COLORADO
Colorado Water Conservation Board
Department of Natural Resources

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Jared Polis, Governor
Dan Gibbs, DNR Executive Director
Lauren Ris, CWCB Director

TO: Colorado Water Conservation Board Members

FROM: Zach Salin, P.E., Project Manager
Kirk Russell, P.E., Finance Section Chief

DATE: September 18, 2024 Board Meeting

AGENDA ITEM: 6d. Water Project Loans
Silver Lake Ditch & Reservoir Company
Elephant Buttress Tunnel Rehabilitation

Staff Recommendation

Staff recommends the Board approve a loan not to exceed $151,500 ($150,000 for project costs and $1,500 for the 1% service fee) to the Silver Lake Ditch & Reservoir Company for costs related to the Elephant Buttress Tunnel Rehabilitation, from the Construction Fund. The loan term will be 20 years at an interest rate of 2.95% per annum. Security for the loan shall be in compliance with CWCB Financial Policy #5.

Introduction

The Silver Lake Ditch & Reservoir Company (Company) is applying for a blended interest rate loan for the Elephant Buttress Tunnel Rehabilitation (Project). The Elephant Buttress Tunnel is a natural rock tunnel used to route a section of the Silver Lake Ditch's transmission piping. Over the last few years, significant rockfall has occurred inside the tunnel and at the two entrances to the tunnel. Rock impacts threaten to damage the transmission piping and impair the delivery of water through the ditch to shareholders. The proposed Project is being undertaken to mitigate this risk and to improve the stability of the tunnel for continued use. Improvements will include the removal of loose rock, installation of new cast-in-place headwalls at either tunnel entrance, an arched liner plate to shore the tunnel walls and roof, and a new liner plate at the east tunnel entrance. Construction is expected to take place between fall/winter of 2024. The total Project cost is estimated to be $280,000. In addition to the Loan request described here, the Company has raised $25,000 for the Project via a one-time special assessment as well as $75,000 of donations provided by ditch shareholders, in order to fully fund the Project. See attached Project Data Sheet for a location map and Project summary.

Borrower – Silver Lake Ditch and Reservoir Company
The Company is a Colorado mutual ditch company which supplies water to the ditch's shareholders in Boulder County. The Silver Lake Ditch (Ditch) was first established in 1888 by J.P. Maxwell as a private ditch, however in 1948, the Ditch was purchased by the Silver Lake Ditch Water Users Association who formed and operated the Company. Shares in the Ditch are allocated based on the ownership of land served by the ditch. The Company is led by a five-member Board of Directors elected to one-year terms by a vote of shareholders at the Company's Annual Meeting. The Board holds meetings, sets rules and regulations, and is empowered to incur debt on behalf of the Company. The Board proposes assessments which must be approved and adopted by the shareholders. The Company is listed as in good standing with the Colorado Secretary of State.

The Ditch serves approximately 247 acres of land split into approximately 307 parcels owned by roughly 290 individuals, private ownership entities, and the City of Boulder.

Background
The Silver Lake Ditch is an irrigation ditch to provide irrigation water to ditch shareholders in Boulder County, Colorado. The Silver Lake Ditch diverts water from Boulder Creek approximately 1 mile upstream of the mouth of Boulder canyon. From there, the water is carried through plastic and steel culverts and steel pipe until it routes through the Elephant Buttress Tunnel, a natural rock tunnel, enroute to the ditch delivery area in Boulder.

The Elephant Buttress Tunnel was impacted during the 2013 floods in Northeast Colorado with the infiltration of runoff triggering increased cracking. Deterioration of the tunnel has since accelerated, with significant rockfall occurring inside the tunnel and at the tunnel mouths over the last few years. The tunnel is at risk of failure, which would interrupt the ditch's ability to deliver water, and create hazardous conditions for maintenance workers. This Project will reinforce the tunnel in order to reduce the potential for a catastrophic failure or cave-in.

Loan Feasibility Study
The Silver Lake Ditch & Reservoir Company Board prepared the Loan Feasibility Study titled, "Stabilization of the Elephant Buttress Tunnel on Silver Lake Ditch" dated August 1, 2024. The feasibility study includes a Technical Memo, titled, "Technical Solutions Memo for the Silver Lake Ditch Tunnel Tunnel Rehabilitation" dated February 28, 2024 which was prepared by Tom Szynakiewicz, P.E. of Harrison Western. The feasibility study, including the technical memo, is in accordance with CWCB guidelines and includes an analysis of alternatives and estimated Project costs.

