SOLDIER CANYON WATER TREATMENT AUTHORITY
Monthly Meeting Agenda
4424 Laporte Avenue
Fort Collins, CO 80521

Thursday May 11, 2023

Mission – The Authority delivers the highest quality treated water to its customers with financial responsibility, and following policies established by the Board in a professional, efficient, and ethical manner.

1. Call to Order 10:00 AM

2. Meeting Minutes for April 13, 2023 - Action Item – Approve Minutes - "Motion to approve the minutes from the meeting on April 13th, 2023".

3. Financial Update – Brenda Griffith, Action Item - Approve Financial Report - "Motion to approve the SCWTA March 2023 Financial Report".

4. Manager's Update – Mark Kempton.

5. Munroe Ditch Water Loss Study by Ayres Associates – Richard Raines, Action Item – Approve Ayres proposal - "Motion to approve the Ayres proposal to perform a water loss study on the Munroe Canal".

6. Filters 5-8 Rehabilitation Project - Materials Procurement – Mark Kempton, Action Item – Approve Leopold Materials Proposal – "Motion to approve the Leopold proposal to provide filter media, underdrains, and pipes for Filters 5-8".

7. Stantec Draft Expansion Capacity Feasibility Study – Mark Kempton, Question - Does the Board wish to follow up on any of the study's recommendations for expanding Plant capacity or need more time to consider?

8. Review of proposed Authority Creation Agreement additions to include new physical facilities – Mark Kempton – Include new 42" HT pipeline, PVP Sedimentation Basin and Screen, PVP Pipeline and additional pipe agreements.

9. Other Business

The next scheduled Authority Board Meeting is June 8, 2023, at 10:00 a.m.

Soldier Canyon Water Treatment Authority
Board Meeting
April 13, 2023

Present at the meeting:

Board Chairman, Eric Reckentine, NWCWD Manager

Board Vice Chairman, Chris Pletcher, FCLWD Manager

Board Treasurer, Mike Scheid, ELCO Manager

Board Director, Jim Borland, FCLWD Director

Board Director, Rod Rice, ELCO Director

Board Director, Scott Cockroft, NWCWD Director

Mark Kempton, SCWTA Manager

Brenda Griffith, SCWTA Office Administrator

Richard Raines, SCWTA Water Resources Manager

The meeting was called to order at 10:05 a.m. by Board Chairman Eric Reckentine.

Business Conducted

1. **Minutes from March 9, 2023, Soldier Canyon Water Authority Board Meetings**

   Minutes from the March 9, 2023, meeting were presented.

   Rod Rice made a motion to approve the minutes. Chris Pletcher seconded the motion. The motion was unanimously approved.

2. **Financial Update**

   Brenda Griffith presented and reviewed with the Authority Board monthly billing records, a review of the February 2023 O&M expenses and the financial dashboard. Chris Pletcher made a motion to approve the financial reports. Scott Cockroft seconded the motion. The motion was unanimously approved.

3. **Managers Update**

   Mark Kempton updated the Board on plant flow, maintenance, staffing, and projects going on in the plant.

4. **Approval of Professional Services Agreement (PSA) with Hensel Phelps for Filter 5-8 and Generator design and cost estimating – Mark Kempton**

   The board was given a copy of the Professional Services Agreement with Hensel Phelps for Filters 5 – 8 and generator design. Chris Pletcher would like some wording changed and our attorney to review before this agreement is finalized. Chris Pletcher made a motion to approve the PSA with his suggested recommendations. Mike Scheid seconded the motion. The motion was unanimously approved.

5. **Approval of Master Contract and Work Order #1 with HDR for the Authority's 20-Year Master Plan – Mark Kempton**

   Chris Pletcher made a motion to approve the Master Contract and Work Order #1 with HDR Engineering for the 20-Year Master Plan with clarifications on insurance and liability. Rod Rice seconded the motion. The motion was unanimously approved.

6. **Discussion item – Mark Kempton – New EPA regulations for PFAs**

   Mark Kempton presented a document from EPA regarding regulations for PFAS. He just wanted to inform the board about this proposal to limit PFAS in drinking water. This could cause possible treatment changes and could shut off the water supply.

