Cherry Creek Basin Water Quality Authority
Board of Directors Meeting Agenda
Thursday, November 17, 2022, 9:00 a.m.

In-Person: SEMSWA
7437 S. Fairplay St.
Centennial, CO 80112

Virtual: Zoom
https://zoom.us/j/3039689098 Passcode: CCBWQA
Phone (669)900-6833 Mtg ID 3039689098# Passcode: #542117

CCBWQA Board of Directors Meeting Documents can be found online at the link below.
https://drive.google.com/drive/folders/1ctix7RwAcABNmt1PKGS8FHThS5G0g-6s?usp=sharing

1. Call to Order and Pledge of Allegiance
2. Oaths of Office
    a. Desiree LaFleur - Town of Castle Rock, Alternate
    b. Abe Laydon - Douglas County
    c. Nancy Sharpe - Arapahoe County
    d. Mike Sutherland - City of Centennial, Alternate
3. Consent Agenda (5 minutes)

(*Items on the consent agenda can be approved with a single motion or, items can be requested to be moved from the consent agenda and moved to the "discussion or direction and/or action" section*.)

    a. Approval of the October 20, 2022 Minutes (enclosed)
    b. Acceptance of the Schedule of Cash Position dated November, 2022 (enclosed)
    c. Approval of the Unpaid Claims as of November, 2022 (enclosed)
    d. Approval of 2023 Agreements (enclosed)
        i. R2R Engineers
        ii. RESPEC - As Needed
        iii. LRE Water
4. Direction and/or Action (30 minutes)
    a. Agreement/Amendment Extensions (Borchardt, enclosed)
        i. Dewberry - Tributary Drainage Way Planning Study
        ii. RESPEC - First Amendment to Consultant Agreement
        iii. Wright Water Engineers - BMP Effectiveness Agreement
    b. Public Hearing - 2023 Budget (Flynn/Ruzzo, enclosed)
        i. Resolution 2022-11-01 Approving Fees for 2023 (enclosed)
        ii. Resolution 2022-11-02 Adopting the 2023 Budget (enclosed)
        iii. Resolution 2022-11-03 Authorizing Appropriation (enclosed)
        iv. Resolution 2022-11-04 Setting the Mill Levy (enclosed)
    c. Lake Nutrients Criteria RMH (DiToro, enclosed)
        i. Hydros Memo (enclosed)
    d. Site Specific Standard Scope (Clary, enclosed)
        i. Hydros Scope of Work (enclosed)
    e. Lone Tree Creek Improvements - Centennial
        i. WWE Memo (Clary, enclosed)
    f. Watershed Model (Clary, enclosed)
        i. RESPEC Technical Memorandum (Leak, enclosed)
5. Discussion (5-10 minutes)
    a. Understanding the 60/40 Analysis (Ruzzo, enclosed)
6. Presentations (15 minutes)
    a. Water Quality Update and Memo (Stewart, enclosed)

b. 2023 to 2032 CIP, Maintenance, and Operations Budget (Borchardt, enclosed)
c. 2022 PRF Field Observation (Borchardt, enclosed)

7. Board Member Items
8. Updates (5-10 minutes)
    a. Technical Manager (Clary)
    b. Cherry Creek Stewardship Partners Update and Events (Davenhill)
    c. TAC (James)
    d. Contract Staff (see enclosed memos)
        i. PAPM (Borchardt)
            a. LUR Monthly Summary
            b. CIP, Maintenance, and Operations Status Report
        ii. Water Quality (Stewart)
        iii. Regulatory (DiToro)
    e. Legal
    f. Other
9. Executive Session pursuant to Section 24-6-402(4) C.R.S., if necessary.
10. Adjournment

CCBWQA Workplan

IN RE THE MATTER OF THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY	
ARAPAHOE AND DOUGLAS COUNTIES, COLORADO	
Attorney: Timothy J. Flynn, Esq. Collins Cole Flynn Winn & Ulmer A Professional Limited Liability Company 165 South Union Blvd, Suite 785 Lakewood, Colorado 80228 Phone Number: (720) 617-0080 E-mail: tflynn@cogovlaw.com	▲ FOR CLERK AND RECORDER'S ▲ USE ONLY

OATH OF OFFICE

I, Desiree LaFleur, do affirm that I will support the Constitution of the United States, the Constitution of the State of Colorado, and the laws of the State of Colorado, and will faithfully perform the duties of the office of Director of the Cherry Creek Basin Water Quality Authority on behalf of the Town of Castle Rock, upon which I am about to enter to the best of my ability.

_____
Desiree LaFleur

STATE OF COLORADO)
) ss.
COUNTY OF ARAPAHOE)

Sworn to before me this ____ day of _____, 20__ by Desiree LaFleur.

Witness my hand and official seal.

_____
Joshua R. Rivero

Title: Chair

IN RE THE MATTER OF THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY	
ARAPAHOE AND DOUGLAS COUNTIES, COLORADO	
Attorney: Timothy J. Flynn, Esq. Collins Cole Flynn Winn & Ulmer A Professional Limited Liability Company 165 South Union Blvd, Suite 785 Lakewood, Colorado 80228 Phone Number: (720) 617-0080 E-mail: tflynn@cogovlaw.com	▲ FOR CLERK AND RECORDER'S ▲ USE ONLY
OATH OF OFFICE	

I, Abraham (Abe) Laydon, do affirm that I will support the Constitution of the United States, the Constitution of the State of Colorado, and the laws of the State of Colorado, and will faithfully perform the duties of the office of Director of the Cherry Creek Basin Water Quality Authority on behalf of Douglas County, upon which I am about to enter to the best of my ability.

_____
Abraham (Abe) Laydon

STATE OF COLORADO)
) ss.
COUNTY OF ARAPAHOE)

Sworn to before me this ____ day of _____, 2022 by Abraham (Abe) Laydon.

Witness my hand and official seal.

_____
Joshua R. Rivero

Title: Chair

IN RE THE MATTER OF THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY	
ARAPAHOE AND DOUGLAS COUNTIES, COLORADO	
Attorney: Timothy J. Flynn, Esq. Collins Cole Flynn Winn & Ulmer A Professional Limited Liability Company 165 South Union Blvd, Suite 785 Lakewood, Colorado 80228 Phone Number: (720) 617-0080 E-mail: tflynn@cogovlaw.com	▲ FOR CLERK AND RECORDER'S ▲ USE ONLY
OATH OF OFFICE	

I, Nancy Sharpe, do affirm that I will support the Constitution of the United States, the Constitution of the State of Colorado, and the laws of the State of Colorado, and will faithfully perform the duties of the office of Director of the Cherry Creek Basin Water Quality Authority on behalf of Arapahoe County, upon which I am about to enter to the best of my ability.

_____
Nancy Sharpe

STATE OF COLORADO)
) ss.
COUNTY OF ARAPAHOE)

Sworn to before me this ____ day of _____, 20__ by Nancy Sharpe.

Witness my hand and official seal.

_____
Joshua R. Rivero

Title: Chair

IN RE THE MATTER OF THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY	
ARAPAHOE AND DOUGLAS COUNTIES, COLORADO	
Attorney: Timothy J. Flynn, Esq. Collins Cole Flynn Winn & Ulmer A Professional Limited Liability Company 165 South Union Blvd, Suite 785 Lakewood, Colorado 80228 Phone Number: (720) 617-0080 E-mail: tflynn@cogovlaw.com	▲ FOR CLERK AND RECORDER'S ▲ USE ONLY

OATH OF OFFICE

I, Mike Sutherland, do affirm that I will support the Constitution of the United States, the Constitution of the State of Colorado, and the laws of the State of Colorado, and will faithfully perform the duties of the office of Director of the Cherry Creek Basin Water Quality Authority on behalf of the City of Centennial, upon which I am about to enter to the best of my ability.

_____
Mike Sutherland

STATE OF COLORADO)
) ss.
COUNTY OF ARAPAHOE)

Sworn to before me this ____ day of _____, 20__ by Mike Sutherland.

Witness my hand and official seal.

_____
Joshua R. Rivero

Title: Chair

Cherry Creek Basin Water Quality Authority
Board of Directors Meeting Agenda
Thursday, October 20, 2022, 9:00 a.m.

Board Members Present
Bahman Hatami, Governor's Appointee (zoom)
Bill Ruzzo, Governor's Appointee
Caryn Johnson, Town of Castle Rock (zoom)
Christopher Lewis, Vice Chairman, Governor's Appointee (zoom)
John McCarty, Secretary, Governor's Appointee
John Woodling, Governor's Appointee
Joshua Rivero, Chairman, Town of Parker
Mike Anderson, City of Lone Tree
Roger Hudson, City of Castle Pines (zoom)
Stephanie Piko, City of Centennial (zoom)
Tom Downing, Governor's Appointee

TAC Members Present
David Van Dellen, Town of Castle Rock (zoom)
Jacob James, TAC Chairman, City of Lone Tree (zoom)
Jon Erickson, TAC Vice Chairman, Board Appointee, Colorado Parks and Wildlife (zoom)
Lisa Knerr, Arapahoe County (zoom)
Rick Goncalves, Board Appointee (zoom)
Ryan Adrian, Douglas County (zoom)

Others Present
Alan Leak, RESPEC
Erin Stewart, LRE Water
James Linden, SEMSWA
Jane Clary, Wright Water Engineers, CCBWQA Technical Manager
Jessica DiToro, LRE Water (zoom)
Joni Nuttle, CDPHE (zoom)
Tim Flynn, Collins Cole Flynn Winn & Ulmer, PLLC
Val Endyk, CCBWQA

1. **Call to Order and Pledge of Allegiance**
   Director Rivero called the meeting to order at 9:00 am and led in the pledge of allegiance.

2. **Oath of Office - Abe Laydon**
   Removed from agenda.

3. **Consent Agenda**
   a. **Approval of the September 15, 2022 Minutes**
   b. **Acceptance of the Schedule of Cash Position dated October, 2022**

c. **Approval of the Unpaid Claims as of October, 2022**
d. **IGA Amendment for Cherry Creek upstream of Scott Road**
e. **IGA Amendment for Happy Canyon Creek near I-25**
f. **IGA Amendment for Cherry Creek at Arapahoe Road**
g. **First Amendment to 2022 Wright Water Engineers Technical Manager Agreement**
h. **Approval of Wright Water Engineers 2023 Technical Manager Services Agreement**
i. **Approval of RG and Associates 2023 Agreement**

Director McCarty moved to approve the consent agenda. Seconded by Director Anderson. The motion carried.

4. **Direction and/or Action**
   a. **2023 Sampling and Analysis Plan Update**

Erin Stewart explained that the CCBWQA Sampling and Analysis Plan/ Quality Assurance Plan is updated on an as-needed basis to account for changes to the monitoring program based on regulatory support, modeling inputs, or other technical information needed. Suggested revisions and updates to the SAP/QAPP for 2023 have been summarized in the memo included in the packet and a redlined version has been provided to the technical manager for review and approval. The redlined document can be found here. The final version can be found here. Most of the changes are minor, providing clarification of the sampling program methodology or analysis parameters. The only substantive change is the addition of soil sampling to evaluate the water quality benefit of stream improvement projects and the effectiveness of phosphorus removal from PRF ponds.
A summary and redlined version of the changes was provided to the TAC earlier this month. The TAC accepted the suggested changes and recommended that the updated 2023 SAP/QAPP be sent to the CCBWQA Board of Directors for final approval.

Director Ruzzo moved to approve the final version with suggested changes and updates to the 2023 SAP/QAPP. Seconded by Director Hatami. The motion carried.

5. **Discussion**
   a. **Lake Nutrients Criteria RMH**

Jessica DiToro presented a memo on the Lakes and Reservoirs Nutrients Criteria RMH which included background information describing two motions to delay the hearing presented to the WQCC. The memo explains that the WQCC released an order in response to the two motions on September 8th that the RMH be rescheduled for April 10, 2023. The new schedule of events related to the RMH was provided by the WQCC on September 19th and can be found in Jessica's memo.

On October 5th, the WQCD submitted a supplement to its PPHS. The result of incorporating the requested updated and corrected datasets in the model can be summarized as a change from Total Phosphorus (µg/L) originally proposed at 36 moving to an updated proposal at 40, and Total Nitrogen (µg/L) originally proposed at 600 moving to an updated proposal at 610.

Staff has reviewed the supplement to the WQCD's PPHS and currently does not envision substantive changes to CCBWQA's previously prepared and submitted RPHS.

CCBWQA Staff will continue to update the TAC and Board and will bring recommendations to the November TAC meeting and a motion to the November Board meeting if appropriate.

Discussion included:

- Wastewater Utility Council and Northern Water have reviewed the WQCD's methodology used to establish the standards and identified concerns that are expected to be raised in the rulemaking hearing.

Additionally, a Water Users group has expressed concerns over water rights implications of the proposed standards and have requested review of the WQCD's proposal by the State Engineer's Office.

- The revised timing of the rulemaking hearing will not change our request for a delayed effective date in order to allow time to develop site-specific standards. The site-specific standards cannot be developed by April 2023.
- CCBWQA wants to maintain a good working relationship with CDPHE and the WQCD.
- Chatfield is considered a cold water reservoir so it has different water quality standards being proposed at this RMH.

b. CCBWQA 2023 Draft Budget

Director Ruzzo presented the 2023 draft budget, providing an overview of the three primary funds: Enterprise Fund, Pollution Abatement Fund, and the General Fund.
Emergency reserves are used to reduce the need for budget amendments and comply with Tabor.
Overview
General Fund (Taxes revenue) - Administration /Watershed Management/ Monitoring
Enterprise Fund (Fee revenue) - $380K in 2022 has been reduced to $300K in 2023 based on anticipated decrease from Park passes.
Pollution Abatement fund - 60% of the revenue from GF and EP is transferred to PAP fund to meet the spending goal of 60% on PAP projects. Supplemental expenditures are used to account for changes from year to year and are used to determine if the 60% is met over the 5-year time period.
Focused and adjusted priorities are the goal for 2023 (linear efforts).
R2R Engineers has requested a reduction in scope, which has resulted in budget adjustments. Some of the projects can be absorbed by other existing consultants, but some may be delayed until project management can be backfilled. Additionally, clarification is needed regarding R2R's role managing in-Park projects during 2023.
CCBWQA will no longer be completing LURs, which will be a reduction by $30K. Local governments will continue to provide internal review and CCBWQA will provide a standard acknowledgement of this review. In cases where more complex reviews are involved, CCBWQA will provide support if requested by the local government.
Approval of the budget will be completed in the November Board meeting, along with certification of the mill levy. A majority of the elected officials will need to be present at that meeting to determine the mill levy.

Discussion included:

- Reserves for land acquisition have been increased from $50K to $100K in anticipation of a potential opportunity with an Arapahoe Rd. property if needed. The line item has been a placeholder to ensure evaluation during annual budget review. It could be set up as a cumulative land acquisition fund over time but it has not been set up that way historically. Other discussion related to land acquisition:
    - The Bow Tie property is the only other property that the CCBWQA has purchased for this purpose.
    - We could reallocate funds for a specific property or we could also pay another purchasing entity back over time.
    - CCBWQA needs to justify the expenditure to protect specific properties from development and expand protected areas in regard to water quality preservation, particularly wetlands and riparian buffer habitats that protect water quality.
    - The Town of Parker acquires lots of floodplain areas in open spaces.
    - $800K included in the budget that could be reallocated for property acquisition if needed.
- CLA can provide an explanation of the 60/40 requirement in the statute, which requires that 60% of the CCBWQA revenue be spent on capital projects involving construction or maintenance of pollution abatement projects. This metric is assessed based on a 5-year rolling average.

i. Draft Capital Improvement Program

A copy of the draft capital improvement program was provided to the board in the packet for information only.

6. **Presentations**

   a. **Board Involvement**

   Director Woodling presented on who/what creates, guides, directs and/or focuses issues, projects, and actions of the CCBWQA.

   Discussion included:

   - We should value and refer to our consultants as staff. The consultants perform services in accordance with direction from the Board. Director Woodling is in favor of more engagement by the Board in directing and understanding the services and functions performed by the consultants. Board discussion informs board direction. Prior to recent changes, we all met in person and conversation was different and more involved. Less Board discussion since the change to many participating virtually. In-person Board participation could provide more communication and good discussion. Board members have the opportunity at every meeting to bring up items that they would like addressed and the majority needs to provide approval prior to direction being taken.
   - The Board has been through lots of changes over the last few years and our entity does not have an Executive Director. We do, however, have an Executive Committee to direct staff.
   - The Board would benefit from annual training and informational sessions regarding the responsibilities and functions of the Authority, including the Authority's mission, vision, goals, and responsibilities.
   - Request for a Board binder providing key organizational and technical documents and outlining expectations for Board members.
   - Elected officials wear many different hats, but as Board members, we are tasked with taking a broad look at how we are preserving water quality. It can be frustrating when it doesn't seem like we're making progress. The modeling efforts we have spent money on seem promising.
   - The CCBWQA can adopt a policy or include a calendar for meetings and training in a resolution.
   - The importance and value of Board participation in setting the CCBWQA's direction was discussed.
   - Jane Clary noted that the discussion following Director Woodling's presentation was very positive and constructive regarding ideas for more active Board engagement and identifying future priorities (e.g., watershed plan). However, she also briefly noted that she had some concerns about and disagreed with a few of the examples used in the presentation itself. In the interest of time, she suggested that these could be discussed at a later time, if needed.

7. **Board Member Items**

   Director Rivero made the point that many of the CCBWQA Board members are elected officials who can make a big difference in their communities as they learn more by participating in discussions and taking that knowledge back to their communities.

   Director Lewis noted that updating the Watershed Plan needs priority in near future planning efforts and will help in strategic planning. The diversity of knowledge and expertise of our Board could help to bring new ideas to meet some of the challenges that we need to address in reducing P in the watershed.

   The CCBWQA operates on policy and an updated watershed plan would provide the guidance we need to make significant progress.

   Director McCarty reminded the Board that we do not have any enforcement capability; however, we can "apply gentle persuasion continuously."

   Director Woodling would like to hear feedback when elected officials take knowledge gained from the Board back to their communities.

8. **Updates**

   a. **Technical Manager**

   Jane Clary brought up the need for a December board meeting due to the timing of the Lakes Nutrient Criteria RMH.

   An updated Board binder/ packet is being developed. It seems that a printed copy may be beneficial; however, an electronic version with a table of contents/searchable index would also be very helpful.

   The Watershed Model and the BMP effectiveness study will provide some additional building blocks to incorporate into an updated Watershed Plan.

b. Cherry Creek Stewardship Partners Update and Events (Davenhill)

Director Anderson stated that he thought that the Cherry Creek Annual Conference was well done and thanked those involved in planning efforts, contributors, and speakers.

c. TAC

Jacob James provided an update from the October TAC meeting. In addition to what was discussed today regarding the budget, there was some discussion on Hydros' budget estimate for developing Site Specific Standards for the reservoir, which will come to the Board in November.

d. Contract Staff

i. PAPM (Clary for Borchardt) Jane provided the update that all the LUR and CIP updates are included in the packet. The RDS system had annual maintenance completed on Oct. 3 and was turned off for the season on Oct. 6. The 2022 Wetland harvesting project is also complete.

a. **LUR Monthly Summary**

b. **CIP, Maintenance, and Operations Status Report**

ii. Water Quality (Stewart)

a. WQ Update Erin Stewart provided a brief update that the data portal is up to date through August. Although the significant rain event in August really decreased the chl-a concentrations, it appears the chl-a standard will not be met in 2022.

iii. Regulatory (DiToro)

e. Legal

No report

f. Other

9. Executive Session pursuant to Section 24-6-402(4) C.R.S., if necessary.

No executive session was held.

10. Adjournment

There being no further business to come before the Board, Director Rivero moved to adjourn the meeting at 10:56 a.m.

CCBWQA Workplan

Cherry Creek Basin Water Quality Authority
Schedule of Cash Position
September 30, 2022
as of November 10, 2022

	General Fund	Pollution Abatement Fund	Enterprise Fund	Total
1st Bank - Checking Account				
Balance as of 09/30/22	$ 32,986.35	$ 32,444.20	$ 5,223.26	$ 70,653.81
Subsequent activities:				
10/19/22 Monthly Transfer for AP	85,000.00	880,000.00	110,000.00	1,075,000.00
10/21/22 Bill.com Open Invoices	(83,970.29)	(884,395.75)	(102,844.13)	(1,071,210.17)
10/25/22 VISA Charge	(28.33)	-	-	(28.33)
10/25/22 Xcel Energy ACH	-	(8,779.31)	-	(8,779.31)
10/31/22 Interest Income	17.76	-	-	17.76
Anticipated Activities				
Monthly Transfer for AP	*60,000.00*	*320,000.00*	*5,000.00*	*385,000.00*
Bill.com Open Invoices	*(58,893.30)*	*(315,857.67)*	*(11,174.00)*	*(385,924.97)*
Anticipated balance	$ 35,112.19	$ 23,411.47	$ 6,205.13	$ 64,728.79
ColoTrust General - (8001)				
Balance as of 09/30/22	$ 1,028,987.00	$ 3,427,779.64	$ 1,586,814.00	$ 6,043,580.63
Subsequent activities:				
10/10/22 Receive Ptax Douglas	12,591.42	-	-	12,591.42
10/10/22 Receive Ptax Arapahoe	6,045.68	-	-	6,045.68
10/07/22 Developer Fees Received Oct	-	-	58,952.03	58,952.03
10/19/22 Monthly Transfer for AP	(85,000.00)	(880,000.00)	(110,000.00)	(1,075,000.00)
10/31/22 Interest Income	15,363.36	-	-	15,363.36
11/10/22 Receive Ptax Douglas	12,142.31	-	-	12,142.31
11/10/22 Receive Ptax Arapahoe	7,202.97	-	-	7,202.97
Anticipated Activities				
Monthly Transfer for AP	*(60,000.00)*	*(320,000.00)*	*(5,000.00)*	*(385,000.00)*
Anticipated balance	$ 937,332.74	$ 2,227,779.64	$ 1,530,766.03	$ 4,695,878.40
ColoTrust Pollution Abatement - (8002)				
Balance as of 09/30/22	$ -	$ 53,884.31	$ -	$ 53,884.31
Subsequent activities:				
10/31/22 Interest Income	-	146.89	-	146.89
Anticipated balance	$ -	$ 54,031.20	$ -	$ 54,031.20
CSAFE - Savings Account				
Balance as of 09/30/22	$ 859,161.30	$ 42,246.04	$ 344,398.20	$ 1,245,805.54
Subsequent activities:				
10/31/22 Interest Income	-	-	3,341.83	3,341.83
Anticipated balance	$ 859,161.30	$ 42,246.04	$ 347,740.03	$ 1,249,147.37
Total funds available as of date above	$ 1,831,606.23	$ 2,347,468.35	$ 1,884,711.19	$ 6,063,785.76

Effective monthly yield (as of 10/31/2022)
1st Bank - 0.050%* if Balance >$20,000
ColoTrust Plus - 3.2053%
CSAFE - 3.15%

Cherry Creek Basin Water Quality Authority
Unpaid Claims as of 11/10/2022

Date	Vendor	Invoice #	Account Description	Amount
10/17/2022	CliftonLarsonAllen LLP	3476871	107000 Accounting	7,418.69
9/30/2022	Davis Graham & Stubbs LLP	839911	107050 Regulatory Support	2,313.00
10/31/2022	Valerie Endyk	10	107445 TAC coordination	600.00
10/31/2022	LRE Water	21163	107450 General watershed management	1,480.00
10/31/2022	LRE Water	21163	107450 General watershed management	3,297.25
9/1/2022	LRE Water	21163	107450 General watershed management	4,915.00
9/30/2022	LRE Water	21163	107453 Data management	877.50
10/31/2022	LRE Water	21163	107453 Data management	2,399.75
10/31/2022	Collins Cole Flynn Winn & Ulmer, PLLC	2663	107460 Legal services	9,893.00
10/25/2022	Pinpoint Systems Inc.	9680	107481 Office expense	843.75
10/25/2022	LRE Water	21163	107500 General technical support	600.00
10/25/2022	LRE Water	21163	107501 Monitoring - Reservoir	5,314.06
10/25/2022	LRE Water	21163	107502 Monitoring - Watershed	100.00
10/25/2022	LRE Water	21163	107502 Monitoring - Watershed	7,016.30
10/25/2022	LRE Water	21163	107505 Data management	2,512.50
10/25/2022	LRE Water	21163	107520 Optional Mgr Support Contingency	5,000.00
10/25/2022	Valerie Endyk	10	107520 Optional Mgr Support Contingency	4,312.50
10/25/2022	R2R Engineers, Inc.	2022-12	117440 Management/administration	21,440.47
10/25/2022	Wright Water Engineers, Inc.	64816	117440 Management/administration	12,251.25
10/25/2022	53 Corporation, LLC	Pay App 2022-4	117722 PRF Restoration	4,570.25
10/22/2022	L & M Enterprises, Inc.	4733	117722 PRF Restoration	1,655.95
10/25/2022	L & M Enterprises, Inc.	4734	117722 PRF Restoration	90,000.00
10/25/2022	OneRain Incorporated	111182	117724 PRF Emergency Repairs	2,972.00
9/13/2013	RESPEC	INV-0922-1255	117728 Reservoir Shoreline Stabilization - East Shade Shelter	10,697.50
10/31/2022	CH2M Hill - Jacobs Engineering	D3150300-038	117803 Stream Reclamation - CC 12-Mile Park	2,270.25
10/31/2022	Mile High Flood District	INV02872	117884 Stream reclamation - CC Dransfeldt Road	170,000.00
9/30/2022	Muller Engineering Company	35460	407720 Reservoir to 12-Mile Park Study	1,175.00
10/25/2022	Muller Engineering Company	35461	407720 Reservoir to 12-Mile Park Study	5,705.50
10/25/2022	Dewberry Engineers Inc	2188291	407733 Tributary Planning	1,512.00
9/30/2022	Cockrel Ela Glesne Greher & Ruhland, P.C.	6045.001 OCT22	407735 Special Studies/Projects - Bow Tie	125.00
9/30/2022	Wright Water Engineers, Inc.	64817	407736 Special Studies/Projects: BMP Effectiveness	2,656.50
10/30/2022	Xcel Energy	802676700	117701 - Utilities - Reservoir Destratification	1,898.32
10/31/2022	** Xcel Energy Credit Memo	802676701	117701 - Utilities - Reservoir Destratification	(1,898.32)

Total Claims	**385,924.97**
General Fund	58,893.30
Pollution Abatement Fund	315,857.67
Enterprise Fund	11,174.00
Total Claims by Funding Source	**385,924.97**

** Xcel Energy account was paid double in October. There is a credit memo for $8,779.31 from which $1,898.32 was applied to above invoice

AGREEMENT FOR CONSULTING SERVICES
FOR
CHERRY CREEK BASIN WATER QUALITY AUTHORITY

THIS AGREEMENT FOR PROFESSIONAL CONSULTING SERVICES ("Agreement") is made and entered into this ____ day of November 2022 to be effective as of the 1st day of January 2023, between the **CHERRY CREEK BASIN WATER QUALITY AUTHORITY**, a quasi-municipal corporation and political subdivision of the State of Colorado ("Authority"), whose address is P.O. Box 3166 Centennial, Colorado 80161, and **R2R ENGINEERS, INC.**, a Colorado corporation ("Consultant"), whose address is 5975 South Quebec Street, Suite 225, Centennial, Colorado 80111, phone number (303) 868-5767. Consultant and Authority may hereinafter singularly be referred to as a "Party" and collectively as the "Parties."

RECITALS

WHEREAS, the Authority was established for the purpose of preserving and protecting the water quality in the Cherry Creek Reservoir and the Cherry Creek Watershed; and

WHEREAS, in furtherance of its purpose, the Authority has retained and continues to retain, from time to time, numerous technical consultants; and

WHEREAS, Authority is in need of professional engineering services to assist the Authority in implementing and monitoring its Pollution Abatement Projects Program and to provide such other services and assistance as more particularly set forth in the Scope of Services as attached hereto; and

WHEREAS, Consultant has performed similar services for Authority in prior years and represents that it has the personnel and expertise to perform the services Authority desires during 2023.

NOW, THEREFORE, in consideration of the promises set forth herein, Authority and Consultant agree as follows:

1. **Scope of Services**. Consultant agrees to provide services to the Authority, consisting of six (6) Tasks in accordance with and as more particularly described in the Scope of Services, attached hereto as **Exhibit A** (consisting of 2 pages) and incorporated herein by this reference, together with all labor and materials, if any, necessary therefore (collectively the "Services"). The Services will be performed in accordance with this Agreement and the Scope of Services; provided, however, that in the event of a conflict between the terms and provisions of the Scope of Services and the text of this Agreement, the text of this Agreement shall control. Notwithstanding any other provision contained herein to the contrary, the Services identified in the Scope of Services as optional and that

are itemized on **Exhibit A** as Tasks 10000, 11000, and 12000 under the heading: "Optional Scope of Services" ("Optional Services") will be performed only if authorized in writing by the Executive Committee.

2. **Notice to Proceed**. As of the effective date of this Agreement and provided Authority has received satisfactory Certificates of Insurance as required by paragraph 15 below, Consultant is hereby authorized to provide the Services as more particularly set forth in the Scope of Services.

3. **Completion Date**. Consultant shall give this Agreement and the Services to be performed hereunder such priority as is necessary to cause the Services to be completed in accordance with the deadlines established herein. At any time during the Term of this Agreement, Authority may request and Consultant shall, within twenty (20) days of such request, submit for Authority's approval a written schedule for the completion of all or any portion of the Tasks which comprise the Services. Unless delayed by acts or the failure to act of Authority, or other causes beyond the control of Consultant, and without extending any deadline established elsewhere in this Agreement, the Scope of Services, or otherwise, all Services required by this Agreement shall be entirely and completely completed to Authority's satisfaction, and all deliverables, if any, as set forth in the Scope of Services shall be delivered to Authority, no later than December 31, 2023.

4. **Responsibility for Services**. The Authority shall not supervise the work of Consultant or instruct the Consultant on how to perform Services. Consultant shall be responsible for the professional quality, technical accuracy, timely completion and coordination of all work, reports and other Services rendered, whether such work is performed directly by Consultant or by any subconsultant or subcontractor hired by Consultant and approved by Authority in accordance with Paragraph 11 below. Without additional compensation and without limiting Authority's remedies, Consultant shall promptly remedy and correct any errors, omissions, or other deficiencies in the Services. Consultant agrees that all Services provided under this Agreement shall be performed with competence, and in accordance with the standard of care of Consultant's profession prevailing in Colorado.

5. **Compensation**. Authority will compensate Consultant for Services performed at the rate of $195.00 per hour up to the limit per task as set forth on **Exhibit B** and will reimburse Consultant for mileage in accordance with the applicable IRS rate. The total compensation that Consultant may receive under this Agreement for Services performed, excluding Optional Services, shall not exceed $181,575.00 without the Authority's prior express written consent.

Consultant has projected the total number of man hours required to perform each of the six (6) Tasks which comprise the Scope of Services. Said projection is included on **Exhibit B**. The hours allocated for each Task is an estimate and Consultant may be over or under the estimated number of hours per Task by as much as fifteen percent (15%).

5.1 **Optional Services.** Page 2 of the Scope of Services itemizes three (3) Tasks identified as Task 10000, 11000 and 12000 which comprise the "Optional Services". Notwithstanding any other provision contained herein to the contrary, Consultant shall not perform all or any of the Optional Services unless and until expressly authorized to do so in writing by the Authority's Executive Committee; provided further that the total compensation that Consultant shall receive for the Optional Services shall under no circumstances exceed $52,265.00 without the Authority's prior written consent. If all of the Optional Services are authorized by the Authority and performed by Consultant the total compensation to Consultant under this Agreement shall not exceed $233,840.00.

5.2 **No Additional Compensation.** The compensation to be paid Consultant under this Agreement is entire and complete and includes any and all reimbursable costs, such as photo copying, mileage, and other reimbursable costs, unless reimbursement is expressly requested by Consultant in advance of incurring such costs, and agreed to in writing by the Authority. Any and all subconsultants employed by Consultant shall be paid for by Consultant at Consultant's costs without any additional mark-ups or add-ons whatsoever. It is understood and agreed that Consultant will not contract with retain any sub-consultants without the prior written approval of Authority.

If Consultant is requested to perform any work not expressly described in the Scope of Services, or that will cause the estimated time to perform any Task described in the Scope of Services to be increased above what is currently contemplated, Consultant shall immediately notify Authority in writing and will not perform such work until authorized to do so in writing by Authority's representative.

6. **Method of Payment**. Consultant shall provide an invoice each month for the Services completed through the last day of the preceding month. Each invoice shall be submitted only for those Services actually performed during the period for which the invoice is submitted. Consultant shall submit with each invoice such supporting documentation as Authority may reasonably request. Each invoice submitted by Consultant shall constitute a representation to Authority that the Services are completed to the point as represented in the billing invoice. Unless Consultant does not properly perform the Services, invoices will be paid within thirty (30) days after receipt. Authority shall have the right to refuse to pay all or a portion of an invoice that is inconsistent with this Agreement. Authority may delay payment until it can verify the accuracy of an invoice, obtain releases or waivers with respect to Services covered in the invoice, or resolve a dispute with Consultant regarding an invoice.

7. **Records and Audits**. Consultant shall at all times maintain a system of accounting records in accordance with its normal billing procedures, together with supporting documentation for all work, purchases, Services and billings under this Agreement. Consultant shall make available for audit and reproduction by Authority all records, in whatever form, related to the Services. Consultant shall provide such availability during the term of this Agreement and for two (2) years after final payment.

Consultant shall refund to Authority any charges determined by Authority's audit to be inconsistent with this Agreement.

8. **Changes in Services**. Authority and, in particular, the Authority's Manager shall have the right to order additions, deletions or changes in the Services at any time and for any reason, but especially for purposes of improving coordination between the Authority's consultants and eliminating the duplication of Services. Requests for material changes in the Services may be made by Authority's representative, orally or writing; provided, however, that oral requests shall be confirmed by a written request within 10 days after the oral request. If the Authority directs the Consultant to proceed with any material change, Consultant shall be paid for the change as agreed to by the Parties.

9. **Confidentiality of Information**. Except as required by law, or as is necessary for the performance of the Services, Consultant shall retain in strictest confidence all information furnished by Authority and the results of any reports or studies conducted as a result of this Agreement, along with all supporting work papers and any other substantiating documents. Consultant shall not disclose such information to others without the prior written consent of Authority's representative. Notwithstanding the foregoing, Consultant shall have no confidentiality obligation with respect to information that: (i) becomes generally available to the public other than as a result of disclosure by Consultant or its agents or employees; (ii) was available to Consultant on a non-confidential basis prior to its disclosure by Authority; and (iii) becomes available to Consultant from a third party who is not, to the knowledge of Consultant, bound to retain such information in confidence.

10. **Ownership of Work Product and Documents**. All documents of whatsoever kind or nature, including but not limited to all printed material and electronic documents produced as a result of the Services performed under this Agreement, shall be the sole property of the Authority after payment to Consultant, and may not be used, sold, or disposed of in any manner without the prior written approval of the Authority's representative. All documents applicable to each Task identified in the Scope of Services shall be delivered and turned over to Authority as and when such Task is completed. Under no circumstance shall any printed or electronic material or other documents produced as a result of the Services performed under this Agreement be retained by Consultant from and after the date Consultant has been paid in full all monies due Consultant hereunder. Consultant may retain one copy of all documents prepared under this Agreement for its records, but such documents may not be used by Consultant for any non-Authority projects without Authority's prior written consent, which may be withheld for any reason. Any un-authorized re-use of Consultant's Instruments of Service by Authority will be at its sole risk and without any liability to the Consultant.

11. **Approval of Subconsultants**. Consultant shall not employ any subconsultant or subcontractor without the prior written approval of the Authority's Executive Committee. Consultant shall be responsible for the coordination, accuracy and

completeness of all Services in accordance with generally accepted engineering principles and practices, regardless of whether the Services are performed by Consultants or one or more subconsultants. Consultant shall endeavor to bind each of its approved subconsultants or approved subcontractors, if any, to the terms of this Agreement. In the event that a subconsultant is unwilling or unable to comply with any term or provision of this Agreement, Consultant will inform Authority of the specific term or provision at issue. Authority may accept the lack of compliance to the terms of this Agreement on the part of the subconsultant, or may request that a different subconsultant be retained. This Agreement may be terminated by Authority if subcontracted by Consultant without the express written consent of Authority's representative.

12. **Independent Contractor**. Nothing herein contained shall be construed to make Consultant an agent or employee of the Authority for any purpose. Consultant shall, in all respects, be an independent contractor to the Authority in its performance of the Services. Consultant and its employees and subconsultants, if any, shall in no way represent themselves to third parties as agents or employees of the Authority in performance of the Services.

13. **Unemployment Insurance or Workers' Compensation Benefits**. Consultant agrees that it is not entitled to unemployment insurance or workers' compensation benefits as a result of performance of the Services for Authority. Consultant shall provide workers' compensation and unemployment insurance benefits for its employees and/or subconsultants as required by law.

14. **Payment of Taxes**. Consultant is solely liable for any federal, state and local income and withholding taxes, unemployment taxes, FICA taxes and workers' compensation payments and premiums applicable to the performance of the Services under this Agreement. Consultant shall indemnify Authority for any liability resulting from nonpayment of such taxes and sums.

15. **Insurance**. Except as otherwise expressly stated in this Agreement, Consultant and each subconsultant shall maintain in full force and effect during the term of this Agreement the following insurance coverage:

(a) Workers' Compensation. Consultant and each approved subconsultant, if any, shall carry Workers' Compensation Insurance to cover liability under the laws of the State of Colorado in connection with the Services performed pursuant to this Agreement, or in the alternative, Consultant, if operating as a single member limited liability company, may elect to opt out of the provisions of Articles 40 to 47 of Title VIII, C.R.S., pursuant to the provisions of Section 8-41-202, C.R.S. If such option is taken, Consultant shall provide Authority with a copy of the written form that is filed with the Division of Workers' Compensation in the Colorado Department of Labor and Employment. Unless otherwise agreed in writing, Consultant shall not hire or pay any other person to perform services for the Authority and agrees to indemnify the Authority

from and against any and all loss or liability sustained by the Authority as a result of a breach of this provision.

(b) Commercial General Liability Insurance. Consultant and each approved subconsultant and each approved subcontractor, if any, shall carry Commercial General Liability Insurance, in an aggregate amount of not less than One Million One Hundred Thousand Dollars ($1,100,000.00), which shall include blanket contractual liability coverage.

(c) Automobile Liability Insurance. Consultant and each approved subconsultant and each approved subcontractor shall carry automobile liability insurance in an aggregate amount of not less than One Million One Hundred Thousand Dollars ($1,100,00.00), to include owned, non-owned and hired vehicles used in the performance of Services under this Agreement.

(d) Professional Liability Insurance. Consultant shall carry Professional Liability Insurance in an aggregate of not less than Five Hundred Thousand Dollars ($500,000.00)

Prior to commencing any Services under this Agreement, Consultant shall provide Authority a Certificate of Insurance evidencing the policies required by this paragraph as well as the amounts of coverage for the respective types of coverage required. The required General Liability and Automobile Policies shall: (1) name Authority as an additional insured for coverages only, with no premium payment obligation; and (2) provide a cross-liability/severability of interest clause. Consultant and each subconsultant shall provide Certificates of Insurance (and renewals thereof) in a form acceptable to the Authority, identifying this Agreement, and demonstrating that required coverages have been obtained. Consultant shall not allow any subconsultant, agent or employee to commence work until appropriate Certificates of Insurance have been obtained and approved by Authority. The coverages specified in the Certificates of Insurance shall not be terminated without providing at least thirty (30) days prior written notice to Authority. If coverage is reduced for any reason, the covered entity, be it Consultant or any subconsultant, shall immediately so notify Authority in writing of the effective date and amount of reduction.

16. **Compliance with Laws**. In performing this Agreement, Consultant shall comply with all applicable laws, rules and regulations, including but not limited to all federal, state and local laws.

17. **Communication**. It is understood by Authority and Consultant that successful progress under this Agreement requires frequent, concise and documented communication between the Parties' representatives. Authority hereby designates each member of its Executive Committee, or such other person as the Authority may from time-to-time designate in writing, as its representatives who individually shall each be able to

give information to and receive information from Consultant. Authority may change its designated representatives or name additional Authority representatives.

Consultant hereby names Richard G. Borchardt, PE CFM as its representative who will give information to and receive information from Authority. Consultant may change its designated representative only with the prior written approval of Authority. Each designated representative shall have full authority to not only accept and receive information, but also to accept notices, give approvals, and to fully represent their respective Parties for all purposes under this agreement.

18. **Liability**. Consultant agrees to pay any damages and costs for any liability or claim of whatsoever nature arising out of this Agreement, to the extent such liability or claim is caused by the negligent or wrongful act or omission of the Consultant, its subconsultants, or Consultant's and subconsultants' officers, agents or employees. This Paragraph 18 shall survive termination of this Agreement.

19. **Acceptance Not a Waiver**. Authority's approval of studies, drawings, designs, plans, specifications, reports, computer programs and other work or material shall not in any way relieve Consultant of responsibility for the performing the Services in accordance with generally acceptable engineering principles and practices. Authority's approval or acceptance of, or payment for, the Services shall not be construed to operate as a waiver of any rights under this Agreement, or of any cause of action arising out of the performance of this Agreement.

20. **Termination or Suspension**. Authority reserves the exclusive right to terminate or suspend all or a portion of the Services under this Agreement by giving ten (10) days prior written notice to Consultant. If any portion of the work shall be terminated or suspended, Authority shall pay Consultant equitably for all Services properly performed pursuant to this Agreement. If the work is suspended and Consultant is not given an order to resume work within sixty (60) days from the effective date of the suspension, this Agreement shall be considered terminated. Upon termination, Consultant shall immediately deliver to Authority any documents then in existence that have been prepared by Consultant pursuant to this Agreement.

In addition to the foregoing, Authority may terminate this Agreement at any time and for any reason or no reason upon ten (10) days advance written notice to Consultant. If Authority terminates the Agreement Consultant shall be paid for the Services performed to the date of termination.

Consultant may terminate this Agreement at any time and for any reason, or no reason, upon thirty (30) days advance written notice to Authority. If Consultant terminates the Agreement, Consultant shall be paid for Services performed to the date of termination.

21. **Term**. Unless terminated sooner in accordance with the provisions of paragraph 20 above, this Agreement shall remain in effect until the Services are fully performed, at which time the Agreement shall terminate and be of no further force and effect, except as to those provisions which expressly survive termination, including but not limited to Paragraph 18. Notwithstanding the foregoing, it is anticipated that the Services will be fully performed on or before December 31, 2023, and that the Authority shall have no obligation to make payments to Consultant for Services performed after December 31, 2023.

22. **Default**. Every term and condition of this Agreement shall be deemed to be a material element of this Agreement. In the event either party shall fail or refuse to perform according to the material terms of this Agreement, such party may be declared in default by the other party by a written notice.

23. **Severability**. If any provision of this Agreement is found to be invalid by any court of competent jurisdiction, such finding shall not affect the validity of the remainder of the Agreement.

24. **Remedies**. In the event a party has been declared in default, such defaulting party shall be allowed a period of fifteen (15) days from receipt of written notice of such default within which to correct, or commence correcting, the default. In the event that the default has not been corrected or begun to be corrected, or the defaulting party has ceased to pursue the correction with due diligence, the party declaring default may elect to (i) terminate this Agreement and seek damages; (ii) treat the Agreement as continuing and require specific performance; or (iii) avail itself of any other remedy at law or in equity. In the event Consultant fails or neglects to perform the Services in accordance with this Agreement, Authority may elect to correct such deficiencies and Consultant shall be obligated to pay for the full cost of the corrections.

25. **Force Majeure**. The Parties shall not be responsible for any failure or delay in the performance of any obligations under this Agreement including, but not limited to, acts of God, flood, fire, war or public enemy, failure of Authority to furnish timely information or to approve or disapprove Consultant's instruments of service promptly, and faulty performance or nonperformance by Authority, Authority's independent consultants or contractors, or governmental agencies. Consultant shall not be liable for damages arising out of any such delay, nor shall the Consultant be deemed to be in breach of this Agreement as a result thereof.

26. **Assignment and Subconsultants**. Consultant may not assign this Agreement or any right or liability or enter into any subcontract or amend any subcontract without prior written consent of Authority's representative.

27. **Successors and Assigns**. Subject to the provisions of Paragraph 26 above, this Agreement shall bind and inure to the benefit of the Parties and their respective successors and assigns.

28. **No Third-Party Beneficiaries**. This Agreement is intended to benefit only the Parties, and neither subconsultants nor suppliers of Consultant, nor any other person or entity is intended by the Parties to be a third-party beneficiary of this Agreement.

29. **Governing Law**. This Agreement shall be governed by and construed under the laws of the State of Colorado.

30. **No Multiple Fiscal Year Obligation**. No provision of this Agreement shall be construed or interpreted as creating an indebtedness or a multiple fiscal year direct or indirect debt, or other multiple year financial obligation whatsoever of Authority within the meaning of any constitutional or statutory debt limitation provision, including, without limitation, Article 11, §§ 1, 2 and 6, and Article 10, § 20 of the Colorado Constitution. This Agreement shall not directly or indirectly obligate the Authority to make any payments beyond the funds legally available to it for the then current fiscal year. No provision of this Agreement shall be construed to pledge or create a lien on any class or source of monies of the Authority, nor shall any provision of this Agreement restrict or limit the discretion of the Authority in the budgeting and appropriation of its funds.

31. **Notice**. All notices required or given under this Agreement shall be in writing and shall be effective: (i) when delivered personally to the other Parties; or (ii) seven days after being deposited in the United States Mail, first class postage prepaid, properly addressed as follows; or (iii) when sent by facsimile transmission and receipt is confirmed by return facsimile transmission.

If to Consultant:

R2R Engineers, Inc.
Attn: Richard G. Borchardt, President
7526 South Willow Circle
Centennial, Colorado 80112

If to Authority:

c/o: Executive Committee
Cherry Creek Basin Water Quality Authority
P.O. Box 3166
Centennial, Colorado 80161

With a copy to:

Timothy J. Flynn
Collins Cole Flynn Winn & Ulmer, PLLC
165 S. Union Boulevard, Suite 785
Lakewood, Colorado 80228

or such other persons or addressees as the parties may designate in writing.

32. **Governmental Immunity**. The parties understand and agree that Authority is relying upon, has not waived, the monetary limitations of $387,000 per person, $1,093,000 per occurrence, and all other rights, immunities and protections provided by the Colorado Governmental Immunity Act, § 24-10-101 et seq. C.R.S., as the same now exists or may hereafter be amended from time to time.

33. **Entire Agreement**. This Agreement constitutes the entire Agreement between the Authority and Consultant and, this Agreement replaces all prior written or oral agreements and understandings between the Parties. This Agreement may be altered, amended or repealed only by a written instrument duly executed by the Parties.

34. **Effective Date**. Upon execution by both Parties, this Agreement shall be effective as of the date first above written.

IN WITNESS WHEREOF, the Parties have executed this Agreement in triplicate originals as of the dates set forth below. This Agreement must have the signature of an authorized person of Consultant on all original copies.

AUTHORITY:
CHERRY CREEK BASIN WATER QUALITY AUTHORITY, a quasi-municipal corporation and political subdivision of the State of Colorado

By: _____
Joshua Rivero, Chair

Attest:

_____
John A. McCarty, Secretary/Treasurer

APPROVED AS TO FORM:

_____
Timothy J. Flynn, General Counsel
Cherry Creek Basin Water Quality Authority

This Agreement is accepted by:

CONSULTANT:
R2R ENGINEERS, INC., a Colorado corporation

By: _____
Richard G. Borchardt, President

By execution, signer certifies that he or she is authorized to accept and bind Consultant to the terms of this Agreement.

R2R ENGINEERS

RIFFLES TO RIPPLES

Exhibit A

SCOPE OF SERVICES FOR
THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY
POLLUTION ABATEMENT PROJECT MANAGER

This position works for the CCBWQA Board of Directors (Board), with the Technical Advisory Committee (TAC), and with a team of consultants and outside entities and agencies that work towards improving water quality in the Cherry Creek Basin and Cherry Creek Reservoir. Project task details and estimated time are presented in Exhibit B.

Task 100 Meetings, Budgets, and General Administration

- **Task 110:** Preparation and attendance at Staff, Subcommittee, TAC and Board meetings.
- **Task 120:** Preparation of capital and maintenance budgets, including meetings as requested by the Authority Technical Manager.
- **Task 120.1:** Preparation of planning and study budgets, including meetings as requested by the Authority Technical Manager
- **Task 130**: As requested by the Authority's Technical Manager or Attorney, assist with the Authority's administrative needs, such as reviewing monthly accounts payable for technical consultants and other CIP projects.
- **Task 140:** As requested by the Authority's Technical Manager or Board, assist with scoping and selection of special consultants.
- **Task 150:** Respond to special projects request authorized by the Authority's Manager or Board not otherwise part of other scope items.

Task 200 Annual Monitoring and Watershed Reporting

- **Task 210:** Preparing text for the Authority's Capital Projects Program and reviewing text by others for the Annual Watershed Report. This work needs to be completed annually.

Task 400 Capital Project Design and Construction

This task involves scoping, budgeting, design, construction observation, and management of several past, current, and future capital project efforts on behalf of the Authority. Projects completed or put on indefinite hold are noted as "task suspended" but the task is shown for tracking purposes.

- **Task 410:** Assist Authority with management of project close-out activities for CIP (Cherry Creek 12-mile Phase 3 and East Boat Ramp Phase 2).
- **Task 420**: General Stream Reclamation Projects. Manage, Monitor & evaluate stream reclamation projects in the Basin. Provide project management for projects that are designed and constructed by Authority selected consultants and contractors. General projects are included in Task 420 and specific planned projects are listed on Resource and Fee estimate and begin with 420 and are followed with a decimal.
- **Task 425**: Stream Corridor Preservation Program; evaluate proposed projects for co-funding with the Authority.
- **Task 430:** Pollution Reduction Facilities; manage, monitor & evaluate non-point source projects in the Basin.
- **Task 440**: Shoreline Stabilization around Cherry Creek Reservoir; provide project management for East Shade Shelters Phase 3 and Tower Loop Phase 2 projects; proved project management and construction observation for Mountain Loop.

Optional Scope of Services:

Task 10000: Optional Services – General Fund: These services will begin following authorization by Executive Committee.

- **Task 10800:** As-needed and directed services for General Fund.

Task 11000: Optional Services – Pollution Abatement Fund: These services will begin following authorization by Executive Committee.

- **Task 11500:** Assist CCBWQA in transitioning operations and maintenance projects to the Authority's selected consultant who will be performing the operations and maintenance projects.
- **Task 11670:** PRF/PAP Water Quality Benefits Report; assist Technical Manager with project management; Authority's selected consultant(s) preparing this report.
- **Task 11680:** Runoff Reduction/RPA Study, assist Technical Manager with project management; Authority's selected consultant(s) preparing this study.
- **Task 11800:** As-needed and directed services for Pollution Abatement Fund.

Task 12000: Optional Services – Enterprise Fund: These services will begin following authorization by Executive Committee.

- **Task 12800:** As-needed and directed services for Pollution Abatement Fund.
- **Task 12921:** Assist Technical Manager on Cherry Creek Adaptive Management Plan from Lake View Drive to CCSP Boundary by providing project management with Authority's selected consultant preparing the adaptive management plan.
- **Task 12940:** Provide project management on BMP Effectiveness Report with Authority's selected consultant preparing the report.

R2R Engineers - Total Project Resources and Fee Estimate (one page tracking sheet)

Project Name: Pollution Abatement Project Manager
Project Number: 22-08.01
Client(s): CCBWQA
Date: 9/11/2022
Prepared by: RGB

R2R ENGINEERS
RIFFLES TO RIPPLES

Minimum Scope of Services

Task #	Task Decription	R2R Project Manager Hours #	R2R Project Manager RB $ 195.00	Project Expense Mileage $	Task Total $	General Fund Break Out $	Pollution Abatement Fund Break Out $	Enterprise Fund Break Out $
100	Meetings, Budgets, and General Administration	316	$ 61,620.00	$ 400.00	$ 62,020.00	$ 62,020.00		
200	Annual Monitoring and Watershed Reporting	32	$ 6,240.00	$ -	$ 6,240.00	$ 6,240.00		
400	Capital Project Design and Construction	577	$ 112,515.00	$ 800.00	$ 113,315.00		$ 113,315.00	
Total (Hours)		925						
Resource Total ($)			$ 180,375.00					
Expense Total ($)				$ 1,200.00				
Proposal Total ($)					$ 181,575.00	$ 68,260.00	$ 113,315.00	$ -

Optional Scope of Services

Task #	Task Decription	R2R Project Manager Hours #	R2R Project Manager RB $ 195.00	Project Expense Mileage $	Task Total $	General Fund Break Out $	Pollution Abatement Fund Break Out $	Enterprise Fund Break Out $
10000	Optional Services - General Fund	34	$ 6,630.00	$ -	$ 6,630.00	$ 6,630.00		
11000	Optional Services - Pollution Abatement Fund	152	$ 29,640.00	$ 200.00	$ 29,840.00		$ 29,840.00	
12000	Optional Services - Enterprise Fund	81	$ 15,795.00	$ -	$ 15,795.00			$ 15,795.00
Total (Hours)		267						
Resource Total ($)			$ 52,065.00					
Expense Total ($)				$ 200.00				
Proposal Total ($)					$ 52,265.00	$ 6,630.00	$ 29,840.00	$ 15,795.00

Minimum+Optional Scope of Services =	$233,840.00	$74,890.00	$143,155.00	$15,795.00

R2R Engineers - Detailed Resources and Fee Estimate (Breakdown of Subtasks)

Project Name: Pollution Abatement Project Manager
Project Number: 22-08.01
Client(s): CCBWQA
Date: 8/26/2022
Prepared by: RGB

R2R ENGINEERS
RIFFLES TO RIPPLES

Minimum Scope of Services

Task #	Task Decription	Project Manager Hours #	Project Manager RB $ 195.00	Project Expense Mileage $	Task Total $
100	**Meetings, Budgets, and General Administration**	**316**	**$ 61,620.00**	**$ 400.00**	**$ 62,020.00**
110	Staff, Subcommittee, TAC, and Board Meetings	216			
120	Prep of Capital and Maintenance* Budgets	50			
120.1	Prep of Planning and Study Budgets	12			
130	Monthly Adminstration	30			
140	As Requested, Scope and Selection Special Consultants	4			
150	Respond to Special Projects As Needed	4			
200	**Annual Monitoring and Watershed Reporting**	**32**	**$ 6,240.00**	**$ -**	**$ 6,240.00**
210	Prep Capital Projects Text	32			
400	**Capital Project Design and Construction**	**577**	**$ 112,515.00**	**$ 800.00**	**$ 113,315.00**
410	PAPs recurring PAPM Activities	40			
	Cherry Creek Stream Reclamation 12-mile Phase 3				
	East Boat Ramp Phase 2 Shoreline Stabilization				
420	Manage, Monitor, and Evaluate Stream Reclamation Projects	8			
	CCBWQA Projects				
420.11	Cherry Creek Reservoir to Lake View Drive - Alternatives Analysis	50			
	Partner Projects				
420.12	Cherry Creek Stream Reaches 3 and 4 (aka Arapahoe Road)	30			
420.21	Cherry Creek Stream Reclamation - U/S Scott Road (Douglas County)	58			
420.22	Cherry Creek Stream Reclamation - at Dransfeldt Extension (Parker)	58			
420.3	Piney Creek Reach 1 to 2	30			
420.5	Happy Canyon Creek at Jordan Road	33			
420.51	Happy Canyon Creek - upstream of I-25	58			
420.61	McMurdo Gulch 22/23/24	42			
420.7	Dove Creek Otero Ave. to Chambers Rd.	42			
425	Stream Corridor Preservation Program	8			
430	PRF Program	8			
430.1	Detention Pond Retrofit	8			
430.2	Upgrade/Relocate Sampling Sites	8			
440	Shoreline Stabilization around Cherry Creek Reservoir	0			
440.50	Shoreline - Mountain Loop	28			
440.51	Shoreline - East Shade Shelters Phase 3 and Tower Loop Phase 2	68			
Total (Hours)		925			
Resource Total ($)			$ 180,375.00		
Expense Total ($)				$ 1,200.00	
Proposal Total ($)					$ 181,575.00

Optional Scope of Services

Task #	Task Decription	Project Manager Hours #	Project Manager RB $ 195.00	Project Expense Mileage $	Task Total $
10000	**Optional Services - General Fund**	**34**	**$ 6,630.00**	**$ -**	**$ 6,630.00**
10800	As-Needed and Directed General Fund Services	34			
11000	**Optional Services - Pollution Abatement Fund**	**152**	**$ 29,640.00**	**$ 200.00**	**$ 29,840.00**
11500	Capital Project Operations and Maintenance transition to others	24			
11670	PRF/PAP Water Quality Benefit Paper Update	40			
11680	Runoff Reduction/RPA Study	28			
11800	As-Needed and Directed Pollution Abatement Fund Services	60			
12000	**Optional Services - Enterprise Fund**	**81**	**$ 15,795.00**	**$ -**	**$ 15,795.00**
12800	As-Needed and Directed Enterprise Fund Services	7			
12921	Cherry Creek Adaptive Management Plan from Lake View Drive to CCSP Boundary	50			
12940	BMP Effectiveness Report	24			
Total (Hours)		267			
Resource Total ($)			$ 52,065.00		
Expense Total ($)				$ 200.00	
Proposal Total ($)					$ 52,265.00

AS NEEDED CONSULTING SERVICES AGREEMENT

THIS AS NEEDED CONSULTING SERVICES AGREEMENT ("Agreement") is entered into as of the _____ of November, 2022, to be effective as of January 1, 2023 between the **CHERRY CREEK BASIN WATER QUALITY AUTHORITY**, a quasi-municipal corporation and political subdivision of the State of Colorado ("Authority"), whose address is Post Office Box 3166, Centennial, Colorado 80161, and **RESPEC COMPANY, LLC.**, a South Dakota corporation ("Consultant"), whose local address is 720 South Colorado Blvd., Suite 410S, Denver, Colorado 80246. Consultant and Authority may hereinafter singularly be referred to as a "Party" and collectively as the "Parties."

