 to 75 cfs in June and 82 to 19 cfs in September (Tetra Tech 2010). As reported in the Grand County Stream Management Plan, recommended environmental flow ranges for flushing flows were commonly present at a USGS gage located downstream of present-day Windy Gap prior to 1985, but since construction of Windy Gap Dam in 1986, the flushing flows have been less than the median 1-, 3-, and 7-day maximums at the gage (Tetra

Tech 2010). Changes in H&H conditions from construction of dams, water use, and changes within the watershed have caused impaired conditions in the Colorado River and Frasier River. A general summary of main adverse conditions resulting from changes in H&H identified from Tetra Tech 2010 for the Colorado River and Frasier River within the Windy Gap Watershed are provided below.

- Reduced aquatic structure and cover, and poor riparian vegetation in localized areas of the Colorado River downstream of Windy Gap.
- Elevated water temperatures and cobble substrate heavily embedded with fine sediments in Colorado River downstream of Windy Gap.
- Blocked fish and aquatic species movement from Windy Gap, Fraser Weir, Granby Diversion, and other barriers.
- Limited aquatic habitat in the Colorado River between Granby Dam and Windy Gap from lack of flow and habitat structure, fish barriers, heavily embedded moderate and low velocity habitats, and a riparian zone in less than optimum condition.
- Unusual flow regimes in Colorado River between Granby Dam and Windy Gap with low stable flows predominating and infrequent high flow events (greater than 1,000 cfs) occurring when water is being spilled from Granby Dam.
- Reduction of recreation opportunities from low flows and increased water temperatures affecting float boating and fisheries along the Colorado River.
- Nutrient loading at Windy Gap and likely exacerbation of whirling disease in and downstream of Windy Gap from nutrient rich environment.

2.3.2 Aquatic Habitat

The Colorado River within the Project area has degraded due to fine-sediment deposition, lack of flushing flows, water temperature increases, rooted aquatic vegetation, whirling disease, and lack of channel connectivity. An aquatic resources investigation was completed in 2011 for the Colorado River and concluded that at least six significant issues need to be considered when addressing the overall health of the Colorado River (Nehring et al. 2011). These six issues were ranked according to priority and include 1) restoration of channel connectivity, 2) channel reconfiguration, stream power, and flushing flows, 3) sediment deposition and transport, 4) water temperature, 5) encroachment of rooted aquatic vegetation, and 6) whirling disease (Nehring et al. 2011).

Field investigations were conducted in 2013 for a habitat evaluation of a 1-mile reach of the Colorado River downstream of Windy Gap (Tetra Tech 2015). Conditions observed immediately downstream of Windy Gap were similar to those observed in a detailed study conducted as part of the 2010 Tetra Tech Grand County Stream Management Plan (Tetra Tech 2015a) and provide insight into the conditions downstream of Windy Gap. The habitat evaluation found the following (Tetra Tech 2015a):

> *"The reach of the Colorado River downstream of Windy Gap is wide and shallow, with riffles and shallow runs dominating the habitat. Pools are small, scattered and few in number. The substrate is predominantly cobble and heavily embedded with fine sediments at locations having slower water velocities. Filamentous green algae and rooted aquatic*

vegetation were just beginning to emerge on the streambed. No algal blooms formed by the benthic diatom (Didymosphenia geminate—didymo, also referred to as "rock snot") were observed covering the streambed this early in the summer season. However, in other years, these nuisance blooms were observed later in the season downstream. No gravel bars suitable for trout spawning were observed and trout cover was limited. Streambanks were stable at most locations and the riparian zone overstory was predominantly narrowleaf cottonwood, with willow, sedge and grass comprising the understory. Multiple year classes of cottonwood were present on the lower floodplain. Fish passage above this section is blocked by Windy Gap Dam, while shallow, high velocity riffles may impede fish movement throughout [the reach]. Overall, habitat quantity and quality through this section would benefit from restoration actions…

2.3.3 Recreation and Fisheries

Travel, tourism, and recreation is the main driver of economy for Grand County. Approximately 51% of the total jobs in Grand County are tourism related and 72% of the homes owned within the county are secondary residences or vacation homes owned by non-local residents (Coley/Forrest, Inc. 2011). Direct costs (goods and services) on fishing alone were estimated at $105,746,000 from 2007 data for the six counties containing the headwaters of the Colorado River (Eagle, Grand, Gunnison, Pitkin, Routt, and Summit Counties). A total economic impact to the headwater counties from fishing generated $180,680,000 and 2,199 jobs based the 2007 data (Coley/Forrest Inc. 2011).

Grand County contains "Gold Medal" fisheries and one of the stream designations include a stretch of the Colorado River from the Frasier River to west Troublesome Creek. The prestigious designation signals the presence of large and abundant trout and attracts anglers nationally and internationally (Coley/Forrest, Inc. 2011). The Windy Gap Watershed contains an approximate 7 ¾ mile stretch of the Colorado River designated as Gold Medal. Concerns have been raised regarding the status of the Gold Medal fishery downstream of Windy Gap from degraded habitat conditions resulting in decreases in fish biomass over time.

A Gold Medal fishery is based on two quantitative criteria: 1) the fishery consistently produces a minimum trout standing stock of 60 pounds per acre (lbs/ac), and 2) the fishery consistently produces a minimum average of 12 quality trout, where quality trout are any trout 14 inches or longer in length (Colorado Parks and Wildlife [CPW] 2008). In 1981, trout biomass measured 279 lbs/ac with 89 trout larger than 14 inches from data collected at the Parshall-Sunset monitoring section (Tetra Tech 2015a), which is located approximately 14 miles downstream of Windy Gap. By 2008, total biomass had declined to 192 lbs/ac with only 27 trout larger than 14 inches. Similarly, between 2007 and 2012, brown trout biomass declined from 264 to 108 lbs/ac, a 59% reduction. Preliminary data from the 2013 population estimates indicate the number of quality trout was down to 17 per ac (13 brown and four rainbow trout) and concern was expressed that by 2014, numbers could drop below Gold Medal standards (Tetra Tech 2015a).

Reduction of fish can be linked to impaired stream function and aquatic habitat degradation as described in Sections 2.3.1 and 2.3.2. These adverse conditions have also resulted in severe reduction of the primary species of the trout diet (mottled sculpin and stonefly) and have reduced trout spawning habitat. Since Windy Gap was constructed, stonefly (*Pteronarcys californica*) appear to be almost extricated between

Windy Gap and Hot Sulphur Springs and mottled sculpin (*Cottus bairdi*) have been drastically reduced representing 0% to 5% of the fish population below Windy Gap versus 23.1% to 80% upstream of the dam (Tetra Tech 2010). Based on brown trout spawning surveys conducted in the Colorado River in 2008 between Granby Dam and Williams Fork, numerous trout were found actively spawning and spawning gravels were measured in six of the completed redds (nests) excavated by the fish through dense mats of aquatic vegetation and heavy deposits of fine sediments (Tetra Tech 2015a). By 2010, spawning gravels were difficult to find and by fall of 2011, the only brown spawning activity was observed well downstream below Hot Sulfur Springs (Tetra Tech 2015a).

2.3.4 Increased Water Temperature

The reach below Windy Gap downstream of the Road 578 bridge is designated as a Cold Water Tier II stream reach by the Colorado Department of Public Health and Environment (CDPHE) with a chronic water temperature standard, set to protect brown trout, of 18.2° C Mean Weekly Average Temperature (MWAT) and a Daily Maximum (DM) of 23.8° C (Tetra Tech 2015a). After reviewing the temperature data, Tetra Tech (2015a) found that stream temperatures commonly exceed the MWAT standard during the summer months, typically late July to early August. The DM standard has also been occasionally exceeded during the summer months. As a result, this reach has been identified by the State of Colorado for having temperature impairment with a high priority, as defined by the Clean Water Act (CWA) Section 303(d). Exceedances for both the MWAT and the DM are expected to increase under most future operating conditions unless mitigating measures, such as reducing or curtailing pumping when temperatures are at the specified thresholds, are implemented (Miller 2011 as cited in Tetra Tech 2015a).

2.3.5 Blocked Fish and Aquatic Species Movement

Three main features of concern within the Windy Gap Watershed have been identified that block or impede fish passage and aquatic organism movement. These consist of the Granby Diversion and Frasier weir on the Fraser River, and Windy Gap Dam on the Colorado River. The Granby Diversion started construction in October 2020 for modifications to incorporate fish passage and was completed in November 2020. The Fraser weir creates an impediment to fish passage due to the length and height fish need to jump to bypass the structure (Tetra Tech 2015a). The drop between weir crest and downstream pool is 2.2 ft, and fish attempting to pass the weir would need to leap 2 ft high and 7 ft in length. Based on studies of fish burst speed and leap angles, it appears that it is highly unlikely fish would be able to pass the Fraser River weir (Tetra Tech 2015a). Windy Gap Dam is an approximate 25-foot-tall structure that blocks fish passage and aquatic organism movement. Restoration of channel connectivity was identified in a 2011 aquatic resources investigation (Nehring et al. 2011) as the number one priority to address the overall health of the Colorado River.

3.0 Scope of the Plan-EA

A scoping process was performed to identify relevant resources or environmental concerns to be analyzed in detail and to determine which could be eliminated from detailed study. Resource concerns were identified for the Project based on required scoping concerns outlined in the NWPM Section 501.24 B (NRCS 2015) and from any additional concerns identified by the public, the SLOs, or agencies during the scoping meeting and/or other planning or public meetings.

Multiple scoping meetings were held to gather input for Project resource concerns and to help identify proposed alternatives based on the input received. Prior to the beginning of the scoping open comment period, a kick-off meeting was held with the SLOs to identify potential areas of concern for modifications. This meeting was held on May 17, 2018, at the Grand Fire Protection District Office in Granby, Colorado. During the open comment period (August 1, 2018 to August 31, 2018), a public scoping meeting was held in the Grand Fire Protection District Office on August 15, 2018. There were 13 public/agency/organization attendees and six Project team members in attendance at the meeting.

Comments could be submitted in person at the meeting or via mail, e-mail, telephone, facsimile, or comment card. There were 11 written public scoping comments received for the Project. The Scoping Report, included in Appendix E, provides a summary of the scoping process.

A summary of resource concerns and their relevancy to the proposed action is provided in Table 3-1. Resource items determined to not be relevant to the proposed action have been eliminated from detailed study and justification for this elimination is provided in Table 3-1. Resource items determined to be relevant to the proposed action have been included in detailed studies described in this report.

Table 3-1. Resource Concerns Summary

Resource Concern	Relevant to the proposed action?		Rationale
	Yes	No	
Soils			
Upland Erosion and Sedimentation	X		Potential would exist for eroding soils from channel/floodplain creation, and soil instability at borrow sites. Construction activities could temporarily increase localized erosion.
Sedimentation	X		Change to sediment transport conditions.
Prime and Unique Farmland	X		Based on a review of Web Soil Survey data (NRCS 2020), farmland of statewide importance is located in the Project area. Prime farmland is not located within the Project area.

Resource Concern	Relevant to the proposed action?		Rationale
	Yes	No	
Water			
Surface Water Quality	X		Actions to occur in and around surface waters.
Surface Water Quantity	X		Altered surface water flow anticipated.
Ground Water Quantity		X	There are no groundwater recharge areas located in or near the Project area, and there would be no change to groundwater recharge from existing conditions.
Clean Water Act (CWA - Waters of the U.S.)	X		Drainages in the Project area are Waters of the U.S. subject to federal and state regulation.
Regional Water Mgt. Plans and Coastal Zone Management Areas		X	There would be no change to Regional Water Mgt. Plans in the Project area. Coastal Zone Management Areas are not applicable (N/A) for the Project area.
Floodplain Management	X		Project actions would result in creation of a floodplain adjacent to the bypass channel. The Project is located in a Special Flood Hazard Area.
Wetlands	X		Wetlands were identified within the Project area based on a Waters of the U.S. and Wetland Delineation completed for the Project area (Appendix E).
Wild and Scenic Rivers		X	No wild or scenic rivers are in or near the Project area, according to National Wild and Scenic Rivers System Map (Wild and Scenic Rivers 2019).
Sole Source Aquifers		X	No sole-source aquifers are in or near the Project area, according to U.S. Environmental Protection Agency (EPA) Sole Source Aquifers for Drinking Water (EPA 2017).
Air			
Air Quality	X		Construction activities produce emissions and fugitive dust.
Clean Air Act		X	The Project area is not located in a non-attainment area and would not generate long-term emissions (CDPHE 2019a). Permits would not be required.
Plants			
Special Status Plant Species		X	Colorado has no regulatory statutes that govern impacts to state-listed rare or sensitive plant species. No Endangered Species Act (ESA) plant species or suitable habitat is located within the Project area based on a botanical survey (CNHP 2020) conducted for the Project area (Appendix E).
Forest Resources		X	Forested lands are not located in or near the Project area.
Noxious Weeds and Invasive Plant Species	X		Construction disturbance could increase the risk of noxious weeds and invasive terrestrial and aquatic species establishment.
Protected Natural Areas		X	There are no protected natural areas or Areas of Critical Environmental Concern located within the Project area.
Riparian Areas	X		Riparian areas are present in the Project area.

Resource Concern	Relevant to the proposed action?		Rationale
	Yes	No	
Animals			
Essential Fish Habitat		X	Essential fish habitat is not present within the Project area.
Wildlife and Wildlife Habitat (terrestrial & aquatic)	X		General wildlife terrestrial habitat and aquatic habitat are present within the Project area.
Coral Reefs		X	Coral reef habitat is N/A to the Project area.
Special Status Animal Species	X		Special status animal species have habitat and/or could occur in the Project area.
Invasive Species	X		No potential for introduction of invasive animal species, except for invasive aquatic species.
Migratory Birds/Bald and Golden Eagles	X		Migratory birds, bald eagles, and associated habitat are present within the Project area.
Human			
Socioeconomics	X		The Project areas are in/near populated areas that could be affected by Project actions.
Historic Properties Cultural Resources	X		Cultural resources are present within the Project area.
Hazardous Materials	X		The Granby Landfill is located within 200 ft of the Project area. Equipment and associated fuels would be working/stored on-site during construction.
Environmental Justice and Civil Rights		X	No low-income or minority groups would be adversely affected by the proposed Project.
Public Health and Safety		X	Windy Gap dam is located upstream of inhabited areas that are within the breach inundation area of the dam.
Recreation	X		Recreation changes anticipated.
Land Use	X		Land use changes anticipated.
Visual Resources and Scenic Beauty	X		Visual/scenic resources are located in the Project area.
Parklands		X	No national or state parks located in or near Project area according to National Parks Map (National Park Service [NPS] 2018) and Colorado Park Finder (CPW 2019a).
Transportation Infrastructure		X	Project activities would not alter the transportation infrastructure.
Noise	X		Construction noise is anticipated.
Ecological Critical Areas		X	There are no ecological critical areas located in or near the Project area.
National Parks, Monuments and Historical Sites		X	No national parks, monuments, or historical sites located in or near Project area based on National Natural Landmarks Map (NPS 2018) and National Parks Map (NPS 2019).
Wilderness Areas or Wildlife Refuge		X	There are no wilderness areas or wildlife refuges in or near the Project area (U.S. National Wilderness Preservation System 2016, U.S. Fish and Wildlife Service [USFWS] 2018).
Scientific Resources		X	No scientific resources are located in or near the Project area.

4.0 Affected Environment

This section describes the resources that could be affected by the proposed alternatives. 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. Resources relevant to the Project are described in Sections 4.1 through 4.6. The environmental consequences to each of the resources discussed in this section are included in Section 6.0. Section 4.7 provides information on the existing status of the dam and is not considered a resource for inclusion in the Environmental Consequences analysis in Section 6.0.

The Project area is located in Grand County, Colorado, to the west and north of the town of Granby, Colorado (Appendix B – Map B1). Project actions would occur in the floodplain of the Colorado and Fraser Rivers, and at borrow sites near the Town of Granby. Because Project actions would occur at several different locations (e.g., Windy Gap Reservoir [Windy Gap], borrow area, etc.), the Project area was separated into four discrete areas based on where these actions would occur. Area 1 includes the Fraser and Colorado Rivers upstream of Windy Gap, the reservoir itself, and the Colorado River downstream of Windy Gap (Appendix B – Map B4.1). Areas 2 and 3 encompass lands identified as potential clay borrow sites, which are located to the north of Windy Gap (Appendix B – Map B4.2 and B4.3). Area 4 is an existing rock and gravel pit located roughly 4 miles northeast of Windy Gap (Appendix B – Map B4.4). Collectively, these areas are referred to as the Project area. Table 4-1 summarizes the physical setting of the Project area.

Table 4-1. Physical Setting Summary

Physical Setting Information		Information Source
Location		
The Project area is located in Grand County to the west and to the north of the Town of Granby, Colorado.		N/A
Size		
Area 1 – 306.3 ac (303.4 ac south and 2.9 ac north of Highway 40) Area 2 – 40.3 ac Area 3 – 56.0 ac Area 4 – 27.9 ac Total Project Area – 430.5 ac		Measured from ArcMap 10.6.1
Topography		
Elevation	Area 1 – 7820 to 7890 ft Area 2 – 7970 to 8210ft Area 3 – 8000 to 8190 ft Area 4 – 8000 to 8240 ft	Google Inc. 2020 (Google Earth)
General Topographic Gradient	Area 1 – Varies but generally sloping to the west-northwest Area 2 – Southwest Area 3 – South Area 4 – Varies but generally sloping to the southwest	

Physical Setting Information						Information Source
Geology						
Geologic Units	Area 1 – Alluvium (Qal), Landslide Deposits (Qls), Middle Park Formation (Tkm) Area 2 – Landslide Deposit (Qls) Area 3 – Qls, Terrace Gravel (Qtg), Troublesome Formation (Tt), Basalt (Tb), Area 4 – Qal, Qtg, Tt, Tb					U.S. Geologic Survey (USGS) Geologic Map (Schroeder 1995, Izett 1974)
Soil Characteristics						
Soil Types	The Project area contains 14 soil types, which are discussed in detail in Section 4.1.					Web Soil Survey (NRCS 2020)
Land Information						
Land Ownership	Area 1 – Subdistrict, Private, Road and Railroad Right-of-Way Area 2 – Subdistrict Area 3 – Subdistrict Area 4 – Subdistrict					Grand County Parcel Viewer Online Map (Grand County 2020)
Land Cover	**Area #**	Area 1	Area 2	Area 3	Area 4	Observations during McMillen Jacobs Site Visits and Google Earth Pro Aerial Imagery.
	Developed	24.4	2.4	6.4	24.6	
	Water Storage	97.4	-	-	-	
	Undeveloped	184.5	37.9	49.6	3.3	

4.1 Soil Resources

Soil information presented in this section has been summarized from NRCS Web Soil Survey data (NRCS 2020). Soils found within the Project area are depicted in Appendix C – Maps C2.1 through C2.4 and listed in Table 4-2. Note that some areas within the Project extents consist of disturbed lands or engineered fill and may not be consistent with the soil descriptions listed below or depicted in Maps C2.1 through C2.4.

Table 4-2. Soil and Farmland Classification Summary

Soil Unit Name	Landform	Ecological Site[1]	Slope	Description	Erosion Hazard	Farmland Classification	Location
Aaberg clay loam (2)	Mountainsides, ridges	Mountain Shale	15-30%	Mudstone and/or shale on mountain flanks	Moderate	Not prime farmland	Area 3
Cimarron loam (12)	Fans, mountainsides	Mountain Loam	2-6%	Local alluvium derived from shale	Slight	Farmland of statewide importance	Area 3
Cimarron loam (13)	Mountain slopes and colluvial aprons	Mountain Loam 13-18” PPT	6-15%	Slope alluvium over residuum weathered from shale	Slight	Farmland of statewide importance	Area 1 & 2
Cimarron loam (14)	Mountain slopes	Not Applicable (N/A)	15-30%	Slope alluvium over residuum weathered from shale	Moderate	Not prime farmland	Area 2 & 3
Cumulic Cryaquolls (25)	Floodplains	N/A	nearly level	Alluvium and/or alluvial outwash	Slight	Not prime farmland	Area 1 & 4
Mayoworth clay loam (53)	Mountainsides	Deep Clay Loam	15-50%	Weathered shale on mountain flanks	Moderate	Not prime farmland	Area 1-3
Quander stony loam (66)	Mountainsides	Stoney Loam	15-55%	Colluvium and/or glacial drift	Slight	Not prime farmland	Area 2
Rock outcrop-Cryoborolls complex (68)	Escarpments, ridges, mountainsides	N/A	70-99%	Outcrop is basalt, and/or sandstone and/or mudstone and/or granite, Cyroborolls is glacial drift	Not Rated (NR)	Not prime farmland	Area 3 & 4
Tine cobbly sandy loam (83)	Breaks	Dry Mountain Loam	15-55%	Alluvium outwash	Slight	Not prime farmland	Area 4
Waybe clay loam (90)	Ridges, mountainsides	Mountain Shale	10-55%	Residuum weathered from shale and/or residuum weathered from mudstone	Severe	Not prime farmland	Area 1 & 3
Woodhall loam (92)	Mountainsides	Moutain Loam	15-50%	Weathered basalt and/or weathered sandstone	Moderate	Not prime farmland	Area 3 & 4
Youga loam (93)	Colluvial aprons	Mountain Loam 13-18” PPT	1-6%	Slope alluvium derived from sedimentary rock	Slight	Farmland of statewide importance	Area 4
Youga loam (95)	Mountain slopes	Mountain Loam	15-45%	Slope alluvium derived from sedimentary rock	Moderate	Not prime farmland	Area 3 & 4
Water (96)	N/A	N/A	N/A	Water	NR	Not prime farmland	Area 1

Source: NRCS 2020

4.1.1 Upland Erosion

Soils within the Project area vary from area to area. Erosivity of soils is dependent upon soil characteristics and the erosional forces acting on them. Erosion of surface materials occurs from wind and water interaction. Chemical processes can also help breakdown surface materials and contribute to erosion. Water is the most powerful erosive force and does the most damage when combined with steep gradients. The steeper the terrain, the greater the potential for erosion from water interaction due to increased water velocities.

NRCS rates erosion hazard of soils based on off-road and off-trail disturbance activities that expose the soil surface. An erosion hazard rating of slight indicates that erosion is unlikely under ordinary climatic conditions; moderate indicates that some erosion is likely and that erosion-control measures may be needed; sever indicates that erosion is likely and that erosion-control measures, including revegetation of bare areas, are advised (NRCS 2020). Soils having a slight erosion hazard rating are in areas that are nearly level or have a low angle grade, resulting in low water velocities.

Approximately 50.9% of the Project area is classified as having a slight erosion hazard, 16.3% as moderate, 2.0% as severe, and the remaining 30.7% is not rated but null from presence of surface water (28.5%) and rock outcrop (2.2%). The soil hazard rating for each soil type is included in Table 4-2.

A summary of soil conditions and erosion potential for each area is provided below.

- Area 1: All soils within Area 1 are designated with a slight erosion hazard, except for a narrow strip of Waybe clay loam soil on the steep slope adjoining Highway 40, which has a severe erosion hazard rating.
- Area 2: Area 2 is located on the slope of a hillside with a higher susceptibility to erosion if soils are disturbed. Approximately 44% of the soils within Area 2 have a slight erosion hazard rating and 56% have a moderate erosion hazard rating.
- Area 3: Area 3 is also located on the slope of a hillside with a higher susceptibility to erosion if soils are disturbed. The area is comprised of approximately 9% severe, 80% moderate, and 3% slight erosion hazard rated soils. The remaining 8% is rock outcrop that is not rated.
- Area 4: An existing rock quarry and gravel pit comprise Area 4. The gravel pit has a slight erosion hazard and is protected with a wearing surface to reduce erosion. The rock quarry is primarily rock outcrop that is resilient to erosion.

4.1.2 Sedimentation

A sedimentation analysis was completed for Windy Gap (AECOM 2019c), which estimated a sediment deposition rate into Windy Gap using two methods (sediment load record methodology and sediment accumulation methodology). It was determined that the sediment load methodology produced the most accurate results based on bathymetric survey error and a pond breach impacting sediment deposition for the accumulation methodology. A sediment deposition rate of 2.0 ac-ft per year (0.5 ac-ft for silt/clay sediments and 1.5 ac-ft for sand/gravel sediments) was calculated for Windy Gap based on the sediment load methodology (AECOM 2019c).

There is 180 ac-ft of sediment storage remaining below the Windy Gap pumping plant minimum operating pool (elevation 7,828.5 ft). Based on the deposition rates calculated for the structure, this would accommodate approximately 90 years of sediment accumulation in Windy Gap.

4.1.3 Prime and Unique Farmland

NRCS, in cooperation with other interested federal, state, and local governments, has inventoried land that can be used to produce the Nation’s food supply. The extent and location of important soils that are best suited for food, feed, fiber, forage, and oilseed crops have been identified and classified as prime farmland, unique farmland, and farmland of statewide or local importance.

No prime or unique farmlands were identified in the Project area. Farmland of statewide importance was identified within the Project area and include Cimarron loam (12 and 13) and Youga loam (93) soils (Appendix C – Maps C2.1 through C2.3). These soils account for a total of 9.3% (40 ac) of the Project area; however, most of these soils have been previously disturbed and would no longer be considered Farmland of statewide importance. Only 12.8 ac of the 40 ac designated as farmland of statewide importance remain within the Project area. A description of farmland of statewide importance for each area is provided below.

- Area 1 – All soils designated as farmland of statewide importance located south of Highway 40 have been previously disturbed (excavated/filled) from construction of the reservoir/Highway 40 and would no longer fit this classification. The soils north of Highway 40 have also been disturbed an only approximately 1.4 ac of land appear to be undisturbed that would fit this classification.
- Area 2 – Soils within Area 2 that are designated as farmland of statewide importance have been disturbed from construction of Road 402. Lands in approximately 11.4 ac of these soils appear to be mostly undisturbed that would fit this classification. Note that these soils are located on lands with a 12% to 15% slope that would not be suitable for cultivation and appear to be partially used for grazing.
- Area 3 – Most of the farmland of statewide importance soils within Area 3 have been graded and/or fill placed from construction of a pipeline, pipeline access road, and overhead power transmission line, and would no longer fit the classification of farmland of statewide importance. Approximately 0.05 ac of land within area 3 would fit the classification of farmland of statewide importance.
- Area 4 – Soils designated as farmland of statewide importance have been mined and excavated for gravel as part of gravel pit operations and the lands no longer fit this classification.

4.2 Water Resources

4.2.1 Surface Water Quality

The Project area is located in the Colorado Headwaters Hydrologic Unit (14010001). Portions of the Willow Creek, Fraser River, Headwaters of the Colorado River, and Little Muddy Creek are included in the Project watershed boundary. The Fraser and Colorado Rivers are the major streams in the watershed boundary. Two reaches of the Fraser River extend from the railroad bridge to its confluence with the Colorado River and include the Fraser River weir. Reaches of the Colorado River in the Project area include short segments both upstream and downstream of Windy Gap (Appendix B – Map B4.1).

Highways and roads contribute sediment, salts, heavy metals, and petroleum pollutants to the waters in the region. The water quality priority identified for the Fraser River was nonpoint source pollution from developed areas, which includes groundwater impacts in development areas and impacts from septic systems and urban activities (NWCCOG 2002).

Per Regulation #93, the state must develop a list of impaired waters (303(d) list) and those waters recommended for continued monitoring and evaluation (M&E) (CDPHE 2020a). This regulation establishes Colorado's Lists of Impaired Waters. These waters include water quality-limited segments requiring total maximum daily loads (TMDLs), impaired waters that do not require a TMDL, and Colorado's M&E List (CDPHE 2020a). The CDPHE summarizes water quality conditions in state waters in the Integrated Water Quality Monitoring and Assessment Report (IR). A summary of the 2020 IR and impaired waters list for the

segments of the Colorado River and Fraser River within the Project area and directly downstream are summarized in Table 4-3 (CDPHE 2020a, b). Windy Gap Reservoir was not listed as an impaired water in the 2020 IR.

Table 4-3. CDPHE Water Quality Summary

River	Segment ID	Use				State Impaired List	
		Aquatic Life	Recreation	Agriculture	Water Supply	Analyte	Affected Use
Colorado River (Upstream of Windy Gap)	COUCUC03_A	Fully Supporting (F)	F	F	Insufficient Information (I)	Arsenic (M&E)	Water Supply
Colorado River (Downstream of Windy Gap)[1]	COUCUC03_B	F	F	F	I	Arsenic (M&E)	Water Supply
Colorado River (Downstream of Windy Gap)[2]	COUCUC03_C	Not Supported (N)	F	F	I	Arsenic (M&E)	Water Supply
						Temperature	Aquatic Life
Fraser River (Upstream of Windy Gap)	COUCUC10c_C	F	I	F	N	Arsenic (303(d))	Water Supply
						E. coli (M&E)	Recreation

Source: CDPHE 2020a, b

1 – From Windy Gap Reservoir to 578 Road Bridge

2 – From 578 Road Bridge to Gore Canyon

The Water Quality Control Commission is responsible for establishing basic standards and an antidegradation rule and establishing a system for classifying state surface waters, as prescribed by the Colorado Water Quality Control Act. Known as Regulation No. 31 (5 CCR 1002-31), this regulation established Colorado's antidegradation policy (5 CCR 1002-31.8). This policy does not prohibit degradation of water quality, unless the Commission has previously designated the water "outstanding waters" or "use-protected". Outstanding and use-protected waters do not exist within or near the Project area (CDPHE 2018). However, any activity that requires a discharge permit or water quality certification under federal or state law, or that is subject to state control regulations, is considered a "reviewable water" (5 CCR 1002-31.8.3). This review may occur if a Section 401 Water Quality Certification is requested for Project activities. At a minimum, all state surface waters existing classified uses and the level of water quality necessary to protect such uses shall be maintained and protected (5 CCR 1002-31.8). The classified uses shall be deemed protected if the narrative and numerical standards are not exceeded (5 CCR 1002-31.8).

Northern Water has a water quality program that includes a Baseline Monitoring Program for lake and reservoir sites, including Windy Gap. A water quality report for the lake and reservoir sites (Billica 2013) included results of the Baseline Monitoring Program which monitored temperature, dissolved oxygen (D.O.), specific conductance, pH, general chemistry, nutrients, metals, phytoplankton, and zooplankton. Data presented in this report were collected during the seven-year period (water year [WY] 2005 through water year [WY] 2011), but sampling at Windy Gap began in 2009. During the monitoring period (WY 2009 through WY 2011) water temperatures in the 0.2 to 2 meter depth interval have remained below the 18.2˚C standard and there have been no occurrences of D.O values below the 6.0 milligrams/liter (mg/L) standard (Billica 2013). Elevated pH values above the 9.0 standard were reported at Windy Gap in August and

September of 2009 ranging from 8.2 to 9.4. Windy Gap was found to have the lowest phytoplankton and zooplankton densities of the west slope water bodies sampled. Table 4-4 provides the mean values detected in Windy Gap for various constituents as documented in the water quality report (Billica 2013).

Table 4-4. Windy Gap Constituent Values Summary

Constituent	Units	Mean Value (1 meter depth)	Mean Value (1 meter above bottom depth)
Ammonia as N (Dissolved)	mg/L	0.0025	0.0038
Nitrate plus Nitrite as N	mg/L	0.0083	0.0093
Total Nitrogen	mg/L	0.3	0.33
Total Phosphorus	mg/L	0.042	0.045
Ortho Phosphate as P	mg/L	0.017	0.014
Total Organic Carbon	mg/L	4.5	4.5
Total Suspended Solids	mg/L	6.6	7
Total Filtered Alkalinity	mg/L	32	32
Calcium	mg/L	12	12
Magnesium	mg/L	2.1	2.1
Sodium	mg/L	3.2	3.1
Potassium	mg/L	0.85	0.84
Chloride	mg/L	1.4	1.4
Sulfate	mg/L	3.1	3
Arsenic (Dissolved)	µg/L	0.32	0.31
Cadmium (Dissolved)	µg/L	0.0093	0.0083
Copper (Dissolved)	µg/L	0.91	1.3
Iron (Dissolved)	µg/L	159	173
Total Iron	µg/L	447	503
Lead (Dissolved)	µg/L	0.076	0.075
Manganese (Dissolved)	µg/L	33	44
Total Mercury	ng/L	2.8	2.8
Nickel (Dissolved)	µg/L	0.62	0.57
Selenium (Dissolved)	µg/L	0.12	0.12
Silver (Dissolved)	µg/L	0.003	0.003
Zinc Dissolved	µg/L	3.5	0.9

4.2.2 Surface Water Quantity and Flow

Surface water in the Project area comes from the Fraser River and the Colorado River. Flows in the rivers and water surface elevation within Windy Gap vary throughout the year depending on precipitation, snowmelt, and upstream reservoir operations. Upstream of Windy Gap, Colorado River flows are highly regulated by Granby Reservoir, typically held at a relatively constant flow of approximately 20 to 80 cfs through the primary pumping period (late April through early July), (Tetra Tech & HabiTech 2017). The Fraser River is often the primary contributor of flows to Windy Gap (Tetra Tech & HabiTech 2017).