7. **Review of proposed Authority Creation Agreement additions to include new physical facilities – Mark Kempton – Include new 42" HT Pipeline, PVP Sedimentation Basin and Screen, PVP Pipeline**

   Mark Kempton shared a proposed amendment to the Authority Creation Agreement to include ownership of the PVP Sed Basin and Screen. The districts feel more information is needed to finalize this information.

8. **Other Business**

   Eric Reckentine asked if Soldier Canyon could take the UCMR5 sample and send it to the districts. Mark will discuss this with Ken and Mary.

9. **Adjournment**

   Rod Rice made a motion to adjourn the meeting. Scott Cockroft seconded the motion.

   The motion was unanimously approved, and the meeting was adjourned at 11:02 a.m.

Respectfully submitted,

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Mark Kempton – Board Secretary, Soldier Canyon Water Treatment Authority

Approved by Authority Board

_____

Eric Reckentine - Board Chairman, Soldier Canyon Water Treatment Authority

Soldier Canyon Water Treatment Authority
Custom Transaction Detail Report
April 2023

Date	Num	Name	Memo	Amount
Apr 23				
04/01/2023	Auto pay	Silver Peaks Accounting	Apr. A/P - Monthly Fee	-750.00
04/03/2023	Auto pay	American Heritage Life Ins. Co.	Mar. A/P - Voluntary Ins.	-221.13
04/04/2023	Pd online	Colorado State Treasurer	Mar. A/P - 1st Qtr. 2023	-1,070.72
04/11/2023	5940	4Rivers Equipment	Mar. A/P - Tractor repair/service	-72.13
04/11/2023	5941	A.R.C. Incorporated	Mar. A/P - Cleaning Services	-444.01
04/11/2023	5942	Airgas	Breathing air, cylinder rentals	-413.84
04/11/2023	Pd online	Baker Tilly US, LLP	Mar. A/P - 2022 Audit	-2,267.14
04/11/2023	5943	Big State Industrial Supply Inc.	Mar. A/P - Safety supplies	-319.26
04/11/2023	5944	Capital Business Systems	Mar. A/P - Lab Copier, shop printer	-26.78
04/11/2023	5945	CEBT	Mar. A/P - Apr. Ins.	-26,499.41
04/11/2023	5946	CenturyLink2	Mar. A/P - Phones	-66.54
04/11/2023	5947	Continental Supply	Mar. A/P - shop supplies	-134.91
04/11/2023	5948	Ditesco	Mar. A/P - R & R Filters 5-8	-3,450.00
04/11/2023	5949	DPC Industries, Inc.	Mar. A/P - chlorine	-8,573.60
04/11/2023	5950	Employers Council Services, Inc.	Mar. A/P - new employee check	-137.75
04/11/2023	5951	Fastenal Company	Maint. Sup.	-2,571.80
04/11/2023	5952	FEDEX	Shipping	-30.19
04/11/2023	5953	First National Bank	Mar. A/P - Education, Misc., Safety, Maint.	-1,211.15
04/11/2023	5954	General Air	Mar. A/P - Welding Supplies	-454.18
04/11/2023	5955	Grainger	Maint. Sup.	-1,144.54
04/11/2023	5956	Gray Matter Systems LLC	Mar. A/P - Software Maint.	-3,341.65
04/11/2023	5957	Graybar Electric Company Inc	Pump drive replacement	-12,823.06
04/11/2023	5958	Greystone Technology	IT Support, email, backups	-3,560.02
04/11/2023	5959	HACH Company	Lab Supplies/Equipment	-8,327.07
04/11/2023	5960	Harcros Chemicals Inc	Soda Ash, Fluoride	-46,735.99
04/11/2023	5961	Hensel Phelps Construction Co.	Mar. A/P - PVP Sed Basin 16" Butterfly Actuator	-40,808.00
04/11/2023	Pd online	Home Depot	Mar. A/P - maint. supplies	-3,238.65
04/11/2023	5962	Hydro-Dyne Engineering, Inc.	Mar. A/P - Service Contract for On-Site Inspection	-2,800.00
04/11/2023	5963	INDOFF, INC.	Office Supplies	-106.88
04/11/2023	5964	Interstate Battery of the Rockies	Mar. A/P - Maint. Sup.	-103.55

