



Notice of Regular Meeting
Cherry Creek Basin Water Quality Authority
Board of Directors Meeting
Thursday, February 15, 2024 at 9:00 a.m.

The meeting will be conducted in-person and virtually as set forth below.
In-person attendance is encouraged due to audio limitations in the meeting room.

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

Virtual: Zoom
<https://us06web.zoom.us/j/87425775963> Passcode: CCBWQA
Phone (646)931-3860 Mtg ID 874 2577 5963# Passcode: #815374

CCBWQA Board of Directors Meeting Documents can be found online at the link below.
https://drive.google.com/drive/folders/1KqGcDC9eS_gMEdSiXPPPBGefAHTib7pf?usp=share_link

1. Call to Order and Pledge of Allegiance
 - a. Introduction of Elysa Loewen, Pollution Abatement Project Manager
2. Oaths of Office (enclosed)
 - a. City of Lone Tree: Jacob James, 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 January 18, 2024 Minutes (enclosed)
 - b. Acceptance of the Schedule of Cash Position Dated February, 2024 (enclosed)
 - c. Acceptance of the Paid Claims for January, 2024 (enclosed)
 - d. Approval of Unpaid Claims as of February, 2024 (enclosed)
 - e. Acceptance of 2023 Project Summaries for Stream Reclamation
 - i. Happy Canyon Creek Stream Upstream of I-25 (enclosed)
 - ii. Dove Creek Phase 1 from Otero Avenue to Chambers Road (enclosed)
4. Direction and/or Action (30 minutes)
 - a. Acceptance of RDS 2023 Annual Operations and Maintenance Report (Goncalves, enclosed)
 - b. Acceptance of RESPEC's Watershed Modeling Scenario Report (Clary/Leak, enclosed)
 - c. Approval of Reservoir Modeling Scope and Budget for Hydros Consulting (Clary, enclosed)
5. Discussion (30 minutes)
 - a. DRAFT [2023 Annual Report on Activities](#) (Nobel)
 - b. CIP Project Identification and Prioritization Process (Ruzzo)
 - c. Discussion of the WY 2023 Water Quality Monitoring Report (Stewart)
 - d. Land Use Referral Process Revision (Clary)
 - e. Aurora Parker and Quincy Intersection Improvements (Ruzzo/Clary)
6. Presentations (none)
7. Board Member Items (As Needed)
8. Updates (15 minutes)
 - a. Technical Manager
 - i. Project Updates
 - ii. Regulation 72 Dewatering Update (CWQCC Website: [6. Consolidated Proposal - Google Drive](#))
 - iii. Watershed Planning Efforts and New Date for Workshop
April 18, 2024 8:30-11:30 am
 - b. Cherry Creek Stewardship Partners (Davenhill)
 - i. [Upcoming Events](#)
 - c. TAC (Knerr)
 - d. Contract Staff (As Needed)
 - i. Pollution Abatement Projects - CIP Status Report (Loewen, enclosed)
 - ii. In-Park PRF and RDS Maintenance and Operations (Goncalves)

- iii. [Water Quality Update](#) (Stewart)
- iv. Regulatory (DiToro)
- v. [Land Use Referral Tracking](#) (Endyk)
- e. Legal
 - i. Final 2024 Budget (enclosed)
- f. Other
- 9. Adjournment

[Board Binder](#) and [2024 Timeline](#)



**Cherry Creek Basin Water Quality Authority
Minutes of the Board of Directors Meeting
Thursday, January 18, 2024 at 9:00 a.m.**

Board Members Present

Aditi Bhaskar, Governor's Appointee
Bill Ruzzo, Assistant Secretary, Governor's Appointee
Christopher Lewis, Vice Chair, Governor's Appointee
Jessica LaPierre, City of Aurora - Alternate (zoom)
John McCarty, Secretary/Treasurer, Governor's Appointee
John Woodling, Governor's Appointee
Joshua Rivero, Chair, Town of Parker
Luis Tovar, Special District Representative
Margaret Medellin, Governor's Appointee
Max Brooks, Town of Castle Rock (zoom)
Mike Anderson, City of Lone Tree
Mike Sutherland, City of Centennial
Ryan Adrian, Douglas County - Alternate
Steve Sundberg, City of Aurora
Tom Downing, Governor's Appointee
Tom Stahl, City of Greenwood Village (zoom)

TAC Members Present

Alex Mestdagh, Town of Parker (zoom)
Ashley Byerley, SEMSWA
Caitlin Gappa, Board Appointee, Douglas County Health Department (zoom)
Cayla Cappello, City of Greenwood Village
David Van Dellen, Town of Castle Rock
Jacob James, City of Lone Tree
James Linden, SEMSWA - Alternate (zoom)
Jon Erickson, TAC Chair, Board Appointee, Colorado Parks and Wildlife (zoom)
Lisa Knerr, TAC Vice Chair, Arapahoe County
Michelle Seubert, Board Appointee, Cherry Creek State Park (zoom)
Rick Goncalves, Board Appointee
Wanda DeVargas, Board Appointee, E-470 (zoom)

Others Present

Erin Stewart, LRE Water
Jane Clary, Wright Water Engineers, CCBWQA Technical Manager
Jessica DiToro, LRE Water (zoom)
Nichole Kirkpatrick, CLA (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. Oaths of Office and Introductions

a. Governor's Appointees

- i. Aditi Bhaskar
- ii. John Woodling
- iii. Tom Downing

Director Rivero administered Oaths of Office for the Governor's newly-appointed Board member Aditi Bhaskar and re-appointed Board members John Woodling and Tom Downing.

Aditi Bhaskar introduced herself to the Board.

The [current list of Governor appointees](#) was provided to the Board.

b. City of Centennial

- i. Mike Sutherland: Board Member
- ii. Stephanie Piko: Alternate

Director Rivero administered an Oath of Office for Mike Sutherland with the City of Centennial.

3. Consent Agenda

- a. Approval of the November 16, 2023 Minutes
- b. Acceptance of the Schedule of Cash Position Dated January, 2024
- c. Acceptance of the Paid Claims for November and December, 2023
- d. Approval of Unpaid Claims as of December, 2023 and January, 2024
- e. Adoption of Resolution 2024-1-1, Open Meetings Law and Notice for Postings
- f. Adoption of Resolution 2024-1-2, Official Custodian of Records and Responding to Open Records Requests

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

4. Direction and/or Action

a. Reappointment of 2024 Chair, Vice Chair, Secretary/Treasurer, and Assistant Secretary

Current appointments:

- Joshua Rivero: Chair
- Christopher Lewis: Vice Chair
- John McCarty: Secretary/Treasurer
- Bill Ruzzo: Assistant Secretary

Director Anderson moved to reappoint Josh Rivero as Chair, Christopher Lewis as Vice Chair, John McCarty as Secretary/Treasurer, and Bill Ruzzo as Assistant Secretary for the calendar year 2024. Seconded by Director Downing. The motion carried.

b. Confirmation of Executive Committee Members

In 2021, the Board appointed an Executive Committee to facilitate Authority operations and assist contract staff. The Executive Committee includes officers of the Board and is supported by the Authority's legal counsel, accounting firm, and technical manager.

Current Executive Committee members:

- Joshua Rivero
- Christopher Lewis
- John McCarty
- Bill Ruzzo

Director Sutherland moved to ratify and confirm that the Board's Executive Committee members are Joshua Rivero, Christopher Lewis, John McCarty, and Bill Ruzzo. Seconded by Director Sundberg. The motion carried.

c. Confirmation of Board Appointees to the TAC for 2024

Val Endyk provided the Board with a memo listing the 2024 TAC members and highlighted the [Board Appointees to the TAC](#).

Director Ruzzo moved to approve Board appointees to the 2024 TAC as set forth in the enclosed January 12, 2024 Memorandum. Seconded by Director Downing. The motion carried.

d. Recommendation Regarding Recognition of Bhaman Hatami, Board Service (September 2019-December 2023)

The Executive Committee recommended the Board recognize former Board member Bhaman Hatami with the following:

- A letter of appreciation.
- A \$250 contribution to Cherry Creek State Park for park improvements.
- A plaque commemorating his years of dedication to the CCBWQA Board.

Director McCarty moved that the Authority recognize Bahman Hatami for his significant contributions to CCBWQA as set forth above. Seconded by Director Lewis. The motion carried.

e. Approval of Recommended Pollution Abatement Project Manager

The CCBWQA issued a competitive Request for Qualifications (RFQ) for Pollution Abatement Project Manager services on November 20, 2023. During December 2023, the Executive Committee and the Technical Manager conducted interviews and checked references for three candidates. The Executive Committee voted to select Elysa Loewen, P.E., with Loewen Engineering as the recommended candidate to serve as CCBWQA's PAMP. The Authority's legal counsel further interviewed the recommended candidate to confirm that the terms and conditions in the Authority's draft agreement for the position would be agreeable to Loewen Engineering. In the interest of filling this position as soon as possible, the Authority's legal counsel prepared a [draft agreement with exhibits](#) describing the scope of services and the consultant's budget and billing rates. The draft agreement was provided to the Board as a supplemental enclosure for review.

Loewen Engineering has confirmed that they can provide the services requested by CCBWQA in its RFQ under the terms in the draft agreement.

Director Anderson moved to authorize that the Board approve the selection of Elysa Loewen with Loewen Engineering as the Authority's Pollution Abatement Project Manager and authorize legal counsel to prepare an agreement for services that may be executed on the Authority's behalf by any member of the Executive Committee. Seconded by Director Sutherland. The motion carried.

5. Discussion

a. WY 2023 Monitoring Report

Erin Stewart presented a summary of the Draft Monitoring Report to the Board. The [memo](#) provided outlines the draft report content and what will be included in the amended report.

The [WY 2023 Draft Monitoring Report](#) was provided to the Board and a provisional draft was provided to the TAC prior to the January 4, 2024 TAC meeting.

Comments are requested by the February Board meeting.

Acceptance of WY 2023 Monitoring Report is scheduled for March.

6. Presentations (presentation and discussion in item 5.)

None

7. Board Member Items (As Needed)

Director Woodling requested the Authority look into pollutant loading from El Paso County.

The Board agreed to send Erin Stewart and John Woodling to El Paso County and report back at a future meeting. This would be within Erin's scope and budget for 2024.

8. Updates

a. Technical Manager

i. Draft 2024 Timeline (enclosed)

A simple calendar with key activities planned for 2024 was provided to the Board and will be attached to each Board agenda for ease of reference.

ii. Modeling Efforts Update

RESPEC has completed additional watershed model scenarios and is revising a draft memorandum summarizing findings. A modeling meeting is also scheduled for January to link watershed model outputs to the reservoir model runs that Hydros will be completing in 2024.

iii. **Regulation 72 Update (hearing documents accessible here:**

https://drive.google.com/drive/u/0/folders/1CH5cOj9ym7Qr_cXi6n4uylyUZtfKs6gl)

Rebuttal statements were filed on January 16, 2024. CCBWQA did not file a rebuttal statement. Jane Clary will participate in any follow-up meetings prior to the rulemaking hearing on February 12, 2024.

iv. **Letter of Support for USACE Special Project (enclosed)**

v. **New Member Orientation**

Remote meeting planned for this year.

vi. **Cherry Creek State Park Stickers Update (enclosed) and Water Quality Brochure Update**

b. **Cherry Creek Stewardship Partners (Davenhill)**

i. **Upcoming Events and Update**

c. **TAC (Knerr)**

TAC is adding a subcommittee this year for Capital Improvement Projects. The TAC is requesting Board participation if there is interest. Lisa Knerr will report back to the Board with more information and a description of the CIP Subcommittee at a future Board meeting.

d. **Contract Staff (As Needed)**

i. **PAPM**

a. **CIP Status Report and 2024 Next Steps (Clary/Borchardt, enclosed)**

b. **Maintenance and Operations Status Report (Goncalves)**

ii. **Water Quality Update (Stewart)**

iii. **Regulatory (DiToro)**

iv. **Land Use Referral Tracking (Endyk)**

e. **Legal**

i. **Mill Levy and 2024 Budget Update**

The final 2024 Budget will be provided to the Authority's Administrator who will distribute it to the Board.

f. **Other**

9. **Adjournment**

There being no further business to come before the Board, Director Rivero adjourned the meeting at 11:08 am.

[Board Binder](#) and [2024 Timeline](#)

Cherry Creek Basin Water Quality Authority
Schedule of Cash Position
December 31, 2023
as of February 8, 2024

	General Fund	Pollution Abatement Fund	Enterprise Fund	Total
<u>1st Bank - Checking Account</u>				
Balance as of 12/31/23	\$ 27,299.64	\$ 27,240.15	\$ 5,671.85	\$ 60,211.64
Subsequent activities:				
01/02/24 Insurance payment CSD P&L	(121.00)	-	-	(121.00)
01/04/24 Insurance payment CSD P&L	(5,396.00)	-	-	(5,396.00)
01/05/24 VISA Charges	(520.08)	-	-	(520.08)
01/09/24 Bill.com Payment (Hydros)	-	(13,760.10)	-	(13,760.10)
01/18/24 Monthly Transfer for AP	90,000.00	70,000.00	8,000.00	168,000.00
01/23/24 Bill.com Payment	(81,716.72)	(57,819.56)	(7,774.25)	(147,310.53)
01/25/24 Verizon ACH	(51.46)	-	-	(51.46)
01/29/24 XCEL ACH	-	(555.99)	-	(555.99)
01/31/24 Interest Income	6.92	-	-	6.92
02/07/24 VISA Charges	(554.34)	-	-	(554.34)
<i>Anticipated Activities</i>				
<i>Transfer from ColoTrust for bills</i>	40,000.00	40,000.00	5,000.00	85,000.00
<i>Bill.com open claims</i>	(39,846.53)	(37,087.17)	(5,785.50)	(82,719.20)
<i>Anticipated balance</i>	<u>\$ 29,100.43</u>	<u>\$ 28,017.33</u>	<u>\$ 5,112.10</u>	<u>\$ 62,229.86</u>
<u>ColoTrust General - (8001)</u>				
Balance as of 12/31/23	\$ 1,229,189.17	\$ 1,594,762.32	\$ 1,561,715.89	\$ 4,385,667.38
Subsequent activities:				
01/10/24 Ptax Arapahoe Cty (Dec)	5,179.31	-	-	5,179.31
01/10/24 Ptax Douglas Cty (Dec)	9,793.37	-	-	9,793.37
01/18/24 Monthly Transfer for AP	(90,000.00)	(70,000.00)	(8,000.00)	(168,000.00)
01/31/24 Deposits Dev Checks	-	-	63,162.95	63,162.95
01/31/24 Interest Income	20,507.60	-	-	20,507.60
<i>Anticipated Activities</i>				
<i>Ptax Arapahoe Cty (Jan)</i>	18,589.32	-	-	18,589.32
<i>Ptax Douglas Cty (Jan)</i>	24,190.14	-	-	24,190.14
<i>Development fees deposits to date (Feb)</i>	-	-	9,883.50	9,883.50
<i>Monthly Transfer for AP</i>	(40,000.00)	(40,000.00)	(5,000.00)	(85,000.00)
<i>Anticipated balance</i>	<u>\$ 1,217,448.91</u>	<u>\$ 1,524,762.32</u>	<u>\$ 1,626,762.34</u>	<u>\$ 4,368,973.57</u>
<u>ColoTrust Pollution Abatement - (8002)</u>				
Balance as of 12/31/23	\$ -	\$ 57,306.89	\$ -	\$ 57,306.89
Subsequent activities:				
01/31/24 Interest Income	-	270.27	-	270.27
<i>Anticipated balance</i>	<u>\$ -</u>	<u>\$ 57,577.16</u>	<u>\$ -</u>	<u>\$ 57,577.16</u>
<u>CSAFE - Savings Account</u>				
Balance as of 12/31/23	\$ 859,161.30	\$ 42,246.04	\$ 422,193.32	\$ 1,323,600.66
Subsequent activities:				
01/31/24 Interest Income	-	-	6,171.98	6,171.98
<i>Anticipated balance</i>	<u>\$ 859,161.30</u>	<u>\$ 42,246.04</u>	<u>\$ 428,365.30</u>	<u>\$ 1,329,772.64</u>
<i>Total funds available as of date above</i>	<u><u>\$ 2,105,710.64</u></u>	<u><u>\$ 1,652,602.85</u></u>	<u><u>\$ 2,060,239.74</u></u>	<u><u>\$ 5,818,553.23</u></u>

Effective monthly yield (as of 1/31/2024)

1st Bank - 0.100%* if Balance >\$20,000
ColoTrust Plus - 5.5560%
CSAFE - 5.48%

Cherry Creek Basin Water Quality Authority
Paid Claims January 19, 2024 through February 15, 2024

