

FEASIBILITY STUDY: LITTLE KING RANCH DAM REHABILITATION PROJECT

Prepared for:

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and

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Feasibility Study Approval

Pursuant to Colorado Revised Statutes 37-60-121 & 122, and in accordance with policies adopted by the Board, the CWCB staff has determined this Feasibility Study meets all applicable requirements for approval.

Zachary Salin

Signed

5/23/2025

Date

February 2025

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Appendices:

- A. Evaluation and Potential Mitigation Cost Memorandum**
- B. Outlet Works Inspection Memorandum**
- C. Emergency Action Plan**
- D. Geotechnical Data Report**
- E. Dam Safety Evaluation and Concept Design Report**
- F. Geotechnical Data Report Addendum**
- G. Cultural Resource Survey Report**
- H. Dam Hazard Classification and Hydrologic Hazard Assessment Report**
- I. Design Summary Report**
- J. Wetland Delineation Report**
- K. Construction Drawings**
- L. Construction Specifications**
- M. Value of Kings Reservoir Water Memorandum**
- N. Project Sponsor Business Documentation**
- O. U.S. Forest Service Special Use Permit**
- P. Project Construction Cost Estimates**
- Q. Project Sponsor Revenue and Expense Projections**
- R. Project Sponsor Income Statement and Balance Sheet**

1. Background

1.1. Purpose

- a. **Type:** The project supports rehabilitation of a restricted dam (Little King Ranch Dam) and reservoir (Kings Reservoir) owned by the project sponsor (Circle C Ranches, LLC) and located on one of the project sponsor's properties (King Mountain Ranch).
- b. **Loan:** The project sponsor requests a loan with a 40-year term and a 2.35-percent interest rate in the amount of \$9,819,513 associated with the construction component of project implementation costs.
- c. **Intent:** The project is intended to rehabilitate the restricted dam and reestablish the full operational capability of the reservoir.
- d. **Need:** The project is necessary to address regulatory compliance and dam safety issues and allow the removal of an existing state-mandated water storage restriction on Kings Reservoir.
- e. **Historical Issues:**

Little King Ranch Dam consists of an embankment dam, outlet works, and a spillway. The dam was constructed in 1968 across Buffalo Creek and consists of a zoned earth embankment approximately 500 feet long and 58 feet high (crest elevation (EL.) 8887.01). The reservoir storage volume is approximately 1,062 acre-feet (ac-ft) at the spillway crest, at EL. 8880.0. The storage is currently restricted by the State Engineer's Office (SEO) to zero-storage with the outlet works gate open from November 1 to May 31 each year and is restricted to gage height 25 (approximately EL. 8854.5), which is at about 242 ac-ft of storage, throughout the remainder of the year. The spillway is at gage height 50.5 (EL. 8880.0).

The reservoir began filling during construction (at one point, the reservoir level rose 45 feet in 6 days). Almost immediately, significant seepage was observed exiting the sides of the stream channel downstream of the embankment. Grouting was reportedly performed in the south (right) abutment during May and June 1969. Approximately 10,005 barrels of cement, plus four semi-truck loads of sack cement, were used during grouting. Grout was reportedly mixed using 3.5 percent bentonite along with sand and sawdust.

In May 1970, seepage through the left abutment bedrock caused a small slope failure in the downstream shell material. The slope failure was reportedly repaired by 1) placing buttress fill to repair and stabilize the downstream slope, 2) applying bentonite slurry and powdered polymer gel to the natural ground surface along both upstream abutments in an attempt to reduce seepage, and 3) injecting sodium silicate chemical grout into seven holes. Holes were drilled from the dam crest, between the left abutment and about 175 feet south of the left abutment, and extended 10 to 20 feet below the top of bedrock.

Despite the previous seepage reduction attempts, significant seepage continued and has been documented emerging along the downstream toe of the embankment, near the outlet works outlet structure, along the left downstream grain, and extending along the right abutment and stream channel up to 300 feet downstream of the dam. The SEO placed storage restrictions on the dam because of the significant ongoing seepage. The first restriction, to gage height 41 (El. 8870.5), was placed on the dam in 1973; however, this did not adequately reduce the seepage. A second restriction, to gage height 25 (El. 8854.5), was placed on the dam in 2010. In 2014, after several incidents where the reservoir level exceeded the restricted level, the SEO placed a zero-storage restriction on the dam between November 1 and May 31.

In 1991, the toe drainpipe was rehabilitated by replacing the corroded downstream portion with new polyvinyl chloride (PVC) pipe. The new PVC pipe discharges into the left side of the stream about 14 feet downstream of the outlet works outlet structure. This rehabilitation has reportedly mitigated historical seepage that exited near the outlet works outlet structure.

The dam condition is currently rated as Unsatisfactory by the SEO due to:

- Excessive seepage
- Excessive vegetation
- Questionable hazard classification
- Questionable spillway size

f. **Opportunities:** The project would address the issues noted above, reestablish the full operational capability of Little King Ranch Dam and Kings Reservoir, and generate the following opportunities for King Mountain Ranch to fully utilize the structure's following decreed water rights:

- **Recreation:** Reestablish an onsite commercial resort community.
- **Fishery:** Management of reservoir pool levels and water releases for effective improvement of the habitat for and the propagation of critical fish species within the reservoir and downstream in Buffalo Creek, Willow Creek, and the Colorado River. The project sponsor is currently in negotiations with Colorado Water Trust to enter into related agreements with Colorado Water Conservation Board, Colorado River Water Conservation District, and Colorado Parks and Wildlife.
- **Fire:** Use of reservoir water to allow effective control of wildland fire activity that could occur onsite and throughout the region.
- **Stock:** Use of reservoir water for onsite livestock consumption.
- **Irrigation:** Use of reservoir water to irrigate onsite lawns and vegetation.
- **Augmentation:** Use of reservoir water releases to replace depletions from reservoir evaporation and pumping of onsite groundwater wells. Reservoir releases could also be used to replace depletions from Willow Creek and the Colorado River made by other water users interested in augmentation.