RECITALS

WHEREAS, the Authority was established for the purpose of preserving, protecting and enhancing the water quality in the Cherry Creek Reservoir ("Reservoir") and the Cherry Creek Watershed ("Watershed"); and

WHEREAS, Consultant pursuant to prior agreements with the Authority developed a Watershed Model and generated specific Watershed Model runs and planning scenarios for the Authority; and

WHEREAS, at times questions arise concerning the Watershed Model and water quality issues in the Watershed and in the Reservoir generally, as to which Consultant has expertise and knowledge; and

WHEREAS, Authority desires to confer with Consultant from time-to-time for the purpose of obtaining advice and information with respect to such questions and with respect to the Watershed Model, including requesting additional Watershed Model runs; and

WHEREAS, Consultant is willing to provide such services and consult with Authority on an as-needed basis, and Authority desires to utilize Consultant for such purposes, upon the terms and conditions hereinafter set forth.

NOW, THEREFORE, in consideration of the promises set forth herein, Authority and Consultant agree as follows:

1. **Scope of Services.** During calendar year 2023, Consultant agrees to make its representatives, including, but not limited to, Alan Leak, available to assist Authority and Authority's other consultants in answering questions and providing information with respect to the Watershed and Reservoir Models and other matters that

affect water quality in Cherry Creek and Cherry Creek Reservoir.

2. **Authorization to Proceed.** Consultant will perform the Services on an as needed basis, but only when requested to do so in writing by the Authority's Administrator.

3. **Compensation.** For the Services performed for Authority during calendar year 2023, Consultant will be compensated in accordance with Consultant's hourly rates and reimbursable costs, as set forth on **Exhibit A**, as attached hereto. Notwithstanding any other provision contained herein to the contrary, total compensation for Services provided by Consultant under this Agreement shall not exceed $25,000 without the express prior written consent of the Authority's Executive Committee.

4. **Separate Agreement.** This is a separate agreement entered into between the Authority and Consultant and is in addition to any other agreements entered into between the Authority and Consultant. Services chargeable to and/or authorized under any prior agreement shall not be charged to or performed under this Agreement. Nothing contained in this Agreement shall be deemed to modify or in any way amend or supersede any existing agreements Consultant has with the Authority; provided, however, the general terms and provisions of those agreements relating to the method of payment, conflict of interest, records, audits, confidentiality of information, insurance, and indemnification, are incorporated herein by reference as if fully set forth.

5. **Binding Effect.** This Agreement shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

6. **Severability**. In the event any one of more of the provisions of this Agreement shall for any reason be held to be invalid or unenforceable, the remaining provisions of this Agreement shall be unimpaired, and shall remain in full force and effect and shall be binding upon the Parties hereto.

7. **Compliance with Laws**. In performing this Agreement, Consultant shall comply with all applicable laws, rules and regulations, including but not limited to all federal, state and local laws.

8. **Counterpart Signatures**. This Agreement can be executed in counterparts, each of which taken together shall constitute one original document.

9. **Governing Law**. This Agreement shall be governed by and construed in accordance with the laws of the State of Colorado.

IN WITNESS WHEREOF, the Parties have executed this Agreement in duplicate original as of the dates set forth below. This Agreement must have the signature of an authorized representative of Consultant on both original copies.

AUTHORITY:

CHERRY CREEK BASIN WATER QUALITY AUTHORITY, a quasi-municipal corporation and political subdivision of the State of Colorado

By: _____
Joshua Rivero, Chair

Date: _____

Approved as to Form:

_____
Timothy J. Flynn, General Counsel
To the Authority

CONSULTANT:

RESPEC, COMPANY, LLC., a South Dakota corporation

By: _____
Alan J. Leak, Principal

Date: _____

2023 BILLING RATE SCHEDULE

COLORADO STAFF

Position	Hourly Rate
Principal/Senior Project Manager	$195–225
Senior Project Manager	$170–215
Project Manager	$150–180
Water Rights Engineer	$140–170
Water Resources Scientist	$130–160
Project Engineer	$130–160
Designer	$100–145
Scientist	$95–140
Engineer	$95–140
Hydrologist	$95–140
Engineering Technician	$80–135
Administrative Support	$75–100
Engineering Intern	$60–80

Expenses	
Mileage	Regulatory Rate
Postage/Courier	At Cost
Vendor Printing and Binding	At Cost
Other Expenses	At Cost

CONSULTANT AGREEMENT

FOR

TECHNICAL, REGULATORY, AND MONITORING CONSULTING SERVICES

THIS CONSULTANT AGREEMENT FOR TECHNICAL, REGULATORY, AND MONITORING CONSULTING SERVICES ("Agreement") is entered into as of the _____ day of November 2022, to be effective as of January 1, 2023, between the **CHERRY CREEK BASIN WATER QUALITY AUTHORITY**, a quasi-municipal corporation and political subdivision of the State of Colorado ("Authority"), whose address is P.O. Box 3166, Centennial, Colorado 80161, and **LRE WATER**, a Colorado corporation ("Consultant") whose address is 1221 Auraria Parkway, Denver, Colorado 80204. Consultant and Authority may hereinafter singularly be referred to as a "Party" and collectively as the "Parties."

RECITALS

WHEREAS, the Authority was established for the purpose of preserving and protecting the water quality in the Cherry Creek Reservoir ("Reservoir") and the Cherry Creek Watershed ("Watershed"); and

WHEREAS, in furtherance of its purposes, the Authority has retained and continues to retain, from time to time, numerous technical consultants; and

WHEREAS, Authority desires to receive Reservoir and Watershed technical and regulatory consulting services ("Watershed Consulting") from Consultant for calendar year 2022 in accordance with the terms and conditions of this Agreement; and

WHEREAS, Authority also desires to receive Reservoir and Watershed water quality monitoring, sampling, laboratory, and technical consulting support services ("Monitoring Consulting") from Consultant for calendar year 2023 in accordance with the terms and conditions of this Agreement; and

WHEREAS, Consultant represents that it has the personnel and expertise necessary to perform such services for Authority in a competent and timely manner.

NOW, THEREFORE, in consideration of the promises set forth herein, Authority and Consultant agree as follows:

1. **Scope of Services**. Consultant agrees to perform and provide Watershed Consulting services consisting of Tasks W1 through W7, and Monitoring Consulting services consisting of Tasks M1 through M9, in accordance with this Agreement as described in the Scope of Services, attached hereto as **Exhibit A** (consisting of 17 pages) which is incorporated herein by this reference which, together with all necessary labor, materials, scheduling, procurement and such related work and services may be necessary and

reasonably inferable from the Scope of Services to complete the totality of the obligations imposed upon Consultant by this Agreement (collectively the "Services"). The Services will be performed in accordance with this Agreement and the Scope of Services; provided, however, that in the event of a conflict between the terms and provisions of the Scope of Services and the text of this Agreement, the text of this Agreement shall control. Notwithstanding any other provision contained herein to the contrary, the Tasks identified in the Scope of Services that will be performed on an as-requested basis will not be performed unless authorized in writing by the Authority's designee identified in Paragraph 18 below.

2. **Notice to Proceed**. Provided Authority has received satisfactory Certificates of Insurance as required by paragraph 16 below, Consultant is authorized to provide the Services; except that Consultant will not perform any Task identified in the Scope of Services as Optional Services, or as requiring prior approval, until Consultant receives specific written direction from the Authority directing Consultant to proceed with such Task.

3. **Completion Date**. Consultant shall give this Agreement and the Services to be performed hereunder such priority as is necessary to cause the Services to be timely and promptly performed in accordance with the time periods contemplated or expressly provided for in the Scope of Services. At any time during the Term of this Agreement Authority may request and Consultant shall, within twenty (20) days of such request, submit for Authority's approval a written schedule for the completion of the various Tasks which comprise the Services. Unless delayed by acts or the failure to act of Authority or other causes beyond the control of Consultant, and without extending any deadline established elsewhere in this Agreement or otherwise, all Services required under this Agreement shall be entirely completed to Authority's reasonable satisfaction and all deliverables as set forth in the Scope of Services shall be delivered to Authority no later than December 31, 2023.

3.1 **Deliverables**. Without in anyway limiting the deliverables as described in the Scope of Services, Consultant shall provide the Authority with an electronic and up to five hard copies of all final product documents and reports prepared by Consultant pursuant to this Agreement. In addition, all deliverables shall comply with such reasonable requirements as the Authority's Manager may establish from time to time provided those requirements are communicated in writing to Consultant no later than twenty (20) days following the execution of this Agreement by both Parties.

4. **Responsibility for Services**. The Authority shall not supervise the work of Consultant or instruct the Consultant on how to perform the Services. Consultant shall be fully responsible for the professional quality, technical accuracy, timely completion, and coordination of Services including all work and reports that are a part thereof, whether such work is performed directly by Consultant or by any subconsultant or subcontractor hired by Consultant and approved Authority in accordance with Paragraph 12 below. Without additional compensation and without limiting Authority's remedies, Consultant shall promptly remedy and correct any errors, omissions, or other deficiencies in the Services. Consultant warrants that all Services provided under this Agreement shall be performed with

competence and in accordance with the standard of care of Consultant's profession prevailing in Colorado.

5. **Compensation**. Authority shall compensate Consultant in accordance with Consultant's hourly rates and reimbursable costs as set forth on **Exhibit B** (consisting of 1 page) attached hereto and incorporated herein by this reference; provided, however, that the total amount of compensation that Consultant shall receive under this Agreement for the performance of Watershed Consulting services, shall not exceed $245,00, which includes $10,000 for GIS technical assistance on an as requested basis, without the express written consent of the Authority. The total amount of compensation that Consultant shall receive for Monitoring Consulting services shall not exceed $333,000, without the express written consent of the Authority. Total compensation that Consultant may receive under this Agreement, including any as requested services shall not exceed $578,000, without the Authority's prior express written consent. Said compensation includes the compensation and costs for Consultant's approved subcontractors, pursuant to paragraph 12 below. If Consultant is requested to perform any work that is outside the Scope of Services as defined herein, or that will cause the estimated time to perform any work that is part of the Services to be increased, Consultant will immediately notify Authority in writing and will not perform such work until authorized to do so in writing by the Authority's representative.

The compensation to be paid Consultant under this Agreement is entire and complete and includes any and all reimbursable costs as set forth, and only as set forth on **Exhibit B**. Consultant further represents and agrees that the reimbursable costs to Authority together with any approved subconsultant or approved subcontractor costs are at Consultant's actual cost and do not include any additional mark-up whatsoever. It is understood and agreed that Consultant will contract with and pay directly all approved subconsultants or approved subcontractors retained by Consultant for the performance of any Services or portion thereof.

5.1 **Rates and Employee Categories**. The Scope of Services sets forth the estimated staffing hours for each Task and the category of Consultant's employees that are expected to perform Services under this Agreement. **Exhibit B** sets forth the hourly rates for each category of Consultant's employee that will be performing Services under this Agreement. Consultant agrees that all labor performed hereunder shall be performed for an hourly rate and by the category of the employee as identified in the Scope of Services and **Exhibit B**, except that if any Services are performed by an employee whose hourly rate is less than the rate described in **Exhibit B**, Authority shall be charged the lesser rate. Further, should any employee's job category or classification change during the term of this Agreement, that change shall not in any way affect or modify the employee's billing rate under this Agreement unless the billing rate has been reduced as a result of such job reclassification, in which case the reduced billing rate shall be applied for purposes of the invoices prepared and submitted to the Authority.

6. **Method of Payment**. Consultant shall provide an invoice each month for the Services completed for the period of the 26th of each month through the 25th of the following

month. Each invoice shall be submitted only for those Services actually performed during the period for which the invoice is submitted. Consultant shall submit with each invoice such supporting documentation as Authority may reasonably request. Each invoice submitted by Consultant shall constitute a representation to Authority that the Services are completed to the point as represented in the billing invoice. Unless Consultant does not properly perform the Services, invoices will be paid within thirty (30) to forty-five (45) days after receipt. Authority shall have the right to refuse to pay all or a portion of any invoice that is inconsistent with this Agreement. Authority may delay payment until it can verify the accuracy of an invoice, obtain releases or waivers with respect to Services covered in the invoice, or resolve a dispute with Consultant regarding an invoice.

Notwithstanding the foregoing, Consultant's invoice for Services performed during the month of December shall include all Services performed up to and including the last day of the month.

7. **Conflict of Interest**. Consultant agrees that it shall notify the Authority of potential conflicts and determine if an informed consent agreement is acceptable between the parties. Consultant agrees that it shall not accept any employment during the term of this Agreement that creates a conflict of interest or compromises the effectiveness of Consultant or otherwise interferes with the ability of Consultant to perform the Services required by this Agreement.

8. **Records and Audits**. Consultant shall at all times maintain a system of accounting records in accordance with its normal billing procedures, together with supporting documentation for all work, purchases, Services and billings under this Agreement. Consultant shall make available for audit and reproduction by Authority all records, in whatever form, related to the Services. Consultant shall provide such availability during the term of this Agreement and for two (2) years after final payment. Consultant shall refund to Authority any charges determined by Authority's audit to be inconsistent with this Agreement.

9. **Confidentiality of Information**. Except as required by law or as is necessary for the performance of the Services, Consultant shall retain in strictest confidence all information furnished by Authority and the results of any reports or studies conducted as a result of this Agreement, along with all supporting work papers and any other substantiating documents. Consultant shall not disclose such information to others without the prior written consent of Authority's representative. Notwithstanding the foregoing, Consultant shall have no confidentiality obligation with respect to information that: (i) becomes generally available to the public other than as a result of disclosure by Consultant or its agents or employees; (ii) was available to Consultant on a nonconfidential basis prior to its disclosure by Authority; and (iii) becomes available to Consultant from a third party who is not, to the knowledge of Consultant, bound to retain such information in confidence.

10. **Ownership of Work Product and Documents**. All printed materials and electronic documents produced as a result of the Services performed under this Agreement shall become the sole property of Authority after payment to Consultant and may not be used, sold or disposed of by Consultant in any manner without prior written consent of Authority, except that Consultant my use and reproduce such materials and documents for purposes solely relating to Consultant's performances of Services under this Agreement including but not limited to Consultant's archival records.

The Authority acknowledges that the Consultant's work papers, and preliminary documents are Consultant's instruments of service. Nevertheless, the final documents prepared under this Agreement shall become the property of the Authority upon completion of the Services and payment in full of all monies due to the Consultant. The Authority agrees, to the fullest extent permitted by law but without waiving any of the protections immunities and defenses available to Authority under the Colorado Governmental Immunity Act to indemnify and hold Consultant, its officers, directors, employees and subconsultants (collectively, the Consultant) harmless from and against any damages, liabilities or costs, including reasonable attorneys' fees, arising out of Authority's negligent or wrongful use of such materials and final documents.

Under no circumstances shall the transfer of ownership of the Consultant's drawings, specifications, electronic files or other instruments of service be deemed a sale by the Consultant that contains any warranties, either express or implied, of merchantability and fitness for any particular purpose.

11. **Changes in Services**. Authority and, in particular, the Authority's manager shall have the right to order additions, deletions or changes in the Services at any time and for any reason, but especially for purposes of improving coordination between the Authority's consultants and eliminating the duplication of Services. Requests for material changes in the Services may be made by Authority's representative orally or in writing; provided, however, that oral requests shall be confirmed by a written request within ten (10) days after the oral request. If Authority directs Consultant to proceed with a material change, Consultant shall be paid for the change as agreed to by the Parties.

12. **Approval of Subconsultants**. Except as set forth in the Scope of Services, Consultant shall not employ any subconsultant or subcontractor without the prior written approval of Authority's representative nor shall Consultant assign any rights or obligations under this Agreement in whole or in part without the Authority's prior written approval which may be withheld for any reason. Consultant shall be responsible for the coordination, accuracy and completeness of all Services in accordance with generally accepted principles and practices of Consultant's profession, regardless of whether the Services are performed by Consultant or one or more subconsultants. Consultant shall endeavor to bind each of its approved subcontractors or approved subconsultants, if any, to the terms of this Agreement. In the event that a subconsultant or subcontractor is unwilling or unable to comply with any term or provision of this Agreement, Consultant will inform Authority of the specific term

or provision at issue. Authority may accept the lack of compliance to the terms of this Agreement on the part of the subconsultant or subcontractor or may request that a different subconsultant or subcontractor be retained. This Agreement may be terminated by Authority if subcontracted or assigned, either in whole or in part, by the Consultant without the express written consent of Authority's representative.

13. **Independent Contractor**. In the performance of the Services, Consultant shall be, for all purposes, an independent contractor and not an employee or agent of Authority. Consultant and its employees and subconsultants shall in no way represent themselves to third parties as agents or employees of Authority.

14. **No Unemployment Insurance or Workers' Compensation Benefits**. Consultant agrees that it is not entitled to unemployment insurance or workers' compensation benefits as a result of performance of the Services for Authority. Consultant is required to provide workers' compensation and unemployment insurance benefits for its employees and/or subconsultants as required by law.

15. **Payment of Taxes**. Consultant is solely liable for any federal, state and local income and withholding taxes, unemployment taxes, FICA taxes and workers' compensation payments and premiums applicable to the performance of the Services under this Agreement. Consultant shall indemnify Authority for any liability resulting from nonpayment of such taxes and sums.

16. **Insurance**. Neither the Consultant nor any subconsultant, agent, or employee thereof shall continue work on any Services until the following minimum insurance coverages have been obtained:

16.1 **Workers' Compensation Insurance**. The Consultant and each subconsultant and each subcontractor, if any, shall carry workers' compensation insurance to cover liability under the laws of the State of Colorado in connection with the Services performed pursuant to this Agreement. Consultant and each subconsultant or subcontractor shall carry separate policies.

16.2 **Commercial General Liability Insurance**. The Consultant and each subconsultant and subcontractor, if any, shall carry commercial general liability insurance, which shall include blanket contractual liability coverage. Such insurance shall be in an amount specified in the Colorado Governmental Immunity Act, § 24-10¬101, et. seq., C.R.S., as may be amended from time to time (currently $387,000 per person, $1,093,000 per occurrence for bodily injury and property damage).

16.3 **Automobile Liability Insurance**. The Consultant and each subconsultant and subcontractor, if any, shall carry automobile liability insurance to include owned, non-owned and hired vehicles used in the performance of Services under this Agreement. Such insurance shall be in the amounts specified in the Colorado Governmental

Immunity Act § 24-10-101, et. seq., C.R.S., as it may be amended from time to time (currently $387,000 per person, $1,093,000 per occurrence for bodily injury and property damage).

16.4 **Professional Liability Insurance**. The Consultant and each subconsultant and subcontractor, if any, shall carry professional liability insurance in the amount of $1,000,000 per claim and aggregate limit, unless an alternate amount is agreed to in writing by the Authority.

Prior to commencing any Services under this Agreement, Consultant shall provide Authority a Certificate of Insurance evidencing the coverages required by this paragraph as well as the amounts of coverage for the respective types of coverage required. The required commercial general liability and automobile policies shall: (i) name the Authority as an additional insured for coverage only, with no premium payment obligation; (ii) provide a cross-liability/severability of interest clause; and (iii) provide that the coverage for the Authority will not be impaired by the Consultant's subconsultant's or subcontractor's failure to comply with any of the terms or conditions of the policy.

The Consultant and each subconsultant and subcontractor, if any, shall provide Certificates of Insurance (and renewals thereof) identifying this Agreement and demonstrating that the required coverages have been obtained. The Consultant shall not allow any subcontractor, agent, or employee to commence work until appropriate Certificates of Insurance have been obtained and approved by the Authority. The coverages specified in each Certificate of Insurance shall not be terminated, reduced, or modified without providing at least thirty (30) prior written days' notice to the Authority.

17. **Compliance with Laws**. In performing this Agreement, Consultant shall comply with all applicable laws, rules and regulations, including but not limited to all federal, state and local laws.

18. **Communications**. It is understood by Authority and Consultant that successful progress under this Agreement requires frequent, concise, and documented communication between the Party's representatives. Authority hereby designates each member of its Executive Committee, or such other person as the Authority may from time-to-time designate in writing, as its representatives who individually shall each be able to give information to and receive information from Consultant. Authority may change its designated representative or name additional Authority representatives as necessary from time to time.

Consultant hereby designates Jessica DiToro and Erin Stewart, as its representatives who will give information to and receive information from Authority. Consultant may change its designated representative only with the prior written approval of Authority. Each designated representative shall have full authority to not only accept and receive information but also to accept notices, give approvals and to fully represent its respective Party for all

purposes under this Agreement; except that for the Consultant all contract documents must be executed by the President or Treasurer of the Consultant.

19. **Indemnification**. The Consultant agrees, to the fullest extent permitted by law, to indemnify and hold harmless the Authority, its officers, directors, and employees (collectively, the "Authority") from and against any and all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, to the extent caused by the Consultant's negligent performance of Services under this Agreement and that of its subconsultants or anyone for whom the Consultant is legally liable.

20. **Acceptance Not a Waiver**. The Authority's approval of studies, drawings, designs, plans, specifications, reports, computer programs and other work or material shall not in any way relieve Consultant of responsibility for the technical accuracy of the Services. The Authority's approval or acceptance of, or payment for, any Services shall not be construed to operate as a waiver of any rights under this Agreement, or of any cause of action arising out of the performance of this Agreement.

21. **Termination or Suspension**. The Authority reserves the full right to terminate or suspend, for any reason or no reason, all or a portion of the Services under this Agreement by giving ten (10) days written notice to the Consultant. If any portion of the Services shall be terminated or suspended, the Authority shall pay the Consultant equitably for all Services properly performed pursuant to this Agreement. If the work is suspended and the Consultant is not given an order to resume work within sixty (60) days from the effective date of the suspension, this Agreement will be considered terminated. Upon termination, the Consultant shall immediately deliver to the Board any documents then in existence, that have been prepared by the Consultant pursuant to this Agreement.

22. **Default**. Each and every term and condition of this Agreement shall be deemed to be a material element of this Agreement. In the event either Party shall fail or refuse to perform according to the material terms of this Agreement, such Party may be declared in default by the other Party by a written notice.

23. **Remedies**. In the event a Party has been declared in default, such defaulting Party shall be allowed a period of fifteen (15) days within which to correct or commence correcting the default. In the event that the default has not been corrected or begun to be corrected, or the defaulting Party has ceased to pursue the correction with due diligence, the Party declaring default may elect to (i) terminate this Agreement and seek damages; (ii) treat the Agreement as continuing and require specific performance; or (ii) avail itself of any other remedy at law or in equity.

24. **Term**. Unless sooner terminated in accordance with the provisions of paragraphs 21 and 23 above, this Agreement shall remain in effect until the Services are fully performed, at which time the Agreement shall terminate and be of no further force and effect,

except as to those provisions which survive termination, including but not limited to paragraphs 8, 9, 10, and 19.

25. **Force Majeure**. The Parties shall not be responsible for any failure or delay in the performance of any obligations under this Agreement caused by acts of God, flood, fire, war or public enemy or the failure of Authority to furnish timely information or to approve or disapprove Consultant's instruments of service within a reasonable period of time.

26. **Assignment**. Subject to the provisions of paragraph 12, this Agreement shall bind and inure to the benefit of the Parties and their respective successors and assigns.

27. **No Third-Party Beneficiaries**. This Agreement is intended to benefit only the Parties and neither subconsultants, subcontractors nor suppliers of Consultant nor any other person or entity is intended by the Parties to be a third-party beneficiary of this Agreement.

28. **Governing Law**. This Agreement shall be governed by and construed under the laws of the State of Colorado.

29. **Notice**. All notices required or given under this Agreement shall be in writing and shall be deemed effective: (i) when delivered personally to the other Party; or (ii) seven (7) days after being deposited in the United States mail, first-class postage prepaid, properly addressed as follows; or (iii) when sent by facsimile transmission and receipt is confirmed by return facsimile transmission.

If to Consultant: Carolyn Nobel
LRE Water
1221 Auraria Parkway
Denver, Colorado 80204

If to Authority: Executive Committee
Cherry Creek Basin Water Quality Authority
P.O. Box 3166
Centennial, Colorado 80161

With a copy to: Timothy J. Flynn
Collins Cole Flynn Winn & Ulmer, PLLC
165 South Union Boulevard, Suite 785
Lakewood, Colorado 80228

Or such other persons or addresses as the Parties may designate in writing.

30. **Governmental Immunity**. The Parties understand and agree that the Authority is relying upon, and has not waived, the monetary limitations of $387,000 per person, $1,093,000 per occurrence, and all other rights, immunities and protections provided

by the Colorado Governmental Immunity Act § 24-10-101 et. seq., C.R.S., as it may be amended from time to time.

31. **No Multiple Fiscal Year Obligation**s. No provision of this Agreement shall be construed or interpreted as creating an indebtedness or a multiple fiscal year direct or indirect debt, or other multiple year financial obligation whatsoever of Authority within the meaning of any constitutional or statutory debt limitation provision, including, without limitation, Article XI, §§ 1, 2 and 6, and Article X, § 20 of the Colorado Constitution. This Agreement shall not directly or indirectly obligate the Authority to make any payments beyond the funds legally available to it for the then current fiscal year. No provision of this Agreement shall be construed to pledge or create a lien on any class or source of monies of the Authority, nor shall any provision of this Agreement restrict or limit the discretion of the Authority in the budgeting and appropriating its funds. The Authority shall notify Consultant if funds are exhausted for any fiscal year, and Consultant may, at its discretion, decide whether to continue providing Services to the Authority during that fiscal year.

32. **Entire Agreement**. This Agreement constitutes the entire agreement between the Authority and Consultant and replaces all prior written or oral agreements and understandings. It may be altered, amended or repealed only by a duly executed written instrument.

33. **Effective Date**. This Agreement shall become effective on the date it is signed by the appropriate representatives of the Authority.

IN WITNESS WHEREOF, the Parties have executed this Agreement in duplicate original as of the date set forth above. This Agreement must have the signature of an authorized person of Consultant on both original copies.

AUTHORITY:

CHERRY CREEK BASIN WATER QUALITY AUTHORITY, a quasi-municipal corporation and political subdivision of the State of Colorado

By: _____
Joshua Rivero, Chair

Attest:

_____
John A. McCarty, Secretary/Treasurer

APPROVED AS TO FORM:

_____
Timothy J. Flynn, General Counsel
Cherry Creek Basin Water Quality Authority

This Agreement is accepted by:

CONSULTANT:

LRE WATER, a Colorado corporation

By: _____
Carolyn Nobel, Chief Operating Officer

Attest:

_____
Mary Presecan, Chairman of the Board

By execution, signer certifies that he or she is authorized to accept and bind Consultant to the terms of this Agreement.

EXHIBIT A

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

2023 Watershed Technical and Regulatory and Monitoring Consulting Scope of Services

LRE Water (LRE) will provide Cherry Creek Basin Water Quality Authority (CCBWQA) with:

- ***Watershed Consulting:*** Watershed technical and regulatory consulting services and technical support to assist with implementation of the CCBWQA's statutory charges, meeting regulatory requirements such as Regulation 72, and the CCBWQA's reservoir and watershed management responsibilities *(Watershed)*, and
- ***Monitoring Consulting:*** Watershed and Reservoir water quality monitoring services, consulting, and technical support in accordance with CCBWQA's Routine Sampling and Analysis Plan/ Quality Assurance Project Plan

Watershed Technical and Regulatory Consulting and Monitoring Sections are presented separately for consistency and comparability with previous years, as illustrated below:

Watershed Technical and Regulatory Consulting (W Tasks)

LRE Water (LRE) will provide the Cherry Creek Basin Water Quality Authority (CCBWQA) with technical and regulatory consulting services and technical support to assist with implementation of the CCBWQA's statutory charges, Regulation 72, and the CCBWQA's reservoir and watershed management responsibilities.

The 2023 scope of services differ from previous years by:

- Task W1 has been amended to include regular staff meetings and assistance with preparation and editing of minutes for TAC and Board meetings.
- Task W2 has been added to separate Regulatory Support Services from Watershed Technical Services.
- Tasks W3 and W7 include technical and web-based support services based on the identification of steps needed for development of an updated Watershed Plan.
- Task W4 includes development of an Executive Summary pdf of the Annual Report.

W1. CCBWQA Meetings

1.1.Board Meetings: Attend and prepare for twelve monthly meetings of the CCBWQA Board of Directors. Includes participation in monthly teleconference to discuss Board agenda items, preparation of Board packet materials and editing of designated meeting minutes.

1.2. TAC Meetings: Attend, prepare for and edit designated meeting minutes for twelve monthly meetings of the Technical Advisory Committee. Provide direction and input to the TAC on watershed and reservoir management-related issues. Includes review of TAC packet materials and other documents, and coordination with other CCBWQA consultants on TAC matters during monthly teleconferences.

1.3. Board and TAC Interim Committees: Attend and participate in Board and/or TAC interim committees, as assigned by the CCBWQA Management.

1.4. Project Coordination: Coordinate with the CCBWQA Technical Manager and, as directed, other CCBWQA consultants and internal team members, regarding watershed and reservoir management activities, by telephone, email, and meetings. This includes meetings with outside stakeholders as necessary for project coordination as well as internal task management. This assumes the CCBWQA Technical Manager will continue to coordinate with LRE to assist with scope clarification, scope authorization, and other CCBWQA-related matters.

1.5. Consultant Selection and Assistance: Assist the CCBWQA Technical Manager with scoping and selection of other CCBWQA consultants for work, and input to consultants, during the budget year.

W2. Regulatory Services

This task includes limited periodic participation in routine regulatory proceedings and/or Water Quality Control Commission (WQCC) hearing-related meetings and Water Quality Control Division (WQCD) workgroup meetings, as directed by the Board or the CCBWQA Management. This includes:

- Tracking the implementation of the WQCD 10-Year Water Quality Roadmap, with respect to potential impacts on water quality standards in Cherry Creek and Cherry Creek Reservoir;
- Participating in the Lake Nutrients Criteria Rulemaking Hearing (RMH) for Regulation 85 and 31-38 that was postponed until April 10, 2023. This includes WQCD TAC participation, and other engagements with regulatory agencies and stakeholders, as needed.
- Participating in the Control Regulation 72 Informational Hearing that will set the scope of the formal Control RMH that is anticipated to be held in the second half of 2023;
- Participating in engagement and stakeholder efforts associated with the larger all encompassing Control Regulation 72 RMH;
- Participating in the formal RMH for Control Regulation 72 in the second half of 2023;
- Working with the CCBWQA Consultant Team to develop site-specific total nitrogen and total phosphorus standards for Cherry Creek Reservoir;
- Compilation of data to support regulatory proceedings, workgroups, etc.;
- Updating the regulatory portions of the 18-month timeline periodically throughout the year; and
- Updating the Regulatory Hearings Memorandum that is included in the TAC and Board packets biannually.

It will be the CCBWQA Management's responsibility to direct time spent for preparation and participation in work group meetings and/or regulatory hearings or meetings.

W3. Technical Services

3.1. Assist the Management Team with strategic planning initiatives to develop pollution abatement projects to achieve the statutory purpose to improve, protect, and preserve the water quality of Cherry Creek and Cherry Creek Reservoir.

3.2. As directed by the CCBWQA Management, LRE will implement assigned technical follow-up tasks arising from the TAC, Board and Management Team meetings, such as:

- Assisting with Technical-Focus Groups, Interim Committees, subgroups (i.e. Point Sources, Regulated Non-point sources, etc.);
- Providing follow-up or additional supporting technical information/analyses; evaluating technical project materials provided by others (e.g., water quality data/analyses) and providing input/recommendations as requested;

- Drafting and incorporating TAC and Board changes into documents;
- Assisting with prioritizing and tracking implementation tasks;
- Providing comment letters on others' water quality control projects, and permit renewals, permit modifications, compliance schedules, etc. as directed; and
- Coordinating with regulatory agencies and other entities (such as the WQCD, Environmental Protection Agency (EPA), US Army Corps of Engineers, Colorado Division of Parks and Wildlife (CPW), etc.) on efforts to improve, protect, and preserve water quality and beneficial uses.

3.3 LRE will focus these efforts on ensuring that the CCBWQA activities remain focused on improving, protecting, and preserving the water quality of Cherry Creek and Cherry Creek Reservoir, and on achieving and maintaining existing water quality, and identifying pollution abatement projects.

Provide technical assistance and regulatory input for continued water quality standards compliance evaluation, including continued efforts to evaluate options for achieving water quality standards compliance. All efforts shall be focused on improving, protecting, and preserving water quality in Cherry Creek and Cherry Creek Reservoir; achieving and maintaining the existing water quality standards; and protecting beneficial uses. This will include input and coordination with work of other CCBWQA consultants, CCBWQA members and entities, including CPW and WQCD to better understand the reservoir and its watershed, and how nutrients, reservoir sediments, and other water quality parameters, such as phosphorus, nitrogen, total organic carbon, pH, temperature, dissolved oxygen, a suspended sediment etc. may affect the beneficial uses and attainment of standards. This will also include participation in WQCD- and/or Water Quality Forum-lead TACs and/or stakeholder meetings (not directly related to any active WQCC rulemaking proceedings), as directed. This could include review of documents, data analysis for consistency with recommended methodology, participation in meetings, and/or other tasks as directed.

3.4 Assist the CCBWQA management in coordinating CCBWQA priority activities, to ensure focus on the CCBWQA's mission, 2023 objectives, and continual progress toward achieving compliance with CCBWQA statutory responsibilities.

3.5 Provide assistance with continued refinement of potential nutrient loading values and impact assessment for various sources identified as priorities by the Board, TAC, and authorized committees. This may include tasks such as provision of input loading information for the watershed and reservoir model runs; assistance with input needed for future reservoir and watershed modeling scenario development such as participating in Interim Committees and/or subgroups (such as Point Sources); and evaluation of potential impacts of riparian protection, indirect and/or direct potable water reuse, and conservation on water quality. These efforts are

focused on identification and design of future pollution abatement projects for the watershed and/or reservoir.

3.6 Continue to obtain and evaluate annual discharge data from EPA ECHO and the Colorado Environmental Records for wastewater treatment facilities, water treatment facilities, and other permitted dischargers, as requested by the CCBWQA Manager.

3.7 Respond to special technical projects requests authorized by the Board, TAC, or CCBWQA Technical Manager and not otherwise included in this Scope of Services, as budget allows.

3.8 Provide support and/or assistance to CCBWQA Technical Manager and other CCBWQA consultants in developing technical information for reservoir and watershed management efforts, as directed by the Board, TAC, or CCBWQA Manager.

3.9 Provide Independent limnology services as approved by the CCBWQA Board of Directors.

3.10 Provide support, as directed by CCBWQA Management, with preliminary efforts of updating the CCBWQA Watershed Plan.

W4. Annual Reporting and Presentation

4.1 Annual E-Report: LRE will compile information and prepare the 2022 Annual Report to the Water Quality Control Commission (WQCC), covering the Water Year October 1, 2021 – September 30, 2022 into the web-based "E-Report" format. Prior year reports will remain "as is" for content and access; a new 2022 E-Report will be generated, building from the previous year's report. Several of the introductory/background pages will remain the same or have minor updates. All storyboards and linked references will be updated with current year information. LRE will work with the CCBWQA's Manager and consultant team to prepare one draft for review (by the TAC first, and then the Board) and finalize the report. The final report will be ready for approval by the TAC and Board at their respective March meetings and will be delivered electronically to the WQCC by March 31, 2023. LRE's work will include preparation of all pages with input from Pollution Abatement Projects Manager, other consultants and CCBWQA Technical Manager, editing for clarity and compliance with Regulation 72 requirements, and incorporating new information and activities undertaken by the CCBWQA.

Assumptions:

- The CCBWQA Technical Manager (or Board designee) will provide information on the names and associations for the 2022 TAC and Board Members, as well as the CIP Budget file.

- The Pollution Abatement Projects Manager will provide text on the Capital Projects Program and summary reports, including photographs, no later than November 30th of each year.
- Information on the Watershed and Reservoir Models will be compiled based on technical memorandums and/or reports provided by the Model Consultants and/or Models Committee, as available at the time the draft report is prepared.
- The Cherry Creek Stewardship Partners will provide report- ready information on basin education activities.
- The MS4 Permittees in the watershed will continue to provide their respective annual reporting information for inclusion in the report, as soon as their WY 2022 reporting data are compiled and available.

The draft report will be available via the portal for a final review. Multiple and conflicting comments from reviewers are possible; therefore, LRE shall work to resolve conflicts in sufficient time to meet regulatory reporting deadlines. Because the report is available electronically via the portal, no hard copy reports will be produced.

4.2 Executive Summary: LRE will prepare an up to four page Executive Summary that presents the highlights of the CCBWQA Annual Report in a printable (pdf) format.

4.3 Annual Presentation to the WQCC: LRE will work with the CCBWQA Technical Manager and other consultants to prepare presentation materials for the WQCC and will attend/participate at the annual WQCC Annual Report presentation as directed by the CCBWQA Manager.

4.4 Compile WY2023 Information: As it becomes available in 2023, LRE will compile data and information to be used in the WY 2023 Annual Report the following year.

W5. Information Management Support

This task includes leveraging the database portal to provide information management support for the CCBWQA team and stakeholders, including:

5.1 Data Integration, Upload, & Management Support: Watershed-related data is obtained and integrated into the CCBWQA Data Portal from a growing range of sources, including uploaded directly to the site, CCBWQA-owned and managed telemetry equipment, and public sources such as weather data. For this subtask LRE will continue to support site data integration, standardization and management through tasks such as:

- Providing technical support to troubleshoot upload errors due to issues such as improper standard template entry and duplicate data submissions
- Updating/uploading legacy data. 2023 updates may include but are not limited to reviewing and refining flag classifications and non-detects, standardizing legacy location and parameter names to be consistent with the current sampling nomenclature and/or populating historical flow data

- Revising/automating the calculation of flow based on telemetry acquired stage data, and support the implementation of additional monitoring equipment that can provide continuous monitoring.
- Automating the import of additional data sources, such as USGS stream gage flow data, model results and/or drought and climate information

5.2 System Hosting & Maintenance: LRE will continue to manage the system hosting for the CCBWQA. This includes the following:

- Domain renewal and management for https://ccbwqaportal.org
- Cloud server hosting through Amazon Web Services for a dedicated virtual server
- Server and hosting maintenance and management: backups verification, critical software patches/upgrades, and system monitoring

5.3 Data and Analaysis Requests: Respond to general requests for information from the Board, TAC, CCBWQA consultants, and/or the public not otherwise required by this Scope of Services. Provide CCBWQA approved information to the public and other local, state, and federal governments and organizations on a request basis. This may also include requests for information to help the CCBWQA with Strategic Planning and/or Watershed Plan implementation and budget planning process and/or development of queries and analysis statistics to support efforts such as regulatory rulemakings or PAP evaluations.

W6. Database Modules

For this task, LRE will expand opportunities for transforming data into actionable information through providing additional targeted analysis "story page" based on requests and requirements discussion from the CCBWQA Manager and team. Options include:

- PAP Mapping & Evaluation: Enhance the PAP map with additional features, map layers and functions such as projects over time, associated costs, nutrient reduction estimates, links to project informatin
- PAP Effectiveness: Enhance the PAP Statistics Tool with additional sites and/or analyses & graphics to continue to provide quantitative, statistical tools to evaluate PAP effectiveness
- Watershed Plan Update Support: Identify and prioritize how portal data and tools can be leveraged to support Watershed Plan updates
- Time Series Compare: Develop an interface to plot selected parameters on the same graph over time (e.g., water quality parameters and flow, biological results and nutrients) to identify relationships and correlations
- Upstream to downstream data display: Automate the display of upstream to downstream watershed sampling events to help to characterize changes over space
- Weather Story Page: Integrate the priority analysis and graphics developed for the prototype Weather Statistics Tool into the portal to enable analysis of weather and water

quality data over time. Items may include: calculating correlation between input and response variables, predicting future values based on multivariate response variables

- Modeling Results: Import key reservoir and watershed modeling results into the CCBQWA database and develop an interface that allows users to efficiently query, access, review and compare various results and scenarios.
- Additional story pages as directed by CCBWQA, which could include storyboards developed for the Annual Report, Board or TAC

LRE will work with CCBWQA management and staff to identify and prioritize potential storyboard enhancements. This categorized list of prioritized features and functions along with associated specific costs for each element can serve as a "menu" of items that CCBWQA can select from to add to the system over time based on available resources.

W7. Geographic Information Systems (GIS) Technical Assistance

As requested by the CCBWQA management, provide technical support related to GIS, Google Earth, and other mapping and/or graphics generation needs or assistance. Work may include but is not limited to:

- Updating the map of PRFs and PAPs.
- Support GIS needs for Annual Monitoring Report and Sampling and Analysis Plan.
- Generating KMZ or other graphics to be used as visual aids in Board/TAC meetings.
- Obtaining, processing, and integrating current and/or historical information on land use and/or land use referral GIS information.

Water Quality Monitoring Services (M Tasks)

The following sections describe the Scope of Services for each Task as outlined in the CCBWQA SAP/QAPP.

The 2023 scope of services differ from previous years by:

- Task M2 - Watershed Monitoring incudes the study on the impacts of extended hold times in storm samples to determine the potential changes to nutrient fractions. This was added in 2022 and will be continued to obtain more data and determine variability. The additional analysis of the impacts of the hold times that occur during storm sampling could impact future SAP revisions.
- Task M2 - Watershed Monitoring, has been amended to include soil sampling of new PAP projects and PRF maintenance activities.
- Task M6 - Consulting and Other Services, has been revised to specify the details of services included: meeting attendance, support with minutes for TAC and Board meetings, and other monitoring, consulting, and/or technical services as requested by the CCBWQA management.
- Task M8 -Wetland Harvesting Project Oversight has been included as an additional service to provide management of the annual Wetland Harvesting project on Cottonwood Creek. Services include: project plan updates, contract and contractor oversight, sampling and analysis of plant material, GIS mapping services of harvested areas, and project status and annual report of project.
- Task M9 - Laboratory Analysis Fees, Shipping charges, equipment costs, and other direct costs have been divided into a separate task. There have been minor increases in costs of services (lab fees, equipment/ boat rental, shipping costs, mileage, etc) which have been accounted for.

M1. Reservoir Sampling and Monitoring

The Cherry Creek Reservoir monitoring program will include:

- Routine Vertical Profiling and Nutrient/Biological Sampling
- Precipitation Gage Maintenance and Sampling
- Sampling frequency and laboratory analyses are outlined in the SAP and Table 1.
- CCR-1, CCR-2 and CCR-3 will be profiled and sampled once per month in March, April, October, November and December (ice conditions permitting) for a total of five (5) sampling events.
- CCR-1, CCR-2 and CCR-3 will be profiled and sampled twice per month from May- September a total of ten (10) sampling events.
- Precipitation gage will be inspected weekly during storm sampling season and samples will be collected and analyzed following seven (7) storm events.

Reservoir Sampling Equipment

- 5-port Multiparameter Sonde (CCBWQA)
- Vertical Sampler (CCBWQA)
- Secchi Disk (CCBWQA)

- Licor Quantum Sensor (CCBWQA)
- Plankton Net
- Thermistor string of HOBO® Water Temp Pro data loggers and associated hardware and software – (CCBWQA)
- Real Time Dissolved Oxygen probes and data loggers (CCBWQA) 1m below the surface and 0.5 meters off the bottom of the reservoir.
    - Seasonal Deployment on Authority negotiated access to the State Park's buoy system. LRE Water will coordinate during the year with Colorado Parks and Wildlife (CPW) staff on buoy placement and sampling schedule.

All equipment, either owned by CCBWQA or provided by the LRE Water will be properly maintained, calibrated, verified, and documented prior to use. The proposal includes all sampling labor, monitoring equipment, record books, sample bottles, preservatives, safety equipment, coolers, and any other equipment/supplies as needed.

Boat Use

During the recreational boating season, the LRE Water will rent and utilize a boat from Pelican Bay at Cherry Creek (i.e. the Marina) to reduce the need and time associated with boat inspections from Colorado Parks and Wildlife for invasive species. LRE Water contractors and staff will adhere to CPW's Boating Statutes and Regulations and operate under Contractor's Safe Work Practice for Working Over or Near Water (SWP 5-6).

Table 1. Reservoir Sampling Parameters and Total Laboratory Analyses Mar- Dec

	Monthly Nutrient - Biological Samples (Photic Zone) Mar-Dec		Monthly Nutrient Profile (4-7m) Mar-Dec	Bi-Monthly Sonde and Nutrient Samples May- Sept	During Storm Sampling Season (May-Oct)			
	2 Sites	1 Site	1 Site	3 Sites	1 Site			
Analyte	CCR-1, CCR-3	CCR-2	CCR-2	CCR-1, CCR-2, CCR-3	PRECIP	Subtotal	Field Dups/ Blanks	Total # Samples
Inorganics								
pH (field)								
Conductivity (field/ QC)	20	10	40	30		100	10	110
Total Nitrogen	20	10	40	30	7	107	10	117
Total Dissolved Nitrogen	20	10	40	30		100	10	110
Ammonia as N	20	10	40	30		100	10	110
Nitrate + Nitrite as N	20	10	40	30		100	10	110
Total Phosphorus	20	10	40	30	7	107	10	117
Total Dissolved Phosphorus	20	10	40	30		100	10	110
Orthophosphate as P	20	10	40	30		100	10	110
Chloride		4				4	0	4
Sulfate		4				4	0	4
Magnesium		4				4	0	4
Calcium		4				4	0	4

Potassium		4				4	0	4
Sodium		4				4	0	4
Alkalinity		4				4	0	4
Organics								
Total Organic Carbon		10	0	10		20	2	22
Dissolved Organic Carbon		10	0	10		20	2	22
Total Volatile Suspended Solids	20	10		15		45	7	52
Total Suspended Solids	20	10		15		45	7	52
Biological								
Chlorophyll-a	20	10		15		45	5	50
Phytoplankton		10		5		15	0	15
Zooplanton		10		5		15	0	15

Data Validation

In LRE Water's commitment to the Authority to produce defensible data, the frequency of the field duplicate and blank sample collection is approximately 10% for Reservoir samples. Field QA/QC samples shall be collected at each sampling event and any issues detected through the collection of these field QA/QC samples will be isolated to the samples only collected during the associated event. Due to the manner in which the zooplankton, phytoplankton, and rain (storm) event samples are collected or analyzed, field duplicate or field blank samples will not be generated from these monitoring program aspects.

The reservoir sampling parameters and laboratory analyses will be performed at the frequency indicated in Table 3, assuming a January 1 start date but the first reservoir sampling to be completed in March. An expedited turnaround time (4-6 weeks) will be utilized for phytoplankton and zooplankton enumeration during the crucial late spring through early fall months. Physical parameters will be collected in the field at the required frequencies in accordance with the current SAP, Table 1. (i.e., temperature, conductivity, pH, dissolved oxygen, oxidation/reduction potential, Secchi disk, 1% transmittance, and continuous temperature at station CCR-2 vertical profiles).

M2. Watershed Sampling and Monitoring

Watershed monitoring will include surface and groundwater sampling to evaluate nutrient load to the reservoir. In addition other watershed monitoring such as sediment and wetland plant sampling to evaluate or estimate potential Pollution Abatement Project (PAP) effectiveness will occur at the director of the CCBWQA.

The program will include:

- Routine Surface Water Sampling, including PRF Pollutant Reduction Effectiveness Sampling – sites and frequency outlined in Table 2.
- Ten (10) surface water sampling stations throughout the Cherry Creek Basin will be sampled on a monthly or every other month basis March through December (10 site visits).

    - *CC-O, CC-7 Ecopark, CC-10, PC-1, CT-1, CT-2, CT-P1, CT-P2, MCM-1, MCM-2*
- Nine (9) additional surface water sampling stations throughout the Cherry Creek Basin will be sampled twice per year.
    - *USGS @ Franktown, CC-1, CC-2, USGS @ Parker, CC-4, CC-5, CC-6, CC-8, CC-9*
- Groundwater Sampling - Four (4) alluvial groundwater monitoring wells along Cherry Creek will be sampled twice per year (2 site visits) May and November.
    - *MW-1, MW-5, MW-9, MW- Kennedy*
- Storm Event Sampling - Seven (7) surface water sites would be equipped with automatic (ISCO) samplers and programmed to collect stormwater samples during up to seven (7) storm events between May and October.
    - *CC-7, CC-10, CT-1, CT-2, CT-P1, CT-P2*
    - Evaluation of change in nutrient fractions with extended hold times for storm samples will be completed during two of the events in 2022 to determine if changes to SAP may be needed in the future.
- Soil Sampling - One (1) or two (2) project sites including up to 12 locations can be sampled and analyzed for particle size and phosphorus content per year. The results will be used in order to accurately estimate water quality benefits from sediment immobilization in stream improvement project areas. In addition up to three (3) samples will be collected and analyzed from PRF maintenance activities such as sediment removal when completed.
- Other Watershed Sampling - Other watershed sampling will be completed as specified by the CCBWQA management. Depending on the scope of the sampling, a separate project SAP may be developed to be approved by the TAC and Board.

Surface and Groundwater Sampling Equipment

- 5-port Multiparameter Sonde (CCBWQA)
- ISCO samplers with submerged probe level sensors
- *Data loggers with cellular telemetry and solar panels*
- *In-stream portable velocity flow-meter*
- *Portable thermistors*
- *Sutron ACCUBAR constant flow bubbler*
- *Data loggers with cellular telemetry and solar panels*
- *Groundwater bailer or pump*
- *Solnist Level Logger*

Data Validation

Data validation and QA/QC procedures will be followed as outlined in Task 1. Field duplicate and blank sample collection will account for approximately 10% for stream and groundwater samples.

Table 2. Stream and Groundwater Sampling Parameters and Total Laboratory Analyses Jan- Dec

	Monthly Surface Water	EO Month Surface Water	Storm Event Surface Water Iscos	Bi- Annual Surface Water	Bi-Annual Ground Water			
	8 Sites	2 Sites	7 sites	9 Sites	4 Sites			
Analyte	CC-0, CC-7, CC-10, CT-P1, CT-P2, CT1,CT2 PC-1	MCM-1, MCM-2	CC-10, CT-P1, CT-P1 CT1,CT2, CC-7 PC-1	USGS@FT USGS@ Parker, CC-1,CC-2, CC-4,CC-5, CC-6,CC-8, CC-9	MW-1, MW-5, MW-9, Kennedy	Subtotal	Field Dups, Splits and Blanks	Total # of Samples Jan-Dec
Inorganics								
Total Nitrogen	96	12	56	18	8	190	12	202
Ammonia as N	96	12	56	18	8	190	12	202
Nitrate + Nitrite as N	96	12	56	18	8	190	12	202
Total Phosphorus	96	12	56	18	8	190	12	202
Total Dissolved Phosphorus	96	12	56	18	8	190	12	202
Orthophosphate as P	96	12	56	18	8	190	12	202
Chloride	6				8	14	1	15
Sulfate	6				8	14	1	15
Magnesium	6					6	0	6
Calcium	6					6	0	6
Potassium	6					6	0	6
Sodium	6					6	0	6
Alkalinity	6					6	0	6
Organics								
Total Organic Carbon	24				8	32	1	33
Dissolved Organic Carbon	24				8	32	1	33
Total Volatile Suspended Solids	50	25	56			131	7	138
Total Suspended Solids	50	25	56			131	7	138

M3. Water Quality Monitoring, Repairs, Upgrades, and Communications

LRE Water will install, operate, troubleshoot and maintain all monitoring equipment and telemetry communications hardware at stations outfitted with continuous level logging equipment. 15-minute data will be transmitted to Campbell Scientific based cloud, and mobile application-based Logger Link/Logger Net software and will be directed to the Authority's website for real time graphical assessment of flow data. Monitoring of mobile application app(s) will be used to detect any abnormalities with equipment readings in order for troubleshooting and repairs, if necessary, to be completed quickly and reduce the potential for incomplete or inaccurate data.

Stage discharge relationships will be updated annually and used to calculate flow from level measurements at each site. Flows will be measured a minimum of four times per year in order to update the stage discharge relationships so flow can be calculated from level and displayed on CCBWQA's data portal.

M4. Annual Monitoring Report and Updates

LRE Water will develop the Annual Monitoring report, including executive summary, in coordination with the Authority and the consultant team to support the Regulation 72 reporting requirements. All draft and final work products will be prepared on schedule, with a December 31st deadline of the draft Annual Monitoring Report deliverable. LRE Water will coordinate with other staff and the consultant team in addressing comments and finalizing the report for approval by the TAC and inclusion in the Annual Report to the WQCC no later than March 15th.

LRE Water will support development of the CCBWQA Annual Report on Activities including documentation and graphics useful for presentation to the WQCC and other audiences. The report will include documentation of compliance (or determination of noncompliance) with the applicable Regulation 38 water quality standards (chlorophyll *a*, dissolved oxygen, pH, temperature and nutrient standards when applicable), using Water Quality Control Commission and Water Quality Control Division assessment methods. This documentation is required by Regulation 72.

M5. Sampling and Analysis Plan Refinements

In coordination with the CCBWQA management, staff, and modeling team, LRE Water will identify monitoring program efficiencies and other needs based on watershed and reservoir modeling outputs, or regulatory requirements. LRE Water will evaluate needs such as changes in monitoring locations, frequency, parameters, etc.

Based on discussions, efficiencies and anticipated needs, changes to the Sampling and Analysis Plan may be warranted. If modifications to the SAP are prudent, LRE Water will propose a streamlined review process, including proposed redline changes to the SAP based on consultant recommendations. The proposed changes will go before the TAC and Board for review and approval.

M6. Consulting and Other Services

LRE Water, staff, and partners can assist with additional services related to the monitoring program or CCBWQA activities as needed. Services can include other water quality activities, tasks or technical support as specified by the CCBWQA management.

Services include: monitoring consultant attendance at weekly staff meetings, monthly TAC meetings and Board meetings, assistance development and editing of meeting minutes, assistance with development of annual budget, preparation of presentations or other documents required for meetings. LRE Water will participate in CR 72 Tri-annual Review Hearings, Reg 38 Special Rulemaking hearings, committee meetings, Cherry Creek Stewardship Partners Watershed conference, and other meetings or services as needed. Additional consulting or tasks will be completed as directed and approved by the CCBWQA management or Board.

M7. Data and Database Support

All water quality data, field measurements, stream flows and physical records will be processed and validated by the QA/QC Manager and will be formatted in data specific worksheet templates. Data will be uploaded to the CCBWQA's data portal. The listed QC programs include requirements for additional laboratory analyse which have been added to the total laboratory costs for all water samples in the SAP.

LRE Water will use the CCBWQA's data portal for regular water quality updates supported by other statistical software and spreadsheet analyses, during TAC and Board meetings and other times as needed.

The database will be used by the LRE Water, as needed, to provide accurate datasets or content, for external meetings, subcommittees, CCBWQA staff requests, contractors, CCBWQA entities, as directed or approved by CCBWQA management or Board.

Additional Tasks

M8. Wetland Harvesting Project Management

LRE Water will provide project management and oversight for the Wetland Harvesting Project on Cottonwood Creek. Services will include: preparation of contract for services, management of the subcontractor performing the harvesting and removal efforts prior to and during activities, and notification and coordination of activities with Cherry Creek State Park staff.

Wetland plants will be sampled and analyzed for nutrient content from areas within planned areas of wetland harvesting which used to estimate the total mass of P and N removed during each harvesting event. Annually approximately six (6) sites will be sampled for plant composition and plants found will be measured to determine length and weight. Samples from each area will be sent to the lab for processing and analysis of total phosphorus and total nitrogen.

Wetland Harvesting mapping and GIS analysis services will be provided to map the harvested area so additional calculations can be made to estimate nutrient removal based on area.

A project summary report will be provided following the completion of each annual harvesting effort and analysis.

Note: The Wetland Harvesting pilot project started in 2021 and is scheduled for 6 years.

Direct Costs

M9. Laboratory Fees and other Direct Costs

LRE Water will pay for all direct costs associated with the completion of monitoring services and consulting included on the scope of work. Costs include laboratory fees associated with analysis of all samples included in the SAP/QAPP from the two main contracted labs, IEH Analytical, and Phycotech LLC, or other labs specified (Eurofins/ Test America, CSU Soils Lab, ACZ Laboratories, etc.) for other monitoring tasks, such as wetland harvesting, soil sampling or as directed by the CCBWQA Management or Board. Direct costs include rental of the barge, "The Kennedy" from the Pelican Bay Marina at Cherry Creek and other monitoring equipment such measuring devices, samplers, and

rental equipment such as flow meters for stream flow measurements. Task 9 also includes required maintenance of the monitoring equipment including calibration supplies, repairs, replacement, and purchase of small parts and consumables as needed, and the cellular data plan, currently paid to Hydrologik LLC, required for the seven (7) sites that are outfitted with telemetry to direct level and flow data to the CCBWQA portal. This task will also include mileage billed at the current government rate from LRE to meetings or projects.