The Fraser River confluence with the Colorado River is located approximately 1,700 ft upstream of Windy Gap and flows from these rivers continue downstream into the reservoir. Water in the reservoir that is not stored or pumped continues downstream through the dam's spillway and outlet systems (refer to Section 1.2.1). A minimum instream flow requirement of the Colorado River, measured just downstream of the dam at County Road 57, is the lesser of the total inflow to Windy Gap or 90 cfs. The minimum instream flow right also includes maintenance of flow rates on the Colorado River of 135 cfs between Williams Fork and Troublesome Creek, and 150 cfs between Troublesome Creek and the Blue River.

Windy Gap Reservoir was constructed to divert Colorado River flows into Lake Granby for storage and delivery. This is accomplished by pumping water from Windy Gap upstream through the existing pipeline system. Water diverted from Windy Gap is for municipal, industrial, agricultural, and recreational uses. Windy Gap has a storage volume of 420 ac-ft. Existing reservoir surface operation ranges from 7828.5 to 7831.5 feet elevation using an active storage volume of approximately 240 ac-ft. The Windy Gap Project water right decree for storage at the reservoir is a net absolute of 445 ac-ft (Case No. 88CW169) for a diversion rate of 600 cfs (Case No. 89CW298).

4.2.3 Waters of the U.S. and Wetlands

Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S. and requires a permit for these activities unless the activities are exempt from Section 404 regulation. Waters of the U.S. are defined as all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide and includes all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce (40 CFR 230.3(s)).

A wetland delineation was completed by Tetra Tech (Tetra Tech 2015b) for portions of the Project area in 2015 to identify and map stream ordinary high-water marks and wetlands in support of a request to identify waters of the U.S. and wetland jurisdictional status from the U.S. Army Corps of Engineers (USACE). McMillen Jacobs Associates wetland specialists performed a waters of the U.S. and wetlands delineation in August 2018 and July of 2020 (Appendix E).

4.2.3.1 Waters of the U.S

Waters of the U.S. delineated within the Project area include 10 channel features totaling 15,027 linear feet (LF) and 11 open water features totaling 98.64 ac that are considered potential jurisdictional waters of the U.S. (Table 4-5), which includes 97.44 ac in Windy Gap Reservoir. All waters of the U.S. are located in Area 1 and none were observed or delineated in Areas 2, 3, and 4. Delineated features can be seen in Appendix C – Map C3.1A. Waters of the U.S. delineated by McMillen Jacobs Associates were classified according to the Cowardin classification system (Cowardin et al. 1979). Note that it is the responsibility of USACE to make the final determination of jurisdictional waters of the U.S. Table 4-5 provides a list of mapped waters within the Project area.

Table 4-5. Summary of Water Features Mapped in the Survey Area

Feature Name	Cowardin Classification				Area / Length[1]
	System	Subsystem	Class	Modifier	
Delineated Open Water Features					
Windy Gap Reservoir	Lacustrine (L)	Limnetic (1)	Unconsolidated Bottom (UB)	Artificially Flooded (K), Diked/ Impounded (h)	97.44 ac
Pond A	Palustrine (P)	N/A	UB	Semipermanently Flooded (F)	0.13 ac
Pond B	P	N/A	UB	F	0.14 ac
Pond C	P	N/A	UB	F	0.48 ac
Pond D	P	N/A	UB	F	0.01 ac
Pond E	P	N/A	UB	F	0.01 ac
Pond F	P	N/A	UB	F	0.01 ac
Pond G	P	N/A	UB	F	0.01 ac
Pond H	P	N/A	UB	F	0.16 ac
Pond I	P	N/A	UB	F	0.04 ac
Pond J	P	N/A	UB	F	0.21 ac
Total Area (Pond/Reservoir)					**98.64 ac**
Delineated Channel Features					
Fraser River	Riverine (R)	Lower Perennial (2)	UB	Permanently Flooded (H)	1,403 LF
Colorado River - Upstream	R	2	UB	H	2,115 LF
Spillway Channel	R	2	UB	H	761 LF
Colorado River - Downstream	R	2	UB	H	2,873 LF
Stream 1	R	2	UB	H, Excavated (x)	4,698 LF
Stream 2	R	2	UB	H	35 LF
Stream 3	R	Intermittent (4)	Streambed (SB)	Seasonally Flooded (C)	348 LF
Stream 4	R	4	SB	Temporarily Flooded (A)	411 LF
Stream 5	R	4	SB	Artificially flooded (K), x	578 LF
TT Stream	Not Classified by Tetra Tech				1,805 LF
Total Length (Channel Features)					**15,027 LF**

1 - Lengths (in linear feet [LF]) are provided for channel features and areas (in ac) are provided for open water features.

4.2.3.2 Wetlands

Wetlands delineated within the Project area include 35 wetlands within Areas 1, 2 and 3 (Table 4-6). Delineated features can be seen in Appendix C – Maps C3.1A, C3.2, and C3.3. No wetlands were observed in Area 4. Wetlands were classified according to the Cowardin classification system (Cowardin et al. 1979). There are 36.19 ac of wetland within the Project area: 33.51 ac in Area 1, 2.67 ac in Area 2, and 0.01 ac in

Area 3. Areas 2 and 3 contain only emergent wetlands and Area 1 has approximately 18.29 ac of emergent wetland and 15.22 ac of scrub/shrub wetland.

Table 4-6. Summary of Wetlands Mapped in the Survey Area

Wetland	Cowardin Classification				HGM	Size (Ac)
	System	Class	Subclass	Modifier		
McMillen Jacobs Delineated Wetlands						
Area 1						
A	Palustrine (P)	Emergent (EM)	Persistent (1)	Saturated (B)	Slope (S)	0.05
B	P	Scrub Shrub (SS)	Deciduous (6)	B	S	0.69
C	P	EM	1	B	S	0.18
D	P	EM	1	B	Depression (D)	0.42
E	P	EM	1	Seasonally Flooded/ Saturated (E)	D	3.09
F	P	SS	6	Seasonally Flooded (C)	Riverine (R)	0.06
G	P	EM	1	B	D	1.23
H	P	SS	6	B	D	0.24
I	P	EM	1	B	S	0.56
J	P	SS	6	C	R	0.18
K	P	EM	1	Semi-permanently Flooded (F), Excavated (x)	R	1.65
L	P	SS	6	B, Diked/Impounded (h)	Lacustrine (L)	0.75
M	P	SS	6	B	S	0.54
N	P	SS	1	B	R	0.68
O	P	SS	6	B	R	0.22
P	P	EM	1	B	S	0.50
Q	P	EM	1	B	R	0.26
R	P	SS	6	B, h	L	0.97
S	P	EM	1	E	D	0.33
V	P	SS	6	B, h	L	9.96
W	P	EM	1	C	L	0.11
X	P	EM	1	C	R	0.10
Y	P	EM	1	B	R	0.37
Z	P	EM	1	B	R	0.02
AA	P	EM	1	B	D	0.01

Wetland	Cowardin Classification				HGM	Size (Ac)
	System	Class	Subclass	Modifier		
AB	P	EM	1	B	R	0.07
AC	P	EM	1	B	D	1.30
AD	P	EM	1	B	D	0.07
AE	P	EM	1	B	D	0.07
McMillen Delineated Area 1 Total						24.68
Tetra Tech Delineated Wetlands (Area 1)						
TT 1	P[1]	EM[1]	Not Classified by Tetra Tech			7.79
TT 2	P[1]	EM[1]	Not Classified by Tetra Tech			0.92
TT 3	P[1]	EM[1]	Not Classified by Tetra Tech			0.11
TT 5	Not Classified by Tetra Tech (assumed SS)					0.01
Area 1 Total						**33.51**
Area 2						
T	P	EM	1	B	S	2.67
Area 3						
U	P	EM	1	E	D	0.01
Total Wetlands in Project Area						**36.19**

1 – Wetland system and class were not classified by Tetra Tech, but the Tetra Tech delineation report noted the system and class National Wetland Inventory classifications.

4.2.4 Floodplain Management

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for the Project area (FEMA 2008) were reviewed to determine existing flood hazard areas (Appendix C – Map C4). The flood zones for each area are summarized in Table 4-7. Flood Zones within the Project area extents include the following (FEMA 2008):

- Zone D: Possible but undetermined flood hazard. No flood hazard analysis has been conducted.
- Zone X: Area of Minimal Flood Hazard determined to be outside of the 0.2% annual chance (500-year) flood.
- Zone A: Areas determined to be located within the 0.1% annual chance (100-year) flood and Base Flood Elevations have not been determined.

Table 4-7. FEMA Flood Zone Summary

Area Number	Area Name	Flood Hazard Ratings	Description
1	Windy Gap Reservoir	Zone A, X, and D	Most of Area 1 is shown within Zone A with a narrow sliver north of Windy Gap Reservoir and south of Highway 40 shown as Zone X. The portion of Area 1 located north of Highway 40 is shown as Zone D.
2	Clay Borrow Area	Zone D	Area 2 through 4 are located entirely within Zone D.
3	Clay Borrow Area	Zone D	
4	Rock/Gravel Borrow Area	Zone D	

4.3 Air Quality

4.3.1 National Ambient Air Quality Standards

Pursuant to requirements of the Clean Air Act (42 U.S.C 7401 et seq), the EPA has established health-based National Ambient Air Quality Standards (NAAQS) for six pollutants considered harmful to public health and the environment, known as criteria pollutants. NAAQS pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), sulfur dioxide (SO_2), and lead (Pb).

Monitoring of NAAQS pollutants in Colorado is delegated to the CDPHE Air Pollution Control Division (APCD). In the APCD's air monitoring network there are 21 meteorological sites, 27 PM_{10} monitoring sites, 17 $PM_{2.5}$ monitoring sites, eight CO monitoring sites, 21 O_3 monitoring sites, five NO_2 monitoring sites, and four SO_2 monitoring sites (CDPHE 2017). Grand County is not listed as a NAAQS nonattainment or maintenance area. Colorado is divided into eight multi-county areas that are generally based on topography and have similar airshed characteristics. These areas are the Central Mountains, Denver Metro/North Front Range, Eastern High Plains, Pikes Peak, San Luis Valley, South Central, Southwestern, and Western Slope regions. Grand County is in the Central Mountains region (CDPHE 2017). The primary monitoring concern in this region is particulate pollution from wood burning and road dust. During 2017, there were five particulate monitoring sites operated by the APCD in the Central Mountains region, but no monitoring sites in Grand County. APCD did not operate any gaseous monitors in this region during 2017. The entire region complies with federal air quality standards (CDPHE 2017).

4.3.2 Climate and Greenhouse Gases

Gases that trap heat in the atmosphere are called greenhouse gases (GHG). GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. In Colorado, the CDPHE updates the state's GHG emissions inventory every 5 years; the last update was in 2019 (CDPHE 2019a). This inventory was generated using the EPA's State Inventory Tool (SIT). This inventory includes a comprehensive summary of 1990-2015 outputs from the current SIT model, as well as emission projections for 2020 and 2030 (CDPHE 2019a).

Results of the 2019 inventory show GHG emissions increased between 1990 and 2010 and decreased between 2010 and 2015. Emissions are projected to continue decreasing, dropping below year 2005 levels by 2030 (CDPHE 2019a). Data presented in Table 4-8 show that most GHG emissions in Colorado come from the energy sector, which includes electric power, transportation, and residential/commercial/industrial fuel use sectors (CDPHE 2019a). Emissions per gross state product have declined dramatically since 1990 and are predicted to have a modest decrease between 2015 and 2030 (CDPHE 2019a).

Table 4-8.Summary of Colorado GHG Emissions by Sector ($MMTCO_2e$) SIT Model Runs 1990-2015

Sector	1990	1995	2000	2005	2010	2015
Electric Power	31	33	39	40	40	36
Transportation	20	24	27	31	30	28
Residential, Commercial & Industrial Fuel Use	15	18	20	25	26	26
Natural Gas and Oil Systems	2	2	6	8	12	16
Agriculture	9	9	13	10	10	11
Coal Mining & Abandoned Mines	5	4	5	7	8	2
Industrial Processes	1	1	3	3	4	4
Waste Management	1	1	2	2	3	4
Total	**84**	**92**	**115**	**126**	**133**	**127**

CDPHE 2019a; MMTCO2e = metric tons of carbon dioxide equivalent.

4.4 Plant Resources

4.4.1 Noxious Weeds and Invasive Plants

Executive Order 13122 states that “a federal agency shall not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction and spread of invasive species in the U.S. or elsewhere.” Noxious weeds and invasive plants are non-native plant species designated by state law or county ordinance because they cause, or have the potential to cause, extraordinary negative economic and ecological impacts.

The Colorado Noxious Weed program aims to control noxious weeds, the non-native aggressive invaders that replace native vegetation, reduce agricultural productivity, cause wind and water erosion, and pose an increased threat to communities from wildfire (Colorado Department of Agriculture [CDA] 2019). This is accomplished by preventing the introduction of new invasive species, eradicating species with isolated or limited populations, and containing and managing those invasive species that are well-established and widespread. To facilitate control efforts, Colorado has prioritized noxious weed species into the following species list (CDA 2019):

- List A – Species in Colorado that are designated by the Commissioner for eradication.
- List B – Species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to stop the continued spread of these species.
- List C – Species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands.
- Watch List – Species that have been determined to pose a potential threat to the agricultural productivity and environmental values of the lands of the state. The Watch List is intended to serve advisory and educational purposes only.

Currently, Grand County manages 26 noxious weed species (Grand County 2018) and designates them as "List A", "List B", or "List C," which are similarly managed according to the CDA categories described above. Listed aquatic and terrestrial species on the CDA and Grand County weed lists occur in the Project area. Spread of terrestrial invasive plants commonly occurs from human-driven activities including recreation, livestock management, vehicle contamination, and garden plantings. Spread of aquatic invasive species occurs primarily through human activity such as recreation. Noxious weeds observed onsite during wetland delineation surveys (McMillen Jacobs 2020), botanical surveys, and provided by Grand County Division of Natural Resources are provided in Table 4-9. The Project area also contains abundant non-native species that are not listed as noxious by Colorado or Grand County.

Table 4-9. Observed Noxious Weeds

Name*	Scientific Name	Area 1	Area 2	Area 3	Area 4	Weed Class
Blank henbane	*Hyoscyamus niger*	*X*				B
Canada thistle	*Cirsium arvense*	*X*	X	X		B
Common mullein	*Verbascum thapsus*	*X*		X	X	C
Cheatgrass	*Bromus tectorum*	*X*	X	X		C
Houndstongue	*Cynoglossum officinale*	*X*				B
Musk thistle	*Carduus nutans*		X			B
Oxeye daisy	*Leucanthemum vulgare*	*X*				B
Scentless chamomile	*Tripleurospermum perforatum*	*X*				B
Whitetop	*Cardaria draba*	*X*				B
Yellow Toadflax	*Linaria vulgaris*	*X*				B

* This list is a compilation of species observed during surveys. It does not represent all species that may be present with the Project area or on adjacent parcels due to the timing and associated growth stage of species when the surveys were conducted.

Grand County controls weed species on county lands and road rights-of-way and provides weed control educational material and technical assistance to the public. Landowners are responsible for the control of noxious weeds on private property (Grand County 2018).

Colorado also maintains a list of Aquatic Nuisance Species (ANS), in addition to noxious weeds. ANS plant species identified for 2020 in Colorado include Brazilian elodea, Eurasian watermilfoil, hybrid invasive watermilfoil, and water hyacinth (CPW 2020a). None of those species were found to occur in Grand County, but Eurasian watermilfoil was found in adjoining counties (Boulder and Larimer Counties).

4.4.2 Riparian Areas

Riparian areas 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 et al. 2000). The riparian area exists in the transitional area between the aquatic and terrestrial ecosystems. Riparian areas contain different vegetative species than the adjoining ecosystems and exhibit more vigorous growth due to shallow groundwater interaction. These areas typically harbor a large number of wildlife species and perform numerous ecological functions.

In the Project area, riparian areas (outside of existing wetlands) are found in Area 1 along the banks of the Fraser and Colorado Rivers, interspersed with wetland vegetation (Appendix C – Map C5). Riparian areas are not present in Areas 2 through 4. Area 1 contains approximately 16.0 ac of riparian vegetation. Riparian areas range from a few ft wide up to nearly 500 ft across and appear to have formed in old river oxbows and areas with a shallow groundwater table. Overstory vegetation includes narrowleaf cottonwood (*Populus angustifolia*) and peach-leaf willow (*Salix amygdaloides*). Common willows include Drummond's willow (*Salix drummondii*) and yellow willow (*Salix lutea*). Understory plants include sedge species (*Carex* species), creeping bentgrass (*Agrostis stolonifera*), and reed canarygrass (*Phalaris arundinacea*) (McMillen Jacobs Associates 2019). Figure 4-1 and Figure 4-2 provide a general view of the riparian corridor along the Colorado River both upstream and downstream of Windy Gap. Figure 4-3 provides a general view of the riparian corridor along the Fraser River.

Figure 4-1. General View of Colorado River Riparian Corridor, Upstream of Windy Gap

Figure 4-2. General View of Colorado River Riparian Corridor, Downstream of Windy Gap

Figure 4-3. General View of Fraser River Riparian Corridor

4.5 Animal Resources

4.5.1 Wildlife and Wildlife Habitat

Habitat within the Project area consists of approximately 13% developed areas, 8% wetland, 27% aquatic, 4% riparian, 1% mixed forest and shrubland, and 47% shrubland and/or grassland. Wildlife species within the Project area may include a range of native and non-native migratory birds, resident birds, mammals, amphibians, reptiles, fish, and macroinvertebrates. Wildlife populations that are the most documented and understood include those that are listed for protection under the ESA, are a state species of concern, or are desired game or furbearers.

There are no designated wilderness areas (U.S. National Wilderness Preservation System 2016) or wildlife refuges (USFWS 2018) in or near the Project area. Habitat types for each area are included in Table 4-10 and depicted in Appendix C – Map C6.1A, and C6.2 through C6.4. Habitat types were determined from a combination of site observations, wetlands/waters surveys, and aerial imagery review conducted by McMillen Jacobs Associates. Habitat conditions within each area are described below Table 4-10.

Table 4-10. Habitat Types

Habitat Type	Area 1		Area 2		Area 3		Area 4		Total	
	Ac[1]	%	Ac[1]	%	Ac[1]	%	Ac[1]	%	Ac[1]	%
Developed	24.3	8%	2.4	6%	5	9%	24.6	88%	**56.3**	**13%**
Wetland	33.5	11%	2.7	7%	0.01	<1%	-	-	**36.2**	**8%**
Water	114.0	37%	-	-	-	-	-	-	**114.0**	**27%**

Habitat Type	Area 1		Area 2		Area 3		Area 4		Total	
	Ac[1]	%	Ac[1]	%	Ac[1]	%	Ac[1]	%	Ac[1]	%
Riparian	16.0	5%	-	-	-	-	-	-	**16.0**	**4%**
Mixed forest/ shrubland	4.8	2%	-	-	-	-	-	-	**4.8**	**1%**
shrub and/or grassland	113.7	37%	35.2	87%	51	91%	3.3	12%	**203.2**	**47%**
Total	**306.3**	**71%**	**40.3**	**9%**	**56**	**13%**	**27.9**	**6%**	**430.5**	**100%**

1-Rounded to the nearest tenth.

- Area 1 (Terrestrial) – Terrestrial areas make up approximately 192.3 ac (63%) of Area 1 and contain a mix of different high-value wildlife habitats that are relatively free from human disturbance. Approximately 37% of Area 1 is a mix of sagebrush shrubland and grassland; 2% is a mix of forest and shrubland/grassland, 5% is riparian vegetation, 11% is emergent and scrub-shrub wetland, and 8% is developed (dam embankment, pumping station, roads, wildlife viewing areas, cabins). Elk, deer, and numerous birds were observed using the area during site visits. Terrestrial habitat is suitable for native and non-native migratory birds, resident birds, mammals, reptiles, and amphibians.
- Area 1 (Aquatic) – Open-water aquatic areas make up approximately 113.7 ac (37%) of Area 1 with the reservoir and ponded features covering 32% and rivers/channels covering 6%. Aquatic life within the Project area consists of amphibian species, one native fish species (mottled sculpin), several introduced fish species (brown trout, rainbow trout, longnose dace, creek chub, Johnny darter, white sucker, and longnose sucker), and macroinvertebrates.

  The Colorado River within the Project area has degraded due changes in the watershed. Human-made alterations and actions in the watershed have blocked/impeded aquatic life passage, reduced water quantities in the river, changed flow and sediment transport patterns, and introduced pollutants. Degradation of the Colorado River has resulted that includes fine-sediment deposition, lack of flushing flows, water temperature increases, rooted aquatic vegetation, introduction of whirling disease, and lack of channel connectivity.

  The Colorado River downstream of Windy Gap is dominated by wide and shallow riffles and shallow runs. The substrate is predominantly cobble and is heavily embedded with fine sediments in lower-velocity areas (Tetra Tech 2015a). Didymo (rock snot), which is a nuisance algal bloom, has been common along this stretch of river. Gravel bars suitable for trout spawning are no longer present and trout cover is limited (Tetra Tech 2015a). The area downstream of Windy Gap has become starved of gravel, as deposition of gravel in this area no longer takes place following construction of the dam. The dam blocks aquatic life passage and interrupts the downstream drift of aquatic insect larvae and coarse organic matter. The Fraser River weir, upstream of the dam, also inhibits aquatic life passage.

  The aquatic invertebrate community of the upper Colorado River has changed since the construction of Windy Gap and those changes persist today in a pattern of reduced diversity and different species assemblages at sites above and below the reservoir. Several sensitive invertebrate species are replaced by more tolerant ones immediately below the dam and some

species common before construction of the reservoir are currently rare or absent at sites below the dam. Sampling in 2010 revealed that eight species of EPT (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]) found at downstream sites were absent or rare closer to the reservoir and five other taxa, not present elsewhere, occur at sites below the dam (Nehring et al. 2011). This reflects a difference in the macroinvertebrate community structure and reduced species richness at sites downstream and near the dam compared to sites further downstream, and compared to data collected in 1980-81, before the dam was built (Erickson 1983).

Area 2 – County Road 402 extends in a north-south orientation through the middle of Area 2. Two dirt roads are also present within Area 2 with one of the roads used as an access to a power transmission line. The area outside of this is a mix of sagebrush shrubland, grassland, and wetland communities that may provide habitat for native and non-native migratory birds, resident birds, mammals, reptiles, and amphibians. Approximately 6% of Area 2 is a developed road corridor, 7% is emergent wetland, and the remaining 87% is a mix of sagebrush shrubland and grassland.

- Area 3 – Similar to Area 2, this area is a mix of sagebrush shrubland, grassland, and wetland plant communities that offer habitat for native and non-native migratory birds, resident birds, mammals, and reptiles. An unnamed gravel road bisects the southern portion of the area. Approximately 9% of Area 3 is developed with a road, pipeline, and overhead powerline corridor, 91% is a mix of sagebrush shrubland and grassland, and 0.02% is emergent wetland.
- Area 4 – Area 4 is highly disturbed from gravel and rock mining operations with no habitat remaining in the gravel pit. Approximately 3.3 ac of land within the rock quarry is a mostly undisturbed mixed grassland and shrubland and the rest is disturbed quarry grounds that do not provide habitat. The habitat within the rock quarry is low quality due to lack of surface water, minimal cover, and disturbance from existing rock quarry operation and roads that adjoin the area to the north, east, and west. Mammals, native and non-native migratory birds, resident birds, and reptiles may use these areas occasionally but would be frequently deterred from the surrounding human activities.

4.5.2 Special Status Animal Species

The ESA, administered by the USFWS, was established to protect endangered and threatened species and their habitats. Section 7 of the Act 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 the USFWS. There are seven ESA animal species listed for Grand County, Colorado (USFWS 2020a) and that were included in the USFWS ESA Information for Planning and Consultation (IPac) list that should be considered in an effects analysis for the Project area (USFWS 2020b). Potential habitat for one of the seven species listed (yellow-billed cuckoo) was identified within the Project area (Table 4-10) (refer to the Biological Evaluation [BE] included in Appendix E). Section 7 consultation was completed for the Project and the results of the consultation are discussed in Section 6.5.2 Environmental Consequences.

Colorado Parks and Wildlife (CPW) maintains a list of wildlife species (CPW 2019c) that are listed on state or federal threatened and endangered lists, or are a state special concern species, per the Colorado Nongame, Endangered, or Threatened Species Conservation Act (CRS 33-2-101). In Grand County, potential habitat for 22 state-listed species is likely to occur, and 13 of those have potential to occur within the Project area (Table 4-11).

Table 4-11 identifies ESA- and state-listed species with potential habitat within the Project area and identifies those species with potential to occur in the Project area. Additional discussion regarding species with potential to occur in the Project area is include below the table.

Table 4-11. Summary of Sensitive Animal Species

Common Name	Status		Potential to Occur in the Project Area	Habitat Description
	ESA	State		
Mammals				
Canada Lynx (*Lynx canadensis*)	T	E	No	Found in dense subalpine forest and willow-choked corridors along mountain streams and avalanche chutes, the home of its favored prey species, the snowshoe hare (CPW 2019c).
Northern Pocket Gopher (*Thomomys talpoides*)	-	SC	Yes	Known to occur in Grand County (CPW 2012) and occupies a wide variety of habitats.
River Otter (*Lontra canadensis*)	-	ST	Yes	Prefers aquatic habitat; however, they are most likely to occupy beaver ponds, stream channels, and warm water sloughs (CPW 2020b).
Wolverine (*Gulo gulo*)	-	SE	No	Restricted to high-elevation habitats in the Rocky Mountains containing the arctic and subarctic conditions with rugged terrain. They have been extirpated from Colorado (CPW 2019d).
Birds				
American Peregrine Falcon (*Falco peregrinus anatum*)	-	SC	Yes	Found using open spaces usually associated with high cliffs and bluffs overlooking rivers and coasts. Recently, many cities with tall buildings have become home to some peregrines (CPW 2019c). Not previously documented in Grand County (NatureServe 2020).
Bald Eagle (*Haliaeetus leucocephalus*)	-	SC	Yes	Often found near water such as reservoirs and along major rivers (South Platte, Arkansas, Rio Grande, Yampa, Colorado) during both the summer and winter (CPW 2019c)
Columbian Sharp-Tailed Grouse (*Tympanuchus phasianellus columbian*)	-	SC	No	Commonly found using the high-mountain shrub-grassland community and associated edges. Sharp-tails are most commonly found in high-elevation grassland areas interspersed with serviceberry, chokecherry, oak brush, sagebrush, snowberry, and aspen. (CPW 2019c).
Ferruginous Hawk (*Buteo regalis*)	-	SC	Yes	Found nesting in isolated trees or small groves of trees, and on other elevated sites such as rock outcrops, buttes, large shrubs, haystacks, and low cliffs. Nests are situated adjacent to open areas such as grassland or shrub steppe. These hawks are closely associated with prairie dog colonies, especially in winter (Colorado Partners in Flight 2000).
Greater Sandhill Crane (*Grus canadensis tabida*)	-	SC	Yes	Known to occur in Grand County. Occupy numerous wetland habitats, including emergent marshes, seeps and springs, wet meadows, moist soil units, playas, reservoirs, and streams (CPW 2020c).
Greater Sage-Grouse (*Centrocercus urophasianus*)	-	SC	Yes	Found only in areas where sagebrush is abundant. Sagebrush is a critical component for sage-grouse, providing both food and cover. These birds are found at altitudes of 6,000 to 8,500 ft (CPW 2019c).
Long-Billed Curlew (Numeniums americanus)	-	SC	Yes	Found in short grass or mixed prairie habitat with flat to rolling topography while breeding and a wide range of habitats during migrations (USFWS 2020b). Grand

Common Name	Status		Potential to Occur in the Project Area	Habitat Description
	ESA	State		
				County is outside of the breeding habitat but within areas of possible occurrence for the species (CPW 2020d).
Mexican Spotted Owl	T	ST	No	Residents of old-growth or mature forests that possess complex structural components and canyons with riparian or conifer communities are also important components (USFWS 2020b). They do not occur or are not known to occur in the county (M. Cowardin personal communication November 18, 2020)
Yellow-Billed Cuckoo (*Coccyzus americanus*)	T	SC	Yes	Generally an uncommon summer resident, mainly on the eastern plains and into the Front Range, with a few breeding records from Grand County, they depend on well-developed riparian woodlands (Wiggins 2005).
Fish				
Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*)	-	SC	Yes	Found in the headwaters of the Colorado River Basin, generally found in higher-elevation small streams, beaver ponds, and lakes rather than large rivers. These habitats feature cold, clear-running, well-oxygenated water; cobble-boulder-gravel substrates; balanced pool-riffle ratios; pH ranging from 6-9; and good riparian cover (USFWS 2006).
Bonytail Chub (*Gila elegans*)	E	SE	No	A warm-water species that appears to favor mainstem rivers regardless of turbidity, usually in or near deep swift water, in flowing pools and eddies just outside the main current. Formerly abundant throughout the Colorado River, this species is now presumed extirpated from Colorado (NatureServe 2020).
Colorado Pikeminnow (*Ptychocheilus Lucius*)	E	ST	No	Generally use various habitats, including deep, turbid, strongly flowing water, eddies, runs, flooded bottoms, or backwaters (especially during high flow). Lowlands inundated during spring high flow appear to be important habitats. Found in western Colorado Watersheds, not documented in Grand County (NatureServe 2020).
Iowa Darter (*Etheostoma exile*)	-	SC	Yes	Not native to this area but the species has been introduced and documented in the Fraser and Colorado Rivers near Windy Gap (J. Ewert, E. Fetherman, D. Kowalski personal communications November 2020).
Humpback Chub (*Gila cypha*)	E	ST	No	Found to use various habitats, including deep, turbulent currents; shaded canyon pools; areas under shaded ledges in moderate current; riffles; and eddies. Found in western Colorado watersheds; not documented in Grand County (NatureServe 2020).
Razorback Sucker (*Xyrauchen texanus*)	E	SE	No	Reproducing populations remain only in the middle Green River in Utah and in an off-channel pond in the Colorado River near Grand Junction. The razorback is most often found in quiet, muddy backwaters along the river (CPW 2019c).
Amphibians				
Boreal Toad (*Anaxyrus boreas boreas*)	-	SE	Yes	Found in a wide variety of habitats ranging from desert springs to mountain wetlands. They range into various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams; sometimes they move up to a few kilometers through uplands (NatureServe 2020).

Common Name	Status		Potential to Occur in the Project Area	Habitat Description
	ESA	State		
Northern Leopard Frog (*Rana pipiens*)	-	SC	Yes	Occur near springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes; usually they are in or near permanent water with rooted aquatic vegetation (NatureServe 2020).
Wood Frog	-	SC	Yes	The wood frog is found in the upper tributaries of the Colorado River in Grand County and are found between elevations 7,900 to 9,800 ft in subalpine zones, marshes, bogs, pothole ponds, beaver ponds, lakes, stream borders, wet meadows, willow thickets, and forests bordering these habitats (CPW 2020e).

T = Threatened, E = Endangered, SC = State Special Concern, SE = State Endangered, ST = State Threatened
* Species is not listed as and ESA for Grand County ESA list or for IPaC

4.5.2.1 Northern Pocket Gopher

Northern Pocket Gopher is a state special concern species that prefer deep soils along streams and in meadows and cultivated fields. They are also found in rocky soils and clay. The gophers occupy a wide variety of habitats ranging from sagebrush steppe, mountain meadows and tundra, to agricultural fields, grasslands, and suburban gardens and lawns (NatureServe 2020). The species is known to occur in Grand County in a common abundance (CPW 2012). Habitat for pocket gopher is present in Areas 1 through 4 and there is potential for occurrence of the species.

4.5.2.2 River Otter

This state threatened species inhabits nearly every aquatic habitat, but they are most likely to occupy beaver ponds, stream channels, and warm water sloughs. River otter historically ranged throughout most of the U.S. and Canada but were extirpated from much of their range in the west. They were reintroduced to Colorado in 1976 and are now found in small numbers throughout most of western Colorado with known occurrence in Grand County (CPW 2020b). River Otter have the potential to be present within Area 1 due to the extensive water systems present, but habitat is not present within Areas 2 through 4.

