CHERRY CREEK BASIN WATER QUALITY AUTHORITY

2022 CAPITAL IMPROVEMENT PROGRAM SUPPORTING DATA

TAC Draft – October 7, 2021
TAC Recommendation – November 4, 2021
Board Review Version – October 21, 2021
Board Final Version – November 18, 2021

2022 CAPITAL IMPROVEMENT PROGRAM

This document presents the details of the 2022 Capital Improvement Program as included in the Authority's Budget adopted by the Board and includes the following information:

Table 1 – Summary of Potential Pollutant Reduction Facilities, Revision for 2022 CIP.

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

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

The Cattail Harvesting Pilot Project included phosphorus reduction/removed from the system based on 2020 Cattail Harvesting Pilot Project Memo.

The Water Quality Pond update projects don't include an estimate of Phosphorus and are expected to optimize performance and facilitate maintenance which will likely have a water quality benefit. The cost share for these projects has been simplified to (25% CCBWQA, and 75% partner). The on-going maintenance of these PRFs outside of Cherry Creek State Park (CCSP) are still 100% partner funded.

Table 2 – Summary of Recommended Pollutant Reduction Facilities 2022 – 2031 Budget Projections

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

CCBWQA's funding on Cherry Creek Stream Reclamation at Dransfeldt Extension (CCB-5.17.1B) is at 13% (not the typical 25% partner project) as the project was

advanced from 2024 and 2025 to 2022 and 2023 to meet the schedule for the requesting entity.

CCBWQA's funding on Lone Tree Creek in CCSP (CCB-21.3) is at 25% (not the typical 100% for projects within CCSP) of the stream reclamation portion of the larger trail project. The trail portion advanced the stream reclamation portion ahead of its water quality priority, limiting the funds available for the project.

CCBWQA's funding on Happy Canyon Creek upstream of I-25 (CCB-22.2) is at 13% (not the typical 25% partner project) as the project was requested for funding in 2021 and 2022 and that was the available funds at the time of the request.

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

CCBWQA's funding on Piney Creek Reach Tower to Orchard (CCB-6.6) is at 24% (not the typical 25% partner project) as that was the funding level requested by the requesting entity.

Row 51 Watershed Priority Projects is a line item for funding projects identified through CCBWQA's watershed model or ongoing master planning efforts.

2022 Operations and Maintenance Budget Detail

These tables provide further 2022 budget detail for operations and maintenance activities proposed for the constructed PRF's including the Reservoir Mixing System (i.e.: compressor and aeration system maintenance).

2022 Stream Reclamation Unit Costs

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

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TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2020 CIP