Note: Any large equipment repairs or purchases will be approved by the CCBWQA and billed to the enterprise equipment fund based on budget.

Estimated Budget for CCBWQA 2023 Watershed, Regulatory, Technical & Water Quality Monitoring Consulting Services

Watershed Technical and Regulatory Consulting Services		
Code	**Task**	
107450	W1. CCBWQA Meetings	$35,000
107050	W2. Regulatory Services	$50,000
107450	W3. Technical Services	$60,000
107451	W4. Annual Report	$25,000
107450	W5. Information Management Support	$30,000
107453	W6. Database Modules	$35,000
107453	W7. GIS Technical Assistance	$10,000
Watershed Services Total		***$245,000***
Water Quality Monitoring Services		
Code	**Task**	
107501	M1. Reservoir & Watershed Sampling & Monitoring	$36,000
107502	M2. Watershed Sampling & Monitoring	$48,000
107502	M3. Continuous WQ Monitoring Upgrades and Communications	$15,000
107500	M4. Monitoring Report and Monthly Graphical Updates	$33,000
107500	M5. Sampling and Analysis Plan Refinements	$5,000
107500	M6. Consulting and Other Services	$35,000
107505	M7. Database Support	$23,000
117440	M8. Wetland Harvesting Project Management	$18,000
new - TBD	M9. Laboratory Analytical Fees and Other Direct Costs	$120,000
Monitoring Services Total		**$333,000**
Total Project Cost		**$578,000**

EXHIBIT B

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2023 Watershed Technical and Regulatory and Monitoring Consulting Scope of Services

LRE Water 2023 RATE SCHEDULE

	Hourly Rate
Student Intern	$65 - $95
Administrative Assistant	$80 - $120
Technician/IT Support	$100 - $140
Staff I Engineer/Scientist	$110 - $140
Staff II Engineer/Scientist	$120 - $160
Staff III Engineer/Scientist	$135 - $175
Project Engineer/Scientist	$155 - $185
Senior Project Engineer/Scientist	$170 - $200
Project Manager	$180 - $225
Senior Project Manager	$210 - $275

Expenses such as laboratory analysis, obtaining aerial photos, or other special services incurred directly in connection with the project are billed at cost. Reimbursable expenses billed at cost include airfare, automobile rental, and other travel or per diem costs including mileage billed at the current IRS rate.

ACTION ITEM MEMORANDUM

To: CCBWQA Board of Directors
From: Richard Borchardt, Pollution Abatement Project Manager
Date: November 17, 2022
Subject: Time of performance extensions to Consultant Agreements/Amendment

Request: The Board approves the extending the contract time of performance and authorizes the appropriate contract amendments be prepared, and delegates authority to the Board Chair and Secretary to sign the amendments.

Prior Board Action: The Board previously approved the Consultant Agreements/Amendments with:

- Dewberry to include water quality and extend stream assessment into state park with the Cherry Creek Tributaries Major Drainageway Planning which had a completion date of August 31, 2020; and
- RESPEC for the design of the East Shade Shelters and Tower Loop Shoreline Stabilization projects which had a completion date of November 30, 2022; and
- Wright Water Engineers for the Best Management Practices (BMP) Effectiveness Study which had a completion date of December 31, 2022.

Project/ Issue: Due to various reasons beyond the control of these consultants, contract time of performance extensions are needed to complete their work. Board action is needed to extend the contract time of performances to December 31, 2023.

TAC Review: TAC has not reviewed this time extension.

Budget: No additional costs are associated with these contract time of performance extensions.

Motion: **I move to approve the extension of the contract time of performances to December 31, 2023; authorize CCBWQA to prepare the appropriate contract amendments with Dewberry, RESPEC, and Wright Water Engineers; and delegate authority to the Board Chair and Secretary to sign the amendments.**

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

ANNUAL BUDGET

FOR THE YEAR ENDING DECEMBER 31, 2023

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
SUMMARY
2023 BUDGET
WITH 2021 ACTUAL AND 2022 ESTIMATED
For the Years Ended and Ending December 31,

10/24/22

	ACTUAL 2021	BUDGET 2022	ACTUAL 6/30/2022	ESTIMATED 2022	BUDGET 2023
BEGINNING FUNDS AVAILABLE	$ 5,329,539	$ 5,116,380	$ 5,758,590	$ 5,758,590	$ 4,635,823
REVENUE					
Property Taxes	2,416,896	2,660,534	2,586,575	2,659,698	2,787,609
Specific Ownership Tax	207,780	201,351	104,042	214,000	215,432
Interest Income	4,235	3,250	16,379	37,362	76,000
Reimbursed expenditures	8,619	-	-	-	-
Recreation Fees	300,908	380,000	131,308	262,000	300,000
Building Permit Fees	245,879	182,000	144,644	280,000	250,000
Wastewater Surcharge	111,320	85,000	55,203	111,000	111,000
Other Revenue	-	-	2,665	2,665	5,000
Total revenue	3,295,637	3,512,135	3,040,816	3,566,725	3,745,041
TRANSFERS IN	1,972,196	2,957,161	1,762,873	2,137,035	2,739,225
Total funds available	10,597,372	11,585,676	10,562,279	11,462,350	11,120,089
EXPENDITURES					
General Fund	860,727	981,338	503,334	1,011,992	1,209,300
Pollution Abatement Fund	1,986,486	4,818,000	702,087	2,730,000	3,872,400
Enterprise Fund	19,373	995,100	81,566	947,500	391,000
Total expenditures	2,866,586	6,794,438	1,286,987	4,689,492	5,472,700
TRANSFERS OUT	1,972,196	2,957,161	1,762,873	2,137,035	2,739,225
Total expenditures and transfers out requiring appropriation	4,838,782	9,751,599	3,049,860	6,826,527	8,211,925
ENDING FUNDS AVAILABLE	$ 5,758,590	$ 1,834,077	$ 7,512,419	$ 4,635,823	$ 2,908,164
EMERGENCY RESERVE	$ 79,000	$ 85,900	$ 81,100	$ 87,100	$ 91,900
RESERVOIR DESTRATIFICATION SERVICE PLAN RESERVE	80,772	69,772	69,772	69,772	43,372
FACILITIES MAINTENANCE RESERVE	100,000	100,000	100,000	100,000	100,000
CAPITAL RESERVE	750,000	750,000	750,000	750,000	750,000
TOTAL DESIGNATED RESERVE	$ 1,009,772	$ 1,005,672	$ 1,000,872	$ 1,006,872	$ 985,272

No assurance provided. See summary of significant assumptions.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
PROPERTY TAX SUMMARY INFORMATION
2023 BUDGET
WITH 2021 ACTUAL AND 2022 ESTIMATED
For the Years Ended and Ending December 31,

10/24/22

	ACTUAL 2021	BUDGET 2022	ACTUAL 6/30/2022	ESTIMATED 2022	BUDGET 2023
ASSESSED VALUATION - ARAPAHOE					
Residential	$ 1,139,288,420	$ 1,199,207,306	$ 1,199,207,306	$ 1,199,207,306	$ 1,036,759,868
Residential Multi-Family	-	-	-	-	136,972,895
Commercial	878,260,273	1,001,435,625	1,001,435,625	1,001,435,625	999,979,575
Industrial	5,192,160	6,461,200	6,461,200	6,461,200	6,461,200
Agricultural	316,142	365,898	365,898	365,898	359,723
State assessed	28,410,130	2,529,200	2,529,200	2,529,200	3,026,620
Vacant land	41,664,426	37,768,626	37,768,626	37,768,626	33,585,156
Personal property	118,694,890	151,299,748	151,299,748	151,299,748	146,354,737
Other	13,559	13,587	13,587	13,587	13,588
Certified Assessed Value	$ 2,211,840,000	$ 2,399,081,190	$ 2,399,081,190	$ 2,399,081,190	$ 2,363,513,362
MILL LEVY					
General	0.500	0.500	0.500	0.500	0.500
Temporary Mill Levy Reduction	(0.022)	(0.021)	(0.021)	(0.021)	0.000
Total mill levy	0.478	0.479	0.479	0.479	0.500
PROPERTY TAXES					
General	$ 1,105,920	$ 1,199,541	$ 1,199,541	$ 1,199,541	$ 1,181,757
Temporary Mill Levy Reduction	(48,660)	(50,381)	(50,381)	(50,381)	-
Levied property taxes	1,057,260	1,149,160	1,149,160	1,149,160	1,181,757
Adjustments to actual/rounding	(16,556)	-	(38,506)	(139)	-
Budgeted property taxes	$ 1,040,704	$ 1,149,160	$ 1,110,654	$ 1,149,021	$ 1,181,757
ASSESSED VALUATION - DOUGLAS					
Residential	$ 1,841,969,370	$ 2,039,108,800	$ 2,039,108,800	$ 2,039,108,800	$ 2,075,528,520
Commercial	575,093,680	600,191,990	600,191,990	600,191,990	620,837,310
Industrial	134,403,590	163,237,070	163,237,070	163,237,070	169,842,810
Agricultural	11,006,580	11,494,050	11,494,050	11,494,050	10,884,420
State assessed	2,856,400	3,260,900	3,260,900	3,260,900	5,174,900
Vacant land	167,049,180	192,875,070	192,875,070	192,875,070	175,734,090
Personal property	198,117,880	200,763,990	200,763,990	200,763,990	209,799,450
Other	139,300	160,790	160,790	160,790	166,030
	2,930,635,980	3,211,092,660	3,211,092,660	3,211,092,660	3,267,967,530
Adjustments	(50,528,361)	(55,822,571)	(55,822,571)	(55,822,571)	(56,262,904)
Certified Assessed Value	$ 2,880,107,619	$ 3,155,270,089	$ 3,155,270,089	$ 3,155,270,089	$ 3,211,704,626
MILL LEVY					
General	0.500	0.500	0.500	0.500	0.500
Temporary Mill Levy Reduction	(0.022)	(0.021)	(0.021)	(0.021)	0.000
Total mill levy	0.478	0.479	0.479	0.479	0.500
PROPERTY TAXES					
General	$ 1,440,054	$ 1,577,635	$ 1,577,635	$ 1,577,635	$ 1,605,852
Temporary Mill Levy Reduction	(63,362)	(66,261)	(66,261)	(66,261)	-
Levied property taxes	1,376,691	1,511,374	1,511,374	1,511,374	1,605,852
Adjustments to actual/rounding	(499)	-	(35,453)	(697)	-
Budgeted property taxes	$ 1,376,192	$ 1,511,374	$ 1,475,921	$ 1,510,677	$ 1,605,852
BUDGETED PROPERTY TAXES					
General	**$ 2,416,896**	**$ 2,660,534**	**$ 2,586,575**	**$ 2,659,698**	**$ 2,787,609**
	$ 2,416,896	**$ 2,660,534**	**$ 2,586,575**	**$ 2,659,698**	**$ 2,787,609**

No assurance provided. See summary of significant assumptions.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
GENERAL FUND
2023 BUDGET
WITH 2021 ACTUAL AND 2022 ESTIMATED
For the Years Ended and Ending December 31,

10/24/22

	ACTUAL 2021	BUDGET 2022	ACTUAL 6/30/2022	ESTIMATED 2022	BUDGET 2023
BEGINNING FUND BALANCE	$ 1,226,554	$ 1,532,684	$ 1,417,208	$ 1,417,208	$ 1,566,706
REVENUE					
Property taxes	2,416,896	2,660,534	2,586,575	2,659,698	2,787,609
Specific ownership tax	207,780	201,351	104,042	214,000	215,432
Interest income	3,776	2,500	13,443	30,000	60,000
Other revenue	-	-	27	27	-
Total revenue	2,628,452	2,864,385	2,704,087	2,903,725	3,063,041
Total funds available	3,855,006	4,397,069	4,121,295	4,320,933	4,629,747
EXPENDITURES					
General and Administrative					
Accounting	59,222	55,000	29,759	62,000	70,000
Administrative Assistant	-	-	-	-	86,300
Auditing	6,800	7,700	7,200	7,200	7,500
CC Stewardship Partners	27,000	30,250	18,000	30,250	35,000
County Treasurer's fee	36,275	39,908	38,809	39,908	39,900
Dues and licenses	1,488	5,000	1,238	1,700	2,000
Insurance and bonds	7,685	12,000	6,863	6,863	10,000
Management/administration	-	-	24,997	25,000	69,000
Legal services	107,698	53,000	63,685	125,000	100,000
Office/Miscellaneous Expense	12,097	15,100	3,817	7,500	7,400
TAC coordination	26,604	12,000	11,910	12,000	20,800
Information & education coordination	-	16,500	113	16,500	-
CCBWQA website	13,002	14,300	8,643	14,300	10,000
Regulatory support	35,255	33,000	59,440	60,000	228,000
Personnel	77,826	86,350	541	541	-
Repairs and Maintenance	-	16,830	-	16,830	-
Optional Mgr Support	-	30,000	17,813	30,000	-
	410,952	426,938	292,828	455,592	685,900
Watershed Management					
Annual report	15,833	26,000	19,881	26,000	32,000
Data management	37,793	50,000	10,489	50,000	45,000
Site application review	-	-	1,879	2,000	6,400
General watershed management	160,417	153,400	64,390	153,400	125,000
	214,043	229,400	96,639	231,400	208,400
Sampling and Analysis Program					
General technical support	31,930	86,000	27,955	86,000	55,000
Monitoring - Reservoir	58,973	86,000	28,686	86,000	36,000
Monitoring - Watershed	99,575	128,000	48,948	128,000	48,000
Monitoring - Laboratory	-	-	-	-	120,000
Data management	44,355	25,000	8,278	25,000	56,000
	234,833	325,000	113,867	325,000	315,000
Special Projects					
Special projects - Undesignated	899	-	-	-	-
	899	-	-	-	-
Total expenditures	860,726	981,338	503,334	1,011,992	1,209,300
TRANSFERS OUT					
Transfers to Pollution Abatement Fund	1,577,072	1,718,631	1,615,268	1,742,235	1,837,825
Supplemental transfers	-	850,000	-	-	500,000
Total transfers out	1,577,072	2,568,631	1,615,268	1,742,235	2,337,825
Total expenditures and transfers out requiring appropriation	2,437,798	3,549,969	2,118,602	2,754,227	3,547,125
ENDING FUND BALANCE	$ 1,417,208	$ 847,100	$ 2,002,693	$ 1,566,706	$ 1,082,622
EMERGENCY RESERVE	$ 79,000	$ 85,900	$ 81,100	$ 87,100	$ 91,900
TOTAL DESIGNATED RESERVE	$ 79,000	$ 85,900	$ 81,100	$ 87,100	$ 91,900

No assurance provided. See summary of significant assumptions.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
POLLUTION ABATEMENT FUND
2023 BUDGET
WITH 2021 ACTUAL AND 2022 ESTIMATED
For the Years Ended and Ending December 31,

10/24/22

	ACTUAL 2021	BUDGET 2022	ACTUAL 6/30/2022	ESTIMATED 2022	BUDGET 2023
BEGINNING FUND BALANCE	$ 2,446,816	$ 1,970,727	$ 2,441,170	$ 2,441,170	$ 1,853,205
REVENUE					
Interest income	26	200	124	2,362	8,000
Other revenue	-	-	2,638	2,638	5,000
Reimbursed expenditures	8,619	-	-	-	-
Total revenue	8,645	200	2,762	5,000	13,000
TRANSFERS IN					
Transfers from General Fund	1,577,072	1,718,631	1,615,268	1,742,235	1,837,825
Transfers from Enterprise Fund	275,700	388,530	147,605	394,800	401,400
Supplemental transfers	119,424	850,000	-	-	500,000
Total transfers in	1,972,196	2,957,161	1,762,873	2,137,035	2,739,225
Total funds available	4,427,657	4,928,088	4,206,805	4,583,205	4,605,430
EXPENDITURES					
General and Administrative					
Management/administration	242,158	307,000	133,473	307,000	396,100
Personnel	116,738	182,000	-	-	-
PAPS - Undesignated	44,723	225,000	5,534	100,000	-
Contingency	-	-	-	-	10,000
	403,619	714,000	139,007	407,000	406,100
Pollution Reduction Facilities - O&M					
PRF Routine	-	35,000	990	35,000	10,000
Repairs and maintenance	-	-	-	-	111,200
Utilities - reservoir destratification	60,124	60,000	16,732	60,000	65,000
Res Destrat service plan	16,180	11,000	-	11,000	26,400
PRF Emergency repairs	-	90,000	-	5,000	-
PRF Weed Control	-	-	-	-	10,000
Wetlands harvesting	-	-	-	-	108,000
Meteorological Station Service	-	6,000	-	3,000	3,000
PRF Restoration	92,255	288,000	745	185,000	40,000
Contingency	-	-	-	-	25,000
	168,559	490,000	18,467	299,000	398,600
Reservoir Projects					
Meteorological station	17,238	-	-	-	-
RDS Rehabilitation	11,487	270,000	11,133	35,000	47,700
Internal Loading Evaluation	-	150,000	-	-	-
Shoreline Stabilization				-	
Reservoir Shoreline Stabilization - East Shade Shelter	10,850	349,000	28,342	349,000	599,000
Reservoir Shoreline Stabilization - Tower Loop	4,932	810,000	-	-	-
Contingency	-	-	-	-	50,000
	44,507	1,579,000	39,475	384,000	696,700
Stream Reclamation Projects					
CC Arapahoe (R 3-4)	-	180,000	25,000	180,000	605,000
Stream reclamation - CC 12-Mile Park	194,802	388,000	337,138	388,000	-
Stream reclamation - CC Scott Road	275,000	275,000	-	275,000	-
Stream reclamation - CC Dransfeldt Extension	60,000	170,000	-	170,000	170,000
Dove Creek: Otero to Chambers	25,000	100,000	75,000	100,000	138,000
Happy Canyon: Jordan to Broncos Pkwy	25,000	68,000	68,000	68,000	88,000
Happy Canyon: The I25 Upstream	250,000	250,000	-	250,000	-
Stream reclamation - McMurdo Gulch	540,000	171,000	-	171,000	907,000
Stream reclamation - Piney Creek	-	38,000	-	38,000	63,000
Watershed Priority Projects	-	250,000	-	-	-
Reservoir to LV Road	-	-	-	-	200,000
Lone Tree Creek	-	95,000	-	-	-
Preservation - Acquisition lease	-	50,000	-	-	100,000
Contingency	-	-	-	-	100,000
	1,369,802	2,035,000	505,138	1,640,000	2,371,000
Total expenditures	1,986,487	4,818,000	702,087	2,730,000	3,872,400
Total expenditures and transfers out requiring appropriation	1,986,487	4,818,000	702,087	2,730,000	3,872,400
ENDING FUND BALANCE	$ 2,441,170	$ 110,088	$ 3,504,718	$ 1,853,205	$ 733,030
RESERVOIR DESTRATIFICATION SERVICE PLAN RESERVE	$ 80,772	$ 69,772	$ 69,772	$ 69,772	$ 43,372
TOTAL RESERVE	$ 80,772	$ 69,772	$ 69,772	$ 69,772	$ 43,372

No assurance provided. See summary of significant assumptions.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
ENTERPRISE FUND
2023 BUDGET
WITH 2021 ACTUAL AND 2022 ESTIMATED
For the Years Ended and Ending December 31,

10/24/22

	ACTUAL 2021	BUDGET 2022	ACTUAL 6/30/2022	ESTIMATED 2022	BUDGET 2023
BEGINNING FUNDS AVAILABLE	$ 1,656,169	$ 1,612,969	$ 1,900,212	$ 1,900,212	$ 1,215,912
REVENUE					
Recreation fees	300,908	380,000	131,308	262,000	300,000
Building permit fees	245,879	182,000	144,644	280,000	250,000
Wastewater surcharge	111,320	85,000	55,203	111,000	111,000
Interest income	433	550	2,812	5,000	8,000
Total revenue	658,540	647,550	333,967	658,000	669,000
Total funds available	2,314,709	2,260,519	2,234,179	2,558,212	1,884,912
EXPENDITURES					
General and administrative					
Management/administration	-	50,000	-	-	21,000
Equipment	6,862	1,100	3,425	3,500	65,000
Planning					
Partner Planning	-	39,000	-	39,000	-
Reservoir to 12-Mile Park Study	-	250,000	35,350	250,000	5,000
CCBWQA Planning	-	295,000	-	295,000	105,000
Tributary Planning	11,881	50,000	35,785	50,000	-
Special Studies/Projects					
Special Studies/Projects - Bow Tie	630	100,000	490	100,000	-
Special Studies/Projects: BMP Effectiveness	-	95,000	-	95,000	75,000
Special Studies/Projects - PRF/PAP WQ Benefits	-	50,000	-	50,000	5,000
Reservoir Nutrient Mitigation	-	-	-	-	50,000
Emerging SCM	-	50,000	-	50,000	-
Watershed Master Plan	-	-	-	-	50,000
Contingency	-	15,000	6,516	15,000	15,000
Total expenditures	19,373	995,100	81,566	947,500	391,000
TRANSFERS OUT					
Transfers to Pollution Abatement Fund	275,700	388,530	147,605	394,800	401,400
Supplemental transfers	119,424	-	-	-	-
Total transfers out	395,124	388,530	147,605	394,800	401,400
Total expenditures and transfers out requiring appropriation	414,497	1,383,630	229,171	1,342,300	792,400
ENDING FUNDS AVAILABLE	$ 1,900,212	$ 876,889	$ 2,005,008	$ 1,215,912	$ 1,092,512
FACILITIES MAINTENANCE RESERVE	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
CAPITAL RESERVE	750,000	750,000	750,000	750,000	750,000
TOTAL DESIGNATED RESERVE	$ 850,000	$ 850,000	$ 850,000	$ 850,000	$ 850,000

No assurance provided. See summary of significant assumptions.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2023 BUDGET
SUMMARY OF SIGNIFICANT ASSUMPTIONS

Services Provided

Cherry Creek Basin Water Quality Authority (the Authority) is a quasi-municipal corporation and political sub-division of the State of Colorado. Formed on June 16, 1988, the Authority was created by Colorado HB1029 to monitor the water quality in the Cherry Creek Basin and to construct facilities to control the accumulation of pollutants.

The District has no employees, and some operations and administrative functions are contracted.

The District prepares its budget on the modified accrual basis of accounting in accordance with the requirements of Colorado Revised Statues C.R.S. 29-1-105 using its best estimates as of the date of the budget hearing. These estimates are based on expected conditions and its expected course of actions. The assumptions disclosed herein are those that the Authority believes are significant to the budget. There will usually be differences between the budget and actual results because events and circumstances frequently do not occur as expected, and those differences may be material. For financial statement reporting under generally accepted accounting principles (GAAP), the Authority uses the full accrual basis of difference from GAAP accounting for Fund Balance. Funds Available represents each fund's current assets less its current liabilities except for the current portion of long-term debt. In addition, the budget separates individual funds which are included as one entity in the GAAP presentation.

Colorado Revised Statute 25-8.5-111(3), as amended by Senate Bill 01-066 in 2001, states that the Authority must spend a minimum of 60% of revenues (collected from fees, tolls, and property tax) on the construction and maintenance of pollution abatement projects in the Cherry Creek Basin or on payments due on debt incurred entirely for such projects. The minimum pollution abatement expenditure requirement is not restricted by fund but is applied to the Authority as a whole.

Revenues

Property Taxes

The primary source of revenue is property taxes. Property taxes are levied by the Authority's Board of Directors. The levy is based on assessed valuations determined by the County Assessor generally as of January 1 of each year. The levy is normally set by December 15 by certification to the County Commissioners to put the tax lien on the individual properties as of January 1 of the following year. The County Treasurer collects the determined taxes during the ensuing calendar year. The taxes are payable by April or, if in equal installments, at the taxpayer's election, in February and June. Delinquent taxpayers are notified in August and generally sales of the tax liens on delinquent properties are held in November or December. The County Treasurer remits the taxes collected monthly to the Authority.

The calculation of the taxes levied is displayed on the Property Tax Summary Information page of the budget.

Senate Bill 21-293 among other things, designates multi-family residential real property (defined generally, as property that is a multi-structure of four or more units) as a new subclass of residential real property. For tax collection year 2023, the assessment rate for single family residential property decreases to 6.95% from 7.15%. The rate for multifamily residential property, the newly created subclass, decreases to 6.80% from 7.15%. Agricultural and renewable energy production property decreases to 26.4% from 29.0%. Producing oil and gas remains at 87.5%. All other nonresidential property stays at 29%.

Revenues - (continued)

Specific Ownership Taxes

Specific ownership taxes are set by the State and collected by the County Treasurer, primarily on vehicle licensing within the County as a whole. The specific ownership taxes are allocated by the County Treasurer to all taxing entities within the County. The budget assumes that the Authority's share will be equal to approximately 7% of the property taxes collected from Arapahoe County and 8% of the property taxes from Douglas County.

Net Investment Income

Interest earned on the Authority's available funds has been estimated based on historical interest earnings.

Fees

The Authority receives recreation fees from the State of Colorado. These fees are a portion of the entry fees to Cherry Creek State Park. The fees are remitted to the Authority on a monthly basis.

The Authority receives building permit fees from various governmental entities that reside within the Authority's borders. These fees are typically remitted on a quarterly basis.

The Authority receives wastewater surcharges from the surrounding water and sanitation districts that operate wastewater treatment facilities and discharge into the Cherry Creek Basin. These surcharges are remitted to the Authority on a quarterly basis by each District.

Expenditures

Administrative and Operating Expenditures

Operating expenditures include the estimated services necessary to maintain the Authority administrative viability such as legal, management, accounting, insurance, banking, meeting expense and other administrative expenses. Estimated expenditures related to water quality management were also included in the General Fund budget.

County Treasurer's Fees

County Treasurer's fees have been computed at 1.50% of property tax collections.

Capital Projects

Anticipated expenditures for capital projects are detailed on the Pollution Abatement Fund page of the budget.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2023 BUDGET
SUMMARY OF SIGNIFICANT ASSUMPTIONS

Debt and Leases

The Authority has no bond indebtedness or any operating or capital leases.

Reserves

Emergency Reserve

The Authority has provided for an Emergency Reserve equal to at least 3% of fiscal year spending as defined under the TABOR Amendment.

Reservoir Destratification Service Plan Reserve

The Authority has provided for a reservoir destratification service plan reserve of $43,372 for use in subsequent year destratification service plan expenditures.

Facilities Maintenance Reserve

The Authority has provided for a facilities maintenance reserve of $100,000 for use in subsequent year capital maintenance projects.

Capital Reserve

The Authority has provided for a total capital reserve of $750,000 for use in subsequent year capital replacement projects.

This information is an integral part of the accompanying budget.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

RESOLUTION 2022-11-01

A RESOLUTION ESTABLISHING THE RATES, FEES AND CHARGES OF THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY FOR CALENDAR YEAR 2023

WHEREAS, the Board of Directors of the Cherry Creek Basin Water Quality Authority has, pursuant to §25-8.5-111(n) and (o), C.R.S., and §25-8.5-101(3), C.R.S., established rates, fees and charges to recover a portion of the cost of water quality preservation services and facilities furnished by the Authority from those persons and activities that benefit from such services and facilities; and

WHEREAS, the Board has published notice of and conducted a public hearing on the Authority's proposed 2023 budget; and

WHEREAS, prior to adopting the 2023 budget and before levying any tax for collection during the 2023 budget year, the Authority must establish its rates, fees and charges for 2023.

NOW THEREFORE, BE IT RESOLVED that the Board of Directors of the Cherry Creek Basin Water Quality Authority of Arapahoe and Douglas Counties, Colorado as follows:

Section 1. **Building Permit Fee**. For calendar year 2023 the Building Permit Fee shall remain the same and shall continue to be assessed as follows:

(a)	Single Family Residence	$60.00
(b)	The building "footprint" of all buildings (excluding any single-family residence), regardless of use or purpose, including but not limited to multi-family, commercial, office, recreational, religious, educational and industrial buildings	$.04\sq. ft.

Section 2. **Cherry Creek Reservoir User Fee**. For calendar year 2023 the Cherry Creek Reservoir User Fee shall remain the same and shall continue to be assessed as follows:

(a)	Annual State Parks Pass, Cherry Creek Basin add-on	$3.00
(b)	One Day State Parks Pass, Cherry Creek Basin add-on	$1.00

Section 3. **Disturbed Lands Fee**. For calendar year 2023 the Cherry Creek Basin Water Quality Authority shall not assess a Disturbed Lands Fee.

Section 4. **Wastewater Effluent Fee**. For calendar year 2023 the Wastewater Effluent Fee shall remain the same and shall continue to be assessed at the rate of $0.05 per thousand gallons of wastewater effluent discharged within the boundaries of the Cherry Creek Basin Water Quality Authority.

Section 5. **Effective Date**. The rates, fees and charges as hereby reaffirmed and adopted by this Resolution shall be in effect as of January 1, 2023 and shall remain in effect until further action of the Authority's Board of Directors.

Section 6. **Delegation of Collection Authority**. The Authority desires that each municipality and county having territory within Authority boundaries assist the Authority in the collection of its Building Permit Fee. Accordingly, the Authority hereby delegates to each such municipality and county full power and authority to collect on the Authority's behalf or assist the Authority with the collection of the Authority's Building Permit Fee attributable to new construction and development located within that portion of each such entities boundaries that overlap the boundaries of the Authority.

Section 7. **Public Health and Necessity**. The Authority Board hereby determines and finds that the adoption of this Resolution is necessary for and promotes the public health welfare and safety of the inhabitants and property within the Cherry Creek Basin Water Quality Authority.

ADOPTED AND EXECUTED this 17th day of November, 2022.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

By _____
Joshua Rivero, Chair

Attest:

_____
John A. McCarty, Secretary/Treasurer

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

RESOLUTION 2022-11-02

ARAPAHOE AND DOUGLAS COUNTIES, COLORADO

A RESOLUTION SUMMARIZING EXPENDITURES AND REVENUES FOR EACH FUND AND ADOPTING A BUDGET FOR THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY, ARAPAHOE AND DOUGLAS COUNTIES, COLORADO, FOR THE CALENDAR YEAR BEGINNING ON THE FIRST DAY OF JANUARY, 2023, AND ENDING ON THE LAST DAY OF DECEMBER, 2023

WHEREAS, the Board of Directors of the Cherry Creek Basin Water Quality Authority ("Authority") authorized CliftonLarsonAllen, LLP to prepare and submit a proposed budget to said governing body no later than October 15, 2022 in accordance with the local government budget law; and

WHEREAS, a proposed budget was submitted to the Board of Directors of the Authority for its consideration on or before said date; and

WHEREAS, said proposed budget was available for inspection by the public at the offices of CliftonLarsonAllen, LLP, located at 8390 E. Crescent Parkway, Suite 300, Greenwood Village, Colorado, and interested electors of the Authority were given the opportunity to file or register any objections to the proposed budget; and

WHEREAS, following due and proper notice published in accordance with law, a public hearing on the proposed budget was held on November 17, 2022, at 8:30 a.m. at SEMSWA, 7437 S. Fairplay Street, Centennial, CO 80112 and virtually via Zoom; and

WHEREAS, the proposed budget has been prepared to comply with all terms, limitations and exemptions, including, but not limited to reserve, transfer and expenditure exemptions under Article X, Section 20 of the Colorado Constitution and other laws which are applicable to or binding upon the Authority; and

WHEREAS, whatever increases may have been made in the expenditures, like increases were added to the revenues so that the budget remains in balance, as required by law.

NOW, THEREFORE, BE IT RESOLVED BY the Board of Directors of the Cherry Creek Basin Water Quality Authority, Arapahoe and Douglas Counties, Colorado:

Section 1. That the estimated expenditures and transfers out for each of the Authority's funds for the calendar year beginning on the first day of January, 2023 and ending on the last day of December 2023 are as follows:

General Fund	$3,547,125
Enterprise Fund	$ 792,400
Pollution Abatement Fund	$3,872,400
Total Expenditures and Transfers	**$8,211,925**

Section 2. That the estimated revenues and transfers in for each of the Authority's funds for the calendar year beginning on the first day of January, 2023 and ending on the last day of December 2023 are as follows:

General Fund	
From 2022 estimated year-end fund balance	$1,566,706
From sources other than general property tax revenue	$ 275,432
From general property tax revenue	$2,787,609
Total General Funds Revenue	**$4,629,747**
Enterprise Fund	
From 2022 estimated year-end fund balance	$1,215,912
From sources other than general property tax revenue	$ 669,000
From general property tax revenue	$ 0
Total Enterprise Funds Revenue	**$1,884,912**
Pollution Abatement Fund	
From 2022 estimated year-end fund balance	$1,853,205
From general property tax revenue – transfer from General Fund	$1,837,825
From sources other than transfers	$ 13,000
From sources other than general property tax revenue – transfer from Enterprise Fund and Supplemental	$ 901,400
Total Pollution Abatement Funds Revenue and Transfers In	**$4,605,430**
Total General Fund, Enterprise and Pollution Abatement Funds Revenue Including Transfers	**$11,120,089**

Section 3. That the budget, as submitted, amended, herein summarized by fund and attached hereto as Exhibit A, is hereby approved and adopted as the budget for the

Cherry Creek Basin Water Quality Authority for the calendar year beginning on the first day of January, 2023, and ending on the last day of December 2023.

Section 4. That the budget, is hereby approved and adopted, shall be certified by the Manager, the Chair, Secretary or other officer of the Authority, to all appropriate agencies, and is made a part of the public records of the Authority.

ADOPTED on the 17th day of November, 2022.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

By: _____
Joshua Rivero, Chair

Attest:

_____
John A. McCarty, Secretary/Treasurer

SEAL

EXHIBIT A

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

2023 BUDGET AND BUDGET MESSAGE

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

RESOLUTION 2022-11-03

ARAPAHOE AND DOUGLAS COUNTIES, COLORADO

A RESOLUTION APPROPRIATING SUMS OF MONEY TO THE VARIOUS FUNDS IN THE AMOUNT AND FOR THE PURPOSE AS SET FORTH BELOW, FOR THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY, ARAPAHOE AND DOUGLAS COUNTIES, COLORADO, FOR THE 2023 BUDGET YEAR

WHEREAS, the Board of Directors of Cherry Creek Basin Water Quality Authority (the "Authority") adopted its annual budget for 2023 in accordance with the Local Government Budget Law, on November 17, 2022; and

WHEREAS, the Board of Directors of the Authority has made provision therein for revenues in an amount equal to or greater than the total proposed expenditures as set forth in said budget; and

WHEREAS, it is not only required by law, but also necessary to appropriate the revenues and reserves or fund balances provided in the budget to and for the purposes described below, thereby establishing a limitation on expenditures for the operations of the Authority;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Cherry Creek Basin Water Quality Authority, Arapahoe and Douglas Counties, Colorado, as follows:

Section 1. That the following sums are hereby appropriated from the revenue of each fund, to each fund, for the purposes stated:

General Fund	$3,547,125
Enterprise Fund	$ 792,400
Pollution Abatement Fund	$3,872,400
Total Sums Appropriated	**$8,211,925**

ADOPTED on the 17th day of November, 2022.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

By: _____
Joshua Rivero, Chair

Attest:

_____
John A. McCarty, Secretary/Treasurer

SEAL

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

RESOLUTION 2022-11-04

ARAPAHOE AND DOUGLAS COUNTIES, COLORADO

A RESOLUTION LEVYING PROPERTY TAXES FOR YEAR 2022 FOR COLLECTION IN 2023, TO HELP DEFRAY THE COSTS OF GOVERNMENT FOR THE CHERRY CREEK BASIN WATER QUALITY AUTHORITY ARAPAHOE AND DOUGLAS COUNTIES, COLORADO, FOR THE 2023 BUDGET YEAR

WHEREAS, the Board of Directors of the Cherry Creek Basin Water Quality Authority ("Authority") adopted its annual budget for 2023, in accordance with the Local Government Budget Law on November 17, 2022; and

WHEREAS, the 2022 valuation for assessment for the Authority, as certified by the Arapahoe County Assessor is $2,363,513,362; and as certified by the Douglas County Assessor is $3,211,704,626; and

WHEREAS, the amount of money necessary to balance the budget for general operating purposes from property tax revenue is $2,787,609; and

WHEREAS, the Authority has no outstanding bonded indebtedness.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Cherry Creek Basin Water Quality Authority, Arapahoe and Douglas Counties, Colorado;

Section 1. That for the purpose of meeting all general operating expenses of the Authority during the 2023 budget year, there is hereby levied a property tax of 5.000 mills upon each dollar of the total valuation for assessment of all taxable property within the Authority to raise $2,787,609 in revenue.

Section 2. That since the Authority has no outstanding bonds, no tax is being levied for debt service purposes.

Section 3. That the Authority's Manager or General Counsel or the Authority's Chair, Secretary or Treasurer is hereby authorized and directed to certify to the Board of County Commissioners of Arapahoe and Douglas Counties, State of Colorado (the "Board of County Commissioners"), the mill levies for the Authority as hereinabove determined and set, but as recalculated as necessary based upon the final (December) certification of valuation for Arapahoe and Douglas Counties in order to comply with any applicable revenue and other budgetary limits.

ADOPTED on the 17th day of November, 2022.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

By: _____
Joshua Rivero, Chair

Attest:

_____
John A. McCarty, Secretary/Treasurer

ACTION ITEM MEMORANDUM

To: CCBWQA Board
From: Jessica DiToro, PE, LRE Water
Date: November 7, 2022
Subject: Lake Nutrients WQCC Rulemaking Hearing

Request: That the CCBWQA Board move to resubmit its Responsive Prehearing Statement (RPHS) for the Lakes Nutrient Criteria Rulemaking Hearing with the attached 10-7-22 letter from Hydros included as an exhibit to the previously submitted RPHS.

Issue: On September 8th, the WQCC released an order in response to two motions requesting a delay in the Lake Nutrients Criteria Rulemaking Hearing (RMH) process. In the order, the WQCC ordered that the RMH be continued and rescheduled for April 10, 2023. All prehearing deadlines for the RMH were stayed until formally rescheduled. A virtual status conference was held on September 14th to establish a new schedule of events related to the RMH. On September 19th, the WQCC issued an official procedural order outlining the new schedule for the April RMH. The new RMH schedule can be found attached with CCBWQA TAC and Board meeting dates overlayed as Attachment 1 to this memorandum.

As part of the updated RMH schedule, the WQCD submitted a supplemental Proponent's Prehearing Statement (sPPHS) on October 5th. Prior to this, the WQCD had requested that stakeholders provide them with updated and corrected datasets so that the model could be rerun, and proposed criteria adjusted as appropriate. CCBWQA provided a corrected dataset to the WQCD in August with its original RPHS. The result of incorporating these updated and corrected datasets in the model is as follows:

Parameter	Original Proposal	Updated Proposal
Total Phosphorus (µg/L)	36	40
Total Nitrogen (µg/L)	600	610

Staff has reviewed the WQCD's sPPHS and has determined that it does not substantively affect the CCBWQA's previously submitted RPHS. Staff recommends that CCBWQA retract its original RPHS and resubmit its RPHS so that it includes a brief letter from Hydros as an exhibit that describes the above statement in more detail. The letter from Hydros is attached below as Attachment 2 for review. Staff also recommends that the following sentence be added to the beginning of the RPHS: "*CCBWQA has reviewed the Division's Supplemental Proponent's Prehearing Statement and determined that it does not substantively affect the CCBWQA's previously submitted RPHS, as described in Exhibit X."*

Budget: Participation in this RMH effort is covered under the current CCBWQA regulatory budget for fiscal year 2022 and is also included in the draft budget for fiscal year 2023.

Motion: The Board moves to retract the previously submitted Responsive Prehearing Statement and resubmit its Responsive Prehearing Statement for the Lakes Nutrient Criteria Rulemaking Hearing with the attached 10-7-22 letter from Hydros included as an exhibit and an additional sentence included in the Responsive Prehearing Statement that references the exhibit. The Board also moves that Staff continue to coordinate with the WQCD on this topic as previously directed.

Next Steps: If the Board moves to submit the updated RPHS and the Hydro letter exhibit, then CCBWQA's legal counsel (DGS) will coordinate with the WQCC to retract the originally submitted RPHS and to submit the updated RPHS as approved by the Board on November 17th by the December 21st due date.

Additionally, Staff will review the RPHSs submitted by the WQCD and other parties and provide updates to the TAC and Board as appropriate in January. CCBWQA Staff and legal counsel will engage with the WQCD as needed to negotiate between now and the Rebuttal Statement step of the RMH-process (Rebuttals are due February 15th).

Attachment 1

Lakes Nutrients Criteria (Regulations 31-38) RMH Schedule + CCBWQA Meeting Schedule		
Event	**Date**	**Activity**
Nutrient Town Hall	May 2nd	Proposed criteria released by WQCD
May TAC	May 5th	1st discussion related to draft criteria at TAC level
May Board	May 19th	1st discussion related to draft criteria at Board level
June TAC	June 2nd	2nd discussion related to draft criteria at TAC level
June Board	June 16th	2nd discussion related to draft criteria at Board level
July TAC	July 7th	3rd discussion related to draft criteria at TAC level – Motion for Party Status
July Board	July 21st	3rd discussion related to draft criteria at Board level – Motion for Party Status
PPHS	August 3rd	Review WQCD's PPHS
August TAC	August 4th	4th discussion related to draft criteria at TAC level – Motion for RPHS
Party Status Requests	August 17th	Submit Party Status Request
August Board	August 18th	4th discussion related to draft criteria at Board level – Motion for RPHS
September TAC	September 1st	5th discussion related to draft criteria at TAC level – Discuss Rebuttal
September Board	September 15th	5th discussion related to draft criteria at Board level – Motion for Rebuttal if needed
Supplemental PPHS	October 5th	Review WQCD's Supplemental PPHS
October TAC	October 6th	6th discussion related to draft criteria at TAC level – Update on status
October Board	October 20th	6th discussion related to draft criteria at Board level – Update on status
November TAC	**November 3rd**	**7th discussion related to draft criteria at TAC level – Discuss RPHS**
November Board	**November 17th**	**7th discussion related to draft criteria at Board level – Motion for RPHS**
December TAC	**December 1st**	**8th discussion related to draft criteria at TAC level – Discuss RPHS(?)**
December Board	**December 15th**	**8th discussion related to draft criteria at Board level – Motion for RPHS(?)**
RPHS	**December 21st**	**Submit Supplemental RPHS – TBD + Review other parties' RPHSs**
January TAC	**January 5th**	**9th discussion related to draft criteria at TAC level – Discuss Rebuttals**
January Board	**January 19th**	**9th discussion related to draft criteria at Board level – Motion for Rebuttals(?)**
February TAC	**February 2nd**	**10th discussion related to draft criteria at TAC level – Update on status**
Rebuttals	**February 15th**	**Submit Rebuttal Statement – TBD + Review other parties' Rebuttals**
February Board	**February 16th**	**10th discussion related to draft criteria at Board level – Update on status**
Motions	**February 22nd**	**TBD**
Complex Outstanding Issues Index	**March 1st**	**Review Index**
March TAC	**March 2nd**	**11th discussion related to draft criteria at TAC level – Discuss RMH Presentation**
Prehearing Conference	**March 7th**	**Participate (virtually) in conference to maintain Party Status**
March Board	**March 16th**	**11th discussion related to draft criteria at Board level – Motion for RMH Presentation**
Negotiation Cutoff	**March 16th**	**Final negotiations with WQCD and other parties today**
Consolidated Proposal	**March 30th**	**Review Proposal**
Cost Benefit Analysis	**March 31st**	**Review Cost Benefit Analysis**
Regulatory Analysis	**April 5th**	**Review Regulatory Analysis**
April TAC	**April 6th**	**12th discussion related to draft criteria at TAC level – Update on status**
RMH	**April 10th**	**Participate (virtually) in RMH**
April Board	**April 20th**	**Update on RMH outcome**
May TAC	**May 4th**	**Update on RMH outcome**

MEMORANDUM

TO: Jane Clary, Cherry Creek Basin Water Quality Authority (CCBWQA) Technical Manager

FROM: Christine Hawley, Hydros Consulting

SUBJECT: Cherry Creek Reservoir and the Lakes Nutrient Standard WQCD Supplemental PHS

DATE: October 7, 2022

On August 3, 2022, the Water Quality Control Division (WQCD) proposed table value standards (TVS) for total nitrogen (TN) and total phosphorus (TP) in lakes and reservoirs in their proponent's pre-hearing statement (PPHS) [1]. As requested by the Cherry Creek Basin Water Quality Authority (CCBWQA), Hydros conducted an analysis[2] to evaluate the applicability/appropriateness of the WQCD for to Cherry Creek Reservoir (CCR). On October 5, 2022, the WQCD provided a supplemental pre-hearing statement (sPHS)[3], which included changes to the TVS values. Hydros has since reviewed the newly proposed TVS values in the sPHS and concludes that the findings from the original analysis of applicability/appropriateness for CCR remain unchanged. Those findings can be summarized as follows:

- The WQCD-proposed TN and TP standards for CCR do not reflect the observed Chl *a* response relative to the CCR Chl *a* standard. Based on this comparison, the proposed TN and TP standards are significantly overprotective for CCR.
- Data from CCR used in the WQCD methodology do not fit the WQCD stressor-response model and tend to fall below the WQCD-designated lines defining both Chl *a*:TP and Chl *a*:N relationships. This further indicates that the proposed standards would be overprotective for CCR.

Based on this analysis, it is strongly recommended that CCBWQA move forward with efforts to develop site-specific standards for TN and TP for proposal at the next South Platte Basin RMH (2025).

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[1] WQCD. 2022a. Prehearing Statement of the Water Quality Control Division to the Colorado Water Quality Control Commission. August 3, 2022.

[2] Hydros Consulting Inc. 2022. Applicability of WQCD-Proposed TN and TP Standards to Cherry Creek Reservoir. Technical memorandum from C. Hawley (Hydros) to J. Clary (CCBWQA). August 8, 2022.

[3] WQCD. 2022b. Supplemental Prehearing Statement of the Water Quality Control Division to the Colorado Water Quality Control Commission. October 5, 2022.

ACTION ITEM MEMORANDUM

To: CCBWQA Board

From: Jane Clary, Technical Manager

Date: November 10, 2022

Subject: Cost Estimate to Develop Site-Specific Standards for Cherry Creek Reservoir

Request: That the Board engage Hydros Consultants to conduct analysis to develop site-specific nutrient standards for Cherry Creek Reservoir in accordance with the scope of work and cost estimate provided by Hydros Consultants on September 16, 2022.

Issue: The Colorado Water Quality Control Division has proposed statewide nutrient standards for lakes and reservoirs in Colorado. Review of the proposed standards by CCBWQA's technical consultants indicates that the proposed standards are not appropriate for Cherry Creek Reservoir. Additionally, the Division's proposed Statement of Basis and Purpose includes this statement regarding site-specific standards: "*The commission may consider revised site-specific nutrients standards for the following lake and reservoir segments that have existing nutrient control regulations in future rulemaking hearings if information to support appropriate and protective revisions is developed: […] Cherry Creek: 2 (COSPCH02; Cherry Creek Reservoir).*"

As requested by the TAC, Hydros Consulting has prepared a scope and cost estimate to develop site-specific nutrient standards for Cherry Creek Reservoir, as described in the attachment to this memorandum. Based on review of this memorandum, the approach and cost estimate are believed to be appropriate for the project. Additionally, Hydros has included multiple "go/no-go" steps in their approach that would enable the effort to end an interim step in the process, if directed by CCBWQA.

Budget: Hydros' proposed budget is $87,755 with an optional task for additional meetings of $5,000 for a total of $92,755. This cost has been included in the proposed 2023 CCBWQA budget.

Recommendation: On November 3, 2022, the TAC recommended that the Board engage Hydros Consultants to conduct analysis to develop a Site-Specific Standard for Cherry Creek Reservoir in accordance with the scope of work and cost estimate provided by Hydros Consultants on September 16, 2022

Next Steps: Work on development of site-specific standards is expected to begin following the April 2023 Lake Nutrients Criteria Rulemaking Hearing. This timeline is based in part on ensuring that CCBWQA's effort takes into consideration the outcome of the April 2023 rulemaking, as well as Hydros' availability to begin work on the project.

TECHNICAL MEMORANDUM

TO: Jane Clary, Cherry Creek Basin Water Quality Authority (CCBWQA) Technical Manager

FROM: Christine Hawley, Hydros Consulting Inc.

SUBJECT: Development of Site-Specific Standard Values for TN and TP in Cherry Creek Reservoir

DATE: September 26, 2022

The Water Quality Control Division (WQCD) has proposed table value standards (TVS) for total nitrogen (TN) and total phosphorus (TP) in a proponent's pre-hearing statement (PPHS; WQCD, 2022) for the November 2022 Rulemaking Hearing (RMH). This includes TN and TP standards that would be applicable to Cherry Creek Reservoir (CCR) if adopted. The November 2022 RMH has since been delayed to April 2023 by the Water Quality Control Commission (WQCC, 2022) in response to stakeholder concerns. At this time, it is unclear whether the currently proposed TN and TP standards will be modified prior to the April 2023 RMH.

At the request of CCBWQA, Hydros reviewed the WQCD methodology behind the currently-proposed TN and TP standards in the context of CCR (Hydros, 2022). Several concerns regarding overall methodology and data issues were noted. Additionally, it was determined that the proposed standards would be highly overprotective and not appropriate for CCR. Further, it was recommended that CCBWQA move forward with efforts to develop site-specific standards for TN and TP for proposal at the next South Platte Basin RMH, currently scheduled to occur in 2025.

This memorandum summarizes the proposed approach, schedule, and budget to develop site-specific TN and TP standards for Cherry Creek Reservoir. Briefly, standard development is expected to be based on analysis of observed CCR data and use of the existing reservoir water-quality model. The scope of work (SOW) is scheduled for completion in 2023, with delivery of a draft technical memorandum summarizing findings and recommendations for next steps by December 31, 2023. There are two decision points built into the schedule to provide opportunities for CCBWQA to revise/refine the approach or discontinue the effort entirely based on information that will become available or be developed during 2023. The anticipated time and materials budget is $87,755. An optional task for up to $5,000, subject to CCBWQA approval, is also included to cover CCBWQA-requested participation by Hydros in any currently-unanticipated relevant meetings/communications. Finally, in addition, an as-needed budget for other Hydros support in 2023 is included, as requested. Descriptions of the proposed approach, schedule, and budget are provided in the following sections.

1 Approach

The objective of this effort is to develop reasonable and defensible site-specific standards for TP and TN in Cherry Creek Reservoir that support efforts to attain the site-specific chlorophyll *a* standard. The proposed TN and TP standards will be defined to reflect site-specific chlorophyll *a* response, to the extent reasonably possible.

To meet this objective, four tasks (plus one optional task and one as-needed task) are proposed, as follows:

Task 1. Review Results of April 2023 Hearing
The current WQCD-proposed TN and TP standards for lakes may or may not be modified by WQCD for the April 10, 2023 RMH. Hydros will follow those developments closely, considering implications for CCR. If revised TN and TP standards are proposed by WQCD for the April 2023 RMH, Hydros will evaluate the reasonable applicability of those values to CCR. Following the April 2023 RMH, Hydros will brief CCBWQA and discuss whether Tasks 2 through 4 are still needed or whether any modifications to the SOW may be needed. This is the first (of two) decision point in this SOW. For scheduling, it is anticipated that this coordination and any resulting change of direction for the SOW will be resolved by May 15, 2023.

Task 2. Technical Analysis to Develop Site-Specific Standard Recommendations
A technical approach will be developed and implemented to generate recommended site-specific nutrient standards. This effort will make primary use of the extensive CCR observed dataset. Additionally, the existing mechanistic, hydrodynamic, water-quality model of the reservoir will be used in this process. It is anticipated that the model will be useful to support quantitative consideration of complexities introduced by the strong nitrogen limitation at CCR. This includes modeling to evaluate the effects of reducing phosphorus to levels that show phosphorus limitation. This also includes evaluating concerns about inadvertently exacerbating the dominance of nitrogen-fixing cyanobacteria if nutrient targets lead to inappropriate modification of the nutrient balance in the reservoir.

In consideration of this SOW, it is important to understand that any appropriate site-specific TN and TP standards developed for CCR are likely to be at values that will be routinely exceeded in the reservoir (particularly for TP). In other words, the eventual site-specific TN and TP standards will not eliminate regulatory nutrient concerns for CCR. The nutrient standards should be set to reflect the Chl *a* standard, and CCR fails to meet the 18 µg/L Chl *a* standard in most years. Therefore, it follows that CCR would likely fail to meet appropriate nutrient standards in most years. That said, it is still considered absolutely critical to pursue site-specific TN and TP standards, as opposed to accepting highly overprotective TVS values. The TN and TP standard values will ultimately be relevant to discharge permits as well as to eventual targeted, TMDL-based load reductions, so they should be developed based on a scientifically-defensible, site-specific analysis.

Task 3. Coordinate with WQCD and CCBWQA during Technical Analysis
If possible, the CCR site-specific standard development effort should be coordinated with the WQCD between now and the 2025 South Platte Basin RMH, keeping the WQCD staff apprised of the planned approach and findings. Ideally such coordination will allow WQCD to support the eventual site-specific standard proposal as it is brought to the WQCC at the 2025 RMH. For this SOW, two meetings with WQCD are envisioned following the April 2023 RMH. The first meeting with WQCD will be an

informational meeting to share the planned general approach and schedule and to seek any initial reactions or recommendations. This first meeting will likely take place when Hydros is well into Task 2, and no major changes to the approach are expected. The purpose of the second meeting with WQCD will be to present draft findings and planned values for the site-specific proposal. It is envisioned that each of those meetings will be preceded by internal coordination meetings between Hydros and CCBWQA. The meeting between Hydros and CCBWQA that precedes the second meeting with WQCD will serve as the second decision point in this SOW. At that meeting, Hydros will present the proposed site-specific standard recommendations to CCBWQA, and CCBWQA may decide whether or not to proceed with those recommendations. For budgeting purposes, it is assumed that all meetings will be remote.

Task 4. Prepare Technical Memorandum Summarizing Findings and Recommended Standards
A technical memorandum summarizing the objective, approach, findings, and recommended site-specific nutrient standards will be prepared and provided to CCBWQA. The draft technical memorandum will be delivered electronically by the close of business on December 16, 2023. A final technical memorandum will be provided to CCBWQA within two weeks of receiving comments. It is assumed for budgeting purposes that required edits will be minimal and revisions will require no more than 8 hours. Note that this SOW does not include development of a site-specific standards proposal for the 2025 RMH or time for Hydros participation in the 2025 RMH. It is assumed that any such additional support will be included in a subsequent SOW.

Optional Task. Additional Meetings/Communications as Directed by CCBWQA
This optional task is included here recognizing that additional meetings and/or communication needs (beyond what is anticipated in Tasks 1 through 4) may arise to meet the objectives of this SOW in 2023. There is uncertainty regarding how the process will unfold and the need for additional coordination with CCBWQA and/or WQCD is possible. Any activities conducted under this optional task would only occur in response to CCBWQA direction and approval.

As-Needed Hydros Support in 2023
This additional as-needed budget of $10,000 for calendar year 2023 is included to cover coordination between Hydros and CCBWQA personnel on any relevant topics that may arise in 2023. This may include participation in a brainstorming/planning meeting regarding the future use of models to support design/testing of watershed and/or in-reservoir management projects.

2 Schedule and Budget

The proposed schedule is summarized in Table 1, including key anticipated meetings, CCBWQA decision points, and deliverables. Dates are approximate, recognizing that meetings have yet to be schedule and will likely need some adjustment to accommodate WQCD and CCBWQA schedules. The entire SOW is scheduled to be complete in 2023, thought the final technical memorandum may follow in early 2024, depending on the timing of CCBWQA review.

Table 1. Summary of Anticipated Project Timeline

Project Milestone	Target
Hydros Briefing to CCBWQA Following April 2023 RMH	On or before April 24, 2023
CCBWQA Decision-Point to Stop, Proceed, Modify SOW	On or before May 15, 2023
Approach Meeting with WQCD	Mid-September 2023
Draft Findings Meeting with CCBWQA	End of October 2023
CCBWQA Decision-Point to Stop, Proceed, Modify SOW	Mid-November 2023
Draft Findings Meeting with WQCD	Late November 2023
Draft Tech Memo to CCBWQA	December 16, 2023
Final Tech Memo to CCBWQA	Two Weeks after Receiving Comments

The total anticipated budget for this project is $87,755. The task-by-task cost estimate is summarized in Table 2. This total does not include costs for the optional task (additional meeting participation/ communications development, as directed by CCBWQA). The optional task is assumed here to have a not-to-exceed budget of $5,000, with activities under this task only occurring with approval by CCBWQA. The total in Table 2 also does not include an additional $10,000 as-needed budget for CCBWQA-requested support from Hydros on any tasks outside of Tasks 1 through 4 in this scope of work that may arise in 2023.