4.5.2.3 American Peregrine Falcon

This state special concern species is primarily found using open spaces usually associated with high cliffs and bluffs overlooking rivers and coasts. Recently, many cities with tall buildings have become home to some peregrines (CPW 2019c). Numerus peregrine falcon sightings have been documented as recently as September 2018 from the watchable wildlife area at Windy Gap (eBird 2020) in Area 1. The species is likely to be present within the Project area for foraging, but nesting habitat is not present.

4.5.2.4 Bald Eagle

This state special concern species breeding range includes Alaska, Canada, the coastal United States, and portions of the northern United States. Nesting occurs in tall trees near water bodies where fish and waterfowl prey are available. In Colorado, bald eagle are found through much of the state, often near water such as reservoirs and along major rivers (South Platte, Arkansas, Rio Grande, Yampa, Colorado) during both the summer and winter (CPW 2019c). There are several documented observations of bald eagles within Area 1 occurring year-round (eBird 2020). Nesting or roosting habitat is available within the Project area, and these species are likely to be present in Area 1 for nesting and foraging.

4.5.2.5 Greater Sandhill Crane

The greater sandhill crane is a state special concern species that can occur almost anywhere in Colorado during migration. They breed in a variety of northern regions, including northwestern Colorado. Preferred habitat consists of wetlands, including emergent marshes, seeps and springs, wet meadows, moist soil units, playas, reservoirs, and streams. They rely heavily on grain crops and wetlands close to those crops are preferred (CPW 2020c). These cranes are known to occur in Grand County and Area 1 contains foraging habitat consisting of extensive wetlands, ponds, streams, and a reservoir. Breeding is not known in Area 1, but according to personal communications with M. Cowardin of CPW, there is possible breeding locations in western Grand County. There have been no documented observations of this species within a 2-mile radius of the Project area (Colorado National Heritage Program [CNHP] 2019). The species have potential to occur in Area 1, but it is not likely due to lack of documented occurrence. Habitat is not present within Areas 2 through 4 and the species would not be present in those areas.

4.5.2.6 Ferruginous Hawk

The ferruginous hawk is a state species of concern. This species is found nesting in isolated trees or small groves of trees, and on other elevated sites such as rock outcrops, buttes, large shrubs, haystacks, and low cliffs. Nests are situated adjacent to open areas such as grassland or shrub steppe (Colorado Partners in Flight 2000). Species sightings were documented at Windy Gap in 2014 (eBird 2020), and the species could be present within the Project area for nesting or foraging.

4.5.2.7 Greater Sage-Grouse

The greater sage-grouse is a state special concern species found only in areas where sagebrush is abundant, at altitudes of 6000 to 8500 ft (CPW 2019c). Sagebrush is a critical component for sage-grouse, providing both food and cover. Areas 2 and 3 have potential greater sage-grouse habitat and there have been documented observations of this species and two documented leks within a 1-mile radius of the Project Area (CNHP 2022). The species is not expected to occur in Area 4 due to lack of habitat.

4.5.2.8 Long-Billed Curlew

Long-billed curlew is a state special concern species that breed in the western United States, including eastern Colorado. During migration, long-billed curlew occurs sporadically in western Colorado and are usually associated with ponds, reservoirs, playas, and wet meadows (CPW 2020d). There have been no documented observations of this species within a 2-mile radius of the Project area (CNHP 2019), and the closest documented sighting is at the Hot Sulphur State Wildlife Area located 8 miles to the southwest (eBird 2020). The species has the potential to be present within Area 1, though not likely due to lack of documented occurrence. Habitat is not present in Areas 2 through 4 and the species would not be present in those areas.

4.5.2.9 Western Yellow-Billed Cuckoo

This ESA threatened and state special concern species depends on well-developed riparian woodlands (Wiggins 2005). The western yellow-billed cuckoo is an uncommon summer resident, mainly on the eastern plains and into the Front Range, with a few breeding records from Grand County (Wiggins 2005). Field surveys were conducted for the Project by Tetra Tech for yellow-billed cuckoo (Tetra Tech 2018). Surveys occurred in Area 1 (along the Fraser and Colorado Rivers) and Area 4 (along Willow Creek), including a

0.5-mile buffer of the Project area. Three field visits were conducted between June 15, 2018, and August 15, 2018. No yellow-billed cuckoos were detected during surveys. The closest known sighting occurred in Routt County, approximately 65 miles northwest of the Project area (Tetra Tech 2018). Based on lack of known occurrence and results of the yellow-billed cuckoo survey conducted on-site, the species is not likely to be present within the Project area. Proposed Critical Habitat for the species is not located in or near the Project area.

4.5.2.10 Colorado River Cutthroat Trout

The Colorado River cutthroat trout is a state special concern species that is found in the headwaters of the Colorado River basin, in higher-elevation small streams, beaver ponds, and lakes. These habitats feature cold, clear-running, well-oxygenated water; cobble-boulder-gravel substrates; balanced pool-riffle ratios; pH ranging from 6 to 9; and good riparian cover (USFWS 2006). The species historically occupied this area but no longer occupies this section of the Colorado River in the vicinity of Windy Gap (Tetra Tech 2015a). There is no “functional” (i.e., reproducing) population anywhere nearby the Project area and the species would only occur incidentally through downstream migration from isolated populations in the headwaters (J. Ewert personal communications November 2020). Therefore, suitable habitat is present for the species in Area 1, but the species is not likely to occur within the Project area.

4.5.2.11 Iowa Darter

The Iowa darter is a state special concern species that was historically found only in the colder waters of the South Platte River basin. The lone remaining population is currently found in Bear Creek in the Arkansas River basin. The fish occur in high-elevation streams with cold, clear water; adequate flow; and shading to maintain pools that provide refuge during low water; and thrive in streams with adequate pools and cover in the form of overhanging vegetation and undercut banks. A small population of Iowa darter are located in the immediate vicinity of Windy Gap that have been noted during 2020 CPW sampling in the Colorado and Fraser Rivers and have been present since the early 1980’s based on USGS sampling records. They are not a native species and assumed to be introduced (J. Ewert, E. Fetherman, D. Kowalski personal communications November 2020).

4.5.2.12 Boreal Toad

Boreal toad is listed as state endangered in Colorado. Found in a wide variety of habitats ranging from desert springs to mountain wetlands, boreal toad range into various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams; sometimes, they move up to a few kilometers through uplands (NatureServe 2020). The CNHP’s last observation of a boreal toad within 2 miles of the Project area occurred in 1947 (CNHP 2019). Habitat for the species is present and the species has the potential to be present within Area 1. No habitat is present in Areas 2 through 4 and the species would not be present in those areas.

4.5.2.13 Northern Leopard Frog

The northern leopard frog is a state special concern species. Found near springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes (NatureServe 2020), CHNP (2019) records document this species within 2 miles of the Project area as recently as 1994. Habitat for the species is

present and the species has the potential to be present within Area 1. No habitat is present in Areas 2 through 4 and the species would not be present in those areas.

4.5.2.14 Wood Frog

The wood frog is a state special concern species that have a distribution in the upper tributaries of the Colorado River in Grand County, and mountains surrounding North Park. They are found between elevations 7,900 to 9,800 ft in subalpine zones, marshes, bogs, pothole ponds, beaver ponds, lakes, stream borders, wet meadows, willow thickets, and forests bordering these habitats (CPW 2020e). Wood frogs have the potential to be present in Area 1 where habitat exists. No habitat is present in Areas 2 through 4 and the species would not be present in those areas.

4.5.3 Invasive Aquatic Animal Species

Colorado established the Aquatic Nuisance Species (ANS) Act in 2008 which makes it illegal to possess, import, export, ship, transport, release, plant, place, or cause ANS to be released (CPW 2014). The purposes of the ANS Act is to implement actions to detect, prevent, contain, control, monitor, and, whenever possible, eradicate aquatic nuisance species from waters of the state and to protect human health, safety, and welfare from ANS (CPW 2020f). ANS are defined as exotic or nonnative aquatic wildlife or any plant species that have been determined to pose a significant threat to the aquatic resources or water infrastructure of the state (CPW 2014).

There are currently six ANS aquatic animals of concern in Colorado that invade lakes reservoirs, rivers, and streams, and include zebra mussel, quagga mussel, New Zealand mudsnails, rusty crayfish, and waterfleas. Of those, rusty crayfish, quagga mussel, and New Zealand mudsnail are present in Colorado according to the 2020 known ANS for Colorado (CPW 2020a). The ANS distribution for 2020 did not identify the three known ANS species in Grand County but they did occur in the adjoining counties (Routt, Jackson, Larimer, Boulder, and Summit Counties). Based on personal communications the population of quagga mussels found in the state is scheduled to be de-listed per the regional standard at the conclusion of 2020 (R. Walters personal communication November 2020).

ANS also include fish pathogens and diseases, such as viral hemorrhagic septicemia or whirling disease. The upper Colorado River, downstream of Windy Gap, is known to be one of the most heavily infected river segments with whirling disease in the state of Colorado (Fetherman 2015). Studies completed in the 90's demonstrated that Windy Gap was a major point source of the parasite that can cause whirling disease in trout and salmon (Triactinomyxon actinospores) and a host for completion of the parasite life cycle (*Myxobolus cerebralis)*, and a primary factor in the whirling disease epizootic in rainbow trout downstream of the reservoir (Nehring et al. 2013). The pathogen that causes whirling disease is present both above and below Windy Gap, and in the Colorado and Fraser Rivers (J. Ewert personal communication November 2020). No other ANS pathogens/diseases were identified in or near the Project area.

4.5.4 Migratory Birds/Bald and Golden Eagles

Eagles are protected under the Eagle Protection Act (16 U.S.C 668), which provides specific protection for bald and golden eagles. 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 Eagle Protection Act, the

term *take* includes pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing. Both bald and golden eagles have potential to occur within the Project area (Table 4-12).

Migratory birds are afforded protection under authority of the Migratory Bird Treaty Act (MBTA) (16 U.S.C 703-712). Under the MBTA, it is unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs. Under the MBTA, the term *take* is defined as any attempt or success at pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting. Migratory bird permits must be obtained through the USFWS Migratory Bird Permit Office for any requested waiver or exception to the MBTA.

The USFWS maintains a list of Migratory Birds of Conservation Concern (MBCC), which are migratory non-game birds that are likely to become candidates for listing under the ESA without additional conservation actions. According to the USFWS IPaC list (USFWS 2020b) for the Project area, there are 12 MBCCs that may warrant special attention in the Project vicinity (Table 4-12). One of these MBCCs (bald eagle) is also listed as state special concern species.

Note that there are other migratory birds protected under the MBTA that are not MBCCs or listed as a special status species that have the potential to be present within the Project area. Additionally, the lack of suitable habitat does not preclude a species from using the area; however, it is unlikely that the species would use the area commonly or for extended periods. Sensitive nesting areas have been identified in the Project area for migratory birds, great blue heron (*Ardea herodias*) and osprey (*Pandion haliaetus*).

Table 4-12. Summary of Migratory Birds with the Potential to Occur in the Project Area

Common Name	Status	Potential to Occur in the Project Area	Habitat Description
Bald Eagle (*Haliaeetus leucocephalus*)	MBCC State SC	Yes	Often found near water such as reservoirs and along major rivers (South Platte, Arkansas, Rio Grande, Yampa, Colorado) during both the summer and winter (CPW 2019c).
Black Rosy-Finch (*Leucosticte atrata*)	MBCC	No	Typically not found in Colorado. Occurs in barren, rocky, or grassy areas and cliffs among glaciers or beyond timberline; in migration and winter, also in open situations, fields, cultivated lands, brushy areas, and around human habitation (NatureServe 2020).
Black Swift (*Cypseloides niger*)	MBCC	Yes	Forages over forests and in open areas. Nests behind or next to waterfalls and wet cliffs (NatureServe 2020).
Brewer's Sparrow (*Spizella berweri*)	MBCC	Yes	Occupies sagebrush, brushy plains. In summer typically in open flats covered with sagebrush; sometimes in stands of saltbush, on open prairie, or in pinyon-juniper woodland (Kaufman 2019).
Brown-Capped Rosy-Finch (*Leucosticte australis*)	MBCC	No	Generally found in barren, rocky, or grassy areas and cliffs among glaciers or beyond timberline; in migration and winter, also in open situations, fields, cultivated lands, brushy areas, and around human habitation (NatureServe 2020).
Clark's Grebe (*Aechmophorus clarkii*)	MBCC	Yes	Found in marshes, lakes, and bays and nests among tall plants growing in water on edge of large areas of open water (NatureServe 2020).

Common Name	Status	Potential to Occur in the Project Area	Habitat Description
Golden Eagle (*Aquila chrysaetos*)	MBCC	Yes	Found in a wide range of habitats. For nesting they most frequently use cliffs but will also nest in trees. Because of their large size and predatory nature, they require large areas of foraging habitat. Tundra, high- and mid-elevation pine forest, piñon-juniper woodlands, sagebrush and other shrub habitats, grassland, and agricultural habitats (CPW 2019c).
Marbled Godwit (*Limosa fedoa*)	MBCC	Yes	Found in marshes and flooded plains; in migration and when not breeding, also on mudflats and beaches and open shallow water along shorelines (NatureServe 2020).
Olive-Sided Flycatcher (*Contopus cooperi*)	MBCC	Yes	Occurs in a variety of forest, woodland, and open situations with scattered trees, especially where tall, dead snags are present. Primary habitat is mature, evergreen montane forest (NatureServe 2020).
Rufous Hummingbird (*Selasphorus rufus*)	MBCC	Yes	Found in coniferous forest, second-growth, thickets, and brushy hillsides, with foraging extending into adjacent scrubby areas and meadows with abundant nectar flowers. Habitat is chiefly secondary-succession communities and forest openings (NatureServe 2020).
Willet (*Tringa semipalmata*)	MBCC	Yes	Occurs in marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (NatureServe 2020).
Willow Flycatcher (*Empidonax traillii*)	MBCC	Yes	Generally tied to brushy areas of willow and similar shrubs. Breeding sites were characterized by greater willow density, larger willow patches with smaller gaps, and greater percent willow coverage than non-willow coverage (NatureServe 2020).

4.6 Human Resources

4.6.1 Socioeconomics

The socioeconomic area of consideration surrounding the Project area can be assessed on a state, county, and local scale. For the purposes of this study, socioeconomic condition is presented for the State of Colorado, Grand County, and the Town of Granby for comparison. The following sections and tables describe the current demographic, employment, income, and economic conditions that have a potential to be affected by Project actions.

4.6.1.1 Population and Demographics

Table 4-13 compares 2017 population and demographic estimates for Granby, Grand County, and Colorado. Percentages for gender, age, and race in Granby are similar and consistent with county and state percentages. The cities, county, and state all had similar statistics for demographics. All communities are predominantly white, with the percentage of white population ranging from 84.2% in the State of Colorado to 96.7% in Granby (Census Bureau 2017).

Table 4-13. 2017 Demographic Profile Summary

Socioeconomic Criteria		Granby		Grand County		Colorado	
		Estimate	%	Estimate	%	Estimate	%
Total Population		1,813	100	14,793	100	5,436,519	100
Gender	Male	960	53.0	7,997	54.1	2,731,315	50.2
	Female	853	47.0	6,796	45.9	2,705,204	49.8
Age	Under 18	365	20.1	2,555	17.3	1,251,333	23.0
	18 & over	1,448	79.9	12,238	82.7	4,185,186	77.0
Race	White	1,754	96.7	13,828	93.5	4,576,201	84.2
	African American	21	1.2	56	0.4	221,155	4.1
	American Indian or Alaska Native	4	0.2	4	0	51,406	0.9
	Asian	0	0	279	1.9	164,771	3.0
	Native Hawaiian and Other Pacific Islander	0	0	107	0.7	8,580	0.2
	Two or More Races	0	0	43	0.3	188,909	3.5
	Other	34	1.9	476	3.2	225,497	4.1

Source: U.S. Census Bureau (Census Bureau) 2017

4.6.1.2 Employment and Income

Table 4-14 shows 2017 employment status and income estimates for Granby, Grand County, the State of Colorado, and the United States. Unemployment rates between Colorado communities are similar, ranging from 3.2 to 3.5%, which is below the national rate of 4.1% (Census Bureau 2017). The percentage of families below the poverty level is lower than the national average of 10.5%, ranging from 4.8% in Granby to 7.6% in the State of Colorado (Census Bureau 2017).

Table 4-14. Employment and Income Summary

Characteristic	Granby	Grand County	Colorado	United States
Population 16 years and older	1,468	12,526	4,320,213	255,797,692
Civilian labor force	1,198	9,254	2,912,932	161,159,470
Employed	1,151	8,829	2,760,076	150,599,165
Unemployed	47	425	152,856	10,560,305
Percent unemployed	3.2%	3.4%	3.5%	4.1%
Median Household Income	58,281	66,489	65,458	57,652
Mean Household Income	70,433	76,471	88,388	81,283
Percent of Families with Income Below Poverty Level	4.8%	5.6%	7.6%	10.5%

Source: Census Bureau 2017

4.6.2 Historic Properties / Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to consider the effects of their undertakings on cultural resources and historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. An archaeological survey for the Project area was conducted in accordance with NRCS standards. A literature review of known and recorded cultural resources was conducted from records maintained as part of the Compass database, Bureau of Land Management (BLM), and National Register of Historic Places (NRHP) (Tetra Tech 2019).

Intensive cultural resources surveys were completed on approximately 266 ac of land within the Project area (Tetra Tech 2019). Desktop research was conducted prior to conducting the field survey for a 1-mile buffer around the site. The desktop research revealed that 46 prior investigations have been undertaken within the 1-mile buffer. An archaeological survey report was prepared (Tetra Tech 2019), identifying a total of 13 cultural sites within the Project area based on recorded sites documented from prior site investigations (nine previously recorded sites) and from TetraTech's survey (four newly recorded sites). Only one site was determined to be eligible for listing in the NRHP, which consists of an existing transmission line. Another site was recommended as needing additional data to determine eligibility for listing in the NRHP. Tetra Tech recommends avoidance of these two sites, with additional data collection at one of the sites if disturbance to the site is unavoidable.

An additional resource evaluation (AECOM 2020a) was conducted on 46 ac of land that is part of the Project area and was not included in the 2019 Tetra Tech survey. The AECOM resource evaluation did not identify historic or cultural sites that would be eligible for listing in the NRHP.

4.6.3 Hazardous Materials

Hazardous and solid wastes include any liquid, solid, gas, or sludge that poses a hazard to human health or the environment because of its quantity, concentration, or physical or chemical characteristics. To determine whether hazardous or solid waste sites occur within or near the Project area, an online review of hazardous materials and waste was conducted using the CDPHE Colorado Environmental Sites Search online mapper (CDPHE 2019b). Review of the CDPHE site identified the Granby Landfill outside of the Project area to the northwest. The landfill is upgradient, is within 200 ft of Area 2, and is no longer in operation. A closed landfill (Old Granby Landfill) is located outside of the Project area and downgradient to the south of Area 2 on BLM managed property. Coyote Creek, and eventually the Colorado River, are the receiving waters of stormwater runoff from both the Granby Landfill and the Old Granby Landfill; however, both landfills have been covered and there is not direct stormwater runoff from any hazardous materials that may be associated with either landfill. No additional hazardous waste producing sites were identified within 1.0 mile of the Project area.

Based on this information, hazardous materials within the Project area do not appear to be a major concern at this time. This comprehensive online survey of potentially hazardous waste sites does not certify the current condition or location of named sites and does not verify that potentially hazardous sites/materials are absent from the study area. On-site surveys would be necessary to ensure the lack of potentially hazardous materials prior to construction.

4.6.4 Public Health and Safety

Windy Gap dam is currently classified as a significant hazard dam by the Colorado State Engineer's Office (SEO). NRCS has not designated a hazard rating for the dam and a rating was evaluated by AECOM according to NRCS guidelines to determine the NRCS hazard rating (AECOM 2019b). The evaluation resulted in inundation of four buildings and a campground containing four campsites during a dam breach. It was determined that approximately nine people would be at risk during a sunny-day dam breach, but based on estimated flood depths and velocities, there is not a significant risk for loss of life. A significant hazard classification was recommended for the NRCS hazard rating based on the evaluation (AECOM 2019b).

4.6.5 Recreation

The primary recreation opportunity in the Project area is located at Windy Gap (Area 1) in the watchable wildlife area completed in 1995 (NCWCD 2003) (Appendix C – Map C7). The area was a joint venture of the Subdistrict, Grand County, the Town of Granby, Great Outdoors Colorado, the U.S. Forest Service, the BLM, the Colorado Division of Wildlife, and Colorado Department of Transportation. It consists of an approximate 1.5-ac area that includes handicap-accessible wildlife viewing blinds, a ½-mile trail, information kiosks, restrooms, a parking area, and picnic shelters. It provides the public with opportunities to view more than 150 different species of birds and wildlife, the most in one location in the entire state (NCWCD 2003).

Recreational opportunities are not present outside of existing county road rights-of-way (ROWs) in Areas 2 through 4, as the lands are privately owned and do not contain trails or other developed recreation infrastructure. County roads in Areas 2 and 3 are accessible to the public; thus, it is possible that recreation, such as off-highway vehicle use or wildlife viewing, occur on a limited basis within road ROWs in these areas. Vehicle travel is only allowed on designated roads.

4.6.6 Land Use

Approximately 14.2% (61.1 ac) of the Project area operates as roads, graded areas, utility corridors, recreation areas, gravel/rock mining areas, cabins, and Windy Gap dam and associated pumping facilities. Approximately 85.8% (369.4 ac) of the Project area contains undeveloped land consisting of waters, wetlands, forests, shrubland, and grasslands (See Section 4.5.1). The land use within these areas was determined based on site observations and knowledge of Subdistrict operations. Table 4-15 shows the land use type for each area and quantifies each type. Approximately 263.4 ac or 61.2% of the Project area is located on undeveloped Subdistrict or private lands that are uninhabited with no current operations or use. These lands are used primarily by wildlife with little to no human activities occurring in them. Windy Gap provides municipal water supply storage covering an area of approximately 106.0 ac or 24.6% of the total Project area. Refer to Appendix C – Maps C8.1A and C8.2 through C8.4 for land use within the Project area. These changes are not anticipated to have adverse impacts to land use.

Table 4-15. Existing Land Use Summary by Area

Land Use	Land Use Per Area								Total	
	Area 1		Area 2		Area 3		Area 4 (%)			
	Ac	%	Ac	%	Ac	%	Ac	%	Ac	%
Roads/Utility Corridor/Graded area	5.2	1.7%	2.4	6.0%	6.4	11.4%	-	-	**14**	**3.2%**
Windy Gap Dam and Pump Facilities	16.3	5.3%	-	-	-	-	-	-	**16.3**	**4.0%**
Recreation	1.5	0.4%	-	-	-	-	-	-	**1.5**	**0.3%**
Gravel/Rock Mining	-	-	-	-	-	-	27.9	100%	**27.9**	**6.4%**
Cabins (Residential)	1.4	0.5%	-	-	-	-	-	-	**1.4**	**0.3%**
Water Supply Storage	106.0	34.6%	-			-	-	-	**106**	**24.6%**
Open Area (private unoccupied lands/waters with no designated use)	175.9	57.5%	37.9	94.0%	49.6	88.6%	-	-	**263.4**	**61.2%**
Total	**306.3**	**71.1%**	**40.3**	**9%**	**56**	**13%**	**27.9**	**6%**	**430.5**	**100.0%**

4.6.7 Visual Resources and Scenic Beauty

Area 2 contains a unique and visually compelling wetland surrounded by mixed grassland and sagebrush shrubland (Figure 4-4 and Figure 4-5). Disturbed areas adjoin Area 2 to the north and west. Area 3 is in a homogeneous mixed grassland and sagebrush shrubland (Figure 4-6). Disturbed areas adjoin Area 3 to the south.

Area 1 is located along the Colorado River and offers views of the river corridor, reservoir, and riparian habitat (Figure 4-7 and Figure 4-8). Area 1 is visible from Highway 40, and visual sensitivity to the public is high. The scenic quality of Area 1 is high, and any changes to the viewshed from the highway or watchable wildlife area would be noticeable. Of importance is the viewshed from the watchable wildlife area. This area is located adjacent to the pumping plant on the north bank of Windy Gap. The primary purpose of this area is to provide scenic views of Windy Gap and the surrounding wetland and riparian habitat for wildlife viewing.

Area 4 is located at an existing gravel/rock quarry, lacking any of its original scenic integrity (Figure 4-9 and Figure 4-10).

Figure 4-4. View of Area 2 Looking South

Figure 4-5. View of Area 2 Wetland Cover

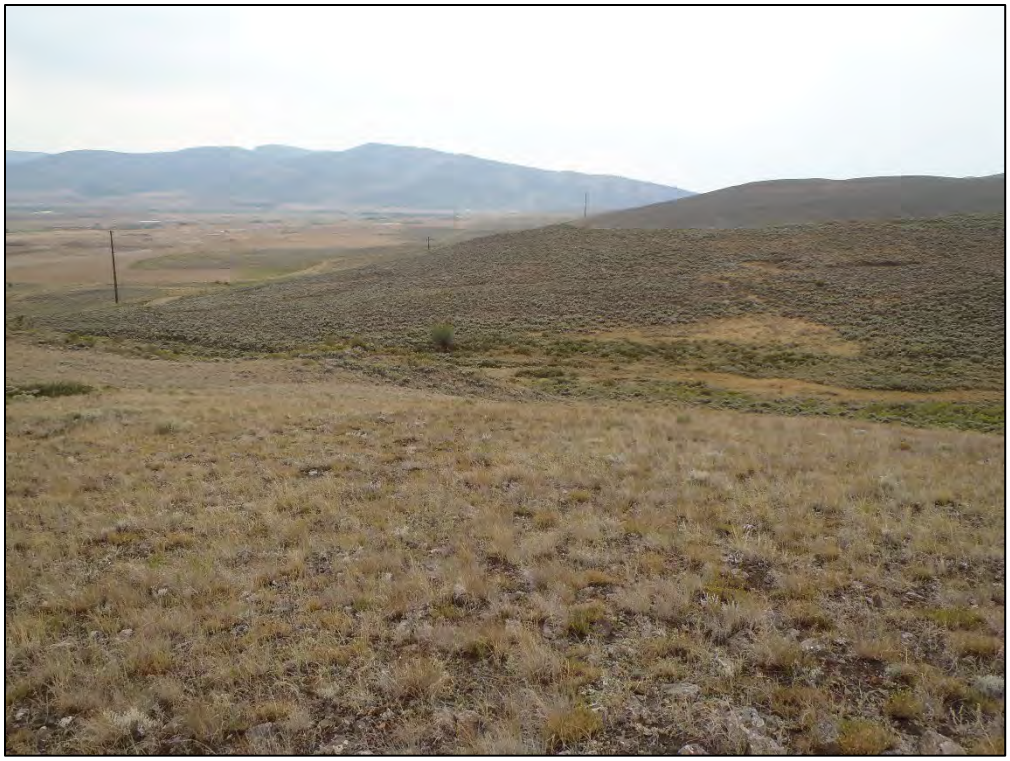

Figure 4-6. View of Area 3 Looking Southwest

Figure 4-7. View of Area 1 Windy Gap Reservoir Looking West

Figure 4-8. View of Area 1 Windy Gap Reservoir and Upstream Colorado River Looking Southeast

Figure 4-9. View of Area 4 Gravel Pit

Figure 4-10. View of Area 4 Rock Quarry

4.6.8 Noise

Applicable noise laws for the Project area are provided in the Noise Control Act of 1972 (42 U.S.C. 4901 et seq.), amended by the Quiet Communities Act of 1978 (42 U.S.C. 4913), which promotes the development of state and local noise control programs. Colorado Noise Statute (25-12-103) also includes regulations regarding noise.

Ambient noise in the Project area has not been measured, and therefore no baseline is available. The Project area adjoins highways, roads, and a railroad. Generally, there is an abundance of noise sources in the Project area produced from vehicle/train /air traffic, pumping operations, and other general operational noises. Area 4 is within active rock and gravel mining sites where equipment operation and associated noises are abundant. Areas 2 and 3 are further removed from main noise sources (train/vehicle traffic) and would experience less noise interruption than Area 1 and 4.

Noise-sensitive receptors are those facilities, land areas, or wildlife populations that require lower noise levels for health and function. Examples include residential neighborhoods, medical facilities, schools, churches, research facilities, parks, and open space. The Project area is not located near densely populated or developed areas. Abundant wildlife is present in Area 1 that would be sensitive to noise. Wildlife is less abundant in Areas 2 and 3, but species present would also be sensitive to noise.

4.7 Current Dam Status

4.7.1 Status of Operation and Maintenance

The Subdistrict has been responsible for the operations and maintenance (O&M) of Windy Gap. Based on a Dam Inspection Report dated October 4, 2017, the actions and/or maintenance and repair items listed below were recorded in the report for current observations at Windy Gap (SE0 2017). The Dam Inspection Report did not note any problems related to the dam embankment slopes or crest, seepage, outlet, or maintenance/repairs.

- Spillway: Prior concrete damage has been patched. Pavement product used on the ogee crest holding up fairly well except on the left side where freeze/ thaw is thought to be an issue due to the shaded nature of the location. Several weeps in the ogee face, on the order of a dozen. Most appear to be in vertical joints, with two flowing a small amount, on the order of a couple gallon per minute (gpm). The lowest horizontal construction joint (about 2 feet above the downstream water surface) is seeping near the middle of the dam in three specific locations. Noble reported that the next horizontal joint up was sealed on the order of 20 years ago and has been performing fairly well. Some of the higher weeps noted maybe attributable to this work aging. Discussed repair, which will be deferred for now given anticipated construction in the next few years on the proposed dam modification.
- Monitoring: If monument survey has not already been performed, this should be scheduled for this year or next. Piezometer data is graphed within threshold limits in order to provide immediate feedback on readings. All data were below expected maximum water levels in 2015 and 2016 except for one reading in April of 2016. This is likely a function of slightly higher groundwater in the area, but should be watched in 2017 for any trending behavior. A monument survey was conducted in 2020 and showed minimal movement.

The maintenance needs will be addressed by the Subdistrict, who have O&M responsibility prior to signing the Watershed Agreement and commencing design.

4.7.2 Breach Analysis and Hazard Classification

The hydraulic model used for the dam breach analysis was the Hydrologic Engineering Center River Analysis System (HEC-RAS), which is software that allows for one-dimensional steady flow and two-dimensional unsteady flow modeling. Parameters, assumptions, and detailed information on the analysis performed are included in Appendix D.

A peak discharge value of 7,040 cfs was used for the breach flow based on the Froehlich methodology (AECOM 2019b) and is more conservative than the discharge calculated from the NRCS Technical Release 60 (NRCS 2005) minimum peak breach discharge equation. The area of inundation can be seen in Appendix C – Maps C1.1 through C1.5. A population at risk during a dam breach was estimated at nine people with an estimated loss of life of 0.01 people, which was determined to be negligible (AECOM 2019b). The structure is currently classified as significant hazard by the State of Colorado. Based on the breach analysis, the NRCS State Conservation Engineer has concurred with recommendations that the dam be classified as significant hazard according to NRCS guidelines (AECOM 2019b).

4.7.3 Potential Modes of Dam Failure

4.7.3.1 Hydraulic Capacity

Hydrologic failure of a dam can occur by breaching the auxiliary spillway or overtopping the dam during a storm event. The integrity and stability of both the auxiliary spillway and the dam embankment are dependent on the depth, velocity, and duration of flow, the vegetative cover, and the soils' resistance to erosion.

To meet NRCS and SEO engineering standards, the dam must not be overtopped during routing of the Inflow Design Flood (IDF) event. IDF modeling results show that the dam embankment would not be overtopped during routing of this design storm under current dam conditions. Refer to Appendix D for a summary of the hydrology analysis that was conducted for the dam. Based on this information, there is a low potential failure mode during the IDF from this condition.

4.7.3.2 Seepage

Embankment and foundation seepage can contribute to failure of an embankment by removing (piping) soil material through the embankment or foundation. As the soil material is removed, voids can be created, allowing ever-increasing amounts of water to flow through the embankment or foundation until the dam collapses due to internal erosion. Seepage that increases with an increase in pool elevation is an indication of a potential problem, as is stained or muddy water exiting the dam on the downstream side. Foundation and embankment drainage systems can alleviate the seepage problem by removing the water without allowing soil particles to be transported away from the dam, but these systems must be working properly. The dam embankment was constructed with an impervious central core and shells composed of compacted pervious gravels. Seepage issues have not been identified at the dam. Therefore, seepage currently presents a low potential failure mode.

4.7.3.3 Seismic

The integrity and stability of an earthen embankment are dependent on the presence of a stable foundation. Foundation movement through consolidation, compression, or lateral movement can create weak zones or voids within an embankment, separation of the principal spillway conduit joints, or, in extreme cases, complete collapse of the embankment.