Water Rights
Silver Lake Ditch utilizes a junior direct flow right (1888) on Boulder Creek, as well as senior storage rights (1893 & 1907) on Silver Lake Reservoir and Wonder Lake Reservoir. Water running through Silver Lake Ditch is diverted off Boulder Creek approximately one mile upstream of the mouth of Boulder Canyon. Over the last 5 years Silver Lake Ditch diverted an average of approximately 239 AF of river water and released an average of 558 AF of water from storage per year. A summary of the water rights associated with the Project are shown in Table 1.

TABLE 1: WATER RIGHTS

Structure Name	Amount (cfs)	Appropriation Date	Adjudication Date	Case No.
Silver Lake Ditch	20.00	12/4/1893	3/13/1907 (4/10/1905)	CA4842
Silver Lake Ditch	45.00	2/7/1907	11/3/1909 (4/10/1905)	CA5563

Project Description
The Project will reduce the potential for a catastrophic failure of Elephant Buttress Tunnel, which would impact the ability of the Dith to provide water to its shareholders. This will include the installation of new headwalls at the tunnel openings, an arched liner plate, construction of a rock deflector, and other pieces which will improve the condition of the tunnel.

Alternative 1 – No Action: Taking no action would leave the Elephant Buttress Tunnel in place in its existing dangerous configuration. The tunnel would continue to experience cave-ins, so this option was not selected.

Alternative 2 – Stabilize Rock: Installing split sets or other ground-supported shoring was considered as a way to stabilize the rock mass. This alternative was eliminated because the existing ground conditions will not allow split sets to penetrate deep enough and the limited space inside the tunnel is difficult for drilling equipment to access.

Alternative 3 – Install Rockfall Protection: Installing traditional rockfall mitigation measures (e.g., top-anchored draped mesh) would not mitigate the potential for debris to block flows, would require ongoing maintenance,and would require access to the top of the slope which is not feasible at this time.

Alternative 4 – Steel Casing at Tunnel Portals: This alternative would install steel casing at the tunnel portals to protect the transmission pipe. This alternative was not selected as the length and weight of the steel casing needed would require helicopters to move the casing into position and does not protect the tunnel from cave-in.

Selected Alternative 5 – Install Liner Plate with Bulkheads, Headwall, and Rock Deflector: This alternative involves scaling loose material from the tunnel interior and replacing cribbing to allow for safe access. Loose material will be removed and placed beyond the east portal tunnel exit.the western portal headwall will be replaced with a more substantial 1 foot thick and 2’ tall headwall across the width of the tunnel. A modular arched liner plate system will be installed, with geotechnical foam used to fill in voids between the tunnel and liner plate. The existing gate at the east portal of the tunnel will be repurposed for use as a rock deflector. Corrugated metal pipe at the tunnel exterior will be replaced with new liner plate and a new cast-in-place headwall will create a smooth entry and exit for flow. The total estimated cost of this alternative is $280,000 as shown in Table 2 below.

TABLE 2: ESTIMATED PROJECT COST

Tasks	Cost
Mobilization	$20,000
West Portal - Scaling & Concrete Headwall	$20,000
Interior Tunnel Work	$105,000
East Portal - Rock Deflector, Liner Plate, and Headwall	$110,000
Contingency (10%)	$25,000
TOTAL	**$280,000**

Permitting: No permits or court decrees will be required to implement this Project. The Borrower will need to obtain permission from the City of Boulder Open Space and Mountain Parks as well as from the adjacent property owner to stage construction vehicles and equipment, however both entities have given permission for these types of activities in the past.

Schedule: Construction work on the Project is expected to begin in the fall of 2024. Construction is expected to be complete by the end of 2024.

Financial Analysis

Table 3 provides a summary of the Project's financial aspects. The Borrower qualifies for a blended interest rate of 3.20% for a 30-year loan. Because the Borrower is requesting a 20-year loan, the interest rate is decreased by 0.25% for a final rate of 2.95%. All interest rate evaluations are per CWCB Financial Policy #7 (Lending Rate Determination).

TABLE 3: FINANCIAL SUMMARY

Project Cost	$280,000
Borrower Cash Match	$130,000
CWCB Loan Amount	$150,000
CWCB Loan Amount (Including 1% Service Fee)	$151,500
CWCB Annual Loan Payment (20-year term @ 2.95%)	$10,136
CWCB Annual Loan Obligation (1st Ten Years)	$11,150
Number of Ditch Shares	246.96
Current Annual Assessment (per acre)	$200*
Estimated Annual Loan Obligation per Share	$45.14

* A Special Tunnel Assessment of $100/ac in 2024 generated $25,000 for the Project

Creditworthiness: The Borrower has no existing debt.