Table 2. Summary of Estimated Cost by Project Task

Project Task	Anticipated Cost
Task 1: Review Results of April 2023 Hearing	$8,455
Task 2: Technical Analysis	$45,536
Task 3: Coordinate with WQCD and CCBWQA	$19,862
Task 4: Tech Memo	$13,902
Total Cost:	**$87,755***

*Does Not Include **Optional Task: Additional Meetings/Communications as Directed by CCBWQA** (Optional Task not-to-exceed $5,000).

3 References

Hydros. 2022. Applicability of WQCD-Proposed TN and TP Standards to Cherry Creek Reservoir. Technical Memorandum from C. Hawley (Hydros) to J. Clary (CCBWQA). August 8, 2022.

WQCC. 2022. Procedural Order Regarding Joint Motions to Continue Hearing; In the Matter Concerning the Adoption of Revisions to the Nutrients Management Control Regulation, Regulation #85, and Revisions Pertaining to Lakes Nutrient Criteria in the Basic Standards and Methodologies for Surface Water, Regulation #31. September 7, 2022.

WQCD. 2022. Prehearing Statement of the Water Quality Control Division to the Colorado Water Quality Control Commission. August 3, 2022.

ACTION ITEM MEMORANDUM

To: CCBWQA Board

From: Jane Clary, Technical Manager

Date: November 10, 2022

Subject: Lone Tree Creek – Centennial Trail Project

Request: That the Board provide direction on how to proceed on an IGA for the Lone Tree Creek – Centennial Trail Project.

Issue: CCBWQA is considering entering into an Intergovernmental Agreement (IGA) related to the City of Centennial's Lone Tree Creek trail expansion that includes a stream reclamation project on Lone Tree Creek extending into Cherry Creek State Park (CCSP). On July 7, 2022, R2R Engineers provided this project synopsis in an Action Item Memo presented to the CCBWQA Technical Advisory Committee (TAC):

> The stream reclamation is on Lone Tree Creek in CCSP in Arapahoe County and is a partner project with the City of Centennial (Centennial) which is the project lead. Centennial's project includes the trail connection to CCSP and the stream reclamation on Lone Tree Creek. Icon Engineering is the design consultant. The proposed stream reclamation benefits the water quality in Lone Tree Creek and the Cherry Creek Reservoir by reducing bed and bank erosion and immobilizing phosphorus in the adjacent soils. It is estimated that this 0.13 mile long-project will immobilize 12 pounds of phosphorus annually. The IGA (which is currently being drafted by CCBWQA's attorney) brings in funding of $448,000 for the stream reclamation. CCBWQA's participation would be for the stream reclamation only and could be either $95,000 (matching CCBWQ's budget) or $112,000 (matching the 25% funding level on partner projects) with the balance of the stream reclamation funding coming from Centennial. The proposed reclamation on the attached shows an enhanced stream reclamation approach with multiple stream threads for various flow rates and a wide wetland and riparian corridors that promote infiltration, interflow between stream and groundwater, and the associated water quality benefits. In addition, there is an educational opportunity with this new trail connection in CCSP; a trail step-out or pull-off area with an education signage would highlight CCBWQA's work, mission, and vision.

As a result of TAC discussion regarding preparation of the IGA at the July TAC meeting, several questions arose resulting in a request that Wright Water Engineers (WWE) further review selected aspects of the project. Discussion can generally be synthesized into these questions:

- Who should be responsible for long-term maintenance?
- Is the project "out of sequence" relative to other stream reclamation priorities?
- If the project is out of sequence, then would channel improvements implemented during the project cause problems later when Authority-led work is completed on the Lone

Tree Creek drainage?

The attached memorandum prepared by WWE describes key findings from the field investigation and provides a summary on p. 7 to support decision-making by the Board related to entering into an IGA for the proposed project. These findings are further condensed to the following points:

1. The proposed Centennial trail and stream reclamation project meets the requirements of CCBWQA for financial support and for CCBWQA to assume long-term maintenance of the stream reclamation component.

2. Construction of Centennial's trail and/or stream reclamation project will likely not adversely alter future CCBWQA plans for Lone Tree Creek that may arise from a more detailed watershed alternatives analysis that is scheduled for 2023.

3. There is sufficient written documentation that Centennial prepared the trail and stream reclamation plan with CCBWQA's input and with the understanding that CCBWQA would provide financial assistance and assume long-term maintenance requirements for the stream reclamation portion of the project.

TAC Review: At their July meeting, the TAC recommended that the Board Authorize CCBWQA to execute an IGA and an expenditure of $112,000. Discussion included questions about long-term maintenance and project sequence relative to other stream reclamation activitie s on Lone Tree Creek.

Budget: A 25% partner match for the project would be $112,000. This cost can be covered under the 2022 CCBWQA budget with a slight increase in funding over the $95,000 budgeted amount or under contingency funds in the proposed 2023 CCBWQA budget for the Pollution Abatement Program if the project proceeds in 2023.

Recommendation: That the Board make a decision based on the technical and non-technical factors described above, supported by the attached technical memorandum prepared by WWE. Three options for a motion could include:

1. **Full Support Option:** Move that the CCBWQA proceed as a partner on the Lone Tree Creek -- Centennial Trail Project, including a 25% partner contribution of $112,0000 as well as terms that identify long-term maintenance responsibilities for the stream reclamation project, with trail maintenance and the routine maintenance of the stream reclamation project assumed by the Cherry Creek State Park and non-routine (restorative and rehabilitative) maintenance for the stream reclamation project assumed by CCBWQA. CCBWQA counsel is directed to proceed with preparation of an IGA among project partners.

2. **Partial Support Option (Maintenance Only):** Move that the CCBWQA proceed as a partner on the Lone Tree Creek -- Centennial Trail Project for maintenance of the stream reclamation project only, as will be defined in an IGA that identifies routine maintenance responsibilities for the trail and the stream reclamation project assumed by the Cherry Creek State Park and non-routine (rehabilitative) maintenance of the stream reclamation project assumed by CCBWQA. CCBWQA counsel is directed to proceed with preparation of an IGA among project partners.

3. **Delayed Decision Option:** Move that the CCBWQA not enter into an IGA for the Lone Tree Creek -- Centennial Trail Project at this time, pending completion of Lone Tree Creek and Windmill Creek Master Plan from the park boundary to the reservoir.

Next Steps: If the Board approves moving forward with the partner project, then CCBWQA counsel will proceed with preparation of an IGA to be approved by the Board at the December 2022 or January 2023 Board meeting. To move forward, the IGA will also require approval from the State Park Headquarters regarding routine maintenance responsibilities. Due to Section 404 and 408 permit delays, the project itself will likely not begin until March 2023 or later, although it was originally planned to begin in late 2022.

MEMORANDUM

To: Bill Ruzzo, P.E., Cherry Creek Basin Water Quality Authority Executive Committee

From: Wright Water Engineers, Inc.
Andrew Earles, Ph.D., P.E., D.WRE and Jane Clary

Date: November 6, 2022

Re: Lone Tree Creek Trail and Stream Reclamation Project

Introduction and Scope

Cherry Creek Basin Water Quality Authority (CCBWQA) is considering entering into an Intergovernmental Agreement (IGA) related to the City of Centennial's Lone Tree Creek trail expansion that includes a stream reclamation project on Lone Tree Creek extending into Cherry Creek State Park. Attachment 1 provides a project vicinity map for the proposed improvements. On July 7, 2022, R2R Engineers provided this project synopsis in an Action Item Memo presented to the CCBWQA Technical Advisory Committee (TAC):

> The stream reclamation is on Lone Tree Creek in CCSP in Arapahoe County and is a partner project with the City of Centennial (Centennial) which is the project lead. Centennial's project includes the trail connection to CCSP and the stream reclamation on Lone Tree Creek. Icon Engineering is the design consultant. The proposed stream reclamation benefits the water quality in Lone Tree Creek and the Cherry Creek Reservoir by reducing bed and bank erosion and immobilizing phosphorus in the adjacent soils. It is estimated that this 0.13 mile long-project will immobilize 12 pounds of phosphorus annually. The IGA (which is currently being drafted by CCBWQA's attorney) brings in funding of $448,000 for the stream reclamation. CCBWQA's participation would be for the stream reclamation only and could be either $95,000 (matching CCBWQ's budget) or $112,000 (matching the 25% funding level on partner projects) with the balance of the stream reclamation funding coming from Centennial. The proposed reclamation on the attached shows an enhanced stream reclamation approach with multiple stream threads for various flow rates and a wide wetland and riparian corridors that promote infiltration, interflow between stream and groundwater, and the associated water quality benefits. In addition, there is an educational opportunity with this new trail connection in CCSP; a trail step-out or pull-off area with an education signage would highlight CCBWQA's work, mission, and vision.

During review of the proposed IGA at the July TAC meeting, several questions arose resulting in a request that Wright Water Engineers (WWE) further review selected aspects of the project. Discussion can generally be synthesized into these questions:

- Who should be responsible for long-term maintenance?
- Is the project "out of sequence" relative to other stream reclamation priorities?
- If the project is out of sequence, then would channel improvements implemented during the project cause problems later when Authority-led work is completed on the Lone Tree Creek drainage?

WWE's review included several components: conceptual review of ICON's 95% design for the project (ICON 2022), comparison of project design flows with a recent hydrologic study by SEMSWA for Lone Tree Creek (WWE 2019), a field visit to the project vicinity on October 14, 2022, and a limited review of available project history documents in CCBWQA's archives. This memorandum provides a summary of field observations with supporting photos in Attachment 2, excerpts from ICON's Phase 3 Drainage Report (Attachment 3), and a summary of findings that can be used to support the CCBWQA Board's decision-making process.[1] Given the technical and non-technical factors involved with such a decision, WWE does not provide a recommendation regarding the IGA in this memorandum.

Summary of Field Observations

On October 14, 2022, Bill Ruzzo, Rich Borchardt, Jane Clary, and Andrew Earles conducted a field visit to Lone Tree Creek and portions of Windmill and Cottonwood Creek within Cherry Creek State Park. The following observations generally follow our site walk, which started on Lone Tree Creek adjacent to the Arapahoe County Water and Wastewater Authority (ACWWA) and followed Lone Tree Creek downstream to the confluence with Windmill Creek. We then followed Lone Tree Creek to the point where it joins Cottonwood Creek and observed portions of Cottonwood Creek near the confluence.

1. The first reach that we evaluated was from ACWWA's offices downstream to a mature wetland complex (Photo 1). In this area, the stream picks up significant base flow from the ACWWA Treatment Plant discharge. The channel is fairly incised in this area, and there are obvious signs of bank erosion (Photo 2). ICON Engineering has prepared a proposed stream restoration project for this area to address bank stability that includes a multi-thread channel, along with improvements to better connect the channel with the adjacent floodplain. Because there is substantial base flow (Photo 3) in this area both from the urbanized portions of Lone Tree Creek and from the ACWWA discharge, there should be a good amount of water here to help sustain riparian and wetland vegetation. At a conceptual level, ICON's plans seem appropriate for this reach and would not conflict with other potential future master planned improvements.

[1] "Opportunistic" field observations that can be used in future master planning are also included in a few areas related to the Lone Tree Creek and the Lone Tree Creek Pond.

2. Downstream of the reach that ICON has plans to restore, there is a large mature wetland complex (Photo 4). The channel concept proposed by ICON for the upstream reach would connect into this wetland area in several different locations. If trail improvements extend into this area, this large wetland complex could be something to consider as a part of the wetland vegetation harvesting program. This wetland complex is a good area to preserve because it provides water quality benefits by allowing sediments to deposit and by creating oxidized and anoxic conditions in varying locations in the wetland that help to transform different types of pollutants.

3. As Lone Tree Creek exits the wetland complex (Photo 5), there are two different flow paths for the creek. One is referred to as the east tributary, which branches off and flows toward Windmill Creek through the "Central" culvert crossing. The east tributary confluences with Windmill Creek downstream of the unpaved gravel road to the old caretaker's house. The western branch appears to be a constructed channel intended to maintain the flow path of Lone Tree Creek through a downstream pond. Based on topographic mapping and two-dimensional modeling by ICON, split flow occurs downgradient of this wetland complex, with a portion of the flow following an engineered channel along a western alignment and other portions of the flow heading toward Windmill Creek. The existing caretaker road across Lone Tree and Windmill Creeks creates a backwater condition that connects these two creeks, resulting in transfer of flow from the Lone Tree to Windmill watersheds via the eastern distributary of Lone Tree Creek. The nearly 90° bend in Lone Tree Creek that directs the channel back to the culverts along the western alignment does not appear to be a natural alignment, and the creek may continue to evolve to flow toward the northeast to Windmill Creek. Allowing this channel evolution to occur is an alternative that should be considered in the master plan for this area; however, the pond on the west branch of Lone Tree Creek provides ecological benefits and benefits for people who enjoy birding and other wildlife. WWE was not able to identify water rights for the water that is retained in this pond, based on a limited review of the Division of Water Resources web tools.

4. Along the unpaved access road to the caretaker's house (Photo 6), there are three culvert crossings, one for the west branch of Lone Tree Creek, one for the east branch of Lone Tree Creek, and a third further east for Windmill Creek (Photos 7 -8). All of these crossings will overtop when flows exceed a minor event; however, the unpaved caretaker access road no longer provides access to a caretaker's residence. It is now used as a path, and overtopping every year or two may not be a be a significant issue, provided that the overtopping does not cause erosion to the path. All three of these crossings had fairly small culverts compared to the bank-full dimensions of the channels and are limited by the height of the access road, which limits the maximum diameter of culverts that can be used given the need for some cover. A good strategy for these crossings is to maximize conveyance beneath the unpaved road/path to the extent

practical given constraints and to design the overtopping sections to be stable/non-erosive in larger events. For overtopping flows, it should be assumed that the full 100-year flow for Lone Tree Creek could occur on either tributary.

5. Downstream from the access road, the primary flows in Lone Tree Creek flow to a pond (Photos 9 & 10) that appears to be an old stock pond that is referred to as Lone Tree Creek Pond in this memorandum. In the early 2000s, ACWWA completed work on this pond to improve the outlet structure and create a grouted boulder rundown chute for the spillway (Photos 11 and 12). The outlet is not designed for water quality purposes. The creek loses considerable elevation from the spillway elevation in the pond to the creek below (Photo 13). The grouted boulder rundown that was constructed to provide stable conveyance in this area has been undercut and has collapsed into the stream (Photo 14). There is significant channel erosion downstream from this failure for at least several hundred feet (Photo 15). This is probably the most critical location on Lone Tree Creek to repair in terms of ongoing erosion that may affect the reservoir. The situation with the grouted boulder chute is likely to worsen if repairs are not completed. Timeline and likelihood of failure were not assessed as part of this field trip.[2]

   In terms of future master planning for Lone Tree Creek, alternatives to consider in this location could be converting the pond into an extended (dry) detention basin to continue to provide water quality benefits and some ecological benefits, while obviating the need for water rights. Depending on how this is done, some of these modifications could also help to manage the elevation drop coming out of the pond. Repairs are needed to the grouted boulder spillway, and a stilling basin at the large scour hole that has formed at the bottom likely would make sense.

   If the pond is retained for ecological reasons, then CCBWQA and the State Park will likely need to further review water rights related options.

   Whether this pond is retained in the current configuration (with spillway improvements and water rights) or converted to a facility that does not retain water, maintenance access should be improved. This could potentially allow for harvesting of fringe wetland vegetation around the pond or dredging of accumulated sediment, which could benefit the water quality of the reservoir and help to minimize occurrence of nuisance conditions with algae blooms and odors associated with the pond.

6. Downstream of the rundown failure, Lone Tree Creek is incised for at least a few hundred yards. This is an area where the invert of the stream could be raised to reconnect the creek and the floodplain. Doing this would also help to reduce the fall

[2] Review of Google Earth aerial photography suggests that the rundown damage was present for at least a few years prior to the significant August 15, 2022 storm event, and failure did not occur during that event. More detailed review of the rundown conditions could be conducted as part of the forthcoming master planning process for Lone Tree Creek.

from the spillway of the pond to the channel below. In conjunction with raising the channel invert, the side slopes could be laid back to a slope of five to one or milder, and the combination of these two measures would help to manage the sheer stresses on the stream through this reach. Downstream of this pond is a reach where more structural measures will be needed to stabilize the stream due to the high energy created by the pond and spilling.

7. Several hundred yards further downstream, the channel is in better condition and does not exhibit signs of significant bank erosion (Photo 16). It also appears that the channel and the floodplain are better connected (including a wetland complex with open water, Photo 17) for the reach of stream that flows from the confluence of Windmill and Lone Tree Creek to Cottonwood Creek. Based on field observations, it is likely that few improvements, if any, are needed for this reach.

8. WWE also visited a portion of Cottonwood Creek where vegetation harvesting is taking place. We observed some beaver activity in this area, a little upstream from the area that was harvested. Overall, many improvements have been implemented to Cottonwood Creek through the State Park. Continued erosion from Lone Tree Creek should be minimized to protect conditions and pollutant reduction facilities (PRFs) in Cottonwood Creek.

Summary of Selected Observations from ICON's Phase 3 Drainage Report (95% Design Plans)

As shown in ICON's Channel Design and Trail Plans in Attachment 3, the following observations are noteworthy:

1. The stream reclamation improvements in the plan end well upstream of the split flow path for Lone Tree Creek. This will allow alternatives analysis under the forthcoming master plan to include evaluation of alternatives regarding the best way to handle this split flow and abrupt "elbow" in the flow path.

2. The trail alignment runs along the western edge of the proposed stream reclamation project; therefore, it should help with maintenance access.

3. The trail alignment should not affect alternatives related to the channel below Lone Tree Creek Pond, which is the primary area on Lone Tree Creek in need of stream reclamation.

   The proposed trail alignment will require three channel crossings, two for Lone Tree Creek and one at Windmill Creek. (A fourth crossing was added to the northern portion of the trail to convey nuisance flows.) Although the culverts for the locations where the creeks cross the existing gravel road portion of the trail will remain undersized for large events, the proposed culvert crossings will be better than the current condition and

likely reduce maintenance requirements for the State Park. See Attachment 3 for excerpts describing the channel crossings and associated constraints. Updated future condition peak flow hydrology (WWE 2019) was used as the basis for flow conditions shown in Table 1, along with ICON's culvert sizing for the three culvert crossings. ICON (2022) further describes the proposed culvert crossings:

> *The existing culverts are a series of CMPs ranging from 18"- 24" in diameter and vary in condition from moderate to damaged and minimally functioning. All existing crossings are insufficient in size to convey the minor storm event. The proposed improvements will include removing and replacing the crossings to increase conveyance capacity to the 5-year storm event. The west Lone Tree Creek crossing will be replaced with a twin 7'x3' concrete box culvert, and the central crossing will be replaced with a 40' prefabricated pedestrian bridge. The existing, damaged twin 24" CMPs at the Windmill Creek crossing will be replaced with new 24" RCPs to improve drainage and maintain the historical flow path*.

Although Windmill Creek culvert (East Culvert) sizing is outside of the scope of this review and is not part of the CCBWQA funding under the IGA, we note that the culvert will not convey the 2- or 5- year floods; however, culvert replacement is still an improvement over the current condition, given the permitting site constraints described in Attachment 3.

Table 1. Future Peak Flow Conditions and Culvert Sizing for Trail Crossings at Lone Tree Creek and Windmill Creek (ICON 2022)

Lone Tree Creek	
Storm Event	Flow (cfs)
2-yr	421
5-yr	580
10-yr	728
25-yr	1097
50-yr	1326
100-yr	1632

Windmill Creek	
Storm Event	Flow (cfs)
2-yr	251
5-yr	384
10-yr	502
25-yr	764
50-yr	1007
100-yr	1262

Culvert Summary		
Culvert	Storm Event	Flow (cfs)
West	5-Year	290
Central	5-Year	630
East	5-Year	43

**Culvert design flows are approximate. Flows vary as culverts are located at the confluence of Lone Tree Creek and Windmill Creek. Flow distribution calculated using 2d HEC-RAS model.*

Selected Observations Pertinent to Future Master Planning

Based on WWE's field observations and review of ICON's Drainage Report, one topic that could be evaluated as a part of the forthcoming master plan for Lone Tree Creek from the Park boundary to the reservoir is whether or not to allow Lone Tree Creek to follow the east tributary path if it appears to be a part of channel evolution. This would obviously shift some of the flows from Lone Tree Creek from one crossing of the caretaker road to another. Based on 2-D modeling by ICON, it looks like this is already happening to a large degree. However, all of these crossings are undersized and will overtop with relative frequency. Therefore, one of the most important aspects of the design is how the caretaker access road/trail will remain stable when it overtops.

Provided that precautions are taken to provide stability during overtopping, we do not see an issue with the proposed trail crossings. For purposes of stability under overtopping conditions, it would be prudent to evaluate the trail crossings for the branches of Lone Tree Creek assuming the full flow of Lone Tree Creek could potentially occur in either the east or west tributary.

Summary of Findings and Considerations

As a result of WWE's independent review of the proposed Lone Tree Creek trail and stream reclamation project, WWE provides the following considerations for use by the CCBWQA Board in supporting discussion and decision-making related to the draft IGA for the Lone Tree Creek project:

1. Based on our independent field visit in October 2022 and review of ICON's Phase 3 Drainage Report, we do not have concerns with the proposed Lone Tree Creek trail or stream reclamation project plans prepared by ICON. Additionally, we believe that these improvements can be implemented without constraining future master planning and potential stream reclamation projects on Lone Tree Creek that the Authority and State Park may choose to undertake in the future. Furthermore, providing the trail crossings as proposed along the caretaker access road should not conflict with future master planning efforts.

2. The proposed stream reclamation project is expected to provide ecological and phosphorus reduction benefits. For these reasons, we believe that it would be reasonable for the State Park to provide routine maintenance and the Authority to provide rehabilitative maintenance over the long-term, consistent with previous arrangement for PRFs in the State Park.

3. In terms of priority of the timing of the proposed improvements on Lone Tree Creek from a solely technical perspective, the optimal sequence for the Authority would be: 1) extend master planning on Lone Tree, Windmill and Dove Creek from the Park Boundary

to the Reservoir, 2) repair severe erosion/channel damage below the Lone Tree Creek Pond, and 3) implement other stream reclamation projects on Lone Tree Creek in a priority determined after completion of the master plan. Given staff, Board and TAC transitions, it may be helpful to CCBWQA's operations to prepare more formal guidelines for staff, the TAC and the Board to follow in the future to avoid late-stage project concerns such as this one. Such guidelines have been followed in the past, but may not be well documented for current staff.[3] These guidelines should be clear about both the technical planning process and the key points in partner projects where Board input is needed related to future funding commitments.

4. Technical considerations aside, we recognize the following non-technical factors that we believe should be considered as the Authority decides whether to contribute 25% matching funds to the project. These factors include: 1) the cost to complete a similar project in the future would likely be funded 100% by the Authority (and/or Park) whereas the current project opportunity reduces the project cost to 25%; 2) the project cost would be approximately 5% of the Authority's $2,371,000 stream reclamation budget for 2023[4]; and 3) potential loss of trust with funding partners may result from stepping out of the project at a late stage when construction was planned to begin. Review of Authority files indicates that the Authority provided a letter of support for the project to the U.S. Army Corps of Engineers in March 2021, participated in the RFP and consultant selection process for the project, reviewed and commented on plans proposed by the ICON, and participated in multiple project meetings. This involvement culminated in R2R Engineers bringing a draft IGA forward to the TAC on July 7, 2022.

We hope that the information summarized in this memorandum can support the CCBWQA's Executive Committee and Board discussions needed to make a final decision regarding the IGA for this project.

References

ICON Engineering, 2022. Drainage Report – Phase 3 Lone Tree Creek Trail Phase II and Stream Improvements. Prepared for Centennial, CO.

R2R Engineers, 2022. Action Item Memorandum to the CCBWQA Technical Advisory Committee Regarding Intergovernmental Agreement for the Lone Tree Creek Trail. July 7, 2022.

[3] Based on communication with Bill Ruzzo (11/5/2022), the CCBWQA's process has generally involved projects beginning with a conceptual or preliminary engineering analysis that is reviewed by the TAC and recommended to the Board for inclusion in the long-term Capital Improvement Program before funding commitments are made.
[4] The Lone Tree Creek Project is not currently included in the draft 2023 budget, but there is a $100,0000 contingency fund included in the stream reclamation project budget. An additional $85,000 of contingency is included in the Pollution Abatement Fund.

Reid, C. 2021. Letter of Support from Chuck Reid, Cherry Creek Basin Water Quality Authority Manager to the U.S. Army Corps of Engineers for Lone Tree Creek Trail and Reclamation Project. March.

Wright Water Engineers, 2019. Southeast Metropolitan Stormwater Authority Cottonwood, Lone Tree, Windmill & Dove Creek Hydrology Update. July.

Attachments:

Attachment 1. Vicinity Map with Key Features
Attachment 2. Photographs from October Field Visit
Attachment 3. Selected Plans from ICON 95% Design Drawings

cc: Rich Borchardt, P.E., R2R Engineers
Jason Trujillo, Cherry Creek State Park

Attachment 1. Vicinity Map

Attachment 1. LoneTree Creek Vicinity Map (Adapted from July 7, 2022 AIM)

Attachment 2. Photo Log

Attachment 2. Selected Photos from Field Visit

Photo 1. Lone Tree Creek channel segment & wetland complex beginning at E. Caley Ave.

Photo 2. Lone Tree Creek channel incision below ACWWA.

Photo 3. Lone Tree Creek channel base flow through wetland area.

Photo 4. Lone Tree Creek channel through wetland complex.

Photo 5. Lone Tree Creek channel condition in State Park downstream of wetland area

Photo 6. Existing gravel road in State Park crossing Lone Treek Creek and Windmill Creek.

Photo 7. Existing CMP culverts for Lone Tree Creek under gravel road.

Photo 8. Exisitng CMP culvert for Windmill Creek under gravel road.

Photo 9. Lone Tree Creek Pond.

Photo 10. Lone Tree Creek Pond near outlet.

Photo 11. Lone Tree Creek Pond outlet stucture and upper portion of rundown.

Photo 12. Lone Tree Creek Pond outlet stucture and upper portion of rundown

Photo 13. Channel erosion and point of rundown failure below Lone Tree Creek Pond.

Photo 14. Channel erosion along Lone Treek Creek below Lone Tree Creek Pond.

Photo 15. Channel erosion along Lone Treek Creek below failing channel rundown from Lone Tree Creek Pond.

Photo 16. Relatively stable vegetated channel on Lone Tree Creek downstream of eroded channel.

Photo 17. Natural wetland channel/pond area on Lone Tree Creek further downstream above the confluence with Cottonwood Creek.

Attachment 3. ICON Excerpts

DRAINAGE REPORT – PHASE 3

Lone Tree Creek Trail Phase II and Stream Improvements

CENTENNIAL, CO

PREPARED FOR:

City of Centennial

13133 E. Arapahoe Rd. Centennial, CO 80112

Amy Wiedeman

303-325-8000

Prepared by:

7000 S. Yosemite Street
Centennial, CO 80112
Kyle Morose
303-221-0802

Project No. 20-038 Lone Tree Creek Trail

April 2022

SEMSWA Case Number: DPR21-00019

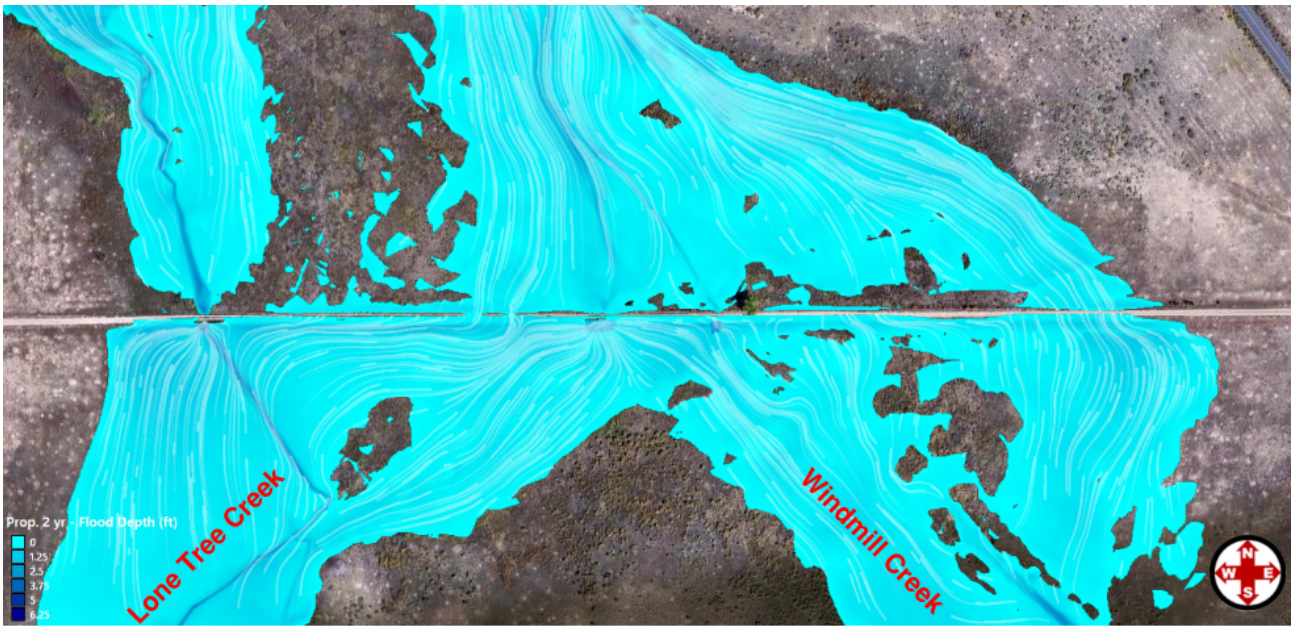


Figure 7 – 2D HEC-RAS Model Depicting Split Flows

VII. Proposed Stormwater Conveyance or Storage Facilities

a. Proposed Stormwater Storage Facilities -N/A

b. Proposed Stormwater Conveyance Facilities

Culverts

Three drainage crossings are proposed to replace the existing three undersized crossings at the trail crossings with Lone Tree Creek and Windmill Creek. These crossings convey flow under the existing gravel road from south to north. Each culvert is to be replaced in its respective location to maintain historic flow paths.

All three culverts are located within the confluence of Lone Tree Creek and Windmill Creek. Multiple split flows exist within this area. A 2D HecRAS model was utilized to analyze the flow distribution along these three culvert locations.

A fourth crossing was added to the northern portion of the trail to convey nuisance flows.

<u>West Crossing (Lone Tree Creek)</u>

Two 7'x3' pre-cast rectangular box culverts will be utilized for the western crossing. This configuration will convey the 5-year storm event below trail, and matches the existing bankfull channel geometry which reduces expansion and contraction of flows. Utilizing a box culvert as opposed to a series of pipes is more cost effective and will require less long term maintenance. This provides the best solution in regards to storm conveyance, constructability, water quality, and low maintenance. Including additional culvert cells to convey larger storm flows becomes less cost efficient as there is minimal head available due to the low

trail elevation. Raising the trail would require adding more fill to the floodplain which would then raise flood elevations and potentially complicate the floodplain development permit process. Therefore a project goal is to minimize trail height and quantity of fill. A 2' boulder weir structure around the west culvert cell will keep base flows within a single culvert cell to reduce sediment deposition potential.

Central Crossing (Lone Tree Creek Split Flow)

A 40' span pre-fabricated pedestrian steel truss bridge will be utilized for the central crossing. This configuration will convey the 5-year storm event below the trail. Utilizing a single span bridge as opposed to a series of pipes/culverts is more cost effective and requires less long-term maintenance. The increased open area decreases the chance of clogging and reduces future maintenance efforts. The bridge deck will be 12' wide with a 10,000 lb loading limit. This area does not have a defined bankfull channel to match because the crossing is located in a wetland setting as opposed to a typical stream system. Using a pedestrian bridge will allow for a natural bottom to be continued under the crossing. Flows in this area appear to be conveyed in sheet flow manner. Sediment transport and deposition is a lower concern at this crossing because most sediment will be filtered out in the upstream wetland area. This design provides the best solution in regards to storm conveyance, constructability and low maintenance.

East Crossing (Windmill Creek)

Two 24" RCP culverts will be utilized for the eastern crossing. This configuration matches the existing culvert sizes but upgrades the material from CMP to RCP. The approach is to replace the crossing with same size as existing conditions to avoid changing the historical drainage path which could potentially complicate the permitting process. Excess flow from the east culverts will be conveyed to the central bridge where a more efficient crossing can be leveraged. This also conveys flow to the natural low point. The culvert invert elevation will be offset so that low flows will utilize a single pipe before accessing both pipes.

North Trail Crossing

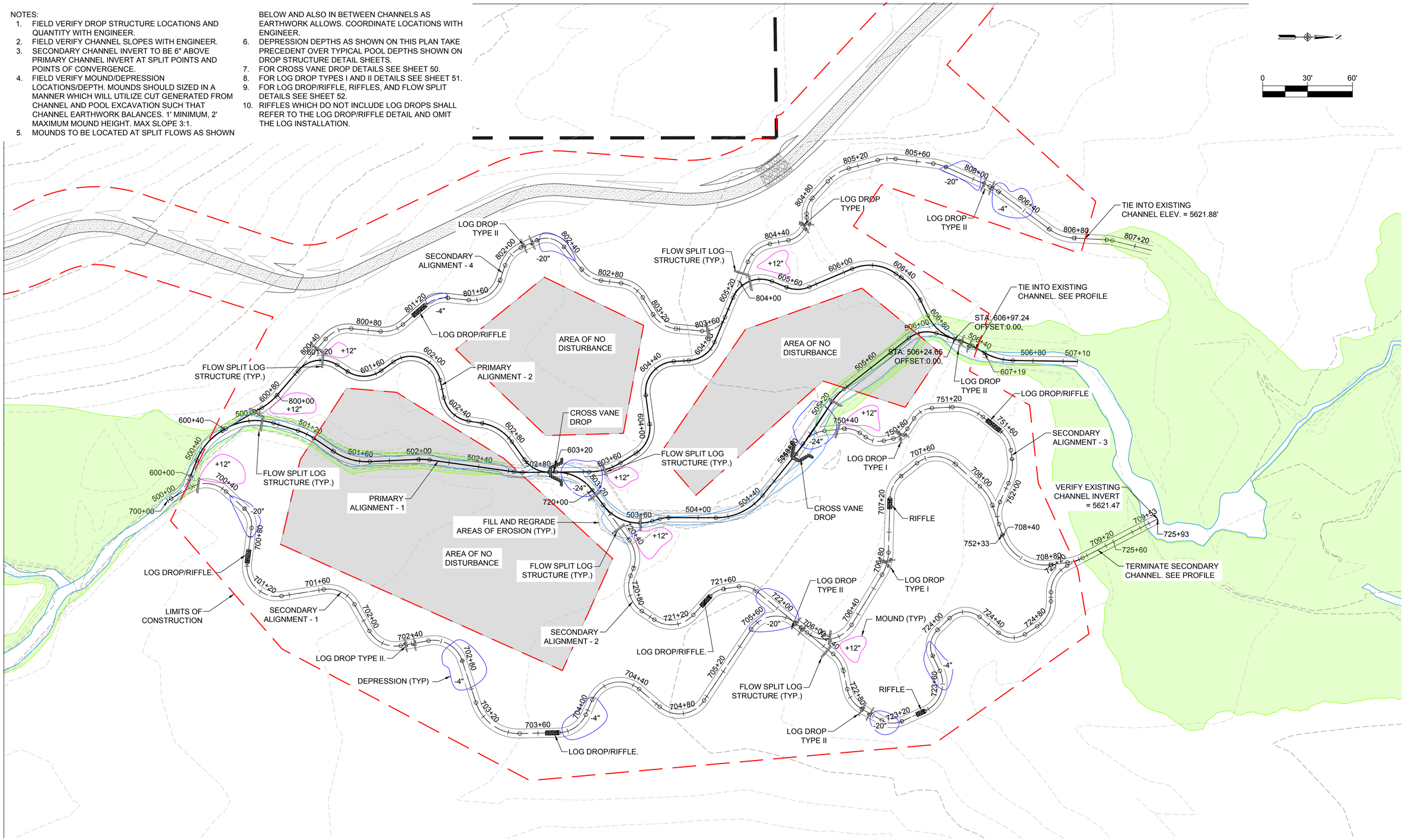
A 24" RCP will be utilized to convey nuisance flows that occur south the trail. The crossing will convey flows north to Lone Tree Creek along the historical drainage path.

Open Channel Design

The term "Stage 0" is in reference to the idea of life stages of a stream channel, as proposed in stream evolution models such as Simon and Hupp (1986) and Cluer and Thorne (2013). Stage 0 refers to a pre-channelization phase in which a stream valley is occupied by a forested wetland complex with many anabranching (interweaving) channels. In these stream evolution models, channelization, or the development of a single stream channel that transports the majority of water through the stream valley, occurs in Stage 1 and is the result of a change in the supply or concentration of water in the stream valley.

NOTES:

1. FIELD VERIFY DROP STRUCTURE LOCATIONS AND QUANTITY WITH ENGINEER.
2. FIELD VERIFY CHANNEL SLOPES WITH ENGINEER.
3. SECONDARY CHANNEL INVERT TO BE 6" ABOVE PRIMARY CHANNEL INVERT AT SPLIT POINTS AND POINTS OF CONVERGENCE.
4. FIELD VERIFY MOUND/DEPRESSION LOCATIONS/DEPTH. MOUNDS SHOULD SIZED IN A MANNER WHICH WILL UTILIZE CUT GENERATED FROM CHANNEL AND POOL EXCAVATION SUCH THAT CHANNEL EARTHWORK BALANCES. 1' MINIMUM, 2' MAXIMUM MOUND HEIGHT. MAX SLOPE 3:1.
5. MOUNDS TO BE LOCATED AT SPLIT FLOWS AS SHOWN BELOW AND ALSO IN BETWEEN CHANNELS AS EARTHWORK ALLOWS. COORDINATE LOCATIONS WITH ENGINEER.
6. DEPRESSION DEPTHS AS SHOWN ON THIS PLAN TAKE PRECEDENT OVER TYPICAL POOL DEPTHS SHOWN ON DROP STRUCTURE DETAIL SHEETS.
7. FOR CROSS VANE DROP DETAILS SEE SHEET 50.
8. FOR LOG DROP TYPES I AND II DETAILS SEE SHEET 51.
9. FOR LOG DROP/RIFFLE, RIFFLES, AND FLOW SPLIT DETAILS SEE SHEET 52.
10. RIFFLES WHICH DO NOT INCLUDE LOG DROPS SHALL REFER TO THE LOG DROP/RIFFLE DETAIL AND OMIT THE LOG INSTALLATION.



No.	DATE	REVISIONS	APPR.

DRAWN BY: CC
DESIGNED BY: KM
APPROVED BY: AB

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PREPARED FOR: Centennial

PREPARED BY: ICON ENGINEERING
7000 S. Yosemite Street, Suite 120
Centennial, CO 80112
Phone (303) 221-0802

PRELIMINARY NOT FOR CONSTRUCTION

LONE TREE CREEK TRAIL PHASE II

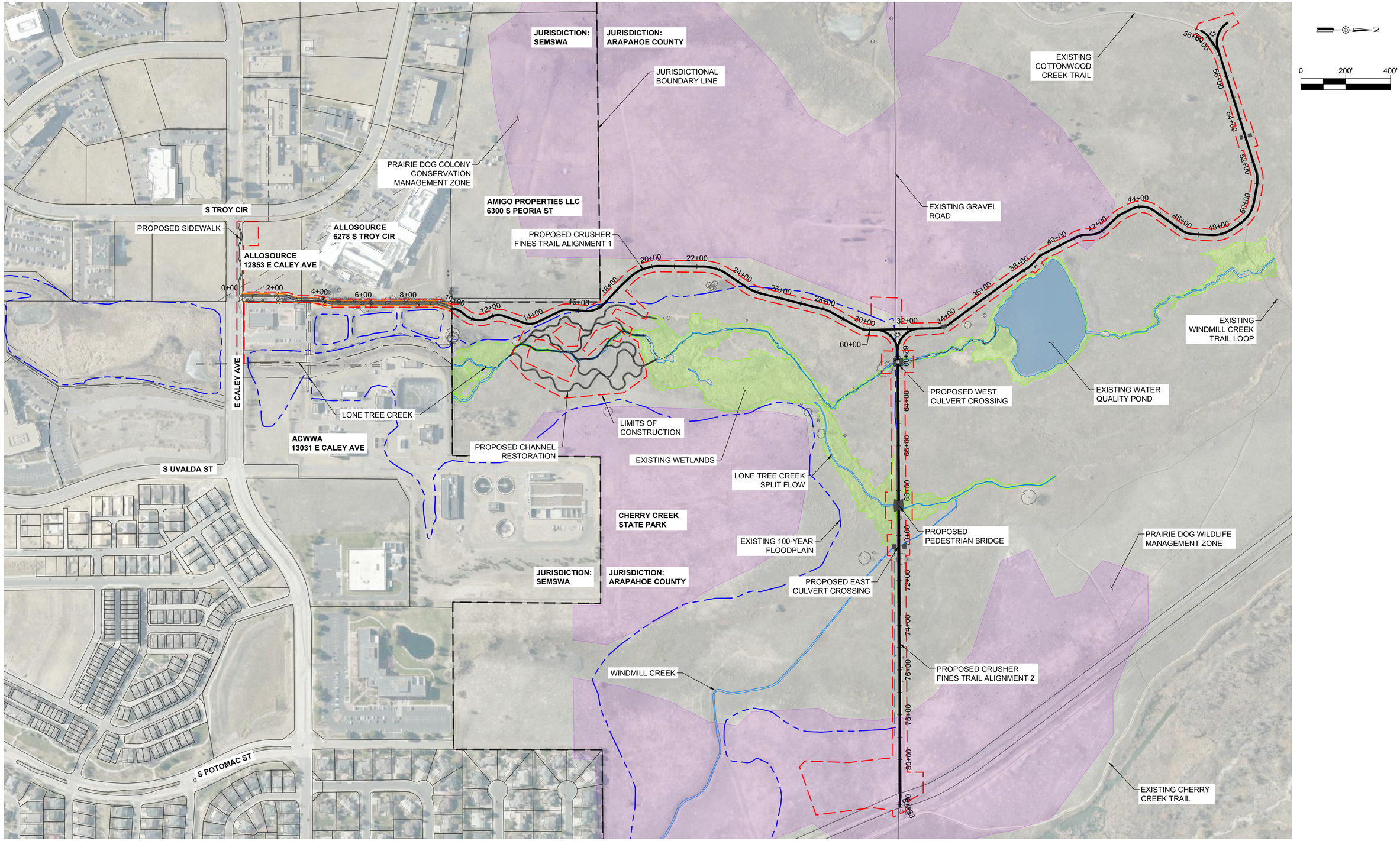
95% DESIGN

CHANNEL PLAN

ICON PROJECT NO. 20-038

DATE APR 2022

SHEET 43 OF 52



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No.	DATE	REVISIONS	APPR.

DRAWN BY: CS
DESIGNED BY: KM
APPROVED BY: AB

811 Know what's below. Call before you dig.

PREPARED FOR: Centennial

PREPARED BY:
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PRELIMINARY NOT FOR CONSTRUCTION

LONE TREE CREEK TRAIL PHASE II

95% DESIGN

ICON PROJECT NO. 20-038

OVERALL SITE

DATE: APR 2022

SHEET: 6 OF 52

ACTION ITEM MEMORANDUM

To: CCBWQA Board

From: Jane Clary, Technical Manager

Date: November 10, 2022

Subject: Cherry Creek HSPF Watershed Model 2030 Buildout Scenario

Request: That the Board accept the Technical Memorandum prepared by RESPEC summarizing findings of the Cherry Creek HSPF Watershed Model 2030 Buildout Scenario

Issue: In April 2017, the Authority contracted RESPEC to recommend and develop a Watershed Model to implement Hydros' recommendation from the 2017 Reservoir Model that additional water quality controls and management strategies be evaluated for the watershed. In November 2018, RESPEC developed and calibrated a Watershed Model for Cherry Creek Reservoir using HSPF (accessible at https://www.cherrycreekbasin.org/wp-content/uploads/2020/04/RSI-2847-Final-Cherry-Creek-Report-UPDATE.pdf). Following development and calibration of the Watershed Model, the Authority contracted RESPEC to evaluate a 2030 Buildout Scenario, with findings summarized in the attached Technical Memorandum.

As described in the attached, RESPEC's technical memorandum presents the assumptions, methods, and results of a hypothetical 2030 land use and associated wastewater discharge scenario using the existing Cherry Creek Watershed HSPF watershed model application. The hypothetical 2030 scenario is represented by: 1) an assumed increase in the amount of developed land since 2011; b) estimated increases in point source effluent flow rates and loads related to the increased development; c) estimated reduction in runoff and pollutant loading rates to represent required new development water quality facilities like low impact development (LID), and d) pollutant reductions on streams where reclamation is planned and where it is estimated to occur with development of the adjacent lands.

In addition to the attached Technical Memorandum, RESPEC has presented findings from the 2030 Model Scenario as follows: 2021 Cherry Creek Basin Watershed Conference, June 2022 TAC meeting, July 2022 Board Meeting and September 2022 Cherry Creek Basin Watershed Conference.

Recommendation: On November 3, 2022, the TAC recommended that the Board accept the Technical Memorandum prepared by RESPEC summarizing findings of the Cherry Creek HSPF Watershed Model 2030 Buildout Scenario.

Next Steps: Reconvene the TAC's Modeling Committee to review recommendations in RESPEC's Technical Memorandum and consider whether additional model scenarios should be completed and identify recommendations for next steps to the TAC. Additionally, outputs from the Watershed Model should be packaged in a manner to be linked with the Reservoir Model previously developed by Hydros.

November 1, 2022

Cherry Creek Basin Water Quality Authority
PO Box 3166
Centennial, CO 80161

RE: Cherry Creek HSPF Watershed Model 2030 Buildout Scenario

This letter presents the assumptions, methods, and results of representing a hypothetical 2030 land use and associated wastewater discharge scenario using the existing Cherry Creek Watershed HSPF watershed model application. The hypothetical 2030 scenario is represented by: 1) an assumed increase in the amount of developed land since 2011; b) estimated increases in point source effluent flow rates and loads related to the increased development; c) estimated reduction in runoff and pollutant loading rates to represent required new development water quality facilities like low impact development (LID), and d) pollutant reductions on streams where reclamation is planned and where it is estimated to occur with development of the adjacent lands.

BACKGROUND

In April 2017 RESPEC Company, LLC. (RESPEC) was contracted by the Cherry Creek Basin Water Quality Authority (Authority) to prepare a watershed model for the Cherry Creek watershed tributary to Cherry Creek Reservoir. The purpose of the model was to create a tool to prioritize and implement recommendations for additional water quality controls and management strategies in the watershed. The major goals of the watershed model were to predict the appropriate watershed inputs and loads to streams; predict the fate and transport of the key constituents (such as nutrients) as they travel downstream through Cherry Creek, tributaries to Cherry Creek, and to Cherry Creek Reservoir; and represent alluvial groundwater flows that provide input to Cherry Creek Reservoir, but not to simulate the reservoir. The modeling platform selected for the watershed model was the Hydrologic Simulation Program Fortran (HSPF). The selected modeling time frame was 2003-2016 based upon availability of the necessary modeling data and to cover the modeling period of the Authority's Reservoir Model. The model inputs included historic climate, hydrologic, hydraulic, and land use (as of 2013) parameters and point source inflows from existing wastewater treatment facilities discharging into the Cherry Creek watershed. The model was calibrated to historic water quality and quality data, where available, at various locations in the watershed as well as for inflows to Cherry Creek Reservoir from Cherry Creek and Cottonwood Creek. The modeling effort is documented in the November 2018 report titled "Cherry Creek Watershed HSPF Nutrient Modeling, Topical Report RSI-2847", prepared by RESPEC (https://www.cherrycreekbasin.org/library/technical-reports). This model is considered as the "Baseline" model for the 2030 modeling effort.

POINT SOURCE TIME-SERIES UPDATES

This section describes the procedures used to represent the point sources for the 2030 scenario. Three of the facilities represented in the model were modeled to have increased flow by 2030: ACWWA LTCWRF, Pinery WWTF, and Parker WWTF. The average flow for the

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605.394.6400

year 2011 for each facility was calculated as the base flow, and the modeled increase in flow was added to the base flow to calculate the flow expected in 2030 at each facility. The increase in flow was based upon the modeled area of additional development within the approximate service areas of these facilities multiplied by a typical unit rate of wastewater generated by medium density development. For development outside of these service areas, the additional flow was assigned to the nearest facility. A summary of effluent flow rates updated in the HSPF model is shown in Table 1. For each facility, the monthly average concentrations from the base modeling period were calculated and used with the continuous flow to calculate the 2030-point source load timeseries for each parameter.

Table 1: Point source effluent flow rate changes in million gallons per day (mgd).

Facility	2011 Average Flow	Expected Flow Increase	2030 Average Flow
ACWWA	1.43	0.22	1.65
Pinery WWTF	0.75	1.66	2.41
Parker WWTF	2.15	2.31	4.46

The 2030 model does not represent any improvements that have (since 2011) or may be made in the future at the modeled facilities to reduce nutrient loads discharged from the facilities. After the initial model runs were performed, the Authority management requested an additional model run be performed to simulate future increases in effluent discharged from the Parker WWTP being planned to be diverted into Rueter-Hess Reservoir. This action is included in Model Run 11 described further in this report.

LAND COVER UPDATES

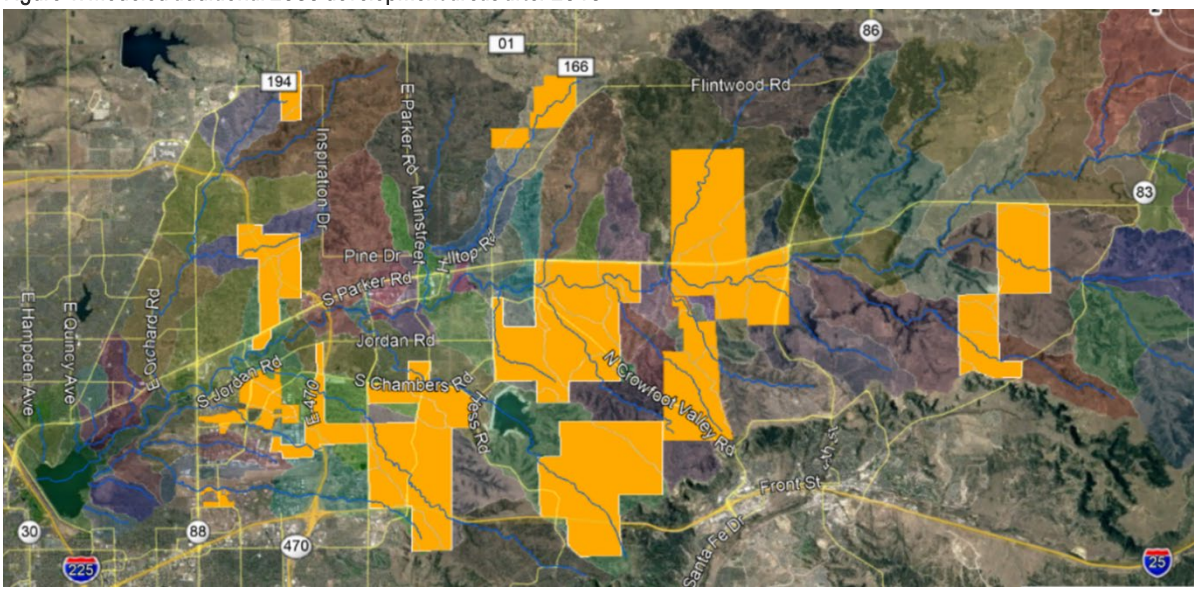
The base model application was developed using the National Land Cover Database (NLCD) 2011 land cover. The 2030 land use condition was developed in two steps. First, the land cover data was updated to the 2016 NLCD. Second, in addition to the updated NLCD 2016 land cover, the extent of development from 2016 to 2030 was estimated using the rate of land disturbance for the last 7 years in the Cherry Creek Watershed as reported in the Authority's January 27, 2021 report on "Approximate Areas of Land Disturbance" 2014-2020. Using this data, approximately 1000 acres per year have been disturbed. Thus, from 2016 to 2030 an estimated 40 square miles of area is expected to be developed. For modeling purposes, the location of the future develop was estimated using the Douglas County 2040 Comprehensive Plan as guide to future growth areas. This Plan includes sub-area plans for the Towns of Parker and Castle Rock, and the Cities of Castle Pines North and Lone Tree. The areas projected to be developed by 2030 and outside of any NLCD 2016 developed areas were converted to medium intensity developed land. The modeled additional development areas are shown in Figure 1.

IMPROVED DEVELOPMENT WATER QUALITY REDUCTIONS (CALLED LID FOR THIS MODEL)

The areas expected to be developed by 2030 (not including open water and wetlands) that were not represented as developed in the NLCD 2016 land cover were represented using a different mass link so that reduced flows and improved water quality from improved development water quality requirements could be included. Surface runoff volume on the additional 2030 developed lands was initially reduced by 20 percent; TSS (sand, silt, and clay) was reduced by 50 percent; TP was reduced by 25 percent; and nitrogen was reduced by 10 percent from the base water quality runoff for the medium intensity developed land. These percentage reductions were based upon the monitored reductions presented in the "International Stormwater BMP Database – 2020 Summary Statistics", 2020. It should be noted that there were consistent shifts from low intensity developed land to open developed land (open land within developed areas) from the NLCD 2011 to the NLCD 2016 land cover. An additional scenario was

run with the reduction of surface runoff volume from the additional 2030 developed lands of 40 percent (an additional of 20% as compared to other model runs) as described in the results portion of this memorandum.

Figure 1: Modeled additional 2030 development areas after 2016



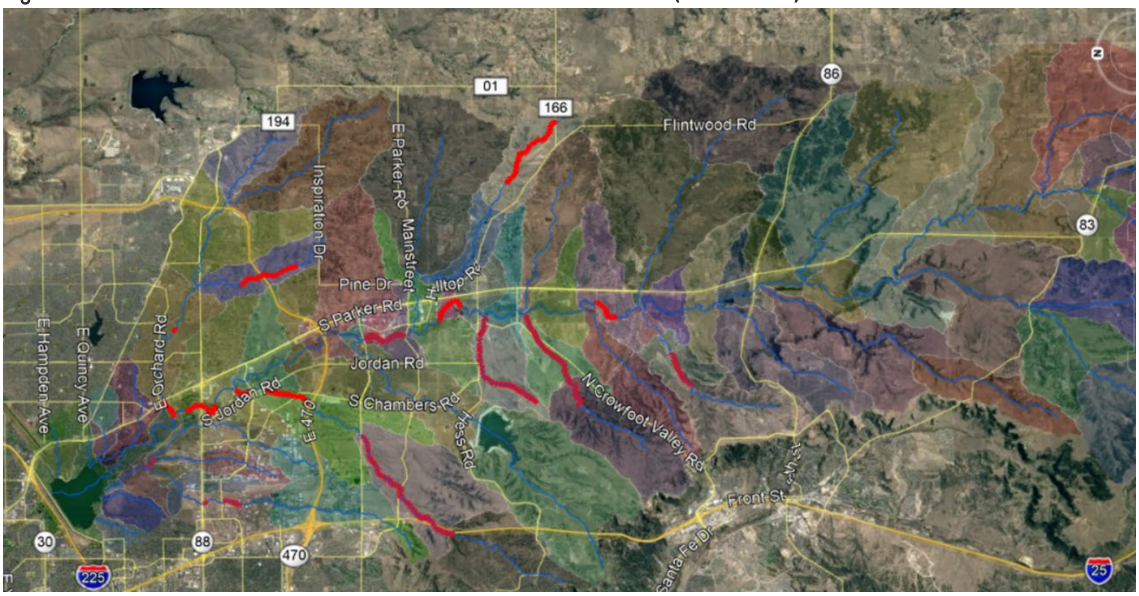
NEW PRF / STREAM RESTORATION REPRESENTATIONS

Reaches on which PRFs and stream reclamation are expected to be installed by 2030 that were not represented in the base model were added based upon three criteria. First, PRF's from the CCBWQA Master CIP list were assumed to be constructed by 2030. Second, any proposed stream restoration project included in the MHFD's 5-yr. CIP program were also included. Last, major drainageways located within the proposed development areas were assumed to be restored as part of the adjacent developments (this assumption is based upon current recommendations from the Mile High Flood District (District) for implementation of channel improvements as presented in the District's adopted Major Drainageway Plans and Outfall Systems Plans). These additional modeled PRF's and stream reclamation reaches are shown in Figure 2 (red lines). The length of each of these PRFs / stream reclamation improvements in each sub-watershed was divided by the reach length to calculate the fraction of the reach that would have a PRF /stream reclamation improvement. If the reach was already represented as having a PRF in the model application, no additional PRFs were represented in the model application. In the base model, reaches with PRFs were calibrated and had a lower M-factor (rate of cohesive sediment scour from the stream bed), a lower KODSET (the rate of BOD settling), a lower PHYSET (the rate of phytoplankton settling), and a lower REFSET (the rate of settling for dead refractory organics). Parameters for full-PRF and non-PRF reaches are shown in Table 2. The original parameters for each reach expected to have a PRF in 2030 were then calculated based on the fraction of the reach with a PRF. Parameters for a total of 18 additional HSPF reaches were affected by PRF installations.

Table 2: Model parameters for reaches with and without PRFs.