A project site-specific seismic analysis for the dam was conducted to determine the possible ground acceleration parameters and seismic issues associated with the dam (AECOM 2020b). This seismic analysis was a project site-specific probabilistic seismic hazard analysis and showed the seismic events and Quaternary faults within 100 km. AECOM addressed the Quaternary faults within 50 km of the dam site and potential sources for ground shaking. It was determined that no Quaternary faults impact the existing or proposed dam structures; however, Quaternary faults are in the vicinity that could affect ground shaking (AECOM 2020b). The analysis determined the ground acceleration for a return period of 475, 975, 2,475, 5,000, 10,000 years. Based on hazard classification analyses for the existing and proposed conditions of Windy Gap Dam, a significant hazard classification was recommended (AECOM 2019b and 2020c). For a significant hazard dam a 2,475-year return period, 0.17g peak ground acceleration, modal magnitude of 6.7, and mean magnitude of 6.3 would be considered for the design earthquake. These results

will be applied to stability analysis to determine the seismic stability of the dam and will be completed during the final design process.

4.7.3.4 Embankment Slope Failure

An embankment slope failure allows increased saturation and weakens the integrity of the dam during storm events; and could result in a catastrophic failure. Slope failure can also create slides and sloughing that lower the top of the dam elevation so that overtopping may occur during the IDF.

The upstream and downstream embankment slopes are approximately 2.5 H:1 V. The dam embankment does currently meet NRCS minimum safety factors for slope stability criteria (AECOM 2019a). The upstream and downstream embankments are in good condition, with no signs of erosion or sloughing and excellent vegetation control. Therefore, embankment slope failure presents a low failure mode.

4.7.3.5 Material Deterioration

Materials used in the principal spillway system and fences are common construction materials, but they are subject to weathering and chemical reaction due to natural elements within the soil, water, and atmosphere. Concrete components can deteriorate and crack, metal components can rust and corrode, and leaks can develop. Embankment failure can occur from internal erosion caused by these leaks.

The Dam Inspection Report for Windy Gap did not note any problems related to the dam outlets but did note issues with the spillway (SEO 2017). The inspection identified about 12 weeps in the ogee face on vertical and horizontal joints, with two flowing a couple gpm (SEO 2017). These seeps have since been addressed and patched. Regular inspections are conducted, and maintenance activities undertaken on any identified issues. At this time, there are no other known issues with deteriorating components on the dam. Based on this information, there is very little potential for failure of the existing dam due to deteriorating components.

4.7.4 Consequences of Dam Failure

There is always risk of dam failure from the potential modes previously described. A sunny day breach of the existing Windy Gap dam was evaluated following SEO criteria (SEO 2007) and NRCS criteria (NRCS 2005). Based on a dam breach analysis conducted (AECOM 2019b), the area of inundation during a breach would extend from the dam downstream along Colorado River corridor through Hot Sulfur Springs (Appendix C – Maps C1.1 through C1.5). There are an estimated 3 residential structures, 1 business structure (Hitching Post), and 4 campsites that would be inundated during a dam breach (AECOM 2019b). Table 4-16 lists the community structures within the breach inundation area and the associated population at risk (9 people). Based on the analysis (AECOM 2019b), loss of life was estimated at less than 0.01 and was determined to be negligible.

Table 4-16. Structures and Population at Risk within Dam Breach Inundation Area

Feature	Number of Structures				Population at Risk
	Inundation <1 foot	Inundation 1-2 ft	Inundation >2 ft	Total Inundated	
Buildings					
Homes	2	1	-	3	3
Hitching Post	-	-	1	1	3
Other					
Campground Campsites	3	1	-	4	3
Total					**9**

5.0 Alternatives

5.1 Project Scoping

Early in the scoping process, comments were requested from the public and government agencies. Comments were accepted both orally at public meetings and via written submittal. The scoping comment period opened on August 1, 2018 and closed on August 31, 2018. The primary purpose of the scoping meeting was to gather input and feedback on the Project's purpose and need statement, potential alternatives for consideration, environmental issues to be addressed in the Plan-EA, methodologies to be used to evaluate impacts, and the overall public participation process. There were 11 written public scoping comments received for the Project. Section 3.0 includes a description of the public scoping process and Appendix E contains a copy of the Scoping Report.

5.2 Formulation Process

The process of formulating alternatives for the Project followed procedures outlined in the NRCS NWPM (NRCS 2015) Parts 500 through 506; NRCS NWPH (NRCS 2014), Parts 600 through 606; Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies (PR&G) (NRCS 2018); and other NRCS watershed planning policy. Several alternatives were developed by the Project team with consideration for issues and concerns discovered during the scoping process and, based on their ability to address the purpose and need of the Project. Alternatives were formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. In accordance with NEPA (40 CFR 1502.14), some initial alternatives were eliminated from further analysis due to exorbitant cost, logistics, environmental reasons, or other critical factors. The Project team analyzed one action alternative and one No Action Alternative in detailed study. Multiple additional alternatives were formulated but were determined to be infeasible and were eliminated from further study.

5.3 Decision Matrix

NRCS must decide whether the selected alternative would constitute a major federal action significantly affecting the quality of the environment. If the NRCS State Conservationist (responsible federal official) determines that the selected alternative would not significantly affect the quality of the environment, then the NRCS State Conservationist would prepare and sign a Finding of No Significant Impact (FONSI), and the Project may proceed. If the NRCS State Conservationist determines that the selected alternative would significantly affect the quality of the environment, then an Environmental Impact Statement (EIS) and a Record of Decision (ROD) must be prepared and signed before the Project can proceed.

5.4 Alternatives Considered but Eliminated from Detailed Study

The following alternatives were considered during the planning process but were eliminated from detailed study due to adverse environmental impacts, if they were considered infeasible, had exorbitant costs, did not meet the purpose and need of the Project, or other critical factors. Because there are two areas considered for improvements to meet the goals of the Project (Windy Gap Dam and Fraser Weir), alternatives for each were developed and are described separately in Sections 5.4.1 Windy Gap Dam Alternatives and 5.4.2 Fraser River Weir Alternatives.

5.4.1 Windy Gap Dam Alternatives

The alternatives discussed in Sections 5.4.1.1 through 5.4.1.5 below were formulated to meet the objectives and goals specific to the Windy Gap Dam.

5.4.1.1 New Channel with Northern Alignment

This alternative would construct a new connectivity channel from the confluence of the Colorado and Fraser Rivers, upstream of Windy Gap Dam, to the Colorado River downstream of the dam. The new connectivity channel would consist of a 40-foot-wide and 2-foot-deep channel through the northern portion of the reservoir in the location of the pre-Windy Gap Dam river channel. A new dam embankment would be constructed separating the new connectivity channel (north of the new embankment) from the reservoir (south of the new embankment). The channel could handle flows up to 600 cfs at bankfull and flows would go out of bank most years during spring runoff. A 200-foot-wide floodplain would be provided to handle out-of-bank flows up to 4,000 cfs (10- to 25-year event) before overtopping the new dam embankment. A new intake tower would be installed with conduit extending from the tower in the reservoir under the new connectivity channel to the existing pump station. The new connectivity channel would be confined between Highway 40 and Windy Gap Reservoir, limiting the width of the floodplain to 200 ft. The channel configuration would not provide enough capacity to meet the necessary design conveyance or provide appropriate geometry for sediment transport capacity. Construction for this alternative would remove the ability to provide water rights to the water users for approximately 2 years during construction. This alternative also has operational constraints that could impact O&M and meeting water diversion requirements due to sediment accumulation in the new intake tower and conduits. Because this alternative does not meet the necessary goals for channel conveyance, has additional O&M issues, and has potential short-term impacts on water rights, it was eliminated from further study.

5.4.1.2 New Channel with Southern Alignment (Narrow Floodplain)

This alternative would construct a new connectivity channel from the confluence of the Colorado and Fraser Rivers, upstream of Windy Gap Dam, to the Colorado River downstream of the dam. The channel design would be the same as described for the New Channel with Northern Alignment Alternative (Section 5.4.1.1) except the new connectivity channel would be constructed through the southern area of the reservoir. Similar to Section 5.4.1.1, the channel configuration would not provide enough capacity to meet the necessary design conveyance or provide appropriate geometry for sediment transport capacity. Therefore, this alternative was eliminated from further study.

5.4.1.3 New Channel with Pump Modifications

This alternative includes removal of the dam and reconstruction of this segment of the Colorado River. The new channel would be reconstructed in the approximate alignment of the historic channel adjacent to the pumphouse and consist of a v-notch channel to accommodate flows up to 600 cfs. A new 5-ac forebay with 15 ac-ft capacity would be constructed adjoining the existing pump house. There are concerns regarding the ability of the existing pumps to start/stop more frequently due to the lower volume of water available to be pumped at any given time from the lack of the existing reservoir storage. The existing pumphouse would be modified and the pumps replaced for the new river channel conditions. This configuration would require the installation of four new variable-frequency drive pumps (12,000 horsepower each) to maintain the current maximum pumping capacity of 600 cfs (Northern Colorado Water Conservancy District [Subdistrict] 2022). The new forebay would also require annual dredging to allow unobstructed flow to the pump house.

The construction cost for the new channel and installation of new pumps is approximately $75,000,000 and 3.3 times higher than the construction cost of the Preferred Alternative (Northern Colorado Water Conservancy District [Subdistrict] 2022). Therefore, this alternative was eliminated from further study due to exorbitant cost to meet the purpose and need of the Project.

5.4.1.4 New Channel Through Middle of Reservoir with Adjustable Weir

This alternative includes reconstructing a channel through the middle of the existing reservoir and maintaining storage reservoirs on either side of the channel. This alternative would require large water level fluctuations in the new channel that would raise levels to allow overtopping flows into the storage reservoirs on either side. Operations would adversely impact the natural flow conditions and block aquatic movement during operation. It would result in an unnatural flow regime shifting back and forth from an impounded reservoir environment to a flowing stream environment. This alternative was eliminated from further study because it does not meet the purpose and need of the Project.

5.4.1.5 New Channel with Wide Floodplain Southern Alignment – Sediment Excavation

The New Channel with Wide Floodplain Southern Alignment – Sediment Excavation Alternative includes the same measures as described for the Low Stage Spillway Raise Alternative (Section 5.5.2), but sediment would be excavated to maintain reservoir storage volume for pumping operations instead of raising the low stage spillway crest. Sediment excavation volumes equivalent to meet the volume of the low stage spillway raise is approximately 74 ac-ft (119,390 cubic yards). Assuming a sediment excavation and material disposal cost of $15 per cubic yard and a 15% contingency, the total cost to excavate this sediment would be approximately $2,059,000. When comparing the costs of increasing the reservoir storage volume by raising the low stage spillway crest ($72,000 [includes spillway modification for the low block line-item cost from Table 7-2 in Appendix D plus contingency]) versus excavating sediment ($2,059,000), the sediment excavation costs are at least 28 times more and would be exorbitant. Therefore, sediment excavation was eliminated from further study.

5.4.1.6 Fish Ladder

A fish ladder would be constructed extending along the bypass channel to the reservoir, through the existing dam embankment. The fish ladder would be sized for low flows (10 to 15 cfs) and could be either a weir and pool ladder or rock channel with boulder controls. While this alternative provides for fish passage, it does not provide for a natural stream flow condition to improve sediment transport or improve aquatic habitat; therefore, this alternative was eliminated from further study since it does not meet the purpose and need of the Project.

5.4.2 Fraser River Weir Alternatives

The alternatives discussed in Sections 5.4.2.1 through 5.4.2.4 below were formulated to meet the objectives and goals specific to the Fraser River Weir.

5.4.2.1 Fishway

This alternative consists of construction a fishway on river left (looking upstream). River left is the preferred side due to existing infrastructure on river right. The fishway would consist of constructing a roughened

concrete ramp extending from the pool downstream of the Fraser weir to a new concrete flow-control structure upstream of the weir. To achieve appropriate fish passage depth and velocity, a head differential through the fishway of 2.5 to 3.0 ft would be maintained in addition to multiple roughness features along the course of the channel. While this option provides fish passage, it removes the ability to make flow rate measurements due to split flows. Therefore, it does not meet the goals of the Project and was eliminated from further study.

5.4.2.2 Bypass Channel

This alternative consists of constructing a rock-lined trapezoidal bypass channel along river left extending from the pool downstream of the Fraser weir to a new concrete flow-control structure upstream of the weir. A head differential through the bypass channel of 2.5 to 3.0 ft would be maintained and would require five or six boulder weirs spaced equally along the course of the channel, each dropping flow about 0.5 ft. Such drops could be easily passed by trout moving upstream. While this option provides fish passage, it removes the ability to make flow rate measurements due to split flows. Therefore, it does not meet the goals of the Project and was eliminated from further study.

5.5 Alternatives Considered for Detailed Study

Alternative analysis is required to determine feasible methods that can meet the purpose and need of the Project. The No Action Alternative must also be considered. The alternatives studied in detail include the No Action Alternative and one action alternatives. A detailed description of each alternative is provided in Sections 5.5.1 and 5.5.2.

The cost estimates for the alternatives provide a level of detail judged appropriate for the purpose of identifying the least costly, environmentally acceptable methos of achieving the agreed-on level of resource protection. Project costs provided for alternatives selected for detailed study include installation and O&M costs. Installation costs include costs to be incurred for installing the works of improvement after the Project is authorized for installation. Installation costs include, as applicable, construction, engineering, real property rights, natural resource rights, permitting, replacement in-kind relocation payments, and Project administration costs (NRCS 2015a). A further breakdown of Project installation costs for alternatives included in detailed study is provided in Section 5.6, Table 5-2. Detailed construction cost estimates are provided in Appendix D.

5.5.1 No Action Alternative

Under this alternative, the SLOs would not perform any modifications to Windy Gap Reservoir or Fraser River weir. Pump storage O&M would continue unchanged. This O&M would continue as it does currently, except excavation/dredging of approximately 2 ac-ft of sediment would need to be performed in the reservoir to maintain pumping operations through year 100. Total O&M costs for a 100-year Project life are estimated at $1,094,000 including excavation/dredging costs.

5.5.2 New Connectivity Channel with Wide Floodplain Southern Alignment – Low Stage Spillway Raise (Preferred Alternative)

The New Connectivity Channel with Wide Floodplain Southern Alignment – Low Stage Spillway Raise Alternative (New Channel-Spillway Raise Alternative) would construct a new connectivity channel from the

confluence of the Colorado and Fraser Rivers, upstream of Windy Gap Dam, to the Colorado River downstream of the dam. The Fraser River weir would also be modified to provide aquatic species passage. The proposed measures would provide a more natural stream condition, meeting the Project goals and objectives while maintaining the existing Windy Gap Dam pumping operations. The measures proposed for this alternative are described below. Maps depicting the alternative measures are provided in Appendix B – Maps B5.1 through B5.4.

Please note that the alternative descriptions and dimensions described are approximate and may be changed as final design is completed but show the best interpretation of the alternative available at this date. The design must meet state and federal dam safety standards as well as standards for design of stream channels for aquatic habitat.

Dam Embankment

To provide room for a new connectivity channel, the reservoir area would be decreased by constructing a new dam embankment approximately 850 ft northeast (into the reservoir) of the existing southern dam embankment leg. The new embankment would extend east-southeast from the existing western dam embankment leg approximately 2,000 ft to a proposed spillway overflow and new diversion structure. The upstream and downstream faces of the dam embankment would be graded at 2.5H:1V slope and covered with a blanket of riprap. The embankment crest elevation would match the existing embankment crest elevation of 7842.5 ft with a 20-foot-wide crest and surfaced with gravel to provide vehicle access. The existing west leg of the dam embankment, in the path of the new connectivity channel (800 ft), would be removed and used as source material for construction of the new dam embankment or new connectivity channel. The existing dam embankment running parallel to the railroad may be left in place and/or partially removed and reused in the new embankment or connectivity channel. Vehicle access on the top of the existing dam embankment would be maintained for O&M access. A sheetpile wall, or riprap toe trench, may be installed in key locations along the southern toe of the new dam embankment and northern toe of the existing dam embankment to provide added scour protection from construction of the new connectivity channel between the two embankments.

New Connectivity Channel

A new connectivity channel approximately 6,500 ft in length would be constructed in between the new dam embankment and the existing dam embankment to connect the Fraser and Colorado Rivers upstream of the dam to the Colorado River downstream of the dam. The final design of this new connectivity channel will follow NRCS Conservation Practice Standards for the state of Colorado. Grade control would be installed at the inlet to the new connectivity channel consisting of a sheetpile wall and boulders (Figure 5-1). The sheetpile wall would extend approximately 390 ft across the channel and floodplain perpendicular to the direction of flow. The boulder grade control would consist of a partially grouted boulder apron approximately 88 ft long and 55 ft wide. The new connectivity channel would be constructed as a trapezoidal channel with an approximate top width between 50 and 60 ft and depth 3 to 5 ft for riffles and pools. This geometry would provide for sediment transport capacity similar to the estimated upstream supply determined from the sediment transport analysis (Tetra Tech & HabiTech 2017). It is estimated that 85% of the sediment would be transported downstream in the new connectivity channel and 15% would be transported into Windy Gap reservoir (Appendix D). The connectivity channel will have a meandering riffle-pool configuration and will carry a bankfull flow of approximately 550 cfs before spilling out on the floodplain. The floodplain would range in width from 700 to 1,000 ft with flood depths averaging less than 2 ft during a

5-year flood (2,340 cfs) and corresponding to a water surface elevation at the new overflow spillway crest (7838.5 ft). The new connectivity channel/floodplain and the Reservoir would have a combined flood conveyance capacity of 32,500 cfs (NRCS Freeboard Hydrograph flood), without overtopping the dam. Two side channels, side channel 1 (1,040 ft) and side channel 2 (750 ft) are also proposed to be constructed along the new channel corridor.

Stream geomorphology and habitat features would be constructed to maintain consistency with both the upstream and downstream river reaches. Pools and riffles, habitat features, and stable substrate would be incorporated into the new connectivity channel and side channels to provide cover and resting areas for fish, macroinvertebrate habitat, and fish spawning habitat. Logs with root wads, biolog check structures, erosion control blanket, or other vegetated wood/river cobble bank protection features would be used to stabilize the bank and create cover. Willows or shrubs would also be transplanted on the top of banks along portions of the new connectivity channel and side channels. Seed mix would be placed in areas outside of the channel banks consisting of a wetland seed mix (Zone 1), riparian transition seed mix (Zone 2), and upland seed mix (Zone 3). Zone 1 includes the area extending from top of the new channel bank to approximately +1-foot in elevation. Zone 2 extends from approximately +1-foot to +3 ft in elevation above the top of the new channel bank. Zone 3 includes areas greater than approximately 3 ft in elevation above the top of the channel bank. Refer to Appendix B – Map B5.1B for the vegetation layout and Table 5-1 for the seed mix species for each zone.

Table 5-1. Connectivity Channel Seed Mix

Zone 1 - Wetland	Zone 2 - Riparian Transition	Zone 3 - Upland
Beckmania syzigachne (American Sloughgrass)	*Beckmania syzigachne* (American Sloughgrass)	*Archillea millefolium* (western yarrow)
Bromus marginatus (mountain brome)	*Bromus marginatus* (mountain brome)	*Achnatherum hymenoides* (indian ricegrass)
Calamagrostis canadensis (bluejoint reedgrass)	*Deschampsia caespitosa* (tufted hairgrass)	*Bromus marginatus* (mountain brome)
Carex nebrascensis (Nebraska sedge)	*Elymus canadensis* (canda wildrye)	*Festuca saximontana* (rocky mountain fescue)
Deschampsia caespitosa (tufted hairgrass)	*Elymus trachycaulus* (slender wheatgrass)	*Koeleria macrantha* (junegrass)
Elymus canadensis (canda wildrye)	*Glyceria striata* (fowl mannagrass)	*Pascopyrum smithii* (western wheatgrass)
Elymus trachycaulus (slender wheatgrass)	*Hordeum brachyantherum* (meadow barley)	*Poa alpina* (alpine bluegrass)
Glyceria striata (fowl mannagrass)	*Pascopyrum smithii* (western wheatgrass)	*Poa secunda* (Sanderg bluegrass)
Hordeum brachyantherum (meadow barley)	*Phleum trachycaulus* (alpine timothy)	
Juncus articus (baltic rush)	*Poa palustris* (fowl bluegrass)	
Pascopyrum smithii (western wheatgrass)		

Zone 1 - Wetland	Zone 2 - Riparian Transition	Zone 3 - Upland
Phleum trachycaulus (alpine timothy)		
Poa palustris (fowl bluegrass)		

Colorado River Modifications

The Colorado River, downstream of Windy Gap Dam spillway, would be graded as necessary to tie into the new connectivity channel and side channel. The right (north) riverbank may be stabilized along the existing cut bank (approximately 800 linear ft) to reduce the potential for future erosion. Bank stabilization is likely to include features similar to those used elsewhere for this alternative including but not limited to riprap and bioengineering. Articulated concrete block (ACB) (16 ft wide) would be installed in the bottom of the channel downstream of the dam to allow a permanent stabilized O&M vehicle access through the river bottom.

New Diversion Structure and Overflow Spillway

A new diversion structure would be constructed approximately 630 ft downstream of the confluence of the Colorado and Fraser Rivers to control water flows between the new Connectivity Channel and Windy Gap Reservoir (Figure 5-1). The new diversion structure would consist of an approximate 75-foot-wide adjustable crest gate on a 64.5-foot-long concrete apron. An equipment building is anticipated to be constructed near the diversion structure to house the gate controls. The structure would be designed with a low flow diversion structure and box culvert to allow freshwater passage through the reservoir as well as egress from the reservoir for aquatic life. A bridge would be installed over the structure for vehicle access and maintenance to the diversion structure and new dam embankment. The Colorado River upstream and downstream of the of the new diversion structure would be graded, where necessary, to tie into the new structure and ensure adequate flow conditions into the reservoir. Figure 5-2 provides a plan view and Figure 5-3 includes a section of the proposed diversion structure.

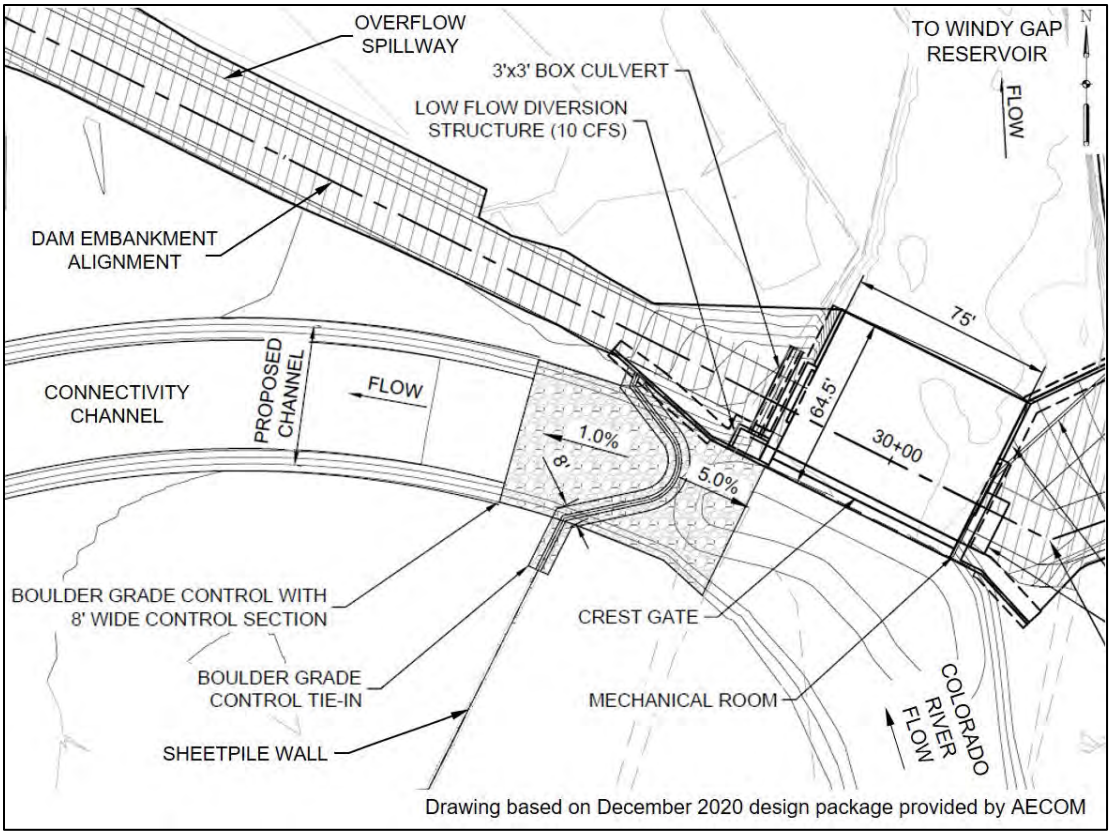

Figure 5-1. Proposed Diversion and Grade Control Plan

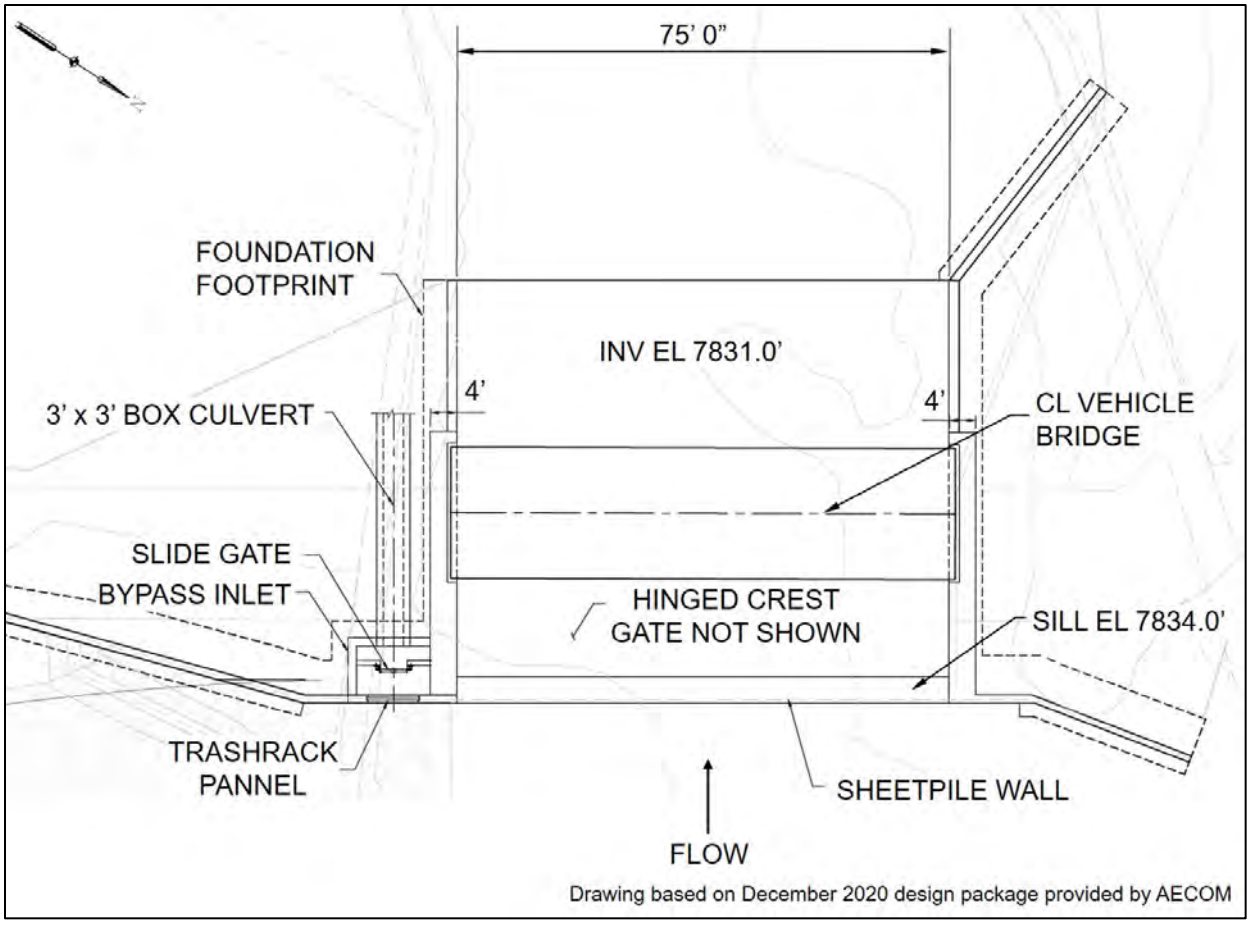

Figure 5-2. Diversion Structure Plan

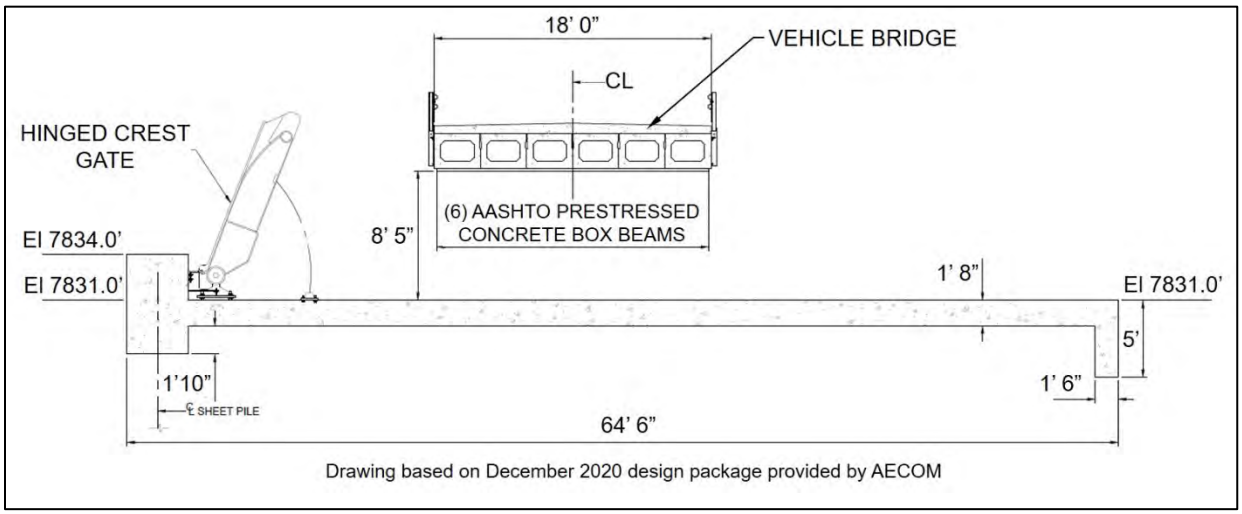

Figure 5-3. Diversion Structure Section

A new overflow spillway would be constructed, as part of the river diversion system, extending east-northeast from the new dam embankment approximately 960 ft to a new crest gate diversion structure. The overflow spillway would be set at elevation 7838.5 ft (4 ft lower than the dam embankment) and would allow flows generally greater than the 5-yr storm event (approximately 2,340 cfs) to enter the reservoir, thereby, reducing the scour/erosion potential in the newly constructed channel. The spillway would be constructed with a 4H:1V upstream slope and 2.5H:1V downstream slope with a 20-foot-wide crest, and armored with ACB, or riprap, if erosion protection is determined to be warranted.

Dam Spillway

The existing concrete spillway lower stage would be raised 1.0 ft to match the upper stage spillway elevation at 7832.5 ft. Raising the lower stage would provide additional water storage volume in the reservoir to maintain the existing pump operations. This would be accomplished by demolishing a few feet of the existing concrete followed by the installation of reinforced cast-in-place concrete with anchors into the existing concrete. The concrete demolition and new reinforced concrete would generally be installed along the existing 42.5-foot-wide concrete block. The spillway capacity would decrease approximately 1,000 cfs but would still be capable of safely routing the new IDF without overtopping the new or existing dam embankment. Refer to Appendix D for a summary of the hydrologic/hydraulic analysis that was undertaken for the reconfigured dam.

Downstream Spillway Channel

The existing Colorado River channel, from the spillway downstream to the new connectivity channel confluence (approximately 1,000 ft), would be partially filled with suitable soil to narrow the channel. This narrowing would occur to accommodate the decrease in flow through the reservoir from taking the reservoir off-line of the connectivity channel. The channel would be narrowed from approximately 330 ft wide down to approximately 80 ft wide and regraded for the new flow conditions. Willows and wetland vegetation would be planted and seeded in this area.

Bypass Outlet and Channel

No modifications would be made to the bypass outlet or associated bypass channel. Flow operations through the bypass outlet and channel would decrease to help provide additional water for new connectivity channel flows.