Soldier Canyon Water Treatment Authority
Custom Transaction Detail Report
April 2023

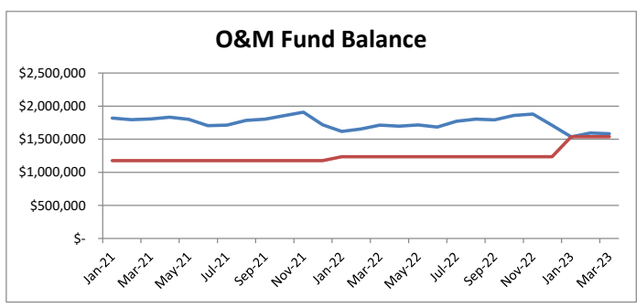
Date	Num	Name	Memo	Amount
04/11/2023	5965	Jax Inc. Mercantile Company	Mar. A/P - Uniforms, Maint. Sup.	-272.98
04/11/2023	5966	Kelly Supply Company	Mar. A/P - Maint. Sup.	-72.83
04/11/2023	5967	Laporte Hardware	Mar. A/P - Maint. Sup.	-228.15
04/11/2023	5968	Larimer County Solid Waste Mgmt	Mar. A/P - Plant clean up	-77.70
04/11/2023	5969	Logical Systems, LLC	R & R - PVP Control Imp, Filters 5-8, PLC Upgrade	-12,148.25
04/11/2023	5970	M.M.S. Environmental Labs	Mar. A/P - Samples	-26.00
04/11/2023	5971	Metal Distributors, LLC	Mar. - Maint. Sup.	-495.37
04/11/2023	5972	National Business Furniture	Mar. A/P - new chairs	-627.36
04/11/2023	5973	ODP Business Solutions	Office Supplies	-113.48
04/11/2023	5974	Officescapes	Mar. A/P - Control Room furniture	-6,238.04
04/11/2023	5975	ONEPOINTSYNC	Mar. A/P - Phones	-220.55
04/11/2023	5976	optek-Danulat, Inc.	Mar. A/P - Ops. Sup.	-7,026.91
04/11/2023	Pd online	Phillips 66 CO/SYNCB	Mar. - Fuel	-264.41
04/11/2023	5977	Ryan Herco	Maint. Sup.	-152.36
04/11/2023	5978	Sam's Club	Mar. A/P - Misc Admin/Ops Sup.	-546.89
04/11/2023	5979	Seter & Vander Wall, P.C.	Mar. A/P - Legal Fees	-4,208.00
04/11/2023	5980	SGS North America, Inc.	Mar. A/P - Samples	-130.98
04/11/2023	Pd Online	Shell	Mar. A/P - Fuel	-539.37
04/11/2023	5981	Solenis LLC	Mar. A/P - Dewatering Chems	-5,019.27
04/11/2023	5982	Stantec Consulting, Inc.	Mar. A/P - Expansion Feasibility Study	-14,412.50
04/11/2023	5983	Summit Safety Solutions	Mar. A/P - Service gas detection equip	-1,862.35
04/11/2023	5984	Team Petroleum	Mar. A/P - Maint. sup.	-229.60
04/11/2023	5985	The Sherwin Williams CO	Mar. A/P - Paint/Supplies	-1,780.84
04/11/2023	5986	US Bank	Mar. A/P - Copier Lease	-538.25
04/11/2023	5987	USALCO	Mar. A/P - CC 2000	-21,340.00
04/11/2023	5988	Verizon Wireless	Mar. A/P - Cell phones	-376.79
04/11/2023	Auto pay	Waste Management of No. Colo	Mar. A/P - Trash/Recycling	-651.34
04/11/2023	5989	Winlectric	Mar. A/P - Electrical Sup.	-279.30
04/11/2023	Pd online	Xcel Energy	Mar. A/P - Electric & Gas	-4,787.16
04/11/2023	5990	Xylem Water Solutions	Mar. A/P - Anthracite	-17,028.00
04/11/2023	5991	First National Bank	Mar. A/P - Education, Misc., Safety, Maint., Off. Su	-4,885.26