Reach Type	M-silt	M-clay	KODSET	PHYSET	REFSET
Non-PRF	0.04	0.05	0.02	0.005	0.01
Full-PRF	0.008	0.01	0.04	0.007	0.012

Figure 2: Modeled additional 2030 PRFs and stream reclamation reaches (shown in red).



SCENARIO SEQUENCING

Completion of the total 2030 Model Scenario was performed through incremental model runs based on the baseline model and sequenced to inform the effect of each incremental change on water quality. The baseline model used: 2011 level of development; 2011 WWTF's flows and water quality; PRF's constructed as of 2016; and development runoff water quality and volumes representative of the average watershed wide development runoff water quality and volumes existing between 2003 and 2016. The 2030 model sequencing used was as follows:

Scenario	Description	Representative Icons	Color
Base	Baseline Model	None	
4	2030 Level of Development Only		
5	2030 WWTF Flows Only		
6	2030 Level of Development and WWTF Flows Only		
7	2030 Level of Development, WWTF Flows, and PRFs		
8	2030 Level of Development, WWTF Flows, PRFs, and LID		
9	2030 Level of Development and LID only		
10	2030 Level of Development, WWTF Flows, PRFs, and LID at 40% Volume Reduction	+ 20% Added Volume Reduction	
11	Scenario 10 with Parker Wastewater Flows from Future Development diverted to Rueter-Hess Reservoir	plus future additional Parker WW to Rueter Hess Res.	

RESULTS

A summary of how flow, sediment, phosphorus, and nitrogen contributions to Cherry Creek Reservoir would change from the expected 2030 buildout under various scenarios are presented in Figures 3 - 9 and in Table 3 in Appendix A. A summary of each scenario model run is as follows:

Scenario 4 – 2030 Level of Development Only: Development with historic water quality requirements does not mitigate the increase in runoff volume, nor increases in phosphorus, nitrogen, and TSS loads over undeveloped conditions for the same area. The increase in runoff volume does dilute the increased nutrient loads but the increase in TSS is substantial (both load and concentration).

Scenario 5 – 2030 WWTF Flows Only: The increased wastewater discharge flows have little impact on phosphorus and TSS loads and concentrations but does increase nitrogen loads and concentrations. More recent efforts to reduce nitrogen discharges in wastewater effluent would likely show a smaller increase if modeled.

Scenario 6 – 2030 Level of Development and WWTF Flows Only: The combination of additional development and increased wastewater flows results in expected changes in flow, loads, and concentrations from the combination of Scenarios 4 and 5.

Scenario 7 – 2030 Level of Development, WWTF Flows, and PRFs: Adding modelled additional PRF's to Scenario 7 shows no changes in flow (as expected) but does show a slight decrease in TSS and nutrient loads and concentrations but comes no where close to mitigating the increases from increased development and wastewater flows. The modeled proposed PRF's, in themselves, weren't intended to fully address impacts from development but are an incremental program to help address the current overloading of nutrients to Cherry Creek Reservoir.

Scenario 8 - 2030 Level of Development, WWTF Flows, PRFs, and LID: When considering all of the individual modeled scenario combinations from Scenario 7, the use of current water quality development requirements exhibits a small amount of benefit in reducing the total increase in runoff volume from development. However, these same current water quality development requirements have a substantial benefit in reducing phosphorus loads and, to a lesser extent, nitrogen loads to Cherry Creek Reservoir. The nutrient loads are not reduced to predevelopment levels but, with the increased runoff volume, nutrient concentrations are reduced to around or below undeveloped nutrient concentrations.

Scenario 9 - 2030 Level of Development and LID only: This scenario reviewed whether the current development required water quality improvements fully mitigated the impact of development on water quality. The results show that this is the case for nutrient concentrations but loads and flow are substantially increased. TSS loads and concentrations are still substantially elevated over undeveloped levels.

Scenario 10 – 2030 Level of Development, WWTF Flows, PRFs, and LID at 40% Volume Reduction: This scenario showed a minor decrease of runoff volume from Scenario 8 with corresponding minor changes in loadings and concentrations. Thus, the assumption on the amount of runoff volume reduction expected from current water quality requirements does not substantially change the water quality results and findings from Scenario 8.

Scenario 11 – Scenario 10 with Parker Wastewater Flows from Future Development diverted to Rueter-Hess Reservoir: If Parker were to divert all additional wastewater flow from increased development the model results show a benefit in slightly reducing flow and nutrient loads to Cherry Creek Reservoir with a minor increase in phosphorus concentration and a minor decrease in nitrogen concentration. TSS is unaffected. As with the baseline model, Rueter Hess Reservoir is not discharging to Cherry Creek in the 2030 model.

CONCLUSIONS

The 2030 Watershed modeling presents several possible future watershed development components and combined future watershed development scenarios and is intended to assist in the planning for

possible impacts of future watershed conditions. Scenarios 8, 10, and 11 all represent possible 2030 watershed conditions with slightly different scenario assumptions. In general, these three scenarios all resulted in substantial increases in total annual flow and pollutant loads to the reservoir. However, changes in pollutant concentrations remained relatively unchanged from the development conditions in the baseline model This difference can be attributed to the combination of the increase in WWTP flows (which provide a dilution effect for TSS and TP because effluent concentrations are lower than observed in baseline stream sampling data entering Cherry Creek Reservoir) and that the reductions in TSS, TN, and TP loads as a result of the PRFs and LID are much greater than the comparable reduction in flow.

Although specific flows, loads, and concentrations are presented from the model outputs, these values should not be considered as absolute values but rather are used to demonstrate the range of possible impacts of the various components that make up the 2030 development scenarios. These future modeled values also include the uncertainty involved with predictions of future watershed conditions.

RECOMMNENDATIONS AND NEXT STEPS

The model results show that, although the concentration of nutrients and TSS are not expected to vary much from baseline conditions, phosphorus, nitrogen, TSS loads and flow are all expected to substantially increase in the future under current water quality development requirements and planned stream reclamation and PRF construction projects. The previous modeling of Cherry Creek Reservoir has looked at the impact of modeled reductions in nutrient concentrations on reservoir water quality. However, the reservoir model has not been used to evaluate the impact of increased loads and flows (with no changes in nutrient concentrations) on reservoir water quality. In addition, continued research into the actual effectiveness of PRFs and development water quality improvements may result in different load and flow reductions than are assumed in the current 2030 model. Thus, we recommend the following next steps:

1. Input the results of the 2030 model into the reservoir model through the linking procedure previously developed for this purpose. Use the result of this reservoir model run to inform decisions on all aspects of the Authority's future goals and projects.
2. Evaluate whether alternative development layouts (i.e. dendritic development) can improve the quality of runoff over current development layouts and, if so, use this assumption as an additional scenario to model.
3. Revisit the current plans for nutrient reductions from the existing WWTF's to determine if the assumptions on WWTF discharge loads and concentrations should be revised and remodeled.

If there are any questions regarding the analysis or results, please do not hesitate to reach out to me by telephone at 720-775-6406 or by email at alan.leak@respec.com.

Sincerely,

Alan J. Leak

Alan Leak, P.E.
Principal

APPENDIX A

Figure 3: Modeled 2030 flow into Cherry Creek Reservoir.

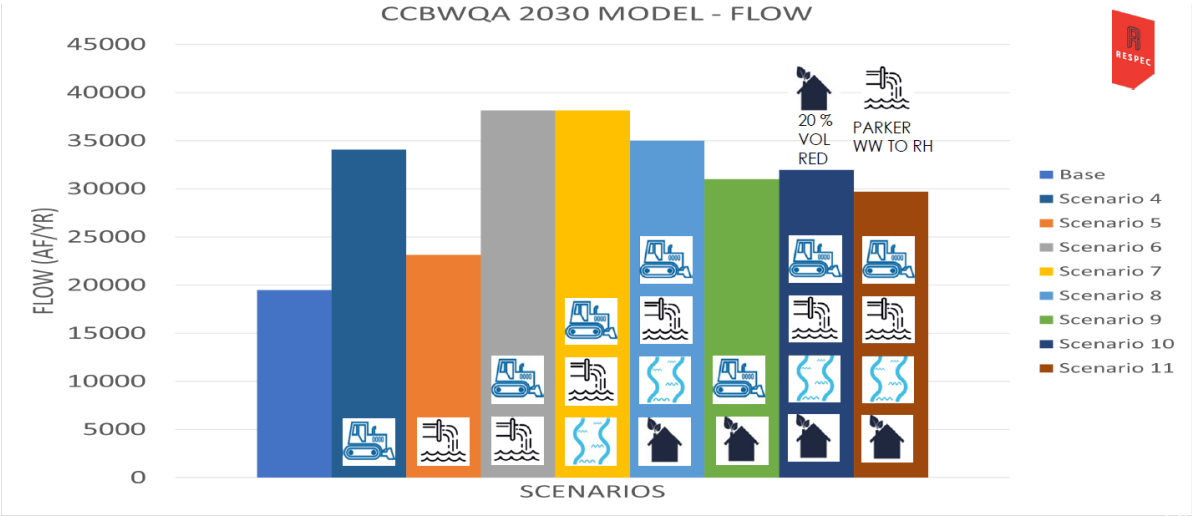


Figure 4: Modeled 2030 total phosphorus load into Cherry Creek Reservoir.

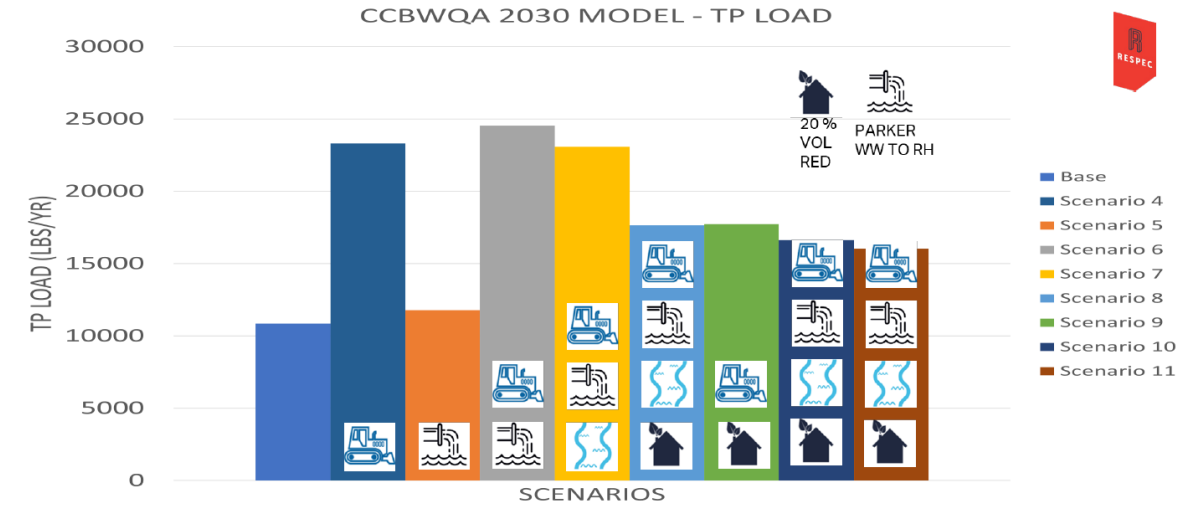


Figure 5: Modeled 2030 total phosphorus concentration into Cherry Creek Reservoir.

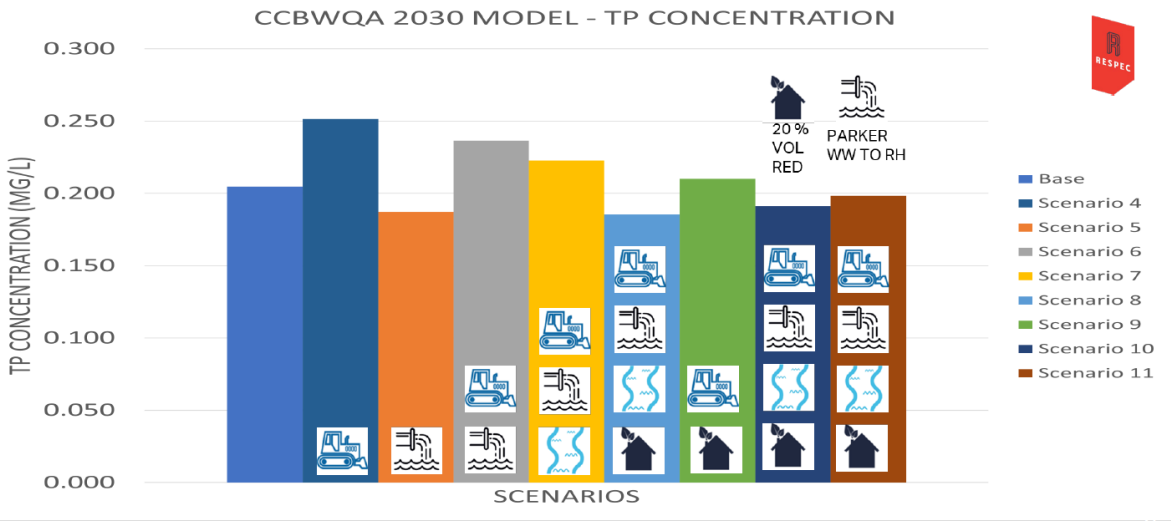


Figure 6: Modeled 2030 total nitrogen load into Cherry Creek Reservoir.

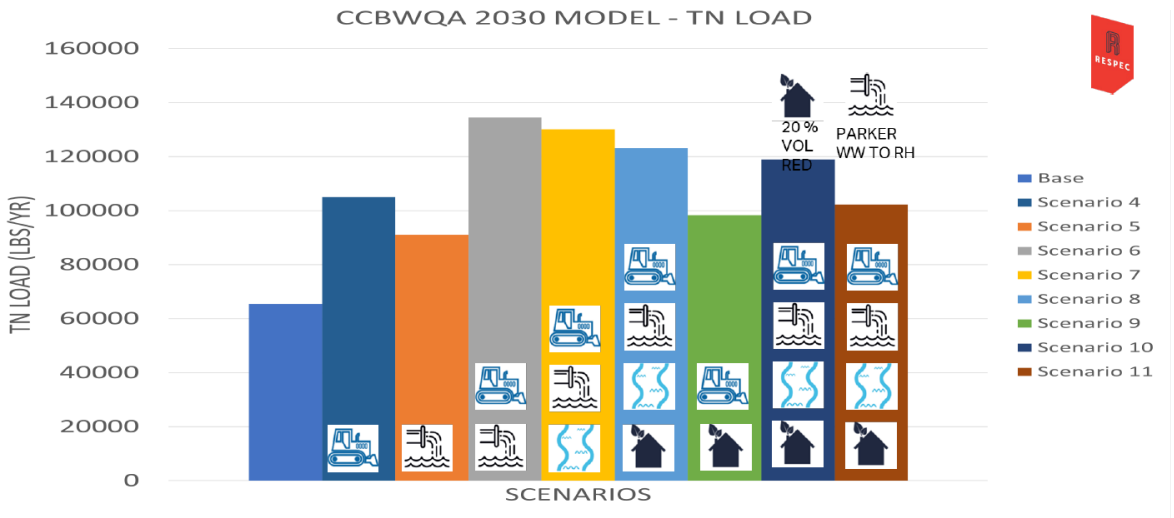


Figure 7: Modeled 2030 total nitrogen concentration into Cherry Creek Reservoir.

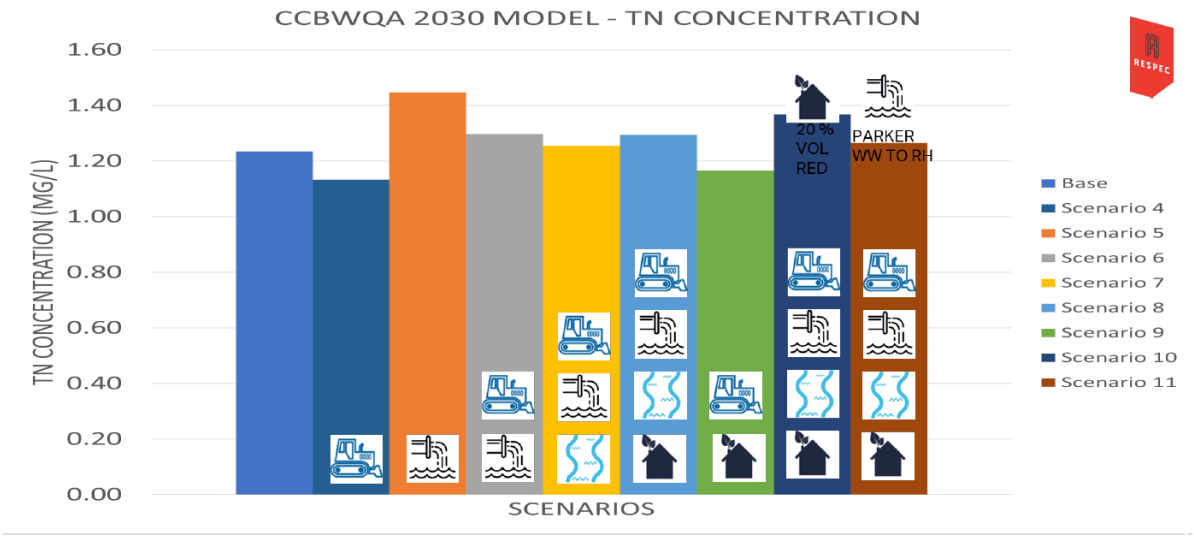


Figure 8: Modeled 2030 total suspended solids load into Cherry Creek Reservoir.

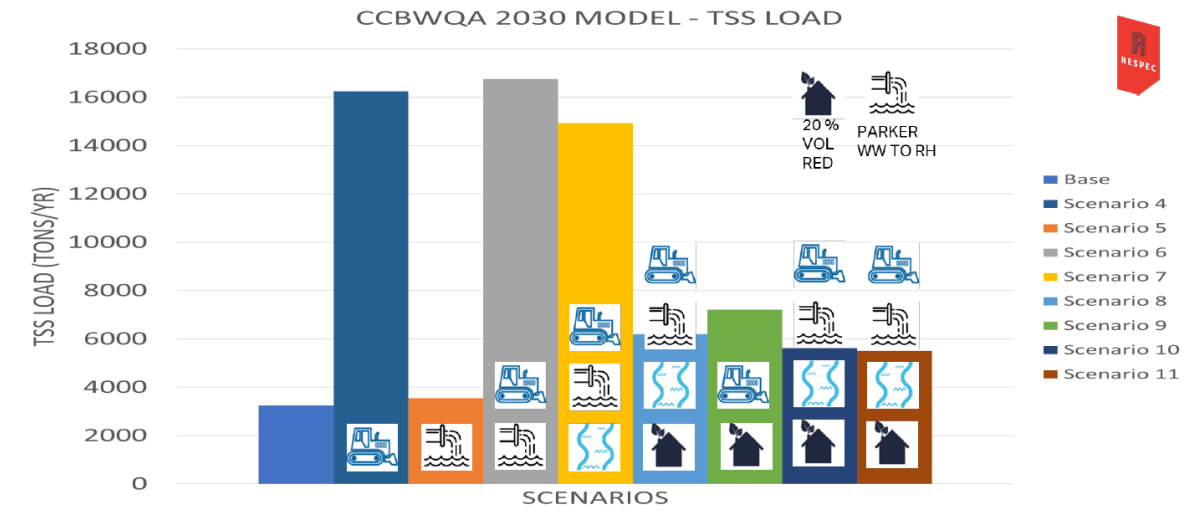


Figure 9: Modeled 2030 total suspended solids concentration into Cherry Creek Reservoir

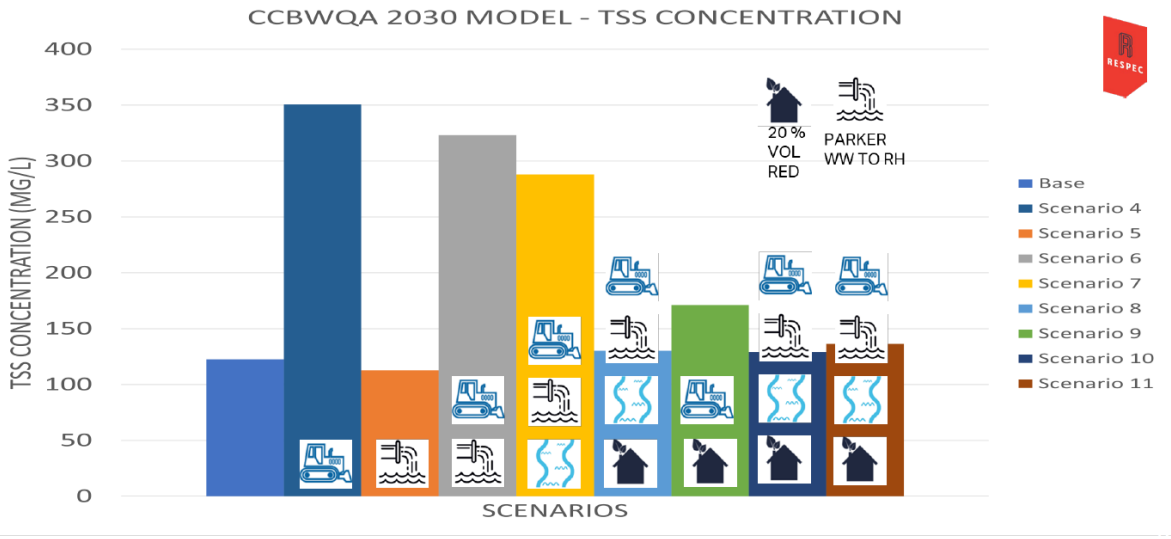

CCBWQA 2030 MODEL - TSS CONCENTRATION
TSS CONCENTRATION (MG/L)
400
350
300
250
200
150
100
50
0
SCENARIOS
20 % VOL RED
PARKER WW TO RH
Base
Scenario 4
Scenario 5
Scenario 6
Scenario 7
Scenario 8
Scenario 9
Scenario 10
Scenario 11

Table 3: 2030 Model Results

	Base_v2 Model				Scen004 Model				Scen005 Model				Scen006 Model				Scen007 Model				Scen008 Model				Scen009 Model				Scen010 Model				Scen011 Model			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**
Cherry Creek Surface Flow	14473	2845	9447	43356	27991	15730	21495	80410	17815	3146	10367	65972	31706	16238	22682	106792	31706	14413	21252	102499	28756	5721	15883	95788	25101	6738	15973	73909	25929	5145	14903	91773	23680	5037	14321	75123
Cottonwood Creek Surface Flow	4340	280	839	18568	5195	395	1132	20374	4647	281	853	21561	5503	396	1147	23377	5503	396	1136	23280	5353	354	1084	23166	5046	353	1080	20257	5203	349	1068	23057	5203	349	1068	23057
Other Surface Inflow	679	122	560	3520	903	123	685	4260	679	122	561	3525	935	123	703	4367	935	123	703	4367	906	123	687	4273	873	123	668	4159	852	123	657	4094	830	123	645	4020
Total Inflow	19491	3247	10846	65444	34090	16249	23312	105043	23141	3549	11781	91058	38144	16757	24532	134535	38144	14932	23092	130146	35015	6198	17655	123227	31019	7214	17721	98326	31984	5617	16628	118924	29713	5509	16034	102200
FWMC	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**
Cherry Creek Surface Flow	20.0	145	0.240	1.10	38.7	413	0.282	1.06	24.6	130	0.214	1.36	43.80	377	0.263	1.24	43.80	334	0.246	1.19	39.72	146	0.203	1.22	34.67	197	0.234	1.08	35.81	146	0.211	1.30	32.71	156	0.222	1.17
Cottonwood Creek Surface Flow	5.99	47.4	0.071	1.57	7.18	55.9	0.080	1.44	6.42	44.4	0.068	1.71	7.60	53	0.077	1.56	7.60	53	0.076	1.56	7.39	49	0.074	1.59	6.97	51	0.079	1.48	7.19	49	0.076	1.63	7.19	49	0.076	1.63
Other Surface Inflow	0.937	133	0.303	1.91	1.248	100	0.279	1.73	0.937	133	0.304	1.91	1.29	97	0.277	1.72	1.29	97	0.277	1.72	1.25	100	0.279	1.73	1.21	104	0.281	1.75	1.18	106	0.284	1.77	1.15	109	0.286	1.78
Total Inflow	26.9	123	0.205	1.23	47.1	351	0.251	1.13	32.0	113	0.187	1.45	53	323.1	0.237	1.30	53	287.9	0.223	1.25	48	130.2	0.185	1.29	43	171.0	0.210	1.17	44	129.2	0.191	1.37	41	136.4	0.198	1.26

	Scen004 - SCH only				Scen005 - WWTF only				Scen006 - SCH & WWTF				Scen007 - SCH, WWTF, & PRF				Scen008 - SCH, WWTF, PRF, & LID				Scen009 - SCH & LID				Scen010 - 008 with Flow eff X 2				Scen011 - 010 w/ Base Parker WWTF			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	93	453	128	85	23	11	10	52	119	471	140	146	119	407	125	136	99	101	68	121	73	137	69	70	79	81	58	112	64	77	52	73
Cottonwood Creek Surface Flow	20	41	35	10	7	0	2	16	27	42	37	26	27	42	35	25	23	26	29	25	16	26	29	9	20	25	27	24	20	25	27	24
Other Surface Inflow	33	1	22	21	0	0	0	0	38	1	26	24	38	1	26	24	34	1	23	21	29	1	19	18	26	1	17	16	22	1	15	14
Total Inflow	75	400	115	61	19	9	9	39	96	416	126	106	96	360	113	99	80	91	63	88	59	122	63	50	64	73	53	82	52	70	48	56
FWMC	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	93	186	18	-4	23	-10	-11	24	119	161	10	12	119	131	3	8	99	1	-15	11	73	37	-3	-2	79	1	-12	18	64	8	-7	6
Cottonwood Creek Surface Flow	20	18	13	-8	7	-6	-5	8	27	12	8	-1	27	12	7	-1	23	2	5	1	16	8	11	-6	20	4	6	4	20	4	6	4
Other Surface Inflow	33	-24	-8	-9	0	0	0	0	38	-27	-9	-10	38	-27	-9	-10	34	-25	-8	-9	29	-22	-7	-8	26	-20	-6	-7	22	-18	-6	-7
Total Inflow	75	186	23	-8	19	-8	-9	17	96	164	16	5	96	135	9	2	80	6	-9	5	59	40	3	-6	64	5	-7	11	52	11	-3	2

	Base Model Results				2030 Buildout Results (008)				2030 Buildout Results (010)				2030 Buildout Results (011)				Scen008 - SCH, WWTF, PRF, & LID				Scen010 - 008 with Flow eff X 2				Scen011 - 010 w/ Base Parker WWTF			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	14473	2845	9447	43356	28756	5721	15883	95788	25929	5145	14903	91773	23680	5037	14321	75123	99	101	68	121	79	81	58	112	64	77	52	73
Cottonwood Creek Surface Flow	4340	280	839	18568	5353	354	1084	23166	5203	349	1068	23057	5203	349	1068	23057	23	26	29	25	20	25	27	24	20	25	27	24
Other Surface Inflow	679	122	560	3520	906	123	687	4273	852	123	657	4094	830	123	645	4020	34	1	23	21	26	1	17	16	22	1	15	14
Total Inflow	19491	3247	10846	65444	35015	6198	17655	123227	31984	5617	16628	118924	29713	5509	16034	102200	80	91	63	88	64	73	53	82	52	70	48	56
FWMC	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	20.0	145	0.240	1.10	39.72	146	0.203	1.22	35.81	146	0.211	1.30	32.71	156	0.222	1.17	99	1	-15	11	79	1	-12	18	64	8	-7	6
Cottonwood Creek Surface Flow	5.99	47.4	0.071	1.57	7.39	49	0.074	1.59	7.19	49	0.076	1.63	7.19	49	0.076	1.63	23	2	5	1	20	4	6	4	20	4	6	4
Other Surface Inflow	0.937	133	0.303	1.91	1.25	100	0.279	1.73	1.18	106	0.284	1.77	1.15	109	0.286	1.78	34	-25	-8	-9	26	-20	-6	-7	22	-18	-6	-7
Total Inflow	26.9	123	0.205	1.23	48	130.2	0.185	1.29	44	129.2	0.191	1.37	41	136.4	0.198	1.26	80	6	-9	5	64	5	-7	11	52	11	-3	2

Cherry Creek Basin WQA
Pollution Abatement Fund
Five Year Rolling Funding and Expenditures

	Actual 2017	Actual 2018	Actual 2019	Actual 2020	Actual 2021	ESTIMATED 2022	Prelim Budget 2023
Revenues							
Transfser from GF - 60%	$ 1,163,156	$ 1,272,278	$ 1,399,313	$ 1,479,489	$ 1,577,072	$ 1,735,131	$ 1,737,000
Transfer from ENT - 60%	299,469	341,409	291,335	437,960	275,700	291,000	274,500
Supplemental transfers	-	-	-	-	119,424	-	500,000
Interest income/Other	1,624	1,065	1,224	388	8,645	5,000	7,500
	1,464,249	1,614,752	1,691,872	1,917,837	1,980,841	2,031,131	2,519,000
Expenditures							
Admin / Mgmt	157,612	195,042	224,808	296,200	403,619	407,000	748,000
PRF O&M	10,179	42,270	7,690	149,664	168,559	402,000	255,000
Reservoir	37,951	-	77,523	308,221	44,507	384,000	749,000
Stream reclamation	889,242	804,000	603,112	670,138	1,369,802	1,640,000	2,271,000
	1,094,984	1,041,312	913,133	1,424,223	1,986,487	2,833,000	4,023,000
Excess of Rev Over Exp	369,265	573,440	778,739	493,614	(5,646)	(801,869)	(1,504,000)
Beginning Fund Balance	231,758	601,023	1,174,463	1,953,202	2,446,816	2,441,170	1,639,301
Ending Fund Balance	$ 601,023	$ 1,174,463	$ 1,953,202	$ 2,446,816	$ 2,441,170	$ 1,639,301	$ 135,301

LRE WATER
CONNECTING WATER TO LIFE

MEMORANDUM

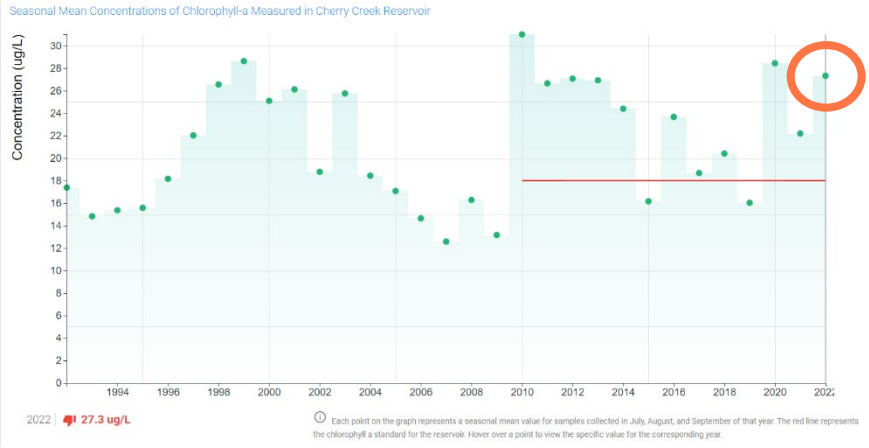
Date:	**11/10/22**
To:	**Cherry Creek Basin Water Quality Authority Board of Directors**
From:	**Erin Stewart, LRE Water**
Subject:	**Water Quality Update – Nov 2022**

CCBWQA Data Portal Water Quality Update Page Link - http://ccbwqportal.org/wq-update/chlorophyll-a

- Navigate to Chl- α, CCR Inflow Concentrations and Comparison, Field Depth Profile, Nutrients Depth Profile

The Water Quality Update pages provide a brief visual of the data collected during the current water year (WY 2022 - October 2021 through September 2022) with the data from previous years available as a reference. This memo provides a brief description of the highlights from the most recent monitoring data available on the data portal.

Chlorophyll-α



Chl-α concentrations are measured in Cherry Creek Reservoir from March through December. The water quality chl-a standard is based on a seasonal average of 18 µg/L from July through September, with seasonal averages shown on the graph from 1992 through 2022. The mean seasonal chl- α concentration for 2022 is 27.3 µg/L, which does not meet the standard. The highest chl- α concentrations were measured during the cyanobacteria blooms in July. Concentrations decreased significantly after the storm in mid-August but increased again in late August and September.

CCR Inflow Phosphorus and Nitrogen Concentrations and Comparison to 5-Year Average (2017-2021)

Site	Cherry Creek @ CC-10		Cottonwood Creek @ CT-2	
Month – FLOW	Total Phosphorus (µg/L)	Total Nitrogen (µg/L)	Total Phosphorus (µg/L)	Total Nitrogen (µg/L)
June BASE	274 (241)	827 (963)	63 (59)	841 (876)
June STORM	*313*	*1560*	*71*	*1760*
July BASE	258 (306)	916 (992)	58 (76)	1290 (1343)
July STORM	-	-	*107*	*1990*
August BASE	310 (263)	570 (787)	61 (63)	774 (1234)
August STORM	*620*	*2950*	*240*	*2550*
Sept BASE	239 (186)	563 (838)	65 (82)	953 (1,701)

* 2017-2021 5-year mean concentration values are shown in parentheses for reference.

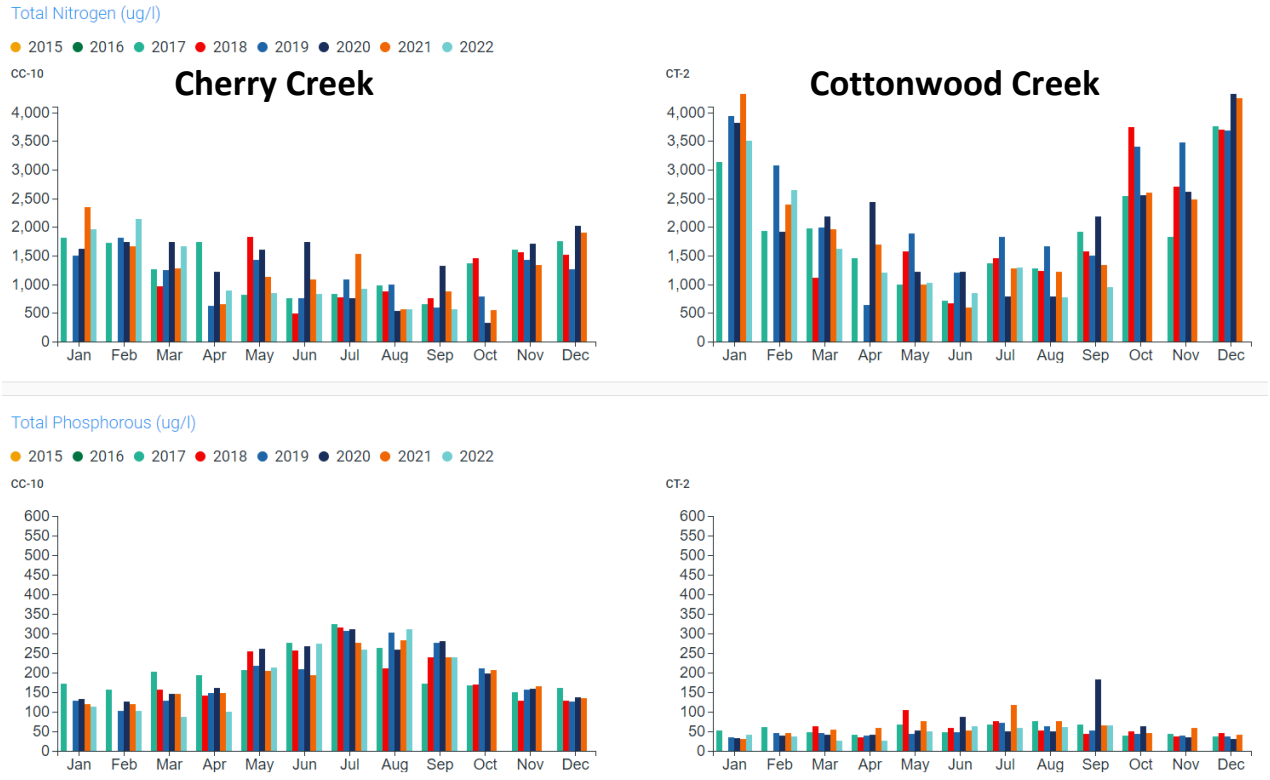
The averages of the base flow and storm flow concentrations are calculated monthly. Although the values do not represent flow-weighted concentrations, the simple averages are included to provide a comparison to long-term monthly average concentrations.

Cherry Creek

In comparison to the 5-year mean (2017-2021), the base flow TP concentrations in Cherry Creek were higher in June, August, and September but lower in July. The base flow TN concentrations in Cherry Creek in June, July, August, and September 2022 were lower than the 5-year mean (2017-2021).

Cottonwood Creek

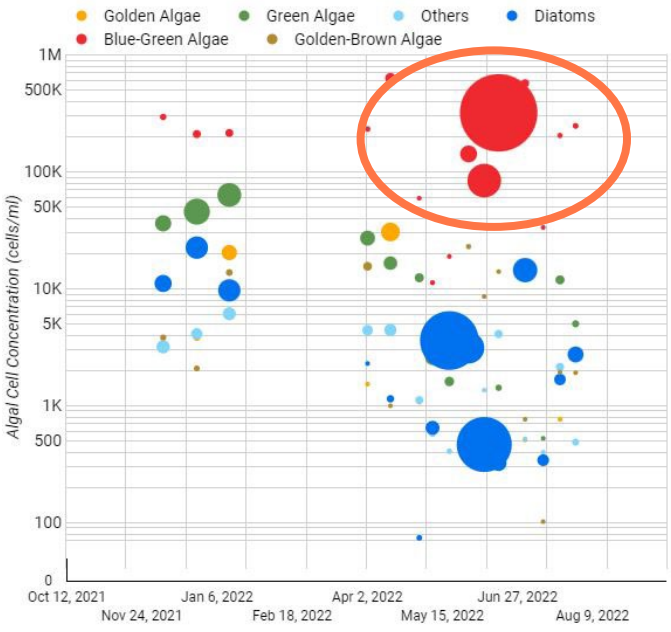
In comparison to the 5-year mean (2017-2021), the base flow TP concentrations in Cottonwood Creek in 2022 were higher in June but lower in July, August, and September. The base flow TN concentrations in Cottonwood Creek in June, July, August, and September 2022 were lower than the 5-year mean (2017-2021).



Plankton

Phytoplankton populations or "algae" are analyzed from Cherry Creek Reservoir monthly when ice is off (March-December).
In late June, a moderate bloom was observed and identified as Dolichospermum. Again, in early July through mid-month, the bloom appeared to be persisting and was very dense out throughout Reservoir. The July bloom was identified as Aphanizomenon, a potentially toxic cyanobacteria. The orange circle on graph highlights the cyanobacteria concentrations (counts) and biovolume during this period (larger circle = ⇧ biovolume)."Caution" or "Warning" signs were posted but no closure was required since laboratory analysis did not detect toxin above the threshold limit.

Later in August and September, the bloom dissipated and did not appear again.



CHERRY CREEK BASIN WATER QUALITY AUTHORITY

2023 CAPITAL IMPROVEMENT PROGRAM SUPPORTING DATA

TAC Draft – October 6, 2022
TAC Recommendation – November 3, 2022
Board Review Version – October 20, 2022
Board Final Version – November 17, 2022

2023 CAPITAL IMPROVEMENT PROGRAM

This document presents the details of the 2023 Capital Improvement Program as included in the Authority's Budget adopted by the Board and includes the following information:

Table 1 – Summary of Potential Pollutant Reduction Facilities, Revision for 2023 CIP.

This table lists all the PRF projects that have been considered for implementation by the Authority since 2000 and shows their current status. The "green" font represents projects in progress and the "blue" font represents completed projects.

Prior to 2010, Cherry Creek Reservoir was under a total maximum annual load (TMAL) limitation for phosphorus. Since PRFs originally focused on reduction of phosphorus loads discharged into the reservoir, the table was developed to provide a brief summary of the design basis, projected loads and treatment, and estimated PRF costs and costs per pound of phosphorus immobilized. Currently there is no TMAL; instead the control strategy identified in Regulation No. 72 is to minimize nutrient (phosphorus and nitrogen) concentrations. Therefore, PRFs are still evaluated, in part, on their costs per pound for consistency between all potential PRFs (see also Stream Reclamation Unit Costs below). Additional information on how PRFs are evaluated, particularly stream reclamation type projects, is presented in the Authority's report dated June 17, 2011 titled *Stream Reclamation Water Quality Benefit Evaluation Interim Status Report*.

The Cottonwood Creek Cattail Harvesting Pilot Project (CCB-13.3.1 A and B) included phosphorus reduction/removed (59-60 pounds per year) from the system based on 2020 Cattail Harvesting Pilot Project Memo for a unit cost $1,000-1,017 per pound of phosphorus removed. In 2021, CCB-13.3.3.1 A removed 69 pounds of phosphorus at unit cost of $1,200 per pound of phosphorus.

Table 2 – Summary of Recommended Pollutant Reduction Facilities 2023 – 2032 Budget Projections

This table lists the PRFs that are in the current, 10-year CIP projection with more detail provided for the projects in the current budget year. Since the Authority partners with other governmental agencies to design and construct some of the PRFs, the Authority's portion of total project costs is also shown. The column labeled "obligated funds" represents the total amount approved by the Authority for the project prior to the budget year, since most projects take several years from concept through construction. Funds are considered "obligated" once the Board approves funding at a regular Board meeting. The highlights of the projects included in the 2023 Budget are described below.

CCBWQA's funding on the East Shade Shelter Shoreline Stabilization Phase III (CCB-17.5) is 100% as it is a PRF in CCSP.

CCBWQA's funding on Cherry Creek Stream Reclamation – Reaches 3 and 4 (CCB-5.14C) is 25% as it is a partner project.

CCBWQA's funding of Cherry Creek – Reservoir to Lake View Drive Alternatives Analysis (CCB-5.16A) is 100%.

CCBWQA's funding on Cherry Creek Stream Reclamation at Dransfeldt Extension (CCB-5.17.1B) is at 7% (not the typical 25% partner project) as the project was advanced from 2024 and 2025 to 2022 and 2023 to meet the schedule for the requesting entity.

CCBWQA's funding on McMurdo Gulch Reclamation (CCB-7.4) is 25% as it is a partner project.

CCBWQA's funding on Lone Tree Creek in CCSP (CCB-21.3, Done in conjunction with Centennial Trail Project) is at 25% (not the typical 100% for projects within CCSP) of the stream reclamation portion of the larger trail project. The trail portion advanced the stream reclamation portion ahead of its water quality priority, limiting the funds available for the project. The $112k shown is not currently in the budget for 2023 and would have to come out of contingency if done in 2023; $95k was included in CCBWQA's 2022 Budget. If CCB-21.3 doesn't move forward, then the Lone Tree Creek in CCSP (CCB-21.3a, CCBWQA Only) was included in 2032 and is 100% CCBWQA funded. The schedule, cost, and priority will be reevaluated based on the Planning effort scheduled for Lone Tree Creek in 2023.

CCBWQA's funding on Happy Canyon Creek County Line to Cherry Creek (CCB-22.1) is at 25% as it is a partner project.

CCBWQA's funding on Dove Creek (CCB-22.1 and CCBW-23.1) is 25% as it is a partner project.

CCBWQA's funding on Piney Creek Reach 1 to 2 (CCB-6.5) is at 22% (not the typical 25% partner project) as that was the funding level requested by the requesting entity.

CCBWQA's funding on PRF Preservation, Acquisition, Lease of Land or Water is budgeted for $100k and CCBWQA's percentage is not known as no project and costs have been identified yet for 2023.

2023 Operations and Maintenance Budget Detail

These tables provide further 2023 budget detail for operations and maintenance activities proposed for the constructed PRF's including the Reservoir Mixing System (i.e.: compressor and aeration system maintenance).

2023 Stream Reclamation Unit Costs

These figures show the stream reclamation unit costs. Figure 1 is for PRFs within CCSP that are fully CCBWQA funded and Figure 2 for projects outside of CCSP that are shared funding.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2023 CIP

Date: **November 11, 2022**

Color Code: Blue: Project Completed

Green: Planned for design/construction during 5-year period

Red: See 2021 CIP Notes for changes to this Spreadsheet

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)		(9)		(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
CCR-1	Reservoir Destratification (mixing)	Officially start-up April 2008	Use inlake mixing to minimize algae blooms, therefore chlorophyll a	369	sq mi	n/a	n/a	n/a		n/a		n/a		810	lbs/season	$ 968				28	$ 80	100%	$968	$ 99	$ 99	
CCB-1	CCSP Wetlands	Prelim design prepared in 2003 (Ref 1, 8)	Restore 60 Acres of wetlands in multiple phases	369	sq mi	3.5 cfs avg daily flow	1415 af/210 days	0.35	mg/l	1050	lbs/yr	Base flow		600	lbs/season	$ 1,928	$ -	$ -	$ -	19	$ 123	100%	$1,928	$ 204	$ 204	18
CCB-5.1	Cherry Creek Sediment Pond at Arapahoe Road (see CCB-5.14)	Project eliminated and area combined into Phase III of CCB-5.14	Design and construct sediment pond	369	sq mi		3600 cy sed/yr	14.6	mg/l	92	lbs/yr	base flow		85	lbs/year	$ 2,355	$ 50	$ -	$ -	$ 90	$ 219	18%	$424	$ 2,575	$ 463	1, 19
CCB-5.2	Arapahoe/Douglas County Line Stream Stabilization	Project completed w/o Authority participation	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 1,062	$ -	$ -	$ -	1	$ 58	0%	$0	$ 1,258	$ -	
CCB-5.3	Cottonwood Bridge Stream Stabilization	Project completed by Parker w/o Authority participation	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 436	$ -	$ -	$ -	2	$ 25	0%	$0	$ 551	$ -	
CCB-5.4	Cherry Creek Stream Stabilization at Main Street (Parker)	Conceptual design by UDFCD	Local stream stabilization (L = 4000 ft)	0.76	mi			100	lbs/mi	76	lbs/yr	Storm Flow	90%	68	lbs/year	$ 1,776	$ -	$ -	$ -	1	$ 96	11%	$200	$ 1,410	$ 159	2, 3
CCB-5.5	Stroh Road Stream Stabilization	Project completed by Parker w/o Authority participation	Stream stabilization (L = 5000 ft)	0.95	mi			100	lbs/mi	95	lbs/yr	Storm Flow	90%	85	lbs/year	$ 218	$ -	$ -	$ -	1	$ 13	0%	$0	$ 149	$ -	
CCB-5.6	Cherry Creek Stream Stabilization at Lincoln Avenue (Parker)	Conceptual design by UDFCD	Local stream stabilization (L = 2350 ft)	0.45	mi			100	lbs/mi	45	lbs/yr	Storm Flow	90%	40	lbs/year	$ 1,447	$ -	$ -	$ -	1	$ 79	21%	$304	$ 1,960	$ 412	2, 3
CCB-5.7	Cherry Creek Stream Stabilization at Eco-Park (SEMSWA)	IGA w/SEMSWA for design in 2010 and construction in 2011/2012	Local stream stabilization (L = 6850 ft)	1.30	mi			100	lbs/mi	130	lbs/yr	Storm Flow	90%	117	lbs/year	$ 4,756	$ -	$ -	$ -	$ 1	$ 256	24%	$1,155	$ 2,191	$ 532	2, 3
CCB-5.8	Cherry Creek Stream Reclamation U/S Arapahoe Rd (Aurora) (see CCB-5.14)	Now Phase 5 of CCB-5.14	Local stream stabilization (L = 2200 ft)	0.42	mi			100	lbs/mi	42	lbs/yr	Storm Flow	90%	38	lbs/year	$ -	$ -	$ -	$ -	1	$ 1	35%	$0	$ 27	$ 9	2, 3
CCB-5.9.1	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase I	Design completed in 2011 for Phase I.	Local stream stabilization (L = 500 ft)	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/year	$ 296	$ -	$ -	$ -	$ 1	$ 17	100%	$296	$ 1,979	$ 1,979	2, 20
CCB-5.9.2	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase II	Design completed in 2013 for Phase II.	Local stream stabilization (L = 2500 ft)	0.47	mi			100	lbs/mi	47	lbs/yr	Storm Flow	90%	43	lbs/year	$ 1,429	$ -	$ -	$ -	$ 1	$ 78	100%	$1,429	$ 1,820	$ 1,820	2, 20
CCB-5.10	Cherry Creek Stream Stabilization at PJCOS (Vermillion Creek, PJMD.)	Design completed by PJMD. Authority is funding partner in design	Local stream stabilization (L = 5100 ft)	0.97	mi			100	lbs/mi	97	lbs/yr	Storm Flow	90%	87	lbs/year	$ 3,017	$ -	$ -	$ -	$ 2	$ 164	21%	$643	$ 1,882	$ 401	2, 3
CCB-5.11	Cherry Creek Stream Stabilization at Norton Farms (Parker)	Conceptual design by UDFCD identified priority 3	Local stream stabilization (L = 2200 ft)	0.42	mi			100	lbs/mi	42	lbs/yr	Storm Flow	90%	38	lbs/year	$ 900	$ -	$ -	$ -	1	$ 49	28%	$252	$ 1,313	$ 368	2, 3
CCB-5.12	Cherry Creek Stream Stabilization at Pine Lane	Project completed by Parker w/o Authority participation	Local stream stabilization (L = 1500 ft)	0.28	mi			100	lbs/mi	28	lbs/yr	Storm Flow	90%	26	lbs/year	$ 500	$ -	$ -	$ -	1	$ 28		$0	$ 1,087	$ -	
CCB-5.13	Cherry Creek Stream Stabilization at Shop Creek Trail	Preliminary design completed in 2010 (Ref 12).	Local Stream Stabilization (L = 2000 ft)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 603	$ -	$ -	$ -	6	$ 38	100%	$603	$ 1,125	$ 1,125	2, 3
CCB-5.14	Cherry Creek Stream Reclamation - CCSP to Eco Park (Ph II to V)	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 11000 ft)	2.08	mi			100	lbs/mi	208	lbs/yr	Storm Flow	90%	188	lbs/year	$ 10,200	$ -	$ -	$ -	$ 1	$ 547	25%	$2,499	$ 2,920	$ 715	2, 3

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Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-5.14A	Cherry Creek Stream Reclamation - Eco Park to Soccer Fields	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 1,850	$ -	$ -	$ -	$ 1	$ 100	35%	$650	$ 2,181	$ 766	2, 3
CCB-5.14B	Cherry Creek Stream Reclamation - Valley Country Club	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 2000 ft.=1400 ft on Cherry Creek and 600 ft. on Tributary)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 2,284	$ -	$ -	$ -	$ 1	$ 123	21%	$484	$ 3,607	$ 764	2, 3
CCB-5.14C	Cherry Creek Stream Reclamation - Valley Country Club to Soccer Fields (Reaches 3 and 4)	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 5167 ft on Cherry Creek)	0.98	mi			100	lbs/mi	98	lbs/yr	Storm Flow	90%	88	lbs/year	$ 5,287	$ -	$ -	$ -	$ 1	$ 284	25%	$1,322	$ 3,223	$ 806	2, 3
CCB-5.14D	Cherry Creek Stream Reclamation - Remaining Sections (not included in Reaches 3 and 4) from Valley Country Club to Soccer Fields	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 3688 ft on Cherry Creek)	0.70	mi			100	lbs/mi	70	lbs/yr	Storm Flow	90%	63	lbs/year	$ 2,980	$ -	$ -	$ -	$ 1	$ 161	25%	$745	$ 2,556	$ 639	2, 3
CCB-5.15	Cherry Creek Stream Reclamation at Country Meadows (Hess Rd)	Project by Town of Parker and Douglas County	Local stream stabilization (L = 7700 ft)	1.46	mi			100	lbs/mi	146	lbs/yr	Storm Flow	90%	131	lbs/year	$ 2,170	$ -	$ -	$ -	$ 2	$ 118	24%	$520	$ 901	$ 216	
CCB-5.16	Cherry Creek Stream Reclamation - 12 Mile Phase III	Project w/in CCSP identified as Reach 1 in Project CCB-5.14 work.	Local stream stabilization (L =30 ft,)	0.01	mi			100	lbs/mi	1	lbs/yr	Storm Flow	90%	1	lbs/year	$ 300	$ -	$ -	$ -	3	$ 19	100%	$300	$ 37,299	$ 37,299	2, 20
CCB-5.16A	Cherry Creek Stream Reclamation - Reservoir to Lake View Drive (Reach 1 in Muller's 2022 Stream Assessment Report)	Project w/in CCSP	Local stream stabilization (L =6365 ft,)	1.21	mi			100	lbs/mi	120.5	lbs/yr	Storm Flow	90%	108	lbs/year	$ 6,842	$ -	$ -	$ -	68	$ 435	100%	$6,842	$ 4,009	$ 4,009	2, 20
CCB-5.16B	Cherry Creek Stream Reclamation - Lake View Drive to North Side of DOLA (Reach 2 in Muller's 2022 Stream Assessment Report)	Project w/in CCSP	Local stream stabilization (L =5220 ft,)	0.99	mi			100	lbs/mi	98.9	lbs/yr	Storm Flow	90%	89	lbs/year	$ 5,612	$ -	$ -	$ -	56	$ 357	100%	$5,612	$ 4,010	$ 4,010	2, 20
CCB-5.16C	Cherry Creek Stream Reclamation - North Side of DOLA to CCSP Boundaries (Reaches 3 and 4 in Muller's 2022 Stream Assessment Report)	Project w/in CCSP	Local stream stabilization (Cherry Creek Reach 3 L =7353 ft, Piney Creek Reach 4 L=2000 ft)	1.77	mi			100	lbs/mi	177.1	lbs/yr	Storm Flow	90%	159	lbs/year	$ 10,054	$ -	$ -	$ -	101	$ 639	100%	$10,054	$ 4,009	$ 4,009	2, 20
CCB-5.17.1A	Cherry Creek Stream Reclamation at KOA	Prelimiinary design completed 2019, Extension Requested by UDFCD and Parker in 2019	Local stream stabilization (L =1400 ft original, L=2000 ft with 600 ft extension)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 2,035	$ -	$ -	$ -	20	$ 129	20%	$375	$ 3,795	$ 776	2, 3
CCB-5.17.1B	Cherry Creek Stream Reclamation at Dransfeldt	Design in 2021, Construction in 2023	Local stream stabilization (L =2400 ft original)	0.45	mi			100	lbs/mi	45	lbs/yr	Storm Flow	90%	41	lbs/year	$ 6,010	$ -	$ -	$ -	60	$ 382	7%	$400	$ 9,340	$ 622	2, 3
CCB-5.17.2	Cherry Creek Stream Reclamation U/S Scott Road	Project requested by Douglas County and UDFCD in 2019	Local stream stabilization (L = 4300 ft)	0.81	mi			100	lbs/mi	81	lbs/yr	Storm Flow	90%	73	lbs/year	$ 5,237	$ -	$ -	$ -	52	$ 333	17%	$900	$ 4,543	$ 781	2, 3
CCB-6.1	Piney Creek Stream Stabilization - Project 1	Authority funded $118,000 Arapahoe County in 2002.	Restore 5200 lf upstream of Parker Road	22.90	sq mi	n/a	n/a	100	lbs/mi	100	lbs/yr	Storm Flow	90%	90	lbs/year	$ 997	$ -	$ -	$ -	at	#VALUE!	13%	$130	#VALUE!	#VALUE!	2, 3
CCB-6.2	Piney Creek Stream Stabilization - Project 2 U/S Buckley Rd	Project completed w/o Authority participation	Reclaim 1700 lf upstream of Buckley Road	0.32	mi			100	lbs/mi	32	lbs/mi	Storm Flow	90%	29	lbs/year	$ 998	$ -	$ -	$ -	1	$ 54	12%	$120	$ 1,880	$ 226	2, 3
CCB-6.3	Piney Creek Stream Sediment Removal - Saddle Rock Golf Course	Request from Aurora in 2011	Sediment removal to restore channel capacity (L = unk)					unk		unk	unk	Sediment	100%	5346	unk	$ 383	$ -	$ -	$ -	$ 10	$ 30	25%	$96	$ 6	$ 1	
CCB-6.4	Piney Creek Stream Reclamation - Reachs 6 & 7	Request from UDFCD in 2014	Local stream stabilization (L = 6,000 ft)	1.14	mi			unk		365	lbs/yr	Storm Flow	90%	329	lbs/year	$ 11,000	$ -	$ -	$ -	$ 2	$ 591	25%	$2,750	$ 1,800	$ 450	12