Reservoir

The normal operating pool elevation would be raised 1 ft to maintain the required volume for pumping operations. Sediment within the reservoir may be excavated/dredged for use in construction of the new dam embankment and connectivity channel. The new storage volume for pumping operations would depend on the quantity of material removed from the reservoir to facilitate construction of the new embankment and channel, but is not anticipated to exceed 445 ac-ft. The reservoir surface area measured at the normal operating pool would decrease from 106 ac to 74 ac.

Fraser River Weir

Two options are currently in evaluation for the Fraser River weir. Both options would have the same disturbance footprints. Option 1 would remove the Fraser River and grade where necessary along approximately 800 linear ft of the channel to allow for aquatic species passage. Riffles and pools would be constructed along the regraded section and four grade control structures installed. Grade control would

consist of large diameter (up to 3-foot diameter) header boulders spanning the width of the channel and a boulder/cobble/riprap blanket. A new stilling river gauge would be installed on the right bank of the river to measure flows. ACB would be installed in the bottom of the channel downstream of the upper grade control to allow a permanent stabilized O&M vehicle access through the river bottom.

Option 2 would leave the existing weir in place and fill/grade the channel downstream of the weir. All existing weir and infrastructure could be used including the gauge house, stilling well, data collection system, and cableways. Grading and fill would be placed to approximately 125 ft downstream from the weir at a 2.0% slope. The riverbed would be raised to match the weir elevation and shape. This would prevent an area of high velocity and would provide a low flow channel to maintain fish passage at a wide range of flows. Grade control weirs, constructed with large boulders, would be installed at the upstream and downstream ends of the re-graded area. A low water vehicle crossing would be installed in the vicinity of the weir structure, likely on the upstream side. If the existing weir is left in place without modification, re-grading would cause a small rise (<0.1ft) in water surface elevation upstream. It should be possible to remove a portion of the concrete weir to prevent this rise if it presents a permitting constraint. Grading may occur upstream and downstream of the grade control weirs as necessary along an 800-foot length similar to Option 1.

Public Recreation

Recreation access by the public would be provided along the new connectivity channel between the existing dam and new dam embankments, as shown on Map C7. The official opening for public access will depend on the success of vegetation establishment and may occur one or two years after construction completion. Vehicle access would be provided off Highway 40 to the O&M access area. The public could use the O&M access area for drop off or parking. No public trails would be constructed, but the public could access the river corridor by foot from the new O&M access area.

Staging and Access

Construction traffic would access the Project area from Highway 40 upstream of the reservoir, as well as at the existing pumping plant. A new access road would be constructed off Highway 40 and leading to the proposed diversion structure for construction and for permanent access. A bridge would be provided for vehicle access across the diversion structure and on the new dam embankment for dam O&M staff only and would not be available to the public vehicle access.

Construction staging would be situated within areas that are planned for disturbance from grading activities. They would not be situated in waters of the U.S., wetlands, cultural sites, or other sensitive areas that are not proposed for modification as part of this alternative.

Borrow Sites and Material Disposal

Suitable material excavated from Area 1 modifications would be used for construction of alternative features or graded into the new connectivity channel corridor. If materials are determined not suitable for construction or grading, they would be placed within the borrow area excavations to replace materials removed, or taken to an offsite permitted disposal location, if deemed necessary. All waste generated during construction would be properly disposed of in accordance with local, state, and federal regulations.

Four borrow sites are proposed to obtain materials necessary in construction of the alternative features. Any materials not obtained from these borrow sites would be purchased from permitted facilities. A description of activities at each of the borrow sites is included below and depicted in Maps 5.2 through 5.4 of Appendix B.

- Area 2: This area contains a clay borrow source that is located approximately ¼-mile north of the Windy Gap Reservoir. An existing private road provides access to the borrow area. The potential borrow area is approximately 40.3 ac; however, only up to 20 ac within this area may be used for excavation of clay materials for construction of the alternative measures. Excavation areas and access would avoid sensitive areas (waters of the U.S., wetlands, cultural sites, etc.).
- Area 3: This area contains a clay borrow source that is located approximately 2¼ miles northwest of Windy Gap Reservoir. An existing private road provides access to the borrow area. The potential borrow area is approximately 56 ac; however, only up to 20 ac of this area may be used for excavation of clay materials for construction of the alternative measures. Excavation areas and access would avoid sensitive areas (waters of the U.S., wetlands, cultural sites, etc.).
- Area 4: This area contains existing gravel and rock borrow sources that are located approximately 3¾ miles northwest of Windy Gap Reservoir. The gravel source is an existing 20-ac gravel pit that is currently operated by Northern Water with existing access roads. The rock source is an existing 7.9-ac rock quarry that is also currently operated by Northern Water with existing access roads.

Schedule

Construction activities are anticipated to occur over two seasons between May and November in 2022 and 2023. Refer to Section 8.5.1 for the planned sequence of installation.

Cost Estimate

The total installation cost for the Raise Alternative is estimated at approximately $27,145,000 as detailed in Table 5-2 below. This includes approximately $22,667,000 for direct construction costs and $4,478,000 for engineering, permits, real property rights, and Project administration costs. O&M costs are estimated to be approximately $2,000,000 over the 100-year Project life. Refer to Appendix D for cost estimate details.

5.6 Summary and Comparison of Alternative Plans

The alternatives proposed for consideration and analyzed in detail in this Plan-EA have been compared against each other to discern the merits and disadvantages of each alternative. This comparison of environmental, social, and economic effects is summarized in Table 5-2. The detailed analysis of environmental consequences for each alternative is provided in Section 6.0.

Table 5-2. Summary and Comparison of Alternative Plans

Resource Concern/Item	No Action Alternative	New Channel – Spillway Raise Alternative
Upland Erosion and Sedimentation		
Upland Erosion	No Impact	Proper Best Management Practices (BMPs) would be installed during and after construction and disturbed areas would be restored and/or stabilized. Short-term minor impacts during construction are anticipated until ground cover becomes established and areas have been stabilized.
Sedimentation	No Impact	Reduces sedimentation into Windy Gap from 2 ac-ft annually to 0.3 ac-ft annually. Reestablishes coarse-sediment transport to the Colorado River alleviating gravel depletion and streambed armoring downstream of Windy Gap; and benefiting stream health. Long-term benefits for stream health and decreased sedimentation into Windy Gap are anticipated.
Prime and Unique Farmlands	No Impact	No prime farmland is present in the Project area. There is potential to disturb up to 6.75 ac of farmland of statewide importance. Impacts would be minor because the lands are not irrigated, there is no current or planned farming/grazing use, and most of the lands are located on steep slopes unsuitable for cultivation.
Water		
Surface Water Quality	No Impact	Construction activities may temporarily impact surface water quality during construction, but construction BMPs would be used to reduce sediment entering waters and limit the amount of turbid water leaving the site. Long-term benefits are anticipated from moderated water temperatures due to decreased water travel times.
Surface Water Quantity and Flow	No Impact	There would be no change to water rights or Windy Gap pumping operations. Flow conveyance would change as flows will be diverted into the new connectivity channel through a new diversion structure off the Colorado River which flows through Windy Gap. In normal operation (non-pumping) with river flows of 90 cfs and less, all flow (minus the low flow into the reservoir to maintain water quality) would be diverted down the connectivity channel. During pumping operations 90+ cfs would be diverted to the connectivity channel. During flood flows greater than a 5-year flood, flow would roughly be split between the connectivity channel and reservoir to reduce scour and erosion of the channel.
Waters of the U.S.	No Impact	Approximately 34.38 ac of open water would be removed (33.8 ac removal from decreased reservoir size and 0.98 ac from removal of ponds), and approximately 2,710 LF of stream channel would be removed for construction of the connectivity channel. The connectivity channel would add 8,290 LF of stream (net increase of 5,580 LF of stream). Temporary disturbance to approximately 4,582 LF of stream would occur from grading for new flow conveyance/tying into the new channel; and narrowing of approximately 671 LF of stream would take place. Placement of concrete/ACB would occur on approximately 122 LF of streambed. Moderate short-term impacts to waters would occur. Alternative measures would result in an overall reduction of open water from a decrease in the Windy Gap Reservoir size; however, the new water flow regime would restore river connection to this section of the Colorado River, add a net of 5,580 LF of stream, and enhance stream function over the long-term.

Resource Concern/Item	No Action Alternative	New Channel – Spillway Raise Alternative
Wetlands		Approximately 13.72 ac of wetland (8.76 ac emergent and 4.96 ac scrub-shrub) would be permanently removed from alternative. Approximately 32 ac of new wetland would be created with 4.1 ac of emergent and 27.9 ac of mixed emergent/scrub-shrub, resulting in a net increase of approximately 18.28 ac of wetland. Moderate short-term impact to wetlands would occur from removal, but long-term beneficial impacts are anticipated from adding an additional 18.28 ac of wetland.
Floodplain Management	No Impact	Alternative measures add additional volume through this river segment to convey flood flows by decreasing Windy Gap Reservoir and reestablishing the Colorado River corridor. The modified segment would have greater capacity and spread flood flows between the reservoir and connectivity channel resulting in overall lower flood surface elevations than the current condition. The alternative is anticipated to have a beneficial impact to flood conveyance capacity of this river section over the long-term. Impacts to floodplain capacity or flood surface elevations in other segments of the river (upstream or downstream of the project area) are anticipated to be negligible.
Air Quality		
Air Quality	No Impact	Short-term increase in emissions concentrated around the construction site are anticipated. Construction activities would not violate air quality standards and BMPs would be implemented.
Plants		
Noxious Weeds and Invasive Plants	No Impact	Short-term impacts would occur during construction and until reestablishment of native vegetation that would put the area at risk for invasion of noxious weeds and invasive plants. a Post Construction Rehabilitation Plan (PCRP) would be developed in coordination with Grand County Division of Natural Resources and impacts would be minor with implementation of BMPs and development of a PCRP. Opening the channel up for public use could increase the potential for spread of invasive terrestrial and aquatic plants over the long-term.
Riparian Areas	No Impact	Moderate short-term impacts to riparian areas would occur from removal of approximately 7.23 ac of riparian vegetation. Approximately 26.23 ac of riparian areas would be restored/created resulting in a net increase of approximately 19.0 ac of riparian vegetation, which is anticipated to have a long-term moderate beneficial impact.
Animals		
Wildlife and Wildlife Habitat (Aquatic)	No Impact	The project is intended to improve stream health and benefit aquatic life by restoring connectivity of the Colorado River. Short-term moderate impacts to aquatic species and habitat are anticipated from 36.8 ac removal of open water and temporary disturbance in 73.7 ac of aquatic habitat. Temporary disturbed areas would be restored after construction completion. Modifications include restoring river connectivity with a net increase of 5,580 LF of stream and adding habitat complexity/cover. There would be a net loss of open water area; however, restoring channel connectivity along the Colorado River would improve stream health benefiting aquatic species and habitat in the Colorado River over the long-term.

Resource Concern/Item	No Action Alternative	New Channel – Spillway Raise Alternative
Wildlife and Wildlife Habitat (Terrestrial)	No Impact	The project is intended to improve terrestrial habitat by restoring riparian corridor connectivity along the Colorado River. Moderate short-term impacts to terrestrial wildlife and habitat would occur from disturbance in up to approximately 139.1 ac of habitat during construction. Temporary disturbed areas would be restored. Restoration includes net increases to important riparian and wetland habitat, and it also restores Colorado River vegetative connectivity for terrestrial wildlife movement/ cover along this segment. This is anticipated to have long-term moderate benefits to terrestrial wildlife species that use the area. Long-term indirect impacts may occur from disturbance to habitat or wildlife species from recreationists using Area 1. These impacts would be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of educational wildlife avoidance signage, and daily passing/varying human presence.
Special Status Animal Species	No Impact	There would be no impact to Endangered Species Act (ESA) animal species; however suitable unoccupied habitat for yellow-billed cuckoo would be disturbed. Section 7 consultation was completed recommending a No Effect determination to listed species, except for yellow-billed cuckoo which had a May Affect, Not Likely to Adversely Affect determination. USFWS concurred with the determination on March 2, 2021 (Appendix A). Thirteen state-listed animal species have the potential to occur in the Project area. Preconstruction surveys would be performed, and spatial buffers would be established as necessary in coordination with USFWS and CPW. Impacts to sensitive species and/or habitat would be short-term during construction and minor based on duration of construction, restoration of disturbed areas, and avoidance/ minimization measures in place. Because the project restores vegetative connectivity for the Colorado River and increases important riparian and wetland habitat, long-term beneficial impacts to special status species that use these habitats are anticipated. Long-term indirect impacts may occur from disturbance to habitat or species from recreationists using Area 1. These impacts would be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of educational wildlife avoidance signage, and daily passing/varying human presence.
Invasive Aquatic Animal Species	No Impact	The additional recreation use increases the potential for spread of invasive aquatic species. However, impacts would likely be negligible based on the existing similar and frequent recreation use of the Colorado and Fraser Rivers both upstream and downstream of the Project area.

Resource Concern/Item	No Action Alternative	New Channel – Spillway Raise Alternative
Migratory Birds/Bald and Golden Eagles	No Impact	Migratory birds and bald/golden eagles could be present in the Project area. Preconstruction surveys would be performed, and spatial buffers would be established as necessary in coordination with USFWS and CPW. Impacts to migratory birds and bald/golden eagles and associated habitat would be short-term and minor to moderate during construction based on the duration of construction, restoration of disturbed areas, abundant suitable habitat in the surrounding area, and avoidance/ minimization measures in place. Because the project restores connectivity for the Colorado River and increases important riparian and wetland habitat, long-term beneficial impacts to bird species that use these habitats are anticipated. Long-term indirect impacts may occur from disturbance to habitat or birds from recreationists using Area 1. These impacts would be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of educational wildlife avoidance signage, and daily passing/varying human presence.
Human		
Socioeconomics	No Impact	Long-term beneficial impacts to the local economy are expected from an increase in public recreation use and associated spending. Short-term economic benefits are also anticipated from construction crew expenditures and additional employment necessary during construction.
Historic Properties / Cultural Resources	No Impact	The Project was determined to have No Adverse Effect to any identified sites and no historic properties would be affected. The State Historic Preservation Office (SHPO) concurred with the determination on April 2, 2021 (Appendix A). Tribal consultation was initiated to 21 federally recognized tribes with interest in Colorado to comply with Executive Order 13175 and the National Historic Preservation Act. Four responses were received and there were no concerns regarding the preferred alternative.
Hazardous Materials	No Impact	Contractors would comply with all federal, state, and local laws and regulations pertaining to pollution and contamination of the environment to prevent pollution by hazardous materials. Construction activities would have a negligible impact of introduction of hazardous materials in the Project area, based on adherence to applicable laws and regulations.
Public Health and Safety	No Impact	A dam breach is not anticipated to result in loss of life for either existing or alternative conditions; therefore, there is no expected change to the threat to public safety when compared to existing conditions for this alternative.
Recreation	No Impact	A long-term direct beneficial impact to public recreation is anticipated from opening up approximately 99.5 ac of land for public access that includes approximately 7,050 LF of stream for public fishing. The official opening for public access will depend on the success of vegetation establishment and may occur one or two years after construction completion. An additional 62.2 ac of land that includes 5,300 LF of stream would be opened for public recreation 10 years after construction completion.
Land Use	No Impact	Long-term land use changes would occur with the largest change consisting of conversion of water supply storage areas to open space and adding recreation use. These changes are not anticipated to have adverse consequences to land use.

Resource Concern/Item	No Action Alternative	New Channel – Spillway Raise Alternative
Visual Resources and Scenic Beauty	No Impact	Short-term impacts to scenic views are anticipated during construction from disturbed grounds and equipment parked or operating in the Project area. Impacts would be moderate during construction, but disturbed areas would be restored. Overall long-term beneficial impacts are anticipated from development of the new riparian corridor and public access to visual resources and scenic beauty of the corridor.
Noise	No Impact	Short-term minor impacts are anticipated during construction, but BMPs would be in place.
Cost and Benefit Summary		
Construction Cost	$0	$22,667,000
Project Environmental, Engineering, Permitting and Administrative Costs	$0	$4,478,000
Total Project Cost (Installation Cost)	$0	$27,145,000
Cost Sharing (NRCS)	$0	$14,380,500
Cost Sharing (SLOs)	$0	$12,764,500
Annual Installation Cost[1]	$0	$714,500
Annual O&M Cost[1]	$9,500	$19,000
Annual Sum Cost	$9,500	$724,000[2]

[1] Calculated using FY 2021 Water Resources Discount Rate (2.5%), annualized over 100-year evaluation period, and using 102-year period of analysis.
[2] O&M cost is the difference between the No Action O&M and the Preferred Alternative O&M.

6.0 Environmental Consequences

NRCS has the responsibility under NEPA to identify and address effects on the environment that may result from the proposed alternatives. These alternatives include the No Action Alternative, New Channel-Spillway Raise Alternative. This section describes the potential effects of the alternatives within each resource category as defined in Section 4.0.

The following lists the specific terminology used to describe impacts associated with alternative measures:

Type

- Direct Effect: Impacts caused by a proposed action and 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 is undertaking such other action.

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 2 years). Long-term impacts are those that last for an extended duration of time. For this evaluation, long-term impacts extend beyond year 2 up to the evaluated life of the project (100 years).

Intensity

- No Impact – Resource conditions would not change.
- Negligible – Resource condition changes would be so slight there would no measurable or perceptible consequence to the resource.
- Minor – A small 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 based on knowledge and experience.
- Moderate – A measurable effect to the resource from the alternative actions. Mitigation measures would likely be needed to offset adverse effects and could be extensive, moderately complicated to implement, and probably successful based on knowledge and experience.
- Substantial – 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.

6.1 Soil Resources

6.1.1 Upland Erosion

Please refer to Section 4.1.1 for existing upland erosion conditions for the Project area.

6.1.1.1 No Action Alternative

There would be no changes to upland erosion from the implementation of this alternative.

6.1.1.2 New Channel – Spillway Raise Alternative

Areas disturbed during construction would have increased potential for erosion. Proper BMPs would be installed during and after construction to prevent and control soil erosion. Areas disturbed during construction activities would be restored and stabilized through establishment of ground cover. Area 4, which is an already disturbed and active gravel pit and rock quarry, would remain disturbed and in operation. Adverse upland erosion would be minor over the short-term and negligible over the long-term based on the use of BMPs and establishment of ground cover on disturbed areas after construction.

6.1.2 Sedimentation

Please refer to Section 4.1.2 for existing sedimentation and sediment transport conditions for the Project area.

6.1.2.1 No Action Alternative

There would be no changes to sedimentation for this alternative. Approximately 2.0 ac-ft of sediment from the Colorado and Fraser Rivers would continue to be trapped in Windy Gap Reservoir annually, contributing to sediment depletion and stream health degradation of the Colorado River downstream of the dam. It is anticipated that degradation from sediment depletion of the Colorado River downstream of the dam would take place at the same rate it is currently and continue to adversely impact stream health.

6.1.2.2 New Channel – Spillway Raise Alternative

Measures proposed for this alternative include restoring connectivity of the Colorado River around Windy Gap. This would return the river to a more natural flow condition, allowing for downstream coarse sediment transport, alleviating downstream gravel depletion and streambed armoring, and benefiting stream health. These actions would also decrease the amount of sediment entering Windy Gap that reduce available water and sediment storage volumes. Approximately 85% of the 2 ac-ft annual sediment load (1.7 ac-ft) would continue down the new connectivity channel and approximately 15% (0.3 ac-ft annually) would be captured in Windy Gap. Heavier bedload sands and gravels would remain in the connectivity channel and primarily suspended fine grained materials (silts and clays) would be captured in Windy Gap. The reservoir would have enough sediment storage volume to provide for 100 years of sediment accumulation, which equates to 30 ac-ft. Moderate long-term benefits for stream health from coarse-sediment transport and decreased sedimentation of Windy Gap are anticipated as a result of implementing this alternative.

Hydraulic and sediment-transport analyses show that bed mobility in the river channels upstream and downstream of Windy Gap would not change significantly after alternative modifications, but additional material (gravel and sand) would be restored (Tetra Tech 2015a). Because flow volumes and velocity of water into and out of the Project area would be similar to current conditions, the ability of the river to

transport material would be similar, but the coarse sediment load would increase in the Colorado River downstream of the dam. This is due to coarse sediments no longer being captured in Windy Gap and instead being passed downstream. Structures that slow water velocities or trap sediment (dams, diversions, weirs, etc.) may see an increase in sediment build up behind them compared to the current conditions, if the structures are not capable of passing the course materials downstream. However, restoring connectivity of the Colorado River for this alternative is not anticipated to increase sediment load over the long-term beyond what would be naturally occurring.

Construction activities have the potential to increase sediment loading in the Colorado River, Fraser River, and onsite ponds and reservoir over the short-term. Based on adherence to state and federal requirements, development and adherence to the Stormwater Pollution Prevention Plan, and implementation of BMPs, only short-term minor adverse impacts during construction are anticipated. Please refer to Section 6.2.1.2 for Project BMPs that would be implemented to reduce the quantity of sediment (1) entering drainages, and (2) flowing downstream and violating any federal or state water quality rules and regulations.

6.1.3 Prime and Unique Farmlands

Prime farmland is not present within the Project area. Farmland of statewide importance outside of disturbed/developed areas is present in Areas 1 through 3 (Appendix C – Maps C2.1 through C2.4). Please refer to Section 4.1.3 for a description of existing prime and unique farmland within the Project area.

6.1.3.1 No Action Alternative

There would be no impacts to prime and unique farmlands from the implementation of this alternative.

6.1.3.2 New Channel – Spillway Raise Alternative

This alternative has the potential to disturb up to 6.75 ac (0.7 ac in Area 1, 6.0 ac in Area 2, and 0.05 ac in Area 3) of soil designated as farmland of statewide importance (Appendix C – Maps C 2.1 through C2.3). These areas are not currently farmed, do not have irrigation established for farming, and are not planned to be used for farming. Livestock grazing does not occur on these lands and soils within Area 2 are on 12% to 15% slopes that would not be suitable for cultivation. Minor impacts to farmland of statewide importance over the short-term and negligible impacts over the long-term are anticipated due to no current or planned farming/grazing use and unsuitable slopes for cultivation.

6.2 Water Resources

6.2.1 Surface Water Quality

Activities related to water quality are regulated by EPA, USACE, and the CDPHE Water Quality Control Commission (WQCC) and Water Quality Control Division (WQCD). Appropriate permits would need to be obtained for any activities regulated by the CWA, and include the following:

- Section 401 of the CWA: for projects or actions that require any federal license or permit to construct or operate a facility, which may result in any fill or discharge into navigable waters of the U.S. All USACE nationwide permits are certified by statute and do not require a certification by the WQCD.

- Section 402 of the CWA for construction activities (COR400000): Developed under the NPDES, the Colorado Discharge Permit System issues permit coverage for stormwater discharges associated with construction activities (construction disturbance over 1 ac), as administered by the WQCD.
- Section 404 Permit: for discharge of fill into waters of the U.S. (potential jurisdictional waters); issued by USACE.
- CDPHE WQCD General Permit (COG070000): for construction dewatering activities.

Please refer to Section 4.2.1 for existing surface water quality conditions for the Project area.

6.2.1.1 No Action Alternative

No measures are proposed for this alternative that would change the surface water quality conditions. It is anticipated that surface water quality would continue to degrade in the Colorado River downstream of the dam at the same rate it is currently occurring.

6.2.1.2 New Channel – Spillway Raise Alternative

Project design elements, including required BMPs, would be implemented to reduce the quantity of sediment (1) entering drainages, and (2) flowing downstream and violating any federal or state water quality rules and regulations. Construction BMPs would include, but would not be limited to, the following:

- A Storm Water Pollution Prevention Plan would be required and implemented that contains erosion and sediment control and pollution-prevention BMPs, such as, but not limited to, silt fences, fiber wattles, and/or earthen berms.
- Water bodies adjacent to construction and staging areas would be identified, and such measures as straw bales, silt fences, and other appropriate sediment-control BMPs would be implemented to prevent the entry of sediment and other contaminants into waters.
- To ensure that accidental spills do not enter waters, the storage of petroleum-based fuels and the refueling of construction machinery would not occur outside of approved designated staging/batch plant areas. Furthermore, the Project would comply with state and federal water quality standards and toxic effluent standards to minimize any potential adverse impacts from discharges to waters of the U.S.
- No construction materials would be stockpiled or deposited in or near any water bodies.

Dewatering activities would consist of draining the reservoir through existing outlets and routing flow through the auxiliary and/or bypass outlet structures. Water would be diverted and/or pumped away from the active work areas where reasonable. Where not reasonable, in water work would be performed and BMPs would be installed throughout the Project site to limit the amount of turbid water generated from construction activities. River flows would be diverted around the in-water work area where reasonable using constructed diversions and/or pumps and pipes. Turbid water produced from activities involving pumping from dewatering collection systems would be transferred through sediment retention BMPs to allow turbidity to settle out of the water column before being discharged into any waters. BMPs would be implemented at discharge location(s) to further filter out construction sediment. Real time monitoring stations would be setup at select locations to monitor turbidity and alert personnel of high turbidity, if detected.

Project measures include construction of a new connectivity channel that would divert river flows around Windy Gap Reservoir instead of passing them through the reservoir. Flows released from the reservoir are generally warmer because water heats up in the shallow reservoir. Diverting flows around the reservoir is anticipated to moderate water temperatures in the Colorado River downstream of the Reservoir by reducing the amount of warmer water released from the reservoir. Natural sediments loads would pass down the new connectivity channel instead of being impounded behind the dam, resulting in an increase of bedload sediments to the sand and gravel starved streambed downstream. Sediment impairments have not been identified within the upstream or downstream stretches of the Colorado River in this area, and alternative measures are not anticipated to result in sediment impairments to these waters.

Based on adherence to state and federal requirements, development and adherence to the Stormwater Pollution Prevention Plan, and implementation of BMPs, only short-term minor adverse impacts during construction are anticipated. Impacts include short-term increases in sediment load in surface water that may occur primarily from precipitation events, dewatering activities, initial drawdown of the reservoir, and initial activation of the new connectivity channel. Minor beneficial impacts to water quality of the Colorado River are anticipated over the long-term from moderated stream temperatures. Minor water temperature increases may occur in Windy Gap outside of pumping operations due to decreased water flow into the reservoir; however, these measures result in moderated stream temperatures for the Colorado River explained above. The Reservoir design includes a proposed fish passage to allow fish to move into the river if temperature increases are realized within the reservoir.

6.2.2 Surface Water Quantity and Flow

Please refer to Section 4.2.2 for existing surface water and water rights in the Project area.

6.2.2.1 No Action Alternative

There would be no change to water quantities and flows from existing conditions with implementation of this alternative.

6.2.2.2 New Channel – Spillway Raise Alternative

This alternative would construct a new connectivity channel to divert Colorado River flows around Windy Gap Reservoir. A diversion structure would be constructed to allow allocation of flows between the reservoir and the new connectivity channel during pumping operations. The court decree for the water rights for the Windy Gap Project controls operation of Windy Gap Reservoir and provides conditions for operation of the proposed connectivity channel (see Section 1.2.1 and 4.2.2 for information on the Windy Gap Project). The current decree provides that the connectivity channel will be operated so that water not needed in the mainstem of the Colorado River to satisfy the in-priority needs of the Windy Gap water rights, will flow down the connectivity channel up to its full capacity including the capacity of the connectivity channel floodplain. The exceptions to this plan for operation are flows necessary to protect the water quality in Windy Gap Reservoir, flows required for delivery to downstream water rights that can only be delivered through Windy Gap Reservoir, flow modifications for the construction, operation, maintenance repair and replacement of the connectivity channel, and other legal requirements. As summarized in Section 4.2.2, the Windy Gap water rights decree restricts Windy Gap Reservoir storage to times when the Colorado River flows measured just downstream of Windy Gap Dam at County Road 57, are above 90 cfs. The design criteria for the Preferred Alternative considers diversions into Windy Gap Reservoir when flows in the connectivity channel are at or above are 100 cfs to provide a factor of safety (10 cfs) and allow for flows to provide fish

passage from Windy Gap Reservoir. The diversion structure would be designed to allow operators to convey up to 600 cfs into the reservoir when needed and to divert additional flows to the connectivity channel. To reduce scour and erosion potential in the connectivity channel, flows greater than approximately 2,340 cfs (corresponding to an approximate 5-year flood) flow would begin to split with a fraction entering the reservoir through a new overflow channel. Flows entering Windy Gap that are not pumped, would pass downstream through one of the reservoir outlets. The proposed flow split summary when the diversion structure into Windy Gap is open is provided in Table 6-1 (AECOM 2021). The flow split between the new connectivity channel and overflow spillway when the diversion structure into Windy Gap is closed is provided in Table 6-2 (AECOM 2021).

A low flow would also need to be conveyed into Windy Gap to maintain acceptable water quality while maximizing flows in the connectivity channel to the greatest extent possible. The minimum required low flow would be determined through a study by the Subdistrict and CPW prior to the start of construction. The low flow would be a pass-through flow that would exit the dam through one of the outlet structures. The gates will be operated based on flow conditions in the river and subject to change from values presented in the table below.

Table 6-1. Proposed Diversion Flow Split Summary

Total River Flow (cfs)	Connectivity Channel (cfs)	Diversion Structure Split into Windy Gap (cfs)	Maximum Pumping Rate at Pumping Plant (cfs)
0 ~ 100	100*	0	0
100 ~ 700	100 ~ 700	0 ~ 600	0-600
700 ~ 2,340	100 ~ 2,340	0 ~ 600	0-600
2,340 ~ 8,120	2,340 ~ 4,060	0 ~ 4,060**	0-600
8,120 (100-year flood)	4,060	4,060***	0-600
12,200 (500-year flood)	6,100	6,100***	0-600
17,840 (IDF)	8,920	8,920***	0-600

*100 minus the low flow determined in final design intended for fish passage and water quality in Windy Gap. Additional flow may be split into Windy Gap as required for the construction, operation, maintenance repair and replacement of the connectivity channel, and other legal requirements
**May include flow over the Spillway Overflow Section
***Includes flow over the Spillway Overflow Section

Table 6-2. Connectivity Channel and Overflow Spillway Flow Split Summary

Stream Flow Event	Colorado River Flow (cfs)	Connectivity Channel Flow (cfs)	Overflow Spillway into Windy Gap flow* (cfs)
Bankfull (Connectivity Channel)	550	550	-
2 year (50% chance flood)	1,610	1,610	-
5 year (20% chance flood)	2,340	2,130	210
10 year (10% chance flood)	3,120	2,650	470
25 year (4% chance flood)	4,570	3,690	880
50 year (2% chance flood)	6,120	4,690	1,430
100 year (1% chance flood)	8,120	5,960	2,160

*Represents conditions with gates closed
Source: AECOM 2021

Outflow from the dam is expected to be maintained out of the low-level bypass outlet or auxiliary outlet, as discussed above. Activation of the principal spillway would be less frequent than with existing conditions due to the new split-flow regime. The principal spillway would activate when the new reservoir normal pool level is exceeded. This could occur under flood conditions or under normal reservoir operational conditions and may include operation of the Pumping Plant. The downstream principal spillway channel and Colorado River would be graded as needed, from the dam to the new connectivity channel, for the proposed new lower-flow regime along this section.

There would be no impact over the short- or long-term to existing water rights for the Windy Gap Project or surface water quantity and flow in the Colorado River.

6.2.3 Waters of the U.S. and Wetlands

A waters of the U.S. and wetland delineation was performed and is included in Appendix E. The delineations identified 10 channel features totaling 15,027 linear ft (LF) and 11 open water features totaling 98.64 ac in Area 1. No water features were identified in Areas 2 through 4. Please refer to Section 4.2.3 for a description of existing waters of the U.S. located within the Project area. Wetlands delineated within the Project area include 35 wetlands within Areas 1, 2 and 3 totaling 36.19 ac.

6.2.3.1 No Action Alternative

There would be no impacts to waters of the U.S. or wetlands from the implementation of this alternative.

6.2.3.2 New Channel – Spillway Raise Alternative

Table 6-3 below summarizes the impacts to waters of the U.S. from alternative measures. A total of approximately 34.38 ac of open water (33.8 ac removal from decreased reservoir size and 0.98 ac from removal of ponds) and 3,593 LF of stream (2,710 LF removed, 671 LF channel narrowing, and 122 LF concrete/ACB placed in streambed) would be permanently affected from alternative measures. A total of approximately 63.21 ac of open water and 4,582 LF of stream would be temporarily affected. Temporarily

disturbed areas would be restored and continue to provide their similar pre-construction functions after completion. This alternative would construct a new connectivity channel adding approximately 6,500 LF of stream and two side channels adding approximately 1,790 LF of stream (Appendix C – Map C3.1C). A total of up to 8,290 LF of stream would be created from alternative measures resulting in a net increase of 5,580 LF of stream when compared to the LF removed from alternative actions. Water of the U.S. impacts are depicted on Map C3.1B of Appendix C.