Process Date	Vendor	Invoice Number	Payment Reference	Amount
1/23/2024	LRE Water	25072	P24012201 - 6494538	\$ 77,969.72
1/23/2024	Muller Engineering Company	0037804	P24012201 - 6494547	13,047.25
1/23/2024	Pinpoint Systems Inc.	10149	P24012201 - 6494556	307.50
1/23/2024	R2R Engineers, Inc.	2023-12	P24012201 - 6494567	12,478.79
1/23/2024	RESPEC	Multiple	P24012201 - 6494514	14,272.50
1/23/2024	RG and Associates LLC	153658	P24012201 - 6494581	880.00
1/23/2024	Valerie Endyk	24	P24012201 - 6494591	3,637.50
1/23/2024	Wright Water Engineers, Inc.	Multiple	P24012201 - 6494524	24,717.27
			Subtotal	\$ 147,310.53
Other Payments				
1/25/2024	Verizon		ACH	51.46
1/29/2024	XCEL Energy	859817382	ACH	555.99
2/2/2024	Streamline.com		Visa	249.00
2/5/2024	Microsoft		Visa	216.00
2/7/2024	Alpine Trophies		Visa	89.34
			Subtotal	\$ 1,110.33
			Total Payments	\$ 148,420.86

**Cherry Creek Basin Water Quality Authority
Unpaid Claims as of 2/15/24**

Invoice date	Invoice	Vendor*	Fund	Chart of account	Invoice amount
1/18/2024	Donation011824	Cherry Creek State Park	10	7480 - Office/Miscellaneous	250.00
2/7/2024	Donation020724	Cherry Creek State Park	10	7440 - Management/Administration	2,592.83
12/31/2023	547-010	Hydros Consulting Inc.	11	7440 - Management/Administration	340.60
1/25/2024	768	Loewen Engineering, Inc.	10	7440 - Management/Administration	1,402.50
1/25/2024	768	Loewen Engineering, Inc.	11	7440 - Management/Administration	427.81
1/25/2024	25384	LRE Water	10	Various Budget Codes for General Fund	20,686.89
1/25/2024	25384	LRE Water	11	7817 - Wetlands Harvesting	660.00
1/25/2024	25459	LRE Water	10	7504 - WQ Data Reporting	3,708.75
1/20/2024	37920	Muller Engineering Company	11	7762 - SR - Reservoir to LV Road	5,987.75
1/31/2024	10181	Pinpoint Systems Inc.	10	7480 - Office/Miscellaneous	2,257.50
1/31/2024	2024-01	R2R Engineers, Inc.	11	7440 - Management/Administration	1,317.19
1/31/2024	153717	RG and Associates LLC	10	Various Budget Codes for General Fund	2,320.00
1/31/2024	153717	RG and Associates LLC	11	7814 - PRF Reservoir Destratification Service Plan	3,200.00
1/31/2024	202401	Valerie Endyk	10	7201 - Administrative assistant	6,201.50
1/1/1934	JAN	Verizon (Estimate)	10	7480 - Miscellaneous	51.56
12/31/2023	68666	Wright Water Engineers, Inc.	40	7677 - CCBWQA Planning	5,381.25
1/31/2024	68854	Wright Water Engineers, Inc.	40	7685 - SSP BMP Effectiveness	404.25
1/31/2024	68855	Wright Water Engineers, Inc.	10	7050 - WQCC Regulation Hearings	375.00
1/31/2024	68855	Wright Water Engineers, Inc.	11	7440 - Management/Administration	24,590.00
1/31/2024	863907023	Xcel Energy	11	7818 - Utilities - Reservoir Destratification	563.82
					<u>\$ 82,719.20</u>

General Fund - 10	\$	39,846.53
Pollution Abatement Fund - 11		37,087.17
Enterprise Fund - 40		5,785.50
Total Claims by Funding Source	\$	<u>82,719.20</u>

* by vendor

Collins Cole Flynn Winn & Ulmer Invoice 4711 was paid twice in error.

An open credit of \$3,826.92 remains with CCFWU to be used against future invoices.



ACTION ITEM MEMORANDUM

To: CCBWQA Board of Directors
From: Jane Clary on behalf of Richard Borchardt, Pollution Abatement Project Manager in 2023
Date: February 1, 2024
Subject: Project summaries for stream reclamation on Happy Canyon Creek upstream of I-25 and Dove Creek Phase 1 from Otero Avenue to Chambers Road

Request: The Board accepts the project summaries for stream reclamation on Happy Canyon Creek Stream upstream of I-25 and Dove Creek Phase 1 from Otero Avenue to Chambers Road.

Project/Issue: CCBWQA and its partners completed stream reclamation on Happy Canyon Creek upstream of I-25 and Dove Creek Phase 1 from Otero Avenue to Chambers Road projects in 2023. The attached project summaries describe the background and purpose, existing conditions, design approach, construction, funding, and water quality benefits of each project.

At the December 7, 2023 TAC meeting, the TAC recommended the Board accept the project summaries.

If accepted by the Board, the project summaries will be included in CCBWQA's 2023 Annual Report.

Budget: N/A

Motion: I move to accept the project summaries for stream reclamation on Happy Canyon Creek upstream of I-25 and Dove Creek Phase 1 from Otero Avenue to Chambers Road.

DATE: November 15, 2023

TO: Jane Clary, Wright Water Engineers, CCBWQA Technical Manager

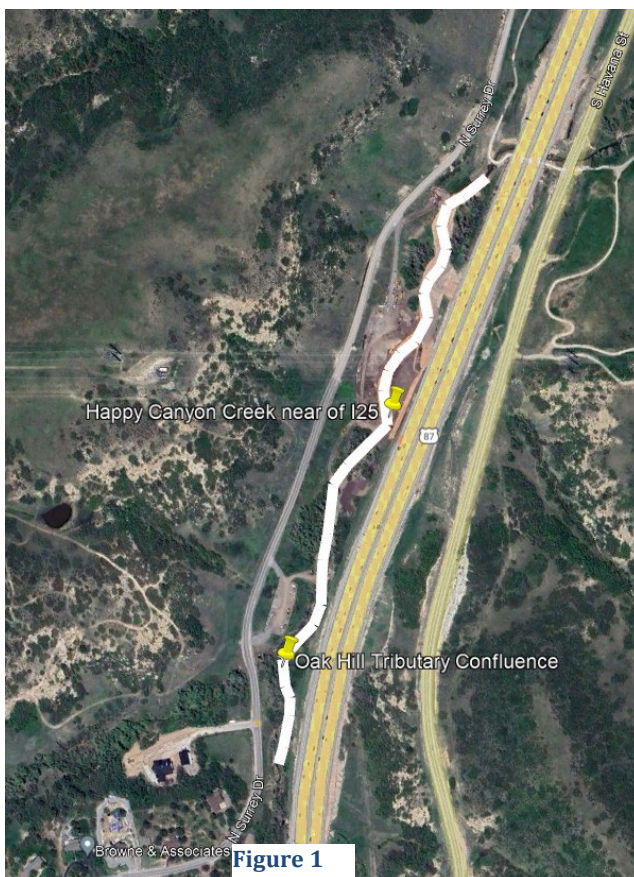
CC: Jon Erickson, CCBWQA Technical Advisory Committee Chairman

FROM: Richard Borchardt, PE & CFM

SUBJECT: Happy Canyon Creek upstream of I25 - Project Summary

Background and Purpose:

In 2013, Douglas County (Douglas) and the Mile High Flood District (MHFD) began stream reclamation on Happy Canyon Creek located upstream of I-25 (Project), shown with the white line in **Figure 1**, about 11.3 miles upstream of Cherry Creek Reservoir. In 2021 the Cherry Creek Basin Water Quality Authority (CCBWQA) and in 2022 the City of Lone Tree (Lone Tree) were added to the Project.



Existing Conditions:

Urbanization of the watershed upstream of the Project results in increased rate, frequency, and magnitude of storm flows in Happy Canyon Creek. The stream incised 4-10 feet with steep eroded banks up to 16 feet tall within the Project, evidence of bed and bank erosion. Although wetland and riparian vegetation existed; it was distressed due to the lowering of the groundwater table from the incised stream (see **Photos 1-3**).

Design Approach:

The goals of the design were to create a healthy stream, well connected to the adjacent wetland and riparian vegetation, and promote the natural and beneficial functions of filtration and infiltration to improve water quality. Muller Engineering Company (MEC) is the design consultant. MEC proposed a stream planform that raises the incised channel, promotes natural stream features, and includes engineered bed and bank protection. This approach created a multi-stage stream section that provides for sediment transport from base flows through minor flood stages (i.e. 2-year recurrence interval) and conveys the larger storms (i.e. from 2-year to 100-year recurrence intervals). This stream reclamation minimizes long-term maintenance and provides an environmentally sound and sustainable practice. MEC designed the Project using a combination of grade control structures (Riffle, Boulder Cascade, and Sculpted Concrete drop structures), bank protection (Void Filled Riprap and Vegetation), and grading to create overbanks, providing a wider stream corridor which reduces erosion potential. The Project includes stream reclamation of approximately 3,000 linear feet.



Photo 1 - near downstream end of project



Photo 2 - near middle of project



Photo 3 - near upstream end of project

R2R Engineers Memorandum

Construction:

Construction was started on the Project in February 2023, completed in November 2023, done by Naranjo Civil Constructors. **Photos 4-6** show the constructed stream reclamation. **Photo 4** highlights a few of the riffle drop structures, **Photo 5** shows the raised stream bed connected to the overbanks and the wetland and riparian plantings, and **Photo 6** shows the sculpted concrete drop structure.

Funding:

MHFD, Douglas, CCBWQA, and Lone Tree are partners on the Project. The Intergovernmental Agreement and Amendments include \$5,441,427 with CCBWQA’s participation being \$500,000 or about 9%. MHFD’s current project budget report shows a remaining balance of about \$612,000 after construction, which will be used to establish vegetation and clear permits, afterwards any remaining balance if any would be refunded to the partners according to their participation level, and the final project cost will be known.



Photo 4- near downstream end of project



Photo 5 - near middle of project



Photo 6 - near upstream end of project

Water Quality Benefits:

The Project includes stream reclamation which provides water quality benefits for the stream and ultimately Cherry Creek Reservoir¹. Stream reclamation reduces erosion and immobilizes nutrients (including phosphorus and nitrogen) in the soil, reducing the nutrient concentrations in the water. The Project immobilizes an estimated 51 pounds of phosphorus per year². The water quality capture area (**Photo 7**) that treats runoff from I-25 provides additional water quality treatment above the estimated 51 pounds of phosphorus per year.



Photo 7 – water quality capture area for runoff from I-25

Summary:

Water Quality Benefit is reduction of ≈ 51 pounds of phosphorus per year

Total Project Cost = \$5,441,427³

CCBWQA's Share = \$500,000⁴

Engineer: Muller Engineering Company

Contractor: Naranjo Civil Constructors

Additional information for the Project can be found on the websites below.

MHFD website link: <https://mhfd.org/resources/mapping/>

CCBWQA website link: <https://www.cherrycreekbasin.org/library/>

¹ CCBWQA Stream Reclamation, Water Quality Benefit Evaluation – Interim Status Report; CCBWQA Technical Advisory Committee; June 16, 2011.

² CCBWQA 2024-2033 Capital Improvement Program Supporting Data, Board Final Review, November 16, 2023

³ Final total project cost won't be known until after final vegetation establishment, permits are cleared, and any remaining balance if any refunded to partners.

⁴ Final CCBWQA's share won't be known until after final vegetation establishment, permits are cleared, and any remaining balance if any refunded to CCBWQA.

DATE: November 30, 2023

TO: Jane Clary, Wright Water Engineers, CCBWQA Technical Manager

CC: Jon Erickson, CCBWQA Technical Advisory Committee Chairman

FROM: Richard Borchardt, PE & CFM

SUBJECT: Dove Creek Phase 1 from Otero Avenue to Chambers Road - Project Summary

Background and Purpose:

In 2021, the Southeast Metro Stormwater Authority (SEMSWA) and Cherry Creek Basin Water Quality Authority (CCBWQA) began stream reclamation on Dove Creek from Otero Avenue to Dove Creek Pond D-1 (Project), shown with the white line in **Figure 1**, about 5.2 miles upstream of Cherry Creek Reservoir. In 2022, the project was broken into 2 phases for construction, with Phase 1 being between Otero Avenue and Chambers Road and scheduled for construction in 2023, and Phase 2 being between Chambers Road and Dove Creek Pond D-1 with construction anticipated in 2024.



Figure 1

R2R Engineers Memorandum

Existing Conditions:

Urbanization of the watershed upstream of the Project results in increased rate, frequency, and magnitude of storm flows in Dove Creek. The stream incised up to 6 feet with steep eroded banks within the Project, evidence of bed and bank erosion (see **Photos 1-3**).

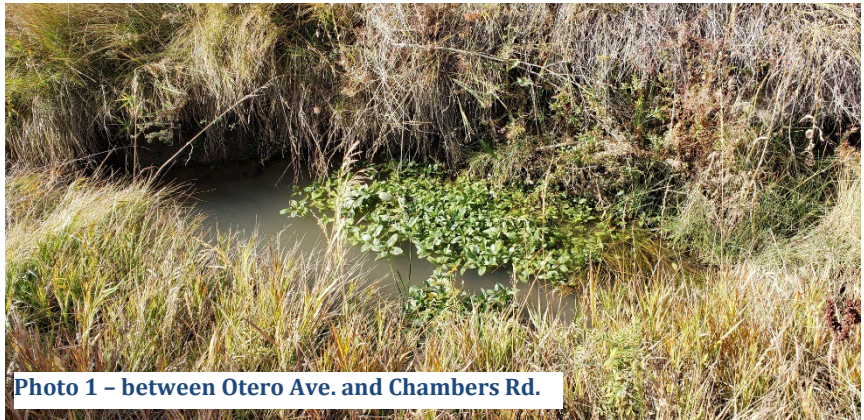


Photo 1 - between Otero Ave. and Chambers Rd.

Design Approach:

The goals of the design were to create a healthy stream, well connected to the adjacent wetland and riparian vegetation, and promote the natural and beneficial functions of filtration and infiltration to improve water quality. RESPEC is the design consultant. RESPEC designed stream reclamation which created a multi-stage stream planform that provides stability and conveys storm flows up to the 100-year recurrence interval. RESPEC designed four sediment capture areas based on Mile High Flood District's forebay criteria to capture coarser sediments entering the stream and the bank-full channel (aka active or low flow channel) to transport the smaller sediments. This stream reclamation and sediment capture/transport minimizes long-term maintenance and provides an environmentally sound and sustainable



Photo 2 - downstream of Chambers Rd.



Photo 3 - between Chambers Rd. and Pond D-1

practice. RESPEC used step pool structures for grade control, bank protection (Void Filled Riprap, Soil Lifts, and Vegetation), and grading to create overbanks providing a wider stream corridor which stabilizes the stream and reduces erosion potential. The Project includes stream reclamation of approximately 2,700 linear feet.

Construction:

Construction of Phase 1 from Otero Avenue to Chambers Road was started in February 2023, completed in July 2023, and done by CEI. **Photos 4-6** show the constructed stream reclamation. **Photos 4-5** highlight the step pool structures, the graded overbanks, and the areas seeded with wetland and riparian vegetation. **Photo 6** shows the sediment capture area downstream of Otero Avenue.

Funding:

SEMSWA and CCBWQA are partners on the Project. The Intergovernmental Agreement and Amendments for design of the Project and construction of Phase 1 include \$2,800,000 with CCBWQA's participation being \$238,000 or about 9%. SEMSWA's current project budget update shows a remaining balance of about \$89,000 after construction, which can be used to establish vegetation and clear permits, afterwards any remaining balance if any would be refunded to the partners according to their participation level, and the final project cost will be known.



Photo 4- looking downstream towards Chambers Rd.



Photo 5 - looking at step pool structure



Photo 6 - looking upstream at sediment capture near Otero Ave.

Water Quality Benefits:

The Project includes stream reclamation and sediment capture areas that provide water quality benefits for the stream and ultimately Cherry Creek Reservoir¹.

Stream reclamation reduces erosion and immobilizes nutrients (including phosphorus and nitrogen) in the soil, reducing the nutrient concentrations in the water. The Project's 2,700 linear feet immobilizes an estimated 46 pounds of phosphorus per year². Phase 1 is 1,300 linear feet or 22 pounds of phosphorus per year.

The four sediment capture areas included with the Project provide additional water quality treatment above the stream reclamation. Phase 1 constructed the sediment capture area downstream of Otero Avenue (**Photo 6**); SEMSWA has cleaned it out three times between June and early September 2023 where they estimated a total of 100 cubic yards of sediment removed, which is a significant sediment reduction that also provides some degree of phosphorus reduction. The Project's sediment capture areas were designed similarly to MHFD's forebay criteria, which represent different assumptions than those used in CCBWQA's historical phosphorus reduction estimates³ (mostly extended detention basins and water quality ponds with 40-hour drain times). Because the Project's sediment capture areas are not designed with a 40-hour drain time to allow for the broader range of sedimentation, they will be most effective at removing larger particle sizes (gross solids) and less effective for finer particles (clays) that tend to have higher phosphorus concentrations. CCBWQA's consulting staff is working on updated phosphorus reduction estimates for the Project's sediment capture areas and will provide an update once completed. This estimated benefit can be included in the Project Summary associated with the Phase 2 construction.