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Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-6.5	Piney Creek Reach 1 to 2 (SEMSWA)	Requested in 2020	2900 lf of stream reclamation	0.55	mi			100	lbs/mi	55	lbs/mi	Storm Flow	90%	49	lbs/year	$ 2,350	$ -	$ -	$ -	$ 2	$ 128	22%	$515	$ 2,588	$ 567	2, 3
CCB-6.6	Piney Creek Tower to Orchard (SEMSWA)	Requested in 2020	3800 lf of stream reclamation	0.72	mi			100	lbs/mi	72	lbs/mi	Storm Flow	90%	65	lbs/year	$ 3,000	$ -	$ -	$ -	$ 2	$ 163	23%	$700	$ 2,512	$ 586	2, 3
CCB-7.1	McMurdo Gulch Reclamation (Castle Rock)	Project completed in 2011	Stream Reclamation (L = 15,000 lf)	2.84	mi			100	lbs/mi	284	lbs/yr	Storm Flow	90%	256	lbs/year	$ 1,470	$ -	$ -	$ -	28	$ 107	43%	$630	$ 419	$ 180	
CCB-7.2	McMurdo Gulch Reclamation (Castle Rock) 19/20 Project	Design in 2019, Construction in 2020	Stream Reclamation (L = 2,000 lf)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 1,677	$ -	$ -	$ -	17	$ 107	25%	$420	$ 3,127	$ 783	2, 3
CCB-7.3	McMurdo Gulch Reclamation (Castle Rock) 20/21/22 Project	Design in 2020, Construction 2021	Stream Reclamation (L = 3,700 lf)	0.70	mi			100	lbs/mi	70	lbs/yr	Storm Flow	90%	63	lbs/year	$ 2,460	$ -	$ -	$ -	25	$ 156	25%	$615	$ 2,480	$ 620	2, 3
CCB-7.4	McMurdo Gulch Reclamation (Castle Rock) 22/23/24 Project	Design in 2022, Construction 2023 and 2024	Stream Reclamation (L = 6,550 lf)	1.24	mi			100	lbs/mi	124	lbs/yr	Storm Flow	90%	112	lbs/year	$ 3,298	$ -	$ -	$ -	33	$ 210	25%	$825	$ 1,878	$ 470	2, 3
CCB-8	Limestone Filter Enhancement	Specific project not identified	Construct limestone filter bed downstream of retention pond	1.0	sq mi	n/a	10.7 af/year/sq mile	427	lbs/sq mi	427	lbs/yr	Base and storm flow	20%	85	lbs/year/mi^2	$ 943		$ -	$ 595	$ 1	$ 83	43%	$405	$ 977	$ 420	
CCB-11	Advanced Water Treatment Plant	Conceptual design prepared	Construct 2 MGD AWT plant on Cottonwood Creek to treat Cherry Creek and Cottonwood Creek flows (0.21-mg/ influent, 0.03 mg/l disch)	3	cfs	2-MGD	2260	0.21	mg/l	1272	lbs/yr	Base flow and groundwater	90%	1145	lbs/year	$ 4,593	unknown	unknown		$ 69		100%	$4,593	$ -	$ -	11
CCB-12	Bowtie Property PRF	Purchase completed 2003	Stabilize confluence (Ph I) and construct sediment pond (Ph 2)	22	sq mi	2-year flood	300 af	500	mg/l/to n	85	lbs/yr	base flow and minor flood	70% pond 65% wetlands	235	lbs/year	$ 826	$ 300	$ 63	$ 1.8	$ 6	$ 70	100%	$826	$ 299	$ 299	
CCB-12.1	Bowtie Phase I	No action to date	Constructed Wetlands u/s Bowtie Property in Cherry Creek (0.20-disch)	369	sq mi	0.5 cfs avg daily flow	210 af/210 days	0.35	mg/l	86	lbs/yr	Base flow	assumed effluent conc	86	lbs/season	$ 235	$ 200	$ 80	$ -	$ 7	$ 35	100%	$235	$ 404	$ 404	
CCB-13.1	Cottonwood\Peoria Wetlands Pond	Completed 2003. Restorative maintenance required in 2009	Joint funded project with UDFCD, GWV, Arapahoe County	8.30	sq mi							base and flood flows	measured	363	lbs/year	$ 1,636	$ -	$ -	$ -	$ 5	$ 93	12%	$196	$ 255	$ 31	2
CCB-13.2	Cottonwood Stream Reclamation in CCSP	Phase I completed in 2004. Phase II completed June 2008 (Ref 2)	11,600 lf of stream reclamation from Peoria to Perimeter Rd. Pond	2.20	mi			100	lbs/mi	220	lbs/yr	base and flood flows	see separate calcs	730	lbs/year	$ 2,200	$ -	$ -	$ -	$ 55	$ 173	100%	$2,200	$ 237	$ 237	2
CCB-13.3	Cottonwood Creek Stream Stabilization at Easter Avenue	Authority contributed $338,000 for construction in 2010.	2,600 lf of stream reclamation from Easter Ave to Briarwood Ave	0.49	mi			100	lbs/mi	49	lbs/yr	Storm Flow	90%	44	lbs/year	$ 1,350	$ -	$ -	$ -	$ 1	$ 73	25%	$338	$ 1,655	$ 414	2
CCB-13.3.1A	Cottonwood Creek Catail Harvesting from Reservoir to Peoria Street~	Pilot Project - Odd Years Harvest Left Bank	1.7 Acres of Cattail Harvesting	2.90	mi				lbs/mi	30	lbs/yr	Storm Flow	100%	59	lbs/year	$ 60						100%	$60	$ 1,017	$ 1,017	4
CCB-13.3.1B	Cottonwood Creek Cattail Harvesting from Reservoir to Peoria Street~	Pilot Project - Even Years Harvest Right Bank	2.0 Acres of Cattail Harvesting	2.90	mi				lbs/mi	237	lbs/yr	Storm Flow	100%	60	lbs/year	$ 60						100%	$60	$ 1,000	$ 1,000	4
CCB-13.4	Peoria Trib B/Airport East and West Pond (Outfall C-1)	Cottonwood Creek Master Planned Improvements. Ponds combined into one.	Combined existing detention ponds and provided EURV	0.35	sq mi			400	lbs/sq mi	140	lbs/yr	Base and storm flow	40%	56	lbs/yr	$ 523	$ -	$ -	$ -	$ -	$ 28	25%	$131	$ 500	$ 125	
CCB-13.5.1	Cottonwood Creek at Briarwood (SEMSWA)	Requested in 2019	700 lf of stream reclamation	0.13	mi			100	lbs/mi	13	lbs/yr	Storm Flow	90%	12	lbs/year	$ 850	$ -	$ -	$ -	9	$ 54	16%	$140	$ 4,529	$ 746	
CCB-13.5.2	Cottonwood Creek D/S Easter Avenue	Requested in 2019	800 lf of stream reclamation	0.15	mi			100	lbs/mi	15	lbs/yr	Storm Flow	90%	14	lbs/year	$ 800	$ -	$ -	$ -	8	$ 51	20%	$160	$ 3,730	$ 746	
CCB-13.5.3	Cottonwood Creek Tributary - Shooting Area Tributary (CCSP)	Requested in 2020	600 lf of stream reclamation	0.11	mi			100	lbs/mi	11	lbs/yr	Storm Flow	90%	10	lbs/year	$ 300	$ -	$ -	$ -	3	$ 19	25%	$75	$ 1,865	$ 466	2, 3

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			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-13.5.4	Cottonwood Creek and Tributary C (IWSD)	Requested in 2020	2080 lf of stream reclamation	0.39	mi			100	lbs/mi	39	lbs/yr	Storm Flow	90%	35	lbs/year	$ 1,664	$ -	$ -	$ -	17	$ 106	25%	$416	$ 2,984	$ 746	2, 3
CCB-13.5.5	Windmill Creek Pond W-9 Retrofit (SEMSWA)				sq mi		3600 cy sed/yr		mg/l		lbs/yr	base flow			lbs/year	$ 150	$ 50	$ -	$ -	$ 90	$ 101	25%	$38	#DIV/0!	#DIV/0!	5
CCB-14	Belleview Wetlands	Co-funding opportunity with USACE on indefinite hold	Retrofit existing develop. w/wet detention pond	235	Ac SF Resid			400	lbs/sq mi	145	lbs/yr	Base and storm flow	50%	73	lbs/year	$ 210	$ -	$ -	$ -	$ 2	$ 13	100%	$210	$ 183	$ 183	2
CCB-15	Surface Water Reuse at Cherry Creek Vista	Supplemental water not available. Project on indefinite hold.	Use water from Cottonwood Creek to irrigate 10-acres			2.92 af/ac-yr	29.2 af/yr	0.20	mg/l	15.9	lbs/yr	base flow	80%	13	lbs/year	$ 50	$ -	$ -	$ -	$ -	$ 3	100%	$50	$ 211	$ 211	
CCB-16	Stream Corridor Preservation	No projects identified	Partner with others to purchase property or conservation easements along Cherry Creek													$ 100					$ 5	100%	$100			1
CCB-17.2	Reservoir Shoreline Stabilization Mountain Loop Trail	Scheduled for construction beginning in 2012	CCSP Recreation sites: Mountain, Lake and Cottonwood Creek Loops											54	lbs/yr	$ 1,131	$ -	$ -	$ -	$ 5	$ 66	100%	$1,131	$ 1,215	$ 1,215	1, 16
CCB-17.2.1	Mountain and Lake Loop - 2021 Shoreline Maintenance	Identified during 2020 annual PRF observation	45 lf of bank stabilization	45	lf	0.1 cy/yr/ft		0.14	lbs/lf	6.3	lbs/yr	bank erosion	80%	5.04	lbs/yr	$ 24	$ -	$ -	$ -	$ 2	$ 3	100%	$24	$ 652	$ 652	1, 16
CCB-17.3	West Boat Ramp Parking Lot WQ Improvements	Final design completed in 2012	Provide water quality treatment of parking lot runoff.	3.43	ac prkg lot					3	lbs/yr	parking lot	70%	2.1	lbs/yr	$ 330	$ -	$ -	$ -	$ 1	$ 19	100%	$330	$ 8,903	$ 8,903	1
CCB-17.4	East Boat Ramp Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	100 lf of bank stabilization	105	lf	0.1 cy/yr/ft		0.14	lbs/lf	14.7	lbs/yr	bank erosion	80%	11.8	lbs/yr	$ 63	$ -	$ -	$ -	$ 2	$ 5	100%	$63	$ 457	$ 457	1, 16
CCB-17.4.1	East Boat Ramp Shoreline Stabilization Phase III	Identified during 2012 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 350	$ -	$ -	$ -	$ 2	$ 21	100%	$350	$ 463	$ 463	1, 16
CCB-17.5	East Shade Shelter Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	20 lf of bank stabilization	20	lf	0.1 cy/yr/ft		0.14	lbs/lf	2.8	lbs/yr	bank erosion	80%	2.2	lbs/yr	$ 18	$ -	$ -	$ -	$ -	$ 1	100%	$18	$ 431	$ 431	1, 16
CCB-17.5.1	East Shade Shelter Shoreline Stabilization Phase III	Identified during 2014 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 906	$ -	$ -	$ -	$ -	$ 49	100%	$906	$ 1,083	$ 1,083	1, 16
CCB-17.6	West Shade Shelter Shoreline Stabilization PRF[14]	Identified initially in 2006. UCD Student Project w/WPR in 2013	1,400 lf of bank stabilization	1400	lf	0.1 cy/yr/ft		0.14	lbs/lf	196.0	lbs/yr	bank erosion	80%	179	lbs/yr	$ 704	$ -	$ -	$ -	$ 1,000	$ 51	65%	$458	$ 285	$ 185	21
CCB-17.7	Tower Loop Shoreline Stabilization Phase II	Identified during 2014 annual PRF inspection	700 lf of bank stabilization	700	lf	0.1 cy/yr/ft		0.14	lbs/lf	98.0	lbs/yr	bank erosion	80%	78.4	lbs/yr	$ 1,056	$ -	$ -	$ -	$ -	$ 57	100%	$1,056	$ 722	$ 722	1, 16
CCB-17.8	Dixon Grove Shoreline Stabilization Phase II	Identified during 2019 annual PRF inspection	200 lf of bank stabilization	200	lf	0.1 cy/yr/ft		0.14	lbs/lf	28.0	lbs/yr	bank erosion	80%	22.4	lbs/yr	$ 235	$ -	$ -	$ -	$ -	$ 13	100%	$235	$ 562	$ 562	1, 16
CCB-18	OWTS Sewer Service	No action to date	Provide Sewer Service for OWTS Areas			To Be Determined		To Be Determined					To Be Determined				To Be Determined					100%		To Be Determined		1
CCB-19	Non-point Pollutant Management	No action to date	Assist agricultural contributors to water quality impact			To Be Determined		To Be Determined					To Be Determined			$ 100	$ -	$ -	$ -	$ -	$ 5	100%	$100	To Be Determined		1
CCB-20.1	Detention Pond Retrofit Program - McMurdo Gulch	Phase 1 - McMurdo Gulch	Modify existing ponds to meet current standards for WQ	1	Each			0.40	lbs/Trib Acre	0.4	lbs/yr	Residential		9	lbs/pond/yr	$ 60	$ -	$ -	$ -	$ 0	$ 4	100%	$60	$ 396	$ 396	1, 17
CCB-21.1	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	Identified in 2014. Request from Arapahoe County Open Space.	500 lf of stream reclamation from CCSP Boundary to Cottonwood Creek	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/yr	$ 340	$ -	$ -	$ -	$ 2	$ 20	100%	$340	$ 2,372.03	$ 2,372	2, 3
CCB-21.2	Lone Tree Creek Pond L-3 Retrofit (SEMSWA)				sq mi		3600 cy sed/yr		mg/l		lbs/yr	base flow			lbs/year	$ 2,355	$ 50	$ -	$ -	$ 90	$ 219	#DIV/0!	$18	#DIV/0!	#DIV/0!	5
CCB-21.3	Lone Tree Creek in CCSP upstream of Pond (Centennial Trail Portion)	Request from Centennial for Participation in Stream Reclamaation portion of Trail Project.	710 lf of stream reclamation between CCSP Boundary and Windmill Creek Loop Trail	0.13	mi			100	lbs/mi	13	lbs/yr	Storm Flow	90%	12	lbs/yr	$ 448	$ -	$ -	$ -	$ 2	$ 26	25%	$112	$ 2,148.56	$ 537	2, 3
CCB-22	Happy Canyon Creek	MDP Priority Project	6,600 lf of stream reclamation upstream of I-25	1.25	mi			100	lbs/mi	125	lbs/yr	Storm Flow	90%	113	lbs/yr	$ 7,702	$ -	$ -	$ -	$ 2	$ 415	25%	$1,926	$ 3,685.78	$ 921	2, 3
CCB-22.1	Happy Canyon Creek at Jordan Road (SEMSWA)	Requested in 2020	2,500 lf of stream reclamation, project extended another 2000 feet in 2022	0.85	mi			100	lbs/mi	85	lbs/yr	Storm Flow	90%	77	lbs/year	$ 2,731	$ -	$ -	$ -	27	$ 174	25%	$683	$ 2,264	$ 566	2, 3

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2023 CIP

Date: **November 11, 2022**

Color Code:
Blue: Project Completed
Green: Planned for design/construction during 5-year period
Red: See 2021 CIP Notes for changes to this Spreadsheet

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment		Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed	Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-22..2	Happy Canyon Creek Upstream of I-25 (MHFD)	Requested in 2020	3000 lf of stream reclamation	0.57	mi			100	lbs/mi	57	lbs/yr	Storm Flow	90%	51 lbs/year	$ 5,441	$ -	$ -	$ -	54	$ 346	9%	$500	$ 6,765	$ 622	2, 3
CCB-23.1	Dove Creek U/S Pond D-1 to Chambers Rd (SEMSWA)	Requested in 2020	1300 lf of stream reclamation	0.25	mi			100	lbs/mi	25	lbs/yr	Storm Flow	90%	22 lbs/year	$ 650	$ -	$ -	$ -	7	$ 41	25%	$163	$ 1,865	$ 466	2, 3
CCB-23.2	Dove Creek Otero to Chambers Rd. (SEMSWA)	Requested in 2020	1400 lf of stream reclamation	0.27	mi			100	lbs/mi	27	lbs/yr	Storm Flow	90%	24 lbs/year	$ 700	$ -	$ -	$ -	7	$ 45	25%	$175	$ 1,865	$ 466	2, 3

BASIS FOR ANALYSIS:

(A) Unit cost of phosphorus removal based on annualized cost of completed project over 35 years at 4% interest rate. CRF = 0.053577

(B) All projects identified provide for additional phosphorus immobilization beyond minimum requirements, unless noted otherwise.

2023 CIP NOTES:

1. Assumed that augmentation for consumptive use not required
2. Augmentation for naturally established wetlands not required (assumption)
3. Phosphorus Estimated based on Interim Stream Reclamation Paper
4. See 2020 Cattail Harvesting Pilot Project Memo. Phosphorus estimated based on SEMSWA 2020 Data.
5. Pond updates to bring up to current standards and to facilitate maintenance. No phosphorus calculation provided, since ponds already exist.
6.
7.
8. Water costs at $ 6,500 per acre foot
9. Present worth of capital replacement
11. Land acquisition and water augmentation not defined. CWSD\ACWWA JWPP project influenced scope of project.
12. Total Phosphorus loading derived from laboratory sediment samples & Stantec Geomorphic Study BANCS analysis.
15. Estimate based on costs for similar work along East Shoreline dating back to 1996
16. Benefit approximated based on other shoreline projects and estimates
17. Loads and performance based on calculations for 3 McMurdo Gulch ponds.
18. SEO opined that ET must be augmented. Also, recent Reservoir fluctuations may render project infeasible. Placed on indefinite hold.
19. Approach was shifted to focus on stream reclamation (CCB-5.14) and reduction of sediment and nutrient sources from erosion.
20. Joint project with CCSP. Integrate design with Dog Park uses and improvements. Estimate based on similar stream stabilization projects
21. Phosphorus: Shoreline 177 lbs/yr + Parking Lot 2 lbs/yr =179 lbs/yr

REFERENCES

1. Muller Eng 2003. *Feasibility Evaluation for Cherry Creek State Park Wetlands Project*
2. Muller Eng 2003. *Feasibility Evaluation for Cottonwood Creek Stream Stabilization Project*
3. AMEC 2005. *Draft Feasibility Report Cherry Creek Reservoir Destratification*
4. AMEC 2006. *Recommendations for Prepurchase of Jamor Equipment for Cherry Creek Reservoir Destratification Project.*
5. Tetra Tech August 2006. *Phosphorus Estimates in Cherry Creek and Cost for Removal via Sediment Trap.*
6 WERF 2000. *Phosphorus Credit Trading in the Cherry Creek Basin: An Innovative Approach to Achieving Water Quality Benefits.*
7. Ruzzo, WP September 5, 2003. Cherry Creek Corridor Master Plan-*Estimate of Phosphorus Reduction from Stream Reclamation*
8. Ruzzo, W. P. September 21, 2006. *Cottonwood Creek Reclamation - Water Rights Augmentation Requirements.*
9. TetraTech December 2006. *Design of Cherry Creek Sediment Basin and Stream Stabilization.*
10. Brown and Caldwell Feb 2007. *Shop Creek Wetlands Pollutant Reduction Facility Wetland Assessment*
11. PBSJ October 2006. *Draft McMurdo Gulch Major Drainageway Master Plan*
12. Brown and Caldwell 2010. *Cherry Creek Stream Reclamation at Shop Creek Trail.*
13. CCBWQA TAC June 16, 2011. *Stream Reclamation Water Quality Benefit Evaluation Interim Status Report*
14. Ruzzo Memo, September 4, 2013, *West Shade Shelter Shoreline Stabilization PRF - Water Quality Analysis.*

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES

2023 - 2032 BUDGET PROJECTIONS (1000$)

	A	B	C	D	E	F	G	H	O	P	Q	R	W	AB	AD	AE	AF	AG	AH	AI	AJ	AK
10		**November 11, 2022**	**Current Project Budget**					**Prior Year Obligated Funds[3]**	**Proposed 2023 Budget**				**Proposed 2024 Budget**	**Proposed 2025 Budget**	**Proposed 2026 Budget**	**Proposed 2027 Budget**	**Proposed 2028 Budget**	**Proposed 2029 Budget**	**Proposed 2030 Budget**	**Proposed 2031 Budget**	**Proposed 2032 Budget**	**2023-2032 Total**
11	**Project No.**	**Project Title**	**Capital[1]**	**Total**	**O&M**	**Authority Portion**	**Authority Portion**		**Design**	**Capital**	**Water**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
12	**Budget Category - General**																					
14	**Budget Category - Reservoir Projects**																					
17	CCR-2	Reservoir Destratification System - Distribution Preliminary Design - Includes evaluation of Optimization of Distribution with WWE Expansion Alternative	$ 2,140	$ 2,140		$ 2,140	100%	$ -	$ -	$ -	$ -	$ -	***$ 270***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 935***	***$ 935***	***$ -***	***$ 2,140***
18	CCR-3	Reservoir Nutrient Mitigation Alternatives Study	$ 100	$ 100		$ 100	100%	$ -	$ -	$ -	$ -	$ -	***$ 100***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 100***
19	CCB-17.5	East Shade Shelter Shoreline Stabilization Phase III	$ 906	$ 906		$ 855	100%	$ 51	$ 59	$ 600	$ -	***$ 659***	***$ 196***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 855***
20	CCB-17.6	West Shade Shelter Shoreline Stabilization PRF	$ 704	$ 704		$ 704	100%	$ 154	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ 550***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 550***
21	CCB-17.7	Tower Loop Shoreline Stabilization Phase II	$ 1,056	$ 1,056		$ 1,056	100%	$ 90	$ -	$ -	$ -	***$ -***	***$ 966***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 966***
22	**Budget Category - Stream Reclamation Projects**																					
23	CCB-5.4	Cherry Creek Stream Reclamation at Main Street (Parker)	$ 1,776	$ 1,776		$ 200	11%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***
24	CCB-5.6	Cherry Creek Stream Stabilization at Lincoln Avenue (Parker)	$ 1,447	$ 1,447		$ 304	21%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 304***	***$ -***	***$ -***	***$ -***	***$ 304***
28	CCB-5.14C	Cherry Creek Stream Reclamation - Reach 3	$ 2,567	$ 2,567		$ 640	25%	$ -	$ 130	$ -	$ -	***$ 130***	***$ 510***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 640***
29	CCB-5.14C	Cherry Creek Stream Reclamation - Reach 4	$ 2,720	$ 2,720		$ 680	25%	$ 25	$ -	$ 475	$ -	***$ 475***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 475***
30	CCB-5.16A	Cherry Creek - Reservoir to Lake View Drive Alternatives Analysis	$ 200	$ 200		$ 200	100%	$ -	$ 200	$ -	$ -	***$ 200***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***
34	CCB-5.17.1B	Cherry Creek Stream Reclamation - at Dranfeldt Extension (Parker)	$ 6,010	$ 6,010		$ 400	7%	$ 60	$ -	$ 170	$ -	***$ 170***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 170***
36	CCB-7.4	McMurdo Gulch Reclamation (Castle Rock)	$ 4,308	$ 4,308		$ 1,078	25%	$ -	$ -	$ 907	$ -	***$ 907***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 907***
37	CCB-13.5.3	Cottonwood Creek Tributary - Shooting Area Tributary (CCSP)	$ 300	$ 300		$ 75	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 75***
38	CCB-13.5.4	Cottonwood Creek and Tributary C (IWSD)	$ 1,664	$ 1,664		$ 416	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 416***	***$ -***	***$ -***	***$ 416***
39	CCB-21.1	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	$ 340	$ 340		$ 340	100%	$ -	$ -	$ -	$ -	***$ -***	***$ 100***	***$ 400***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 500***
40	CCB-21.3	Lone Tree Creek in CCSP upstream of Pond (Done in conjunction with Centennial Trail Project)	$ 448	$ 448		$ 112	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	$ -
41	CCB-21.3a	Lone Tree Creek in CCSP upstream of Pond (CCBWQA Only)	$ 448	$ 448		$ 448	100%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 448***	***$ 448***
42	CCB-22.1	Happy Canyon Creek County Line to Cherry Creek (SEMSWA)	$ 1,520	$ 1,520		$ 381	25%	$ 25	$ -	$ 88	$ -	***$ 88***	***$ 50***	***$ 75***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 288***
44	CCB-23.1	Dove Creek U/S Pond D-1 to Chambers Rd (SEMSWA)	$ 650	$ 650		$ 163	25%	$ -	$ -	$ 63	$ -	***$ 63***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 138***
45	CCB-23.2	Dove Creek Otero to Chambers Rd. (SEMSWA)	$ 700	$ 700		$ 175	25%	$ 25	$ -	$ 75	$ -	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 75***
46	CCB-6.5	Piney Creek Reach 1 to 2 (SEMSWA)	$ 2,350	$ 2,350		$ 515	22%	$ -	$ 63	$ -	$ -	***$ 63***	***$ 39***	***$ 25***	***$ 75***	***$ 150***	***$ 125***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 477***

	A	B	C	D	E	F	G	H	O	P	Q	R	W	AB	AD	AE	AF	AG	AH	AI	AJ	AK
1	**CHERRY CREEK BASIN WATER QUALITY AUTHORITY**																					
2	***TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES***																					
3	**2023 - 2032 BUDGET PROJECTIONS (1000$)**																					
9																						
10		**November 11, 2022**	**Current Project Budget**					**Prior Year Obligated Funds[3]**	**Proposed 2023 Budget**				**Proposed 2024 Budget**	**Proposed 2025 Budget**	**Proposed 2026 Budget**	**Proposed 2027 Budget**	**Proposed 2028 Budget**	**Proposed 2029 Budget**	**Proposed 2030 Budget**	**Proposed 2031 Budget**	**Proposed 2032 Budget**	**2023-2032 Total**
11	**Project No.**	**Project Title**	**Capital[1]**	**Total**	**O&M**	**Authority Portion**	**Authority Portion**		**Design**	**Capital**	**Water**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
47	CCB-6.6	Piney Creek Tower to Orchard (SEMSWA)	$ 3,000	$ 3,000		$ 710	24%	$ -	$ -	$ -	$ -	***$ -***	***$ 75***	***$ 150***	***$ 235***	***$ 250***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 710***
48	CCB-5.16A,B,C	Cherry and Piney Creeks in CCSP	$ 22,500	$ 22,500			0%	$ -	$ -	$ -	$ -	***$ -***	***$ 450***	***$ 1,400***	***$ 1,000***	***$ 1,355***	***$ 1,900***	***$ 2,000***	***$ 920***	***$ 960***	***$ 1,500***	***$ 11,485***
49	CCB-5.14D	Cherry Creek Stream Reclamation - Remaining Sections (not included in Reaches 3 and 4) from Valley Country Club to Soccer Fields	$ 2,980	$ 2,980		$ 745	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ 100***	***$ 100***	***$ 545***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 745***
50	**Budget Category - PRF Water Quality/Wetland Ponds**																					
51	**Budget Category - PRF Preservation, Acquisition, Lease**																					
52	CCB-16	PRF Preservation, Acquisition, Lease of Land or Water	$ 500	$ 500		$ -	0%	$ -		$ 100	$ -	***$ 100***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 550***
53		***SUB-TOTALS***										***$ 2,930***	***$ 2,881***	***$ 2,200***	***$ 2,085***	***$ 2,350***	***$ 2,350***	***$ 2,354***	***$ 2,321***	***$ 1,945***	***$ 1,998***	***$ 23,414***

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES

2023 - 2032 BUDGET PROJECTIONS (1000$)

	A	B	C	D	E	F	G	H	O	P	Q	R	W	AB	AD	AE	AF	AG	AH	AI	AJ	AK
10		November 11, 2022	Current Project Budget					Prior Year Obligated Funds[3]	Proposed 2023 Budget				Proposed 2024 Budget	Proposed 2025 Budget	Proposed 2026 Budget	Proposed 2027 Budget	Proposed 2028 Budget	Proposed 2029 Budget	Proposed 2030 Budget	Proposed 2031 Budget	Proposed 2032 Budget	2023-2032 Total
11	Project No.	Project Title	Capital[1]	Total	O&M	Authority Portion	Authority Portion		Design	Capital	Water	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
54		***OPERATIONS AND MAINTENANCE***																				
56		***Routine Category***																				
57	OM-7	Reservoir Destratification	$ 350	$ 350		$ 350	100%			$ 35		$ 35	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 395
58	OM-14.1	PRF Weed Control	$ 100	$ 100		$ 100	100%			$ 10		$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 100
59	OM-14.2	PRF Reseeding at CCSP	$ 50	$ 50		$ 27	100%			$ 5		$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 50
60	OM-14.3	PRF Mowing	$ 50	$ 50		$ 45	100%			$ 5		$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 50
61		***SUB-TOTAL***	$ 550	$ 550		$ 522				$ 55		$ 55	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 595
62		***Operations Category***																				
63	O - 1	RDS Utilities	$ 650	$ 650		$ 650	100%			$ 65		$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 650
64	O - 2	RDS Service Plan	$ 155	$ 155		$ 155	100%			$ 12		$ 12	$ 13	$ 14	$ 15	$ 16	$ 17	$ 18	$ 19	$ 20	$ 20	$ 164
65	O - 3	PRF Emergency Repairs	$ -	$ -		$ -	#DIV/0!			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
66	O - 4	Meteorological Station	$ 36	$ 36		$ 36	100%			$ 3		$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 30
67		***SUB-TOTAL***	$ 841	$ 841		$ 841				$ 80		$ 80	$ 81	$ 82	$ 83	$ 84	$ 85	$ 86	$ 87	$ 88	$ 88	$ 844
68		***Restorative Category***																				
69	OM -	Tree/Shrub Planting	$ 18	$ 18		$ 18	100%			$ -		$ -	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 18
70	OM -	Fence Repair	$ 72	$ 72		$ 72	100%			$ -		$ -	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 72
71	OM -	Shoreline / Bank Restoration																				$ -
72		Average Annual Cost								$ -		$ -	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 1,755
73		*Shop Creek Concrete Repairs*	$ 10	$ 10		$ 10				$ 10		$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10
74		*Mountain/Lake Loop Shoreline*	$ 24	$ 24		$ 24	100%			$ 30		$ 30	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30
75	OM -	Wetland Harvesting	$ 900	$ 900		$ 900	100%			$ 90		$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 900
76		***SUB-TOTAL***	$ 1,024	$ 1,024		$ 1,024				$ 130		$ 130	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 2,785
77		***Rehabilitation Category***																				
78	OM -						#DIV/0!															
79		***SUB-TOTAL***	$ -	$ -		$ -				$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
81		***SUB-TOTAL O&M***	$ 2,415							$ 265		$ 265	$ 436	$ 437	$ 438	$ 439	$ 440	$ 441	$ 442	$ 443	$ 443	$ 4,540
82		***GRAND TOTAL***										$ 3,195	$ 3,317	$ 2,637	$ 2,523	$ 2,789	$ 2,790	$ 2,795	$ 2,763	$ 2,388	$ 2,441	$ 30,006

Cherry Creek Basin Water Quality Authority
Summary of Operation & Maintenance (O&M) Costs
Prepared / Updated: November 4, 2022

Project	Quantity			CCSP Work	CCBWQA Purchases Seed with CCSP Installation	CCBWQA Work					Comments	Total Cost
	Each	Hours	Acres	Herbicide Application[1]	Tractor Reseeding (Seed Cost Only)[2]	Weed Control[1]	Tree Planting[3]	Shrub Planting[3]	Misc.	Restorative / Rehabilitation work[4]		
Shop Creek	1					$ 3,000					Herbicide treatment of vegetation growing on faces of drops at 100% CCBWQA, since it isn't weed control related.	$ 13,000
	1									$ 10,000	Project carryover from 2022 to 2023, Concrete Repair at Crests of 3 drop structures.	
Cottonwood Wetlands	1									$ 3,600	PRF Routine, Decompaction and revegetation of access along embankment. Cleaning of outlet grate.	$ 3,600
Mountain/Lake Loop Shoreline	1									$ 30,000	Project carryover from 2022 to 2023, Restore shoreline area.	$ 30,000
East Boat Ramp	1					$ 3,000					Weed Control for noxious weeds at 100% CCBWQA, since within 5 years of PRF construction.	$ 3,000
Cherry Creek 12-mile Phase III	1					$ 4,000					Weed Control for noxious weeds at 100% CCBWQA, since within 5 years of PRF construction.	$ 4,000
Subtotal				$ -	$ -	$ 10,000	$ -	$ -	$ -	$ 43,600		

Totals

CCSP =	**$ -**
CCBWQA =	**$ 53,600**
Combined =	**$ 53,600**

Note 1. CCBWQA performs weed control (mechanical until native grasses mature, then herbicide) for first 5 years after PRF construction; afterwards 50/50 split between CCBWQA and CCSP.
Note 2. Reseeding Rate = $800/acre. CCBWQA purchases seed CCSP installs it with their tractor and the seed attachment purchased by CCBWQA.
Note 3. Tree Replacement = $1,000/ea. Shrub Replacement =$50/ea.. CCBWQA Participation @ 100%.
Note 4. PRF Function Repair/Maintenace. Project Specific Estimate. CCBWQA Participation @ 100%.

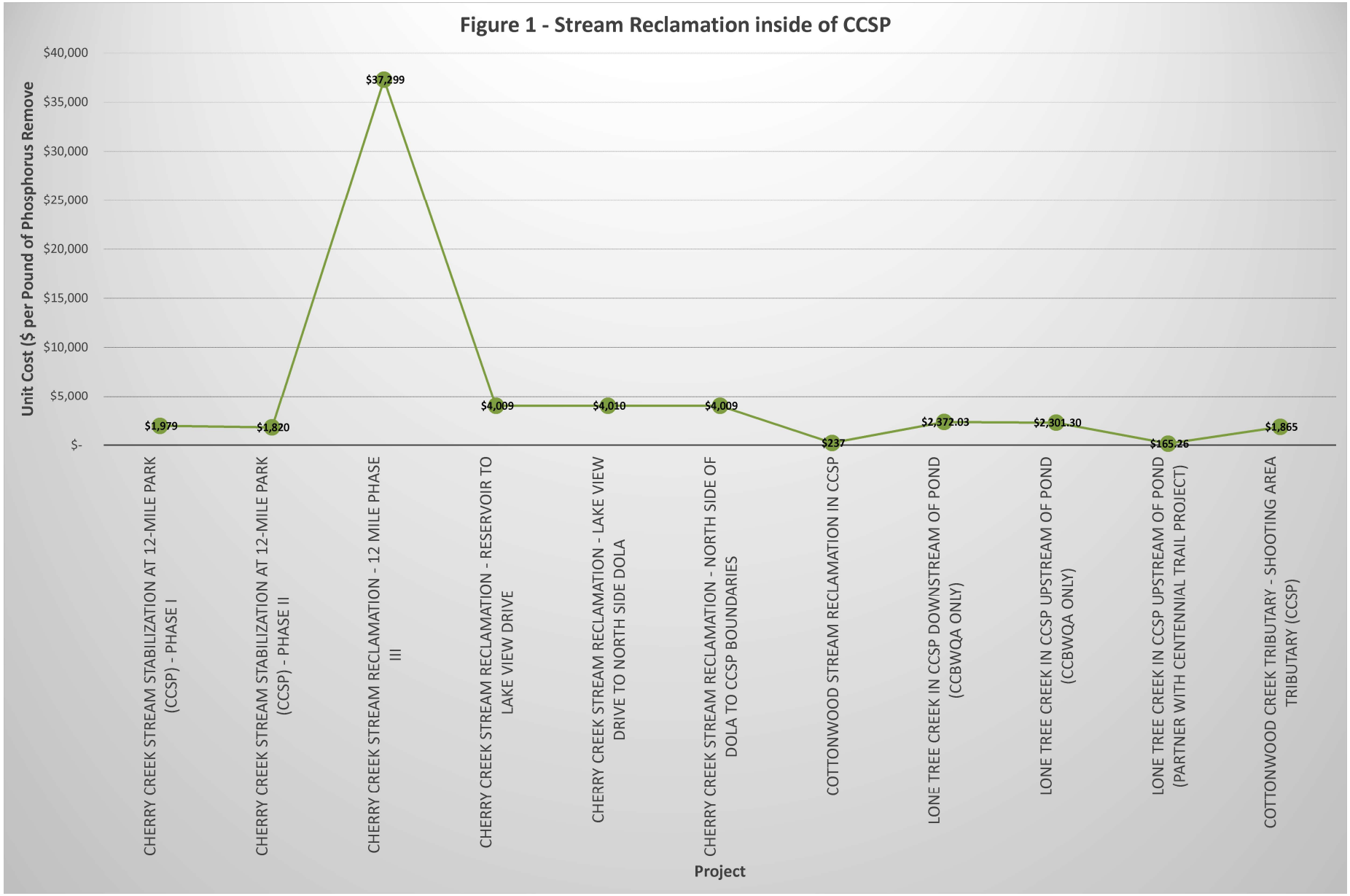
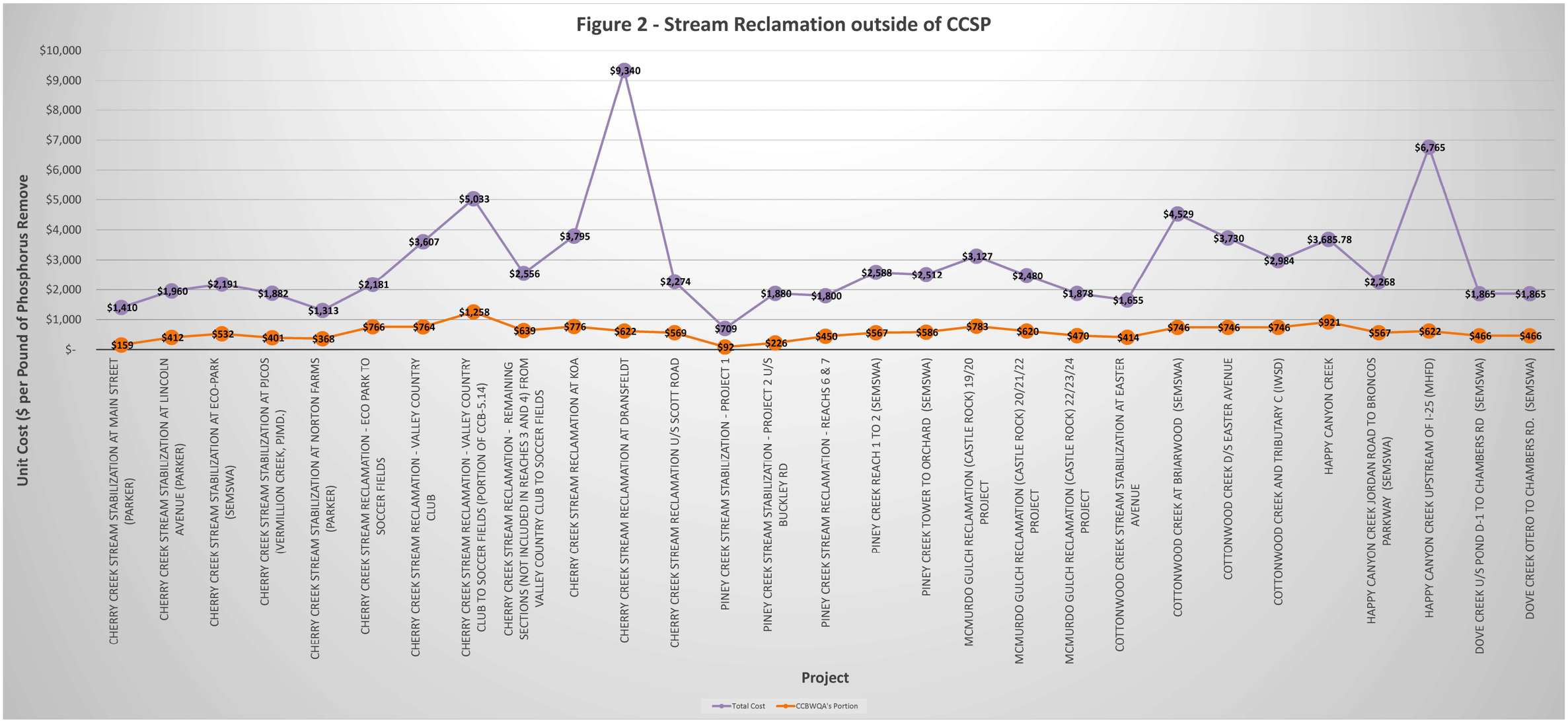


Figure 1 - Stream Reclamation inside of CCSP
Unit Cost ($ per Pound of Phosphorus Remove
$40,000
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$-
$1,979
$1,820
$37,299
$4,009
$4,010
$4,009
$237
$2,372.03
$2,301.30
$165.26
$1,865
CHERRY CREEK STREAM STABILIZATION AT 12-MILE PARK (CCSP) - PHASE I
CHERRY CREEK STREAM STABILIZATION AT 12-MILE PARK (CCSP) - PHASE II
CHERRY CREEK STREAM RECLAMATION - 12 MILE PHASE III
CHERRY CREEK STREAM RECLAMATION - RESERVOIR TO LAKE VIEW DRIVE
CHERRY CREEK STREAM RECLAMATION - LAKE VIEW DRIVE TO NORTH SIDE DOLA
CHERRY CREEK STREAM RECLAMATION - NORTH SIDE OF DOLA TO CCSP BOUNDARIES
COTTONWOOD STREAM RECLAMATION IN CCSP
LONE TREE CREEK IN CCSP DOWNSTREAM OF POND (CCBWQA ONLY)
LONE TREE CREEK IN CCSP UPSTREAM OF POND (CCBWQA ONLY)
LONE TREE CREEK IN CCSP UPSTREAM OF POND (PARTNER WITH CENTENNIAL TRAIL PROJECT)
COTTONWOOD CREEK TRIBUTARY - SHOOTING AREA TRIBUTARY (CCSP)
Project

Figure 2 - Stream Reclamation outside of CCSP



CHERRY CREEK BASIN WATER QUALITY AUTHORITY

2023 CAPITAL IMPROVEMENT PROGRAM SUPPORTING DATA

TAC Draft – October 6, 2022
TAC Recommendation – November 3, 2022
Board Review Version – October 20, 2022
Board Final Version – November 17, 2022

2023 CAPITAL IMPROVEMENT PROGRAM

This document presents the details of the 2023 Capital Improvement Program as included in the Authority's Budget adopted by the Board and includes the following information:

Table 1 – Summary of Potential Pollutant Reduction Facilities, Revision for 2023 CIP.

This table lists all the PRF projects that have been considered for implementation by the Authority since 2000 and shows their current status. The "green" font represents projects in progress and the "blue" font represents completed projects.

Prior to 2010, Cherry Creek Reservoir was under a total maximum annual load (TMAL) limitation for phosphorus. Since PRFs originally focused on reduction of phosphorus loads discharged into the reservoir, the table was developed to provide a brief summary of the design basis, projected loads and treatment, and estimated PRF costs and costs per pound of phosphorus immobilized. Currently there is no TMAL; instead the control strategy identified in Regulation No. 72 is to minimize nutrient (phosphorus and nitrogen) concentrations. Therefore, PRFs are still evaluated, in part, on their costs per pound for consistency between all potential PRFs (see also Stream Reclamation Unit Costs below). Additional information on how PRFs are evaluated, particularly stream reclamation type projects, is presented in the Authority's report dated June 17, 2011 titled *Stream Reclamation Water Quality Benefit Evaluation Interim Status Report*.

The Cottonwood Creek Cattail Harvesting Pilot Project (CCB-13.3.1 A and B) included phosphorus reduction/removed (59-60 pounds per year) from the system based on 2020 Cattail Harvesting Pilot Project Memo for a unit cost $1,000-1,017 per pound of phosphorus removed. In 2021, CCB-13.3.3.1 A removed 69 pounds of phosphorus at unit cost of $1,200 per pound of phosphorus.

Table 2 – Summary of Recommended Pollutant Reduction Facilities 2023 – 2032 Budget Projections

This table lists the PRFs that are in the current, 10-year CIP projection with more detail provided for the projects in the current budget year. Since the Authority partners with other governmental agencies to design and construct some of the PRFs, the Authority's portion of total project costs is also shown. The column labeled "obligated funds" represents the total amount approved by the Authority for the project prior to the budget year, since most projects take several years from concept through construction. Funds are considered "obligated" once the Board approves funding at a regular Board meeting. The highlights of the projects included in the 2023 Budget are described below.

CCBWQA's funding on the East Shade Shelter Shoreline Stabilization Phase III (CCB-17.5) is 100% as it is a PRF in CCSP.

CCBWQA's funding on Cherry Creek Stream Reclamation – Reaches 3 and 4 (CCB-5.14C) is 25% as it is a partner project.

CCBWQA's funding of Cherry Creek – Reservoir to Lake View Drive Alternatives Analysis (CCB-5.16A) is 100%.

CCBWQA's funding on Cherry Creek Stream Reclamation at Dransfeldt Extension (CCB-5.17.1B) is at 7% (not the typical 25% partner project) as the project was advanced from 2024 and 2025 to 2022 and 2023 to meet the schedule for the requesting entity.

CCBWQA's funding on McMurdo Gulch Reclamation (CCB-7.4) is 25% as it is a partner project.

CCBWQA's funding on Lone Tree Creek in CCSP (CCB-21.3, Done in conjunction with Centennial Trail Project) is at 25% (not the typical 100% for projects within CCSP) of the stream reclamation portion of the larger trail project. The trail portion advanced the stream reclamation portion ahead of its water quality priority, limiting the funds available for the project. The $112k shown is not currently in the budget for 2023 and would have to come out of contingency if done in 2023; $95k was included in CCBWQA's 2022 Budget. If CCB-21.3 doesn't move forward, then the Lone Tree Creek in CCSP (CCB-21.3a, CCBWQA Only) was included in 2032 and is 100% CCBWQA funded. The schedule, cost, and priority will be reevaluated based on the Planning effort scheduled for Lone Tree Creek in 2023.

CCBWQA's funding on Happy Canyon Creek County Line to Cherry Creek (CCB-22.1) is at 25% as it is a partner project.

CCBWQA's funding on Dove Creek (CCB-22.1 and CCBW-23.1) is 25% as it is a partner project.

CCBWQA's funding on Piney Creek Reach 1 to 2 (CCB-6.5) is at 22% (not the typical 25% partner project) as that was the funding level requested by the requesting entity.

CCBWQA's funding on PRF Preservation, Acquisition, Lease of Land or Water is budgeted for $100k and CCBWQA's percentage is not known as no project and costs have been identified yet for 2023.

2023 Operations and Maintenance Budget Detail

These tables provide further 2023 budget detail for operations and maintenance activities proposed for the constructed PRF's including the Reservoir Mixing System (i.e.: compressor and aeration system maintenance).

2023 Stream Reclamation Unit Costs

These figures show the stream reclamation unit costs. Figure 1 is for PRFs within CCSP that are fully CCBWQA funded and Figure 2 for projects outside of CCSP that are shared funding.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2023 CIP

Date: **November 11, 2022**

Color Code: Blue: Project Completed

Green: Planned for design/construction during 5-year period

Red: See 2021 CIP Notes for changes to this Spreadsheet

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)		(9)		(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
CCR-1	Reservoir Destratification (mixing)	Officially start-up April 2008	Use inlake mixing to minimize algae blooms, therefore chlorophyll a	369	sq mi	n/a	n/a	n/a		n/a		n/a		810	lbs/season	$ 968				28	$ 80	100%	$968	$ 99	$ 99	
CCB-1	CCSP Wetlands	Prelim design prepared in 2003 (Ref 1, 8)	Restore 60 Acres of wetlands in multiple phases	369	sq mi	3.5 cfs avg daily flow	1415 af/210 days	0.35	mg/l	1050	lbs/yr	Base flow		600	lbs/season	$ 1,928	$ -	$ -	$ -	19	$ 123	100%	$1,928	$ 204	$ 204	18
CCB-5.1	Cherry Creek Sediment Pond at Arapahoe Road (see CCB-5.14)	Project eliminated and area combined into Phase III of CCB-5.14	Design and construct sediment pond	369	sq mi		3600 cy sed/yr	14.6	mg/l	92	lbs/yr	base flow		85	lbs/year	$ 2,355	$ 50	$ -	$ -	$ 90	$ 219	18%	$424	$ 2,575	$ 463	1, 19
CCB-5.2	Arapahoe/Douglas County Line Stream Stabilization	Project completed w/o Authority participation	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 1,062	$ -	$ -	$ -	1	$ 58	0%	$0	$ 1,258	$ -	
CCB-5.3	Cottonwood Bridge Stream Stabilization	Project completed by Parker w/o Authority participation	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 436	$ -	$ -	$ -	2	$ 25	0%	$0	$ 551	$ -	
CCB-5.4	Cherry Creek Stream Stabilization at Main Street (Parker)	Conceptual design by UDFCD	Local stream stabilization (L = 4000 ft)	0.76	mi			100	lbs/mi	76	lbs/yr	Storm Flow	90%	68	lbs/year	$ 1,776	$ -	$ -	$ -	1	$ 96	11%	$200	$ 1,410	$ 159	2, 3
CCB-5.5	Stroh Road Stream Stabilization	Project completed by Parker w/o Authority participation	Stream stabilization (L = 5000 ft)	0.95	mi			100	lbs/mi	95	lbs/yr	Storm Flow	90%	85	lbs/year	$ 218	$ -	$ -	$ -	1	$ 13	0%	$0	$ 149	$ -	
CCB-5.6	Cherry Creek Stream Stabilization at Lincoln Avenue (Parker)	Conceptual design by UDFCD	Local stream stabilization (L = 2350 ft)	0.45	mi			100	lbs/mi	45	lbs/yr	Storm Flow	90%	40	lbs/year	$ 1,447	$ -	$ -	$ -	1	$ 79	21%	$304	$ 1,960	$ 412	2, 3
CCB-5.7	Cherry Creek Stream Stabilization at Eco-Park (SEMSWA)	IGA w/SEMSWA for design in 2010 and construction in 2011/2012	Local stream stabilization (L = 6850 ft)	1.30	mi			100	lbs/mi	130	lbs/yr	Storm Flow	90%	117	lbs/year	$ 4,756	$ -	$ -	$ -	$ 1	$ 256	24%	$1,155	$ 2,191	$ 532	2, 3
CCB-5.8	Cherry Creek Stream Reclamation U/S Arapahoe Rd (Aurora) (see CCB-5.14)	Now Phase 5 of CCB-5.14	Local stream stabilization (L = 2200 ft)	0.42	mi			100	lbs/mi	42	lbs/yr	Storm Flow	90%	38	lbs/year	$ -	$ -	$ -	$ -	1	$ 1	35%	$0	$ 27	$ 9	2, 3
CCB-5.9.1	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase I	Design completed in 2011 for Phase I.	Local stream stabilization (L = 500 ft)	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/year	$ 296	$ -	$ -	$ -	$ 1	$ 17	100%	$296	$ 1,979	$ 1,979	2, 20
CCB-5.9.2	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase II	Design completed in 2013 for Phase II.	Local stream stabilization (L = 2500 ft)	0.47	mi			100	lbs/mi	47	lbs/yr	Storm Flow	90%	43	lbs/year	$ 1,429	$ -	$ -	$ -	$ 1	$ 78	100%	$1,429	$ 1,820	$ 1,820	2, 20
CCB-5.10	Cherry Creek Stream Stabilization at PJCOS (Vermillion Creek, PJMD.)	Design completed by PJMD. Authority is funding partner in design	Local stream stabilization (L = 5100 ft)	0.97	mi			100	lbs/mi	97	lbs/yr	Storm Flow	90%	87	lbs/year	$ 3,017	$ -	$ -	$ -	$ 2	$ 164	21%	$643	$ 1,882	$ 401	2, 3
CCB-5.11	Cherry Creek Stream Stabilization at Norton Farms (Parker)	Conceptual design by UDFCD identified priority 3	Local stream stabilization (L = 2200 ft)	0.42	mi			100	lbs/mi	42	lbs/yr	Storm Flow	90%	38	lbs/year	$ 900	$ -	$ -	$ -	1	$ 49	28%	$252	$ 1,313	$ 368	2, 3
CCB-5.12	Cherry Creek Stream Stabilization at Pine Lane	Project completed by Parker w/o Authority participation	Local stream stabilization (L = 1500 ft)	0.28	mi			100	lbs/mi	28	lbs/yr	Storm Flow	90%	26	lbs/year	$ 500	$ -	$ -	$ -	1	$ 28		$0	$ 1,087	$ -	
CCB-5.13	Cherry Creek Stream Stabilization at Shop Creek Trail	Preliminary design completed in 2010 (Ref 12).	Local Stream Stabilization (L = 2000 ft)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 603	$ -	$ -	$ -	6	$ 38	100%	$603	$ 1,125	$ 1,125	2, 3
CCB-5.14	Cherry Creek Stream Reclamation - CCSP to Eco Park (Ph II to V)	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 11000 ft)	2.08	mi			100	lbs/mi	208	lbs/yr	Storm Flow	90%	188	lbs/year	$ 10,200	$ -	$ -	$ -	$ 1	$ 547	25%	$2,499	$ 2,920	$ 715	2, 3

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2023 CIP

Date: **November 11, 2022**

Color Code: Blue: Project Completed

Green: Planned for design/construction during 5-year period

Red: See 2021 CIP Notes for changes to this Spreadsheet

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-5.14A	Cherry Creek Stream Reclamation - Eco Park to Soccer Fields	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 1,850	$ -	$ -	$ -	$ 1	$ 100	35%	$650	$ 2,181	$ 766	2, 3
CCB-5.14B	Cherry Creek Stream Reclamation - Valley Country Club	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 2000 ft.=1400 ft on Cherry Creek and 600 ft. on Tributary)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 2,284	$ -	$ -	$ -	$ 1	$ 123	21%	$484	$ 3,607	$ 764	2, 3
CCB-5.14C	Cherry Creek Stream Reclamation - Valley Country Club to Soccer Fields (Reaches 3 and 4)	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 5167 ft on Cherry Creek)	0.98	mi			100	lbs/mi	98	lbs/yr	Storm Flow	90%	88	lbs/year	$ 5,287	$ -	$ -	$ -	$ 1	$ 284	25%	$1,322	$ 3,223	$ 806	2, 3
CCB-5.14D	Cherry Creek Stream Reclamation - Remaining Sections (not included in Reaches 3 and 4) from Valley Country Club to Soccer Fields	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 3688 ft on Cherry Creek)	0.70	mi			100	lbs/mi	70	lbs/yr	Storm Flow	90%	63	lbs/year	$ 2,980	$ -	$ -	$ -	$ 1	$ 161	25%	$745	$ 2,556	$ 639	2, 3
CCB-5.15	Cherry Creek Stream Reclamation at Country Meadows (Hess Rd)	Project by Town of Parker and Douglas County	Local stream stabilization (L = 7700 ft)	1.46	mi			100	lbs/mi	146	lbs/yr	Storm Flow	90%	131	lbs/year	$ 2,170	$ -	$ -	$ -	$ 2	$ 118	24%	$520	$ 901	$ 216	
CCB-5.16	Cherry Creek Stream Reclamation - 12 Mile Phase III	Project w/in CCSP identified as Reach 1 in Project CCB-5.14 work.	Local stream stabilization (L =30 ft,)	0.01	mi			100	lbs/mi	1	lbs/yr	Storm Flow	90%	1	lbs/year	$ 300	$ -	$ -	$ -	3	$ 19	100%	$300	$ 37,299	$ 37,299	2, 20
CCB-5.16A	Cherry Creek Stream Reclamation - Reservoir to Lake View Drive (Reach 1 in Muller's 2022 Stream Assessment Report)	Project w/in CCSP	Local stream stabilization (L =6365 ft,)	1.21	mi			100	lbs/mi	120.5	lbs/yr	Storm Flow	90%	108	lbs/year	$ 6,842	$ -	$ -	$ -	68	$ 435	100%	$6,842	$ 4,009	$ 4,009	2, 20
CCB-5.16B	Cherry Creek Stream Reclamation - Lake View Drive to North Side of DOLA (Reach 2 in Muller's 2022 Stream Assessment Report)	Project w/in CCSP	Local stream stabilization (L =5220 ft,)	0.99	mi			100	lbs/mi	98.9	lbs/yr	Storm Flow	90%	89	lbs/year	$ 5,612	$ -	$ -	$ -	56	$ 357	100%	$5,612	$ 4,010	$ 4,010	2, 20
CCB-5.16C	Cherry Creek Stream Reclamation - North Side of DOLA to CCSP Boundaries (Reaches 3 and 4 in Muller's 2022 Stream Assessment Report)	Project w/in CCSP	Local stream stabilization (Cherry Creek Reach 3 L =7353 ft, Piney Creek Reach 4 L=2000 ft)	1.77	mi			100	lbs/mi	177.1	lbs/yr	Storm Flow	90%	159	lbs/year	$ 10,054	$ -	$ -	$ -	101	$ 639	100%	$10,054	$ 4,009	$ 4,009	2, 20
CCB-5.17.1A	Cherry Creek Stream Reclamation at KOA	Prelimiinary design completed 2019, Extension Requested by UDFCD and Parker in 2019	Local stream stabilization (L =1400 ft original, L=2000 ft with 600 ft extension)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 2,035	$ -	$ -	$ -	20	$ 129	20%	$375	$ 3,795	$ 776	2, 3
CCB-5.17.1B	Cherry Creek Stream Reclamation at Dransfeldt	Design in 2021, Construction in 2023	Local stream stabilization (L =2400 ft original)	0.45	mi			100	lbs/mi	45	lbs/yr	Storm Flow	90%	41	lbs/year	$ 6,010	$ -	$ -	$ -	60	$ 382	7%	$400	$ 9,340	$ 622	2, 3
CCB-5.17.2	Cherry Creek Stream Reclamation U/S Scott Road	Project requested by Douglas County and UDFCD in 2019	Local stream stabilization (L = 4300 ft)	0.81	mi			100	lbs/mi	81	lbs/yr	Storm Flow	90%	73	lbs/year	$ 5,237	$ -	$ -	$ -	52	$ 333	17%	$900	$ 4,543	$ 781	2, 3
CCB-6.1	Piney Creek Stream Stabilization - Project 1	Authority funded $118,000 Arapahoe County in 2002.	Restore 5200 lf upstream of Parker Road	22.90	sq mi	n/a	n/a	100	lbs/mi	100	lbs/yr	Storm Flow	90%	90	lbs/year	$ 997	$ -	$ -	$ -	at	#VALUE!	13%	$130	#VALUE!	#VALUE!	2, 3
CCB-6.2	Piney Creek Stream Stabilization - Project 2 U/S Buckley Rd	Project completed w/o Authority participation	Reclaim 1700 lf upstream of Buckley Road	0.32	mi			100	lbs/mi	32	lbs/mi	Storm Flow	90%	29	lbs/year	$ 998	$ -	$ -	$ -	1	$ 54	12%	$120	$ 1,880	$ 226	2, 3
CCB-6.3	Piney Creek Stream Sediment Removal - Saddle Rock Golf Course	Request from Aurora in 2011	Sediment removal to restore channel capacity (L = unk)					unk		unk	unk	Sediment	100%	5346	unk	$ 383	$ -	$ -	$ -	$ 10	$ 30	25%	$96	$ 6	$ 1	
CCB-6.4	Piney Creek Stream Reclamation - Reachs 6 & 7	Request from UDFCD in 2014	Local stream stabilization (L = 6,000 ft)	1.14	mi			unk		365	lbs/yr	Storm Flow	90%	329	lbs/year	$ 11,000	$ -	$ -	$ -	$ 2	$ 591	25%	$2,750	$ 1,800	$ 450	12