Table 6-3. Waters of the U.S. Impacts

Water of the U.S.	Delineated Area/Length[1]	Estimated Impact Area/Length[1]		Impact Description
		Temporary	Permanent	
Windy Gap Reservoir	97.44 ac	63.21 ac	33.8 ac	Temporary impact is excavation in the reservoir. Permanent impact is removal of reservoir for construction of the connectivity channel.
Pond A	0.13 ac	-	-	No Impact
Pond B	0.14 ac	-	0.14 ac	Fill and grading for construction and permanent access
Pond C	0.48 ac	-	0.05 ac	Fill and grading for construction and permanent access
Pond D	0.01 ac	-	-	No Impact
Pond E	0.01 ac	-	-	No Impact
Pond F	0.01 ac	-	0.01 ac	Grading for new connectivity channel
Pond G	0.01 ac	-	0.01 ac	
Pond H	0.16 ac	-	0.16 ac	
Pond I	0.04 ac	-	0.04 ac	
Pond J	0.21 ac	-	0.17 ac	Regrading for new connectivity channel and placement of fill for new dam embankment
Total	**98.64 ac**	**63.21 ac**	**34.38 ac**	**Summary of total impacts**
		97.59 ac		
Fraser River	1,403 LF	784 LF	16 LF	Temporary is regrading for removal of Fraser weir. Permanent is placement of ACB for 16-foot-wide vehicle crossing
Colorado River - Upstream	2,115 LF	1,550 LF	65 LF	Permanent is placement of concrete for construction of diversion structure. Temporary is grading for conveyance downstream of the diversion structure into Windy Gap and to tie into new connectivity channel
Spillway Channel	761 LF	-	761 LF	Fill for narrowing of channel and conversion to wetlands.
Colorado River - Downstream	2,873 LF	2,223 LF	16 LF	Regrading to tie into new connectivity channels and side channels, bank stabilization measures along cut banks
Stream 1	4,698 LF	-	1,450 LF	Permanent removal from regrading for new connectivity channel
Stream 2	35 LF	-	-	No Impact
Stream 3	348 LF	-	-	No Impact
Stream 4	411 LF	-	-	No Impact
Stream 5	578 LF	25	25	Improve existing culvert crossing
TT Stream	1,805 LF	-	1,260 LF	Permanent removal from regrading for new connectivity channel

Water of the U.S.	Delineated Area/Length[1]	Estimated Impact Area/Length[1]		Impact Description
		Temporary	Permanent	
Total Impacts Channels	**15,027 LF**	**4,582 LF**	**3,593 LF**	**Summary of total impacts**
		8,175 LF		

1 - Lengths (in LF) are provided for channel features and areas (in ac) are provided for ponded features.

Table 6-4 below summarizes the impacts to wetlands from alternative measures. Approximately 13.72 ac of wetland (8.76 ac emergent and 4.96 ac scrub-shrub) would be permanently removed from alternative modifications (Appendix C – Map C3.1B). Disturbed lands would be restored and would include establishing 32.0 ac of new wetland consisting of 4.1 ac emergent and 27.9 ac mix of emergent and scrub-shrub (Appendix C – Map C3.1C). Therefore, alternative actions would result in a net increase of 18.28 ac of wetlands.

Table 6-4. Estimated Wetland Impacts

Wetland	Wetland Type	Delineated Area (Ac)	Impact Area (Ac)	Impact Description
A	EM	0.05	-	Construction of new dam embankment
B	SS	0.69	0.67	Permanent access and parking
C	EM	0.18	-	No Impact
D	EM	0.42	0.01	Construction access
E	EM	3.09	0.21	Construction staging and access
F	SS	0.06	0.06	Fraser weir improvements
G	EM	1.23	0.22	Construction access
H	SS	0.24	0.07	Construction staging and access
I	EM	0.56	0.36	Grading for new connectivity channel and fill from dam embankment
J	SS	0.18	0.18	Construction staging and access
K	EM	1.65	0.24	Grading for new connectivity channel
L	SS	0.75	-	No Impact
M	SS	0.54	0.54	Grading for new connectivity channel
N	SS	0.68	0.68	Fill from spillway channel narrowing
O	SS	0.22	0.04	Construction staging and access
P	EM	0.50	0.50	Grading for new connectivity channel
Q	EM	0.26	0.02	
R	SS	0.97	0.38	
S	EM	0.33	0.33	Grading for new connectivity channel
T	EM	2.67	-	No Impact

Wetland	Wetland Type	Delineated Area (Ac)	Impact Area (Ac)	Impact Description
U	EM	0.01	-	No Impact
V	SS	9.96	1.42	Grading for new connectivity channel and placement of fill for dam embankment
W	EM	0.11	0.11	Grading for new connectivity channel
X	EM	0.10	-	No Impact
Y	EM	0.37	0.10	Grading for new connectivity channel
Z	EM	0.02	-	No Impact
AA	EM	0.01	-	
AB	EM	0.07	-	
AC	EM	1.30	0.61	Grading for new connectivity channel
AD	EM	0.07	0.07	
AE	EM	0.07	0.07	
TT1	EM	7.79	5.80	Grading for new connectivity channel and fill for new dam embankment
TT2	EM	0.92	0.92	Grading for new connectivity channel
TT3	EM	0.11	0.11	
TT5	SS	0.01	-	No Impact
Total EM Wetland		20.97	8.76	
Total SS Wetland		15.22	4.96	
Total		**36.19**	**13.72**	
Total Wetland Created		**32.0 ac of wetlands would be created with 4.1 ac of EM wetlands and 27.9 ac of mixed EM and SS wetlands.**		

EM = emergent, SS = scrub-shrub

Emergent wetlands created would be seeded and planted with the emergent species listed in Table 6-5. Mixed emergent and scrub shrub wetlands created would be planted with shrubs and emergent species listed in Table 6-5. Map C3.1C in Appendix B shows the wetlands to be created from alternative measures.

Table 6-5. Wetland Plant List

Emergent Wetland Seed Mix		
Beckmania syzigachne (American Sloughgrass)	*Calamagrostis canadensis* (bluejoint reedgrass)	*Carex aquatilis* (water sedge)
Carex nebrascensis (Nebraska sedge)	*Deschampsia caespitosa* (tufted hairgrass)	*Elymus canadensis* (canda wildrye)
Glyceria striata (fowl mannagrass)	*Hordeum brachyantherum* (meadow barley)	*Juncus articus* (baltic rush)
Schoenoplectus americanus (threesquare)		
Emergent Wetland Plugs		
Carex aquatilis (water sedge)	*Carex nebrascensis* (Nebraska sedge)	*Carex utriculata* (Beaked sedge)
Schoenoplectus americanus (threesquare)	*Schoenoplectus tabernaemontani* (softstem bulrush)	
Wetland Shrubs		
Alnus incana (mountain alder)	*Cornus sericea* (red osier dogwood)	*Salix boothii* (Booth's willow)
Salix drummondii (Drummond's willow)	*Salix geyerii* (Geyer's willow)	*Salix monticola* (Park willow)

Moderate short-term adverse impacts to wetlands and waters of the U.S. are anticipated from removal or grading disturbance during construction. Alternative measures would result in an overall reduction of open water from a decrease in the Windy Gap Reservoir size; however, the new water flow regime would restore river connection to this section of the Colorado River and enhance stream function. There would be a net increase of 18.28 ac of wetland and 5,580 LF of stream from alternative measures. Therefore, this alternative is anticipated to provide moderate beneficial impacts over the long-term to waters of the U.S. and wetlands.

6.2.4 Floodplain Management

Please refer to Section 4.2.4 for existing floodplain management information.

6.2.4.1 No Action Alternative

There would be no change from existing conditions for this alternative.

6.2.4.2 New Channel – Spillway Raise Alternative

Borrow sites in Areas 2 through 4 are located in Zone D, and alternative measures would not change the flood zone designation. Area 1 is located in FEMA Flood Zone A. Alternative measures include modifications within this flood zone; however, modifications are not anticipated to increase the existing Flood Zone A extents. The project measures would not raise the dam embankment and would decrease the size of the reservoir, thereby adding additional volume through this river segment to convey flood flows. The modified segment would have a wider floodplain and spread flood flows between the reservoir and connectivity channel resulting in overall lower flood surface elevations than the current condition. The alternative reestablishes a portion of the pre-dam Colorado River corridor and associated floodplain which is anticipated to have a beneficial impact to flood conveyance capacity of this river section over the long-

term. Impacts to floodplain capacity or flood surface elevations in other segments of the river (upstream or downstream of the project area) are anticipated to be negligible.

6.3 Air Quality

Please refer to Section 4.3 for existing information regarding air quality for the Project area.

6.3.1 No Action Alternative

There would be no change to air quality from existing condition for this alternative.

6.3.2 New Channel – Spillway Raise Alternative

Construction activities would temporarily emit several air pollutants. PM10 emissions are associated with the dust created from demolition, land clearing, ground excavation, cut-and-fill operations, and road construction. All other pollutants (PM2.5, CO, sulfur oxides, nitrous oxides, mobile source air toxics, and GHGs) are generated from heavy-duty diesel engines used by the construction equipment. Construction emissions are greatest during the earthwork phases because of the dust associated with this activity. Fugitive dust can also be produced by winds blowing through the construction site and by trucks carrying uncovered loads. Additionally, mud tracked onto paved roads leading to and from the construction site creates a source of fugitive dust (i.e., road dust) after it dries.

Emissions from trucks and construction equipment powered by heavy-duty diesel engines would be short-term and concentrated around the construction site. Delays associated with travel through construction zones would increase emissions from on-road vehicles. However, these short delays would likely result in only a small amount of additional pollutant emissions when compared with the usual traffic experienced around the construction site.

Fugitive dust, mobile source air toxics, and GHG emission increases associated with construction would be minimized by the implementation of applicable BMPs. These include the following:

- Spraying the soil on-site with water or other similar approved dust suppressant/soil binder.
- Wetting materials hauled in trucks, providing adequate freeboard (space from the top of the material to the top of the truck), or covering loads to reduce emissions during material transportation/ handling.
- Providing a stabilized construction entrance (track-out pad), wheel washers, and/or other similar BMPs at construction site access areas to reduce track-out of site materials onto the adjacent roadway network.
- Removing tracked-out materials deposited onto adjacent roadways.
- Wetting material stockpiles to prevent windblown emissions.
- Establishing vegetative cover on bare ground as soon as possible after grading to reduce windblown dust.
- Requiring appropriate emission-control devices on all construction equipment.

- Requiring the use of cleaner-burning fuels.
- Using only properly operating, well-maintained construction equipment.

Impacts to air quality from construction activities are expected to be negligible over the short-term based on the implementation of BMPs and the short duration of construction. There would be no impact to air quality over the long-term.

6.4 Plant Resources

This section describes the impacts of the proposed action on the plant resources in the Project area. Necessary consultation will be performed as required by Section 7 of the ESA and related NRCS guidelines if ESA-listed plants are present in the Project area. Section 7(a)(2) of the ESA requires that all federal agencies ensure that their project actions do not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat of listed species.

6.4.1 Noxious Weeds and Invasive Plants

Please refer to Section 4.4.1 for existing information regarding noxious weeds and invasive plants.

6.4.1.1 No Action Alternative

There would be no change to noxious weeds and invasive plants from this alternative.

6.4.1.2 New Channel – Spillway Raise Alternative

This alternative has the potential to put the Project area at risk for future invasion of noxious weeds. BMPs would be implemented during construction to prevent the spread of noxious weeds/invasive plant species and comply with Executive Order 13112. During construction and until restoration areas are fully established, they would be maintained on a regular basis (twice per year) to prevent the establishment of noxious weeds and invasive plant species. 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 they are discovered. Routine monitoring after construction completion for all noxious weeds listed on the Grand County list would be performed and noxious weeds would be eradicated from the Project site if observed. In addition, a Post-construction Rehabilitation Plan would be developed in coordination with Grand County Division of Natural Resources and would include mechanisms for addressing weed establishment and treatment. Minor impacts are anticipated over the short-term based on implementation of BMPs and post-construction monitoring. Once the vegetation becomes reestablished in the disturbed areas, long-term impacts are anticipated to be negligible in conjunction with routine maintenance of the Project area.

Alternative measures include opening the new connectivity channel corridor for public use. There would be a long-term, minor indirect impacts from recreationists using the area and increasing the potential for spread of invasive terrestrial and aquatic plants. Individuals are responsible for following the rules and requirements established by the state for invasive species. Any person in violation of the established rules and requirements is subject to enforcement actions by the regulating enforcement agency.

6.4.2 Riparian Areas

No riparian areas are present in Areas 2 through 4. Area 1 contains approximately 16.0 ac of riparian vegetation. Please refer to Section 4.4.3 for existing information regarding riparian areas.

6.4.2.1 No Action Alternative

There would be no change to riparian areas from existing conditions from implementation of this alternative.

6.4.2.2 New Channel – Spillway Raise Alternative

Approximately 7.23 ac of riparian area (outside of existing wetlands) would be removed for this alternative (Appendix C – Map C5) for construction of the connectivity channel and staging/access. Larger trees would be avoided to the greatest extent possible within the staging/access areas to preserve mature riparian vegetation. Approximately 26.23 ac of new riparian habitat would be created or restored. This results in net increase of approximately 19.0 ac of riparian habitat in Area 1, for a total of approximately 35.0 ac of riparian habitat in Area 1 after alternative measures.

Riparian areas would be seeded and planted with the grass and shrub species listed in Table 6-6. Map C6.1B in Appendix C shows the habitat restoration including riparian areas to be created from alternative measures.

Table 6-6. Riparian Plant List

Riparian Seed Mix		
Beckmania syzigachne (American Sloughgrass)	*Bromus marginatus* (mountain brome)	*Deschampsia caespitosa* (tufted hairgrass)
Elymus canadensis (canda wildrye)	*Elymus trachycaulus* (slender wheatgrass)	*Glyceria striata* (fowl mannagrass)
Hordeum brachyantherum (meadow barley)	*Pascopyrum smithii* (western wheatgrass)	*Phleum trachycaulus* (alpine timothy)
Poa palustris (fowl bluegrass)		
Riparian Shrub Plantings		
Alnus incana (mountain alder)	*Cornus sericea* (red osier dogwood)	*Populus angustifolia* (narrowleaf cottonwood)
Salix boothii (Booth's willow)	*Salix monticola* (Park willow)	

Alternative measures would result in moderate adverse impacts over the short-term to riparian habitat from disturbance and removal. However, moderate beneficial impacts over the long-term are anticipated from a net increase of 19.0 ac of riparian habitat.

6.5 Animal Resources

6.5.1 Wildlife and Wildlife Habitat

Area 4 consists of actively disturbed lands on an existing gravel pit and rock quarry and only contain 3.3 ac of low-quality habitat. Areas 1 through 3 are primarily undisturbed lands containing suitable habitat for

wildlife. Please refer to Section 4.5.1 for information regarding the presence of wildlife and wildlife habitat in the Project area.

6.5.1.1 No Action Alternative

There would be no change to wildlife habitat from existing conditions from the implementation of this alternative.

6.5.1.2 New Channel – Spillway Raise Alternative

Project measures included disturbance in approximately 110.5 ac of aquatic habitat and approximately 139.1 ac of terrestrial habitat. Maps C6.1A and C6.2 through C 6.4 in Appendix C depict the impacts to habitat in the Project area. Map C6.1B in Appendix C depicts the proposed habitat in Area 1 after restoration is completed. Aquatic and terrestrial wildlife species and habitat impacts are described below.

- Area 1 (Aquatic) – Approximately 36.8 ac of aquatic habitat would be permanently removed consisting of reducing the size of Windy Gap Reservoir, permanent removal of portions of Stream 1 and TT Stream, and fill to narrow the Colorado River downstream of the dam. Temporary disturbance would also occur in up to 73.7 ac of aquatic habitat from excavation in the reservoir, channel grading, and modification of channel substrate. A summary of aquatic impacts are summarized in Table 6-7 and depicted in Appendix C – Map C6.1A. Refer to Section 6.2.3.2 for a detailed description of waters of the U.S. impacts. Project modifications include construction of a connectivity channel with associated side channels that would restore aquatic species passage and downstream sediment transport that is currently cut off by Windy Gap Dam. The new channel is anticipated to moderate water temperatures from decreased water travel time through the new channel. Habitat complexity would be incorporated into the new channel through installation of root wads, log vanes, large boulders, and riffle-and-pool complexes. The connectivity channel would improve sediment transport, increasing the establishment of suitable fish spawning habitat downstream of the dam and allowing downstream drift of aquatic insect larvae. It also opens upstream fish passage to suitable habitat and spawning areas. An egress for fish would be provided at the diversion structure to allow fish passage out of the reservoir. The channel would be designed to meet NRCS standards and other applicable design standards for proper functionality of the new ecosystem conditions. Approximately 9.7 ac of aquatic habitat would be added from construction of the new connectivity channel and side channels. This would result in a net loss of 27.1 ac of open water area; However, restoring channel connectivity is anticipated to provide overall improved aquatic habitat conditions for the Colorado River. A net increase in stream length of 5,580 LF would occur. These measures are anticipated to have a moderate beneficial impact over the long-term to aquatic species and habitat in the Colorado River.

  Short-term, minor adverse impacts to fish and aquatic organisms would occur during construction. Dewatering would be necessary in Windy Gap Reservoir and streams for in-water construction activities. Coordination with CPW, Trout Unlimited, and USFWS would also be conducted for data collection and study opportunities while streambed/reservoir bed areas are exposed. Fish salvage, if necessary, would be coordinated with CPW and Trout Unlimited. Benthic invertebrates, including macroinvertebrates and other non-mobile organisms, would be impacted in areas that would be disturbed and dewatered. It is anticipated that after rewatering, disturbed areas would become

reestablished by organisms and benthic invertebrates within 1 month. Fish could return to the area immediately upon rewatering.

- Areas 1 through 4 (Terrestrial) - A total of approximately 139.1 ac of terrestrial habitat may be disturbed by alternative actions in Areas 1 through 4. Approximately 13.7 ac of this disturbance would take place in wetlands (see Section 6.2.3 for a detailed discussion on wetland impacts), approximately 7.2 ac in riparian areas (see section 6.4.3 for a detailed discussion on riparian impacts), 115.1 ac in mixed sagebrush shrubland and grassland, and 3.1 ac in mixed forest and shrub areas (Table 6-7). There would be moderate adverse impacts to terrestrial wildlife and habitat over the short-term during construction and until vegetation becomes reestablished. Wildlife species, if present, might be temporarily disturbed and displaced to adjacent habitats during construction. Once construction is completed, they could return to the area. Temporarily disturbed areas would be restored upon construction completion. Area 1 would be restored as appropriate to match the river corridor vegetative communities along the Colorado River both upstream and downstream of the Project Area (Appendix C – Map C6.1B). Areas 2 and 3 would restore disturbed areas to match the existing surrounding habitat conditions (Appendix C – Maps C6.2 and C6.3). Area 4 would maintain its existing operation as a gravel pit and rock quarry and no restoration at these sites would be performed. Table 6-8 provides a summary of proposed restoration measures for this alternative.

  Alternative measures would have a net increase to important riparian and wetland habitat within Area 1. It also reestablishes the Colorado River corridor through the area restoring the vegetative cover and connectivity for terrestrial wildlife movement/refuge along the river. This is anticipated to have a long-term moderate benefit to terrestrial wildlife that use the area. Developed areas within Area 1 would increase by 0.2%, but this minimal increase is not anticipated to have a measurable long-term impact on wildlife species. No long-term impacts are anticipated to wildlife or habitat in Areas 2 and 3 based on restoration of disturbed areas. Area 4 would permanently convert 3.3 ac of habit to a developed rock quarry. Long-term impacts to wildlife/habitat in Area 4 would be minor due to the low-quality habitat conditions from lack of surface water, minimal cover, and disturbance from existing rock quarry operations and adjoining roads.

  Long-term, minor indirect impacts may occur from disturbance to habitat or wildlife species from recreationists (primarily fishers) using Area 1. Species may be temporarily disturbed and displaced from human activities. Informational signage for wildlife avoidance would be posted at the watchable wildlife area for public education. Impacts from human disturbance are anticipated to be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of informational signage, and daily passing/varying human presence.

Table 6-7. Wildlife Habitat Impacts

Wildlife Habitat	Impact (Ac)[1]							
	Area 1		Area 2	Area 3	Area 4		Total Impact	
	Temp	Perm	Temp	Temp	Temp	Perm	Temp	Perm
Water (aquatic)	73.7	36.8	-	-	-	-	**73.7**	**36.8**
Wetland	-	13.7	-	-	-	-	**0**	**13.7**
Riparian	-	7.2	-	-	-	-	**0**	**7.2**
shrub and/or grassland	-	71.8	20	20	-	3.3	**40**	**75.1**
Mixed forest/shrubland	-	3.1	-	-	-	-	**0**	**3.1**
Total	**73.7**	**132.6**	**20.0**	**20.0**	**0.0**	**3.3**	**113.7**	**135.9**
	206.0		**20.0**	**20.0**	**3.3**		**249.6**	

1 – Numbers rounded to the nearest tenth.

Temp = Temporary, Perm = Permanent

Table 6-8. Wildlife Habitat in Project Area After Restoration

Habitat Type	Area 1		Area 2		Area 3		Area 4		Total	
	Ac[1]	%	Ac[1]	%	Ac[1]	%	Ac[1]	%	Ac[1]	%
Developed	24.8	8%	2.4	6%	5	9%	27.9	100%	64.3	15%
Wetland	51.8	17%	2.7	7%	0.01	0.02%	-	-	54.5	13%
Water	86.6	28%	-	-	-	-	-	-	86.6	20%
Riparian	35.0	12%	-	-	-	-	-	-	35.0	8%
Mixed forest/ shrubland	4.1	1%	-	-	-	-	-	-	4.1	1%
shrub and/or grassland	104.0	34%	35.2	87%	51	91%	-	-	186.0	43%
Total	**306.3**	**71%**	**40.3**	**9%**	**56**	**13%**	**27.9**	**6%**	**430.5**	**100%**

1 – Numbers rounded to the nearest tenth.

6.5.2 Special Status Animal Species

Necessary consultation was performed as required by Section 7 of the ESA and related NRCS guidelines. Section 7(a)(2) of the ESA requires that all federal agencies ensure that their actions in a project do not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat of listed species. No ESA-listed animal species occur in the Project area, but suitable habitat for yellow-billed cuckoo is present. A BE was submitted to the USFWS on January 22, 2021 and concluded that there would be **No Effect** to ESA-listed animals, except for yellow-billed cuckoo which had a determination of May Affect, Not Likely to Adversely Affect (Appendix A). The USFWS concurred with the determination on March 2, 2021 (Appendix A). Please refer to Section 4.5.2 for information regarding special status animal species within the Project area.

In addition to ESA species, there are 13 state-listed animal species that have the potential to be present within the Project area and/or suitable habitat for the species is present. Five of these species are migratory birds protected under the MBTA; and these species are discussed in Section 4.5.4. The other eight species include pocket gopher, river otter, greater sage-grouse, Colorado River cutthroat, Iowa darter, boreal toad, northern leopard frog, and wood frog. Please refer to Section 4.5.2 for additional information regarding special status animal species and potential occurrence within the Project area.

6.5.2.1 No Action Alternative

There would be no impact to ESA-listed animal species due to the implementation of this alternative.

6.5.2.2 New Channel – Spillway Raise Alternative

This alternative would not impact ESA species because none are present within the Project area. Suitable habitat for the yellow-billed cuckoo is present in Area 1, but none were detected in or near the Project area during surveys (Tetra Tech 2018). There would be moderate adverse impacts to suitable habitat over the short-term during construction and until vegetation becomes reestablished. Temporarily disturbed areas would be restored upon construction completion. Alternative measures would have a net increase to important riparian and wetland habitat within Area 1 that is suitable habitat for the species. This is anticipated to have a long-term moderate benefit to yellow-billed cuckoo suitable habitat within the Project area.

This alternative has the potential to disturb state sensitive species and/or associated habitat directly from construction activities. If present, sensitive species might be temporarily disturbed and displaced to adjacent habitats during construction. Once construction is completed, they could return to the area. Temporarily disturbed areas would be restored upon construction completion. Areas of disturbance would be surveyed for state-listed species by a qualified biologist no more than 5 days prior to the commencement of work. If the species were found during surveys, relocation or other protection measures would be performed. Impacts to state-listed species would be minor over the short-term, based on the duration of construction, restoration of disturbed areas, and avoidance/minimization measures in place.

The greater sage-grouse has been observed along with two active leks within a 1-mile radius of the Project area. There is no direct construction proposed in either species observation areas or leks but visual and sound disturbance from construction may disrupt breeding behavior during certain times of the year. Through coordination with CPW, conservation measures will be employed to reduce impacts to the greater sage-grouse during the breeding season which is typically between March 1 and July 15 at Area 2. Areas 1 and 3 are within 1-mile but are separated by topographic ridgelines and any short-term impacts would be negligible. See Section 8.3 Avoidance and Minimization Measures for a list of conservation practices that will be implemented for the greater sage grouse. The following conservation measures would be implemented for Area 2 and as a result there would be minor impacts over the short-term:

- Avoid construction from March 1 to June 1 in Area 2. If construction is required during this time period, there would be no construction between sunrise to 9:00AM to limit disturbance during the greater sage-grouse breeding season.
- Area 2 would be surveyed for the greater sage-grouse by a qualified biologist no more than 5 days prior to the commencement of work.
- No nighttime construction would be performed at Area 2 to limit sound and light disturbance.
- Restoration of the disturbed portion of Area 2 will be performed to re-establish cleared shrubs and forbs by replanting similar shrub species in addition to the approved upland seed mix after construction is complete at Area 2.

Alternative measures would have a net increase to important riparian and wetland habitat within Area 1. It also reestablishes the Colorado River corridor through the area restoring the vegetative cover and connectivity for terrestrial or aquatic species movement/refuge along the river. This is anticipated to have a long-term moderate benefit to sensitive species that use these habitats. Long-term, minor indirect impacts may also occur from disturbance to habitat or sensitive species from recreationists (primarily fishers) using

the area. Species may be temporarily disturbed and displaced from human activities. Informational signage for wildlife avoidance would be posted at the watchable wildlife area for public education. Impacts from human disturbance are anticipated to be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of informational signage, and daily passing/varying human presence.

6.5.3 Invasive Aquatic Animal Species

No ANS (animal species) are present in the Project area, but ANS rusty crayfish and New Zealand mudsnail have been identified in counties adjoining Grand County. Whirling disease, an ANS fish disease, is present in the Colorado River upstream and downstream of Windy Gap, in Windy Gap Reservoir, and in the Fraser River. Please refer to Section 4.5.3 for more information regarding the presence of invasive aquatic animal species and Colorado ANS in the vicinity of the Project area.

6.5.3.1 No Action Alternative

There would be no change for this alternative to invasive animal species.

6.5.3.2 New Channel – Spillway Raise Alternative

This alternative creates a new water channel and opens it up for recreation use. The existing reservoir sediment may contain the parasite that can cause whirling disease. Construction activities will be limited so that the spread of potentially contaminated soils is confined within the new reservoir footprint or it will be salvaged, stockpiled, or placed separately from the other topsoil on the site. Any potentially contaminated soils will only be used/placed in areas outside of the floodplain or it will be buried where there is no surface water connection to the new connectivity channel. Construction equipment that handles the potentially contaminated soil will be cleaned prior to moving other on-site materials to prevent cross contamination. Impacts would likely be minor during construction based on proper soil handling and cleaning procedures.

Use of these waters increases the potential for spread of invasive aquatic species, particularly those found near project waters in adjoining counties (rusty crayfish and New Zealand mudsnail). Individuals are responsible for following the rules and requirements established by the state for ANS. Any person in violation of the established rules and requirements is subject to enforcement actions by the regulating enforcement agency. Long-term indirect impacts are anticipated from potential spread of invasive aquatic animal species from recreation use of the new connectivity channel. However, impacts would likely be negligible based on existing similar and frequent recreation use of the Colorado and Fraser Rivers both upstream and downstream of the Project area.

6.5.4 Migratory Birds/Bald and Golden Eagles

A variety of migratory birds and bald eagles have the potential to occur in the Project area for nesting and foraging. Golden eagles have the potential to occur in the Project area for foraging. Sensitive nesting areas have been identified in the Project area for migratory birds, great blue heron (*Ardea herodias*) and osprey (*Pandion haliaetus*). Please refer to Section 4.5.4 for information regarding the presence of migratory birds/bald and golden eagles in the vicinity of the Project area.

6.5.4.1 No Action Alternative

There would be no impact to migratory birds and bald or golden eagles due to the implementation of this alternative.

6.5.4.2 New Channel – Spillway Raise Alternative

This alternative would have short-term impacts to migratory birds, bald/golden eagles, and associated habitat, but avoidance and minimization measures would be implemented. Spatial buffers would be established around known sensitive nesting areas in coordination with USFWS, CPW, and NRCS. Clearing of vegetation for project measures would be performed outside of the nesting season to the greatest extent possible. If construction activities occurred during migratory bird breeding/nesting periods, the Project area and surrounding habitats would be surveyed by a qualified biologist for active nests no more than 5 days prior to the commencement of work. If active nests were found during surveys, spatial buffers would be established around the nests in coordination with USFWS, CPW, and NRCS. Construction activities within the buffer areas would be prohibited until a qualified biologist confirmed that all nests are no longer active. Non-nesting migratory birds and bald/golden eagles, if present, might be temporarily disturbed and displaced to adjacent habitats during construction. Once construction is completed, they could return to the area. Disturbed areas would be restored upon construction completion. Minor to moderate impacts are anticipated during construction based on the implementation of avoidance/minimization measures, short-term disturbance, and restoration of disturbed areas.

Alternative measures would have a net increase to important riparian and wetland habitat within Area 1. It also reestablishes the Colorado River corridor through the area restoring the vegetative cover and connectivity for bird movement/refuge along the river. This is anticipated to have a long-term moderate benefit to bird species that use these habitats. Long-term, minor indirect impacts may also occur from disturbance to habitat or birds from recreationists (primarily fishers) using the area. Species may be temporarily disturbed and displaced from human activities. Informational signage for wildlife avoidance would be posted at the watchable wildlife area for public education. Impacts from human disturbance are anticipated to be minor based on abundant surrounding habitat, enhanced habitat conditions, posting of informational signage, and daily passing/varying human presence.

6.6 Human Resources

6.6.1 Socioeconomics

Please refer to Section 4.6.1 for information regarding current socioeconomic conditions in the vicinity of the Project area.

6.6.1.1 No Action Alternative

There would be no change to socioeconomic conditions due to the implementation of this alternative.

6.6.1.2 New Channel – Spillway Raise Alternative

This alternative includes public recreation access to areas of the Colorado and Fraser Rivers that would likely be used mostly by fishing enthusiasts. An increase in local and non-local recreationists to the area is anticipated, which would increase spending for lodging, restaurants, recreational services, gas stations,

and retail stores. This would have a minor beneficial impact over the long-term to the economy. Short-term, minor economic benefits would also be incurred from additional employment requirements and construction crew expenditures that may be necessary during construction.

6.6.2 Historical Properties / Cultural Resources

One site (existing transmission line) within the Project area was determined to be eligible for listing in the NRHP, and another site was recommended as needing additional data to determine eligibility for listing in the NRHP. NRCS has determined, in consultation with appropriate Native American tribes (refer to Section 7.1.5) and the Colorado SHPO (refer to Section 7.1.4), that the project will have no adverse effects to historic properties/cultural resources if these two sites are avoided during construction. Please refer to Section 4.6.2 for information regarding current historical and cultural resources within the Project area.

6.6.2.1 No Action Alternative

There would be no impacts to historical or cultural resources due to implementation of this alternative.

6.6.2.2 New Channel – Spillway Raise Alternative

The two archaeological sites identified in the archaeological survey report (Tetra Tech 2019) would not be disturbed for this alternative. The archaeological survey report was submitted to the Colorado Office of Archaeology and Historic Preservation (OAHP), which acts as the State Historic Preservation Office (SHPO), for concurrence with a No Adverse Effect to Historic Properties determination on February 24, 2021. The OAHP responded in a letter dated April 2, 2021, that no adverse effects would occur to the sites and that no historic properties would be affected for those properties determined not eligible for listing to the NRHP (Appendix A). However, if artifacts or human remains are unearthed during construction, construction activities should halt and the appropriate SHPO and tribal entities notified immediately.

6.6.3 Hazardous Materials

Please refer to Section 4.6.3 for information regarding hazardous materials in the vicinity of the Project area.