- g. **Importance:** The project is important to the project sponsor to address the noted issues, generate the opportunities named above, and enhance property value.
- h. **Expectations:** The project sponsor expects the state to lift current reservoir water storage restrictions after project construction is complete (anticipated in 2025), allowing continuation of decreed reservoir pool levels (anticipated in 2026).

1.2. Study Area Description

The study area is in Grand County, Colorado, about 15 miles northwest of Granby, Colorado, in Section 4, Township 3 North, Range 78 West of the 6th Principal Meridian and in Sections 33 and 34, Township 4 North, Range 78 West of the 6th Principal Meridian. The project site is located along Buffalo Creek, a tributary to Willow Creek, a tributary to the Colorado River. Little King Ranch Dam is located on private property (King Mountain Ranch) owned by the project sponsor, which is bounded by U.S. Forest Service (USFS) land and accessed via Forest Road NFSR 108.1 (Buffalo Creek Road). The topography surrounding the study area includes forested hills sloping toward the Buffalo Creek valley with elevations on the private property ranging from approximately 9,200 feet to 8,840 feet. Historically used to support a commercial resort community, the study area is currently unpopulated, supports hunting activities, and is anticipated to be developed in the future to reestablish a commercial resort community. Key maps and plans of the study area are included in the appendices as noted below in **Section 1.3. Previous Studies** on **Table 1: Completed Project Studies**.

1.3. Previous Studies

Table 1 lists key studies, maps, and plans that have been completed for project implementation.

Table 1: Completed Project Studies

Date	Study	Reference	Key Maps and Plans
Jul 2019	Evaluation and Potential Mitigation Cost Memo	Appendix A	---
Dec 2020	Outlet Works Inspection Memo	Appendix B	---
Apr 2021	Emergency Action Plan	Appendix C	---
Jan 2022	Geotechnical Data Report	Appendix D	---
Mar 2022	Dam Safety Evaluation and Concept Design Report	Appendix E	---
May 2023	Geotechnical Data Report Addendum	Appendix F	---
Jul 2023	Cultural Resource Survey Report	Appendix G	Figures: 1, 2, A1
Jun 2024	Dam Hazard Classification and Hydrologic Hazard Assessment Report	Appendix H	Figure: 2.1
Jun 2024	Design Summary Report	Appendix I	Figure: 2.1
Sep 2024	Wetland Delineation Report	Appendix J	Figure: 1
Oct 2024	Construction Drawings	Appendix K	Sheets: 1, 4-5, 8-9, 12-15
Oct 2024	Construction Specifications	Appendix L	---
Jan 2025	Value of Kings Reservoir Water Memo	Appendix M	---

2. Project Sponsor

- a. **Background:** The project sponsor is Circle C Ranches, LLC, a private Limited Liability Company with a single member (David Phelps) that was formed on October 7, 2020,

pursuant to § 7-90-301 and § 7-80-204 of the Colorado Revised Statutes (C.R.S.). A copy of the Articles of Organization and Operating Agreement is included in **Appendix N: Project Sponsor Business Documentation**.

- b. **History:** From 2016 through 2023, Mr. Phelps made approximately 20 land acquisitions (over 18,000 acres) throughout the state of Colorado that include approximately one dozen active agricultural ranches (over 17,000 acres) with ample fields used for hay production and raising cattle. The ranches include an abundance of senior water rights and ditch systems used primarily for agricultural irrigation purposes. To support ranch activities, Mr. Phelps has hired numerous ranch workers and has purchased a large quantity of farm equipment. To best consolidate the use of ranch personnel and equipment over the ranching platform, Mr. Phelps formed his ranch management company, Circle C Ranches, LLC, in 2020. This single entity manages all the combined ranching operations allowing efficient use of available resources and a single point of sale for efficient marketing of agricultural products (<https://www.circlecranches.com/>).
- c. **Revenue:** Revenue sources for the project sponsor include the sale of hay, cattle, and livestock genetics products and services.
- d. **Water Supply Facilities:** The project sponsor does not own or operate any public water supply facilities. Private water supply facilities owned and operated by the project sponsor include Little King Ranch Dam and Kings Reservoir at King Mountain Ranch; Matheson Dam and Reservoir used for agricultural irrigation at another of the project sponsor's ranches in Grand County; numerous agricultural irrigation ditches on approximately one dozen of the project sponsor's ranches; and numerous groundwater supply wells on approximately 20 of the project sponsor's properties.

3. Water Rights

3.1. Water Supply Availability

Little King Ranch Dam is an on-channel structure across Buffalo Creek, which is the sole source of surface water supplying Kings Reservoir. The Buffalo Creek channel extends from its headwaters two miles northwest of Little King Ranch Dam to its confluence with Willow Creek 2.5 miles southeast of the dam. The primary source of streamflow in Buffalo Creek is surface water runoff responding to seasonal snowmelt and periodic rainfall. Buffalo Creek is an ungauged stream where historical streamflow data is not available for tabulation or analysis.

The Buffalo Creek watershed covers 7,320 total acres of remote and primarily undeveloped forestland with the uppermost 1,419 acres of that area draining to Kings Reservoir. The U.S. Forest Service (USFS) owns 96 percent (7,018 acres) of the 7,320-acre watershed, with the remaining four percent (302 acres) of the watershed owned by the project sponsor (King Mountain Ranch). The remote and undeveloped characteristics of a watershed with few landowners has historically resulted in few decreed water structures within this region. **Figure 1** portrays the approximate locations of nine decreed structures in the Buffalo Creek watershed.