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

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Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-6.5	Piney Creek Reach 1 to 2 (SEMSWA)	Requested in 2020	2900 lf of stream reclamation	0.55	mi			100	lbs/mi	55	lbs/mi	Storm Flow	90%	49	lbs/year	$ 2,350	$ -	$ -	$ -	$ 2	$ 128	22%	$515	$ 2,588	$ 567	2, 3
CCB-6.6	Piney Creek Tower to Orchard (SEMSWA)	Requested in 2020	3800 lf of stream reclamation	0.72	mi			100	lbs/mi	72	lbs/mi	Storm Flow	90%	65	lbs/year	$ 3,000	$ -	$ -	$ -	$ 2	$ 163	23%	$700	$ 2,512	$ 586	2, 3
CCB-7.1	McMurdo Gulch Reclamation (Castle Rock)	Project completed in 2011	Stream Reclamation (L = 15,000 lf)	2.84	mi			100	lbs/mi	284	lbs/yr	Storm Flow	90%	256	lbs/year	$ 1,470	$ -	$ -	$ -	28	$ 107	43%	$630	$ 419	$ 180	
CCB-7.2	McMurdo Gulch Reclamation (Castle Rock) 19/20 Project	Design in 2019, Construction in 2020	Stream Reclamation (L = 2,000 lf)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 1,677	$ -	$ -	$ -	17	$ 107	25%	$420	$ 3,127	$ 783	2, 3
CCB-7.3	McMurdo Gulch Reclamation (Castle Rock) 20/21/22 Project	Design in 2020, Construction 2021	Stream Reclamation (L = 3,700 lf)	0.70	mi			100	lbs/mi	70	lbs/yr	Storm Flow	90%	63	lbs/year	$ 2,460	$ -	$ -	$ -	25	$ 156	25%	$615	$ 2,480	$ 620	2, 3
CCB-7.4	McMurdo Gulch Reclamation (Castle Rock) 22/23/24 Project	Design in 2022, Construction 2023 and 2024	Stream Reclamation (L = 6,550 lf)	1.24	mi			100	lbs/mi	124	lbs/yr	Storm Flow	90%	112	lbs/year	$ 3,298	$ -	$ -	$ -	33	$ 210	25%	$825	$ 1,878	$ 470	2, 3
CCB-8	Limestone Filter Enhancement	Specific project not identified	Construct limestone filter bed downstream of retention pond	1.0	sq mi	n/a	10.7 af/year/sq mile	427	lbs/sq mi	427	lbs/yr	Base and storm flow	20%	85	lbs/year/mi^2	$ 943		$ -	$ 595	$ 1	$ 83	43%	$405	$ 977	$ 420	
CCB-11	Advanced Water Treatment Plant	Conceptual design prepared	Construct 2 MGD AWT plant on Cottonwood Creek to treat Cherry Creek and Cottonwood Creek flows (0.21-mg/ influent, 0.03 mg/l disch)	3	cfs	2-MGD	2260	0.21	mg/l	1272	lbs/yr	Base flow and groundwater	90%	1145	lbs/year	$ 4,593	unknown	unknown		$ 69		100%	$4,593	$ -	$ -	11
CCB-12	Bowtie Property PRF	Purchase completed 2003	Stabilize confluence (Ph I) and construct sediment pond (Ph 2)	22	sq mi	2-year flood	300 af	500	mg/l/to n	85	lbs/yr	base flow and minor flood	70% pond 65% wetlands	235	lbs/year	$ 826	$ 300	$ 63	$ 1.8	$ 6	$ 70	100%	$826	$ 299	$ 299	
CCB-12.1	Bowtie Phase I	No action to date	Constructed Wetlands u/s Bowtie Property in Cherry Creek (0.20-disch)	369	sq mi	0.5 cfs avg daily flow	210 af/210 days	0.35	mg/l	86	lbs/yr	Base flow	assumed effluent conc	86	lbs/season	$ 235	$ 200	$ 80	$ -	$ 7	$ 35	100%	$235	$ 404	$ 404	
CCB-13.1	Cottonwood\Peoria Wetlands Pond	Completed 2003. Restorative maintenance required in 2009	Joint funded project with UDFCD, GWV, Arapahoe County	8.30	sq mi							base and flood flows	measured	363	lbs/year	$ 1,636	$ -	$ -	$ -	$ 5	$ 93	12%	$196	$ 255	$ 31	2
CCB-13.2	Cottonwood Stream Reclamation in CCSP	Phase I completed in 2004. Phase II completed June 2008 (Ref 2)	11,600 lf of stream reclamation from Peoria to Perimeter Rd. Pond	2.20	mi			100	lbs/mi	220	lbs/yr	base and flood flows	see separate calcs	730	lbs/year	$ 2,200	$ -	$ -	$ -	$ 55	$ 173	100%	$2,200	$ 237	$ 237	2
CCB-13.3	Cottonwood Creek Stream Stabilization at Easter Avenue	Authority contributed $338,000 for construction in 2010.	2,600 lf of stream reclamation from Easter Ave to Briarwood Ave	0.49	mi			100	lbs/mi	49	lbs/yr	Storm Flow	90%	44	lbs/year	$ 1,350	$ -	$ -	$ -	$ 1	$ 73	25%	$338	$ 1,655	$ 414	2
CCB-13.3.1A	Cottonwood Creek Catail Harvesting from Reservoir to Peoria Street~	Pilot Project - Odd Years Harvest Left Bank	1.7 Acres of Cattail Harvesting	2.90	mi				lbs/mi	30	lbs/yr	Storm Flow	100%	59	lbs/year	$ 60						100%	$60	$ 1,017	$ 1,017	4
CCB-13.3.1B	Cottonwood Creek Cattail Harvesting from Reservoir to Peoria Street~	Pilot Project - Even Years Harvest Right Bank	2.0 Acres of Cattail Harvesting	2.90	mi				lbs/mi	237	lbs/yr	Storm Flow	100%	60	lbs/year	$ 60						100%	$60	$ 1,000	$ 1,000	4
CCB-13.4	Peoria Trib B/Airport East and West Pond (Outfall C-1)	Cottonwood Creek Master Planned Improvements. Ponds combined into one.	Combined existing detention ponds and provided EURV	0.35	sq mi			400	lbs/sq mi	140	lbs/yr	Base and storm flow	40%	56	lbs/yr	$ 523	$ -	$ -	$ -	$ -	$ 28	25%	$131	$ 500	$ 125	
CCB-13.5.1	Cottonwood Creek at Briarwood (SEMSWA)	Requested in 2019	700 lf of stream reclamation	0.13	mi			100	lbs/mi	13	lbs/yr	Storm Flow	90%	12	lbs/year	$ 850	$ -	$ -	$ -	9	$ 54	16%	$140	$ 4,529	$ 746	
CCB-13.5.2	Cottonwood Creek D/S Easter Avenue	Requested in 2019	800 lf of stream reclamation	0.15	mi			100	lbs/mi	15	lbs/yr	Storm Flow	90%	14	lbs/year	$ 800	$ -	$ -	$ -	8	$ 51	20%	$160	$ 3,730	$ 746	
CCB-13.5.3	Cottonwood Creek Tributary - Shooting Area Tributary (CCSP)	Requested in 2020	600 lf of stream reclamation	0.11	mi			100	lbs/mi	11	lbs/yr	Storm Flow	90%	10	lbs/year	$ 300	$ -	$ -	$ -	3	$ 19	25%	$75	$ 1,865	$ 466	2, 3

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2023 CIP

Date: **November 11, 2022**

Color Code: Blue: Project Completed

Green: Planned for design/construction during 5-year period

Red: See 2021 CIP Notes for changes to this Spreadsheet

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-13.5.4	Cottonwood Creek and Tributary C (IWSD)	Requested in 2020	2080 lf of stream reclamation	0.39	mi			100	lbs/mi	39	lbs/yr	Storm Flow	90%	35	lbs/year	$ 1,664	$ -	$ -	$ -	17	$ 106	25%	$416	$ 2,984	$ 746	2, 3
CCB-13.5.5	Windmill Creek Pond W-9 Retrofit (SEMSWA)				sq mi		3600 cy sed/yr		mg/l		lbs/yr	base flow			lbs/year	$ 150	$ 50	$ -	$ -	$ 90	$ 101	25%	$38	#DIV/0!	#DIV/0!	5
CCB-14	Belleview Wetlands	Co-funding opportunity with USACE on indefinite hold	Retrofit existing develop. w/wet detention pond	235	Ac SF Resid			400	lbs/sq mi	145	lbs/yr	Base and storm flow	50%	73	lbs/year	$ 210	$ -	$ -	$ -	$ 2	$ 13	100%	$210	$ 183	$ 183	2
CCB-15	Surface Water Reuse at Cherry Creek Vista	Supplemental water not available. Project on indefinite hold.	Use water from Cottonwood Creek to irrigate 10-acres			2.92 af/ac-yr	29.2 af/yr	0.20	mg/l	15.9	lbs/yr	base flow	80%	13	lbs/year	$ 50	$ -	$ -	$ -	$ -	$ 3	100%	$50	$ 211	$ 211	
CCB-16	Stream Corridor Preservation	No projects identified	Partner with others to purchase property or conservation easements along Cherry Creek													$ 100					$ 5	100%	$100			1
CCB-17.2	Reservoir Shoreline Stabilization Mountain Loop Trail	Scheduled for construction beginning in 2012	CCSP Recreation sites: Mountain, Lake and Cottonwood Creek Loops											54	lbs/yr	$ 1,131	$ -	$ -	$ -	$ 5	$ 66	100%	$1,131	$ 1,215	$ 1,215	1, 16
CCB-17.2.1	Mountain and Lake Loop - 2021 Shoreline Maintenance	Identified during 2020 annual PRF observation	45 lf of bank stabilization	45	lf	0.1 cy/yr/ft		0.14	lbs/lf	6.3	lbs/yr	bank erosion	80%	5.04	lbs/yr	$ 24	$ -	$ -	$ -	$ 2	$ 3	100%	$24	$ 652	$ 652	1, 16
CCB-17.3	West Boat Ramp Parking Lot WQ Improvements	Final design completed in 2012	Provide water quality treatment of parking lot runoff.	3.43	ac prkg lot					3	lbs/yr	parking lot	70%	2.1	lbs/yr	$ 330	$ -	$ -	$ -	$ 1	$ 19	100%	$330	$ 8,903	$ 8,903	1
CCB-17.4	East Boat Ramp Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	100 lf of bank stabilization	105	lf	0.1 cy/yr/ft		0.14	lbs/lf	14.7	lbs/yr	bank erosion	80%	11.8	lbs/yr	$ 63	$ -	$ -	$ -	$ 2	$ 5	100%	$63	$ 457	$ 457	1, 16
CCB-17.4.1	East Boat Ramp Shoreline Stabilization Phase III	Identified during 2012 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 350	$ -	$ -	$ -	$ 2	$ 21	100%	$350	$ 463	$ 463	1, 16
CCB-17.5	East Shade Shelter Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	20 lf of bank stabilization	20	lf	0.1 cy/yr/ft		0.14	lbs/lf	2.8	lbs/yr	bank erosion	80%	2.2	lbs/yr	$ 18	$ -	$ -	$ -	$ -	$ 1	100%	$18	$ 431	$ 431	1, 16
CCB-17.5.1	East Shade Shelter Shoreline Stabilization Phase III	Identified during 2014 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 906	$ -	$ -	$ -	$ -	$ 49	100%	$906	$ 1,083	$ 1,083	1, 16
CCB-17.6	West Shade Shelter Shoreline Stabilization PRF[14]	Identified initially in 2006. UCD Student Project w/WPR in 2013	1,400 lf of bank stabilization	1400	lf	0.1 cy/yr/ft		0.14	lbs/lf	196.0	lbs/yr	bank erosion	80%	179	lbs/yr	$ 704	$ -	$ -	$ -	$ 1,000	$ 51	65%	$458	$ 285	$ 185	21
CCB-17.7	Tower Loop Shoreline Stabilization Phase II	Identified during 2014 annual PRF inspection	700 lf of bank stabilization	700	lf	0.1 cy/yr/ft		0.14	lbs/lf	98.0	lbs/yr	bank erosion	80%	78.4	lbs/yr	$ 1,056	$ -	$ -	$ -	$ -	$ 57	100%	$1,056	$ 722	$ 722	1, 16
CCB-17.8	Dixon Grove Shoreline Stabilization Phase II	Identified during 2019 annual PRF inspection	200 lf of bank stabilization	200	lf	0.1 cy/yr/ft		0.14	lbs/lf	28.0	lbs/yr	bank erosion	80%	22.4	lbs/yr	$ 235	$ -	$ -	$ -	$ -	$ 13	100%	$235	$ 562	$ 562	1, 16
CCB-18	OWTS Sewer Service	No action to date	Provide Sewer Service for OWTS Areas			To Be Determined		To Be Determined					To Be Determined				To Be Determined					100%		To Be Determined		1
CCB-19	Non-point Pollutant Management	No action to date	Assist agricultural contributors to water quality impact			To Be Determined		To Be Determined					To Be Determined			$ 100	$ -	$ -	$ -	$ -	$ 5	100%	$100	To Be Determined		1
CCB-20.1	Detention Pond Retrofit Program - McMurdo Gulch	Phase 1 - McMurdo Gulch	Modify existing ponds to meet current standards for WQ	1	Each			0.40	lbs/Trib Acre	0.4	lbs/yr	Residential		9	lbs/pond/yr	$ 60	$ -	$ -	$ -	$ 0	$ 4	100%	$60	$ 396	$ 396	1, 17
CCB-21.1	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	Identified in 2014. Request from Arapahoe County Open Space.	500 lf of stream reclamation from CCSP Boundary to Cottonwood Creek	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/yr	$ 340	$ -	$ -	$ -	$ 2	$ 20	100%	$340	$ 2,372.03	$ 2,372	2, 3
CCB-21.2	Lone Tree Creek Pond L-3 Retrofit (SEMSWA)				sq mi		3600 cy sed/yr		mg/l		lbs/yr	base flow			lbs/year	$ 2,355	$ 50	$ -	$ -	$ 90	$ 219	#DIV/0!	$18	#DIV/0!	#DIV/0!	5
CCB-21.3	Lone Tree Creek in CCSP upstream of Pond (Centennial Trail Portion)	Request from Centennial for Participation in Stream Reclamaation portion of Trail Project.	710 lf of stream reclamation between CCSP Boundary and Windmill Creek Loop Trail	0.13	mi			100	lbs/mi	13	lbs/yr	Storm Flow	90%	12	lbs/yr	$ 448	$ -	$ -	$ -	$ 2	$ 26	25%	$112	$ 2,148.56	$ 537	2, 3
CCB-22	Happy Canyon Creek	MDP Priority Project	6,600 lf of stream reclamation upstream of I-25	1.25	mi			100	lbs/mi	125	lbs/yr	Storm Flow	90%	113	lbs/yr	$ 7,702	$ -	$ -	$ -	$ 2	$ 415	25%	$1,926	$ 3,685.78	$ 921	2, 3
CCB-22.1	Happy Canyon Creek at Jordan Road (SEMSWA)	Requested in 2020	2,500 lf of stream reclamation, project extended another 2000 feet in 2022	0.85	mi			100	lbs/mi	85	lbs/yr	Storm Flow	90%	77	lbs/year	$ 2,731	$ -	$ -	$ -	27	$ 174	25%	$683	$ 2,264	$ 566	2, 3

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2023 CIP

Date: **November 11, 2022**

Color Code:
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Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment		Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed	Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-22..2	Happy Canyon Creek Upstream of I-25 (MHFD)	Requested in 2020	3000 lf of stream reclamation	0.57	mi			100	lbs/mi	57	lbs/yr	Storm Flow	90%	51 lbs/year	$ 5,441	$ -	$ -	$ -	54	$ 346	9%	$500	$ 6,765	$ 622	2, 3
CCB-23.1	Dove Creek U/S Pond D-1 to Chambers Rd (SEMSWA)	Requested in 2020	1300 lf of stream reclamation	0.25	mi			100	lbs/mi	25	lbs/yr	Storm Flow	90%	22 lbs/year	$ 650	$ -	$ -	$ -	7	$ 41	25%	$163	$ 1,865	$ 466	2, 3
CCB-23.2	Dove Creek Otero to Chambers Rd. (SEMSWA)	Requested in 2020	1400 lf of stream reclamation	0.27	mi			100	lbs/mi	27	lbs/yr	Storm Flow	90%	24 lbs/year	$ 700	$ -	$ -	$ -	7	$ 45	25%	$175	$ 1,865	$ 466	2, 3

BASIS FOR ANALYSIS:

(A) Unit cost of phosphorus removal based on annualized cost of completed project over 35 years at 4% interest rate. CRF = 0.053577

(B) All projects identified provide for additional phosphorus immobilization beyond minimum requirements, unless noted otherwise.

2023 CIP NOTES:

1. Assumed that augmentation for consumptive use not required
2. Augmentation for naturally established wetlands not required (assumption)
3. Phosphorus Estimated based on Interim Stream Reclamation Paper
4. See 2020 Cattail Harvesting Pilot Project Memo. Phosphorus estimated based on SEMSWA 2020 Data.
5. Pond updates to bring up to current standards and to facilitate maintenance. No phosphorus calculation provided, since ponds already exist.
6.
7.
8. Water costs at $ 6,500 per acre foot
9. Present worth of capital replacement
11. Land acquisition and water augmentation not defined. CWSD\ACWWA JWPP project influenced scope of project.
12. Total Phosphorus loading derived from laboratory sediment samples & Stantec Geomorphic Study BANCS analysis.
15. Estimate based on costs for similar work along East Shoreline dating back to 1996
16. Benefit approximated based on other shoreline projects and estimates
17. Loads and performance based on calculations for 3 McMurdo Gulch ponds.
18. SEO opined that ET must be augmented. Also, recent Reservoir fluctuations may render project infeasible. Placed on indefinite hold.
19. Approach was shifted to focus on stream reclamation (CCB-5.14) and reduction of sediment and nutrient sources from erosion.
20. Joint project with CCSP. Integrate design with Dog Park uses and improvements. Estimate based on similar stream stabilization projects
21. Phosphorus: Shoreline 177 lbs/yr + Parking Lot 2 lbs/yr =179 lbs/yr

REFERENCES

1. Muller Eng 2003. *Feasibility Evaluation for Cherry Creek State Park Wetlands Project*
2. Muller Eng 2003. *Feasibility Evaluation for Cottonwood Creek Stream Stabilization Project*
3. AMEC 2005. *Draft Feasibility Report Cherry Creek Reservoir Destratification*
4. AMEC 2006. *Recommendations for Prepurchase of Jamor Equipment for Cherry Creek Reservoir Destratification Project.*
5. Tetra Tech August 2006. *Phosphorus Estimates in Cherry Creek and Cost for Removal via Sediment Trap.*
6 WERF 2000. *Phosphorus Credit Trading in the Cherry Creek Basin: An Innovative Approach to Achieving Water Quality Benefits.*
7. Ruzzo, WP September 5, 2003. Cherry Creek Corridor Master Plan-*Estimate of Phosphorus Reduction from Stream Reclamation*
8. Ruzzo, W. P. September 21, 2006. *Cottonwood Creek Reclamation - Water Rights Augmentation Requirements.*
9. TetraTech December 2006. *Design of Cherry Creek Sediment Basin and Stream Stabilization.*
10. Brown and Caldwell Feb 2007. *Shop Creek Wetlands Pollutant Reduction Facility Wetland Assessment*
11. PBSJ October 2006. *Draft McMurdo Gulch Major Drainageway Master Plan*
12. Brown and Caldwell 2010. *Cherry Creek Stream Reclamation at Shop Creek Trail.*
13. CCBWQA TAC June 16, 2011. *Stream Reclamation Water Quality Benefit Evaluation Interim Status Report*
14. Ruzzo Memo, September 4, 2013, *West Shade Shelter Shoreline Stabilization PRF - Water Quality Analysis.*

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES

2023 - 2032 BUDGET PROJECTIONS (1000$)

	A	B	C	D	E	F	G	H	O	P	Q	R	W	AB	AD	AE	AF	AG	AH	AI	AJ	AK
10		**November 11, 2022**	**Current Project Budget**					**Prior Year Obligated Funds[3]**	**Proposed 2023 Budget**				**Proposed 2024 Budget**	**Proposed 2025 Budget**	**Proposed 2026 Budget**	**Proposed 2027 Budget**	**Proposed 2028 Budget**	**Proposed 2029 Budget**	**Proposed 2030 Budget**	**Proposed 2031 Budget**	**Proposed 2032 Budget**	**2023-2032 Total**
11	**Project No.**	**Project Title**	**Capital[1]**	**Total**	**O&M**	**Authority Portion**	**Authority Portion**		**Design**	**Capital**	**Water**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
12	**Budget Category - General**																					
14	**Budget Category - Reservoir Projects**																					
17	CCR-2	Reservoir Destratification System - Distribution Preliminary Design - Includes evaluation of Optimization of Distribution with WWE Expansion Alternative	$ 2,140	$ 2,140		$ 2,140	100%	$ -	$ -	$ -	$ -	$ -	***$ 270***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 935***	***$ 935***	***$ -***	***$ 2,140***
18	CCR-3	Reservoir Nutrient Mitigation Alternatives Study	$ 100	$ 100		$ 100	100%	$ -	$ -	$ -	$ -	$ -	***$ 100***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 100***
19	CCB-17.5	East Shade Shelter Shoreline Stabilization Phase III	$ 906	$ 906		$ 855	100%	$ 51	$ 59	$ 600	$ -	***$ 659***	***$ 196***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 855***
20	CCB-17.6	West Shade Shelter Shoreline Stabilization PRF	$ 704	$ 704		$ 704	100%	$ 154	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ 550***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 550***
21	CCB-17.7	Tower Loop Shoreline Stabilization Phase II	$ 1,056	$ 1,056		$ 1,056	100%	$ 90	$ -	$ -	$ -	***$ -***	***$ 966***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 966***
22	**Budget Category - Stream Reclamation Projects**																					
23	CCB-5.4	Cherry Creek Stream Reclamation at Main Street (Parker)	$ 1,776	$ 1,776		$ 200	11%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***
24	CCB-5.6	Cherry Creek Stream Stabilization at Lincoln Avenue (Parker)	$ 1,447	$ 1,447		$ 304	21%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 304***	***$ -***	***$ -***	***$ -***	***$ 304***
28	CCB-5.14C	Cherry Creek Stream Reclamation - Reach 3	$ 2,567	$ 2,567		$ 640	25%	$ -	$ 130	$ -	$ -	***$ 130***	***$ 510***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 640***
29	CCB-5.14C	Cherry Creek Stream Reclamation - Reach 4	$ 2,720	$ 2,720		$ 680	25%	$ 25	$ -	$ 475	$ -	***$ 475***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 475***
30	CCB-5.16A	Cherry Creek - Reservoir to Lake View Drive Alternatives Analysis	$ 200	$ 200		$ 200	100%	$ -	$ 200	$ -	$ -	***$ 200***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***
34	CCB-5.17.1B	Cherry Creek Stream Reclamation - at Dranfeldt Extension (Parker)	$ 6,010	$ 6,010		$ 400	7%	$ 60	$ -	$ 170	$ -	***$ 170***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 170***
36	CCB-7.4	McMurdo Gulch Reclamation (Castle Rock)	$ 4,308	$ 4,308		$ 1,078	25%	$ -	$ -	$ 907	$ -	***$ 907***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 907***
37	CCB-13.5.3	Cottonwood Creek Tributary - Shooting Area Tributary (CCSP)	$ 300	$ 300		$ 75	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 75***
38	CCB-13.5.4	Cottonwood Creek and Tributary C (IWSD)	$ 1,664	$ 1,664		$ 416	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 416***	***$ -***	***$ -***	***$ 416***
39	CCB-21.1	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	$ 340	$ 340		$ 340	100%	$ -	$ -	$ -	$ -	***$ -***	***$ 100***	***$ 400***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 500***
40	CCB-21.3	Lone Tree Creek in CCSP upstream of Pond (Done in conjunction with Centennial Trail Project)	$ 448	$ 448		$ 112	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	$ -
41	CCB-21.3a	Lone Tree Creek in CCSP upstream of Pond (CCBWQA Only)	$ 448	$ 448		$ 448	100%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 448***	***$ 448***
42	CCB-22.1	Happy Canyon Creek County Line to Cherry Creek (SEMSWA)	$ 1,520	$ 1,520		$ 381	25%	$ 25	$ -	$ 88	$ -	***$ 88***	***$ 50***	***$ 75***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 288***
44	CCB-23.1	Dove Creek U/S Pond D-1 to Chambers Rd (SEMSWA)	$ 650	$ 650		$ 163	25%	$ -	$ -	$ 63	$ -	***$ 63***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 138***
45	CCB-23.2	Dove Creek Otero to Chambers Rd. (SEMSWA)	$ 700	$ 700		$ 175	25%	$ 25	$ -	$ 75	$ -	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 75***
46	CCB-6.5	Piney Creek Reach 1 to 2 (SEMSWA)	$ 2,350	$ 2,350		$ 515	22%	$ -	$ 63	$ -	$ -	***$ 63***	***$ 39***	***$ 25***	***$ 75***	***$ 150***	***$ 125***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 477***

	A	B	C	D	E	F	G	H	O	P	Q	R	W	AB	AD	AE	AF	AG	AH	AI	AJ	AK
1	**CHERRY CREEK BASIN WATER QUALITY AUTHORITY**																					
2	***TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES***																					
3	**2023 - 2032 BUDGET PROJECTIONS (1000$)**																					
9																						
10		**November 11, 2022**	**Current Project Budget**					**Prior Year Obligated Funds[3]**	**Proposed 2023 Budget**				**Proposed 2024 Budget**	**Proposed 2025 Budget**	**Proposed 2026 Budget**	**Proposed 2027 Budget**	**Proposed 2028 Budget**	**Proposed 2029 Budget**	**Proposed 2030 Budget**	**Proposed 2031 Budget**	**Proposed 2032 Budget**	**2023-2032 Total**
11	**Project No.**	**Project Title**	**Capital[1]**	**Total**	**O&M**	**Authority Portion**	**Authority Portion**		**Design**	**Capital**	**Water**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
47	CCB-6.6	Piney Creek Tower to Orchard (SEMSWA)	$ 3,000	$ 3,000		$ 710	24%	$ -	$ -	$ -	$ -	***$ -***	***$ 75***	***$ 150***	***$ 235***	***$ 250***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 710***
48	CCB-5.16A,B,C	Cherry and Piney Creeks in CCSP	$ 22,500	$ 22,500			0%	$ -	$ -	$ -	$ -	***$ -***	***$ 450***	***$ 1,400***	***$ 1,000***	***$ 1,355***	***$ 1,900***	***$ 2,000***	***$ 920***	***$ 960***	***$ 1,500***	***$ 11,485***
49	CCB-5.14D	Cherry Creek Stream Reclamation - Remaining Sections (not included in Reaches 3 and 4) from Valley Country Club to Soccer Fields	$ 2,980	$ 2,980		$ 745	25%	$ -	$ -	$ -	$ -	***$ -***	***$ -***	***$ 100***	***$ 100***	***$ 545***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 745***
50	**Budget Category - PRF Water Quality/Wetland Ponds**																					
51	**Budget Category - PRF Preservation, Acquisition, Lease**																					
52	CCB-16	PRF Preservation, Acquisition, Lease of Land or Water	$ 500	$ 500		$ -	0%	$ -		$ 100	$ -	***$ 100***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 550***
53		***SUB-TOTALS***										***$ 2,930***	***$ 2,881***	***$ 2,200***	***$ 2,085***	***$ 2,350***	***$ 2,350***	***$ 2,354***	***$ 2,321***	***$ 1,945***	***$ 1,998***	***$ 23,414***

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES

2023 - 2032 BUDGET PROJECTIONS (1000$)

	A	B	C	D	E	F	G	H	O	P	Q	R	W	AB	AD	AE	AF	AG	AH	AI	AJ	AK
10		November 11, 2022	Current Project Budget					Prior Year Obligated Funds[3]	Proposed 2023 Budget				Proposed 2024 Budget	Proposed 2025 Budget	Proposed 2026 Budget	Proposed 2027 Budget	Proposed 2028 Budget	Proposed 2029 Budget	Proposed 2030 Budget	Proposed 2031 Budget	Proposed 2032 Budget	2023-2032 Total
11	Project No.	Project Title	Capital[1]	Total	O&M	Authority Portion	Authority Portion		Design	Capital	Water	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
54		***OPERATIONS AND MAINTENANCE***																				
56		***Routine Category***																				
57	OM-7	Reservoir Destratification	$ 350	$ 350		$ 350	100%			$ 35		$ 35	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 395
58	OM-14.1	PRF Weed Control	$ 100	$ 100		$ 100	100%			$ 10		$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10	$ 100
59	OM-14.2	PRF Reseeding at CCSP	$ 50	$ 50		$ 27	100%			$ 5		$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 50
60	OM-14.3	PRF Mowing	$ 50	$ 50		$ 45	100%			$ 5		$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 50
61		***SUB-TOTAL***	$ 550	$ 550		$ 522				$ 55		$ 55	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 595
62		***Operations Category***																				
63	O - 1	RDS Utilities	$ 650	$ 650		$ 650	100%			$ 65		$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 65	$ 650
64	O - 2	RDS Service Plan	$ 155	$ 155		$ 155	100%			$ 12		$ 12	$ 13	$ 14	$ 15	$ 16	$ 17	$ 18	$ 19	$ 20	$ 20	$ 164
65	O - 3	PRF Emergency Repairs	$ -	$ -		$ -	#DIV/0!			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
66	O - 4	Meteorological Station	$ 36	$ 36		$ 36	100%			$ 3		$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 30
67		***SUB-TOTAL***	$ 841	$ 841		$ 841				$ 80		$ 80	$ 81	$ 82	$ 83	$ 84	$ 85	$ 86	$ 87	$ 88	$ 88	$ 844
68		***Restorative Category***																				
69	OM -	Tree/Shrub Planting	$ 18	$ 18		$ 18	100%			$ -		$ -	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 18
70	OM -	Fence Repair	$ 72	$ 72		$ 72	100%			$ -		$ -	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 72
71	OM -	Shoreline / Bank Restoration																				$ -
72		Average Annual Cost								$ -		$ -	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 1,755
73		*Shop Creek Concrete Repairs*	$ 10	$ 10		$ 10				$ 10		$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10
74		*Mountain/Lake Loop Shoreline*	$ 24	$ 24		$ 24	100%			$ 30		$ 30	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30
75	OM -	Wetland Harvesting	$ 900	$ 900		$ 900	100%			$ 90		$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 900
76		***SUB-TOTAL***	$ 1,024	$ 1,024		$ 1,024				$ 130		$ 130	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 2,785
77		***Rehabilitation Category***																				
78	OM -						#DIV/0!															
79		***SUB-TOTAL***	$ -	$ -		$ -				$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
81		***SUB-TOTAL O&M***	$ 2,415							$ 265		$ 265	$ 436	$ 437	$ 438	$ 439	$ 440	$ 441	$ 442	$ 443	$ 443	$ 4,540
82		***GRAND TOTAL***										$ 3,195	$ 3,317	$ 2,637	$ 2,523	$ 2,789	$ 2,790	$ 2,795	$ 2,763	$ 2,388	$ 2,441	$ 30,006

Cherry Creek Basin Water Quality Authority
Summary of Operation & Maintenance (O&M) Costs
Prepared / Updated: November 4, 2022

Project	Quantity			CCSP Work	CCBWQA Purchases Seed with CCSP Installation	CCBWQA Work					Comments	Total Cost
	Each	Hours	Acres	Herbicide Application[1]	Tractor Reseeding (Seed Cost Only)[2]	Weed Control[1]	Tree Planting[3]	Shrub Planting[3]	Misc.	Restorative / Rehabilitation work[4]		
Shop Creek	1					$ 3,000					Herbicide treatment of vegetation growing on faces of drops at 100% CCBWQA, since it isn't weed control related.	$ 13,000
	1									$ 10,000	Project carryover from 2022 to 2023, Concrete Repair at Crests of 3 drop structures.	
Cottonwood Wetlands	1									$ 3,600	PRF Routine, Decompaction and revegetation of access along embankment. Cleaning of outlet grate.	$ 3,600
Mountain/Lake Loop Shoreline	1									$ 30,000	Project carryover from 2022 to 2023, Restore shoreline area.	$ 30,000
East Boat Ramp	1					$ 3,000					Weed Control for noxious weeds at 100% CCBWQA, since within 5 years of PRF construction.	$ 3,000
Cherry Creek 12-mile Phase III	1					$ 4,000					Weed Control for noxious weeds at 100% CCBWQA, since within 5 years of PRF construction.	$ 4,000
Subtotal				$ -	$ -	$ 10,000	$ -	$ -	$ -	$ 43,600		

Totals

CCSP =	**$ -**
CCBWQA =	**$ 53,600**
Combined =	**$ 53,600**

Note 1. CCBWQA performs weed control (mechanical until native grasses mature, then herbicide) for first 5 years after PRF construction; afterwards 50/50 split between CCBWQA and CCSP.
Note 2. Reseeding Rate = $800/acre. CCBWQA purchases seed CCSP installs it with their tractor and the seed attachment purchased by CCBWQA.
Note 3. Tree Replacement = $1,000/ea. Shrub Replacement =$50/ea.. CCBWQA Participation @ 100%.
Note 4. PRF Function Repair/Maintenace. Project Specific Estimate. CCBWQA Participation @ 100%.

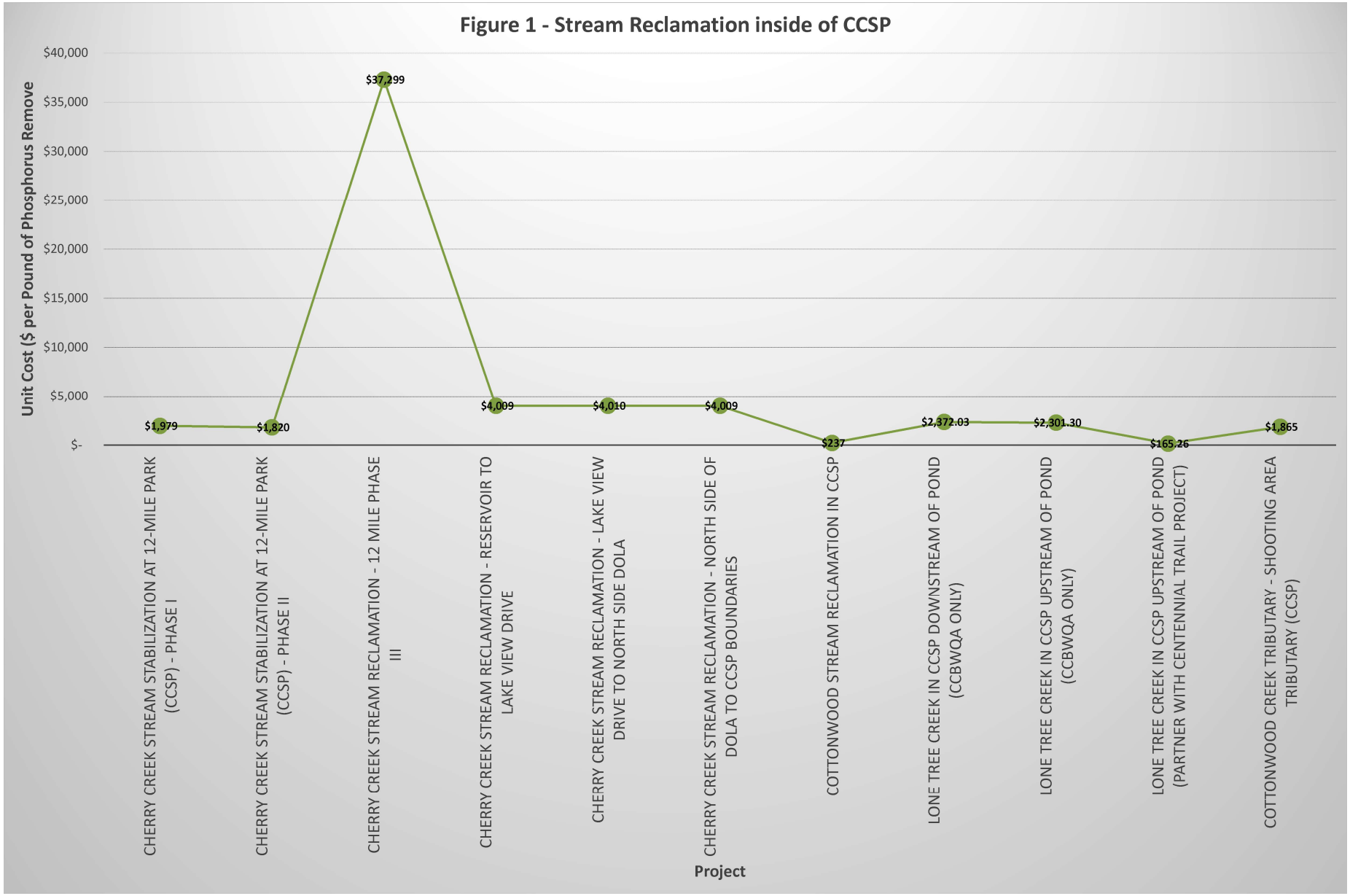
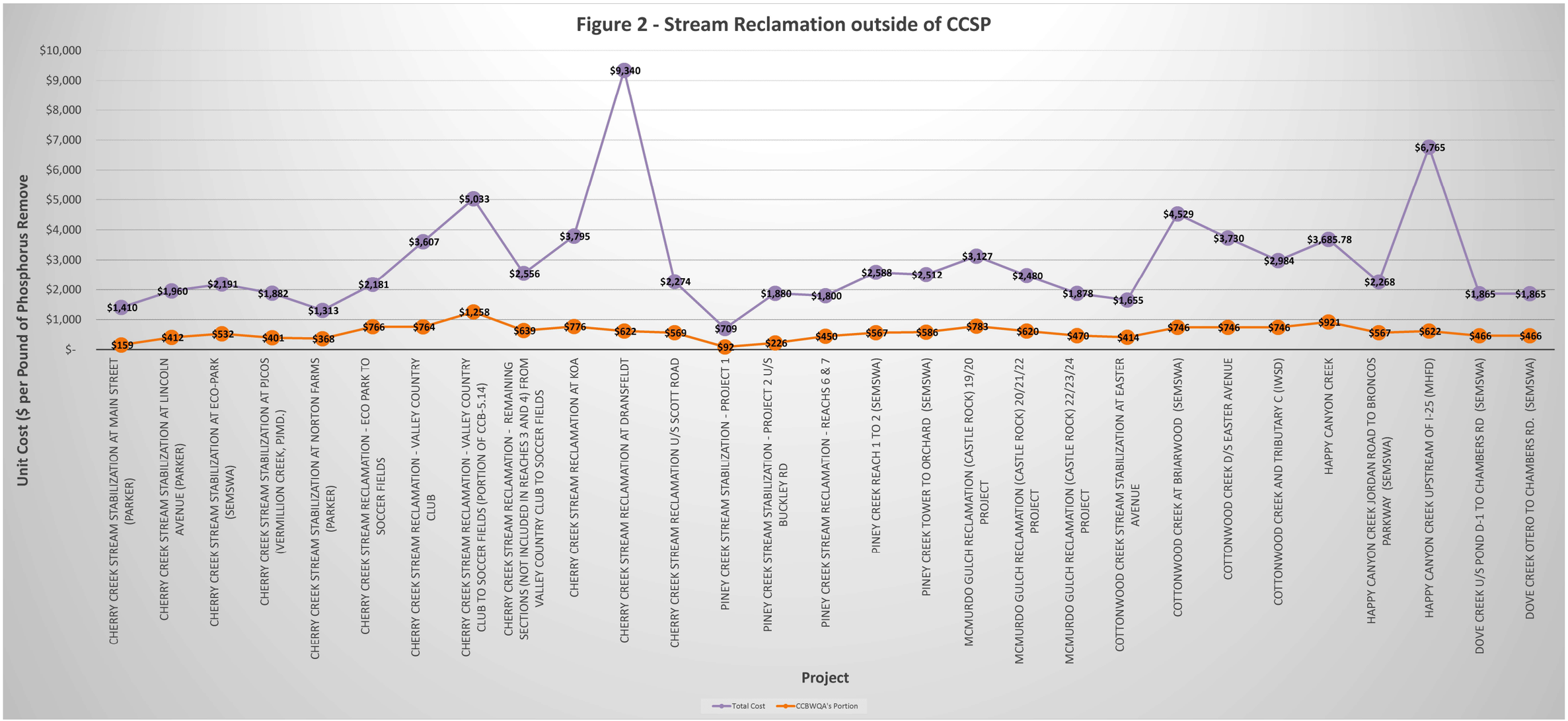


Figure 1 - Stream Reclamation inside of CCSP
Unit Cost ($ per Pound of Phosphorus Remove
$40,000
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$-
$1,979
$1,820
$37,299
$4,009
$4,010
$4,009
$237
$2,372.03
$2,301.30
$165.26
$1,865
CHERRY CREEK STREAM STABILIZATION AT 12-MILE PARK (CCSP) - PHASE I
CHERRY CREEK STREAM STABILIZATION AT 12-MILE PARK (CCSP) - PHASE II
CHERRY CREEK STREAM RECLAMATION - 12 MILE PHASE III
CHERRY CREEK STREAM RECLAMATION - RESERVOIR TO LAKE VIEW DRIVE
CHERRY CREEK STREAM RECLAMATION - LAKE VIEW DRIVE TO NORTH SIDE DOLA
CHERRY CREEK STREAM RECLAMATION - NORTH SIDE OF DOLA TO CCSP BOUNDARIES
COTTONWOOD STREAM RECLAMATION IN CCSP
LONE TREE CREEK IN CCSP DOWNSTREAM OF POND (CCBWQA ONLY)
LONE TREE CREEK IN CCSP UPSTREAM OF POND (CCBWQA ONLY)
LONE TREE CREEK IN CCSP UPSTREAM OF POND (PARTNER WITH CENTENNIAL TRAIL PROJECT)
COTTONWOOD CREEK TRIBUTARY - SHOOTING AREA TRIBUTARY (CCSP)
Project

Figure 2 - Stream Reclamation outside of CCSP



R2R ENGINEERS

RIFFLES TO RIPPLES

MEMORANDUM

DATE:	November 1, 2022 (Revised to include TAC input on November 4, 2022)
TO:	Jacob James, P.E.; Cherry Creek Basin Water Quality Authority (CCBWQA) – Technical Advisory Committee (TAC) Chairman Jane Clary, Wright Water Engineers, CCBWQA Technical Manager
CC:	Jason Trujillo, Cherry Creek State Park (CCSP) Park Manager
FROM:	Richard G. Borchardt PE, CFM
SUBJECT:	2022 Annual Field Observation of Pollution Reduction Facilities (PRFs) at CCSP

Introduction

Annually, the CCBWQA performs Field Observation of the PRFs constructed by the CCBWQA at CCSP. The annual Field Observation is a requirement of the Operations and Maintenance Agreement between the CCBWQA and CCSP dated January 14, 2006 (Agreement). The West Boat Ramp PRF was excluded from the Agreement by the First Amendment dated April 18, 2013 (Amendment).

The purpose of the Field Observation is to assess whether the PRFs are functioning as designed and to identify routine, restorative, and rehabilitative maintenance requirements. The TAC of the CCBWQA will use this report to provide recommendations to the Board for the following fiscal year budgeting of maintenance activities. Restorative and rehabilitative maintenance requirements are the responsibility of the CCBWQA. Routine maintenance is the responsibility of CCSP. Other items, such as educational/interpretive sign replacement and weed control, as outlined in the Agreement, are shared 50% by CCSP and 50% by CCBWQA. The West Boat Ramp PRF's routine, restorative, and rehabilitative maintenance responsibility is 100% CCSP and/or the Marina.

As defined in the Agreement, the term "Restorative and Rehabilitative Maintenance" shall mean all maintenance and repair reasonably necessary to keep the structural and other essential components or portions of a PRF in good working order and functioning as designed, including but not limited to the repair of walls, embankments, pipes, gates, monitoring facilities, erosion and riprap, the removal of sediment, and the replacement of vegetation within the disturbed area of a PRF as needed to maintain or restore the PRF's function. "Routine Maintenance" shall mean any and all maintenance that is necessary (other than Restorative and Rehabilitative Maintenance) to keep a PRF in a clean, visually appealing and safe condition, free from debris and rubbish, and protected from vandalism and malicious mischief to the same extent as any other public facility located within the CCSP.

The PRFs that are part of the Stream and Drainage System are observed at least annually and after storm events since they are more likely to have changes in their condition. The PRFs that are Shoreline Stabilization are observed on an as needed basis or as the CCBWQA, CCSP and/or United States Army Corps of Engineers personnel identify issues or concerns during the year. The Field Observation frequency by PRF is shown in **Table 1**. The Cherry Creek at 12-mile Park (Phase III) PRF was substantially complete in 2022 and therefore was added to **Table 1**.

PRFs Field Observation Annually and After Significant Storm Events (Part of Stream and Drainage System)	**PRFs Field Observation As-Needed (Part of Shoreline Stabilization)**
Shop Creek	Tower Loop
Cherry Creek at 12-Mile Park (Phases I and II)	East Shade Shelters
Cherry Creek at 12-Mile Park (Phases III)	East Boat Ramp
Cottonwood Creek Stream Reclamation	Dixon Grove
Cottonwood Wetlands	Mountain and Lake Loop
Quincy Drainage	
West Boat Ramp	

Table 1 – Frequency of Field Observation by PRF

The CCSP brochure map (**Figure 1**) is included for reference and shows general vicinity of PRFs.

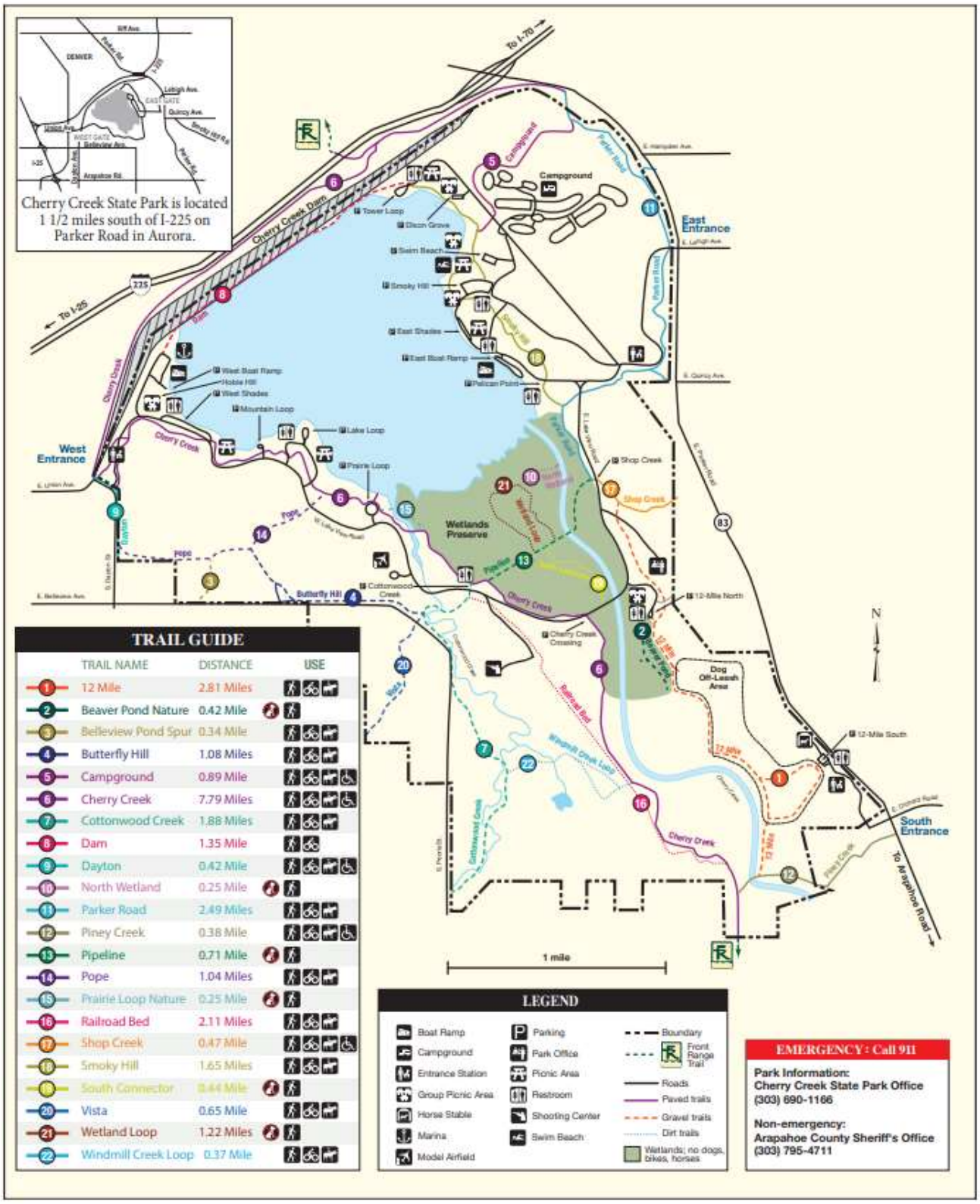


Figure 1 - CCSP brochure map

In 2022, all PRFs were observed. The Field Observation was performed in July and August. A coordination meeting with Colorado Parks and Wildlife (Claudia Mead and Jonathan Kingery) occurred on August 2, 2022.

On August 15-16, 2022, there was a significant storm event (see storm photos on right and following page courtesy of Erin Stewart with LRE Water). This storm event necessitated post-storm visits of the Cherry Creek 12-mile Park (Phases I, II, and III), the Cottonwood Creek Stream Reclamation, and Cottonwood Wetlands, as those were the primary PRFs that saw increased runoff from this storm event.

Storm Photo - Cherry Creek at CC10

Storm Photo - Cherry Creek at Lake View Drive

General Assessments

The 2022 annual Field Observation general assessments and photos are provided on the following pages. The post-storm findings and photos have been included for the Cherry Creek 12-mile Park (Phases I, II, and III), the Cottonwood Creek Stream Reclamation, and Cottonwood Wetlands PRFs.

Storm Photo - Cottonwood Creek at CT-P1

West Boat Ramp (Reservoir Water Surface Elevation = 5547.7 on 7/28/22): Construction of this PRF was completed in 2014. All maintenance for this PRF is the responsibility of CCSP. Routine maintenance is needed to clear woody vegetation (**Photo 1**). At the 8/2/22 meeting with CCSP, CCSP staff marked limits of the spillway with paint and will coordinate with Marina and associated groups to relocate items currently stored there to another location (**Photo 2**). Maintenance that was identified for CCSP is cutting and clearing of vegetation around outlet and relocating stored items outside of spillway.

Photo 1 - 7/28/22

Photo 2 - 7/28/22

Cottonwood Wetlands: Some woody vegetation was observed around outlet (**Photo 3**). This vegetation was subsequently cut and removed with the wetland harvesting effort. Some aquatic vegetation and algae were observed in water (**Photo 4**) and maintenance bench above outlet grate had cattail debris covering it (**Photo 5**); the outlet grate and bench were subsequently cleaned with the wetland harvesting. Several standing dead trees were noted around the PRF (**Photo 6**). The educational signs appear to be in functional shape (**Photos 7 and 8**). The post-storm visit was done on August 26, 2022; no damage was observed from the post-storm visit and a higher water surface was observed (**Photos 9 and 10**). Stressed vegetation and compaction of soils was observed on the access along the embankment (**Photos 11-14**); decompaction and reseeding will likely benefit the recovery of the native grasses and protection of embankment during overtopping events. The maintenance identified for CCBWQA's consideration is cleaning of the outlet grate and decompaction and revegetation of the access along the embankment.

Photo 3 – 8/1/22

Photo 4 – 8/1/22

Photo 5 – 8/1/22

Photo 6 – 8/1/22

Photo 7 – 8/1/22

Photo 8 – 8/1/22

Photo 9 (Post-storm visit on 8/26/22)

Photo 10 (Post-storm visit on 8/26/22)

Photo 11 – 8/1/22 (before heavy access use in 2022)

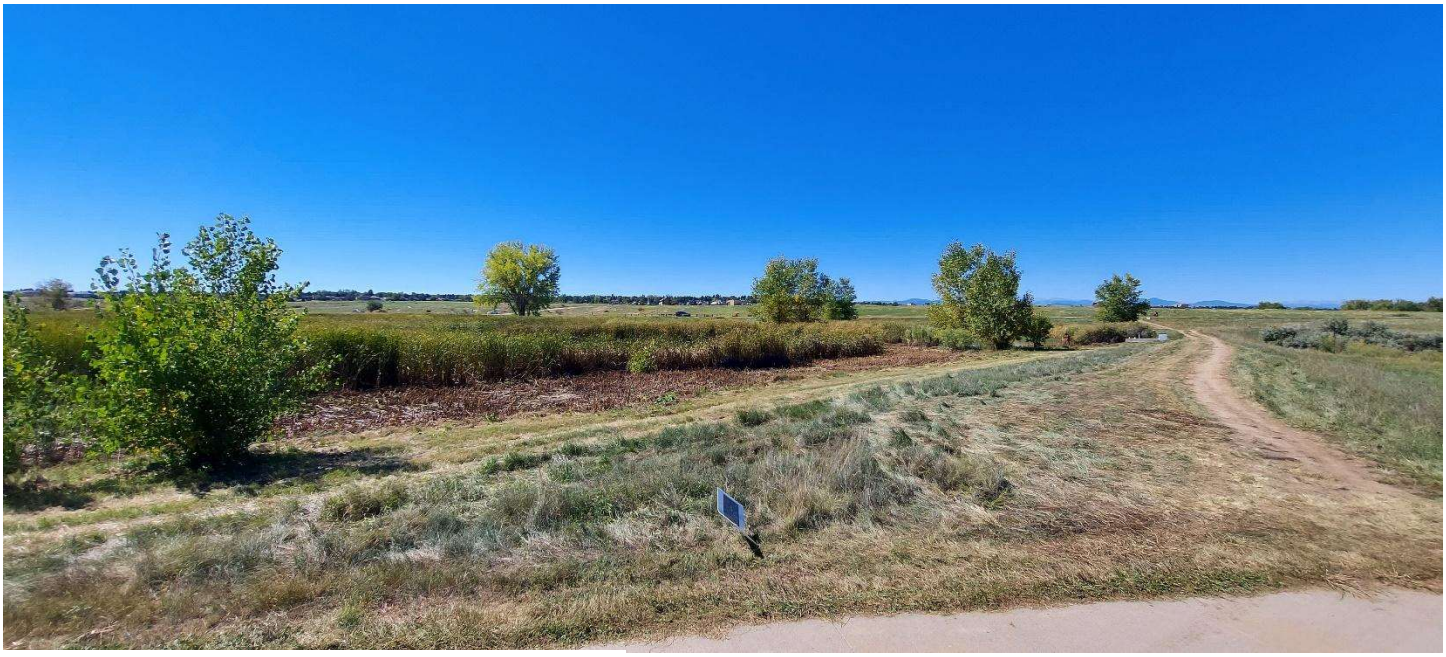


Photo 12 – 10/10/22 (after heavy use in 2022)

Photo 13 – 10/10/22 (Compaction test along access)

Photo 14 – 10/10/22 (Compaction test outside of access)

Cottonwood Creek Stream Reclamation: Riparian and wetland vegetation along stream banks is thriving (**Photo 15**). Riffle drops are functioning with some Russian olives, a Colorado noxious weed list B species, present (**Photo 16**). Common reed, a Colorado noxious weed watch-list species, was observed (**Photo 17**). Several downed trees were noted from beaver activity (**Photo 18**). The post-storm visit was done on August 26, 2022; no damage was observed from the post-storm visit and evidence of high-water debris was observed (**Photos 19 and 20**). No maintenance was specifically identified; however, continued monitoring and coordination with CCSP staff on noxious weeds is suggested.