6.6.3.1 No Action Alternative

There would be no changes to hazardous material conditions from the existing site conditions due to implementation of this alternative.

6.6.3.2 New Channel – Spillway Raise Alternative

This alternative would have no direct or indirect impacts on hazardous materials sites or solid waste storage areas. There is always the potential to impact the environment from release of a hazardous material brought on-site during construction activities. Contractors would comply with all federal, state, and local laws and regulations pertaining to pollution and contamination of the environment to prevent pollution by hazardous materials. Construction activities would have a negligible impact over the short-term from introduction of hazardous materials in the Project area, based on adherence to applicable laws and regulations. No impacts are anticipated over the long-term.

6.6.4 Public Health and Safety

Please refer to Section 4.6.4 for information regarding existing public health and safety conditions.

6.6.4.1 No Action Alternative

There would be no change to public safety from existing conditions due to the implementation of this alternative.

6.6.4.2 New Channel – Spillway Raise Alternative

For this alternative, the low-stage spillway would be raised 1-foot and the reservoir area decreased. The storage volume behind the dam would change from 420 ac-ft to 300 ac-ft for this alternative.

A breach analysis was performed for the proposed dam conditions utilizing both NRCS criteria (NRCS 2019) and the SEO criteria (SEO 2020). The breach analyses conservatively assumed the reconfigured reservoir would have the same total storage at the raised spillway crest elevation. This was to account for embankment materials (for new construction) potentially being borrowed from within the reservoir and the potential for future dredging by Northern to restore their permitted storage without affecting the hazard classification. An incremental population at risk was calculated comparing the spillway capacity flood (determined for the SEO criteria) occurring with and without a dam breach. The resulting incremental population at risk was determined to be zero with no significant incremental damage or loss of life occurring. The hazard classification for the new dam conditions was determined to be significant hazard for both NRCS and SEO criteria. Both NRCS and SEO reviewed and approved the breach analysis for the preferred alternative. The dam spillways and connectivity channel have been designed to handle SEO requirements for climate change increases during extreme precipitation or flood events.

The sunny day failure is not anticipated to result in loss of life for either existing or proposed conditions; therefore, there is no expected change to the threat to public safety when compared to existing conditions for this alternative.

6.6.5 Recreation

Please refer to Section 4.6.5 for information regarding current recreation in the vicinity of the Project area.

6.6.5.1 No Action Alternative

There would be no change to recreation resources due to the implementation of this alternative.

6.6.5.2 New Channel – Spillway Raise Alternative

This alternative adds a new stream corridor along the Colorado River and opens areas up for public recreation access. Approximately 99.5 ac of land would be added and opened to the public for recreation after construction completion. However, the official opening for public access will depend on the success of vegetation establishment and may occur one or two years after construction completion. If vegetation is negatively impacted from public recreation then the Sponsor may restrict access at their discretion. This area includes approximately 7,050 linear ft of stream along the Colorado and Fraser River. It is anticipated

that recreationists would use the area primarily for fishing and wildlife viewing. An additional approximately 62.2 ac of land containing approximately 5,300 linear ft of the Colorado River would be opened for public recreation 10 years after construction completion. Refer to Appendix C – Map C7 for areas to be opened for public recreation access. A moderate beneficial impact over the long-term to public recreation and fishing accessibility is anticipated from these alternative measures. The existing wildlife viewing area would remain open during construction and there are no short-term impacts anticipated to public access and viewing.

6.6.6 Land Use

Please refer to Section 4.6.6 for information regarding current land use in the Project area.

6.6.6.1 No Action Alternative

There would be no change to recreation resources due to the implementation of this alternative.

6.6.6.2 New Channel – Spillway Raise Alternative

Land use within Areas 2 through 4 would not change for this alternative. Land use within Area 1 would reduce the area used for water supply storage and Windy Gap operational features, and add more open space. Recreation use of 161.7 ac would be added and shared with open areas, with 99.5 ac opened for recreation after construction completion and 62.2 ac opened for recreation use 10 years after construction completion. A new dam embankment, overflow spillway, diversion structure, and parking lot/access road would be constructed, changing open areas for use as part of the Windy Gap dam and pump facilities. The existing dam embankment would be removed and converted to open space along a segment. The rest of the existing dam embankment would be converted to an access road for O&M. Map C8.1B of Appendix C depicts the proposed land use changes for this alternative. Table 6-9 below provides a summary of proposed land use for this alternative and Table 6-10 summarizes the land use changes from the existing to the proposed condition. There would no impact to land use over the short-term during construction but minor impacts to land use over the long-term are anticipated from the changed land use. These changes are not anticipated to have adverse consequences to land use.

Table 6-9. Proposed Land Use Summary by Area

Land Use	Land Use Per Area								Total	
	Area 1		Area 2		Area 3		Area 4 (%)			
	Ac	%	Ac	%	Ac	%	Ac	%	Ac	%
Roads/Utility Corridor/Graded Area	7.7	2.5%	2.4	6.0%	6.4	11.4%	-	-	**16.5**	**3.8%**
Windy Gap Dam and Pump Facilities	13.1	4.3%	-	-	-	-	-	-	**13.1**	**3.0%**
Recreation	1.5	0.4%	-	-	-	-	-	-	**1.5**	**0.3%**
Shared Recreation and Open Space	161.7	52.8%	-	-	-	-	-	-	**161.7**	**37.6%**
Gravel/Rock Mining	-	-	-	-	-	-	27.9	100%	**27.9**	**6.5%**
Cabins (Residential)	0.3	0.1%	-	-	-	-	-	-	**0.3**	**0.1%**
97.431.8%- Water Supply Storage	74.0	24.2%	-			-	-	-	**74**	**17.2%**
Open Area (private unoccupied lands/waters with no designated use)	48	15.7%	37.9	94.0%	49.6	88.6%	-	-	**135.5**	**31.5%**
Total	**306.3**	**71.1%**	**40.3**	**9%**	**56.0**	**13%**	**27.9**	**6%**	**430.5**	**100.0%**

Table 6-10. Area 1 Land Use Change Summary

Land Use	Existing (ac)	Proposed (ac)	Change in Land Use (ac)
Roads/Utility Corridor/Graded Area	5.2	7.7	+2.5
Windy Gap Dam and Pump Facilities	16.3	13.1	-3.2
Residential	1.4	0.3	-1.1
Water Supply Storage	106.0	74.0	-32
Recreation	1.5	163.2*	+161.7*
Open Space (private unoccupied lands/waters with no designated use)	175.9	209.7	+33.8

*161.7 ac area shared with Open Space.

6.6.7 Visual Resources and Scenic Beauty

Please refer to Section 4.6.7 for information regarding visual resources in the Project area.

6.6.7.1 No Action Alternative

There would be no change to visual resources or scenic beauty due to the implementation of this alternative.

6.6.7.2 New Channel – Spillway Raise Alternative

Alternative measures would construct a new stream channel that would be open for public access in Area 1. This would create additional opportunity and vantage points to view the existing and new riparian corridor. The existing watchable wildlife area would remain open during and after construction for the public with continued viewing of the reservoir; however, the reservoir surface area would be smaller. Moderate beneficial impacts are anticipated over the long-term from the new riparian corridor and public access to visual resources and scenic beauty.

Short-term impacts to scenic views are anticipated during construction from disturbed grounds and equipment parked or operating in the Project area. Disturbed areas would be restored after construction completion. These impacts would be moderate over the short-term during construction, but disturbed areas would be restored.

6.6.8 Noise

Please refer to Section 4.6.8 for existing noise conditions within the Project area.

6.6.8.1 No Action Alternative

There would be no changes to noise from existing conditions due to the implementation of this alternative.

6.6.8.2 New Channel – Spillway Raise Alternative

During construction activities, noise could be generated that may constitute a nuisance to nearby residential and other community properties through the use of diesel engines, back-up alarms, and increased traffic to the Project area. The Project area is in a rural setting and heavy traffic noise is common in this area from the adjoining highway. Construction equipment would be outfitted with noise dampening measures. This effect would be short-term, and noise minimization efforts would be used. Noise impacts would be minor over the short-term, based on the duration of construction and implementation of BMPs. There would be no impact over the long-term because there are no mechanical components proposed as part of the Project and highway traffic would be similar to the existing conditions.

6.7 Cumulative Effects

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

- Granby Diversion Improvement Project – Trout Unlimited, in coordination with the Town of Granby, Grand County, CPW, and USFWS, have partnered to improve the existing Granby Diversion located on the Fraser River just west of the Highway 40 bridge crossing. The diversion routes the town's municipal water supply as well as irrigation water from the Fraser River. The diversion is an 80-foot-wide, 3.5-foot-high boulder structure that spans the Fraser River. The primary objective of this project was to provide fish passage for trout and native species and for non-motorized boating recreation, while maintaining water diversion for municipal and irrigation purposes. The diversion dam structure was a fish passage barrier. The Granby Diversion Improvement Project started construction in October 2020 for modifications to incorporate fish passage and was completed in November 2020.

- Fraser Flats Habitat Improvement Project – Measures were performed for channel improvements to enhance aquatic habitat and included willow planting along a 0.9-mile reach of the Fraser River. The project is located approximately 2.5 miles north of the town of Fraser and re-established riparian habitat, improved aquatic habitat, and provided shade to moderate water temperatures for aquatic life. The project was completed in the fall 2018.
- Ranch Creek Habitat Improvement Project – Willow planting along a 1-mile reach of Ranch Creek was performed to re-establish riparian habitat and provide shade to moderate water temperatures for aquatic life. The project is located upstream of Windy Gap along a tributary to the Fraser River and was completed in 2020.
- Irrigators in Lands in the Vicinity of Kremmling – This consists of bank stabilization projects and installation of several innovative in-stream structures designed to improve water levels for irrigation while enhancing critical river habitat by rebuilding riffle and pool structure. The project is located approximately 25 miles downstream from Windy Gap along the Colorado River. Construction is currently underway and is anticipated for completion in 2022.
- Moffat Collection System Project – This project would divert a large portion of the Fraser River's annual flow to Denver Water to provide potable water to the Denver area. Water diversion is anticipated to begin in 2025. The project includes a Mitigation and Enhancement Coordination Plan that aims to balance water demand with river health through mitigation and enhancement efforts on the Fraser River and Colorado River headwaters. Mitigation efforts include aquatic habitat restoration projects in Williams Fork and Colorado River Cutthroat Trout habitat improvements in tributaries of the Fraser River and Williams Fork. Enhancement activities include the formation of an adaptive management program known as "Learning by Doing" (LBD), environmental flows to alleviate stream temperature problems in the Fraser River and tributaries, flushing flows to prevent sediment problems, and providing funding for aquatic habitat and stream improvement projects.
- Fraser River Sediment Pond – This project, in its seventh year of operation, consists of removing traction sand used along Highway 40 from the Fraser River. Sediment removal occurs on an as-needed basis. In 2019, 330 tons of sand were removed. Monitoring downstream of the sediment pond shows significant habitat improvement.
- Williams Fork River Restoration Project –This project was completed in 2019 and enhanced 2.08 river miles upstream and downstream of Williams Fork Reservoir. It included a 0.86-mile segment that is open to public fishing on the Kemp Breeze State Wildlife Area, upstream of the confluence with the Colorado River. The restoration activities are expected to result in improved low flow conditions, instream habitat diversity, channel stability, and streamside vegetation. Denver Water intends to open a portion of its property along a 1.2-mile segment upstream of the Williams Fork Reservoir to public fishing in the future. Public access for this segment is anticipated to open in late 2024 or early 2025.
- Windy Gap Firming Project – The project is a collaborative effort by 12 Northeastern Colorado water providers to improve the reliability of the Windy Gap Project. A new reservoir (Chimney Hollow Reservoir) would be located just west of Carter Lake in Larimer County. Construction is anticipated to span 4 years and begin in 2023. Its 90,000 ac-ft of dedicated storage capacity would supply a reliable 30,000 ac-ft of water each year for future generations. No changes to existing pumping water rights from Windy Gap Reservoir would be required and this project is unrelated to the measures proposed for the Colorado River Headwaters Connectivity Project.

- Colorado River Habitat Restoration Project–This project would provide enhancement measures in connection with the Moffat Project and Windy Gap Firming project. It includes Colorado River improvements between Windy Gap Reservoir and Kemp Breeze. A portion of the stream improvement work is expected to start in 2022 and be completed in 2023. Additional stream improvement work is anticipated in the future. The primary project goal is to improve aquatic habitat.

6.7.1 No Action Alternative

There is no action or change as part of this alternative. Therefore, there would be no cumulative impacts for this alternative.

6.7.2 New Channel – Spillway Raise Alternative

Most of the past, present, or reasonably foreseeable future actions in the vicinity of the Project area include stream restoration activities, with exception of two projects for municipal water supply needs. Any project occurring during the same time and place has the potential to cumulatively increase short-term adverse construction impacts.

The stream restoration activities of the projects listed above have been completed or would be completed prior to project construction, except for the Colorado River habitat Restoration Project that would be occurring during the same period. The restoration project would occur between Windy Gap and Kemp Breeze. Construction activities for the Windy Gap Firming project may also overlap; however, the project is located 40 miles away in a different watershed and would not contribute cumulative construction impacts. Cumulative adverse construction impacts would increase upland erosion, sedimentation, surface water quality/flow, air quality, noxious weeds/invasive plants, wildlife species/habitat (including special status species, migratory birds, and bald/golden eagles), visual resources, and noise. Based on construction timing, implementation of avoidance/minimization measures, and adhering to construction BMPs, the cumulative short-term actions are not anticipated to increase the intensity determination more than what is already described in Section 6.1 through Section 6.6.

Restoration projects include improvements to river corridors for flow and aquatic/terrestrial habitat enhancements. The restoration projects would have moderate long-term beneficial impacts to surface water quality/flow, riparian areas, terrestrial/aquatic wildlife species/habitat (including special status species, migratory birds, and bald/golden eagles), recreation, and visual resources when added to this project action.

This Project has primarily long-term beneficial impacts to resources. Long-term adverse impacts include those related to recreation access and its' disturbance to wildlife/habitat and spread of invasive aquatic/terrestrial plant species. The Williams Fork River Restoration Project includes opening a 1.2-mile segment of stream up for public recreation. These projects would cumulatively increase the potential for spread of invasive terrestrial and aquatic plants over the long-term. They would also increase human disturbance that could disturb or displace wildlife to adjacent habitats, if present. Based on the rules and requirements established by the state to reduce the spread of invasive plant species, the cumulative impacts to invasive plant species would be minor. Cumulative long-term impacts to wildlife (including special status species, migratory birds, and bald/golden eagles), is anticipated to be minor based on abundant surrounding habitat, posting of wildlife avoidance signage, habitat enhancement, and daily passing/varying human presence.

6.8 Risk and Uncertainty

A variety of factors contribute to the potential for dam failure, including the intensity of a storm event, a damaging seismic event, construction materials and techniques, and O&M activities. There is no unusual risk or uncertainty that the dam would not continue to operate as intended after modifications. Dams are inherently hazardous structures, but with careful design in accordance with SEO dam safety requirements and continued maintenance, they should continue to support their use. Calculations and considerations in the report are based on a 102-year period of analysis.

Estimating project costs and benefits involves a certain degree of 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 project 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.

There are uncertainties with estimation of economic benefits from alternative measures. These uncertainties are listed in Section 8.0 of Appendix D. There is also uncertainty in estimating the social and environmental costs associated with each alternative because interested party values, judgments, and opinions may shift over time.

Additional risk and uncertainties associated with the Project include the following:

- Upland Erosion and Sedimentation: Erosion and sedimentation are dependent upon several unpredictable factors. The actual sedimentation rate could vary based on conditions in drainage area, including construction activity, wildfires, storm events, and off-highway vehicle/pedestrian traffic, among others.

6.9 Irreversible and Irretrievable Resource Commitments

NEPA requires that environmental analysis include identification of "… any irreversible and irretrievable commitments of resource which would be involved in the Proposed Action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects this use could have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural resource).

Implementing the alternatives would not result in destruction of a specific resource or loss in value of an affected resource that cannot be restored. The alternatives analyzed would involve a commitment of a range of natural, physical, human, and fiscal resources. Considerable amounts of fossil fuels, labor, and construction materials would be expended. Additionally, large amounts of labor and natural resources would

be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. They are not, however, in short supply, and their use would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of federal and cost-share funds that would not be retrievable.

The commitment of these resources would be based on the premise that residents in the immediate area, the state, and the region would benefit by the alternative enhancements. These benefits generally are anticipated to outweigh the permanent commitment of resources.

7.0 Consultation, Coordination, and Public Participation

This section describes the public and agency coordination efforts for the Colorado River Headwaters Connectivity Project.

7.1 Consultation

7.1.1 U.S. Army Corps of Engineers

USACE has jurisdiction over work in waters of the U.S. under Section 404 of the Clean Water Act (CWA). USACE was invited to comment on the Project during the scoping period (letter sent on July 31, 2018), but no comment was received. A formal request to be a cooperating agency was submitted to USACE on January 27, 2020 and they responded on February 21, 2020 accepting cooperating agency status (Appendix A). The USACE issued Nationwide Permit 27, Aquatic Habitat Restoration, Enhancement, and Establishment Activities verification for the Project on April 14, 2022 (Appendix A).

7.1.2 U.S. Fish and Wildlife Service

USFWS was invited to comment on the Project during the scoping period. A letter was sent on July 31, 2018, to the USFWS Field Supervisor requesting comments, but no comments were received. A Biological Evaluation (BE) was completed for the Project to comply with Section 7 of the ESA. The BE was submitted to the USFWS on January 22, 2021, to comply with Section 7 of the ESA. The USFWS concurred with the determination on March 2, 2021 that the Project would have No Effect to ESA species or proposed/designated critical habitat, except for yellow-billed cuckoo which had a determination of May Affect, Not Likely to Adversely Affect (Appendix A). USFWS was invited to review and comment on the Draft Plan-EA during the open comment period, but no comment was received.

7.1.3 Colorado Parks and Wildlife

CPW was involved during the alternative-development process for the Project and participated in review and development of alternatives. CPW was invited to comment on the Project during the scoping period, but no comments were received. Northern Water has coordinated with CPW on special status species avoidance and impact minimization, including but not limited to, pre-activity surveys for nesting special status birds, nest buffers, and signage describing wildlife impact avoidance and stream/habitat improvements to be posted at the watchable wildlife area for public awareness. Informal coordination with CPW (CPW 2022) occurred after the Draft Plan-EA review period regarding the greater sage-grouse conservation measures and the results have been documented in the Final Plan-EA.

7.1.4 Colorado Office of Archaeology and Historic Preservation and State Historic Preservation Office

Cultural resource reports were completed (Tetra Tech 2019 and AECOM 2020a) and two archaeological sites within the Project area were recommended to be avoided. Alternative measures would avoid disturbance to these two archaeological sites. To comply with Section 106 the reports were submitted to the Colorado OAHP for review and SHPO concurrence with a determination of No Adverse Effect to Historic

Properties on February 24, 2021. SHPO concurrence was received on April 2, 2021 (Appendix A). In the event that cultural/archaeological resources are found during construction activities, construction would stop and the appropriate agencies would be notified according to NRCS protocol. SHPO was invited to review and comment on the Draft Plan-EA during the open comment period, but no comment was received.

7.1.5 Tribal

Tribal consultation was completed for the Project to comply with Executive Order 13175 and the National Historic Preservation Act. The following tribal entities were invited to comment on the Project during the scoping period, and two tribal responses were received. The Tribal Historic Preservation of the Cheyenne and Arapaho Tribes responded indicating that they have no interest in the Project. The Southern Ute Indian Tribe responded requesting additional information on the planned site for its impact on properties of religious and cultural importance. A Cultural Resources Inventory Report was submitted with consultation letters on May 17, 2021, to the tribes listed below (Appendix A).

- Apache Tribe of Oklahoma
- Arapaho Tribe
- Cheyenne and Arapaho Tribes
- Cheyenne River Sioux Tribe
- Comanche Nation
- Crow Creek Sioux Tribe
- Eastern Shoshone Tribe
- Fort Belknap Indian Community
- Fort Sill Apache Tribe
- Jicarilla Apache Tribe
- Kiowa Tribe
- Mescalero Apache Tribe
- Northern Cheyenne Tribe
- Oglala Sioux Tribe
- Pawnee Nation
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribes
- Southern Ute Indian Tribe
- Standing Rock Sioux Tribe
- Ute Indian Tribe
- Ute Mountain Ute Tribe

The tribes were also invited to review and comment on the Draft Plan-EA during the open comment period and one comment was received from Pawnee Nation. Responses received from tribes to date for consultation are summarized below.

- Oglala Sioux Tribe: The THPO for the tribe will be providing a determination and concurrence of the Colorado SHPO. At the issuance of this report no additional response had been received from the tribe.
- Pawnee Nation: The proposed project should not affect the cultural landscape of the Pawnee Nation. However, be advised that additional undiscovered properties could be encountered, and they must be immediately reported to us under both the NHPA and the Native American Craves Protection and Repatriation Act regulations.
- Rosebud Sioux Tribe: They are currently reviewing the request for consultation and will respond as soon as possible. At the issuance of this report no additional response had been received from the tribe.
- Southern Ute Indian Tribe: The tribe requested additional information regarding a site within the area of potential effect, the location and proximity of lithic scatters to one another, and if the Fraser River weir would be made of manmade materials. NRCS provided the additional information on August 25, 2021. At the issuance of this report no additional response had been received from the tribe.

7.2 Coordination

7.2.1 Subdistrict, Trout Unlimited, and Grand County

Grand County, Trout Unlimited, and the Subdistrict are the SLOs for the Project. The SLOs requested financial assistance from the NRCS through Standard Form 424-Application for Federal Assistance. Initial coordination was conducted between these entities and NRCS regarding the Project and the proposed watershed protection measures. Meetings were conducted throughout the planning and engineering process with the SLOs to develop the Project measures and identify potential concerns. SLOs were provided copies of the preliminary draft report for review and comments or concerns were addressed and/or corrected prior to issuance of the Draft Plan-EA to the public. SLOs were also provided copies of the preliminary final report for review and comments or concerns were addressed and/or corrected prior to issuance of the Final Plan-EA.

7.2.2 Stakeholders

Coordination was conducted with private landowners from whom agreements and/or easements may need to be obtained to facilitate alternative measures. Interested stakeholders were invited to review and comment on the Draft Plan-EA and comments received are included in Appendix A. Coordination with stakeholders will continue throughout the final design phase to obtain necessary agreements and/or easements prior to the start of construction.

7.2.3 Colorado State Engineer's Office

The SEO for Dam Safety has jurisdiction over dams in the state and must review and approve plans and specifications for the construction and repair of jurisdictional dams. The 40% Basis of Design Report for proposed dam modifications was submitted to Dam Safety for review and they replied on April 9, 2020. Dam Safety noted that the report was well prepared and the conclusions appropriate, but additional supporting analysis and details would need to be provided for review (Appendix A). Dam Safety was invited to review and comment on the Draft Plan-EA during the open comment period, but no comment was received. Additional Dam Safety coordination will occur and review comments will be addressed during the final design phase.

7.3 Public Participation

7.3.1 Public Participation Plan

The Public Participation Plan, dated July 2018 (McMillen Jacobs Associates 2018), was prepared to provide effective procedures that define outreach to the general public, recreationists, local businesses, 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

The participation of the public is a vital component of the Project so that those who are interested in or potentially affected by proposed alternatives have an opportunity to share their concerns and provide input regarding the Plan-EA during the initial stages of the process. The Colorado River Headwaters Connectivity Project Scoping Report (see Appendix E) outlined the scoping efforts and comments received from the agencies and general public during the scoping process.

A scoping meeting was held on August 15, 2018, at the Grand Fire Protection District Office in Granby, Colorado. The meeting provided opportunity for the public and agencies to express any specific concerns and their relevance to the proposed action. Comments could be submitted in person at the meeting or via mail, e-mail, telephone, facsimile, or comment card. There were 11 written public scoping comments received for the Project during the scoping comment period, which was open from August 1, 2018, through August 31, 2018.

7.3.3 Public Outreach

Table 7-1 lists the Project's public outreach activities. The public was notified of each activity listed below and provided with opportunities to comment on the Project.

Table 7-1. Public Outreach Activities

Date	Purpose	Type
July 31, 2018	Scoping Notice Mailing	Invite interested parties to comment during the scoping period.
August 1, 2018	Scoping Comment Period Open	
August 1, 2018	Scoping Notice Published	Scoping Notice posted to the NRCS and Grand County websites and Scoping Notice published in *Sky-Hi News*
August 2, 2018	Scoping Notice Published	Scoping Notice published in the *Middle Park Times* and Notice emails sent to interested parties
August 3, 2018	Scoping Notice Published	Scoping Notice published in the *Grand Gazette* and *Winter Park Times*
August 8, 2018	Scoping Notice Published	Scoping Notice published in *Sky-Hi News*
August 9, 2018	Scoping Notice Published	Scoping Notice published in *Middle Park Times*
August 10, 2018	Scoping Notice Published	Scoping Notice published in the *Grand Gazette* and *Winter Park Times*
August 15, 2018	Scoping Meeting	Public Meeting held at the Grand Fire Protection District Office in Granby, Colorado
August 31, 2018	Scoping Period Closed	
February 7, 2022	Draft Plan-EA Notice of Availability (NOA)	NOA of the Draft Plan-EA, comment period, and meeting announcements sent via mail

Date	Purpose	Type
February 8, 2022	Draft Plan-EA Available for Review	The Draft Plan-EA was made available for electronic download on the NRCS website and hard copy viewing at the Granby Library, Hot Sulphur Springs Library, Grand County Office, and Granby Town Hall
February 8, 2022	Draft Plan-EA Notice of Availability NOA	NOA of the Draft Plan-EA, comment period, and meeting announcements sent via e-mail, posted to the NRCS website, posted to Northern Water website and social media
February 8, 2022	Draft Plan-EA Public Comment Period Open	
February 9, 2022	Draft Plan-EA NOA Published	Draft Plan-EA NOA published in *Sky-Hi News*
February 22, 2022	Draft Plan-EA Public Meeting	In-person and virtual Draft Plan-EA meeting
February 24, 2022	Draft Plan-EA Public Meeting Recording	Draft Plan-EA public meeting recording posted to the NRCS website
March 10, 2022	Draft Plan-EA Public Comment Period Closed	
May 2022	Final Plan-EA	NOA sent via email, published in the *Sky-Hi News*, and posting of the Final Plan-EA and FONSI to the NRCS website

7.3.4 Agency Involvement

During development of the Plan-EA, agencies were contacted to request input and participation in the Project. Agencies were provided scoping announcement letters that notified them of the Project, public meeting time and locations, and open comment period, and also requested their input. The agencies accepting participation and/or providing input in the Project to date, in addition to NRCS and the SLOs, are listed below. See Section 11.0 for a list of all agencies that were included in the distribution list for Project information announcements. The results of consultation with agencies and organizations during the Draft Plan-EA review period are documented in the Final Plan-EA.

- CPW
- USACE
- USFWS (Section 7 Consultation)
- Colorado SHPO (Section 106 Consultation)
- Colorado Dam Safety Division (Concept Design Review)
- Tribes

7.3.5 Agency Plan-EA Reviews

Prior to the Draft Plan-EA issuance to the public, the NRCS's National Water Management Center and the USACE were provided copies of the preliminary report for review. Agency report comments or concerns were addressed and/or corrected prior to issuance of the Draft Plan-EA to the public.

7.3.6 Draft Plan-EA Public Comment

An NOA describing the proposed project, information on the Draft Plan-EA public meeting, availability of the Draft Plan-EA for review, and solicitation of comments, was mailed to interested parties before the start of the open comment period. These included mailings/e-mails to 159 private parties and agencies/tribes/organizations as listed in Section 11.0. The NOA was published in the local newspaper (Sky-Hi News) on February 9, 2022, Northern Water social media sites and website on February 8, 2022, and Northern Water e-mail bulletin on February 14, 2022. The NOA and Draft Plan-EA were posted and available for download on the NRCS project website during the open comment period which started on February 8, 2022. Hard copies of the Draft Plan-EA were also available for review at the Granby Library, Hot Sulphur Springs Library, Grand County Office, and Granby Town Hall. Documentation of Draft Plan-EA NOA materials are provided in Appendix E.

One combined in-person and virtual agency/public Draft Plan-EA meeting was conducted on February 22, 2022 with 23 people in attendance in-person and 33 people in attendance virtually (including project team personnel).

The open comment period lasted from February 8, 2022 through March 10, 2022. Written comments could have been submitted via mail, e-mail, and oral comments could have been submitted via phone. 424 comments were received during the open comment period for the Draft Plan-EA (Appendix A) and a comment response matrix is also provided in Appendix A for any comments that posed questions or required additional clarification.

7.3.7 Final Plan-EA and FONSI

The Final Plan-EA was updated to address comments received on the Draft Plan-EA and a FONSI was prepared. An NOA of the Final Plan-EA and FONSI was published in the local newspaper (*Sky-Hi News*) and sent to agencies and parties expressing interest in the Project to date via email. Copies of the Final Plan-EA and FONSI were made available for download on the NRCS Project website.

8.0 Preferred Alternative

8.1 Rationale for Preferred Alternative Selection

Alternatives were formulated following procedures outlined in the NWPM (NRCS 2015a), NWPH (NRCS 2014), PR&G (NRCS 2018), and other NRCS watershed planning policy. The Preferred Alternative was selected based on the ability to meet the purpose and need, compliance with the previously mentioned documents, the economic benefits it provides, and the ability to meet the Project goals and objectives.

The New Channel – Spillway Raise Alternative was selected as the Preferred Alternative for the Project. This alternative meets the purpose and need of the Project by enhancing aquatic habitat, improving water quality, providing recreation opportunities, and reestablishing connectivity for aquatic life and fish passage. This is accomplished by connecting the Colorado and Fraser Rivers upstream and downstream of Windy Gap and taking the existing municipal water storage reservoir offline. A new riparian corridor would be developed along the connectivity channel matching the upstream and downstream corridors and the pump storage operations at Windy Gap would be maintained.

8.2 Measures to be Installed

A summary of the Action Alternative measures is included below. Refer to Section 5.4.2 for a detailed description of the alternative. A map of Preferred Alternative measures is provided in Appendix B – Maps B5.1 through B5.4, and conceptual design drawings are provided in Appendix D.

Connectivity Channel

- Construct a connectivity channel and side channels along the new corridor complete with stream geomorphology and habitat features.
- Grade the Colorado River to tie into the new connectivity channel and to provide proper conveyance for the new flow conditions.
- Seed and plant the new corridor with wetland, riparian, and upland vegetation where appropriate.

Windy Gap Dam Modifications

- Construct a new 850-foot-long dam embankment to decrease the reservoir size for construction of a new connectivity channel.
- Raise the dam's low stage spillway 1-foot to match the upper stage spillway elevation.
- Construct an overflow spillway between the dam embankment and new diversion structure.
- Use nearby borrow sources for construction of alternative measures consisting of materials within the reservoir and floodplain footprint, materials on the old dam embankment, and borrow areas identified in Areas 2 through 4.
- Grade the area between the new dam embankment and old dam embankment to create a new channel corridor. Install sheet pile or launching riprap where necessary along the new and old dam embankment toes.

Diversion Structure

- Construct an adjustable crest gate diversion structure with fish passage and associated equipment building to divert water into the connectivity channel. Install a bridge over the diversion structure for O&M vehicle access. Install sheetpile below the ground and channel surface across the channel corridor for grade control at the diversion structure.

Fraser Weir

- Modify the Fraser weir, regrade the river channel, and install grade control, stream geomorphology/habitat features, and bank stabilization measures where appropriate.

Entire Project

- Install bank stabilization measures where appropriate along the Colorado River.
- Install a new river vehicle crossing just below the dam through the Colorado River and near the location of the Fraser weir. Install a new O&M access road from the new Fraser vehicle crossing to the old dam embankment.
- Restore temporary disturbed areas with riparian or upland vegetation seeding and plantings to match the surroundings.
- Provide recreation access to the new connectivity channel.

8.3 Avoidance, Minimization, and Mitigation

Compensatory mitigation would not be required for the Preferred Alternative. The avoidance and minimization measures proposed for the Preferred Alternative are described in Sections 8.3.1 through 8.3.9 below.

8.3.1 Upland Erosion

Erosion may occur on disturbed and cleared areas within the Project area during precipitation events. Proper BMPs would be installed during and after construction to prevent and control soil erosion. Areas disturbed during construction activities would be restored and stabilized through establishment of ground cover.