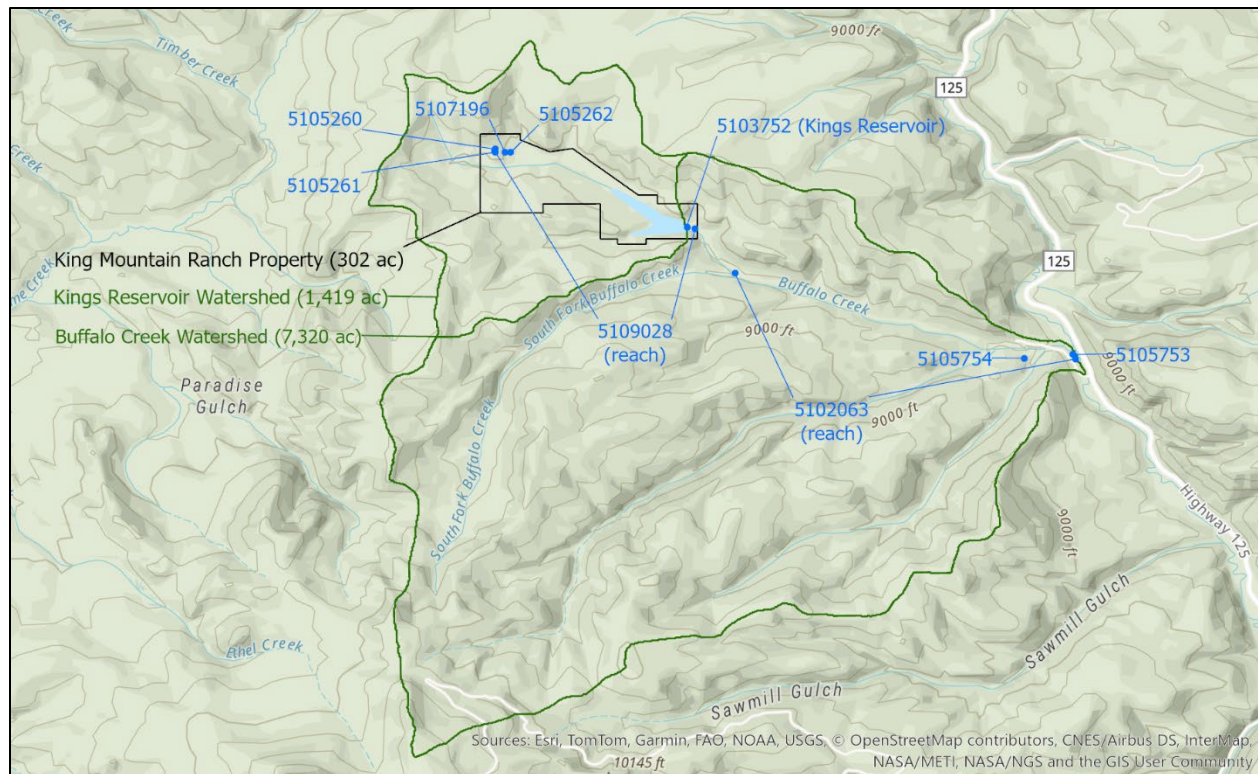


Figure 1: Decreed Structures in Buffalo Creek Watershed

Table 2 includes a tabulation of water rights information associated with the nine decreed structures located in the Buffalo Creek watershed. As noted below, the project sponsor owns the first six of nine listed structures and their associated water rights.

Table 2: Water Rights for Decreed Structures in Buffalo Creek Watershed

WDID	Structure Name	Type	Source ¹	Use ²	Amount ³	Unit ⁴	Appro Date	Adjud Date
5103752	Kings Reservoir ⁵	Reservoir	SW	169	37.350	AF	07/31/1947	05/30/1972
				5679	1,090.000	AF	11/03/1967	12/31/1987
5109028	The Colorado Resort Aug Plan Depletion Reach ⁵	Reach ⁸	SW GW	A	---	---	---	12/31/1988
5107196	The Colorado Resort Augmentation Plan ⁵	Augment/ Replace ⁹	SW GW	A	---	---	---	12/31/1988
5105260	Little King Ranch Well 2 ⁵	Well	GW	38	0.044	CFS	06/02/1960	12/31/1982
5105261	Little King Ranch Well 3 ⁵	Well	GW	38	0.044	CFS	08/02/1966	12/31/1982
5105262	Little King Ranch Well 4 ⁵	Well	GW	38	0.088	CFS	08/02/1966	12/31/1982
5102063	Min Flow Buffalo Creek ⁶	MinFlow ¹⁰	SW	M	1.000	CFS	11/08/1985	12/31/1985
5105754	BC SHG-D Spring ⁷	Spring	SW	78	0.001	CFS	01/10/1972	12/31/1972
5105753	BC SHG-C Well ⁷	Well	GW	78	0.001	CFS	10/08/1968	12/31/1972

¹ Source: All water rights for listed structures are sourced from Buffalo Creek (SW = Surface Water; GW = Groundwater).

² Use: 1 = Irrigation; 3 = Commercial; 5 = Recreation; 6 = Fishery; 7 = Fire; 8 = Domestic; 9 = Stock; A = Augmentation; M = Minimum Streamflow

³ Amount: All listed amounts have an adjudication status of 'absolute'.

⁴ Unit: AF = acre feet (water right decreed to storage); CFS = cubic feet per second (water right decreed to direct flow).

⁵ Active structure and water right(s) owned exclusively by the project sponsor.

⁶ Active structure and water right owned exclusively by the State of Colorado (Colorado Water Conservation Board).

⁷ Active structure and water right owned exclusively by the U.S Forest Service (Arapaho National Forest).