Photo 15 – 8/1/22

Photo 16 – 8/1/22

Photo 17 – 8/1/22

Photo 18 – 8/1/22

Photo 19 (Post-storm visit on 8/26/22)

Photo 20 (Post-storm visit on 8/26/22)

Cherry Creek 12-mile Park Phase I: Phase I was completed in 2012. Bed erosion was noted in 2021 Annual Field Observation. A grade control structure was installed downstream with the Cherry Creek 12-mile Park Phase III project which appears to be helping (**Photos 21 and 22**). Additional bank erosion was observed (**Photo 23**) and the August storm event appears to have accelerated it (**Photo 24**). Bank and bed erosion appear to be active further upstream and away from the grade control structure installed with the Cherry Creek 12-mile Park Phase III project (**Photo 25**). No maintenance was identified; however, a capital project for stream reclamation may be needed. Continued planning is suggested to identify work needed, overall priorities, and costs for Cherry Creek between Lake View Drive and the CCSP Boundary.

Photo 21 – 7/28/22

Photo 22 – 7/28/22

Photo 23 (Bank Erosion on 7/28/22)

Photo 24 (Bank Erosion at post-storm visit on 8/23/22)

Photo 25 – 7/28/22

Cherry Creek 12-mile Park Phase II: Phase II was completed in 2014 and is experiencing high pedestrian and dog activity. Bed and bank erosion were observed near the boundary between Phase I and Phase II (**Photo 27**). Vegetation continues to be denuded by heavy park use (**Photo 28**). Additional bank erosion was observed (**Photo 29**) and the August storm event appears to have accelerated it (**Photo 30**). Bank erosion was observed on secondary channel, east of main stem (**Photo 31**). No maintenance was identified; however, a capital project for stream reclamation may be needed. Continued planning is suggested to identify work needed, overall priorities, and costs for Cherry Creek between Lake View Drive and the CCSP Boundary.

Photo 27 – 7/28/22

Photo 28 – 7/28/22

Photo 29 (Bank and Bed Erosion on 7/28/22)

Photo 30 (Bed and Bank Erosion at post-storm visit on 8/23/22)

Photo 31 – 7/28/22

Cherry Creek 12-mile Park Phase III: Phase III was substantially complete (**Photos 32 and 33**) ahead of the August storm event. There was some damage that resulted from the August storm event (**Photos 34 to 35**) and the construction Best Management Practices/Stormwater Control Measures greatly minimized the storm impact. Repairs are anticipated to be made in 2022 as the project is not fully closed out at the time of this report. Weed control is needed to help with vegetation re-establishment in project area; it will likely start with mechanical control and then move to herbicide once grasses start to mature. A capital project for stream reclamation may be needed, continued planning is suggested to identify work needed, overall priorities, and costs for Cherry Creek between Lake View Drive and the CCSP Boundary.

Photo 32 – 7/28/22

Photo 33 – 7/28/22

Photo 34 – 8/23/22

Photo 35 – 8/23/22

Shop Creek: There are 5 drop structures within CCSP numbered 1 through 5 from upstream to downstream, and an additional drop structure outside of the CCSP Boundary. Drop 1 has spalling concrete along the crest (**Photos 36**). Drop 2 has spalling concrete along the crest, seepage between layers of roller-compacted concrete, and vegetation growing on downstream face (**Photo 37**). Drop 3 has spalling concrete along the crest, a tree growing next to drop with tree root intrusion in drop (**Photos 38 to 39**), and vegetation growing on downstream face of drop (**Photo 40**). Drop 4 has vegetation growing on downstream face and less severe spalling of concrete (**Photos 41 to 42**). Drop 5 has seepage between layers of roller-compacted concrete and less severe spalling of concrete (**Photo 43**). CCSP performs regular maintenance by cleaning the trash racks and mowing and removing vegetation around inlets (**Photo 44**). No deficiencies were observed with the educational signage. The maintenance identified for CCBWQA consideration is concrete repairs at crests of drops 1, 2, 3; removal of tree at drop 3; and vegetation control on face of drops 2, 3, and 4. Since seepage was noted on drops 2 and 5, it is recommended that seepage be monitored on all drops.

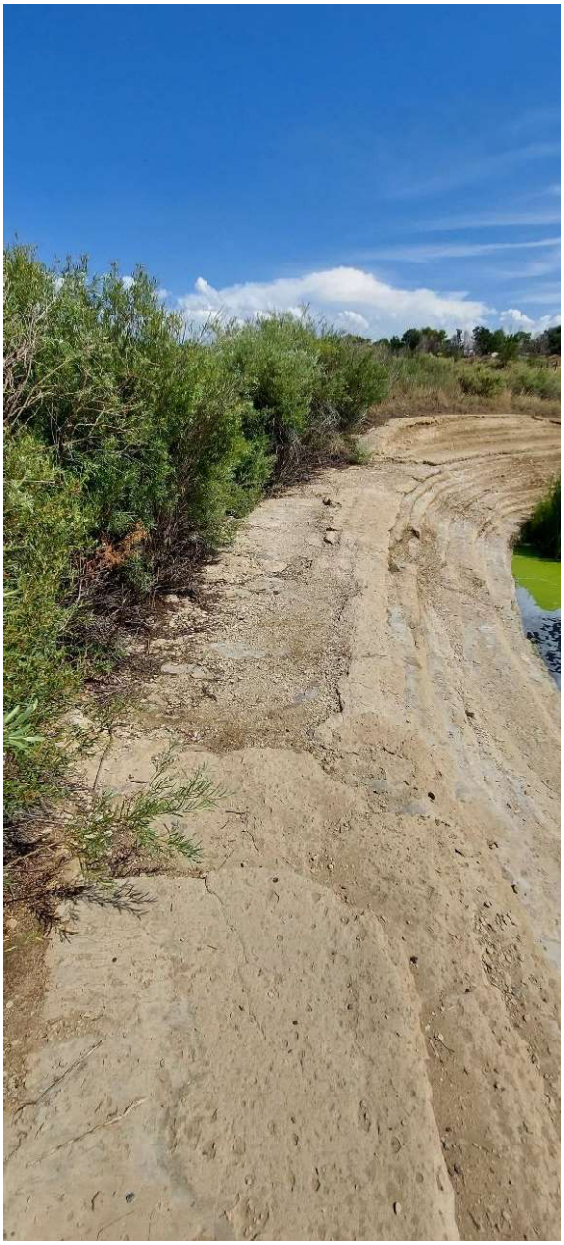


Photo 36 – Drop 1 – 7/27/22

Photo 37 – Drop 2 – 7/27/22

Photo 38 – Drop 3 – 7/27/22

Photo 39 – Drop 3 – 7/27/22

Photo 40 – Drop 3 – 7/27/22

Photo 41 – Drop 4 – 7/27/22

Photo 42 – Drop 4 – 7/27/22

Photo 43 – Drop 5 – 7/27/22

Photo 44 – Drop 5 – 7/27/22

Quincy Drainage: CCSP Staff cleans outlet structure (**Photo 45**). Some dead standing and fallen trees were observed (**Photo 46**). Bed and bank erosion observed in channel from Lake View Drive to PRF (**Photos 47 to 48**). No maintenance was identified. A capital project for stream reclamation may be needed from Lake View Drive to PRF. Planning is suggested to identify work needed, overall priorities, and costs.

Photo 45 – 7/27/22

Photo 46 – 7/27/22

Photo 47 – 7/27/22

Photo 48 – 7/27/22

Dixon Grove (Reservoir Water Surface Elevation = 5548.1 on 7/27/22): Boulders and riprap serve as protection of shoreline (**Photos 49 and 50**). Area includes a water quality capture area (**Photo 51)** that receives runoff from adjacent parking lot (**Photos 52 and 53**). Shoreline erosion was observed just south of Dixon Grove (**Photo 54**). No maintenance needs were identified. Shoreline stabilization may be needed for the erosion located to the south of the PRF, and a planning effort may be useful in identifying work needed, priority, and costs.

Photo 49 - 7/27/22

Photo 50 - 7/27/22

Photo 51 - 7/27/22

Photo 52 - 7/27/22

Photo 53 - 7/27/22

Photo 54 - 7/27/22

East Boat Ramp (Reservoir Water Surface Elevation = 5547.9 on 8/9/22, 5547.3 on 10/4/22): Boulders and riprap serve as protection of shoreline (**Photos 55 and 56**). Maintenance work was completed in October 2022 (**Photos 57 and 58**). Weed control is needed to help with vegetation re-establishment in the project area; it will likely start with mechanical control and then move to herbicide once grasses start to mature.

Photo 55 - 8/9/22

Photo 56 - 8/9/22

Photo 57 – 10/4/22

Photo 58 – 10/4/22

East Shade Shelters (Reservoir Water Surface Elevation = 5547.9 on 8/9/22):

South Section: Boulders and riprap have shifted, and erosion was observed (**Photos 59 to 60, 62**). Concrete walk and bench have been eroded and undermined (**Photo 61**). Social trail with erosion **(Photos 63, 66, 68 to 70)**. Shoreline bank erosion was observed (**Photos 64 to 65, 67**). No maintenance needs were identified. Shoreline stabilization may be needed for the erosion located in this section of this PRF, and a planning effort may be useful in identifying work needed, priority, and costs.

North Section: This area includes bank erosion (**Photo 71**) and social trails (**Photo72**). A capital project is currently being designed to stabilize the shoreline. No maintenance needs were identified as the capital project is expected to address the bank erosion and minimize impact of trails.

Photo 59 – 8/9/22

Photo 60 – 8/9/22

Photo 61 – 8/9/22

Photo 62 – 8/9/22

Photo 63 – 8/9/22

Photo 64 – 8/9/22

Photo 65 – 8/9/22

Photo 66 – 8/9/22

Photo 67 – 8/9/22

Photo 68 – 8/9/22

Photo 69 – 8/9/22

Photo 70 – 8/9/22

Photo 71 – 8/9/22

Photo 72 – 8/9/22

Mountain and Lake Loop (Reservoir Water Surface Elevation = 5548.1 on 7/28/22): Approximately 100 feet of shoreline is eroding (**Photo 73**) near the Lake Loop parking lot; there is a current maintenance design and permitting underway. Erosion was noted around a tree (**Photo 74**) near the rowing club storage buildings and the tree's roots seem to be providing some protection. No additional maintenance was identified beyond the current project. It suggested that erosion at tree near rowing club storage buildings be monitored.

Photo 73 – 7/28/22

Photo 74 – 7/28/22

Tower Loop (Reservoir Water Surface Elevation = 5548.2 on 7/12/22): This area includes boulders and riprap for shoreline protection (**Photo 75**). Bank erosion and social trails (**Photo 76**) are located to the south and east of the PRF; a capital project is currently being designed to stabilize the shoreline. No maintenance needs were identified as the capital project is expected to address the bank erosion and minimize impact of trails.

Photo 75 – 7/12/22

Photo 76

Conclusions

The conclusions from the 2022 Annual Field Observation of PRFs are:

1. All PRFs appear to be performing their functions. The Field Observation general assessments included thoughts on maintenance, monitoring, and planning efforts for future capital projects.
2. The maintenance identified for consideration by the TAC and Board includes a Summary of Operation & Maintenance costs and individual budget estimates for Restorative/Rehabilitation work included in **Appendix A**. The Operations and Maintenance cost as the result of this Field Observation for 2022 is $53,600 as compared to the 2021 budget of $204,850.
3. Concerns and issues that were located outside the limits of the original PRF or require additional analysis/study beyond the engineering already done for the original PRF were suggested as planning efforts. These planning efforts would identify the capital project needed, determine priority, identify the water quality benefit, and costs. These planning efforts include:
    a. Cherry Creek 12-mile Park Projects – continued planning on Cherry Creek from Lake View Drive to CCSP Boundary
    b. Quincy Drainage – planning for stream reclamation on Quincy Drainage to address bank and bed erosion from Lake View Drive to PRF
    c. Dixon Grove – planning for shoreline stabilization for Cherry Creek Reservoir to address erosion located to the south of the PRF
    d. East Shade Shelter – planning for shoreline stabilization for Cherry Creek Reservoir to address erosion located in the south section of the PRF

Appendix A

Cherry Creek Basin Water Quality Authority
Summary of Operation & Maintenance (O&M) Costs
Prepared / Updated: November 4, 2022

Project	Quantity			CCSP Work	CCBWQA Purchases Seed with CCSP Installation	CCBWQA Work					Comments	Total Cost
	Each	Hours	Acres	Herbicide Application[1]	Tractor Reseeding (Seed Cost Only)[2]	Weed Control[1]	Tree Planting[3]	Shrub Planting[3]	Misc.	Restorative / Rehabilitation work[4]		
Shop Creek	1					$ 3,000					Herbicide treatment of vegetation growing on faces of drops at 100% CCBWQA, since it isn't weed control related.	$ 13,000
	1									$ 10,000	Project carryover from 2022 to 2023, Concrete Repair at Crests of 3 drop structures.	
Cottonwood Wetlands	1									$ 3,600	PRF Routine, Decompaction and revegetation of access along embankment. Cleaning of outlet grate.	$ 3,600
Mountain/Lake Loop Shoreline	1									$ 30,000	Project carryover from 2022 to 2023, Restore shoreline area.	$ 30,000
East Boat Ramp	1					$ 3,000					Weed Control for noxious weeds at 100% CCBWQA, since within 5 years of PRF construction.	$ 3,000
Cherry Creek 12-mile Phase III	1					$ 4,000					Weed Control for noxious weeds at 100% CCBWQA, since within 5 years of PRF construction.	$ 4,000
Subtotal				$ -	$ -	$ 10,000	$ -	$ -	$ -	$ 43,600		

Totals

CCSP =	**$ -**
CCBWQA =	**$ 53,600**
Combined =	**$ 53,600**

Note 1. CCBWQA performs weed control (mechanical until native grasses mature, then herbicide) for first 5 years after PRF construction; afterwards 50/50 split between CCBWQA and CCSP.
Note 2. Reseeding Rate = $800/acre. CCBWQA purchases seed CCSP installs it with their tractor and the seed attachment purchased by CCBWQA.
Note 3. Tree Replacement = $1,000/ea. Shrub Replacement =$50/ea.. CCBWQA Participation @ 100%.
Note 4. PRF Function Repair/Maintenace. Project Specific Estimate. CCBWQA Participation @ 100%.

2022 PRF Field Observation
Shop Creek 2023 Repair

Date: 10/31/2022

R2R ENGINEERS
RIFFLES TO RIPPLES

No.	Item	Quantity	Unit	Unit Price	Extension
1	Mobilization	1	LS	$ 700.00	$ 700.00
2	Concrete Repair at Crests	1	LS	$ 5,000.00	$ 5,000.00
3	Water Control	1	LS	$ 1,000.00	$ 1,000.00
4	Concrete Washout	1	EA	$ 750.00	$ 750.00
5	Tree Removal	1	LS	$ 875.00	$ 875.00

Subtotal		$	8,325.00
Contingency	20%	$	1,665.00
Subtotal		$	9,990.00
Surveying			
Engineering, Permitting & Const Svs		$	-
Total Estimated Construction Cost		**$**	**9,990.00**

2022 PRF Field Observation
Cottonwood Wetlands 2023 Repair

Date: 10/31/2022

R2R ENGINEERS
RIFFLES TO RIPPLES

No.	Item	Quantity	Unit	Unit Price	Extension
1	Mobilization	1	LS	$ 500.00	$ 500.00
2	Decompaction	0.2	AC	$ 5,000.00	$ 1,000.00
3	Reseeding and Mulch	0.2	AC	$ 5,000.00	$ 1,000.00
4	Clean out Outlet Structure	1	LS	$ 500.00	$ 500.00

Subtotal		$	3,000.00
Contingency	20%	$	600.00
Subtotal		$	3,600.00
Surveying			
Engineering, Permitting & Const Svs		$	-
Total Estimated Construction Cost		**$**	**3,600.00**

2022 PRF Inspection
Mountain and Lake Loop 2023 Repair

Date: 10/31/2022

R2R ENGINEERS
RIFFLES TO RIPPLES

No.	Item	Quantity	Unit	Unit Price	Extension
1	Mobilization	1	EA	$ 1,200.00	$ 1,200.00
2	Construction Fence	800	LF	$ 4.50	$ 3,600.00
3	Erosion Control Log	80	LF	$ 3.00	$ 240.00
4	Type M Soil Riprap	85	CY	$ 185.00	$ 15,725.00
5	Seed	0.5	AC	$ 2,500.00	$ 1,250.00
6	Mulch	0.5	AC	$ 2,500.00	$ 1,250.00
7	Remove and Reset Fence for Access	50	LF	$ 32.00	$ 1,600.00

Subtotal		$	24,865.00
Contingency	20%	$	4,973.00
Subtotal		$	29,838.00
Surveying			
Engineering, Permitting & Const Svs	30%	$	-
Total Estimated Construction Cost		**$**	**29,838.00**

Cherry Creek Basin Water Quality Authority

Land Use Referral Summary

Prepared: *November 10, 2022*

October has yielded 23 reviews to date down from 26 in September. 9 were commercial, 5 were residential, 4 were mixed use, 2 were utility, 2 were road and bridge and 1 was parks and open space land use submittals. November has yielded 10 reviews to date.

Oct-22

Referral Agency	Proposed Development	Type of Land Use	Date Received	Review Deadline	Approx. Dev. Size (acres)	Review Date	Comments
Town of Parker	Kime Ranch	residential	10/3/2022	11/2/2022	42.9	10/7/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construction BMPs 3. Construction Drawing file was unable to download from Etrakit, please send a copy of the construction drawings to landusereferral@ccbwqa.org for our review of the Construction BMP plan.
Town of Parker	Newlin Crossing F3	residential	10/3/2022	11/2/2022	100.7	10/12/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construction BMPs 3. When available please provide the construction disturbance phasing and schedule to show the maximum disturbance area and duration of disturbance. Please reference Control Regulation Section CR72 72.7(2.(b)(5(i)A for construction BMP phasing requirements
Douglas County	South Metro Fire Rescue Authority, Amended and Restated Service Plan	Mixed use	10/4/2022	10/18/2022	0	10/10/2022	No exceptions taken with the amended service plan
City of Aurora	CATTLEMENS AT EAGLE BEND FLG #01	residential	10/4/2022	10/18/2022	9.1	10/11/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construction BMPs 3. No further referrals to the Authority on this project are required
City of Castle Rock	Four Corners	Other - Road & Bridge	10/4/2022	Not provided	3	10/12/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construction or Construction BMPs 3. No further referrals to the authority on this project are required.
Town of Parker	Lincoln Professional Park L3 - Andy's Custard	commercial	10/5/2022	11/2/20022	3.6	10/21/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the construction BMPs (Erosion Control Plain) submitted with the Project CDs. 3. Please provide a drainage letter or report detailing the proposed post construction BMPs or existing post construction BMPs for the site. 4. The authority reserves the right to review and comment on future submittals for the project.
Douglas County	6685 S State Highway 83	commercial	10/5/2022	10/26/2022	100	10/25/2022	The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). The post-construction BMPs for animal waste management includes prevention of groundwater and surface water contamination . Provide description of BMPs taken to prevent groundwater and surface water contamination (i.e. containment of manure storage/pile, storage/pile and application to pastures are outside of waterways and ditches); provide this information so that it can be reviewed. The Authority reserves the right to review and comment on future submittals.
City of Aurora	CATTLEMENS AT EAGLE BEND FLG #01	residential	10/10/2022	10/12/2022	9.1	10/12/2022	Signature set. No exceptions with the previous submittal
Douglas County	Douglas County Zoning Resolution (Zoning Resolution) Sections 3, 4, and 36	commercial	10/7/2022	11/7/2022	NA	10/19/2022	No exceptions taken with the amendment to the zoning resolutions. The authority reserves the right to review individual proposed developments (vet clinics) within the Cherry Creek Basin when they become available.
SEMSWA	Cobblestone Car Wash - Parker Rd	commercial	10/7/2022	10/19/2022	1.4	10/17/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construction BMPs. 3. When construction BMPs (GESC Plan is available please provide for our review and comment.
City of Aurora	SMOKY HILL CROSSING FLG #01	commercial	10/13/2022	10/18/2022	0.9	10/17/2022	Previously reviewed 2334 1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construction or Construction BMPs 3. No further referrals to the authority on this project
Douglas County	Rueter-Hess Reservoir Oxygenation Project, Parker Water & Sanitation District Location and Extent Request	Other- Utlity	10/12/2022	10/26/2022	6.4	10/19/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construction BMPs 3. Provide construction BMPs (GESC) for our review and comment when available.
City of Castle Pines	The Canyons Planned Development, 4th Amendment	Other - Parks and Open Space	10/19/2022	11/19/2022	320	10/24/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the Development Plan amendment; when detailed development plans in this amended area are available, the authority reserves the right to review and comment on future referrals.
City of Aurora	Kings Point North East	residential	10/21/2022	11/4/2022	908	10/24/2022	Previously reviewed 2337 Previous Comments Not addressed please see below: 1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. As noted in the drainage report, a variance was requested to bypass structural water quality for the rear portion of the lots backing Antelope creek. Tier 3 post construction BMPs are still required for these areas; please provide more detail of the acceptable post construction BMPs for the areas and provide supporting calculations. Utilization of existing landscape for runoff reduction BMPs is acceptable provided runoff reduction meets design criteria outlined in the USCDM Vol.3, however more information and supporting calculations needs to be provided. 3. This site includes development in the stream preservation areas which requires additional post construction BMPs per the CR72. See Section 72.7 (2.)(c.)(8)(i) of the CR72 for more information regarding the requirements. Please explain what additional BMPs are being provided to meet these requirements. 4. The authority reserves the right to review and comment on future referrals for the project
CDOT	Parker Road Resurfacing and Pedestrian Improvements	Other - Road & Bridge	10/26/2022	Not Provided	0.57	10/26/2022	Previously Reviewed 2441 No exceptions taken with the Authorized exclusion for post construction BMPs for sidewalk construction
City of Centennial	Joliet Live-Work Units (PLAT)	Mixed use	10/24/2022	11/14/2022	5.8	10/27/2022	No exceptions taken with the proposed plat.See additional comments submitted for SITE-22-2022

City of Centennial	Joliet Live-Work Units	Mixed use	10/24/2022	11/14/2022	5.8	10/27/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construciton BMPs. 3. When construction BMPs (GESC plan) are available, please provide for our review and comment
SEMSWA	Joliet St Live Work	Mixed use	10/25/2022	11/11/2022	5.8	11/1/2022	1.The Authority's Control Regulation 72 requires construction and post-construction Best Management Practices (BMPs). 2. No exceptions taken with the proposed post construciton BMPs. 3. When construction BMPs (GESC plan) are available, please provide for our review and comment
City of Centennial	Reguis Jesuit Athletic Fields	commercial	10/27/2022	11/28/2022	18	11/4/2022	1.This project is located in the Cherry Creek Basin and therefore must follow requirements in the Cherry Creek Basin Water Quality Authority's Control Regulation 72 . Control Regulation 72 requires both construction and post-construction Best Management Practices (BMPs). Based on the disturbance area and additional impervious area added, this project would classify as a Tier 3 development and shall provide BMPs meeting the requirements for this designation. 2. No exceptions taken with the proposed post construction BMP treating the majority of the site (full spectrum detention). However, Basins OS1, OS2, OS3 and OS4 include the addition of more than 6,000sf of new/added impervious area (sidewalk). Per control regulation 72, new/added impervious area should be treated in a post construction BMP meeting Tier 3 requirements. It was not clear how this impervious area will be treated prior to release into the municipal storm sewer system, please advise. 3. Please provide more detail: is the hydrodynamic separator proposed in basin US3 designed to treat the WQCV required for a Tier 3 development? 4. Construction BMPs were not provided at this time, please provide when available.
Town of Parker	Trails at Crowfoot F9 AMD 1	commercial	10/27/2022	11/29/2022	4.2		
Town of Parker	Trails at Crowfoot F9 AMD1 L1 - Gas Station	commercial	10/27/2022	11/30/2022	4.2		
SEMSWA	Reguis Jesuit Athletic Fields	commercial	10/28/2022	11/25/2022	18	11/4/2022	1.This project is located in the Cherry Creek Basin and therefore must follow requirements in the Cherry Creek Basin Water Quality Authority's Control Regulation 72 . Control Regulation 72 requires both construction and post-construction Best Management Practices (BMPs). Based on the disturbance area and additional impervious area added, this project would classify as a Tier 3 development and shall provide BMPs meeting the requirements for this designation. 2. No exceptions taken with the proposed post construction BMP treating the majority of the site (full spectrum detention). However, Basins OS1, OS2, OS3 and OS4 include the addition of more than 6,000sf of new/added impervious area (sidewalk). Per control regulation 72, new/added impervious area should be treated in a post construction BMP meeting Tier 3 requirements. It was not clear how this impervious area will be treated prior to release into the municipal storm sewer system, please advise. 3. Please provide more detail: is the hydrodynamic separator proposed in basin US3 designed to treat the WQCV required for a Tier 3 development? 4. Construction BMPs were not provided at this time, please provide when available.
Douglas County	9240A N. Apache Road, Site Improvement Plan (SIP)	Other- Utlity	10/31/2022	11/21/2022	40.1		

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2022 Capital Project, Maintenance, and Planning Status Report
November 11, 2022

RESERVOIR PROJECTS

1. Reservoir Destratification System (RDS)– Distribution System Concepts (CCR-2)
   a. Description: The RDS in-lake distribution system consists of several lines and 116 membrane disc diffusers that create the bubble plumes to help mix the reservoir and improve water quality. The RDS reduces the chlorophyl a in the reservoir. The RDS was originally installed in 2008. The in-lake distribution which been requiring increased maintenance in 2019-2021, which is indicating that replacement may be needed within the 10-year CIP window. In January 2020, Wright Water Engineers (WWE) evaluated in-lake treatment in the Reservoir included an expansion of existing destratification system. This project evaluates the replacement and/or upgrade of the distribution system and informs cost and timing of the work.
   b. Status: Project is waiting on watershed model runs, at which time it will be brought back to TAC and Board for further discussion, input, and direction (3/31/22).

2. Reservoir Nutrient Mitigation Alternatives Study (CCR-3)
   a. Description: Nutrients in the Reservoir fuel the chlorophyl a level. In January 2020, Wright Water Engineers (WWE) evaluated in-lake treatment in the Reservoir. In 2021, Solitude Lake Management performed a sediment sampling and testing in the Reservoir. This study combines this recent work with CCBWQA's ongoing water quality sampling in the reservoir and the reservoir model, to inform options to reduce nutrients in the reservoir and refine their viability.
   b. Status: *Alternatives study has been moved to 2024 pending feasibility and modeling results*.

3. East Shade Shelters Phase III and Tower Loop Phase II Shoreline Stabilization (CCB-17.5 and CCB-17.7)
   a. Description: These projects were identified in 2014 through the annual inspection. The Tower Loop Phase II connects to the Phase I project and extends shoreline protection 570 feet to the southeast towards Dixon Grove. The East Shade Shelters Phase III starts on the north end of the Shade Structure and goes 400-feet to the south.
   b. Status: Consultant selection is scheduled for the 1st quarter. A consultant selection committee will be set in February (1/29/21). At the February TAC meeting Jason Trujillo, Jon Erickson, Lanae Raymond, Bill Ruzzo were interested in serving on the consultant selection committee (2/11/21). This selection committee was discussed at the 3/18/21 Board Meeting, and no further members were added. The Request for Proposals (RFP) has been posted on BidNet and Proposals are due 04/21/21 (3/25/21). The pre-proposal meeting was held on 4/7/21. 5 proposals were received on 4/28/21; the selection committee is reviewing them. Interviews were held and a selection is being brought to the May Board meeting (5/14/21). Board authorized negotiations with RESPEC (5/27/21). Agreement has been executed with RESPEC (10/15/21). Field Survey of project areas and topographic mapping is underway (12/30/21). A design kickoff meeting was held on 4/22/22. A design sprint workshop was held on 7/12/22 which included a site visit and evaluation of alternatives. RESPEC is developing a recommended alternative (9/8/22). *RESPEC provided updated project costs for budgeting and is working on 30% submittal (10/13/22).*

STREAM RECLAMATION PROJECTS

1. Cherry Creek Monitoring Station CC-10, Flow Measuring Improvements (CCB-5.13)
   a. Description: This project was identified in 2019 as part of the exploration of the downcut area and through the flow analysis with during the reservoir and watershed modeling effort. It installs equipment upstream of the perimeter road that would be used to measure the flow

that splits off to the west and bypasses the CC-10 and provide a new rating curve at CC-10 to improve measurements of high flow at this location.

b. Status: RESPEC provided scope of work and fee for the engineering and survey work needed, and it was approved by the Board at their April 2020 meeting. Survey is scheduled for 5/29/20. Survey is complete. Updated rating curves are scheduled to be delivered by late September. Received update from RESPEC that information is under Quality Assurance and Quality Check review and will be submitted soon (10/8/20). RESPEC's draft memo was received on 12/4/20 and comments have been returned. A meeting was held with Erin, Chuck, Chris, and Rich on 12/16/20 to discuss measuring station improvements and scheduling. A tour with Jason Trujillo was held on 2/12/21, no fire damage was noted on CC-10. A stage gage will be added upstream of Lake View Drive to allow for flow measurement of flows that bypass CC-10 and go directly to Cherry Creek reservoir (3/12/21). Work order has been prepared to Hydrologik for stage measurement at Lake View Drive (4/13/21). Hydrologik has installed the stage measurement at Lake View Drive and RESPEC has submitted the Final Draft of the Rating Curve and it is currently under review (8/13/21). Comments on report have been provided to RESPEC (11/11/21). Additional analysis on rating curve for CC10 was done to determine effects of reservoir level (3/31/22). RESPEC prepared a detailed rating curve for Lake View Drive which will facilitate flow comparison between CC10 and Lake View Drive (5/13/22).

2. Cherry Creek Stream Reclamation at Arapahoe Road aka Reaches 3 and 4 (CCB-5.14C)

a. Description: This project continues the work on Cherry Creek by CCBWQA, MHFD, and local partners. It ties into the previous stream reclamation projects of Cherry Creek Eco Park to Soccer Fields (CCB-5.14A) and Cherry Creek at Valley Country Club (CCB-5.14B). The 5,167 Linear Feet of stream reclamation reduces bed and bank erosion immobilizing approximately 88 pounds of phosphorus annually. The project is anticipated to be funded over several years and likely be broken into phases.

b. Status: In 2021, and IGA was executed between CCBWQA, MHFD, City of Aurora, and SEMSWA to begin this work. IGA Amendment that brings in 2022 funding is under review (5/13/22). Board authorized IGA Amendment for 2022 funding on 7/21/22 (8/12/22). IGA Amendment has been revised to show Aurora's lower participation; CCBWQA's participation was lowered accordingly to meet 25% partner project level; revised IGA Amendment received TAC recommendation and is being taken to Board for their consideration in October (10/13/22). *Board authorized the IGA Amendment for 2022 funding at their 10/22/22 meeting.*

3. Cherry Creek Stream Reclamation at 12-Mile Park – Phase 3 (CCB 5.16A)

a. Description: The design contract with CH2M Hill was executed on November 27, 2018. Notice to proceed included only those services defined as Phase 1 in CH2M Hill's scope of services. As part of the approved Action Item Memo to the Board, staff recommended that a design review committee consisting of the Capital Projects Manager and up to three TAC members be established. The not-to-exceed fee totals $104,991.88; with the Part 1 services not-to-exceed fee of $45,078.88, and the Part 2 services not-to-exceed fee of $59,913.00. The design review committee is David Van Dellen, Jacob James, Casey Davenhill, Bahman Hatami/Jon Erickson, and Richard Borchardt. CH2M Hill is now Jacobs.

b. Status: Jacobs is starting data collection for topographic survey and wetland mapping. Survey is scheduled to start 2/28/19 and is coordinated with Colorado State Parks. Survey has been completed and wetland mapping is underway. Jacobs has prepared updated schedule to account for weather delays on surveying and wetland mapping. The design kickoff meeting was held on 5/15/19. Jacobs is preparing concepts and costs for 4 alternatives. A field visit and progress meeting are scheduled for 8/8/19. Jacobs presented alternatives and costs to the design review committee on 8/8/19. Jacobs and the design review committee are preparing a presentation on alternatives and costs for the TAC (9/5/19 and 10/3/19) and Board (10/17/19). Received authorization from Board at 10/17/19 meeting to move project forward in 2 phases; Jacobs is working on scope of work adjustments needed for this approach. Final design of phase 3A (protects existing work done in phases 1

and 2) and permit level design of Phase 3B (adaptive approach downstream of breach area) are underway. A progress meeting was held on 1/30/20; design on Phase 3A is about 30% complete. The initial site visit with the Army Corps of Engineers has been cancelled due to stay at home orders, approach has changed to supplying them a draft of the materials and addressing questions and comments. Progress meeting and site visit to look at Phase 3B was held on 6/1/20. Scope of work and fee for adaptive management and preliminary design of Phase 3B is under review by committee. A joint Cherry Creek Committees meeting is scheduled for 10/5/20 to discuss optimization between the Cherry Creek 12-mile Phase 3B project and the Cherry Creek Reservoir to Park Boundary study. Phase 3A was submitted to the US Army Corps of Engineers for their 408 review on 11/4/20. Construction BMPs plan and report were reviewed and approved by Arapahoe County on behalf of Cherry Creek State Park on 12/22/20. Jacobs submitted draft Scope of Work (draft SOW) for the optimization for Phase 3B (north of breach repair) for adaptive management approach; the joint committee meeting is schedule for 2/3/21 to review SOW. A meeting is scheduled with USACOE's new contact Bobbi Jo Trout for CCBWQA on 2/1/21 where a status update on the 408 review will be requested. The Joint Cherry Creek Committees recommended holding off on Jacobs draft SOW, as the scope and scale of adaptive management may evolve with Muller's Study of the area between Reservoir and the Park Boundary; Bobbi is checking on status of 408 review (2/11/21). A site visit with Bobbi and Jason was held on 4/26/21 to help facilitate the USACOE's 408 review. A site visit with the Cherry Creek subcommittee was held on 6/24/21, plan modifications associated with additional erosion from spring 2021 runoff and Muller's study work on Cherry Creek are being evaluated by the Cherry Creek subcommittee. A coordination meeting was held on 7/12/21 with Jacobs and Muller to discuss updating the location cutoff wall and layout (based on the erosion from the 2021 Spring runoff and the Muller's geomorphic and 2D modeling effort); Jacobs is preparing exhibits for subcommittee's discussion and consideration (7/29/21). The subcommittee met on 8/12/21 and provided Jacobs direction on cutoff wall location and plan revisions. Revised plans and engineer's opinion of probable construction cost has been sent to project committee (11/11/21). Board is considering the release of the project to Bid (12/9/21). Board authorized project for bidding with the base bid and add alternate at their December 2021 meeting. We received confirmation that plan revisions made are still in conformance with 408 approval; are waiting for response regarding revisions and the 404 permit; received approval on GESC plans and report (12/30/21). CCBWQA received concurrence on conformance with existing 404 permit and project is out for bid (1/13/22). The project is out to bid and the pre-bid meeting was held on1/28/22. CCBWQA received 10 bids on 2/4/22; the low bidder is 53 Corporation. Notice of Award has been issued to 53 Corporation (3/10/22). Construction Agreement has been executed (3/31/22). The pre-construction meeting was held on 4/6/22 with construction scheduled to start on 4/25/22. Construction is underway (5/13/22). Construction is nearing completions with the final walk-through was held on 6/14/22. Project is substantially complete and is waiting for seeding and planting window to complete willow staking and touch up seeding (7/15/22). Jacobs is scheduled to do a site visit on 9/9/22 to evaluate post-storm condition and recommend repairs needed because of the 8/15/22 storm. Repairs are minor and are being scheduled with 53 Corporation (10/13/22). *Visited site with 53 Corporation on 11/2/22.*

4. Cherry Creek Stream Reclamation – Upstream of Scott Road (CCB-5.17)

a. Description: Design and construction of stream reclamation is in partnership with Douglas County and MHFD. It improves 4,100 feet of Cherry Creek and is located upstream of Scott Road.

b. Status: IGA was approved by the Board at their April 2020 meeting. Muller had been selected as consultant, and design scope of work is being prepared. Kickoff meeting was held on 12/11/20; a follow-up field visit will be scheduled for early 2021. Site visit was held on 1/29/21. Conceptual design is complete, negotiations are underway to contract for 60% design (4/8/21). Muller is working on alternatives (4/30/21). Muller is working on preliminary design and an IGA Amendment to bring in additional 2021 funding from Douglas County is being brought to the Board in October (10/15/21); IGA Amendment has been executed

(11/11/21). Muller is preparing 60% Design Submittal (1/28/22). Muller submitted 60% Design on 2/2/22; comments have been provided on 60% Design Submittal (3/10/22). IGA Amendment bringing in 2022 funding is scheduled for TAC and Board consideration in June (5/27/22). IGA Amendment was authorized at the June 16th Board Meeting (6/30/22).

5. Cherry Creek Stream Reclamation at Dransfeldt (CCB-5.17.1B)

a. Description: Design and construction of stream reclamation is in partnership with Town of Parker and MHFD. It improves 2,400 feet of Cherry Creek near the future location of Dransfeldt bridge which is just downstream of the Cherry Creek at KOA project.

b. Status: Initial scoping has begun, and a partners meeting was held on 1/30/21. IGA is scheduled for CCBWQA's May TAC and Board meetings (4/30/21). IGA was approved by all parties and has been executed (6/25/21). Muller Engineering has submitted their Draft Scope of Work for Design Services, and the project sponsors have reviewed it (7/8/21). Design kickoff meeting was held on 10/14/21. Alternatives are being evaluated (12/9/21). Pre-submittal meeting for the 404 permit is being scheduled (12/30/21). CLOMR is being prepared for project (3/10/22) and was submitted to FEMA on 3/31/22. CEI was selected for as project partner to provide contractor input during the design (5/27/22). CLOMR is under review by FEMA (8/12/22).

6. McMurdo Gulch 2020/2021/2022 Stream Reclamation (CCB-7.2)

a. Description: The design and construction of stream reclamation is in partnership with Castle Rock. Castle Rock is the lead agency. This phase continues the work from the previous project and the improves the next set of high priority areas about 2,500 feet. The Authority's water quality component share for design and construction is estimated to be $360,000 ($60,000 for design in 2020, and $300,000 for construction in 2021). The total project cost is estimated at $1,440,000.

b. Status: 2020 Funding was approved at June Board Meeting and capital budget restructure will be drafted for future consideration. 60% level progress meeting is scheduled for 10/5/20. Review comments on 60% submittal were provided on 10/6/20. 90% design submittal is scheduled by end of March (3/12/21). 90% design submittal is being reviewed (4/8/21). CCBWQA submitted comments on 90% design on 4/13/21. The 90% design review and progress meeting was held on 7/22/21, and the construction funding for project is being considered by the TAC at their August meetings (7/29/21). The IGA is currently be drafted and will be brought to the Board at their September meeting (8/13/21). The project is being bid by Castle Rock with the bid opening scheduled for 11/12/21. Tezak Construction was the apparent low bidder (12/9/21). The pre-construction meeting was held on 1/3/22. Construction is underway (2/11/22). A construction meeting was held on 3/8/22, with sites 1-3 have the general construction completing and are waiting for a revegetation window and site 4 has started work on riffle structure. Seeding and revegetation are underway during spring planting window (5/13/22).

7. Lone Tree Creek in Cherry Creek State Park (CCB-21.1)

a. Description: This project includes a trail connection to Cherry Creek State Park and includes 570 linear feet of stream reclamation on Lone Tree Creek from the State Park Boundary to the Windmill Creek Loop Trail. The City of Centennial is the project lead. CCBWQA participation is for the stream reclamation only.

b. Status: 95% submittal is under review (5/13/22); review comments have been returned (5/27/22). Project funding was brought to TAC at their 7/7/22 meeting, during drafting of IGA it was discovered that future maintenance of stream reclamation should be considered, project will be brought back to TAC at an upcoming meeting for maintenance discussion and recommendation (8/12/22). A stakeholder meeting was held on 9/29/22 to discuss maintenance. *A stakeholder meeting was held on 11/2/22 to discuss findings from CCBWQA's site visit and findings included in Wright Water Engineers report.*

8. Happy Canyon Creek – County Line to Confluence with Cherry Creek (CCB-22.1)

a. Description: The design and construction are in partnership with Southeast Metro Stormwater Authority and MHFD and includes 2,500 feet of stream reclamation. The Authority's water quality component share for design and construction is estimated to be $325,000. The total project cost is estimated at $1,300,000.
b. Status: IGA is scheduled for June TAC and Board meetings (5/27/21). IGA has been approved and executed by all parties (7/29/21). Jacobs has been selected as design consultant and project scoping is underway; limits have been extended upstream to the County Line and sediment capture area and transport will be included with the project (10/15/21). Jacobs has submitted their scope of work and fee for design which is under review by project sponsors (11/11/21). Project sponsors have completed a review of Jacobs' fee and scope of work and the agreement is being routed for signatures (1/28/22). IGA Amendment to bring in 2022 funding is in process (3/10/22). A project kickoff meeting was held on 3/28/2022. A site visit was performed on 4/12/22 to document existing conditions and identify sediment source/transport/deposition areas. Project Team is preparing a sampling plan for bank and bed materials to determine phosphorous content (5/13/22). The project team met on 5/24/22 to discuss project goals and Jacobs is progressing through the study. Jacobs and ERC are working on sediment transport analysis and model (6/30/22). The results from the sediment transport model were presented at the 8/23/22 progress meeting and an upstream sediment capture area just south of the JWPP was included in the alternatives analysis (8/26/22). The alternative analysis report is expected to be completed before the end of 2022 (10/13/22). *Lab results from stream soil samples were sent to Jacobs so that they include phosphorus reduction in the alternatives analysis report; a groundwater investigation is needed to inform sediment capture facility and stream reclamation alternatives, scoping and negotiations are in progress (11/11/22).*

9. Happy Canyon Creek - Upstream of I-25 (CCB-22.2)
a. Description: The design and construction are in partnership with Douglas County, City of Lone Tree, and MHFD and includes 2,500 feet of stream reclamation. The Authority's water quality component share for design and construction is estimated to be $500,000. The total project cost is estimated at $2,000,000.
b. Status: Douglas County, City of Lone Tree, and MHFD have initially funded and selected Muller Engineering as the design engineer. Design has started and a progress meeting was held on 1/27/21. Design is progressing (2/11/21). Muller has submitted 60% Design Deliverables (5/27/21). IGA for 2021 Funding is being brought to Board in September (9/9/21). 2021 IGA Amendment has been executed (11/11/21). Coordination with CDOT and easement acquisitions are on-going (1/13/22). Board authorized 2022 funding and IGA Amendment at their June 16th meeting (6/30/22). The project received environmental clearance from CDOT (8/12/22). The 90% design submittal is scheduled for delivery by end of September (8/26/22). The 90% design submittal is being reviewed (10/13/22). *Comments were provided on 90% submittal (11/11/22).*

10. Dove Creek - Otero to Chambers Rd. (CCB-23.1)
a. Description: The design and construction are in partnership with Southeast Metro Stormwater Authority (SEMSWA) and with Mile High Flood District (MHFD) being a key stakeholder; it includes 1,300 feet of stream reclamation. The Authority's water quality component share for design and construction is estimated to be $175,000. The total project cost is estimated at $700,000.
b. Status: SEMSWA is drafting the Intergovernmental Agreement to bring in the 2021 funding for the project (3/12/21). RESPEC is the design consultant; two conceptual design alternatives have been prepared and reviewed during meeting on 3/15/21. IGA is scheduled for CCBWQA's May TAC and Board meetings (4/30/21). IGA has been approved and executed by all parties (7/29/21). 30% Design Review Meeting was held on 8/23/21. A Progress meeting is scheduled for 2/26/22 with 60% Plan submittal expected to follow (1/28/22). The 60% Design was submitted on 2/16/2022, comments were provided, and a design review meeting was held on 2/23/2022. IGA Amendment to bring in 2022 funding is in process (3/10/22). Construction costs were prepared by CEI based on 60% submittal

(5/13/22). A design progress meeting was held 6/14/22 and 90% design submittal is being prepared (6/30/22). 90% design submittal is expected by the end of July (7/15/22). The 90% design submittal was reviewed, and comments were submitted on 8/22/22. *Construction is anticipated in 2023 (10/13/22). A progress meeting was held on 11/8/22, project will likely be done in 2 phases, IGA Amendment will be needed early in 2023 so that construction can start ahead of storm season.*

11. Piney Creek from Fraser Street to Confluence with Cherry Creek aka Reaches 1 and 2 (CCB-21.1)
   a. Description: This project includes 2900 liner feet of stream reclamation on Piney Creek. The project partners are SEMSWA and CCBWQA.
   b. Status: Project coordination meeting was held with SEMSWA on 6/29/22. IGA drafted and is being reviewed by SEMSWA (8/12/22). IGA was approved by CCBWQA at the 9/15/22 Board meeting.

MAINTENANCE

1. Reservoir Destratification Operations (OM-7)
   a. Description: Includes 2022 Annual Operations and Maintenance of the Reservoir Destratification System (RDS).
   b. Status: Ingersoll Rand replaced the top pressure regulating valve on 4/4/22; the pre-season check was done simultaneously, and no leaks were observed. The RDS was started for the season on 5/1/22. At the request of Colorado Parks and Wildlife (CPW) to aid in search and recovery efforts the RDS was turned off on 5/10/22 and it will be started back up when notified by CPW that it is appropriate. The RDS was restarted on 5/14/22. Ingersoll Rand preformed compressor maintenance on 6/14/22 and B&RW repaired a leaky diffuser head on 6/22/22. Annual maintenance on the in-lake distribution system started on 8/22/22 and 8/23/22 with the remaining maintenance scheduled for the end of September. Compressor shut down with a high temperature warning on 9/2/22; the Ingersoll Rand technician responded on 9/7/22, cleaned out coolers, and restarted compressor. A leak in the reservoir distribution was observed on 9/15/22, the affected zone 1 was turned off until repairs can be made, repairs were completed on 9/27/22 and zone 1 was turned back on then. Annual maintenance continued the week of 10/3/22 and when it was completed the system was turned off for the season on 10/6/22.

2. PRF Weed Control (OM 14.1)
   a. Description: Includes 2022 weed control from 2021 Annual Observation of Pollution Reduction Facilities (PRFs).
   b. Status: *No weed control was performed in 2022*.

3. PRF Reseeding at CCSP (OM 14.2)
   a. Description: Includes 2022 routine restoration of PRF vegetation at Cherry Creek State Park (CCSP) from 2021 Annual Observation of Pollution Reduction Facilities (PRFs).
   b. Status: *No seeding was performed in 2022.*

4. Mountain and Lake Loop Shoreline Stabilization Phase II (OM 4.6)
   a. Description: This project was identified in through the 2020 annual inspection and design and permitting started in 2021. It adds about 40 feet of shoreline protection where it has eroded leaving a 1-2 foot tall vertical bank.
   b. Status: Construction Plans have been prepared and the GESC was submitted to Arapahoe County for review (1/13/22). Plans are being reviewed by US Army Corps of Engineers for 408 clearance (5/13/22).

5. East Boat Ramp Shoreline Stabilization Phase II (OM 4.6)
   a. Description: This project was identified in through the 2012 annual inspection and design and permitting started in 2019. It connects to the Phase I project and extends shoreline protection 100 feet to the north towards the East Shade Shelters.

b. Status: Field work has been completed on the East Boat Ramp Shoreline Stabilization and design is underway. Permitting Meeting was held on 9/16/19. ERO has been contracted to for 404 permitting assistance. Preliminary Design was completed on the East Boat Ramp in December 2019; permitting and final design has begun. Design is about 80% complete. Site meeting with Colorado Parks and Wildlife was held on 3/25/20. ERO has prepared 404 permit application on 4/30/20. 404 permit application has been submitted. East Boat Ramp Plans were submitted on 8/26/20 to USACOE and Cherry Creek State Park staff for their review and approval. USACOE's 408 approval was received and final bid documents are being prepared (1/29/21). Contract Documents are being updated for Bidnet (5/27/21). GESC is being prepared (11/11/21). GESC was submitted to Arapahoe County for review (1/13/22). Project is out for bid (5/13/22). The pre-bid meeting was held on 5/25/22. The bid opening was on 6/8/22 with 53 Corporation being the low bidder. The Board authorized the award to 53 Corporation and the construction funding at their June 16th meeting (6/30/22). 53 Corporation started construction on 8/22/23. Project is nearing completion and final walk-through was held on 10/4/22. *Construction is complete (11/11/22).*

6. 2021 Wetland Harvesting Pilot Project (OM WHPP)
   a. Description: Includes 2021 Wetland Harvesting on Cottonwood Creek (Western Bank) to remove Phosphorus and Nitrogen. Harvesting cuts the above ground biomass, collects and hauls off cuttings effectively removing the Phosphorus and Nitrogen trapped in the cuttings. The preserved below ground biomass will regenerate and regrow, creating a sustainable harvesting program that retains the natural and beneficial functions of the wetlands.
   b. Status: The Board authorized Wetland Harvesting Pilot Project at their March 2021 meeting (8/13/21). The Pilot Project started on 10/11/21, a site visit was made on 10/13/21, and is scheduled to be completed by 10/31/21. Field work has been completed (11/11/21). Lab data is being compiled (12/9/21). LRE Water is preparing a google earth and GIS boundaries of 2021 harvest limits (12/30/21). Lab data on vegetation samples was received and nutrient removal information from 2021 harvesting is being developed (1/28/22). The 2021 update and data were presented to TAC at their 4/7/22 meeting. Presentation of 2021 Update is scheduled for the May Board meeting (5/13/22). An update on the regrowth of the 2021 Harvest Area will be provided at the 8/18/22 Board Meeting and 9/1/22 TAC Meeting.

7. 2022 Wetland Harvesting Pilot Project (OM WHPP)
   a. Description: Includes 2022 Wetland Harvesting on Cottonwood Creek (Eastern Bank) to remove Phosphorus and Nitrogen. Harvesting cuts the above ground biomass, collects and hauls off cuttings effectively removing the Phosphorus and Nitrogen trapped in the cuttings. The preserved below ground biomass will regenerate and regrow, creating a sustainable harvesting program that retains the natural and beneficial functions of the wetlands.
   c. Status: Action for 2022 is scheduled for the May Board meeting (5/13/22). The Board authorized the wetland harvesting work for 2022 (5/27/22). L&M is preparing proposal for 2022 wetland harvesting (8/12/22). The 2022 wetland harvesting is scheduled from 9/12/22 to 9/23/22 (8/26/22). The 2022 wetland harvesting has been completed; lab results of samples, area measurement, and final weights of harvesting are in progress (10/13/22).

PLANNING

1. Cherry Creek Master Plan Cherry Creek State Park Boundary upstream to the Mile High Flood District Boundary (PAPM-0)
   a. Description: The Mile High Flood District (MHFD), Southeast Metro Stormwater Authority, Town of Parker, Douglas County, and CCBWQA are preparing a Major Drainageway Planning Study for Cherry Creek upstream of Cherry Creek Reservoir. The Plan identifies potential Pollution Abatement Projects (PAPs). Potential PAPs are stream reclamation (immobilizes phosphorus in soil).
   b. Status: Muller Engineering has been selected as the consultant for the project and their scope of work and fee and currently under review by the project sponsors. Field visits by the consulting team started on 10/8/20 and were completed on 11/6/20. Progress meeting was

held on 12/14/20, which included overview of field visits. At the 2/8/21 progress meeting, a water quality parametric was discussed, and could be mapped and used to identify deficiencies along Cherry Creek. Muller is scheduled to present at TAC at the 5/6/21 TAC meeting, and the 2021 Water Quality Planning Scope of Work and Fee will be considered at CCBWQA's May TAC and Board meetings (4/30/21). Muller provided update and 2021 Water Quality Planning work was authorized (5/27/21). A progress meeting was held on 10/11/21. Muller has added a water quality parametric to the overall stream assessment exhibit and is working with RESPEC to include information from watershed model (12/30/21). A draft storyboard of the work was presented at the progress meeting on 4/11/22. Water Quality text for StoryMap/WebPlan submittal is scheduled for mid-August (7/15/22). Received water quality submittal on 8/26/22 and it is being reviewed (9/8/22). Muller is incorporating final comments and presented story map at the 9/23/22 Cherry Creek Stewardship Conference.

2. Cherry Creek Tributaries Major Drainageway Planning (PAPM-1)

a. Description: The Mile High Flood District (MHFD), City of Aurora, Southeast Metro Stormwater Authority, and Douglas County are preparing a Major Drainageway Planning Study for Cherry Creek Tributares upstream of Cherry Creek Reservoir and Dewberry / J3 is the consultant. The tributaries included are Little Raven Creek, Suhaka Creek, Joplin Tributary, Grove Ranch, Valley Club Acres, North Arapahoe Tributary, South Arapahoe Tributary, Chenango Tributary, Tagawa Tributary, Kragelund Tributary, and 17-mile Tributary. This project identifies potential Pollution Abatement Projects (PAPs) within the Cherry Creek Tribs MDP and the areas of those tributaries in CCSP. Potential PAPs are stream reclamation (immobilizes phosphorus in soil) and water quality treatment within detention basins (settlement of sediments and attached phosphorus).

b. Status: Board authorized CCBWQA to enter into Agreement with Dewberry at their 2/20/20 meeting, and CCBWQA contracted with Dewberry. Dewberry conducted field work 4/28-4/30/20. Dewberry will continue CCBWQA's work in conjunction with hydrology and alternatives in MHFD master plan. Dewberry has submitted the Alternatives Memo which is being reviewed (10/15/21). Comments have been provided on Alternatives Memo (12/9/21). Dewberry is working on the grading of the proposed water quality ponds (6/10/22). Study progress meetings were held for 17-mile Tributary on 8/15/22 and Kragelund Tributary on 8/22/22. A study progress meeting was held for Chenango Tributary on 9/2/22. *The draft alternatives analysis was submitted on 10/26/22 and is under review.*

3. Cherry Creek Stream Planning and Approach Study Reservoir to 12-Mile Park (BAPM-1)

a. Description: Several issues and concerns exist on Cherry Creek between the reservoir and 12 -mile Park: the continued head cut erosion and fallen and dying trees, CCBWQA's CC-10 monitoring station's declining accuracy and reliability of flow measurements, Bank and bed erosion along Cherry Creek from Perimeter Road to downstream, and the change in flow path downstream of the Cherry Creek 12-mile Park Phase 2 project (Breach Area). This study will help determine the water quality implications of these issues, CCBWQA's approach and role in the area, and stake-holders and possible partners.

b. Status: Interim committee is being set up to negotiate with Muller and determine scope of work, fee, and deliverables for TAC and Board consideration. Interim committee consists of Bill Ruzzo, John McCarty, Jon Erickson, Jason Trujillo, Rich Borchardt, and Chuck Reid. The scoping meeting is scheduled for 3/30/20. Muller conducted field assessment work on 4/28/20. Drone video is pending permit approval by USACOE. Muller has submitted draft base scope of work and optional additional services, which are being reviewed and considered by interim committee at their next meeting on 5/4/20. The next scoping meeting with interim committee and Muller is scheduled for 5/15/20; with a final draft of scope and fee being prepared for consideration shortly afterwards. Muller's scope of work and fee were distributed to TAC and Board authorized design services at their April 2020 meeting. Muller's revised scope and fee is being reviewed by committee. The study committee of John McCarty, Bill Ruzzo, Jacob James, Lanae Raymond, David VanDellen, and Jon Erickson has been formed to assist with decisions and direction during study. The kickoff meeting was

held on 8/11/20. A joint Cherry Creek Committees meeting is scheduled for 10/5/20 to discuss optimization between the Cherry Creek 12-mile Phase 3B project and the Cherry Creek Reservoir to Park Boundary study. Muller is preparing draft scope of work for the optimization approach (11/12/20). Muller has submitted the draft scope of work and fee for the optimization approach on 12/9/20. Muller revised draft Scope of Work (draft SOW) for the optimization to include sub-consultant work; the joint committee meeting is schedule for 2/3/21 to review draft SOW. The Joint Cherry Creek Committees and TAC have reviewed the draft SOW, and the final version is being included for Board consideration at their February Board Meeting (2/11/21). The Board approved Muller's Optimization work at their February Board Meeting (2/26/21). Muller plans to provide an update at July TAC meeting (4/30/21). Muller provided a draft submittal of historical site information and the survey efforts on 5/24/21. Muller will provide an update at the July TAC and Board Meetings (6/25/21). Please submit any comments on Draft report to Rich by 8/20/21 (7/29/21). Muller's additional scope of work for workshops and partnering efforts are scheduled was authorized by the Board in September (10/15/21); amendment to Muller's contract has been executed (11/11/21). It is anticipated that the workshop will be held in 2022 (12/30/21). Muller submitted the water quality assessment report on 4/9/22 which is currently being reviewed by the Pollution Abatement Project Manager. Comments on water quality study and monitoring have been sent to Muller (5/27/22). Muller is revising study to include comments (7/15/22). Muller has submitted revised channel monitoring report on 9/8/22. Muller has submitted the revised stream assessment report on 10/10/22.