TABLE 4: FINANCIAL RATIOS

Financial Ratio	Past Years	Future w/ Project
Operating Ratio (revenues/expenses) weak: <100% | typical: 100% - 120% | strong: >120%	144% (strong) $107.3k/$74.2k	125% (strong) $107.3k/$85.5k
Debt Service Coverage Ratio (revenues-expenses)/debt service weak: <100% | typical: 100% - 120% | strong: >120%	N/A	292% (strong) ($107.3k-$74.2k) $11.3k
Cash Reserves to Current Expenses weak: <50% | typical: 50% - 100% | strong: >100%	131% (strong) $97.9k/$74.2k	114% (strong) $97.9k/$85.5k
Annual Cost per Acre-Foot (797 AF) weak: >$24 | typical: $3 - $24 | strong: <$3	$93.20 (weak)	$107.39 (weak)

Collateral: Security for this loan will be a pledge of assessment revenues as well as the Project itself, including all access, easements, rights, and appurtenances associated therewith. This security is in compliance with the CWCB financial Policy #5 (Collateral).

cc: James Snow, President, Board of Directors, Silver Lake Ditch & Reservoir Company
Jennifer Mele, Colorado Attorney General's Office

Attachments: Water Project Loan Program – Project Data Sheet

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Elephant Buttress Tunnel Rehabilitation

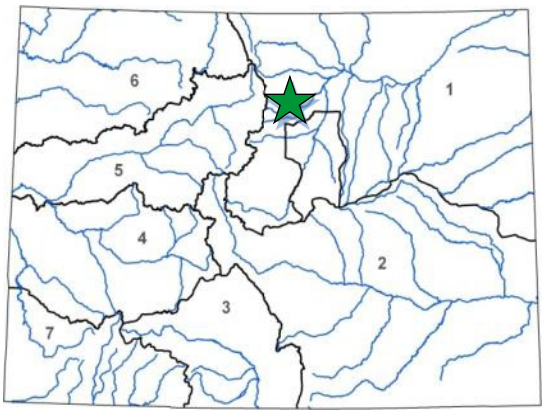
Silver Lake Ditch & Reservoir Company

September 2024 Board Meeting

LOAN DETAILS	
Project Cost:	$280,000
CWCB Loan (with 1% Service Fee):	$151,500
Loan Term and Interest Rate:	20 Yrs @ 2.95%
Funding Source:	Construction Fund

BORROWER TYPE		
Agriculture	*Municipal*	*Commercial*
10%	0% Low - 89% Mid - 0% High	1%

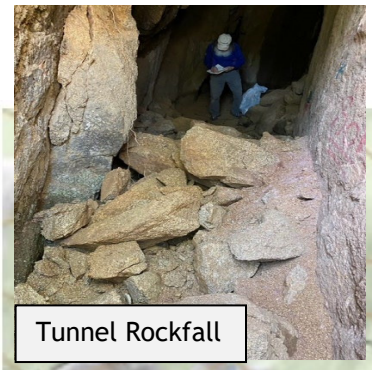
PROJECT DETAILS	
Project Type:	Ditch Rehabilitation
Average Annual Delivery:	797 AF



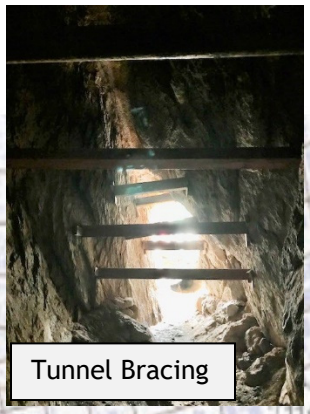
LOCATION			
County:			Boulder
Water Source:			Boulder Creek
Drainage Basin:			South Platte
Division:	1	*District:*	6

The Silver Lake Ditch and Reservoir Company (Company) was formed in 1945 to purchase the Silver Lake Ditch which had fallen into disrepair since being originally constructed in 1888 and so was delivering little water to users. The Company serves 300 shareholders with direct flow water in addition to stored water in Silver Lake and Island Reservoirs. The water is used for residential irrigation, municipal landscaping, agriculture, and open space.

A section of the ditch is piped through a tunnel in Elephant Buttress, which began to deteriorate after the 2013 floods. The tunnel has experienced substantial rockfall over the last several years. Currently, the Company is concerned about the potential for a catastrophic collapse of the tunnel which would significantly reduce, if not eliminate, the ability of the Company to deliver water to their shareholders. The Project will install an arched liner plate system throughout the tunnel and backfill the void space above the liner system as well as perform work at each end of the tunnel to deflect rockfall and discourage unauthorized access. Construction is expected to begin in the fall of 2024 and be completed in time for the 2025 irrigation season.



Tunnel Rockfall



Tunnel Bracing

Elephant Buttress Tunnel Location