⁸ Decreed augmentation plan depletion reach with an upper and lower terminus as portrayed on the previous figure.

⁹ Decreed augmentation plan for Kings Reservoir releases to replace evaporation and groundwater well depletions.

¹⁰ Decreed minimum instream flow reach with an upper and lower terminus as portrayed on the previous figure.

Based on state records, 25 well permit applications were historically filed for locations within the 7,320-acre Buffalo Creek watershed, and 15 of those applications have expired or were denied. The remaining ten permit applications are associated with ten existing wells that were constructed on King Mountain Ranch property and are owned by the project sponsor, and six of those constructed wells are used exclusively for groundwater monitoring purposes on or near Little King Ranch dam. The remaining four existing wells (Permits Numbers 5282, 28274, 14307F, and 32293F) were constructed between 1960 and 1987 to supply groundwater to King Mountain Ranch's commercial resort community for domestic and commercial purposes and are no longer used since the resort became non-operational.

3.2. Water Supply Demands

As described in the previous section, with only two landowners (USFS and the project sponsor), the remote and undeveloped characteristics of the Buffalo Creek watershed have historically resulted in few decreed water structures and water rights within this region. These conditions illustrate a watershed with ample water supply availability and relatively minor water supply demands that are anticipated to continue in the future.

Based on the water rights and groundwater well information presented in the previous section, existing and foreseeable water demands within the Buffalo Creek watershed are primarily limited to demands associated with the decreed water rights owned by the project sponsor. These water demands include annual storage of up to 1,090 acre-feet of Buffalo Creek streamflow in Kings Reservoir used for irrigation, recreation, fishery, fire, stock, and augmentation purposes; and for use of groundwater that is hydraulically connected to surface water flows in Buffalo Creek through pumping (up to 0.176 cfs) of King Mountain Ranch wells for domestic and commercial purposes.

Plans are being made to operate Little King Ranch Dam and Kings Reservoir pool levels and water releases for effective improvement of the habitat for and the propagation of critical fish species within the reservoir and downstream in Buffalo Creek, Willow Creek, and the Colorado River. The project sponsor is currently in negotiations with Colorado Water Trust (CWT) to enter into related agreements with Colorado Water Conservation Board (CWCB), Colorado River Water Conservation District (CRWCD), and Colorado Parks and Wildlife (CPW). A mutually beneficial agreement with CWCB is anticipated to support the water demand associated with CWCB's decreed water right used for Buffalo Creek minimum instream flows (up to 1 cfs). Other minor potential demands include those associated with USFS's decreed water rights for one spring (up to 0.001 cfs) and one well (up to 0.001 cfs) used for fire and domestic purposes.

Based on the information described above, Buffalo Creek water yields are anticipated to adequately fulfill noted demands with appropriate reliability and without deficit.

4. Project Description

This section documents the project need by assessing existing and future conditions, identifying potential problems and deficiencies, and formulating and evaluating potential solutions.

4.1. Analysis of Alternatives

As noted in **Section 1.1. Purpose**, the condition of Little King Ranch Dam is currently rated as Unsatisfactory by the SEO due to excessive seepage, excessive vegetation, questionable hazard classification, and questionable spillway size. Five alternative concepts were evaluated to provide decision criteria for a preferred alternative.

4.1.1. Alternative 1: Remove and Re-construct Dam

- a. **Description:** This alternative includes complete removal and replacement of the dam allowing the dam foundation and embankment to be completely re-worked and constructed in accordance with modern construction techniques. Foundation treatment would be performed from the original ground surface rather than the top of the embankment allowing the existing alluvium to be removed and replaced using compacted fill.
- b. **Impacts:** Similar to Alternative 2 (see following section).
- c. **Institutional Requirements:** Similar to Alternative 2 (see following section).
- d. **Special Considerations:** Similar to Alternative 2 (see following section).
- e. **Outputs/Yields:** Similar to Alternative 2 (see following section).
- f. **Costs, Economic Analysis, and Feasibility:** Total capital costs (including construction, engineering, permitting, and other miscellaneous costs) were estimated at a reconnaissance-level (low end of a Class 5 estimate) to range from \$8,000,000 to \$10,000,000 (see **Appendix A: Evaluation and Potential Mitigation Cost Memorandum**), which equates to an approximate unit cost of \$8,000 to \$10,000 per acre-foot of water storage. Project benefits would be the same as described in the following section for Alternative 2. Alternative 1 was not selected as the preferred alternative primarily due to costs that were estimated to be significantly higher than the costs estimated for Alternative 2 although the two alternatives would include similar impacts, institutional requirements, special considerations, outputs/yields, and benefits.

4.1.2. Alternative 2: Repair Existing Dam

- a. **Description:** This alternative includes rehabilitation of the embankment dam and appurtenances. The project would be configured to store all inflow from the Inflow Design Flood (IDF). Primary project components would include the following activities as detailed in **Section 4.2. Selected Alternative:**
 - Demolition and Abandonment of Existing Facilities
 - Embankment and Foundation Rehabilitation
 - Outlet Works Rehabilitation
 - Spillway Rehabilitation

b. Impacts:

- **Man-Made Environment:** During construction, approximately 15 acres of the man-made environment (limited to the project sponsor's private property) would be temporarily impacted including: five acres of earthen material excavation from an existing onsite airplane landing strip (material borrow site), five acres of earthen material excavation and replacement at the existing dam site, and five acres of earthen material storage within the existing reservoir pool inundation area. After construction, up to approximately 60 acres of the man-made environment (limited to the project sponsor's private property) would be impacted by seasonal water inundation from the reservoir pool. Project activities are not anticipated to impact any residential/commercial buildings, utilities, historical/archaeological sites, or outdoor recreation activities.
- **Natural Environment:** During construction, approximately five acres of the natural environment (limited to the project sponsor's private property) would be temporarily impacted by earthen material excavation from an unvegetated borrow site adjacent to the existing dam. After construction, up to six acres of the natural environment would be impacted by seasonal water inundation from the reservoir pool including up to four acres of wetland vegetation located on the project sponsor's private property and up to two acres of upland vegetation located on adjacent USFS national forest land. Project activities are not anticipated to impact streamflow, water quality, aquatic wildlife, terrestrial wildlife, threatened and endangered species, forestland, or wilderness areas.