Date: October 29, 2020

Color Code: Blue: Project Completed

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

Red: See 2021 CIP Notes for changes to this Spreadsheet

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)		(9)		(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
CCR-1	Reservoir Destratification (mixing)	Officially start-up April 2008	Use inlake mixing to minimize algae blooms, therefore chlorophyll a	369	sq mi	n/a	n/a	n/a		n/a		n/a		810	lbs/season	$ 968				28	$ 80	100%	$968	$ 99	$ 99	
CCB-1	CCSP Wetlands	Prelim design prepared in 2003 (Ref 1, 8)	Restore 60 Acres of wetlands in multiple phases	369	sq mi	3.5 cfs avg daily flow	1415 af/210 days	0.35	mg/l	1050	lbs/yr	Base flow		600	lbs/season	$ 1,928	$ -	$ -	$ -	19	$ 123	100%	$1,928	$ 204	$ 204	18
CCB-5.1	Cherry Creek Sediment Pond at Arapahoe Road (see CCB-5.14)	Project eliminated and area combined into Phase III of CCB-5.14	Design and construct sediment pond	369	sq mi		3600 cy sed/yr	14.6	mg/l	92	lbs/yr	base flow		85	lbs/year	$ 2,355	$ 50	$ -	$ -	$ 90	$ 219	18%	$424	$ 2,575	$ 463	1, 19
CCB-5.2	Arapahoe/Douglas County Line Stream Stabilization	Project completed w/o Authority participation	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 1,062	$ -	$ -	$ -	1	$ 58	0%	$0	$ 1,258	$ -	
CCB-5.3	Cottonwood Bridge Stream Stabilization	Project completed by Parker w/o Authority participation	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 436	$ -	$ -	$ -	2	$ 25	0%	$0	$ 551	$ -	
CCB-5.4	Cherry Creek Stream Stabilization at Main Street (Parker)	Conceptual design by UDFCD	Local stream stabilization (L = 4000 ft)	0.76	mi			100	lbs/mi	76	lbs/yr	Storm Flow	90%	68	lbs/year	$ 1,776	$ -	$ -	$ -	1	$ 96	11%	$200	$ 1,410	$ 159	2, 3
CCB-5.5	Stroh Road Stream Stabilization	Project completed by Parker w/o Authority participation	Stream stabilization (L = 5000 ft)	0.95	mi			100	lbs/mi	95	lbs/yr	Storm Flow	90%	85	lbs/year	$ 218	$ -	$ -	$ -	1	$ 13	0%	$0	$ 149	$ -	
CCB-5.6	Cherry Creek Stream Stabilization at Lincoln Avenue (Parker)	Conceptual design by UDFCD	Local stream stabilization (L = 2350 ft)	0.45	mi			100	lbs/mi	45	lbs/yr	Storm Flow	90%	40	lbs/year	$ 1,447	$ -	$ -	$ -	1	$ 79	21%	$304	$ 1,960	$ 412	2, 3
CCB-5.7	Cherry Creek Stream Stabilization at Eco-Park (SEMSWA)	IGA w/SEMSWA for design in 2010 and construction in 2011/2012	Local stream stabilization (L = 6850 ft)	1.30	mi			100	lbs/mi	130	lbs/yr	Storm Flow	90%	117	lbs/year	$ 4,756	$ -	$ -	$ -	$ 1	$ 256	24%	$1,155	$ 2,191	$ 532	2, 3
CCB-5.8	Cherry Creek Stream Reclamation U/S Arapahoe Rd (Aurora) (see CCB-5.14)	Now Phase 5 of CCB-5.14	Local stream stabilization (L = 2200 ft)	0.42	mi			100	lbs/mi	42	lbs/yr	Storm Flow	90%	38	lbs/year	$ -	$ -	$ -	$ -	1	$ 1	35%	$0	$ 27	$ 9	2, 3
CCB-5.9.1	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase I	Design completed in 2011 for Phase I.	Local stream stabilization (L = 500 ft)	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/year	$ 296	$ -	$ -	$ -	$ 1	$ 17	100%	$296	$ 1,979	$ 1,979	2, 20
CCB-5.9.2	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase II	Design completed in 2013 for Phase II.	Local stream stabilization (L = 2500 ft)	0.47	mi			100	lbs/mi	47	lbs/yr	Storm Flow	90%	43	lbs/year	$ 1,429	$ -	$ -	$ -	$ 1	$ 78	100%	$1,429	$ 1,820	$ 1,820	2, 20
CCB-5.10	Cherry Creek Stream Stabilization at PJCOS (Vermillion Creek, PJMD.)	Design completed by PJMD. Authority is funding partner in design	Local stream stabilization (L = 5100 ft)	0.97	mi			100	lbs/mi	97	lbs/yr	Storm Flow	90%	87	lbs/year	$ 3,017	$ -	$ -	$ -	$ 2	$ 164	21%	$643	$ 1,882	$ 401	2, 3
CCB-5.11	Cherry Creek Stream Stabilization at Norton Farms (Parker)	Conceptual design by UDFCD identified priority 3	Local stream stabilization (L = 2200 ft)	0.42	mi			100	lbs/mi	42	lbs/yr	Storm Flow	90%	38	lbs/year	$ 900	$ -	$ -	$ -	1	$ 49	28%	$252	$ 1,313	$ 368	2, 3
CCB-5.12	Cherry Creek Stream Stabilization at Pine Lane	Project completed by Parker w/o Authority participation	Local stream stabilization (L = 1500 ft)	0.28	mi			100	lbs/mi	28	lbs/yr	Storm Flow	90%	26	lbs/year	$ 500	$ -	$ -	$ -	1	$ 28		$0	$ 1,087	$ -	
CCB-5.13	Cherry Creek Stream Stabilization at Shop Creek Trail	Preliminary design completed in 2010 (Ref 12).	Local Stream Stabilization (L = 2000 ft)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 603	$ -	$ -	$ -	6	$ 38	100%	$603	$ 1,125	$ 1,125	2, 3
CCB-5.14	Cherry Creek Stream Reclamation - CCSP to Eco Park (Ph II to V)	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 11000 ft)	2.08	mi			100	lbs/mi	208	lbs/yr	Storm Flow	90%	188	lbs/year	$ 10,200	$ -	$ -	$ -	$ 1	$ 547	25%	$2,499	$ 2,920	$ 715	2, 3
CCB-5.14A	Cherry Creek Stream Reclamation - Eco Park to Soccer Fields	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 2700 ft)	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 1,850	$ -	$ -	$ -	$ 1	$ 100	35%	$650	$ 2,181	$ 766	2, 3
CCB-5.14B	Cherry Creek Stream Reclamation - Valley Country Club	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 2000 ft.=1400 ft on Cherry Creek and 600 ft. on Tributary)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 2,284	$ -	$ -	$ -	$ 1	$ 123	21%	$484	$ 3,607	$ 764	2, 3
CCB-5.14C	Cherry Creek Stream Reclamation - Valley Country Club to Soccer Fields (Portion of CCB-5.14)	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 5167 ft on Cherry Creek)	0.98	mi			100	lbs/mi	98	lbs/yr	Storm Flow	90%	88	lbs/year	$ 8,267	$ -	$ -	$ -	$ 1	$ 444	25%	$2,067	$ 5,033	$ 1,258	2, 3
CCB-5.15	Cherry Creek Stream Reclamation at Country Meadows (Hess Rd)	Project by Town of Parker and Douglas County	Local stream stabilization (L = 7700 ft)	1.46	mi			100	lbs/mi	146	lbs/yr	Storm Flow	90%	131	lbs/year	$ 2,170	$ -	$ -	$ -	$ 2	$ 118	24%	$520	$ 901	$ 216	
CCB-5.16	Cherry Creek Stream Reclamation - 12 Mile Phase III	Project w/in CCSP identified as Reach 1 in Project CCB-5.14 work.	Local stream stabilization (L =720 ft,)	0.14	mi			100	lbs/mi	14	lbs/yr	Storm Flow	90%	12	lbs/year	$ 490	$ -	$ -	$ -	5	$ 31	100%	$490	$ 2,538	$ 2,538	2, 20
CCB-5.16A	Cherry Creek Stream Reclamation - 12 Mile Phase IIIA	Project w/in CCSP identified as Reach 1 in Project CCB-5.14 work.	Local stream stabilization (L =270 ft,)	0.05	mi			100	lbs/mi	5.1	lbs/yr	Storm Flow	90%	5	lbs/year	$ 242	$ -	$ -	$ -	2	$ 15	100%	$242	$ 3,343	$ 3,343	2, 20