Summary:

Water Quality Benefit of reduction of ≈ 22 pounds of phosphorus per year

Total Project Cost = \$2,800,000⁴

CCBWQA's Share = \$238,000⁵

Engineer: RESPEC

Contractor: CEI

Additional information for the Project can be found on the websites below.

SEMSWA website link: <https://www.semswa.org/our-work/>

CCBWQA website link: <https://www.cherrycreekbasin.org/library/>

¹ CCBWQA Stream Reclamation, Water Quality Benefit Evaluation – Interim Status Report; CCBWQA Technical Advisory Committee; June 16, 2011.

² CCBWQA 2024-2033 Capital Improvement Program Supporting Data, Board Final Review, November 16, 2023

³ CCBWQA 2024-2033 Capital Improvement Program Supporting Data, Board Final Review, November 16, 2023

⁴ Final total project cost won't be known until after final vegetation establishment, permits are cleared, and any remaining balance if any refunded to partners.

⁵ Final CCBWQA's share won't be known until after final vegetation establishment, permits are cleared, and any remaining balance if any refunded to CCBWQA.



MEMORANDUM

To: CCBWQA Board of Directors
From: Val Endyk - CCBWQA Administrative Assistant
Jane Clary - CCBWQA Technical Manager
Date: February 9, 2024
Subject: Motions for Board Consideration: February 15, 2024 Agenda Items 4a-4c

Motions: 4a: Acceptance of RDS 2023 Annual Operations and Maintenance Report (Goncalves, enclosed)

Move to accept the 2023 RDS Annual Report and recommend that the Board accept the report and implement the recommendations during 2024.

- Authorize additional maintenance of the compressor oil coolers.
- Continue monitoring annual energy consumption.
- Analyze existing aerator equipment replacement by first developing a scope and budget subject to review and approval of the Executive Committee

4b: Acceptance of RESPEC's Watershed Modeling Scenario Report (Clary/Leak, enclosed)

Move to accept RESPEC's Watershed Modeling Scenario Report, as revised and dated January 22, 2024.

4c: Approval of Reservoir Modeling Scope and Budget for Hydros Consulting (Clary, enclosed)

Move to approve the Reservoir Modeling Scope and Budget for Hydros Consulting as provided to the Board and authorize the Authority's legal counsel to amend agreement to attach the scope of work.



ACTION ITEM MEMORANDUM

To: CCBWQA Board of Directors
From: Rick Goncalves, RDS & PRF Maintenance Manager
Date: February 15, 2023
Subject: 2023 RDS Annual Operations and Maintenance Report

Request: That the Board accept the 2023 RDS Annual Report and implement the RDS maintenance and operations recommendations made in the report.

The following activities are recommended for the RDS operations and maintenance:

1. **Additional maintenance:** To prevent the compressor oil coolers from clogging with dust, overheating, and shutting down as occurred on August 21, 2023, recommend that Ingersoll Rand (IR) add two maintenance stops to their current maintenance schedule to clean the compressor oil coolers in April and in August, in between their three current contracted maintenance dates, to minimize the chances of another high temperature shutdown for an additional cost of \$1,750.
2. **Continue monitoring annual energy consumption:** It is recommended to continue monitoring the annual energy consumption and look for any trends that may point to developing issues or concerns with the compressor.
3. **Analyze existing aerator replacement:** It is recommended that the Authority evaluate whether replacement parts for the current aerator assemblies will continue to be available, and if not available, what other heads might be available as replacements in the future.

Budget: The additional recommended maintenance cost and operational activities are within the 2024 budget.

TAC Review: TAC reviewed, accepted and recommended that the board accept and implement the recommendations made in the report.

Reports: 2023 RDS Annual Report and [RDS Operations Policy](#)

Suggested**Motion:**

Move to accept the 2023 RDS Annual Report and to implement the following recommendations presented in the report:

- Authorize additional maintenance of the compressor oil coolers.
- Continue monitoring annual energy consumption.
- Analyze existing aerator equipment replacement options by first developing a scope and budget subject to review and approval of the Executive Committee.

Next Steps:

Implement the Board's directive.



**CHERRY CREEK RESERVOIR
DESTRATIFICATION SYSTEM**

**OPERATION AND MAINTENANCE
ANNUAL REPORT
2023**

Prepared by:

Ricardo Goncalves, PE

January 2024



RG AND ASSOCIATES, LLC

4885 Ward Road, Suite 100 • Wheat Ridge, CO 80033
Del Norte • Wheat Ridge
303-293-8107 • www.rgengineers.com

**CHERRY CREEK BASIN WATER QUALITY AUTHORITY
RESERVOIR DESTRATIFICATION SYSTEM
OPERATION AND MAINTENANCE
ANNUAL REPORT
2023**

INTRODUCTION

RG and Associates, LLC (RGA) has been retained to manage the operation and maintenance of the compressor and aeration system commonly referred to as the Cherry Creek Reservoir Destratification System (RDS). The RDS began operation in April 2008.

RDS OPERATIONS POLICY

At its January 20, 2022, meeting, the CCBWQA Board of Directors (Board) adopted a restated amended Policy for the Operation of the RDS (Policy) by resolution 2022-1-2 which recognized that the RDS historically has shown to reduce the summer Chlorophyll *a* average by 0.8 to 4.7 ug/l. As such, the board established a new operating season of approximately mid-April through approximately the end of September.

In accordance with this policy, then, RGA started the RDS on April 17, 2023, and shut it down at 11:28 am on October 5, 2023.

SYSTEM OPERATION

The RDS operated almost trouble-free in 2023, with only 21 hours of down-time, less than one day, as compared to 9 days in 2022. Part of this was due to the fact that there were no calls during the operating season for heads inadvertently broken by boat anchors, causing a system upset, and part was due to implementation of the RMS, the remote monitoring system, whereby we and the IR team were able to get almost immediate notification that the system was not operating and allowing repair teams to get out repairs immediately make repairs or adjustments. The operating log of the system is contained in the Appendix for more information.

REPAIRS TO THE SYSTEM

Repairs to the system were minimal in 2023. At the beginning of April, it was discovered that the lower pressure regulator and some of its piping had frozen and broken during the winter due to water that had accumulated during the past year of operation. IR repaired the broken pipe, installed drip-legs to allow accumulated water to be blown off, and installed a new pressure reducer.

The second repair was done in the second week of April, when at start-up testing of the system, it was found that two of the aerators were not operating correctly, by allowing too much air to pass through them. B&RW repaired these aerators by replacing parts and had them operational on April 17, for official seasonal start-up.

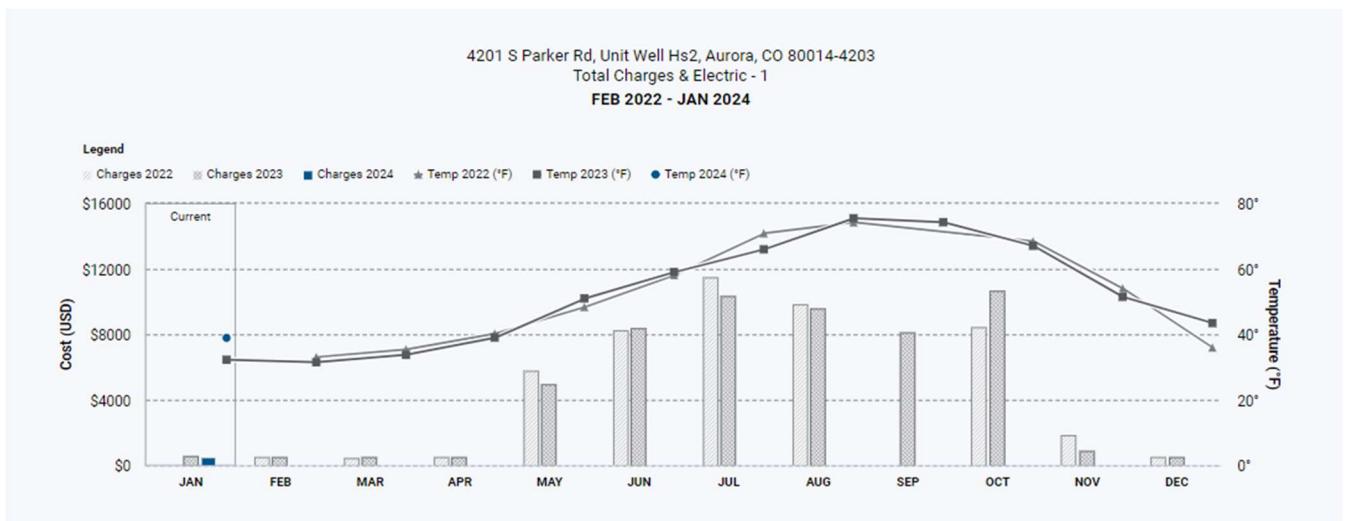
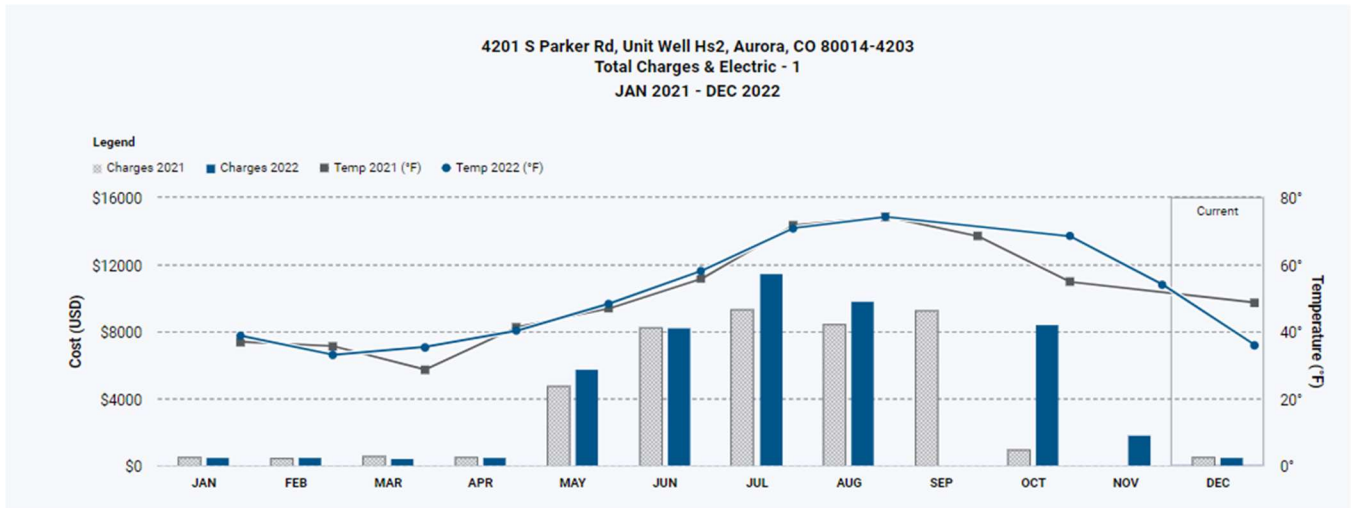
No other repairs were necessary throughout the operating season.

MAINTENANCE ON THE SYSTEM

Routine maintenance was performed three times on the system on-schedule by Ingersoll Rand, in February, June and October, under their PerformanceCare maintenance contract with the Authority. One unscheduled maintenance event was done by the IR team on August 21, when we were alerted by the RMS that the compressor had shut down due to overheating. That maintenance included blowing accumulated dust off of the oil coolers to allow them to provide adequate cooling.

The final scheduled maintenance event was performed between October 3rd and 5th by Foster Dirt and Construction Co. Foster Dirt replaced B&RW during the year due to Blair Wacha's desire to retire and transition the business to Justin Foster of Foster Dirt and Construction Co. Blair stayed on the team during the year to assist and lend his expertise to the Foster Dirt Team. During this final maintenance, a few cam levers, cam pins and flow regulators were replaced due to corrosion on the old parts and the flow regulators were cleaned, but nothing of great consequence was noted. A complete log of the maintenance performed can be found in the Appendix of this report, for more detailed information regarding this maintenance event.

2023 ELECTRICAL USAGE AND CHARGES



+

Xcel Energy provided two graphs shown above, graphing monthly data for the electrical charges and ambient temperatures for a two-year period of time, one superimposed on the other for comparison's sake. One graph is for the 2021-2022 period and the other is for the 2022-2023 period. Note that there is information missing September 2022, which may be a result of the meter not having been read. When the corresponding data is summarized, the total electrical usage for 2023 was 202,240 kWh at a cost of \$55,592.31 compared with 2022 that used 181,720 kWh at a cost of \$48,088.50.

The energy use of the RDS increased in 2023 as compared to 2022 as shown on the charts below. While the 2023 season was shorter than 2022 by 3 days, when comparing startup and stop dates for each year, April 17 to October 5, 2023 (171 days) versus April 15 to October 6, 2022 (174 days), 2023 only had less than one day of shutdown (21 hours) due to mechanical issues, versus 9 days in 2022, yielding 170 net operating days in 2023 versus 163 net operating days in 2022. The increase in operating time in 2023 equates to a 4.3 % increase in operating time, yet the actual power usage in 2023 increased by 11.8%. While there is no readily apparent reason for this difference, it may be a result of different weather patterns, or, more likely, the greater amount of average water depth in the reservoir due to the spring storms. It is recommended, as was last year, that the energy use be monitored going forward to determine whether there are any developing performance issues with the RDS.

System power Costs 2022-2023

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
Charges 2022		\$481.62	\$473.83	\$486.83	\$5,802.56	\$8,276.05	\$11,497.55	\$9,826.91		\$8,420.90	\$1,820.20	\$504.77	\$47,591.22
Charges 2023	\$546.82	\$520.39	\$511.15	\$483.99	\$4,977.13	\$8,403.07	\$10,340.82	\$9,578.53	\$8,136.47	\$10,666.11	\$896.45	\$531.38	\$55,592.31
Charges 2024	\$532.55												
Temp 2022 (°F)		33.06667	35.39655	40.25806	48.39655	58.13334	70.913795	74.25		68.46774	54.06452	36	
Temp 2023 (°F)	32.25714	31.5	33.76667	39.03571	51.01724	59.07576	66.01667	75.5	74.29311	67.09091	51.48276	43.46875	
Temp 2024 (°F)	38.90625												

System Power Usage 2022-2023

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total KW-HR	
Energy Usage 2022 (kWh)			800	760	800	26,200	38,240	41,600	35,160		29,760	6,640	880	180,840
Energy Usage 2023 (kWh)	1,080	960	920	800	21,440	37,080	36,680	34,240	28,600	37,680	1,920	840	202,240	
Energy Usage 2024 (kWh)	840													
Temp 2022 (°F)		33.06667	35.39655	40.25806	48.39655	58.13334	70.9138	74.25		68.46774	54.06452	36		
Temp 2023 (°F)	32.25714	31.5	33.76667	39.03571	51.01724	59.07576	66.01667	75.5	74.29311	67.09091	51.48276	43.46875		

RDS EFFECT ON WATER QUALITY

One of the goals of the RDS is to disrupt the natural buoyancy of cyanobacteria to reduce the frequency and severity of blooms. The updates to the RDS system in 2022 which allow for a full season of operation, likely provide additional benefit during the seasonal chlorophyll-a standard assessment period (July-September) and may also have helped to more quickly disrupt blooms that typically occur later in the season.

RESERVOIR WATER QUALITY

- Cyanobacteria blooms are variable
- Species responsible for closures due to toxin production occur but not every year
- 2023 - Cyano bloom in late July tested positive for toxin and affected areas were closed to contact for few days - within 2 weeks the bloom had dissipated and no toxin was detected (Microcystis - non N-fixer)

Year	Bloom	Toxin/ Closure
2014	Yes - Severe	Yes/ Yes
2015	Yes - Moderate	Not Detected/ No
2016	Yes - Severe	Yes/ Yes
2017	Yes	- / No
2018	Yes - Mild	Not Detected/ No
2019	Yes - Moderate	Not Detected/ Caution
2020	Yes - Severe	Yes/ extended
2021	No	
2022	Yes - multiple	Yes/ Yes
2023	Yes - multiple	Yes/ Yes



Cyanobacteria Activity-Courtesy of LRE Water

OVERALL HEALTH OF THE SYSTEM

Generally, the RDS is in sound condition, especially since the compressor was replaced in January of 2020, four years ago. The life of a system like that should be upwards of 20-30 years, with the compressor being the most sensitive to wear and tear. The compressor is the only active part of the system and is only three years into its life span. The aerators and piping are passive parts, meaning they have no moving parts, and in the opinion of Foster Dirt and Construction Co., the aeration system is a “Cadillac” system, and should have at least five to ten years of life left. The only problems that we have had with the aeration system is from corrosion of the stainless-steel parts.