c. Institutional Requirements:

- **Local:** Grand County requires no authorization. Approved engineering plans are required to be provided to Grand County.
- **State:** Engineering design drawings and specifications are required to be approved by the State Division of Water Resources (DWR) State Engineer's Office (SEO).
- **Federal (USFS):** A U.S. Forest Service (USFS) Special Use Authorization (SUA) under the National Environmental Policy Act's (NEPA) Categorical Exclusion (CE) designation is required to allow the reservoir pool to inundate a small area of USFS land adjacent to the private land owned by the project sponsor. Related activities that are required to support the authorization include consultation with the State Historic Preservation Office (SHPO) under the National Historic Preservation Act (NHPA) and consultation with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA).

- **Federal (USACE):** A U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) 404/401 Clean Water Act (CWA) Authorization is required to allow implementation of permanent construction activities. Authorization would be under an NWP 3 (Maintenance), which also covers 401 certification (due to NWP use), and would use SHPO and USFWS consultations from the USFS as noted above.
- d. **Special Considerations:** Extraordinary situations are not anticipated to be encountered during design or construction, except the need to complete construction activities within an abbreviated period (June through October).
- e. **Outputs/Yields:** Annual project yield would be consistent with the water storage rights decreed for Kings Reservoir of up to 1,090 acre feet per year with good year-to-year reliability, as compared to the existing annual yield authorized under current restricted conditions of up to 242 acre-feet per year from June through October.
- f. **Costs, Economic Analysis, and Feasibility:** Total capital costs (including construction, engineering, permitting, and other miscellaneous costs) were estimated at a reconnaissance-level (low end of a Class 5 estimate) to range from \$3,900,000 to \$8,750,000 (see **Appendix A: Evaluation and Potential Mitigation Cost Memorandum**), which equates to an approximate unit cost of \$3,900 to \$8,750 per acre-foot of water storage.

The project would address regulatory compliance and dam safety issues associated with the dam, allow the removal of the existing state-mandated water storage restriction on the reservoir, reestablish the full operational capability of the dam and reservoir, generate opportunities to fully utilize the structure's decreed water rights, and enhance property value. Project beneficiaries could include:

- Critical fish species (habitat and propagation) in Buffalo Creek, Willow Creek, and the Colorado River by effectively operating reservoir pools and releases through mutually beneficial agreements with the Colorado Water Conservation Board, Colorado River Water Conservation District, and Colorado Parks and Wildlife;
- The natural environment of the region by effectively using stored reservoir water to control wildland fire activity;
- A large number of recreational enthusiasts by reestablishing an onsite commercial resort community; and
- The project sponsor by enhancing private property value.

Alternative 2 was selected as the preferred alternative primarily due to costs that were estimated to be significantly lower than the costs estimated for Alternative 1 although the two alternatives would include similar impacts, institutional requirements, special considerations, outputs/yields, and benefits.

4.1.3. Alternative 3: Lower Spillway

- a. **Description:** This alternative includes permanently lowering the reservoir level by lowering the elevation of the spillway to the state-mandated restriction level. Lowering the spillway would require demolition of the existing spillway concrete, excavation to the new spillway level and width, and placement of concrete for a control sill and apron to protect the channel.
- b. **Impacts:**
 - **Man-Made Environment:** During construction, approximately two acres of the man-made environment (limited to the project sponsor's private property) would be temporarily impacted including: approximately one acre of existing spillway concrete demolition, soil excavation, and new spillway concrete placement, and approximately one acre of earthen material storage within the existing reservoir pool inundation area. After construction, up to approximately 20 acres of the man-made environment (limited to the project sponsor's private property) would be impacted by seasonal water inundation from the reservoir pool. Project activities are not anticipated to impact any residential/commercial buildings, utilities, historical/archaeological sites, or outdoor recreation activities.
 - **Natural Environment:** Project activities are not anticipated to impact the natural environment during or after construction (includes no impacts to streamflow, water quality, aquatic wildlife, terrestrial wildlife, threatened and endangered species, forestland, or wilderness areas).
- c. **Institutional Requirements:**
 - **Local:** Grand County requires no authorization. Approved engineering plans are required to be provided to Grand County.
 - **State:** Engineering design drawings and specifications are required to be approved by the State Division of Water Resources (DWR) State Engineer's Office (SEO).
 - **Federal (USACE):** A U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) 404/401 Clean Water Act (CWA) Authorization is required to allow implementation of permanent construction activities. Authorization would be under an NWP 3 (Maintenance), which also covers 401 certification (due to NWP use). Related activities that are required to support the authorization include consultation with the State Historic Preservation Office (SHPO) under the National Historic Preservation Act (NHPA) and consultation with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA).