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Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-5.17.1A	Cherry Creek Stream Reclamation at KOA	Preliminary design completed 2019, Extension Requested by UDFCD and Parker in 2019	Local stream stabilization (L =1400 ft original, L=2000 ft with 600 ft extension)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 2,035	$ -	$ -	$ -	20	$ 129	20%	$375	$ 3,795	$ 776	2, 3
CCB-5.17.1B	Cherry Creek Stream Reclamation at Dransfeldt	Design in 2021, Construction in 2023	Local stream stabilization (L =2400 ft original)	0.45	mi			100	lbs/mi	45	lbs/yr	Storm Flow	90%	41	lbs/year	$ 3,048	$ -	$ -	$ -	30	$ 194	13%	$400	$ 4,737	$ 622	2, 3
CCB-5.17.2	Cherry Creek Stream Reclamation U/S Scott Road	Project requested by Douglas County and UDFCD in 2019	Local stream stabilization (L = 4100 ft)	0.78	mi			100	lbs/mi	78	lbs/yr	Storm Flow	90%	70	lbs/year	$ 2,500	$ -	$ -	$ -	25	$ 159	25%	$625	$ 2,274	$ 569	2, 3
CCB-6.1	Piney Creek Stream Stabilization - Project 1	Authority funded $118,000 Arapahoe County in 2002.	Restore 5200 lf upstream of Parker Road	22.90	sq mi	n/a	n/a	100	lbs/mi	100	lbs/yr	Storm Flow	90%	90	lbs/year	$ 997	$ -	$ -	$ -	$ 10	$ 64	13%	$130	$ 709	$ 92	2, 3
CCB-6.2	Piney Creek Stream Stabilization - Project 2 U/S Buckley Rd	Project completed w/o Authority participation	Reclaim 1700 lf upstream of Buckley Road	0.32	mi			100	lbs/mi	32	lbs/mi	Storm Flow	90%	29	lbs/year	$ 998	$ -	$ -	$ -	1	$ 54	12%	$120	$ 1,880	$ 226	2, 3
CCB-6.3	Piney Creek Stream Sediment Removal - Saddle Rock Golf Course	Request from Aurora in 2011	Sediment removal to restore channel capacity (L = unk)					unk		unk	unk	Sediment	100%	5346	unk	$ 383	$ -	$ -	$ -	$ 10	$ 30	25%	$96	$ 6	$ 1	
CCB-6.4	Piney Creek Stream Reclamation - Reachs 6 & 7	Request from UDFCD in 2014	Local stream stabilization (L = 6,000 ft)	1.14	mi			unk		365	lbs/yr	Storm Flow	90%	329	lbs/year	$ 11,000	$ -	$ -	$ -	$ 2	$ 591	25%	$2,750	$ 1,800	$ 450	12
CCB-6.5	Piney Creek Reach 1 to 2 (SEMSWA)	Requested in 2020	2900 lf of stream reclamation	0.55	mi			100	lbs/mi	55	lbs/mi	Storm Flow	90%	49	lbs/year	$ 2,350	$ -	$ -	$ -	$ 2	$ 128	22%	$515	$ 2,588	$ 567	2, 3
CCB-6.6	Piney Creek Tower to Orchard (SEMSWA)	Requested in 2020	3800 lf of stream reclamation	0.72	mi			100	lbs/mi	72	lbs/mi	Storm Flow	90%	65	lbs/year	$ 3,000	$ -	$ -	$ -	$ 2	$ 163	23%	$700	$ 2,512	$ 586	2, 3
CCB-7.1	McMurdo Gulch Reclamation (Castle Rock)	Project completed in 2011	Stream Reclamation (L = 15,000 lf)	2.84	mi			100	lbs/mi	284	lbs/yr	Storm Flow	90%	256	lbs/year	$ 1,470	$ -	$ -	$ -	28	$ 107	43%	$630	$ 419	$ 180	
CCB-7.2	McMurdo Gulch Reclamation (Castle Rock) 19/20 Project	Design in 2019, Construction in 2020	Stream Reclamation (L = 2,000 lf)	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 1,677	$ -	$ -	$ -	17	$ 107	25%	$420	$ 3,127	$ 783	2, 3
CCB-7.3	McMurdo Gulch Reclamation (Castle Rock) 20/21/22 Project	Design in 2020, Construction 2021	Stream Reclamation (L = 3,700 lf)	0.70	mi			100	lbs/mi	70	lbs/yr	Storm Flow	90%	63	lbs/year	$ 2,460	$ -	$ -	$ -	25	$ 156	25%	$615	$ 2,480	$ 620	2, 3
CCB-7.4	McMurdo Gulch Reclamation (Castle Rock) 22/23/24 Project	Design in 2022, Construction 2023 and 2024	Stream Reclamation (L = 6,550 lf)	1.24	mi			100	lbs/mi	124	lbs/yr	Storm Flow	90%	112	lbs/year	$ 3,298	$ -	$ -	$ -	33	$ 210	25%	$825	$ 1,878	$ 470	2, 3
CCB-8	Limestone Filter Enhancement	Specific project not identified	Construct limestone filter bed downstream of retention pond	1.0	sq mi	n/a	10.7 af/year/sq mile	427	lbs/sq mi	427	lbs/yr	Base and storm flow	20%	85	lbs/year/mi^2	$ 943		$ -	$ 595	$ 1	$ 83	43%	$405	$ 977	$ 420	
CCB-11	Advanced Water Treatment Plant	Conceptual design prepared	Construct 2 MGD AWT plant on Cottonwood Creek to treat Cherry Creek and Cottonwood Creek flows (0.21-mg/ influent, 0.03 mg/l disch)	3	cfs	2-MGD	2260	0.21	mg/l	1272	lbs/yr	Base flow and groundwater	90%	1145	lbs/year	$ 4,593	unknown	unknown		$ 69		100%	$4,593	$ -	$ -	11
CCB-12	Bowtie Property PRF	Purchase completed 2003	Stabilize confluence (Ph I) and construct sediment pond (Ph 2)	22	sq mi	2-year flood	300 af	500	mg/l/to n	85	lbs/yr	base flow and minor flood	70% pond 65% wetlands	235	lbs/year	$ 826	$ 300	$ 63	$ 1.8	$ 6	$ 70	100%	$826	$ 299	$ 299	
CCB-12.1	Bowtie Phase I	No action to date	Constructed Wetlands u/s Bowtie Property in Cherry Creek (0.20-disch)	369	sq mi	0.5 cfs avg daily flow	210 af/210 days	0.35	mg/l	86	lbs/yr	Base flow	assumed effluent conc	86	lbs/season	$ 235	$ 200	$ 80	$ -	$ 7	$ 35	100%	$235	$ 404	$ 404	
CCB-13.1	Cottonwood\Peoria Wetlands Pond	Completed 2003. Restorative maintenance required in 2009	Joint funded project with UDFCD, GWV, Arapahoe County	8.30	sq mi							base and flood flows	measured	363	lbs/year	$ 1,636	$ -	$ -	$ -	$ 5	$ 93	12%	$196	$ 255	$ 31	2
CCB-13.2	Cottonwood Stream Reclamation in CCSP	Phase I completed in 2004. Phase II completed June 2008 (Ref 2)	11,600 lf of stream reclamation from Peoria to Perimeter Rd. Pond	2.20	mi			100	lbs/mi	220	lbs/yr	base and flood flows	see separate calcs	730	lbs/year	$ 2,200	$ -	$ -	$ -	$ 55	$ 173	100%	$2,200	$ 237	$ 237	2
CCB-13.3	Cottonwood Creek Stream Stabilization at Easter Avenue	Authority contributed $338,000 for construction in 2010.	2,600 lf of stream reclamation from Easter Ave to Briarwood Ave	0.49	mi			100	lbs/mi	49	lbs/yr	Storm Flow	90%	44	lbs/year	$ 1,350	$ -	$ -	$ -	$ 1	$ 73	25%	$338	$ 1,655	$ 414	2
CCB-13.3.1A	Cottonwood Creek Catail Harvesting from Reservoir to Peoria Street~	Pilot Project - Odd Years Harvest Left Bank	1.7 Acres of Cattail Harvesting	2.90	mi				lbs/mi	30	lbs/yr	Storm Flow	100%	59	lbs/year	$ 60						100%	$60	$ 1,017	$ 1,017	4
CCB-13.3.1B	Cottonwood Creek Cattail Harvesting from Reservoir to Peoria Street~	Pilot Project - Even Years Harvest Right Bank	2.0 Acres of Cattail Harvesting	2.90	mi				lbs/mi	237	lbs/yr	Storm Flow	100%	60	lbs/year	$ 60						100%	$60	$ 1,000	$ 1,000	4
CCB-13.4	Peoria Trib B/Airport East and West Pond (Outfall C-1)	Cottonwood Creek Master Planned Improvements. Ponds combined into one.	Combined existing detention ponds and provided EURV	0.35	sq mi			400	lbs/sq mi	140	lbs/yr	Base and storm flow	40%	56	lbs/yr	$ 523	$ -	$ -	$ -	$ -	$ 28	25%	$131	$ 500	$ 125	