RECOMMENDATIONS

The following recommendations are provided for consideration to improve system operation.

- To prevent the compressor oil coolers from clogging with dust and overheating, as occurred on August 21, to have Ingersoll Rand (IR) clean compressor coolers in April and in August, in between their three current contracted maintenance dates to minimize the chances of another high temperature shutdown. Jeff Handley has already quoted that to add this maintenance to their current contract would cost an additional \$1,750 and they are ready to implement this at any time.
- It is recommended to continue monitoring the annual energy consumption and look for any trends that may point to developing issues or concerns with the compressor.
- It is recommended that the authority begin an analysis to determine whether the current aerator assemblies will be able to be replaced in the coming years, if necessary, due to availability, and if not available, what other heads might be available as replacements.
- After completion of the reservoir/watershed modeling efforts, slated to be completed this year, it is recommended that data be analyzed from the results of that modeling work as to whether it is warranted to increase the aeration system output, and if so, how much to increase it, analyze how much the existing system output can be increased by either changing the flow control orifices or changing out the heads with new, higher output heads, how much the existing compressor's output can be increased, all to determine if the existing system can be modified at all to meet future needs, augmented or whether it would need to be completely replaced.

Appendices

SUMMARY of 2023 OPERATIONS DETAILS, REPAIRS and MAINTENANCE

SUMMARY of 2023 OPERATIONS DETAILS, REPAIRS and MAINTENANCE

April 7-

- Rich Borchardt, Erin Stewart and Rick Goncalves met at the compressor building to begin season startup procedures.
- Found the compressor building open, doors ajar, and the lower pressure regulator and its piping disassembled.
- With no entries on the Maintenance log explaining what had happened, we decided to cancel the test until we could find out what the situation was.
- After contacting Ingersoll Rand, I found out, from Jeff Handley of IR that the maintenance personnel who were working at the facility had been let go for doing poor work, at our compressor as well as elsewhere and he said he would go out to check out and start the compressor.
- I related to CPW that vandalism was not the problem with the doors.
- Later in the day, Jeff called to say that the compressor was “good to go” and that the aerators were pumping air into the reservoir.
- He also said that he would arrange to get the piping and pressure regulator reinstalled, and leave the compressor shut off. He also said that the problem with the piping and lower regulator was caused by poor piping design that allowed water that is naturally produced by compressing air to accumulate at the low spots in the pipe then freeze and break the pipe and regulator.

April 14-

- Started the compressor at 12:30 pm then proceeded with Erin Stewart to inspect the aerator plumes by boat.
- Found two aerators out of order and established their locations by GPS to forward to B&RW for repair.
- Blair Wacha of B&RW was contacted and related to me that he would be out early morning on April 17 to repair the faulty aerators.
- Finished our inspection of the system and shut the compressor off at 1:45pm.



Broken aerator



Broken aerator



Marking broken aerator by GPS

April 17-

- B&RW finished its repair of the two identified aerators and a third that he had found.
- Blair called me to give details of the repairs, all of which were situations where the plastic flow regulators had been blown out of place by back-pressure, probably caused by too rapid a shutdown during shutdown last year.
- We will be revising our shutdown procedures for the end of the operating season.

- With notice that the system was operating in good condition, I directed Blair to leave the compressor on at 40 psi.
- I then notified CCBWQA staff, Parks personnel and managers that the RDS was on and operating for the season.

April 19-

- Went out to the reservoir twice to perform the final two pressure step increases to 50 psi and 55 psi which were performed at least 4 hours apart, as per Authority Operations Policy.

April 20-

- Received a quote from Ingersoll Rand for \$2,992.45 to repair the compressor piping to and from the lower pressure regulator that was damaged by water that is normal in air compression that accumulated, froze, and broke the pipe and regulator, replace the broken pressure regulator, and revise the piping to provide drop-legs with purge valves to prevent accumulated water from freezing and breaking the pipes again.
- This repair is not covered under warranty, as the warranty only covers the compressor itself.
- The entire system was designed to meet Authority directed operating parameters of “between April and November” and the building heater was designed to produce enough heat within those parameters to allow the compressor to work with at a minimum of 38 degrees. No one anticipated needing the building to be heated during the off season, as there would have been no need to. Except for accumulated water in the pipes? No one anticipated that either. Heating the building to prevent accumulated water from freezing would not have been the prudent solution. Providing drop legs and purging the water at the end of the operating season is.

April 24-

- The repair cost was approved by the Executive Committee and a work order prepared and issued to Ingersoll Rand.

May 8-

- Ingersoll Rand repaired the broken compressor piping and pressure reducing valve.

May 18-

- At the May 18th board meeting, the question was raised as to whether the broken piping and pressure reducing valve repairs should be paid for by Ingersoll Rand under warranty or not. Based on the analysis of the contract documents and maintenance agreement report that all warranties had expired, and, principally, that the damage to the compressor piping and pressure reducing valve had been due to the compressor piping not being sufficiently protected from freezing, through no fault of Ingersoll Rand, Ingersoll Rand was paid for the repairs.

June 14-

- Made a spot inspection of the compressor and visual inspection of the aeration pattern in the reservoir. Found the aeration pattern in the reservoir satisfactory, the compressor running at its 100 psi satisfactorily, but the pressure reducer gauge was showing only 45psi. Figuring that it had been adjusted during the piping repair, I adjusted it back up to 55 psi. Everything was good.



Initial pressure at 45 psi



Compressor pressure at 100 psi



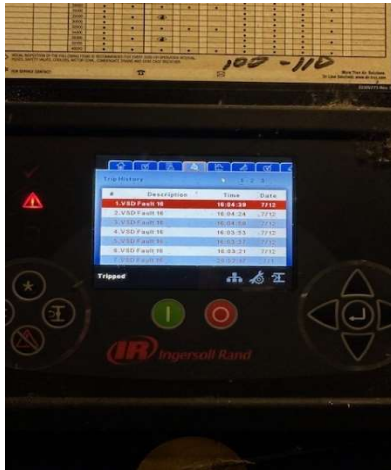
Reset pressure to 55 psi

July 5-

- Made another spot RDS inspection. Lake aerator pattern still showed no aerator issues. The compressor pressures were still good, but outlet pressure was down to 50 psi. Re-adjusted the pressure to 55 psi. Suspect that the changing reservoir levels due to the floods are affecting the pressures. Will continue to watch for any problems.

July 13-

- On 7/13/23 at 8:15 I performed a random visual inspection of the diffuser pattern on the reservoir and found that was no pattern, meaning that no air was getting to the aerators in the reservoir.
- Upon an inspection of the compressor, I found that it was off, with a fault indication reading "VSD Fault 16" at 4:18 pm, the day before, 7/12/23. This meant that the compressor had been off for about a day and a half.
- I called Jeff Handley at Ingersoll Rand, who indicated that IR had just received a fault notice, and that it was safe to restart the compressor, which was done.
- The compressor started immediately with no issue. Jeff said the fault had been caused by a voltage drop, probably from local area heavy air conditioning usage, or possibly caused by an electrical contractor known to have been working nearby.



July 19-

- I made another spot inspection. Reservoir aeration pattern was satisfactory, but discharge pressure was down to 50 psi. Pressure was adjusted to 55 psi. All else looked good. I checked aeration manholes for flood damage. Except for a piece of driftwood that floated into one of the manholes, there was little evidence that reservoir high flood levels had affected the manholes or the aeration piping at all, and there was definitely no damage.



July 26-

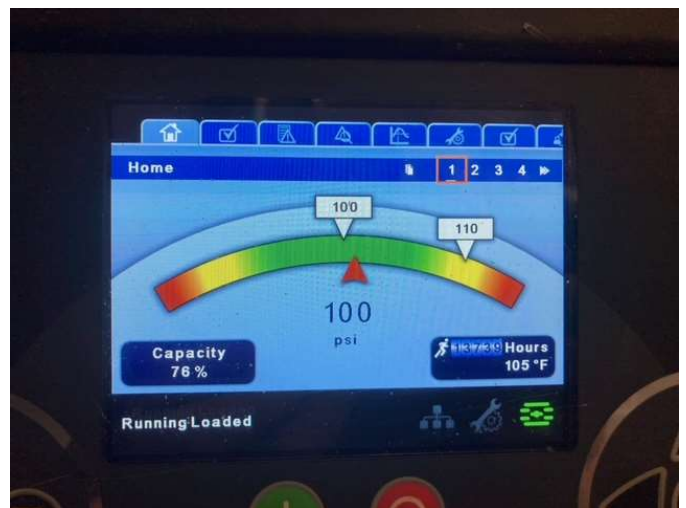
- I had Ingersoll Rand put the Authority on the IR Remote Monitoring System (RMS) so as to get notifications on compressor failure relatively quickly to minimize RDS down time.

August 21-

- Even though out of the country, I received an alarm by text message from the newly implemented RMS indicating that the compressor had shut down due to excessive bearing temperature. When I immediately called Ingersoll Rand, they said that they had received the same alarm and had someone already on it.
- The compressor had shut down because of excessive oil temperature caused by excessive dust build-up on the oil cooler. IR cleaned the oil cooler, and had the compressor back on line in 3 hours and 15 minutes from the time of the shutdown, substantiating the value of setting up the RMS process.



Trip notification



Compressor back in operation



Dust buildup on the oil cooler



Oil cooler after cleaning

October 4

- The yearly inspection and maintenance of the aeration system was done and completed on October 4, 2023, by Foster, Dirt and Construction. Its inspection report is contained in the Appendix of this report.
- Foster Dirt has taken over the duties that Blair Wacha with B&RW had previously done for the last number of years.
- No major issues were encountered. A few of the cam lock levers and pins were replaced due to corrosion.
- It appears that more pins and cams have been replaced in the area of the reservoir where Cottonwood Creek drains into it than any other place in the reservoir.
- This could be caused by wastewater effluent presence in Cottonwood Creek drainage from the upstream wastewater treatment plants.



Corroded flow regulator



Corroded cam lever



Corroded pin

October 5

- On October 5th, 2023, the process for compressor was shut down in accordance with Authority Policies and Procedures was begun.
- The newly installed drip legs were released of accumulated water to prevent water freezing in the pressure reducers.
- Water was blown off from the compressor and the regulator tank.
- A new procedure whereby the air discharge valves downstream of the pressure reducers were shut down very slowly while the compressor was still running to shut off the air to the aeration system gradually to prevent a sudden back pressure on the aeration system heads that has caused some of the O-rings to blow out in the past.
- After the valves were shut, the compressor was shut down for the winter at 8:15 am.



Foster Dirt Report from 2023 Annual Maintenance

Foster Dirt Report from 2023 Annual Maintenance

September 2023 repairs to Cherry Creek aeration system

Head location	Clean head & adjust position, check fitting tightness	Clean or replace filter	Upper cam pins replaced	Lower cam pins replaced	Replace cam levers	Replace O Ring	Replace other broken parts	Actual latitude N 39 deg, xx.xxx min	Actual longitude W 104 deg, xx.xxx min	Stainless Steel Band Clamp Thickness (new .025") / End of Line Blow Off Valve Pressure (distribution vault pressure 47 psi)	Notes
101	x	clean	0	0	0	0	0	38.507	51.912		
102	x	clean	0	0	0	0	0	38.477	51.894		
103	x	clean	0	0	0	0	0	38.446	51.879		
104	x	clean	1	0	0	0	0	38.413	51.870		
105	x	clean	0	0	0	0	0	38.373	51.875		
106	x	clean	0	0	0	0	0	38.357	51.899		
107	x	clean	0	0	0	0	0	38.338	51.931		
108		x	clean	0	0	0	0	38.327	51.956		
109	x	clean	0	0	0	0	0	38.361	51.823		
110	x	clean	0	0	0	0	0	38.338	51.830		
111	x	clean	0	0	0	0	0	38.322	51.842		
112	x	clean	0	0	0	0	0	38.298	51.870		
113	x	clean	0	1	0	0	0	38.277	51.891		
114	x	clean	0	0	0	0	0	38.349	51.786		
115	x	clean	0	2	0	0	0	38.337	51.740		Apparently moved by boater 50 ft. We moved back
116	x	clean	0	0	0	0	0	38.332	51.710		Apparently moved by boater 100 ft. We moved back
117	x	clean	1	2	0	0	0	38.327	51.669		Apparently moved by boater 50 ft. We moved back
118	x	replace	1	0	0	0	0	38.320	51.626		Heavy filter build up, filter taken for cleaning/repair
119	x	clean	0	1	0	0	0	38.314	51.584		Apparently moved by boater 50 ft. We moved back
120	x	clean	0	0	0	0	0	38.307	51.549		Apparently moved by boater 100 ft. We moved back
121	x	clean	0	0	0	0	0	38.477	51.998		
122	x	clean	0	0	0	0	0	38.452	52.043		
123	x	clean	0	0	0	0	0	38.431	52.077		
124											out of service since 2018
Head location	Clean head & adjust position, check fitting tightness	Clean or replace filter	Upper cam pins replaced	Lower cam pins replaced	Replace cam levers	Replace O Ring	Replace other broken parts	Actual latitude N 39 deg, xx.xxx min	Actual longitude W 104 deg, xx.xxx min	Stainless Steel Band Clamp Thickness/ End of Line Blow Off Valve Pressure (distribution vault pressure 47 psi)	Notes
201	x	clean	0	0	0	0	0	38.543	51.840		
202	x	clean	0	0	0	0	0	38.514	51.817		
203	x	clean	0	0	0	0	0	38.489	51.793		
204	x	clean	0	1	0	0	0	38.467	51.769		
205	x	clean	0	0	0	0	0	38.444	51.741		
206	x	clean	0	0	0	0	0	38.418	51.715		
207	x	clean	0	0	0	0	0	38.389	51.673		
208	x	clean	1	0	0	0	0	38.364	51.607		
209	x	clean	0	0	0	0	0	38.351	51.553		
210	x	replace	0	0	0	0	0	38.332	51.488		Heavy filter build up, filter taken for cleaning/repair
211	x	clean	0	0	0	0	0	38.339	51.428		Apparently moved by boater 50 ft. We moved back
212	x	clean	0	0	0	0	0	38.357	51.296		Apparently moved by boater 200 ft. We moved back
213	x	clean	0	0	0	0	0	38.384	51.254		Apparently moved by boater 50 ft. We moved back
214	x	clean	0	0	0	0	0	38.432	51.192		
215	x	clean	0	0	0	0	0	38.474	51.142		Mineral build up on fittings
216	x	clean	0	0	0	0	0	38.513	51.097		Mineral build up on fittings
217	x	clean	0	0	0	0	0	38.551	51.062		Mineral build up on fittings
218	x	clean	0	0	0	0	0	38.601	51.029		Blow off at end


Head location	Clean head & adjust position, check fitting tightness	Clean or replace filter	Upper cam pins replaced	Lower cam pins replaced	Replace cam levers	Replace O Ring	Replace other broken parts	Actual latitude N 39 deg. xx.xxx min	Actual longitude W 104 deg. xx.xxx min	Stainless Steel Band Clamp Thickness/ End of Line Blow Off Valve Pressure (distribution vault pressure 47 psi)	Notes
301	x	clean	0	0	0	0	0	38.427	51.578		
302	x	clean	0	0	0	0	0	38.448	51.526		Mineral build up on fittings
303	x	clean	0	0	0	0	0	38.473	51.603		Mineral build up on fittings
304	x	clean	0	0	0	0	0	38.447	51.438		Mineral build up on fittings
305	x	clean	0	1	0	0	0	38.420	51.416		Blow off at end
306	x	clean	0	0	0	0	0	38.493	51.427		
307	x	clean	0	0	0	0	0	38.475	51.390		
308	x	clean	0	0	0	0	0	38.433	51.362		Blow off at end
309	x	clean	0	0	0	0	0	38.401	51.323		
310	x	replace	0	0	0	0	0	38.507	51.358		Heavy filter build up, filter taken for cleaning/repair
311	x	clean	0	0	0	0	0	38.485	51.342		
312	x	clean	0	0	0	0	0	38.456	51.293		Blow off at end
313	x	clean	0	0	0	0	0	38.542	51.323		
314	x	clean	0	0	0	0	0	38.571	51.276		Leaking fitting tightened
315	x	clean	0	0	0	0	0	38.601	51.220		Leaking fitting tightened
316	x	clean	0	0	0	0	0	38.627	51.170		Blow off at end
Head location	Clean head & adjust position, check fitting tightness	Clean or replace filter	Upper cam pins replaced	Lower cam pins replaced	Replace cam levers	Replace O Ring	Replace other broken parts	Actual latitude N 39 deg. xx.xxx min	Actual longitude W 104 deg. xx.xxx min	Stainless Steel Band Clamp Thickness/ End of Line Blow Off Valve Pressure (distribution vault pressure 15 psi)	Notes
401	x	clean	0	0	0	0	0	38.525	51.633		
402	x	clean	0	0	0	0	0	38.536	51.604		
403	x	clean	0	0	0	0	0	38.556	51.559		
404	x	clean	0	0	0	0	0	38.580	51.512		
405	x	clean	0	0	0	0	0	38.606	51.462		
406	x	clean	0	0	0	0	0	38.634	51.408		
407	x	clean	0	0	0	0	0	38.660	51.347		
408	x	clean	0	0	0	0	0	38.689	51.300		
409	x	clean	0	0	0	0	0	38.709	51.250		
410	x	clean	0	2	1	0	0	38.740	51.192		
411	x	clean	0	1	0	0	0	38.761	51.152		Blow off at end
412	x	clean	0	0	0	0	0	38.492	51.570		
413	x	replace	0	0	0	0	0	38.502	51.543		Heavy filter build up, filter taken for cleaning/repair
414	x	clean	0	0	0	0	0	38.528	51.491		
415	x	clean	0	0	0	0	0	38.547	51.455		
416	x	clean	0	0	0	0	0	38.575	51.390		
417	x	clean	0	0	0	0	0	38.604	51.338		
418	x	clean	0	0	0	0	0	38.630	51.289		
419	x	clean	0	0	0	0	0	38.661	51.237		
420	x	clean	0	0	0	0	0	38.689	51.178		Mineral build up on fittings
421	x	clean	0	0	0	0	0	38.711	51.134		Blow off at end
422	x	clean	0	0	0	0	0	38.540	51.679		
423	x	clean	0	1	0	0	0	38.559	51.625		
424	x	clean	0	0	0	0	0	38.585	51.575		
425	x	clean	0	1	0	0	0	38.612	51.521		
426	x	clean	0	0	0	0	0	38.640	51.466		
427	x	clean	0	0	0	0	0	38.667	51.415		
428	x	clean	0	1	0	0	0	38.692	51.361		
429	x	clean	1	0	0	0	0	38.718	51.305		
430	x	clean	0	0	0	0	0	38.745	51.250		
431	x	clean	0	0	0	0	0	38.771	51.201		Blow off at end