- d. **Special Considerations:** Seepage and loss of water from the reservoir and repair of the outlet works would not be addressed using this alternative. It is possible that the spillway may need to be widened to pass the inflow design flood depending on the hydrologic hazard classification associated with a smaller reservoir, which would have to be further investigated. Other extraordinary situations are not anticipated to be encountered during design or construction, except the need to complete construction activities within an abbreviated period (June through October).
- e. **Outputs/Yields:** Annual project yield would be consistent with the existing annual yield authorized under current restricted conditions of up to 242 acre-feet per year from June through October with good year-to-year reliability.
- f. **Costs, Economic Analysis, and Feasibility:** Total capital costs (including construction, engineering, permitting, and other miscellaneous costs) were estimated at a reconnaissance-level (low end of a Class 5 estimate) to range from \$2,000,000 to \$3,000,000 (see **Appendix A: Evaluation and Potential Mitigation Cost Memorandum**), which equates to an approximate unit cost of \$2,000 to \$3,000 per acre-foot of water storage. Project beneficiaries are similar to those identified for Alternative 2, although water availability and reliability would be significantly reduced. Alternative 3 was not selected as the preferred alternative because it would significantly restrict dam and reservoir operations and significantly limit opportunities to utilize the structure's decreed water rights and would not address seepage and loss of water from the reservoir and repair of the outlet works.

4.1.4. Alternative 4: Breach Dam

- a. **Description:** This alternative includes entire removal of the dam requiring development of a breach design to excavate the existing embankment. A crew with heavy equipment would remove the existing embankment and place the excavated materials within the reservoir basin. The resulting stream channel would need to be returned to the original ground or be adequate to pass a 100-year flood event.
- b. **Impacts:**
 - **Man-Made Environment:** During construction, approximately 10 acres of the man-made environment (limited to the project sponsor's private property) would be temporarily impacted including five acres of earthen material excavation at the existing dam site and five acres of earthen material storage within the existing reservoir pool inundation area. The outdoor recreational activities associated with the reservoir would be eliminated. Project activities are not anticipated to impact any residential/commercial buildings, utilities, or historical/archaeological sites.

- **Natural Environment:** Project activities are not anticipated to impact the natural environment during or after construction (includes no impacts to streamflow, water quality, aquatic wildlife, terrestrial wildlife, threatened and endangered species, forestland, or wilderness areas).
- c. **Institutional Requirements:** Similar to Alternative 3.
- d. **Special Considerations:** Extraordinary situations are not anticipated to be encountered during design or construction, except the need to complete construction activities within an abbreviated period (June through October).
- e. **Outputs/Yields:** None.
- f. **Costs, Economic Analysis, and Feasibility:** Total capital costs (including construction, engineering, permitting, and other miscellaneous costs) were estimated at a reconnaissance-level (low end of a Class 5 estimate) to range from \$250,000 to \$500,000 (see **Appendix A: Evaluation and Potential Mitigation Cost Memorandum**). Alternative 4 was not selected as the preferred alternative because it would eliminate dam and reservoir operations and remove opportunities to utilize the structure's decreed water rights.

4.1.5. Alternative 5: No Action

- a. **Description:** This alternative would allow the dam to remain in its current condition with restricted reservoir storage operations.
- b. **Impacts:** None.
- c. **Institutional Requirements:** The dam and reservoir would be required to be operated under the current restrictions for dam safety purposes.
- d. **Special Considerations:** Issues that would not be addressed include seepage and loss of water from the reservoir and repair of the outlet works.
- e. **Outputs/Yields:** Annual project yield would be consistent with the existing annual yield authorized under current restricted conditions of up to 242 acre-feet per year from June through October with good year-to-year reliability.
- f. **Costs, Economic Analysis, and Feasibility:** No significant costs are associated with this alternative. Alternative 5 was not selected as the preferred alternative because it would maintain significantly restricted dam and reservoir operations, would significantly limit opportunities to utilize the structure's decreed water rights, would not address seepage and loss of water from the reservoir and repair of the outlet works, and would not address regulatory compliance and dam safety issues.

4.2. Selected Alternative

Selection of a preferred alternative for project implementation included consideration for information presented in **Section 4.1. Analysis of Alternatives**. Alternative 2 (Repair Existing Dam) was selected as the preferred alternative and has been approved by the State Division of Water Resources (DWR) State Engineer's Office (SEO). The following sections provide a detailed description of the selected alternative.

4.2.1. Project Description

A narrative description of project components and operation is included in **Appendix I: Design Summary Report (Section 2)**.

4.2.2. Maps

Key maps and plans associated with the project are included in the appendices as noted in **Section 1.3. Previous Studies** on **Table 1: Completed Project Studies**.

4.2.3. Conceptual Plan/Cross-Section

A full set of layouts and cross-sections for each major project structure is included in **Appendix K: Construction Drawings**. A full set of construction specifications is included in **Appendix L: Construction Specifications**.

4.2.4. Conceptual Design Features

Design criteria for all proposed project facilities are included in **Appendix I: Design Summary Report**.

4.2.5. Field Investigations

Table 3 lists field investigations that have been completed for project implementation.

Table 3: Completed Project Field Investigations

Completion Date	Type of Field Investigation	Reference
09/21/2020	Outlet Works Inspection	Appendix B
09/24/2021	Geotechnical Investigation	Appendices D/F
07/31/2022	Site and Topographic Survey	Appendix K
05/31/2023	Cultural Resource Survey	Appendix G
06/26/2023	Wetland Delineation	Appendix J

4.2.6. Right-of-Way/Land

The project sponsor owns all the land parcels associated with the project including the following Grand County account (parcel) numbers and acreage:

- a. R025820 (1081-333-00-003): 101.370 acres
- b. R025822 (1081-333-00-007): 151.690 acres
- c. R026230 (1081-343-00-005): 16.110 acres

d. R027860 (1081-343-00-008): 32.660 acres

The project sponsor has obtained a Special Use Permit (SUL952) from the U.S. Forest Service (Title V of the Federal Land Policy and Management Act, 43 U.S.C. 1761-1772) to access the privately owned property across U.S. Forest Service land through use of Forest Road NFSR 108.1 Buffalo Creek Road (see **Appendix O: U.S. Forest Service Special Use Permit**).

4.2.7. Cost Estimate

Table 4 lists capital costs of project implementation (expended and estimated).