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			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-13.5.1	Cottonwood Creek at Briarwood (SEMSWA)	Requested in 2019	700 lf of stream reclamation	0.13	mi			100	lbs/mi	13	lbs/yr	Storm Flow	90%	12	lbs/year	$ 850	$ -	$ -	$ -	9	$ 54	16%	$140	$ 4,529	$ 746	
CCB-13.5.2	Cottonwood Creek D/S Easter Avenue	Requested in 2019	800 lf of stream reclamation	0.15	mi			100	lbs/mi	15	lbs/yr	Storm Flow	90%	14	lbs/year	$ 800	$ -	$ -	$ -	8	$ 51	20%	$160	$ 3,730	$ 746	
CCB-13.5.3	Cottonwood Creek Tributary - Shooting Area Tributary (CCSP)	Requested in 2020	600 lf of stream reclamation	0.11	mi			100	lbs/mi	11	lbs/yr	Storm Flow	90%	10	lbs/year	$ 300	$ -	$ -	$ -	3	$ 19	25%	$75	$ 1,865	$ 466	2, 3
CCB-13.5.4	Cottonwood Creek and Tributary C (IWSD)	Requested in 2020	2080 lf of stream reclamation	0.39	mi			100	lbs/mi	39	lbs/yr	Storm Flow	90%	35	lbs/year	$ 1,664	$ -	$ -	$ -	17	$ 106	25%	$416	$ 2,984	$ 746	2, 3
CCB-13.5.5	Windmill Creek Pond W-9 Retrofit (SEMSWA)				sq mi		3600 cy sed/yr		mg/l		lbs/yr	base flow			lbs/year	$ 150	$ 50	$ -	$ -	$ 90	$ 101	25%	$38	#DIV/0!	#DIV/0!	5
CCB-14	Belleview Wetlands	Co-funding opportunity with USACE on indefinite hold	Retrofit existing develop. w/wet detention pond	235	Ac SF Resid			400	lbs/sq mi	145	lbs/yr	Base and storm flow	50%	73	lbs/year	$ 210	$ -	$ -	$ -	$ 2	$ 13	100%	$210	$ 183	$ 183	2
CCB-15	Surface Water Reuse at Cherry Creek Vista	Supplemental water not available. Project on indefinite hold.	Use water from Cottonwood Creek to irrigate 10-acres			2.92 af/ac-yr	29.2 af/yr	0.20	mg/l	15.9	lbs/yr	base flow	80%	13	lbs/year	$ 50	$ -	$ -	$ -	$ -	$ 3	100%	$50	$ 211	$ 211	
CCB-16	Stream Corridor Preservation	No projects identified	Partner with others to purchase property or conservation easements along Cherry Creek													$ 100					$ 5	100%	$100			1
CCB-17.2	Reservoir Shoreline Stabilization Mountain Loop Trail	Scheduled for construction beginning in 2012	CCSP Recreation sites: Mountain, Lake and Cottonwood Creek Loops											54	lbs/yr	$ 1,131	$ -	$ -	$ -	$ 5	$ 66	100%	$1,131	$ 1,215	$ 1,215	1, 16
CCB-17.2.1	Mountain and Lake Loop - 2021 Shoreline Maintenance	Identified during 2020 annual PRF observation	45 lf of bank stabilization	45	lf	0.1 cy/yr/ft		0.14	lbs/lf	6.3	lbs/yr	bank erosion	80%	5.04	lbs/yr	$ 24	$ -	$ -	$ -	$ 2	$ 3	100%	$24	$ 652	$ 652	1, 16
CCB-17.3	West Boat Ramp Parking Lot WQ Improvements	Final design completed in 2012	Provide water quality treatment of parking lot runoff.	3.43	ac prkg lot					3	lbs/yr	parking lot	70%	2.1	lbs/yr	$ 330	$ -	$ -	$ -	$ 1	$ 19	100%	$330	$ 8,903	$ 8,903	1
CCB-17.4	East Boat Ramp Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	100 lf of bank stabilization	100	lf	0.1 cy/yr/ft		0.14	lbs/lf	14.0	lbs/yr	bank erosion	80%	11.2	lbs/yr	$ 120	$ -	$ -	$ -	$ 2	$ 8	100%	$120	$ 753	$ 753	1, 16
CCB-17.4.1	East Boat Ramp Shoreline Stabilization Phase III	Identified during 2012 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 350	$ -	$ -	$ -	$ 2	$ 21	100%	$350	$ 463	$ 463	1, 16
CCB-17.5	East Shade Shelter Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	20 lf of bank stabilization	20	lf	0.1 cy/yr/ft		0.14	lbs/lf	2.8	lbs/yr	bank erosion	80%	2.2	lbs/yr	$ 18	$ -	$ -	$ -	$ -	$ 1	100%	$18	$ 431	$ 431	1, 16
CCB-17.5.1	East Shade Shelter Shoreline Stabilization Phase III	Identified during 2014 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 400	$ -	$ -	$ -	$ -	$ 21	100%	$400	$ 478	$ 478	1, 16
CCB-17.6	West Shade Shelter Shoreline Stabilization PRF[14]	Identified initially in 2006. UCD Student Project w/WPR in 2013	1,400 lf of bank stabilization	1400	lf	0.1 cy/yr/ft		0.14	lbs/lf	196.0	lbs/yr	bank erosion	80%	179	lbs/yr	$ 704	$ -	$ -	$ -	$ 1,000	$ 51	65%	$458	$ 285	$ 185	21
CCB-17.7	Tower Loop Shoreline Stabilization Phase II	Identified during 2014 annual PRF inspection	700 lf of bank stabilization	700	lf	0.1 cy/yr/ft		0.14	lbs/lf	98.0	lbs/yr	bank erosion	80%	78.4	lbs/yr	$ 900	$ -	$ -	$ -	$ -	$ 48	100%	$900	$ 615	$ 615	1, 16
CCB-17.8	Dixon Grove Shoreline Stabilization Phase II	Identified during 2019 annual PRF inspection	200 lf of bank stabilization	200	lf	0.1 cy/yr/ft		0.14	lbs/lf	28.0	lbs/yr	bank erosion	80%	22.4	lbs/yr	$ 235	$ -	$ -	$ -	$ -	$ 13	100%	$235	$ 562	$ 562	1, 16
CCB-18	OWTS Sewer Service	No action to date	Provide Sewer Service for OWTS Areas			To Be Determined		To Be Determined					To Be Determined				To Be Determined					100%		To Be Determined		1
CCB-19	Non-point Pollutant Management	No action to date	Assist agricultural contributors to water quality impact			To Be Determined		To Be Determined					To Be Determined			$ 100	$ -	$ -	$ -	$ -	$ 5	100%	$100	To Be Determined		1
CCB-20.1	Detention Pond Retrofit Program - McMurdo Gulch	Phase 1 - McMurdo Gulch	Modify existing ponds to meet current standards for WQ	1	Each			0.40	lbs/Trib Acre	0.4	lbs/yr	Residential		9	lbs/pond/yr	$ 60	$ -	$ -	$ -	$ 0	$ 4	100%	$60	$ 396	$ 396	1, 17
CCB-21.1	Lone Tree Creek in CCSP (CCBWQA Only)	Identified in 2014. Request from Arapahoe County Open Space.	500 lf of stream reclamation from CCSP Boundary to Cottonwood Creek	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/yr	$ 340	$ -	$ -	$ -	$ 2	$ 20	100%	$340	$ 2,372.03	$ 2,372	2, 3
CCB-21.2	Lone Tree Creek Pond L-3 Retrofit (SEMSWA)				sq mi		3600 cy sed/yr		mg/l		lbs/yr	base flow			lbs/year	$ 2,355	$ 50	$ -	$ -	$ 90	$ 219	#DIV/0!	$18	#DIV/0!	#DIV/0!	5
CCB-21.3	Lone Tree Creek in CCSP (Centennial Trail Portion)	Request from Centennial for Participation in Stream Reclamaation portion of Trail Project.	570 lf of stream reclamation between CCSP Boundary and Windmill Creek Loop Trail	0.11	mi			100	lbs/mi	11	lbs/yr	Storm Flow	90%	10	lbs/yr	$ 380	$ -	$ -	$ -	$ 2	$ 22	25%	$95	$ 2,301.30	$ 575	2, 3
CCB-22	Happy Canyon Creek	MDP Priority Project	6,600 lf of stream reclamation upstream of I-25	1.25	mi			100	lbs/mi	125	lbs/yr	Storm Flow	90%	113	lbs/yr	$ 7,702	$ -	$ -	$ -	$ 2	$ 415	25%	$1,926	$ 3,685.78	$ 921	2, 3