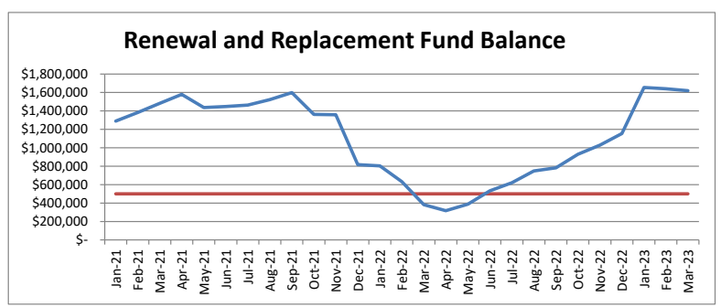
Soldier Canyon Water Treatment Authority
Custom Transaction Detail Report
April 2023

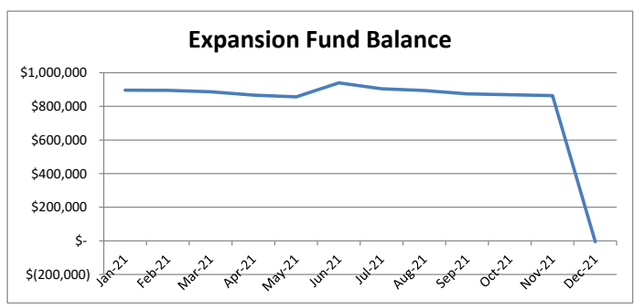
Date	Num	Name	Memo	Amount
04/12/2023	5992	Ayres Associates Inc	Mar. A/P - Munroe System Water Loss Study	-4,235.00
04/12/2023	5993	Crow Creek Construction LLC	Mar. A/P - Overland Ponds - Larimer #2 Outlet	-142,330.05
04/12/2023	5994	Ditesco	Mar. A/P - WR Overland Ponds Projects	-2,370.00
04/12/2023	5995	Lyons Gaddis Attorneys & Counselors	Mar. A/P - General	-532.00
04/12/2023	5996	North Poudre Irrigation Co.	Mar. - Lining Munroe Canal	-116,250.00
04/13/2023	5997	Logical Systems, LLC	R & R - PVP Control Imp, Filters 5-8	-5,468.50
04/17/2023	pd online	Xcel Energy	Utilities - Gas & Elec	-9,296.81
04/17/2023	Auto pay	BASIC Benefits	HRA Accts. Monthly fee	-50.00
04/18/2023	5998	Stantec Consulting, Inc.	Mar. A/P - Expansion Feasibility Study	-4,842.50
Apr 23				**-563,659.10**

	Months														
	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	**YTD Total**	**Budget**	**% To Budget**
Revenue Total	968,282	463,025	468,469	-	-	-	-	-	-	-	-	-	1,899,776	8,153,954	23.30%
Fixed O&M Revenue Total	400,936	400,936	400,936										1,202,808	4,811,235	25.00%
Variable O&M Revenue Total	61,794	55,287	58,635										175,716	1,338,719	13.13%
Renewal and Replacement Revenue Total	500,999	-	-										500,999	2,004,000	25.00%
Expansion Revenue Total	-	-	-										-	-	#DIV/0!
Misc./Interest Income	4,553.00	6,802.00	8,898.00										20,253	250	81.012
Expenses Total	676,279	418,830	501,775	-	-	-	-	-	-	-	-	-	1,596,884	7,850,549	20.34%
Fixed O&M Expenses	556,678	379,324	384,955										1,320,957	4,811,235	27.46%
Variable O&M Expenses	119,601	25,161	95,753										240,515	1,035,314	23.23%
Energy Expenses	17,248	17,447	14,084										48,779	105,969	46.03%
Chemical Expenses	102,353	7,714	81,669										191,736	1,232,750	15.55%
Renewal and Replacement Expenses	-	14,345	21,067										35,412	2,004,000	1.77%
Expansion Expenses	-	-	-	-	-	-	-	-					-		#DIV/0!