Table 4: Project Implementation Costs

Phase	Activity	Project Costs	
		Expended 2019-2024	Estimated 2025-2026
Property Acquisition	Property	\$ 3,500,000	\$ -
	Commissions and Closing Charges	\$ 186,850	\$ -
Total Costs for Property Acquisition¹		\$ 3,686,850	\$ -
Administration	Owner Representative (Legal)	\$ 25,000	\$ 25,000
	Owner Representative (Technical)	\$ 211,256	\$ 152,120
Permitting	Regulatory Requirements (State SEO Fee)	\$ 30,000	\$ -
	Regulatory Requirements (Federal NEPA)	\$ 62,798	\$ 18,000
Engineering: Feasibility	Outlet Works Inspection	\$ 19,417	\$ -
	Emergency Action Plan	\$ 19,846	\$ -
	Geologic/Geotechnical Investigation	\$ 207,935	\$ -
	Dam Safety Evaluation	\$ 56,800	\$ -
	Mitigation Concepts	\$ 60,080	\$ -
	Hydrologic/Dam Hazard Classifications	\$ 96,056	\$ -
	Project Management and Meetings	\$ 20,921	\$ -
Engineering: Design	Data Collection	\$ 147,660	\$ -
	Design Analyses\Construction Documents	\$ 707,018	\$ -
	Project Management and Meetings	\$ 93,090	\$ -
Engineering: Construction	Contractor Bid Documents	\$ 21,553	\$ -
	Field Engineering	\$ 16,505	\$ 320,000
	Engineering Services during Construction	\$ 6,980	\$ 212,000
	Materials and Quality Assurance Testing	\$ -	\$ 90,000
	Closeout Documentation	\$ -	\$ 75,200
	Project Management and Meetings	\$ 6,544	\$ 45,400
Total Costs for Professional Services¹		\$ 1,809,459	\$ 937,720
		\$ 2,747,179	
Construction Activities	Labor, Equipment, Materials	\$ 1,645,864	\$ 7,430,590
	Contingency	\$ -	\$ 743,059
Total Costs for Construction Activities²		\$ 1,645,864	\$ 8,173,649
		\$ 9,819,513	

¹ Total costs for acquisition and professional services are not included in the requested loan amount.

² Total costs for construction comprise the total requested loan amount and include costs expended in 2024 for preliminary earthwork activities to prepare the site for 2025 construction activities plus future construction cost estimates as detailed in **Appendix P: Project Construction Cost Estimates** with a tabulation of quantities, unit costs, total costs, and contingency.

4.2.8. Implementation Schedule

Table 5 provides the project implementation schedule for activities that have been completed to date and are projected to be completed in the future.

Table 5: Project Implementation Schedule

Activity	Start	Complete
Land Acquisition	Jun 2019	Aug 2019
Concept Studies	Jun 2019	Aug 2019
Feasibility Studies	Aug 2019	Jul 2022
Engineering Design	Jul 2022	Oct 2024
Permitting	Jul 2022	May 2025
Contracting	Mar 2025	May 2025
Construction	Jun 2025	Nov 2025
Financing	Jun 2025	May 2065

4.2.9. Impacts

The project would provide positive impacts on local and regional plans for water resource development, land use, recreation, economic development, and other social effects by promoting the benefits described in **Section 4.1.2. Alternative 2: Repair Existing Dam (Subsection f. Costs, Economic Analysis, and Feasibility)**. Impacts to the man-made and natural environments identified in **Section 4.1.2. Alternative 2: Repair Existing Dam (Subsection b. Impacts)** would be addressed as described below.

- **Man-Made Environment:** Construction activities that would temporarily impact the man-made environment by earthen material excavation, storage, and replacement would include implementation of state-approved engineering designs for the effective control of surface water, erosion, and sedimentation and for reclamation of the project site. The project sponsor is in the process of securing authorization and an environmental permit from the USACE to allow project construction activities.
- **Natural Environment:** Construction activities that would temporarily impact the natural environment by earthen material excavation of the borrow site adjacent to the existing dam would include implementation of state-approved engineering designs for the effective control of surface water, erosion, and sedimentation and for reclamation of the project site. The project sponsor is in the process of securing authorization and environmental permits from the USACE and the USFS to allow post-construction water inundation from the reservoir pool that would impact wetland vegetation located on the project sponsor's private property and upland vegetation located on adjacent USFS national forest land. Supporting documentation associated with environmental permitting is included in **Appendix G: Cultural Resource Survey Report** and **Appendix J: Wetland Delineation Report**.

4.2.10. Institutional Feasibility

This section describes institutional considerations and actions that have been and are being undertaken to obtain compliance with local, state, and federal governmental requirements and allow project implementation.

- a. **Local:** Grand County has been consulted, and no county authorization is required. Approved engineering plans have been provided to the county.
- b. **State:** The State Division of Water Resources (DWR) State Engineer's Office (SEO) has approved engineering design drawings and specifications. No further state authorization is required.
- c. **Federal (USFS):** A U.S. Forest Service (USFS) Special Use Authorization (SUA) under the National Environmental Policy Act's (NEPA) Categorical Exclusion (CE) designation is required and being requested to allow the reservoir pool to inundate a small area of USFS land adjacent to the private land owned by the project sponsor. Related activities that have been completed include consultation with the State Historic Preservation Office (SHPO) under the National Historic Preservation Act (NHPA) and consultation with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA). A draft SUA CE application has been submitted to the USFS, and USFS authorization is currently being processed. USFS authorization is not required to begin construction activities (anticipated to begin in June 2025) and is required to allow reservoir pool inundation (anticipated to begin in 2026) of USFS land.
- d. **Federal (USACE):** A U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) 404/401 Clean Water Act (CWA) Authorization is required and being requested to allow implementation of permanent construction activities. USACE will authorize activities under an NWP 3 (Maintenance), which also covers 401 certification (due to NWP use). USACE will use SHPO and USFWS consultations from the USFS completed as noted above. Other related activities that have been completed include USACE acceptance of the project's defined "Normal Conditions", which was used to determine the area of existing onsite wetlands and streams that must be mitigated. A compensatory wetland and stream mitigation agreement is anticipated to be completed by April 2025 through an In-Lieu Fee (ILF) program administered by the National Forest Foundation. Submittal of the NWP verification request to the USACE is anticipated by February 2025, and USACE authorization of the NWP is anticipated by April 2025.