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES

REVISIONS FOR 2020 CIP

Date: October 29, 2020

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

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads					Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate		Total		Source	Removal	lbs Removed		Capital	Land Acquisition	Water Augment[8]	Capital Replace[9]	O&M	Annual Cost @ 4%	CCBWQA Share (%)	CCBWQA Share ($)	w/o cost sharing	w/cost sharing	
CCB-22.1	Happy Canyon Creek Jordan Road to Broncos Parkway (SEMSWA)	Requested in 2020	2,500 lf of stream reclamation	0.47	mi			100	lbs/mi	47	lbs/yr	Storm Flow	90%	43	lbs/year	$ 1,520	$ -	$ -	$ -	15	$ 97	25%	$380	$ 2,268	$ 567	2, 3
CCB-22..2	Happy Canyon Creek Upstream of I-25 (MHFD)	Requested in 2020	3000 lf of stream reclamation	0.57	mi			100	lbs/mi	57	lbs/yr	Storm Flow	90%	51	lbs/year	$ 3,943	$ -	$ -	$ -	39	$ 251	13%	$500	$ 4,902	$ 621	2, 3
CCB-23.1	Dove Creek U/S Pond D-1 to Chambers Rd (SEMSWA)	Requested in 2020	1300 lf of stream reclamation	0.25	mi			100	lbs/mi	25	lbs/yr	Storm Flow	90%	22	lbs/year	$ 650	$ -	$ -	$ -	7	$ 41	25%	$163	$ 1,865	$ 466	2, 3
CCB-23.2	Dove Creek Otero to Chambers Rd. (SEMSWA)	Requested in 2020	1400 lf of stream reclamation	0.27	mi			100	lbs/mi	27	lbs/yr	Storm Flow	90%	24	lbs/year	$ 700	$ -	$ -	$ -	7	$ 45	25%	$175	$ 1,865	$ 466	2, 3

BASIS FOR ANALYSIS:

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

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

2021 CIP NOTES:

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

REFERENCES

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

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES

2022 - 2031 BUDGET PROJECTIONS (1000$)