Head location	Clean head & adjust position, check fitting tightness	Clean or replace filter	Upper cam pins replaced	Lower cam pins replaced	Replace cam levers	Replace O Ring	Replace other broken parts	Actual latitude N 39 deg, xx.xxx min	Actual longitude W 104 deg, xx.xxx min	Stainless Steel Band Clamp Thickness/ End of Line Blow Off Valve Pressure (distribution vault pressure 47 psi)	Notes
501	x	clean	0	0	0	0	0	38.608	51.716		
502	x	clean	0	0	0	0	0	38.646	61.759		Replace corroded SS fitting
503	x	clean	0	0	0	0	0	38.684	51.581		
504	x	clean	0	0	0	0	0	38.710	51.534		
505	x	clean	0	0	0	0	0	38.733	51.488		
506	x	clean	0	0	0	0	0	38.756	51.440		
507	x	clean	0	0	0	0	0	38.779	51.393		
508	x	clean	0	0	0	0	0	38.811	51.321		
509	x	clean	1	0	0	0	0	38.831	51.271		
510	x	clean	0	0	0	0	0	38.850	51.226		
511	x	clean	0	0	0	0	0	38.638	51.108		
512	x	clean	0	0	0	0	0	38.615	51.110		
513	x	clean	0	1	0	0	0	38.574	51.145		
514	x	clean	0	0	0	0	0	38.549	51.183		
515	x	clean	0	0	1 upper	0	0	38.526	51.232		
516	x	clean	0	0	0	0	0	38.507	51.276		
517	x	clean	0	1	0	0	0	38.573	51.678		
518	x	clean	0	0	0	0	0	38.591	51.633		
519	x	clean	0	0	0	0	0	38.614	51.587		
520	x	clean	0	0	0	0	0	38.641	51.530		
521	x	clean	0	0	0	0	0	38.661	51.484		
522	x	clean	0	0	0	0	0	38.693	51.427		
523	x	clean	0	0	0	0	0	38.723	51.368		Abnormally dirty filter
524	x	clean	0	0	0	0	0	38.747	51.325		Plugged filter
525	x	clean	0	0	0	0	0	38.774	51.267		
526	x	clean	0	0	0	0	0	38.802	51.213		
527	x	clean	0	0	0	0	0	38.821	51.162		Blow off at end



EXTERNAL MEMORANDUM

To: Cherry Creek Basin Water Quality Authority
Modeling Sub-committee

From: Alan J. Leak, P.E. 
Principal
RESPEC
720 South Colorado Blvd., Suite 410 S
Denver, CO 80246

Date: January 22, 2024

Subject: Additional Watershed Model Scenarios and Scenario Approaches

Two additional watershed scenarios were completed using the Cherry Creek 2030 Future Development HSPF model:

1. Reduced WWTF TN concentration (Scenario 12).
2. Scenario 12 plus improved water quality treatment for all developed areas (Scenario 13).

Scenarios 8 through 13 were also rerun using an alternative approach where water quality efficiencies were adjusted using the flow efficiency. For the scenarios represented, flow, sediment, and nutrients were being adjusted. With small flow adjustments, changes in concentrations of parameters that are not intentionally being adjusted with each scenario (such as BOD and dissolved oxygen) are not obvious. However, the larger the flow adjustments become, the more the scenario concentrations of those parameters that are not intentionally being adjusted show up. Therefore, in the most recent run of scenarios, where flow adjustments were as large as 40%, the increases in concentrations of parameters such as BOD and dissolved oxygen were becoming apparent, and an alternative methodology was incorporated to also adjust the loads of all parameters based on the changes in flow. Details regarding the additional scenarios and the alternative efficiency factor methodology are provided in the following sections. Results are briefly described in this memo with the full results provided in Appendix A.

ADDITIONAL SCENARIOS

Scenario 12 was developed using Scenario 11 (full 2030 buildout) as the base model. The WWTF TN concentrations were capped at 6 mg/l during the summer (April – September) and 8 mg/l during the winter (October – March). The Pinery, Parker, and Stonegate facilities exceed the seasonal limits 100%, 58%, and 23% of the simulation time-period, respectively. During these periods, the total nitrate-nitrite concentrations were reduced until there were no more

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exceedances. The Arapaho County Water and Wastewater Authority (ACWWA) facility never exceeded the seasonal TN limits, so those associated time series remained unchanged.

Relative to Scenario 11, the inflow TN loads and concentrations to Cherry Creek Reservoir for Scenario 12 were reduced by 5% and 3%, respectively. The TN load is still 51% higher than the base model, but the concentration is 1% lower. Inflow volume, TSS, and TP remained the same as Scenario 11.

Scenario 13 was developed using Scenario 12 as the base model. Efficiency factors for flow (0.4), TSS (0.5), TN (0.1), and TP (0.25) that were applied to new development in Scenarios 10 – 12 were applied to all developed model landuse categories.

As expected, Scenario 13 resulted in a reduction in inflow volume and water quality loads to the reservoir relative to Scenarios 11 and 12. However, there was a 10% and 15% increase in inflow TP and TN concentrations, respectively, relative to Scenario 11. These modeled increases are likely due to the modeled enrichment that occurs in the model when the flow efficiency change is larger than water quality efficiencies change (e.g., when more volume than load is removed at the edge of the stream, an increase in inflow concentration is expected). The results generated using the original methodology show the effects of changes in loads but do not maintain the original concentrations of the modeled constituents. Although applying the efficiencies directly to loads is an acceptable method to model load changes, our goal with this additional modeling is to use concentrations as the basis for projections related to the effects of improved water quality treatment for all developed areas. Thus, the alternative efficiency factor approach is provided for this purpose.

ALTERNATIVE EFFICIENCY FACTOR APPROACH

The equation below was used to adjust the water quality efficiency factors as a function of the flow efficiency factor for Scenarios 8 – 13.

$$NewEff_{WQ} = (1 - Eff_{Flow}) \times OriEff_{WQ} + Eff_{Flow}$$

where:

$$\begin{aligned} NewEff_{WQ} &= \text{adjusted water quality efficiency factor} \\ Eff_{Flow} &= \text{efficiency factor for flow} \\ OriEff_{WQ} &= \text{original water quality efficiency factor} \end{aligned}$$

This methodology prevents enrichment in water quality pollutants when the flow efficiency is higher than a water quality efficiency. It also preserves runoff concentrations for parameters that have zero efficiency by setting the efficiency to that of flow. For example, the efficiency for BOD was zero, so the concentrations in runoff actually increased using original method even though the load remained the same. The original and new efficiency factors are summarized in Table 1.



Table 1. Summary of Original and New Efficiency Factors.

Parameter	Original Efficiency Scen 8 – 9	New Efficiency Scen 8 – 9	Original Efficiency Scen 10 – 13	New Efficiency Scen 10 – 13
Flow	0.20	0.20	0.40	0.40
TSS	0.50	0.60	0.50	0.70
TP	0.25	0.40	0.25	0.55
TN	0.10	0.28	0.10	0.46
Temperature	0.00	0.20	0.00	0.40
DO	0.00	0.20	0.00	0.40
BOD	0.00	0.20	0.00	0.40
Carbon	0.00	0.20	0.00	0.40

The new methodology resulted in more accurate estimates of future loads and concentrations. Overall, the narrative remains the same regarding inflow to the reservoir where TSS, TP, and TN loads are still substantially larger than the base condition for Scenarios 8-12. Scenario 13 resulted in no change in TP load and slight increase in TSS and TN load relative to the base condition. Furthermore, all inflow concentrations for Scenario 13 were lower than the base results. A legend for the various scenarios is presented in Table 2. Presented in Figures 1-7 are graphic representations of the results of the alternative model runs.

Table 2 – Scenarios Legend











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 Reservoir	
12	Scenario 11 with WWTF TN in Discharges Limited to 6 mg/l Summer, 8 mg/l Winter	 plus future additional Parker WW to Rueter Hess Reservoir and reduced TN from WWTF	
13	Scenario 12 with Improved Water Quality Treatment for all Developed Areas	 plus future additional Parker WW to Rueter Hess Reservoir, reduced TN, and improved WQ for all development	