5. Financial Feasibility Analysis

This section documents the financial feasibility of the selected alternative by providing a detailed financial program to describe financing arrangements and the sources and uses of funds for the proposed project, and by providing an analysis of the project sponsor's ability to repay all existing and projected debt service, as well as normal operating expenses.

5.1. Loan Amount

Table 4: Project Implementation Costs in **Section 4.2.7. Cost Estimate** provides an itemized list for capital costs (expended and estimated) of project implementation including costs associated with property acquisition (\$3,686,850), professional services (\$2,747,179), and construction activities (\$9,819,513). The project sponsor requests a loan with a 40-year term and a 2.35-percent interest rate in the amount of \$9,819,513 associated with the construction component of project implementation costs.

5.2. Financing Sources

The sources of funding for the project include the project sponsor covering the cost of property acquisition (\$3,686,850) and professional services (\$2,747,179) and the CWCB loan to be utilized as the method of financing for the construction component of project implementation costs (\$9,819,513).

5.3. Revenue and Expenditure Projections

A detailed schedule of estimated annual revenues and annual expenditures for the entire period of debt retirement is provided as a financial model included in **Appendix Q: Project Sponsor Revenue and Expense Projections**.

5.4. Loan Repayment Sources

The loan will be repaid through a combination of water revenue from the project and operating income from the project sponsor (Circle C Ranches, LLC) as detailed in the financial model (see **Appendix Q: Project Sponsor Revenue and Expense Projections**).

5.5. Financial Impacts

The project sponsor's debt load from the project will be equivalent to the CWCB loan obligation (\$9,819,513) repaid over the 40-year loan term as tabulated in **Appendix Q: Project Sponsor Revenue and Expense Projections**. New annual revenues are anticipated to be generated through uses of project water for recreational (\$1,120,000 per year) and piscatorial/environmental (\$282,000 per year) purposes as described in **Appendix M: Value of Kings Reservoir Water Memorandum**. The project sponsor is anticipated to pay off the balance of the loan encumbering the property (current balance of about \$3.3M), which would lower the project sponsor's existing annual cash outlays.

5.6. Collateral

The collateral being offered by the borrower to assure repayment of the CWCB loan is comprised of the water storage rights associated with the project and owned by the project sponsor (1,090 acre feet decreed for Kings Reservoir). The total present value of the subject water rights has been appraised at \$27,408,000 as detailed in **Appendix M: Value of Kings Reservoir Water Memorandum**.

5.7. Sponsor Creditworthiness

The borrower's income statement and balance sheet for the last three calendar years is included in **Appendix R: Project Sponsor Income Statement and Balance Sheet**.

6. Conclusions and Recommendation

The Little King Ranch Dam Rehabilitation Project would rehabilitate the existing Little King Ranch Dam and promote effective operations of the existing Kings Reservoir owned by the project sponsor (Circle C Ranches, LLC) and located on King Mountain Ranch within the Buffalo Creek watershed in Grand County, Colorado. The condition of the dam is currently rated as unsatisfactory by the State Engineer's Office (SEO) due to excessive seepage, excessive vegetation, questionable hazard classification, and questionable spillway size. The project is necessary to address regulatory compliance and dam safety issues, allow the removal of an existing state-mandated water storage restriction on the reservoir, reestablish the full operational capability of the dam and reservoir, and generate multiple opportunities for the project sponsor to fully utilize the structure's decreed water rights. The remote and undeveloped characteristics of Buffalo Creek watershed that covers an area with few landowners (limited to the U.S. Forest Service and the project sponsor) has historically resulted in few decreed water structures within the region, most of which are owned by the project sponsor. Buffalo Creek water yields are anticipated to adequately fulfill water demands with appropriate reliability and without deficit.

Five alternative concepts were evaluated as part of this feasibility study to provide decision criteria for project implementation of a preferred alternative. The selected alternative includes rehabilitation of the dam and appurtenances including demolition and abandonment of existing facilities and rehabilitation of the dam foundation, embankment, outlet works, and spillway. Implementation of the selected alternative would provide positive impacts on local and regional plans for water resource development, economic development, land use, and recreational and other social activities by supporting opportunities for enhancement of regional critical fish species habitat, regional wildland fire control activities, local recreational activities, and onsite property value. Impacts to the man-made and natural environments from implementation of the selected alternative would be mitigated through execution of state-approved engineering designs of effective control structures and processes. The project sponsor is in the process of securing authorization and environmental permits from the U.S. Army Corps of Engineers (USACE) and the U.S. Forest Service (USFS) to allow project construction activities and post-construction water inundation from the reservoir pool.

Five major field investigations and 12 major studies associated with the selected alternative were completed from 2019 through 2024 as part of project implementation to support construction activities that are anticipated to be completed in 2025. Implementation of the selected alternative has been shown to be technically feasible (through SEO-approved construction drawings and specifications), institutionally feasible (through forthcoming USACE and USFS authorizations and environmental permits), and financially feasible (through the project sponsor's capability for loan repayment). The project sponsor requests a loan with a 40-year term and a 2.35-percent interest rate in the amount of \$9,819,513 associated with the construction component of project implementation costs.

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