		November 11, 2021	Current Project Budget					Prior Year Obligated Funds[3]	Residual PRF Costs	Proposed 2022 Budget				Proposed 2023 Budget				Proposed 2024 Budget				Proposed 2025 Budget				Proposed 2026 Budget	Proposed 2027 Budget	Proposed 2028 Budget	Proposed 2029 Budget	Proposed 2030 Budget	Proposed 2031 Budget	2022-2031 Total
	Project No.	Project Title	Capital[1]	Total	O&M	Authority Portion	Authority Portion			Design	Capital	Land	Total	Design	Capital	Water	Total	Design	Capital	Land	Total	Design	Capital	Land	Total	Total	Total	Total	Total	Total	Total	Total
	Budget Category - General																															
	Budget Category - Reservoir Projects																															
21	CCR-2	Reservoir Destratification System - Distribution Preliminary Design - Includes evaluation of Optimization of Distribution with WWE Expansion Alternative	$ 2,140	$ 2,140		$ 2,140	100%	$ -	***$ 2,140***	$ 270	$ -	$ -	***$ 270***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 935***	***$ 935***	***$ 2,140***
22	CCR-3	Reservoir Nutrient Mitigation Alternatives Study	$ 150	$ 150		$ 150	100%	$ -	***$ 150***	$ 150	$ -	$ -	***$ 150***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 150***
23	CCB-17.5	East Shade Shelter Shoreline Stabilization Phase III	$ 400	$ 400		$ 400	100%	$ 51	***$ 349***	$ -	$ 349	$ -	***$ 349***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 349***
24	CCB-17.6	West Shade Shelter Shoreline Stabilization PRF	$ 704	$ 704		$ 704	100%	$ 154	***$ 550***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ 550***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 550***
25	CCB-17.7	Tower Loop Shoreline Stabilization Phase II	$ 900	$ 900		$ 900	100%	$ 90	***$ 810***	$ -	$ 810	$ -	***$ 810***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 810***
26	**Budget Category - Stream Reclamation Projects**																															
27	CCB-5.4	Cherry Creek Stream Reclamation at Main Street (Parker)	$ 1,776	$ 1,776		$ 200	11%	$ -	***$ 200***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ 200***	***$ -***	***$ -***	***$ -***	***$ 200***
28	CCB-5.6	Cherry Creek Stream Stabilization at Lincoln Avenue (Parker)	$ 1,447	$ 1,447		$ 304	21%	$ -	***$ 304***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ 304***	***$ -***	***$ -***	***$ 304***
32	CCB-5.14	Cherry Creek Stream Reclamation - Reach 3	$ 2,567	$ 2,567		$ 640	25%	$ -	***$ 640***	$ -	$ -	$ -	***$ -***	$ 130	$ -	$ -	***$ 130***	$ -	$ 510	$ -	***$ 510***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 640***
33	CCB-5.14	Cherry Creek Stream Reclamation - Reach 4	$ 2,720	$ 2,720		$ 680	25%	$ 25	***$ 655***	$ 180	$ -	$ -	***$ 180***	$ -	$ 475	$ -	***$ 475***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 655***
34	CCB-5.16	Cherry Creek Stream Reclamation - CCSP 12-mile Phase III	$ 490	$ 490		$ 490	100%	$ -	***$ 490***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ 490	$ -	***$ 490***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 490***
35	CCB-5.16A	Cherry Creek Stream Reclamation - CCSP 12-mile Phase III (Phase 3A Construction for $388k in 2022)	$ 550	$ 550		$ 550	100%	$ 162	***$ 388***	$ -	$ 388	$ -	***$ 388***		$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 388***
36	CCB-5.17	Cherry Creek Stream Reclamation - U/S Scott Road (Douglas County)	$ 2,500	$ 2,500		$ 625	25%	$ 350	***$ 275***	$ -	$ 275	$ -	***$ 275***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 275***
38	CCB-5.17.1B	Cherry Creek Stream Reclamation - at Dranfeldt Extension (Parker)	$ 3,048	$ 3,048		$ 400	13%	$ 60	***$ 340***	$ -	$ 170	$ -	***$ 170***	$ -	$ 170	$ -	***$ 170***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 340***
40	CCB-7.4	McMurdo Gulch Reclamation (Castle Rock)	$ 4,308	$ 4,308		$ 1,078	25%	$ -	***$ 1,078***	$ 171	$ -	$ -	***$ 171***	$ -	$ 907	$ -	***$ 907***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 1,078***
41	CCB-13.5.3	Cottonwood Creek Tributary - Shooting Area Tributary (CCSP)	$ 300	$ 300		$ 75	25%	$ -	***$ 75***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ 75***
42	CCB-13.5.4	Cottonwood Creek and Tributary C (IWSD)	$ 1,664	$ 1,664		$ 416	25%	$ -	***$ 416***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 416***	***$ -***	***$ 416***
43	CCB-21.1	Lone Tree Creek in CCSP (CCBWQA Only)	$ 340	$ 340		$ 340	100%	$ -	***$ 340***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 340***	***$ 340***
44	CCB-21.3	Lone Tree Creek in CCSP (Centennial Trail Portion)	$ 380	$ 380		$ 95	25%	$ -	***$ 95***	$ -	$ 95	$ -	***$ 95***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 95***
45	CCB-22.1	Happy Canyon Creek County Line to Cherry Creek (SEMSWA)	$ 1,520	$ 1,520		$ 381	25%	$ 25	***$ 356***	$ 68	$ -	$ -	***$ 68***	$ -	$ 88	$ -	***$ 88***	$ -	$ 50	$ -	***$ 50***	$ -	$ 75	$ -	***$ 75***	***$ 75***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 356***
46	CCB-22..2	Happy Canyon Creek Upstream of I-25 (MHFD)	$ 3,943	$ 3,943		$ 500	13%	$ 250	***$ 250***	$ -	$ 250	$ -	***$ 250***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 250***
47	CCB-23.1	Dove Creek U/S Pond D-1 to Chambers Rd (SEMSWA)	$ 650	$ 650		$ 163	25%	$ -	***$ 163***	$ 25	$ -	$ -	***$ 25***	$ -	$ 63	$ -	***$ 63***	$ -	$ 75	$ -	***$ 75***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 163***
48	CCB-23.2	Dove Creek Otero to Chambers Rd. (SEMSWA)	$ 700	$ 700		$ 175	25%	$ 25	***$ 150***	$ -	$ 75	$ -	***$ 75***	$ -	$ 75	$ -	***$ 75***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 150***
49	CCB-6.5	Piney Creek Reach 1 to 2 (SEMSWA)	$ 2,350	$ 2,350		$ 515	22%	$ -	***$ 515***	$ 38	$ -	$ -	***$ 38***	$ 63	$ -	$ -	***$ 63***	$ 39	$ -	$ -	***$ 39***	$ -	$ 25	$ -	***$ 25***	***$ 75***	***$ 150***	***$ 125***	***$ -***	***$ -***	***$ -***	***$ 515***
50	CCB-6.6	Piney Creek Tower to Orchard (SEMSWA)	$ 3,000	$ 3,000		$ 710	24%	$ -	***$ 710***	$ -	$ -	$ -	***$ -***	$ -	$ -	$ -	***$ -***	$ -	$ 75	$ -	***$ 75***	$ -	$ 150	$ -	***$ 150***	***$ 235***	***$ 250***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 710***
51		Watershed Priority Projects - Cherry and Piney Creek near CCSP					#DIV/0!	$ -	***$ -***	$ 250	$ -	$ -	***$ 250***	$ -	$ -	$ -	***$ -***	$ -	$ 450	$ -	***$ 450***	$ -	$ 1,500	$ -	***$ 1,500***	***$ 1,100***	***$ 1,900***	***$ 1,900***	***$ 2,000***	***$ 920***	***$ 960***	***$ 10,980***
52	**Budget Category - PRF Water Quality/Wetland Ponds**																															
53	**Budget Category - PRF Preservation, Acquisition, Lease**																															
54	CCB-16	PRF Preservation, Acquisition, Lease of Land or Water	$ 500	$ 500		$ -	0%	$ -	***$ 500***	$ -	$ -	$ 50	***$ 50***		$ 50	$ -	***$ 50***	$ -	$ 50	$ -	***$ 50***	$ -	$ 50	$ -	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 50***	***$ 500***
55		***SUB-TOTALS***							***$ 11,939***				***$ 3,614***				***$ 2,021***				***$ 1,249***				***$ 2,290***	***$ 2,085***	***$ 2,350***	***$ 2,350***	***$ 2,354***	***$ 2,321***	***$ 2,285***	***$ 18,920***

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES

2022 - 2031 BUDGET PROJECTIONS (1000$)