Figure 1 - Modeled Flow

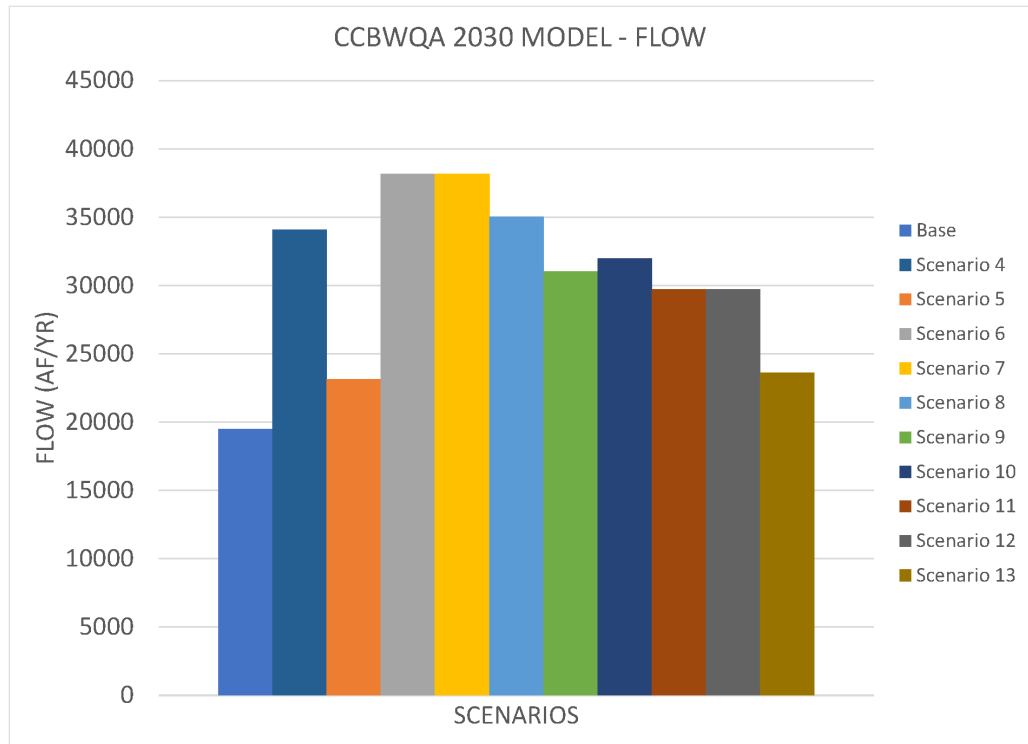


Figure 2 - Modeled TP Load

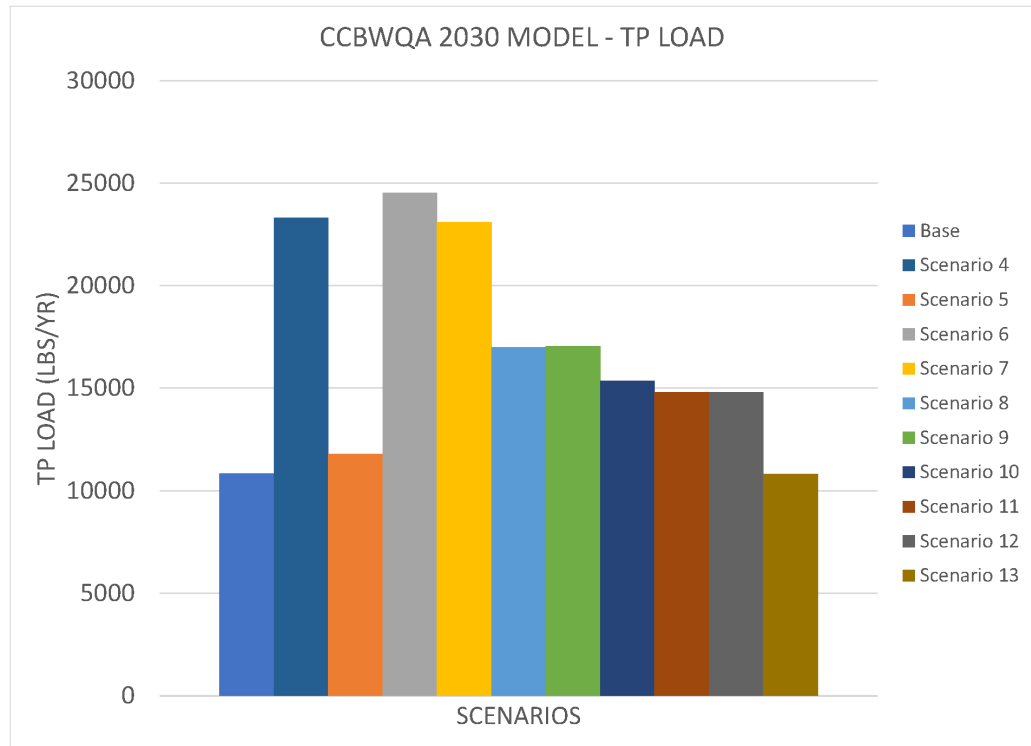


Figure 3 - Modeled TP Concentration

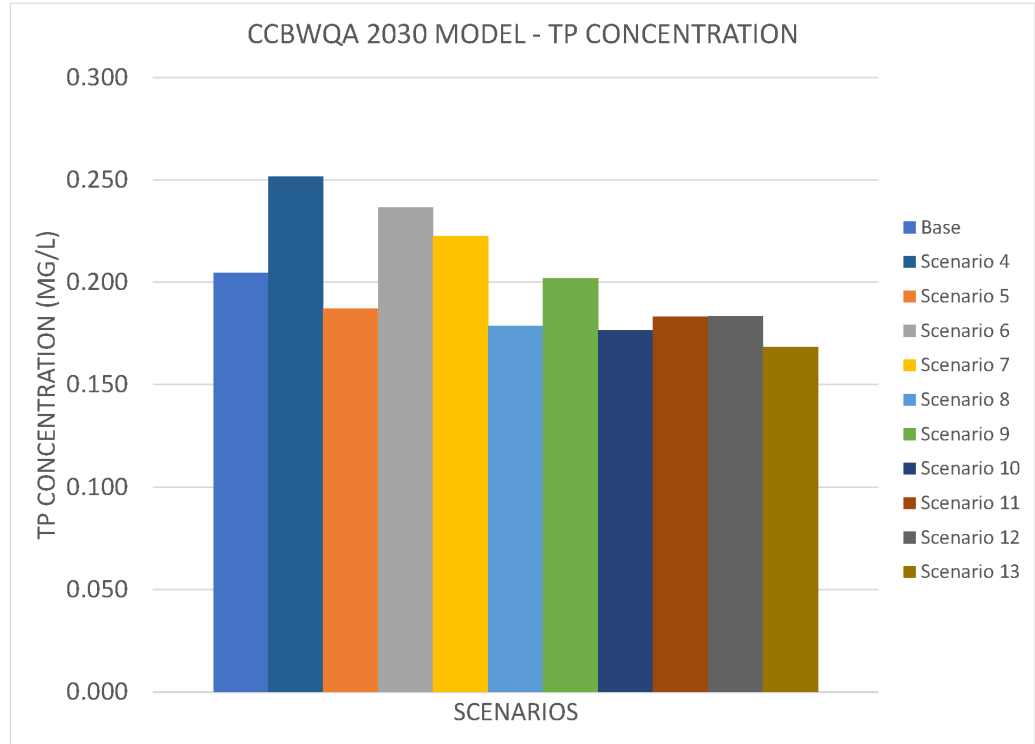


Figure 4 - Modeled TN Load

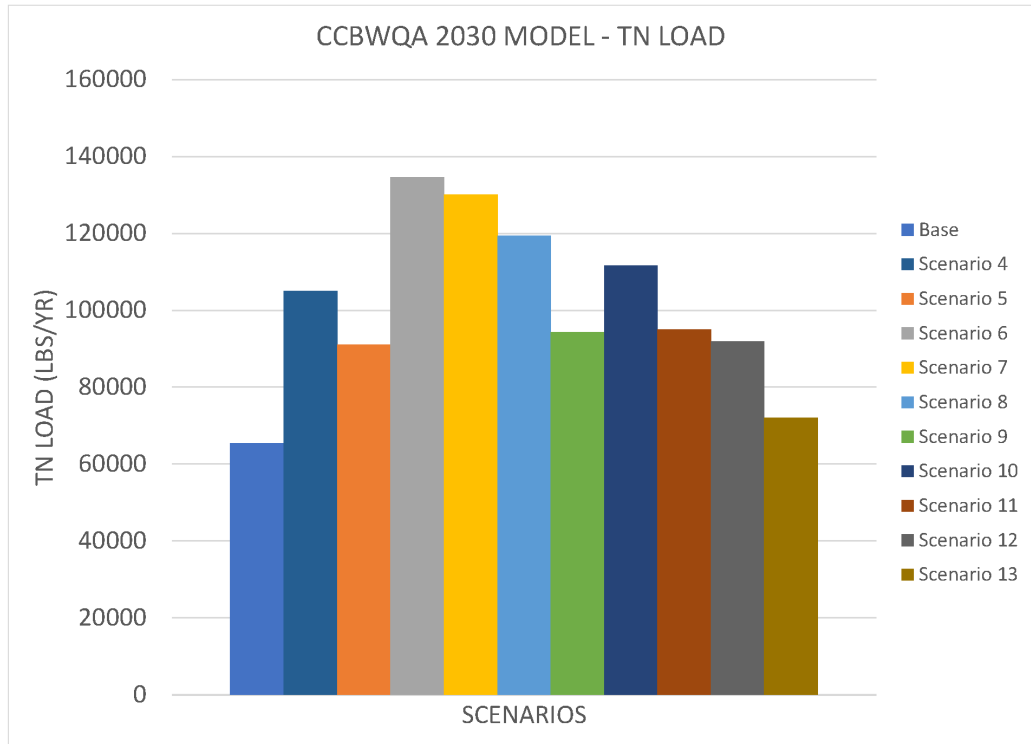


Figure 5 - Modeled TN Concentration

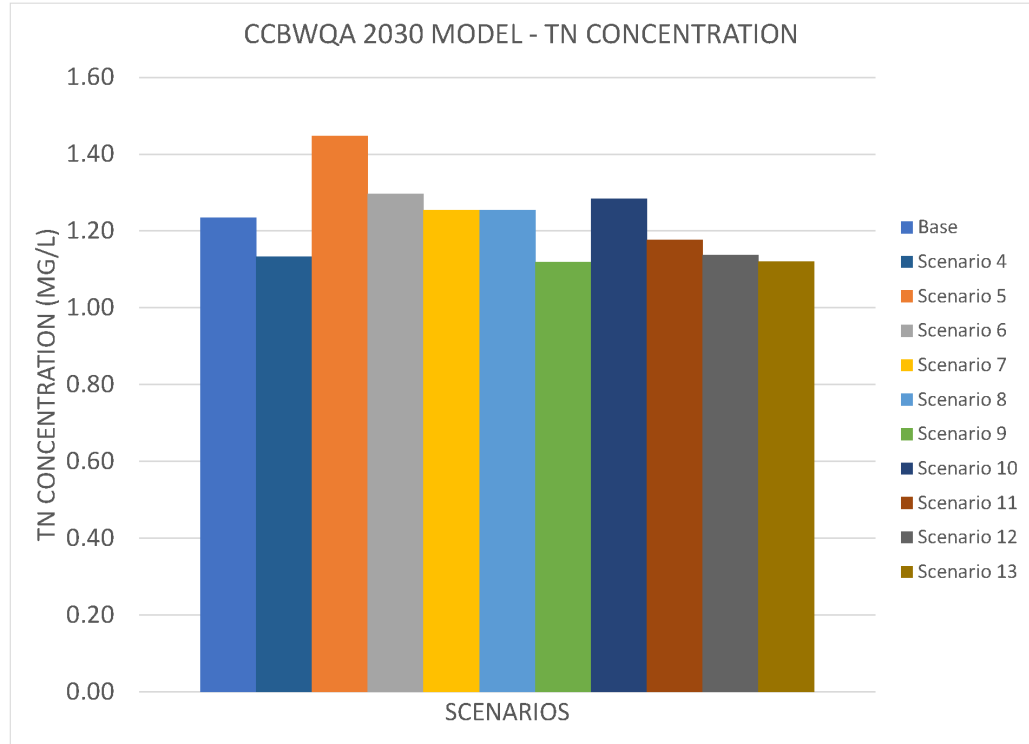


Figure 6 - Modeled TSS Load

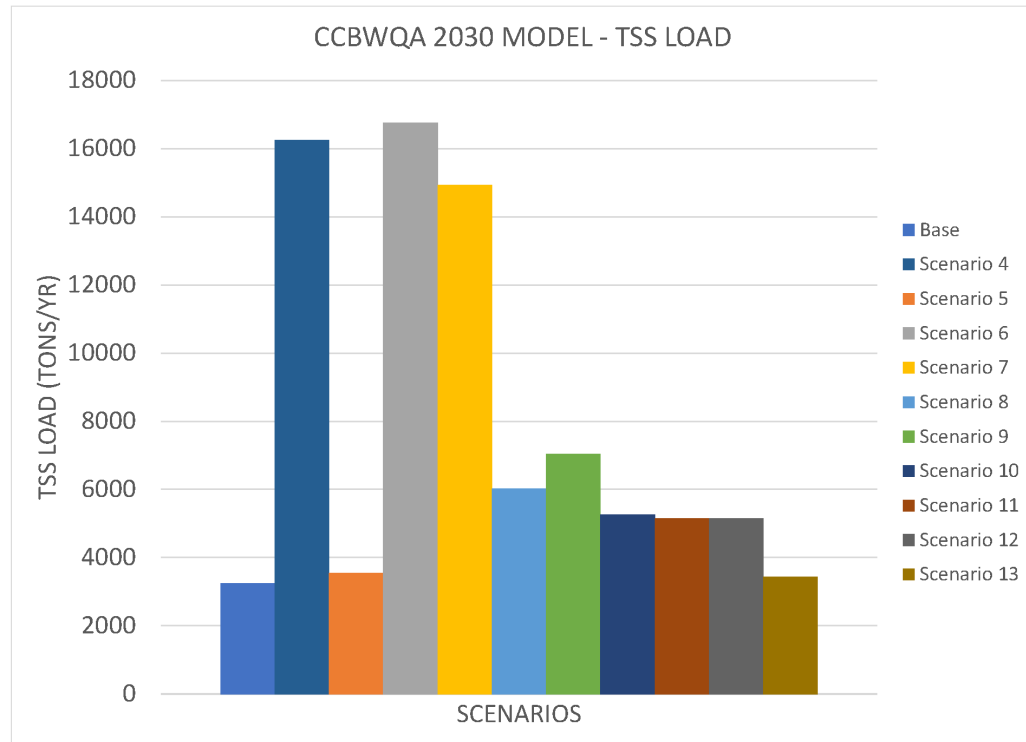
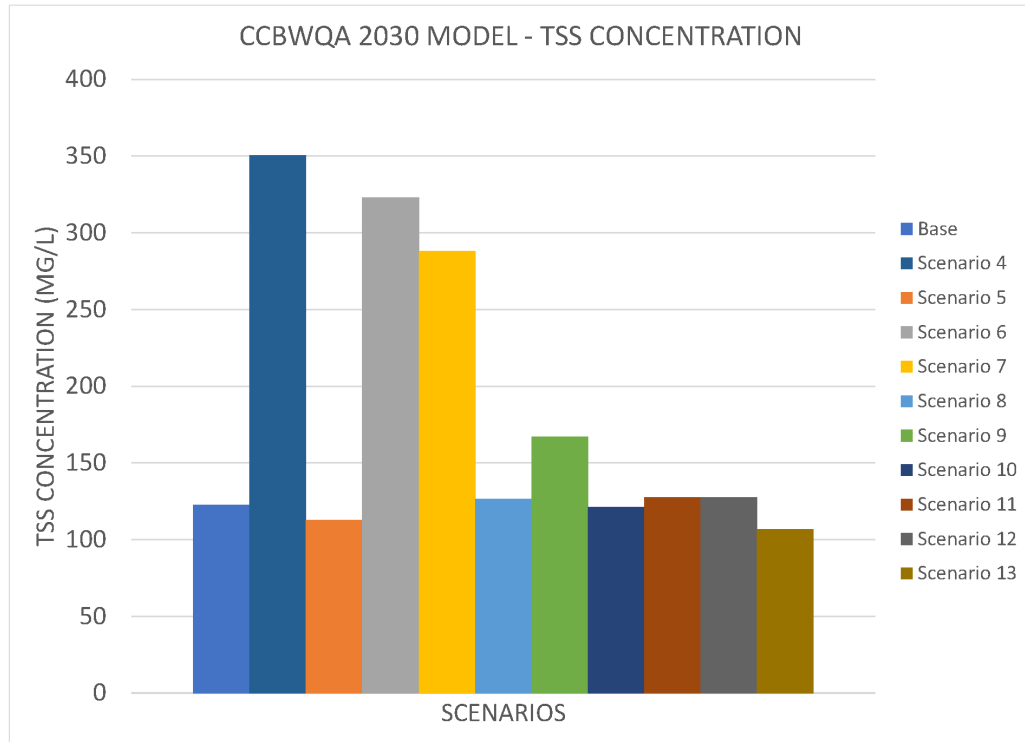


Figure 7 - Modeled TSS Concentration





APPENDIX A

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Load and Concentration Results	Base_v2 Model				Scen004 Model				Scen005 Model				Scen006 Model				Scen007 Model				Scen008 Model				Scen009 Model				Scen010 Model				Scen011 Model				Scen012 Model				Scen013 Model											
	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	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	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	5552	15261	92211	25101	6570	15323	70119	25929	4805	13694	84859	23680	4697	13141	68397	23680	4697	13141	68397	19173	3278	9967	49777								
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	346	1053	22956	5046	345	1049	20050	5203	334	1007	22651	5203	334	1007	22651	4034	112	537	20224												
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	820	123	645	4020	422	42	310	2000								
Total Inflow	19491	3247	10846	65444	34090	16249	23312	105043	23141	3549	11781	91058	38144	16757	24532	134535	38144	14932	23092	130146	35015	6022	17001	119440	31019	7039	17040	94328	31984	5262	15358	111604	29713	5155	14793	95068	29713	5155	14793	95068	23629	3432	10815	72001								
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	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	142	0.195	1.18	34.67	193	0.224	1.03	35.81	136	0.194	1.20	32.71	146	0.204	1.06	32.71	146	0.204	1.06	26.48	126	0.191	0.95								
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	48	0.072	1.58	6.97	50	0.076	1.46	7.19	47	0.071	1.60	7.19	47	0.071	1.60	5.57	20	0.049	1.84												
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	1.15	109	0.286	1.78	0.58	73	0.271	1.74								
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	126.5	0.179	1.25	43	166.9	0.202	1.12	44	121.0	0.177	1.28	41	127.6	0.183	1.18	41	127.6	0.183	1.14	33	106.8	0.168	1.12								

Change Relative to Base_v2	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				Scen012 - 011 w/ WWTF TN Capped				Scen013 - 012 w/ Eff Fac on all Dev			
	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	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	% 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	95	62	113	73	131	62	8	79	69	45	96	64	65	39	58	64	65	39	58	32	15	6	15
Cottonwood Creek Surface Flow	20	41	35	10	7	0	2	16	27	42	37	26	27	42	35	25	23	24	25	24	16	23	25	8	20	19	20	22	20	19	20	22	20	19	20	22	-7	-60	-36	9
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	22	1	15	14	-38	-66	-45	-43
Total Inflow	75	400	115	61	19	9	39	96	416	126	106	96	360	113	99	80	85	57	83	59	117	57	44	64	62	42	71	52	59	36	45	52	59	36	45	21	6	0	10	10
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	% 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	-2	-19	7	73	33	-6	-7	79	-6	-19	9	64	1	-15	-4	64	1	-15	-8	32	-13	-20	-13
Cottonwood Creek Surface Flow	20	18	13	-8	7	-6	-5	8	27	12	8	-1	27	12	7	-1	23	0	2	0	16	6	7	-7	20	0	0	2	20	0	2	20	0	2	-7	-57	-31	17	17	17
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	22	-18	-6	-7	-38	-45	-11	-9
Total Inflow	75	186	23	-8	19	-8	-9	17	96	164	16	5	96	135	9	2	80	3	-13	2	59	36	-1	-9	64	-1	-14	4	52	4	-11	-5	52	4	-10	-8	21	-13	-18	-9



TO: Jane Clary, Cherry Creek Basin Water Quality Authority (CCBWQA) Technical Manager
FROM: Christine Hawley, Hydros Consulting Inc.
SUBJECT: Scope of Work for Linked Reservoir Model Runs in 2024
DATE: January 25, 2024

Hydros currently has a contract with Cherry Creek Basin Water Quality Authority (CCBWQA) for 2024 that includes \$50,000 to run simulations with the Cherry Creek Reservoir Model using watershed model results as the basis for inputs (i.e., linked model runs). At the time of development of the Hydros contract for 2024, there was uncertainty as to which model runs should be conducted and how the effort should be coordinated with CCBWQA, so a detailed scope of work was not included in the contract. At a recent meeting (1/24/24) between representatives of CCBWQA, Hydros, and the watershed modeling contractor (RESPEC), an approach was developed. This memorandum presents the scope of work reflecting that approach and the anticipated schedule and budget for consideration by CCBWQA.

1 Phased Approach

Recognizing that this effort comprises the first full test of linkage of the watershed and reservoir models for the Cherry Creek basin, a phased approach is specified to allow for flexibility to support issue resolution, as needed. Phase I consists of conducting the initial set of linked model runs. The first task of Phase II will be to share the draft model run results with CCBWQA (or the appropriate subcommittee) in an informal presentation. The remaining tasks in Phase II will be determined by CCBWQA in response to Phase I findings and the remaining budget.

Model runs to be considered in this scope of work are:

- **Baseline Run** (simulating observed conditions from 2003-2016);
- **Watershed Model Run 6** (2030 development and WWTF flows; RESPEC, 2024); and
- **Watershed Model Run 13** (2030 development and WWTF flows, PRFs, LID, and 40% volume reduction, diversion of Parker wastewater flows from future development to Rueter-Hess Reservoir, and WWTF TN discharges limited to 8 mg/L in winter and 6 mg/L in summer; RESPEC, 2024).

These scenarios were selected to be the initial model linkage simulations because they are expected to produce notable differences in reservoir response relative to baseline, thereby supporting evaluation of model linkage, providing useful insights to CCBWQA, and informing next steps.

1.1 Phase I – Conduct Initial Linkage Runs

Task 1. Coordinate with RESPEC to Receive Data

Hydros will coordinate with RESPEC to receive the required daily flow and water-quality output from the watershed model for the selected model runs. The data request will include specifications for format and content for each run. Watershed model output will be needed for the following locations:

- Cherry Creek inflow to Cherry Creek Reservoir;
- Cottonwood Creek inflow to Cherry Creek Reservoir; and
- Direct watershed inflow to Cherry Creek Reservoir.

In addition to daily flow rates, daily watershed model output will be needed at each location for the following water-quality constituents:

- Temperature (°C);
- Dissolved oxygen (mg/L);
- Total organic carbon (mg/L as C);
- Dissolved organic carbon (mg/L as C);
- Total ammonia (mg/L as N);
- Nitrate plus nitrite (mg/L as N);
- Total nitrogen (mg/L as N);
- Orthophosphate (mg/L as P);
- Total phosphorus (mg/L as P); and
- Total suspended solids (mg/L).