Reserves







Emergency Reserve Fund Balance end of Mar.	1,581,488	1,619,035	(4,900)
Minimum Emergency Reserve Target	1,537,489	500,000	-
+/- Target	43,999	1,119,035	(4,900)

Soldier Canyon Water Treatment Authority

Soldier Canyon Water Treatment Authority Board Meeting – Plant Manager's Update

Thursday, May 11, 2023

- Mark Kempton will be on vacation for the June 8th Board Meeting. Mark will still call in via Teams while Jacob will be in person as my replacement.
- The South Plant was successfully brought online the 1st week of May.
- Demands are increasing.
- The Plant Expansion 2-Year Warranty period expires on June 1 , 2023. Working on submitting a comprehensive list of warranty items to Garney in May.
- The Plant went off the PVP starting the evening of Saturday April 29th due to very high turbidities in the River. Turbs in excess of 130 ntu (100 ntu is our cut off point).
- Also, off the River due to annual NPIC 3-day flush of the Ditch which started Tuesday May 2nd.
- The Plant came back on the River Thursday May 4th. We are making a concerted effort to treat as much Poudre water as possible without compromising finished water quality.
- We are using the PVP Sed Pond as much as possible to mitigate high turbidities. The Pond is leaking intermittently. We are still investigating the source.
- PVP Sed Pond Liner will need to be replaced in the next 1 to 3 years. Preliminary cost is approx. $200,000. A new concrete liner would cost in excess of $1 million.
- The PLC upgrades for Filters 5-8 are complete.
- The new PVP Intake PLCs are also complete.
- HDR has scheduled 20-Year Master Plan data collection and interview meetings with each District and with Plant staff.
- Stantec provided the Draft Capacity Expansion Feasibility Study.