	November 11, 2021		Current Project Budget					Prior Year Obligated Funds[3]	Residual PRF Costs	Proposed 2022 Budget				Proposed 2023 Budget				Proposed 2024 Budget				Proposed 2025 Budget				Proposed 2026 Budget	Proposed 2027 Budget	Proposed 2028 Budget	Proposed 2029 Budget	Proposed 2030 Budget	Proposed 2031 Budget	2022-2031 Total
Project No.	Project Title	Capital[1]	Total	O&M	Authority Portion	Authority Portion			Design	Capital	Land	Total	Design	Capital	Water	Total	Design	Capital	Land	Total	Design	Capital	Land	Total	Total	Total	Total	Total	Total	Total	Total
	OPERATIONS AND MAINTENANCE																														
	Routine Category																														$ -
OM-7	Reservoir Destratification	$ 270	$ 270		$ 270	100%				$ 27		$ 27		$ 27		$ 27				$ 27				$ 27	$ 27	$ 27	$ 27	$ 27	$ 27	$ 27	$ 270
OM-14.1	PRF Weed Control	$ 80	$ 80		$ 80	100%				$ 8		$ 8		$ 8		$ 8				$ 8				$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 80
OM-14.2	PRF Reseeding at CCSP	$ 27	$ 27		$ 27	100%				$ -		$ -		$ 3		$ 3				$ 3				$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 3	$ 27
OM-14.3	PRF Mowing	$ 45	$ 45		$ 45	100%				$ -		$ -		$ 5		$ 5				$ 5				$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 5	$ 45
	SUB-TOTAL	$ 422	$ 422		$ 422					$ 35		$ 35		$ 43		$ 43				$ 43				$ 43	$ 43	$ 43	$ 43	$ 43	$ 43	$ 43	$ 422
	Operations Category																														
O - 1	RDS Utilities	$ 600	$ 600		$ 600	100%				$ 60		$ 60		$ 60		$ 60				$ 60				$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 600
O - 2	RDS Service Plan	$ 155	$ 155		$ 155	100%				$ 11		$ 11		$ 12		$ 12				$ 13				$ 14	$ 15	$ 16	$ 17	$ 18	$ 19	$ 20	$ 155
O - 3	PRF Emergency Repairs	$ 900	$ 900		$ 900	100%				$ 90		$ 90		$ 90		$ 90				$ 90				$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 900
O - 4	Meteorological Station	$ 60	$ 60		$ 60	100%				$ 6		$ 6		$ 6		$ 6				$ 6				$ 6	$ 6	$ 6	$ 6	$ 6	$ 6	$ 6	$ 60
	SUB-TOTAL	$ 1,715	$ 1,715		$ 1,715					$ 167		$ 167		$ 168		$ 168				$ 169				$ 170	$ 171	$ 172	$ 173	$ 174	$ 175	$ 176	$ 1,715
	Restorative Category																														
OM -	Tree/Shrub Planting	$ 18	$ 18		$ 18	100%				$ -		$ -		$ 2		$ 2				$ 2				$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 18
OM -	Fence Repair	$ 72	$ 72		$ 72	100%				$ -		$ -		$ 8		$ 8				$ 8				$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 8	$ 72
OM -	Shoreline / Bank Restoration																														$ -
	Average Annual Cost									$ -		$ -		$ 195		$ 195				$ 195				$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 1,755
	Shop Creek Concrete Repairs	$ 9	$ 9		$ 9					$ 9		$ 9		$ -		$ -				$ -				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 9
	Cottonwood Creek Stream Reclamation	$ 20	$ 20		$ 20	100%				$ 20		$ 20		$ -		$ -				$ -				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20
	12-Mile Phase II South End Revegetation Bank Stabilization	$ 54	$ 54		$ 54	100%				$ 54		$ 54		$ -		$ -				$ -				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 54
	Mountain/Lake Loop Shoreline	$ 24	$ 24		$ 24	100%				$ 24		$ 24		$ -		$ -				$ -				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 24
	East Boat Ramp	$ 91	$ 91		$ 91	100%				$ 91		$ 91		$ -		$ -				$ -				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 91
OM -	Wetland Harvesting	$ 900	$ 900		$ 900	100%				$ 90		$ 90		$ 90		$ 90				$ 90				$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 90	$ 900
	SUB-TOTAL	$ 1,188	$ 1,188		$ 1,188					$ 288		$ 288		$ 295		$ 295				$ 295				$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 295	$ 2,943
	Rehabilitation Category																														
OM -						#DIV/0!																									
	SUB-TOTAL	$ -	$ -		$ -					$ -		$ -		$ -		$ -				$ -				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	SUB-TOTAL O&M	***$ 3,325***								***$ 490***		***$ 490***		***$ 506***		***$ 506***				***$ 507***				***$ 508***	***$ 509***	***$ 510***	***$ 511***	***$ 512***	***$ 513***	***$ 514***	***$ 5,886***
	GRAND TOTAL											***$ 4,104***				***$ 2,527***				***$ 1,756***				***$ 2,798***	***$ 2,594***	***$ 2,860***	***$ 2,861***	***$ 2,866***	***$ 2,834***	***$ 2,799***	***$ 24,806***
												$ 4,104				$ 6,631				$ 8,387				$ 11,185	$ 13,779	$ 16,639	$ 19,500	$ 22,366	$ 25,200	$ 27,999	
												2.8				5.6				8.4				11.2	14	16.8	19.6	22.4	25.2	28	

Cherry Creek Basin Water Quality Authority
Summary of Operation & Maintenance (O&M) Costs
Prepared / Updated: October 12, 2021

Project	Quantity			CCSP Work	CCBWQA Purchases Seed with CCSP Installation	CCBWQA Work					Comments	Total Cost
	Each	Hours	Acres	Mowing[1]	Tractor Reseeding (Seed Cost Only)[2]	Herbicide Application[1]	Tree Planting[3]	Shrub Planting[3]	Misc.	Restorative / Rehabilitation work[4]		
Shop Creek			8			$ 2,200					Stream Corridor Only, Remaining Areas done by CCSP	$ 11,200
	1									$ 9,000	Concrete Repair at Inlet Grate Connections	
Cottonwood CreekPh I & PhII			15			$ 2,400					Stream Corridor Only, Remaining Areas done by CCSP	$ 24,000
		4		$ 1,600							Mowing done by CCSP	
	1									$ 20,000	Fencing, Erosion Control, Soil Amendment,	
Cottonwood Wetlands			10			$ 2,000					Stream Corridor Only, Remaining Areas done by CCSP	$ 2,000
CC @ 12-Mile Park Ph I		8		$ 3,200							Mowing done by CCSP	$ 3,200
CC @ 12-Mile Park Ph II		8		$ 3,200							Mowing done by CCSP	$ 57,200
	1									$ 54,000	Riprap Bank Protection, Soil Amendment, Seed Bed Prep, Seed, Blanket, and Fencing	
Mountain/Lake Loop Shoreline[5]			4			$ 1,200					Stream Corridor Only, Remaining Areas done by CCSP	$ 24,850
	1									$ 23,650	Carryover from 2021, Restore shoreline area	
East Boat Ramp[5]	1									$ 90,400	Carryover from 2021, Restore shoreline area	$ 90,400
East Shade Shelters											No Maintenance Planned for 2022	$ -
West Boat Ramp											WBR is CCSP Maintenance Responsibility	$ -
Subtotal				$ 8,000	$ -	$ 7,800	$ -	$ -	$ -	$ 197,050		