Task 2. Develop Data Translation Tools

Tools will be developed and tested to translate watershed model outputs into reservoir model inputs in accordance with the detailed linkage methodology previously developed by the CCBWQA Model Linkage subcommittee (Hydros et al., 2020). While only a small number of model runs are planned for this scope of work, tool development is considered an important step to streamline future linked model runs.

Task 3. Conduct Data Translation and Model Simulations

Watershed model output received from RESPEC will be processed and used to calculate reservoir model input values using the translation tools. The reservoir water balance will also be modified for each run, updating daily outflow rates to maintain daily storage values from the baseline run. Flow and water-quality input files will then be created for the reservoir model. Finally, the reservoir model scenario runs will be conducted.

Task 4. Process and Review Model Results

Reservoir model run results will be processed and reviewed, focusing on the following output:

- Total Nitrogen (July-Sept Avg. – 1 m, CCR-2);
- Total Phosphorus (July-Sept Avg. – 1 m, CCR-2);
- Chlorophyll *a* (July-Sept Avg. – 1 m, CCR-2);
- Cyanobacteria (timeseries, 1 m, CCR-2); and
- Dissolved oxygen (timeseries, bottom cell, CCR-2).

Graphics will be generated to support visual comparison of results from the three simulations.

1.2 Phase II – Coordinate with CCBWQA and Conduct Next Steps

Task 1. Present Summary of Results to CCBWQA

Hydros will prepare and deliver an informal presentation of the findings from Phase I to CCBWQA (or the appropriate sub-committee). The presentation will include recommendations for next steps.

Task 2. Conduct Next Steps Determined by CCBWQA

The remaining tasks in Phase II will be determined by CCBWQA in response to Phase I findings and the available remaining budget. It is anticipated that Phase II tasks may include documenting Phase I results, conducting additional runs, and/or revisiting the linkage approach, as needed.

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 scheduled and will likely need some adjustment to accommodate CCBWQA schedules. The entire SOW is scheduled to be complete in 2024.

Table 1. Summary of Anticipated Project Timeline

Project Milestone	Target
Watershed Model Output Received	On or before February 9, 2024
Presentation of Phase I Results	On or before May 15, 2024
CCBWQA Decision-Point for Next Steps	On or before June 15, 2024
Completion of Next Steps (TBD; Phase II, Task 2)	End of October 2024

The total anticipated budget for this project is \$50,000, corresponding with the contract amount for 2024 with Hydros for Reservoir Model Runs. Cost estimates for Phase I and Phase II are summarized in Table 2.

Table 2. Summary of Estimated Cost by Project Task

Project Phase	Anticipated Cost
Phase I – Conduct Initial Linkage Runs	\$38,915
Phase II – Coordinate with CCBWQA and Conduct Next Steps	\$11,085
Total Cost:	\$50,000

3 References

Hydros Consulting, RESPEC, Kilgore, R. 2020. Technical Memorandum to CCBWQA Re: Proposed Approach to Link the Cherry Creek Watershed and Reservoir Models. April 30, 2020.

RESPEC. 2024. Memorandum from A. Leak (RESPEC) to CCBWQA Modeling Sub-committee. Subject: Additional Watershed Model Scenarios and Scenario Approaches. January 22, 2024.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2023 Capital Project Status Report
February 9, 2024

RESERVOIR PROJECTS

1. East Shade Shelters Phase III and Tower Loop Phase II Shoreline Stabilization (CCB-17.5.1 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 (10/13/22). The 30% submittal was received on 11/16/22 and is under review. CCBWQA provided comments on 30% review on 1/17/23; a value engineering effort is recommended as the project costs exceed the budget. The value engineering meeting was held on 2/24/23. RESPEC's request for additional services was approved by TAC and Board in May (5/25/23). The reservoir water level has come down since the May and June storms and additional erosion was observed on 7/14/23; a site visit was made with RESPEC on 8/1/23 and the erosion areas at East Shade Shelters were measured. It has been estimated that roughly 14 cubic yards of soil was eroded from the 2023 storms (9/15/23). A progress meeting was held on 9/15/23, RESPEC will refine the breakout of components between recreational (CPW responsibility), water quality (CCBWQA responsibility), and shared (both CPW and CCBWQA responsibilities) costs and work on 408 review submittal to US Army Corps of Engineers. RESPEC was provided by the US Army Corps of Engineers' guidance on cut and fill and asked to prioritize the 408 application and review; they are coordinating with Gene Seagle in preparation for this submittal. RESPEC has provided a draft plan of action for the 408 permit submittal to be discussed with Gene (1/15). *A meeting was held with Gene on (02/01/2024) to discuss the 408 requirements, subsequently RESPEC followed up with a submittal package PDF of the summary of impact for the project via email to Gene and Joe with USACE on (02/02/2024)*

Tower Loop Phase II –

1. In 1st and 2nd quarters, PAPM receives design submittal that includes revisions from value engineering effort. Final design and construction are currently scheduled for 2032 and 2033 (see row 12 of 10-year CIP).

STREAM RECLAMATION PROJECTS

1. Cherry Creek Stream Reclamation at Arapahoe Rd. - Valley Country Club to Soccer Fields, Reaches 3 to 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, an 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. It appears that CCBWQA's 2023 participation will be reduced as a result of less partner funding available for this project (2/24/23). The IGA Amendment that brings in 2023 funding was recommended by the TAC and authorized by the Board at their June meetings (6/29/23). MHFD is starting consultant selection process (10/13/23). Jacobs, Olsson, and Muller were shortlisted for interviews which are scheduled for mid-December (11/10/23). Muller was selected as the consultant (12/28/23). *A scoping meeting for the project was held on (01/30/2024), a design scope is anticipated in the next month.*
2. Cherry Creek - Reservoir to Lake View Drive Alternatives Analysis and Development of Preferred Alternative (CCB-5.16A)
 - a. Description: This project is in follow up to CCBWQA's study of Cherry and Piney Creeks in Cherry Creek State Park (CCSP). Muller completed two reports on Cherry Creek from Reservoir to State Park Boundary, Stream and Water Quality Assessment and Baseline Channel Monitoring Report, in 2022. These reports highlight the need for this project.
 - b. Status: A workshop is scheduled for the 3/16/23, to seek CCBWQA Board and TAC input on this project and Cherry and Piney Creeks in CCSP (3/10/23). *The follow up from workshop is underway – project overview and funding flyer has been created,* Muller is scoping the next step of design for Reach 1 and providing a fee, and multi-pronged approach is in development for workshop priority reaches that prioritizes Reach 1 and reduces risk from upstream reaches; these items will be brought to TAC and Board for discussion, direction, and/or action at upcoming meetings (3/30/23). A site visit for partner outreach and funding was held on 5/25/23 at 1-4 pm (6/8/23). A coordination meeting was held with Aurora on 6/23/23 and they showed interest in partnering on the project to protect their water lines. The

Mile High Flood District has provided their budget/CIP schedule and Arapahoe County Open Space has been contacted to investigate potential partnering opportunities (7/13/23). The TAC created a subcommittee for this project on 8/3/23; which will attend progress meetings, provide timely feedback to Muller, and to coordinate with TAC as needed. The alternatives analysis kickoff meeting was held on 8/29/23. A site visit was held on 9/22/23 to look at multiple flow paths and potential risks for consideration in alternatives analysis. It was verbally reported at the 11/16/23 Board meeting that Colorado Parks and Wildlife's repair of Lake View Drive is underway which includes the alternatives of concrete pipe and trash racks, cleaning out of culverts 1-9 and the beaver debris, and it is scheduled for completion by mid-December. Muller was provided US Army Corps of Engineers' guidance on cut and fill for consideration in their alternatives analysis (12/1/23). *Muller is working through the Alternative Analysis and is coordinating a meeting (02/02/2024) to discuss alternatives in late February with the team.*

3. 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). Muller is working on Final Design and held a progress meeting on 4/14/23, a site visit is being scheduled to support the 90% design submittal. The 90% site visit was held on 5/22/23. Muller submitted their 90% design submission on 9/14/23; the engineer's estimate confirms that additional funding is needed for construction. IGA Amendment for additional funding is scheduled for TAC and Board consideration at October meetings and 90% review meeting was held on 10/13/23. Comments were provided for 90% submittal and discussed at the review meeting (11/10/23).
4. 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 as project partner to provide contractor input during the design (5/27/22). CLOMR is under review by FEMA (8/12/22). Muller has received comments on CLOMR and is preparing responses; 90% Submittal is scheduled for early February (1/27/23). Comments on 90% Submittal were provided on 2/22/23; project is experiencing substantive cost increases due to current market conditions (2/24/23). TAC at their 3/2/23 meeting recommended that the Board authorized the IGA Amendment to bring in 2023 funding along with an increase in CCBWQA's 2023 funding from \$170,000 to \$570,000. The Board authorized the IGA Amendment with the increased 2023 funding of \$570,000 at their 3/16/23 meeting. The Conditional Letter of Map Revision (CLOMR) was issued by the Federal Emergency Management Agency (FEMA) on April 28, 2023 (5/12/23). The sanitary sewer relocation will be contracted to start with, in order to avoid a pipe material cost increase, and to get it out of the way for the forthcoming stream reclamation (7/13/23). The sanitary sewer relocation has been contracted for with Concrete Express Inc. or CEI (8/11/23). Construction of stream reclamation will start once 404 permit has been received (11/10/23). *CEI has sent final contract pricing to MHFD via email (01/26/2024) updated from pricing in October 2023.*

5. Piney Creek - Cherry Creek to Parker Road, Reaches 1 to 2 (SE/MSWA) (CCB-6.5)
 - 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. IGA Amendment to bring in 2023 funding was recommended by the TAC and authorized by the Board in May (5/25/23). CCBWQA sent the Draft IGA Amendment to SEMSWA for review on 6/29/23. SEMSWA has no comments on the IGA Amendment and plans to take it to their Board in October (8/11/23). The project site was walked w/ith SEMSWA and Olsson and Associates on 8/30/23, Olsson is preparing their scope of work and fee for design. Comments on Olsson's scope of work and fee were provided to and coordinated with SEMSWA (11/10/23). Olsson's scope of work and fee have been finalized and SEMSWA is planning on contracting for the initial design phase in early 2024 (12/1/23). The design contract with Olsson was completed on (01/19/2024). *A site visit is set with Nicole with SEMSWA for 02/12/2024 to observe and discuss the project.*
6. Piney Creek south of Orchard Rd., Reaches 4 to 5 (SEMSWA) (CCB-6.6)
 - a. Description: *New Project 2024 – Description TBD*
 - b. Status: *A site visit is set with Nicole with SEMSWA for 02/12/2024 to observe and discuss the project.*
7. McMurdo Gulch Priority 3 Stream Reclamation (CCB-7.4)
 - 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 phase. Muller Engineering is the design consultant.
 - b. Status: Board authorized IGA for Priority 3 at their May 19,2022 meeting. Muller submitted their 30% deliverable on 10/31/22, review comments were returned on 11/8/22. Easements needed for projects have been identified (1/23/22). The 60% Submittal was received on 1/30/23 and comments have been provided on 2/7/23.

Muller is working on updating their construction cost estimate (2/8/23). On 2/23/23, Castle Rock requested that CCBWQA's 2023 funding be deferred to 2024 to match their schedule. A meeting was held on 01/24/2024 to help determine the approach for obtaining 404 permitting (including Muller, ERO, Castle Rock and CCBWQA). Wetland mitigation under a nationwide permit was recommended by ERO and potential cost impacts for this approach were discussed. Muller's is working on updating estimated construction costs but anticipates being able to move forward with one complete project instead of phasing into two (separating the work on the upstream reach). *Muller provided a breakdown of the estimated construction cost versus budget in a meeting with Castle Rock on (02/08/2024) showing the potential to construct both projects in one phase.*

8. Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only) (CCB-21.1)
 - a. Description: *New Project 2024 – Description TBD*
 - b. Status:

9. Lone Tree Creek in Cherry Creek State Park (CCB-21.3)
 - 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 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. The Board supports CCBWQA's partnering with Centennial at their 11/17/22 meeting. A Memo of Understanding is under review by Colorado Parks and Wildlife (CPW) affirming maintenance responsibilities for the stream reclamation fit under the current agreement between CCBWQA and CPW (3/30/23). CCBWQA sent the Draft IGA to Centennial for review on 5/23/23. The project is included in CCBWQA's 2024 Budget and 10-year CIP (11/10/23). *UASCE is currently reviewing this project as of a letter requesting comments dated (12/15/2023)*

10. Happy Canyon Creek at Jordan Road (SEMSWA) (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 phosphorus 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). Groundwater scope of work has been reviewed and approved by project sponsors (1/13/23). The IGA Amendment bringing in the 2023 funding was recommended by TAC and authorized by the Board in April (5/12/23). A progress meeting was held on 10/30/23 where the groundwater information was reviewed and the impacts from the 2023 storms were discussed; MHFD is planning additional sediment removals accordingly. A project site walk with the project team is scheduled for 1/31/2024. *A site walk was held on 01/31/2024 with SEMSWA, MHFD and the design team to discuss the study and observe the changes in the project since the 2023 storms. MHFD has performed sediment removals, and that quantity information was shared with the project team. (01/31/2024)*

11. 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 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). Muller completed the 100% design submittal on 11/22/22. CDOT permit was issued, and pre-construction meeting was held on 1/10/23; construction start is scheduled for 1/30/23 pending execution of easement documents from Surrey Ridge which has agreed to terms and easement language. Notice to Proceed on construction is pending execution of easement documents (1/27/23). Easements have been signed by property owners and Notice to Proceed has been issued to Naranjo Civil Constructors (2/8/23). Construction is underway with initial construction BMPs/stormwater controls in place; water diversion and control is being set up for the downstream section of the project (3/10/23). Water control is in place and construction of stream reclamation is underway for downstream sections of the project (3/30/23). Riffle and Boulder Cascade drop structures on downstream third of project are nearing completion (4/13/23). Construction is underway in the middle third of the project; efforts consist of stream

grading and installation of Riffle and Boulder Cascade drop structures (5/12/23). The storm damage from May 11 to 13, 2023 event is being identified and repaired (5/25/23). Construction on the middle third is substantially complete and work has begun on the upstream third (7/27/23). The construction is nearly complete with the punch list walk on 9/13/23; contractor is working on completing plantings and resolving punch list items. Asphalt repairs on the frontage road are being scheduled and some of the plantings will need to be done during the 2024 spring planting window to improve their chance for success (11/10/23). Asphalt repairs have been made and the project summary has been prepared (12/1/23).

12. 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. Dove Creek IGA for construction of Phase 1 is scheduled for TAC and Board in January 2023, construction is expected to start shortly afterwards (12/30/22). Construction is scheduled to start mid-February; construction agreement and engineering construction services amendment are currently being reviewed (1/27/23). Construction and engineering construction services have been finalized and a preconstruction meeting was held on 2/2/23. Notice to Proceed has been issued to Concrete Express; construction is underway with initial construction BMPs/stormwater controls in place (3/10/23). Water control is in place and construction of stream reclamation is on-going (3/30/23). Step pool drop structures have been constructed and work on soil wraps is underway (4/13/23). Low-flow or bank full channel work (soil wraps and erosion control blanket) and step-pool structures are complete, water diversion has been removed, and is active to storm flows; work continues in upland areas and higher elevations of stream reclamation (5/12/23). Storm damage from May 11 to 13, 2023 event is being repaired (5/25/23). Construction punch list is being completed (6/29/23). Construction of Phase 1 is complete (7/27/23). Project summary has been prepared (12/1/23).