SOLDIER CANYON FILTER PLANT

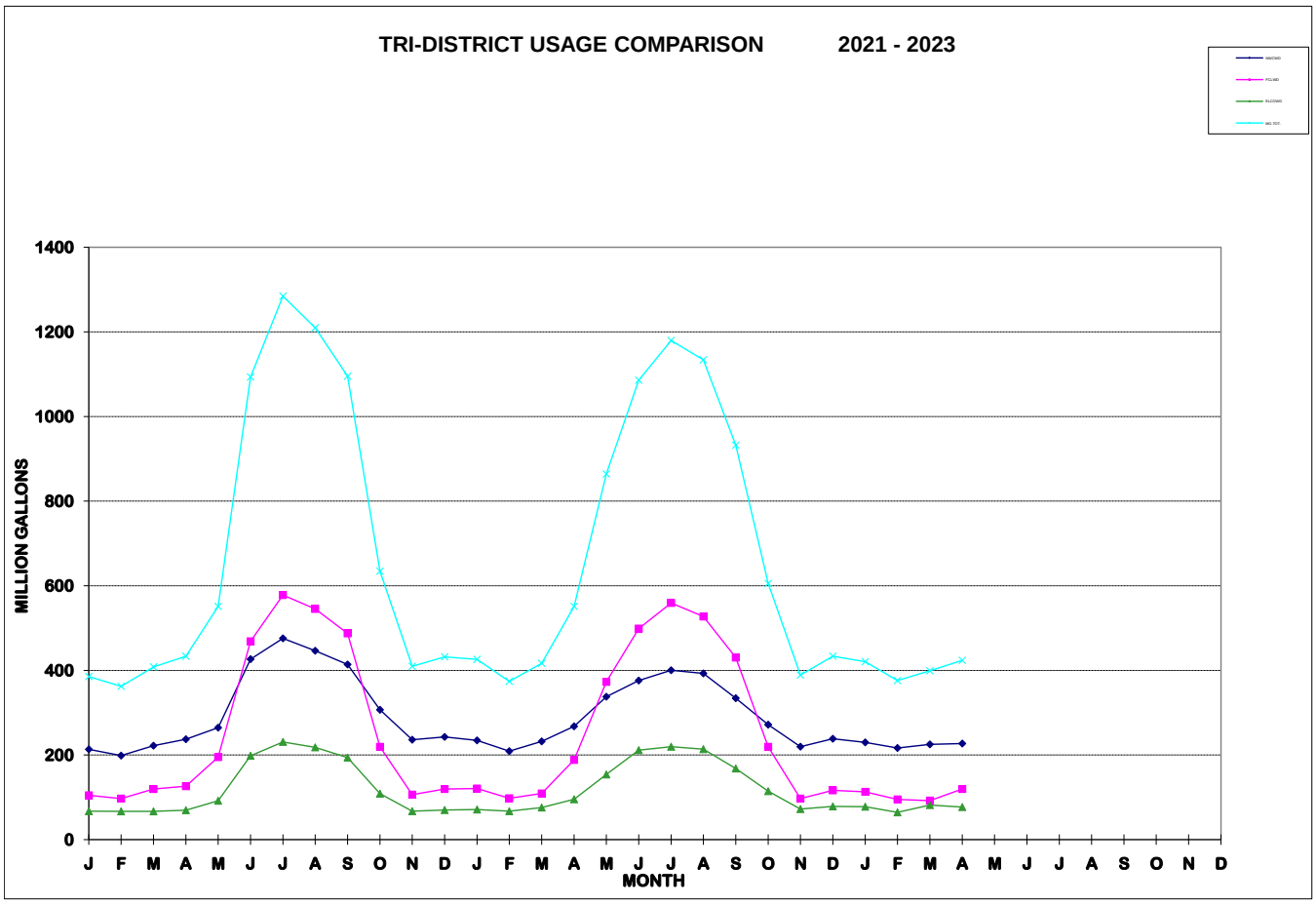
3 YEAR COMPARITIVE USAGE

TRI-DISTRICTS

2021 - 2023

[3yruse2003.xls]

	NWCWD			FCLWD			ELCOWD			MO. TOTAL		
	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
MONTH												
JAN.	213.232	234.429	229.737	104.782	120.573	113.018	67.179	71.023	77.609	385.193	426.025	420.364
FEB.	198.610	209.077	216.632	96.767	97.666	95.005	66.857	67.231	64.464	362.234	373.974	376.101
MAR.	221.902	232.206	225.289	119.593	108.830	92.041	66.593	75.633	81.548	408.088	416.669	398.878
APR.	237.188	267.526	227.216	126.389	188.202	119.497	69.689	95.364	77.028	433.266	551.092	423.741
MAY	264.431	337.491		195.029	372.881		91.809	153.949		551.269	864.321	0.000
JUN.	426.419	375.998		468.780	498.690		198.058	211.301		1093.257	1085.989	0.000
JUL.	475.675	400.401		577.994	559.459		230.767	219.816		1284.436	1179.676	0.000
AUG.	446.326	392.969		545.214	527.105		218.222	213.667		1209.762	1133.741	0.000
SEP.	414.085	334.021		487.309	430.478		193.749	167.893		1095.143	932.392	0.000
OCT.	306.612	271.670		219.058	219.380		108.798	114.438		634.468	605.488	0.000
NOV.	236.168	219.703		106.260	96.875		67.336	72.121		409.764	388.699	0.000
DEC.	242.592	238.439		119.446	116.273		69.906	78.550		431.944	433.262	0.000
YR.TOT.	3683.240	3513.930	898.874	3166.621	3336.412	419.561	1448.963	1540.986	300.649	8298.824	8391.328	1619.084



Tri-Districts Monthly Flows (MGD)

April 2023

HT 1st Reading	05/01/23	**16102216**
HT 1st Reading	04/01/23	**15793646**

Total 24-hour District Flows (MGD)

SCFP Influent Flows (MGD)