Totals

CCSP =	**$ 8,000**
CCBWQA =	**$ 204,850**
Combined =	**$ 212,850**

Areas in Acres

37

0

Note 1. Mowing Rate = $400/hr. to meet shared 50/50 PRF maintenance participation between CCBWQA and CCSP; CCSP performs mowing and CCBWQA performs herbicide application for noxious weed control.

Note 2. Reseeding Rate = $800/acre. CCBWQA purchases seed CCSP installs it with their tractor and the seed attachment purchased by CCBWQA.

Note 3. Tree Replacement = $1,000/ea. Shrub Replacement =$50/ea.. CCBWQA Participation @ 100%.

Note 4. PRF Function Repair/Maintenace. Project Specific Estimate. CCBWQA Participation @ 100%.

Note 5. Projects are being carried over from 2021 to 2022.

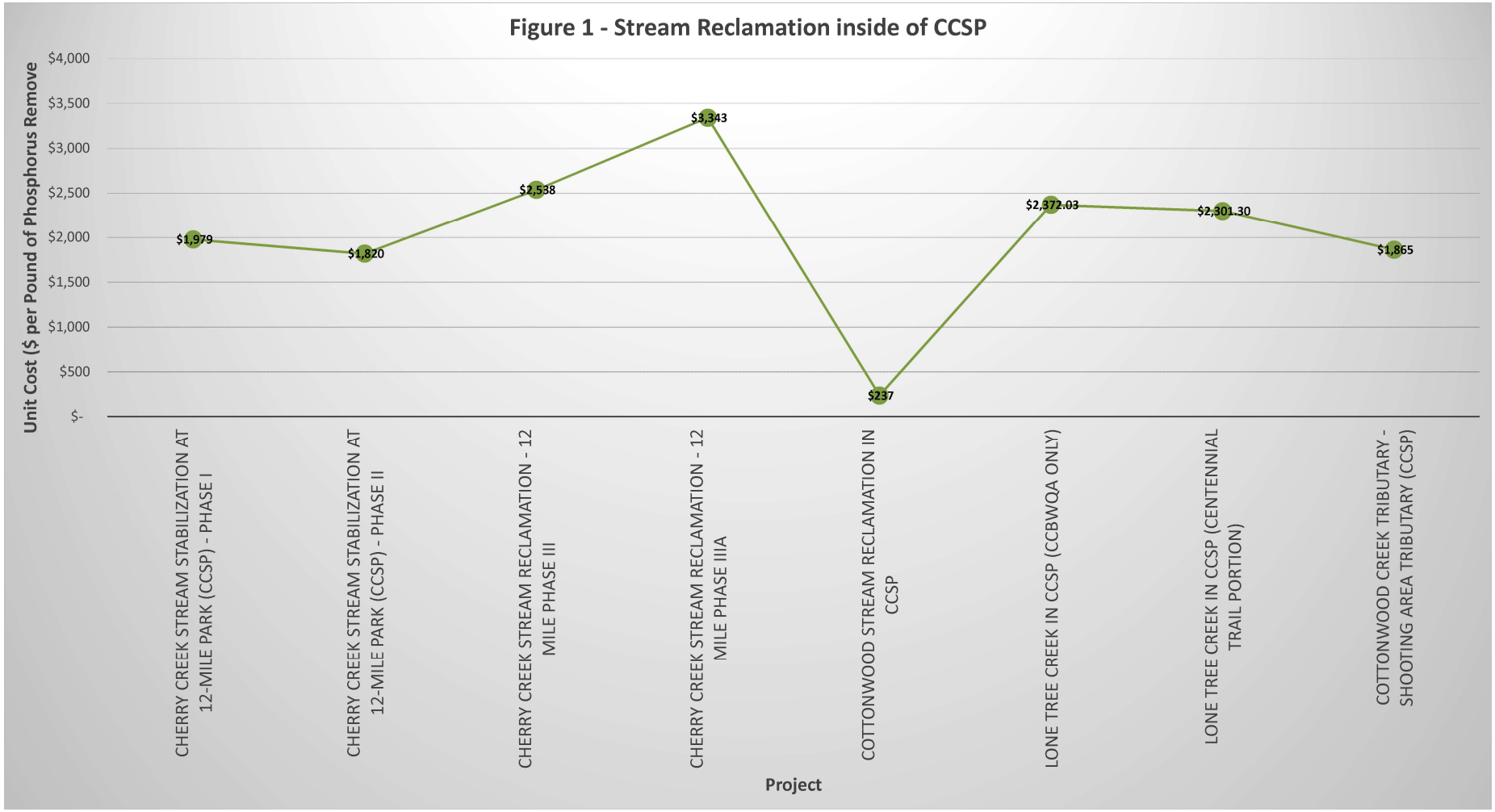
Figure 1 - Stream Reclamation inside of CCSP
Unit Cost ($ per Pound of Phosphorus Remove
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$-
$1,979
$1,820
$2,538
$3,343
$237
$2,372.03
$2,301.30
$1,865
CHERRY CREEK STREAM STABILIZATION AT 12-MILE PARK (CCSP) - PHASE I
CHERRY CREEK STREAM STABILIZATION AT 12-MILE PARK (CCSP) - PHASE II
CHERRY CREEK STREAM RECLAMATION - 12 MILE PHASE III
CHERRY CREEK STREAM RECLAMATION - 12 MILE PHASE IIIA
COTTONWOOD STREAM RECLAMATION IN CCSP
LONE TREE CREEK IN CCSP (CCBWQA ONLY)
LONE TREE CREEK IN CCSP (CENTENNIAL TRAIL PORTION)
COTTONWOOD CREEK TRIBUTARY - SHOOTING AREA TRIBUTARY (CCSP)
Project

Figure 2 - Stream Reclamation outside of CCSP