13. Dove Creek - Chambers Rd. to Pond D-1 (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. Construction was broken into 2 phases with Phase 2 scheduled for 2024.
 - b. Status: CCBWQA acted at their October meeting to advance their funding for Phase 2 Construction to 2023 with SEMSWA's funding scheduled for 2024, IGA has been prepared and scheduled for signatures after SEMSWA's November Board meeting, phosphorus estimates for sediment capture areas for the project were provided to Technical Manager (11/10/23). A progress meeting was held on 01/23/204 and construction is expected to start on 02/05/2024 completing 07/2024. *GESC and State Stormwater Permitting was obtained week of the 02/05/2024 allowing the work to commence. Potholing for the project has been completed and results of waterline depths in the project area, appear to reduce encasements required throughout the project reach as reported in the progress meeting (02/06/2024)*

14. Mountain and Lake Loop Shoreline Stabilization Phase II (OM-)
 - a. Description: This project was identified 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). *Comments were received from the US Army Corps of Engineers on 8/29/23.* A meeting has been scheduled for 11/16/23 with USACOE's local staff and CPW staff to discuss the cut and fill balance requirements on this project and other planned projects in Cherry Creek State Park (11/10/23). A site meeting with CPW is being scheduled to determine the feasibility of the project after the 2023 storm damage (12/1/23). The 12/20/23 site meeting with Michelle Seubert identified 2 possible alternatives to address 2023 storm damage and meet USACOE cut and fill requirements while maintaining access to the swim beach. An updated project cost is about \$90,000 which is over the \$65,000 budgeted in 2024 (12/28/23). *After discussion with Gene at USACE, further analysis to determine project feasibility is necessary and will be provided.*

**CHERRY CREEK BASIN WATER QUALITY AUTHORITY
ANNUAL BUDGET
FOR THE YEAR ENDING DECEMBER 31, 2024**

**CHERRY CREEK BASIN WATER QUALITY AUTHORITY
SUMMARY
2024 BUDGET
WITH 2022 ACTUAL AND 2023 ESTIMATED
For the Years Ended and Ending December 31,**

1/12/24

	ACTUAL 2022	ESTIMATED 2023	BUDGET 2024
BEGINNING FUND BALANCES	\$ 5,758,590	\$ 5,814,599	\$ 5,852,704
REVENUES			
Property taxes	2,644,574	2,784,685	3,004,097
Specific ownership taxes	210,405	215,204	234,739
Recreation Fees	193,937	209,000	213,000
Building Permit Fees	268,283	230,000	234,000
Wastewater Fees	119,734	161,000	164,000
Interest income	118,845	340,300	266,800
Other revenue	5,520	50	9,500
Total revenues	<u>3,561,298</u>	<u>3,940,239</u>	<u>4,126,136</u>
TRANSFERS IN	<u>2,132,922</u>	<u>2,362,463</u>	<u>2,971,001</u>
Total funds available	<u>11,452,810</u>	<u>12,117,301</u>	<u>12,949,840</u>
EXPENDITURES			
General Fund	932,337	1,010,507	1,202,919
Special Revenue Fund	2,351,559	2,683,262	3,835,832
Enterprise Fund	221,393	208,365	540,000
Total expenditures	<u>3,505,289</u>	<u>3,902,134</u>	<u>5,578,751</u>
TRANSFERS OUT	<u>2,132,922</u>	<u>2,362,463</u>	<u>2,971,001</u>
Total expenditures and transfers out requiring appropriation	<u>5,638,211</u>	<u>6,264,597</u>	<u>8,549,752</u>
ENDING FUND BALANCES	<u>\$ 5,814,599</u>	<u>\$ 5,852,704</u>	<u>\$ 4,400,088</u>
EMERGENCY RESERVE	\$ 88,600	\$ 98,300	\$ 103,300
RESERVOIR DEST. SERV PLAN RESERVE	70,393	43,993	16,593
FACILITIES MAINTENANCE RESERVE	100,000	100,000	100,000
CAPITAL RESERVE	750,000	750,000	750,000
TOTAL RESERVE	<u>\$ 1,008,993</u>	<u>\$ 992,293</u>	<u>\$ 969,893</u>

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
PROPERTY TAX SUMMARY INFORMATION
2024 BUDGET
WITH 2022 ACTUAL AND 2023 ESTIMATED
For the Years Ended and Ending December 31,

1/12/24

	ACTUAL 2022	ESTIMATED 2023	BUDGET 2024
ASSESSED VALUATION - ARAPAHOE			
Residential	\$ 1,199,207,306	\$ 1,037,127,617	\$1,296,133,271
Residential - Multi Family	-	136,788,751	156,788,401
Commercial	1,001,435,625	999,003,626	1,245,317,696
Industrial	6,461,200	6,461,200	6,541,155
Agricultural	365,898	359,723	646,186
State assessed	2,529,200	3,026,620	3,026,610
Vacant land	37,768,626	34,036,588	40,544,729
Personal property	151,299,748	144,405,973	162,863,044
Other	13,587	13,588	13,089
Certified Assessed Value	<u>\$ 2,399,081,190</u>	<u>\$ 2,361,223,686</u>	<u>\$2,911,874,181</u>
MILL LEVY			
General	0.500	0.500	0.500
Temporary Mill Levy Reduction	(0.021)	0.000	(0.075)
Total mill levy	<u>0.479</u>	<u>0.500</u>	<u>0.425</u>
PROPERTY TAXES			
General	\$ 1,199,541	\$ 1,180,612	\$ 1,455,937
Temporary Mill Levy Reduction	(50,381)	-	(218,391)
Levied property taxes	1,149,160	1,180,612	1,237,546
Refunds and abatements	(13,832)	-	-
Budgeted property taxes	<u>\$ 1,135,328</u>	<u>\$ 1,180,612</u>	<u>\$ 1,237,546</u>
ASSESSED VALUATION - DOUGLAS			
Residential	\$ 2,039,108,800	\$ 2,075,018,450	\$2,820,500,950
Commercial	600,191,990	618,323,350	686,712,610
Industrial	163,237,070	169,097,570	214,402,350
Agricultural	11,494,050	10,800,380	13,602,430
State assessed	3,260,900	4,954,100	4,901,800
Vacant land	192,875,070	175,740,950	214,496,980
Personal property	200,763,990	210,085,220	272,978,200
Other	160,790	166,030	87,900
	3,211,092,660	3,264,186,050	4,227,683,220
Adjustments	(55,922,571)	(56,039,622)	(71,093,450)
Certified Assessed Value	<u>\$ 3,155,170,089</u>	<u>\$ 3,208,146,428</u>	<u>\$4,156,589,770</u>
MILL LEVY			
General	0.500	0.500	0.500
Temporary Mill Levy Reduction	(0.021)	0.000	(0.075)
Total mill levy	<u>0.479</u>	<u>0.500</u>	<u>0.425</u>
PROPERTY TAXES			
General	\$ 1,577,635	\$ 1,604,073	\$ 2,078,295
Temporary Mill Levy Reduction	(66,261)	-	(311,744)
Levied property taxes	1,511,374	1,604,073	1,766,551
Refunds and abatements	(2,128)	-	-
Budgeted property taxes	<u>\$ 1,509,246</u>	<u>\$ 1,604,073</u>	<u>\$ 1,766,551</u>
BUDGETED PROPERTY TAXES			
General	<u>\$ 2,644,574</u>	<u>\$ 2,784,685</u>	<u>\$ 3,004,097</u>
	<u>\$ 2,644,574</u>	<u>\$ 2,784,685</u>	<u>\$ 3,004,097</u>

No assurance provided. See summary of significant assumptions.

**CHERRY CREEK BASIN WATER QUALITY AUTHORITY
GENERAL FUND
2024 BUDGET
WITH 2022 ACTUAL AND 2023 ESTIMATED
For the Years Ended and Ending December 31,**

1/12/24

	ACTUAL 2022	ESTIMATED 2023	BUDGET 2024
BEGINNING FUND BALANCES	\$ 1,417,208	\$ 1,665,524	\$ 1,964,993
REVENUES			
Property taxes	2,644,574	2,784,685	3,004,097
Specific ownership taxes	210,405	215,204	234,739
Interest income	96,626	275,000	200,000
Other revenue	27	50	1,500
Total revenues	<u>2,951,632</u>	<u>3,274,939</u>	<u>3,440,336</u>
TRANSFERS IN			
Total funds available	<u>4,368,840</u>	<u>4,940,463</u>	<u>5,405,328</u>
EXPENDITURES			
General and administrative			
Accounting	55,161	65,000	70,000
Administrative Assistant	57,435	69,000	86,500
Auditing	7,200	8,000	8,000
County Treasurer's fee	39,694	41,770	45,061
CC Stewardship Partners	31,000	35,000	35,000
Dues and membership	1,238	1,500	2,000
Information & Education Coordination	2,550	-	12,000
Insurance	6,863	6,037	6,500
Legal	125,217	110,000	115,000
Management/Administration	-	69,000	68,700
Office/Miscellaneous Expense	9,451	9,400	11,500
TAC Coordination	23,410	20,800	20,800
WQCC regulation hearings	76,501	161,000	75,000
Website	8,643	10,000	3,000
Contingency	-	-	65,458
	<u>444,363</u>	<u>606,507</u>	<u>624,519</u>
Watershed Management			
Annual Report	25,689	40,000	34,000
Data Management	46,659	45,000	50,000
General Watershed Management	139,841	50,000	177,000
Site Application Review	4,032	2,000	6,400
	<u>216,221</u>	<u>137,000</u>	<u>267,400</u>
Monitoring and Reporting			
General Technical Support	56,091	56,000	40,000
Monitoring - Reservoir	75,704	31,000	40,000
Monitoring - Watershed	115,340	60,000	53,000
Monitoring - Laboratory	-	100,000	120,000
WQ Data Reporting	24,618	20,000	58,000
	<u>271,753</u>	<u>267,000</u>	<u>311,000</u>
Total expenditures	<u>932,337</u>	<u>1,010,507</u>	<u>1,202,919</u>
TRANSFERS OUT			
Transfers to Pollution Abatement Fund	1,770,979	1,835,933	2,064,201
Supplemental Transfers	-	129,030	500,000
	<u>1,770,979</u>	<u>1,964,963</u>	<u>2,564,201</u>
Total expenditures and transfers out requiring appropriation	<u>2,703,316</u>	<u>2,975,470</u>	<u>3,767,120</u>
ENDING FUND BALANCES	<u>\$ 1,665,524</u>	<u>\$ 1,964,993</u>	<u>\$ 1,638,208</u>
EMERGENCY RESERVE	<u>\$ 88,600</u>	<u>\$ 98,300</u>	<u>\$ 103,300</u>
TOTAL RESERVE	<u>\$ 88,600</u>	<u>\$ 98,300</u>	<u>\$ 103,300</u>

No assurance provided. See summary of significant assumptions.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
POLLUTION ABATEMENT FUND
2024 BUDGET
WITH 2022 ACTUAL AND 2023 ESTIMATED
For the Years Ended and Ending December 31,

1/12/24

	ACTUAL 2022	ESTIMATED 2023	BUDGET 2024
BEGINNING FUND BALANCES	\$ 2,441,170	\$ 2,226,105	\$ 1,908,106
REVENUES			
Interest income	934	2,800	2,800
Other revenue	2,638	-	5,000
Total revenues	<u>3,572</u>	<u>2,800</u>	<u>7,800</u>
TRANSFERS IN			
Transfers from General Fund	1,770,979	1,835,933	2,064,201
Transfers from Enterprise Fund	309,595	397,500	406,800
Supplemental Transfers from other funds	52,348	129,030	500,000
Total Transfers In	<u>2,132,922</u>	<u>2,362,463</u>	<u>2,971,001</u>
 Total funds available	 <u>4,577,664</u>	 <u>4,591,368</u>	 <u>4,886,907</u>
EXPENDITURES			
General and administrative			
Management/Administration	434,311	358,100	433,400
PAPS - Undesignated	5,356	-	-
Repairs and maintenance	-	10,000	-
Contingency	-	-	16,732
	<u>439,667</u>	<u>368,100</u>	<u>450,132</u>
Pollution Reduction Facilities - O&M			
PRF Routine	21,755	10,000	10,000
PRF Repairs and Maintenance	2,972	111,200	158,300
PRF Restoration	154,368	35,000	10,000
PRF Reservoir Destratification Service Plan	10,379	26,400	27,400
Meteorological Station Service	-	3,000	3,000
Weed Control	-	10,000	15,500
Wetlands Harvesting	-	108,000	108,000
Utilities - Reservoir Destratification	63,586	65,000	71,500
Contingency	-	-	65,000
	<u>253,060</u>	<u>368,600</u>	<u>468,700</u>
Reservoir Projects			
RDS Rehabilitation	13,262	14,700	48,000
Shoreline Stabilization			
RSS East Shade Shelter	76,989	99,000	658,000
Contingency	-	-	75,000
	<u>90,251</u>	<u>113,700</u>	<u>781,000</u>
Stream Reclamation Projects			
SR - CC Arapahoe (R 3-4)	170,000	300,000	300,000
SR - CC 12-Mile Park	352,452	18,862	-
SR - CC Dransfeldt Extension	170,000	570,000	-
SR - Dove Creek - Otero to Chambers	75,000	138,000	-
SR - Happy Canyon - Jordan to Broncos Pkwy	68,000	88,000	50,000
SR - McMurdo Gulch	170,129	-	869,000
SR - Piney Creek (Reach 1-2)	38,000	63,000	39,000
SR - Reservoir to LV Road	-	115,000	341,000
SR - Preservation Acquisition Lease	-	-	100,000
SR - CC Scott Road	275,000	-	-
SR - Happy Canyon - I-25 Upstream	250,000	-	-
SR - Lone Tree Creek	-	-	112,000
SR - Lone Tree Creek (downstream pond)	-	-	120,000
SR - Dove Creek - Pond D1 to Otero (Phase 2)	-	540,000	-
SR - Piney Creek (Reach 4-5)	-	-	75,000
Contingency	-	-	130,000
	<u>1,568,581</u>	<u>1,832,862</u>	<u>2,136,000</u>
Total expenditures	<u>2,351,559</u>	<u>2,683,262</u>	<u>3,835,832</u>
Total expenditures and transfers out requiring appropriation	<u>2,351,559</u>	<u>2,683,262</u>	<u>3,835,832</u>
ENDING FUND BALANCES	<u>\$ 2,226,105</u>	<u>\$ 1,908,106</u>	<u>\$ 1,051,075</u>
RESERVOIR DEST. SERV PLAN RESERVE	\$ 70,393	\$ 43,993	\$ 16,593
TOTAL RESERVE	<u>\$ 70,393</u>	<u>\$ 43,993</u>	<u>\$ 16,593</u>

No assurance provided. See summary of significant assumptions.

CHERRY CREEK BASIN WATER QUALITY AUTHORITY
ENTERPRISE FUND
2024 BUDGET
WITH 2022 ACTUAL AND 2023 ESTIMATED
For the Years Ended and Ending December 31,

1/12/24

	ACTUAL 2022	ESTIMATED 2023	BUDGET 2024
BEGINNING FUNDS AVAILABLE	\$ 1,900,212	\$ 1,922,970	\$ 1,979,605
REVENUES			
Recreation Fees	193,937	209,000	213,000
Building Permit Fees	268,283	230,000	234,000
Wastewater Fees	119,734	161,000	164,000
Interest income	21,285	62,500	64,000
Other revenue	2,855	-	3,000
Total revenues	<u>606,094</u>	<u>662,500</u>	<u>678,000</u>
Total funds available	<u>2,506,306</u>	<u>2,585,470</u>	<u>2,657,605</u>
EXPENDITURES			
General and administrative			
Management/Administration	-	21,000	45,000
Equipment	7,413	15,000	65,000
Contingency	6,916	-	15,000
Planning			
CCBQWA Planning	17,823	95,000	10,000
Tributary Planning	41,022	-	60,000
Reservoir to 12-Mile Park Study	55,366	32,365	5,000
Special Studies/Projects			
SSP Bow Tie	2,468	-	-
SSP BMP Effectiveness	12,365	45,000	35,000
SSP PRF/PAP WQ Benefits	-	-	5,000
SSP Reservoir Nutrient mitigation	-	-	50,000
SSP Emerging SCM	78,020	-	-
SSP Watershed Master Plan	-	-	50,000
Reservoir Model	-	-	50,000
RDS Distribution Analysis	-	-	150,000
Total expenditures	<u>221,393</u>	<u>208,365</u>	<u>540,000</u>
TRANSFERS OUT			
Transfers to Pollution Abatement Fund	<u>361,943</u>	<u>397,500</u>	<u>406,800</u>
Total expenditures and transfers out requiring appropriation	<u>583,336</u>	<u>605,865</u>	<u>946,800</u>
ENDING FUNDS AVAILABLE	<u>\$ 1,922,970</u>	<u>\$ 1,979,605</u>	<u>\$ 1,710,805</u>
FACILITIES MAINTENANCE RESERVE	\$ 100,000	\$ 100,000	\$ 100,000
CAPITAL RESERVE	750,000	750,000	750,000
TOTAL DESIGNATED RESERVE	<u>\$ 850,000</u>	<u>\$ 850,000</u>	<u>\$ 850,000</u>

No assurance provided. See summary of significant assumptions.

**CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2024 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 Statutes 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.

**CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2024 BUDGET
SUMMARY OF SIGNIFICANT ASSUMPTIONS**

Revenues - (continued)

Property Taxes (continued)

For property tax collection year 2024, SB22-238 and SB23B-001 set the assessment rates and actual value reductions as follows:

Category	Rate		Category	Rate	Actual Value Reduction	Amount
Single-Family Residential	6.70%		Agricultural Land	26.40%	Single-Family Residential	\$55,000
Multi-Family Residential	6.70%		Renewable Energy Land	26.40%	Multi-Family Residential	\$55,000
Commercial	27.90%		Vacant Land	27.90%	Commercial	\$30,000
Industrial	27.90%		Personal Property	27.90%	Industrial	\$30,000
Lodging	27.90%		State Assessed	27.90%	Lodging	\$30,000
			Oil & Gas Production	87.50%		

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.

**CHERRY CREEK BASIN WATER QUALITY AUTHORITY
2024 BUDGET
SUMMARY OF SIGNIFICANT ASSUMPTIONS**

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.

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 \$16,593 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.