8.3.2 Surface Water Quality

Construction activities could temporarily impact surface water quality, but alternative design elements, including BMPs, would be implemented to reduce the quantity of sediment (1) entering drainages, and (2) flowing downstream and violating any federal or state water quality rules and regulations. Construction BMPs would include, but would not be limited to, the following:

- A Stormwater Pollution Prevention Plan would be implemented that contains erosion and sediment control and pollution prevention BMPs, such as (but not limited to) silt fences, fiber wattles, and/or earth berms.
- Construction and staging areas would be assessed for the feasibility of such measures as straw bales, silt fences, and other appropriate sediment-control BMPs, which would be implemented to prevent the entry of sediment and other contaminants into downstream drainages.
- To ensure that accidental spills do not enter waters, the storage of petroleum-based fuels and other hazardous materials and the refueling of construction machinery would not occur outside of approved designated staging/batch plant areas. Furthermore, the alternative would comply with federal and state water quality standards and toxic effluent standards to minimize any potential adverse impacts from discharges to waters of the U.S.

Dewatering activities would consist of draining the reservoir through existing outlets and routing flow through the auxiliary and/or bypass outlet structures. Water would be diverted and/or pumped away from

the active work areas where reasonable. Where not reasonable, in water work would be performed and BMPs would be installed throughout the Project site to limit the amount of turbid water generated from construction activities. River flows would be diverted around the in-water work area as reasonable using constructed diversions and/or pumps and pipes. Turbid water produced from activities involving pumping from dewatering collection systems would be transferred through sediment retention BMPs to allow turbidity to settle out of the water column before being discharged into any waters. BMPs would be implemented at discharge location(s) to further filter out construction sediment. Real time monitoring stations would be setup at select locations to monitor turbidity and alert personnel of high turbidity, if detected.

8.3.3 Air Quality

Construction activities would temporarily emit air pollutants. Fugitive dust, mobile-source air toxics, and GHG emission increases associated with construction would be minimized by implementing the following applicable BMPs:

- Spraying the soil on-site with water or another similar approved dust suppressant/soil binder.
- Wetting materials hauled in trucks, providing adequate freeboard (space from the top of the material to the top of the truck), or covering loads to reduce emissions during material transportation/ handling.
- Providing a stabilized construction entrance (track-out pad), wheel washers, and/or other similar BMPs at construction site accesses to reduce track-out of site materials onto the adjacent roadway network.
- Removing tracked-out materials deposited onto adjacent roadways.
- Wetting material stockpiles to prevent windblown emissions.
- Establishing vegetative cover on bare ground as soon as possible after grading to reduce windblown dust.
- Requiring appropriate emission-control devices on all construction equipment.
- Requiring the use of cleaner-burning fuels.
- Using only properly operating, well-maintained construction equipment.

8.3.4 Noxious Weeds and Invasive Plants

Construction activities would put the Project area at risk for future invasion of noxious weeds and invasive plant species. BMPs would be implemented during construction to prevent the spread of noxious weeds and invasive plant species. During construction and until restoration areas are fully established, BMPs would be maintained on a regular basis (twice per year) to prevent the establishment of noxious weeds and invasive plant species. Non-desirable plant species would be controlled by cleaning equipment prior to delivery to the Project site, eradicating these species before the start and during construction as discovered, and routinely monitoring after construction completion. Routine monitoring after construction completion for all noxious weeds listed on the Grand County list would be performed and noxious weeds would be eradicated from the Project site if observed. A Post-construction Rehabilitation Plan would be developed in coordination with Grand County Division of Natural Resources that would include mechanisms for

addressing weed establishment and treatment. Negative impacts would be managed with re-planting and various methods of weed control.

8.3.5 Wildlife and Wildlife Habitat

Construction activities would be limited to the smallest extent practicable within the Project area. Disturbed areas would be restored after construction completion. Fish salvage, if necessary, would be coordinated with CPW and Trout Unlimited. Informational signage for wildlife avoidance would be posted at the watchable wildlife area for public education. The project would adhere to all local, state, and federal regulations.

8.3.6 Special Status Animal Species

Refer to Section 8.3.8 for avoidance and minimization measures for state species of concern that are also protected under the MBTA.

Construction activities would be limited to the smallest extent practicable within the Project area. Disturbed areas would be restored after construction completion. Areas proposed for disturbance would be surveyed by a qualified biologist no more than 5 days prior to the commencement of work. If species were found during surveys, relocation of the species or other protection measures would be performed.

The following greater sage-grouse conservation measures will be implemented for Area 2:

- Avoid construction from March 1 to June 1 in Area 2. If construction is required during this time period, there would be no construction between sunrise to 9:00AM to limit disturbance during the greater sage-grouse breeding season.
- Area 2 would be surveyed for the greater sage-grouse by a qualified biologist no more than 5 days prior to the commencement of work.
- No nighttime construction would be performed at Area 2 to limit sound and light disturbance.
- Restoration of the disturbed portion of Area 2 will be performed to re-establish cleared shrubs and forbs by replanting similar shrub species in addition to the approved upland seed mix after construction is complete at Area 2.

8.3.7 Invasive Aquatic Animal Species

Construction activities would be limited so that the spread of potentially contaminated soils containing the parasite for whirling disease is confined within the new reservoir footprint or it will be salvaged, stockpiled, or placed separately from the other topsoil on the site. Any potentially contaminated soils will only be used/placed in areas outside of the floodplain or it will be buried where there is no surface water connection to the new connectivity channel. Construction equipment that handles the potentially contaminated soil will be cleaned prior to moving other on-site materials to prevent cross contamination.

8.3.8 Migratory Birds/Bald Eagles

Construction activities would be limited to the smallest extent practicable within the Project area. Disturbed areas would be restored after construction completion. Clearing of vegetation for project activities would

be performed outside of the nesting season to the greatest extent possible. If construction activities occur during migratory bird breeding/nesting periods, the Project area and surrounding habitats would be surveyed by a qualified biologist for active nests no more than 5 days prior to the commencement of work. If active nests are found during surveys, spatial buffers would be established around such in coordination with USFWS and CPW. Construction activities within a given buffer area would be prohibited until a qualified biologist confirmed that the nest is no longer active.

8.3.9 Hazardous Materials

NRCS requires that contractors comply with all federal, state, and local laws and regulations pertaining to pollution and contamination of the environment to prevent pollution of surface water, groundwater, soil, and air with any hazardous materials. If any hazardous materials/sediment or suspect hazardous materials/sediment are encountered during ground disturbing activities, the contractor shall follow all applicable state and federal regulations for handling, disposing, and reporting of hazardous materials.

8.3.10 Historical Properties / Cultural Resources

Disturbance to the two archaeological sites identified in the archaeological survey report (Tetra Tech 2019) would be avoided. A 15-meter no disturbance buffer around the sites would be provided. In the event that previously unidentified cultural resources are identified during project implementation, the Unanticipated Discoveries Procedures found in Appendix E would be followed.

8.3.11 Visual Resources

Areas disturbed during construction activities would be restored after construction completion. 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 revegetated with NRCS-approved plant species to match the surrounding plant community.

8.3.12 Monitoring

The SLO is preparing a post-construction monitoring plan which includes, but not limited to, the following physical, chemical, and/or biological parameters: river flow, floodplain characteristics, river channel dimensions, fish presence, macroinvertebrates, temperature, habitat conditions, large woody debris, noxious weeds, and public access impacts. This plan will be coordinated with the appropriate permitting agencies and stakeholder and will be finalized prior to construction completion. Monitoring efforts are anticipated to occur between year 1 through 5 post construction completion. If monitoring identifies any areas of concern then the SLO with coordinate with the appropriate permitting agencies and/or stakeholders to remedy the concerns through adaptive management.

8.4 Permits and Compliance

The federal, state, and local permits and compliance actions described in this section would be required for implementation of the Preferred Alternative. A Watershed Agreement and a Memorandum of Understanding shall be completed and signed by NRCS and the SLOs prior to the obligation of construction funds for the Preferred Alternative. Securing of permits and associated costs are the responsibility of the SLOs.

8.4.1 Federal

USFWS: A BE was submitted to the USFWS on January 22, 2021 to comply with Section 7 of the ESA. The BE concluded that the Project would have No Effect to ESA species or proposed/designated critical habitat, except for yellow-billed cuckoo which had a determination of May Affect, Not Likely to Adversely Affect (Appendix A). Concurrence from USFWS for the determination was received on March 2, 2021 (Appendix A).

USACE: Under Section 404 of the Clean Water Act, a Nationwide Permit 27, Aquatic Habitat Restoration, Enhancement, and Establishment Activities verification would be required. The USACE issued Nationwide Permit 27, Aquatic Habitat Restoration, Enhancement, and Establishment Activities verification for the Project on April 14, 2022 (Appendix A).

8.4.2 State

Colorado Division of Water Resources, Department of Natural Resources, Dam Safety Program: Approval would be required for the final design report, construction drawings, and specifications by the Division Dam Safety Engineer.

CDPHE WQCD: Under Section 402 of the Clean Water Act, a COR 400000 Colorado Discharge Permit is required for stormwater discharge associated with construction activities for construction activities that disturb more than 1 ac and discharge pollutants to surface waters. A Stormwater Pollution Prevention Plan would be developed, including submitting a Notice of Intent (NOI) to the WQCD.

Colorado OAHP and SHPO: A Cultural Resources Inventory Report was submitted to the Colorado OAHP, which serves as the SHPO office for concurrence, with a determination No Adverse Effect to Historic Properties. A SHPO concurrence letter, dated April 2, 2021, was received and has been included in Appendix A. In the event that cultural/archaeological resources are found during construction activities, construction would stop and the appropriate agencies would be notified according to NRCS protocol.

Colorado Division of Reclamation, Mining and Safety: If extraction of construction materials is needed from a source that does not have an existing mining permit, a mining operations permit would be required in order to extract materials.

8.4.3 Local

Grand County Permits: Any additional required county permits would be obtained prior to construction.

8.5 Installation and Financing

8.5.1 Planned Sequence of Installation

The SLOs would complete all approvals and permits for the Project prior to the start of construction, which may take up to 1 year to obtain. Construction activities are anticipated to occur over two seasons between May and November in 2022 and 2023. The following summarizes the proposed sequencing of main components for construction activities:

Season 1 (May to November 2022):

- Dewater reservoir (to be initiated as soon as possible following decrease in spring runoff flows);
- Install the new dam embankment and begin armoring;
- Grade the corridor and channel for the new connectivity channel;
- Install the diversion structure;
- Grade areas of Colorado River downstream of Windy Gap Dam and install bank stabilization;
- Seed and plant areas where appropriate.

Season 2 (May to November 2023):

- Allow for filling of the reservoir, as necessary, during spring runoff;
- Dewater Reservoir (to be initiated as soon as possible following decrease in spring runoff flows);
- Finish armoring the new dam embankment;
- Remove Fraser weir, regrade Fraser River, and install grade control and river gage;
- Install grade control in the Colorado River near new diversion structure;
- Construct the connectivity channel confluence at the new diversion structure;
- Raise the low block of the principal spillway;
- Additional grading, fill, material placement, and bank protection installation along the; connectivity channel
- Seed and plant areas where appropriate;
- Fill reservoir.

8.5.2 Responsibilities

This Watershed Work Plan sets forth the responsibilities of NRCS and the SLOs. The roles and responsibilities for NRCS and the SLOs would be in accordance with this Plan-EA, the Watershed Agreement, MOU, and the O&M Agreement. The NRCS is responsible for leading the planning efforts and providing engineering support. The SLOs are responsible for environmental permits and construction implementation. NRCS or the SLOs are responsible for the Project design. NRCS would assist the SLOs during construction by providing oversight and certifying completion of the Project.

8.5.3 Contracting

Improvements installed through NRCS funding mechanisms would be procured using awarded contracts. The SLOs would oversee and administer construction of the Project in coordination with NRCS.

8.5.4 Real Property and Relocations

The land planned for modification and disturbance is primarily on lands owned by NCWCD. Real property rights may be required to obtain construction access on private lands within the Project area (Appendix C – Map C9). Easements for these areas would need to be obtained by the SLOs prior to construction and are anticipated to cost up to $25,000.

8.5.5 Emergency Action Plan

The November 2019 Emergency Action Plan (EAP) is the most up-to-date plan describing actions to recognize and respond to emergency and non-emergency events under the existing dam configuration. A new EAP must be completed by the SLOs to address the changes to the dam and must be prepared as a stand-alone document. The EAP assists the dam SLOs in recognizing and responding to emergency and non-emergency events. NRCS would need to concur with the EAP prior to the execution of fund-obligating documents for modifications to the dam. EAPs shall be reviewed and updated by the SLOs annually for consistency with the Project and to include all local points of contact necessary for an emergency response.

8.5.6 Financing

The watershed plan must be authorized before funding may be made available for Project operations. NRCS funding for construction costs for watershed protection are variable but are typically funded up to 75%. Because other funding has already been secured on 46% of the construction cost by the SLO's, NRCS will be funding construction for the remaining 54% from the Watershed Protection and Flood Prevention Act (PL 83-566, as amended by PL 106-472). The SLOs have also secured funding for 37% of design engineering and NRCS would fund the remaining 63%. Both NRCS and the SLOs would bear Project administration costs that each incurs.

Funding for O&M of the Project after construction would be derived from normal revenues of the SLOs. This O&M cost would be budgeted annually so that the facilities are kept in good condition and meeting current NRCS and state regulations.

8.6 Operation and Maintenance

Operation of the dam and appurtenances includes the administration, management, and performance of non-maintenance actions needed to keep the dam structure safe and functioning as designed. Maintenance includes performance of work, measuring the recording instrumentation data, preventing deterioration of structures, and repairing damage or replacing the structure as needed to prevent failure. Repairing damages to completed structures caused by normal deterioration, droughts, flooding, or vandalism is considered maintenance. Maintenance includes both routine and as-needed measures.

Inspection of the dam is necessary to verify that the structures are safe and functioning properly. The SLO and Colorado Dam Safety are responsible for inspecting the dam on an annual basis as well as after major

events such as floods and earthquakes. Inspection reports would be supplied to the NRCS following each inspection. Inspections and the associated reports would assess the following items:

- Identify the adequacy of O&M activities.
- Identify needed O&M work.
- Identify unsafe conditions, including changes in the use of the floodplain below the dam.
- Specify ways of relieving unsafe conditions or performing other needed work.
- Set action dates for performing corrective actions.

Northern Water would continue to be responsible for the operation, maintenance, rehabilitation, and future modifications to the dam, and the estimated annual O&M cost is $19,000. A specific O&M Plan would be prepared by NRCS and the SLO in accordance with the NRCS National Operation and Maintenance Manual (NRCS 2003). This plan and agreement would be entered into prior to the start of construction activities and would be in place for the evaluated life of the Project. The agreement would provide for inspections, reports, and procedures for performing the maintenance items. The agreement would include specific provisions for retention, use, and property improved with PL83-566, as amended by PL106-472, assistance.

In addition to the O&M Plan, the SLO is preparing a post-construction monitoring plan which includes, but is not limited to, the following physical, chemical, and/or biological parameters: river flow, floodplain characteristics, river channel dimensions, fish presence, macroinvertebrates, temperature, habitat conditions, large woody debris, noxious weeds, and public access impacts. This plan will be coordinated with the appropriate permitting agencies and stakeholders and will be finalized prior to construction completion.

8.7 Costs

The installation cost estimate for the Preferred Alternative is $27,145,000, as identified in Table 8-1 and Appendix D. Economic tables have been included to present information relevant to the costs and benefits of the Preferred Alternative. Structural tables have been included to present the relevant structural information pertinent to the design of the Preferred Alternative. Detailed structural designs and construction cost estimates would be prepared for the Project during the final design phase and prior to the start of the competitive bidding process. The final cost of the Project would be the price received from the winning construction bid plus or minus the amount of contract modifications. Assessments, considerations, and calculations are based on a 100-year evaluation period and a discount rate of 2.5%.

The estimated installation cost in Table 8-1 (NWPM Economic Table 1) documents the total costs for each work of improvement by federal agency and land ownership category. There are no federal lands located within the modification extents, and therefore, all works of improvement would take place on non-federal lands. Works of improvement include four groups of measures that are interdependent of each other (connectivity channel, Windy Gap dam modifications, diversion structure, and the Fraser weir).

Table 8-1. Estimated Installation Cost Watershed Protection Measures

Colorado River Headwaters Connectivity Project
Windy Gap Watershed, Colorado
(Dollars)[1/]

Works of Improvement	PL83-566 Funds [2/]	Other Funds [2/]	Total
Connectivity Channel	$5,464,000	$4,865,500	**$10,329,500**
Windy Gap Dam Modifications	$5,176,500	$4,587,000	**$9,763,500**
Diversion Structure	$3,452,000	$3,057,000	**$6,509,000**
Fraser Weir	$288,000	$255,000	**$543,000**
Total Project	**$14,380,500**	**$12,764,500**	**$27,145,000**

1/ Price base: 2020 Prepared April 2021

2/ All works of improvement are on non-federal land.

The structural data in Table 8-2 (NWPM Structural Table 3) shows important physical characteristics for the Preferred Alternative.

Table 8-2. Structural Data – Dams with Planned Storage Capacity

Colorado River Headwaters Connectivity Project
Windy Gap Watershed, Colorado

Item	Unit	Preferred Alternative
NRCS Hazard Class of Structure	-	Significant
Seismic Zone	-	1
Total Uncontrolled Drainage Area	sq mi	334.3
Total Controlled Drainage Area	sq mi	444.8
Total Drainage Area	sq mi	779.1
Runoff curve N. (1-day) (AMC II)	-	43 to 87 sub basin range
Time of concentration (Tc) 1/	hours	12
Elevation top dam	ft (NAVD 88)	7842.5
Elevation crest spillway	ft (NAVD 88)	7832.5
Elevation crest high stage inlet	ft (NAVD 88)	N/A
Elevation crest low stage inlet	ft (NAVD 88)	N/A
Spillway type	-	Concrete Ogee
Spillway bottom width	ft	345
Spillway exit slope	%	N/A
Maximum Height of Dam	ft	25
Volume of Fill in Dam Embankment	cy	75,000 (existing) 60,000 (new)

Item	Unit	Preferred Alternative
Total Capacity 2/	ac-ft	300 to 445
Sediment Submerged	ac-ft	30
Sediment Aerated	ac-ft	0
Beneficial Use (municipal water supply) 2/	ac-ft	270 to 415
Floodwater Retarding	ac-ft	0
Between high and low stage inlet	ac-ft	N/A
Surface Area		
Sediment Pool	ac	10
Beneficial Use Pool (municipal water supply)	ac	74
Floodwater Retarding Pool	ac	N/A
Spillway Design		
Capacity of Low Stage (max) 3/	cfs	45,500
Capacity of High Stage (max) 3/	cfs	45,500
Dimension of Conduit	inches	N/A
Type of Conduit	N/A	N/A
Frequency of Operation Spillway (assumes a full sediment pool)	% chance	N/A
Principal Spillway Hydrograph		
Rainfall Volume 4/	inches	2.96
Runoff Volume 5/	inches	0.74
Storm Duration	hours	24
Velocity of Flow (Ve)	ft/s	44
Maximum Spillway Discharge	cfs	8,920
Max. Reservoir Water Surface Elevation	ft (NAVD 88	7836.1
Freeboard Hydrograph		
Rainfall Volume 4/	inches	5.11
Runoff Volume 5/	Inches	2.00
Storm Duration	hours	72
Max. Reservoir Water Surface Elevation	ft	7837.8
Capacity Equivalents		
Sediment Volume	inches	N/A
Floodwater Retarding Volume	inches	N/A
Beneficial Volume (municipal water supply)	inches	N/A

1/ Tc was estimated for the 334.3 sq-mi uncontrolled drainage area. Prepared April 2021
2/ Total capacity of the reservoir below the spillway crest is dependent on how much dredging is done (if any) and how much borrow material would be excavated from the reservoir. This would be estimated as part of the design and would be confirmed as part of the construction effort.
3/ The principal spillway would be an open chute with a constant elevation at 7832.5 ft (does not have a low or high stage) and a maximum capacity of about 45,500 cfs.
4/ Aerially adjusted rainfall with climate factor increase
5/ Does not include baseflow/snowmelt volume

N/A – Not Applicable for dams with concrete spillways

The structural data in Table 8-3 (NWPM Structural Table 3b) shows the connectivity channel details for the Preferred Alternative. Figure 8-1 below depicts the reaches described in Table 8-3.

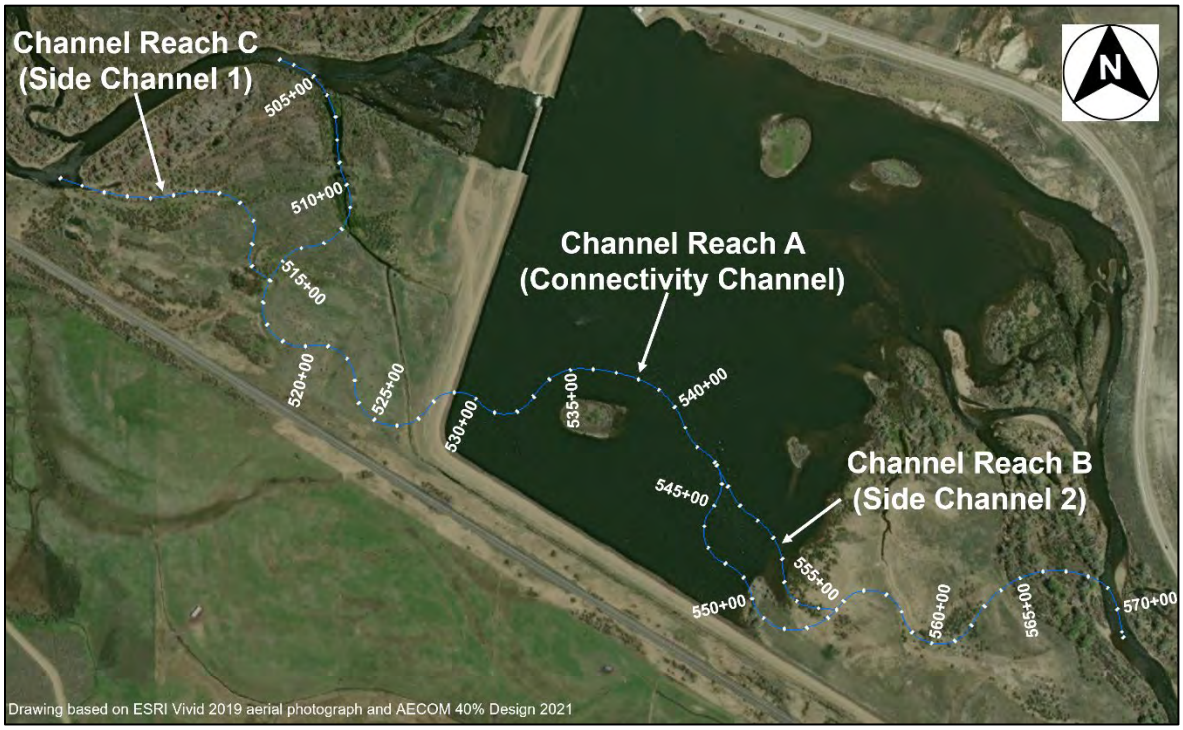

Figure 8-1. Channel Reaches for Channel Work

Table 8-3. Structural Data - Channel Work

Colorado River Headwaters Connectivity Project
Windy Gap Watershed, Colorado

Channel Reach	Station	Drain Area (mi^2)	Year Freq Design Dischg. (cfs)	Frequency Design Discharge (yr) 1/	Water Surface Elevation (ft)	Hydraulic Gradient (ft/ft)	Channel Dimensions				*n* Value		Velocities (ft/s)		Excavation Volume (yd^3)	Type of Work 2/	Existing Channel Type	Present Flow Condition
							Gradient (ft/ft)	Bottom Width (ft)	Elevation (ft)	Side Slope (H:V)	Aged	As-Built	Aged 3/	As-Built 3/				
A	504+00 to 569+00	779.1	550	1.5	7814.5 to 7837.8	0.0036	0.0033	40	7812.7 to 7834.5	2.5:1 to 4.0:1	0.04	0.04	3.6	3.6	107,943	I	M, 1985	S
B	554+30 to 543+00 (4/)	779.1	209	1.5	7826.0 to 7832.6	0.0058	0.012	15	7822.7 to 7831.4	2.5:1 to 4.0:1	0.04	0.04	4.6	4.6	2,713	I	M, 1985	S
C	516+00 to Colorado River (4/)	779.1	156	1.5	7812.7 to 7817.5	0.004	0.005	15	7811.1 to 7817.5	2.5:1 to 4.0:1	0.04	0.04	3.7	3.7	4,883	I	M, 1985	S

A = Connectivity Channel, B = Side Channel 1, C = Side Channel 2 Prepared April 2021

1/ Where excavation is no planned, show cross-sectional area and wetted perimeter below hydraulic grade lines.

2/ I Establishment of new channel including necessary stabilization measures.
II Enlargement or realignment of existing channel or stream.
III Cleaning out natural or manmade channel (including bar removal and major clearing and snagging operations).
IV Clearing and removal of loose debris within channel section.
V Stabilization as primary purpose (by continuous treatment or localized problem areas – present capacity adequate).

3/ Velocities are based on design bankfull.

4/ Stationing is approximate, based on Connectivity Channel Stationing.

Project costs were annualized over a 100-year evaluation period and accounting for a 2-year installation period using net present value (NPV) techniques. Table 8-4 (NWPM Economic Table 4) shows the estimated average annual Preferred Alternative costs.

Table 8-4. Estimated Average Annual Costs

Colorado River Headwaters Connectivity Project
Windy Gap Watershed, Colorado
(Dollars) 1/

Improvements	Project Outlays Amortization of Installation Cost 2/	Project Outlays Amortization of O&M and Replacement Cost 2/	Total
Connectivity Channel and Wind Gap Dam/Fraser Weir	$714,500	$9,500*	**$724,000**

1/ Price base: 2020. Prepared April 2021

2/ Calculated using FY 2021 Water Resources Discount Rate (2.5%), annualized over 100-year evaluation period, and using 102-year period of analysis.

* O&M cost is the difference between the No Action O&M and the Preferred Alternative O&M.

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10.0 List of Preparers

10.1 Plan-EA Preparers

Table 10-1 lists the people who participated in the preparation of this document.

Table 10-1. List of Preparers

Name	Title (Years of Experience)	Education	Other
NRCS – Colorado			
John Andrews	40+	B.S. - Agricultural Science B.S. - Agricultural Engineering M.S. - Environmental Engineering	P.E., CO & IL CPESC
Ana Vargo	Geologist (25+)	B.S. – Geology M.S. – Geology	Utah P.G.
Krystal Phillips	State Biologist (15)	B.A. – Biology M.A.S. – Environmental Policy	
Craig Dengel	State Cultural Resources Specialist (15)	B.A. – Sociology and Anthropology M.S. – Geography Ph.D. ABD. – Anthropology	
Adaptive Environmental Planning, LLC (Plan-EA Preparation)			
Greg Allington	Project Manager/Biologist (15+)	B.S. – Wildlife Ecology	
Bobbi Preite	Natural Resources Consultant (15+)	B.S. – Geology	
McMillen Jacobs Associates (GIS Maps)			
Laura Johnson	Licensing and Regulatory Consultant (17+)	B.S. – Biology M.S. – Aquatic and Fishery Sciences	
Long Watershed Planning Economics, LLC (Economic Analysis)			
John Long	Economist (20+)	B.S. – Agricultural Economics	
AECOM (Concept Design)			
Greg Glunz	Sr. Civil Engineer	M.S. Agricultural Engineering	PE, Colorado
John Sikora	Sr. Civil Engineer	M.S. Agricultural Engineering	PE, Colorado
Northern Water (SLO)			
Sean Henry	Environmental Compliance Specialist (16)	B.A. Geography, Environmental Analysis	
Curtis Hartenstine	Water Quality Manager	B.S. Forest Ecology M.S. Environmental Science Water	
Jen Stephenson	Water Quality Monitoring and Compliance Coordinator (15+)	B.S. Watershed Science	
Mark Coleman	Aquatic Ecologist	B.S. Zoology M.S. Zoology Ph.D. Fishery and Wildlife Biology	
Kevin Lock	Project Manager (10)	B.S. Geological Engineering	PE, Colorado
Jeff Drager	Director of Engineering (38)	B.S. Civil Engineering M.S. Water Resources Engineering	PE, Colorado, California

11.0 Distribution List

This section lists the government agencies and organizations that are included on the Project distribution list for the scoping notice and notices of availability for the Draft Plan-EA, Final Plan-EA, and FONSI.

11.1 Federal Government

BLM
Bureau of Reclamation
USACE
U.S. Environmental Protection Agency
USFWS

11.2 State Government

U.S. Representative
U.S. Senators
Colorado Representative
Colorado Senator
Colorado State Land Board
Colorado Department of Public Health & Environment
Colorado Reclamation Mining & Safety Division
Colorado Water Conservation Board
Colorado River Water Conservation District
Colorado Division of Water Resources
Colorado Natural Heritage Program
Colorado Department of Agriculture
Colorado Department of Transportation
Colorado Parks & Wildlife
Colorado Forestry Division
Colorado Department of Natural Resources
Colorado OAHP
Colorado State Engineer's Office

11.2.1 Local Government

Town of Granby
Grand County
Town of Hot Sulphur Springs
Town of Kremmling
Town of Fraser
Town of Winter Park

11.2.2 Business and Organizations

American Rivers
Colorado Headwaters Partners
Conservation Colorado
Western Resource Advocates
Platte River Power Authority
Colorado River Headwaters Chapter of Trout Unlimited
Colorado Trout Unlimited
Nature Conservancy Colorado
Upper Colorado River Alliance
Denver Water
Western Area Power Administration

11.2.3 Tribes

Apache Tribe of Oklahoma
Arapaho Tribe of the Wind River Reservation
Cheyenne and Arapaho Tribes of Oklahoma
Cheyenne River Sioux Tribe Comanche Nation of Oklahoma
Comanche Nation
Crow Creek Sioux Tribe of the Crow Creek Reservation
Eastern Shoshone Tribe of the Wind River Reservation
Fort Belknap Indian Community
Fort Sill Apache Tribe
Jicarilla Apache Tribe
Kiowa Tribe
Mescalero Apache Tribe

Northern Cheyenne Tribe Oglala Sioux Tribe
Oglala Sioux Tribe
Pawnee Nation of Oklahoma
Rosebud Sioux Tribe
Shoshone-Bannock Tribes
Southern Ute Indian Tribe
Standing Rock Sioux Tribe
Ute Indian Tribe of the Uintah & Ouray Reservation, Utah
Ute Mountain Ute Tribe

11.2.4 Private Parties

The names and addresses of private parties who received scoping notices, notice of the Draft Plan-EA, and notice of the Final Plan-EA and FONSI are not listed in this section for privacy.

12.0 Acronyms, Abbreviations, and Short Forms

ac	acre
ACB	articulated concrete block
ac-ft	acre-feet
APCD	Air Pollution Control Division
BE	Biological Evaluation
BMPs	Best Management Practices
C-BT	Colorado-Big Thompson Project
CDA	Colorado Department of Agriculture
CDPHE	Colorado Department of Public Health and Environment
Census Bureau	U.S. Census Bureau
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
CO_2	carbon dioxide
CPW	Colorado Parks and Wildlife
CWA	Clean Water Act
DM	Daily Maximum
Draft Plan-EA	Draft Watershed Plan and Environmental Assessment
EA	Environmental Assessment
EAP	Emergency Action Plan
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	feet
GHG	greenhouse gas
H&H	hydrology and hydraulic
HEC-RAS	Hydrologic Engineering Center River Analysis System
HUC	Hydrologic Unit Code
IDF	Inflow Design Flood
IPaC	Information for Planning and Consultation
IR	Integrated Water Quality Monitoring and Assessment Report
LF	linear feet
M&E	Monitoring and Evaluation
MBCC	Migratory Birds of Conservation Concern

MBTA	Migratory Bird Treaty Act
MWAT	Mean Weekly Average Temperature
NAVD	North American Vertical Datum
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	nitrous oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	U.S. Department of Agriculture Natural Resources Conservation Service
NRHP	National Register of Historic Places
NCWCD	Northern Colorado Water Conservancy District
NWCCOG	Northwest Colorado Council of Governments
NWPH	National Watershed Program Handbook
NWPM	National Watershed Program Manual
O_3	ozone
O&M	Operations and Maintenance
OAHP	Office of Archaeology and Historic Preservation
Pb	Lead
PL	Public law
Plan-EA	Watershed Plan and Environmental Assessment
PM	particulate matter
ROD	Record of Decision
SEO	Colorado State Engineer's Office
SHPO	State Historic Preservation Office
SIT	State Inventory Tool
SLO	Sponsoring Local Organization
SO_2	sulfur dioxide
sq mi	Square-mile
Subdistrict	Municipal Subdistrict, Northern Colorado Water Conservancy District
TMDL	total maximum daily load
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQCD	Water Quality Control Division