	ELC TOT	FCL TOT	NWC TOT	Dist Total Flow	SCFP Daily Peak Flow	HT Flow	PV Flow	Total Influent Flow
4/1/2023	3.105	3.455	6.612	13.172	18.000	13.230	0.000	13.230
4/2/2023	2.093	4.835	7.291	14.219	17.690	14.530	0.000	14.530
4/3/2023	2.804	3.120	7.799	13.723	17.720	14.414	0.000	14.414
4/4/2023	2.163	3.270	6.894	12.327	15.730	10.876	2.270	13.146
4/5/2023	1.921	3.616	7.265	12.802	18.060	8.406	4.627	13.033
4/6/2023	3.192	3.183	6.711	13.086	18.350	9.601	3.399	13.000
4/7/2023	2.078	3.218	8.197	13.493	17.910	12.048	2.257	14.305
4/8/2023	2.395	3.629	6.732	12.756	17.360	6.245	5.563	11.808
4/9/2023	2.435	3.344	8.016	13.795	17.770	9.624	4.996	14.620
4/10/2023	2.927	3.785	8.219	14.931	18.520	7.861	6.577	14.438
4/11/2023	2.701	1.808	8.218	12.727	19.950	9.540	5.243	14.783
4/12/2023	3.429	2.246	8.789	14.464	18.190	8.397	5.171	13.568
4/13/2023	2.047	1.454	7.505	11.006	17.750	6.194	5.388	11.582
4/14/2023	2.698	1.380	7.018	11.096	15.380	6.188	4.583	10.771
4/15/2023	2.060	1.800	6.614	10.474	17.950	7.053	4.357	11.410
4/16/2023	2.843	1.559	7.621	12.023	15.600	6.740	3.957	10.697
4/17/2023	2.560	0.627	8.731	11.918	15.690	9.373	3.922	13.295
4/18/2023	3.401	0.479	7.720	11.600	17.140	7.261	3.948	11.209
4/19/2023	2.235	3.014	7.901	13.150	17.770	8.696	4.670	13.366
4/20/2023	2.990	6.217	7.096	16.303	20.560	11.391	5.292	16.683
4/21/2023	2.032	6.467	7.570	16.069	22.580	10.401	6.000	16.401
4/22/2023	2.720	5.804	6.778	15.302	20.610	10.152	5.595	15.747
4/23/2023	2.221	6.451	8.255	16.927	23.200	11.159	5.038	16.197
4/24/2023	3.231	6.652	8.099	17.982	23.000	13.246	5.519	18.765
4/25/2023	2.038	6.197	7.654	15.889	21.410	11.162	6.309	17.471
4/26/2023	2.833	6.396	6.551	15.780	18.240	9.932	5.949	15.881
4/27/2023	2.116	6.764	7.556	16.436	21.300	12.022	5.754	17.776
4/28/2023	3.003	6.285	6.896	16.184	22.620	10.554	5.542	16.096
4/29/2023	2.305	6.738	8.686	17.729	21.850	14.094	4.073	18.167
4/30/2023	3.770	6.387	9.562	19.719	27.610	18.180	2.402	20.582
Minimum	1.921	0.479	6.551	10.474	15.380	6.188	0.000	10.697
Maximum	3.770	6.764	9.562	19.719	27.610	18.180	6.577	20.582
Average	2.595	4.025	7.653	14.273	19.224	10.184	4.428	14.612
Metered Usage	**75.241**	**116.725**	**221.944**	**413.910**		**295.340**	**128.401**	**423.741**
% Used	18.18	28.20	53.62	100.00				
MG Difference	1.787	2.772	5.272	9.831		Influent-Effluent Difference (MG)		**9.831**
Total Usage	**77.028**	**119.497**	**227.216**	**423.741**		Influent-Effluent Difference (%)		**2.32**

Soldier Canyon Water Treatment Authority - Treatment Capacity Share

District	Capacity Allocation (MGD)	Treatment Capacity Share (%)
ELCO	**13.719**	**22.865 %**
FCLWD	**23.043**	**38.405 %**
NWCWD	**23.238**	**38.730 %**
TOTAL	**60.000**	**100.000 %**

SOLDIER CANYON WATER TREATMENT AUTHORITY

WORK ORDER (EXHIBIT A)

Work Order No. 382058-GEN

Effective Date: 5/11/2023

End Date: 12/31/2023

Ayres Associates (Consultant) agrees to provide to Soldier Canyon Water Treatment Authority (Client), the professional services described for the Project identified below. The professional services shall be performed in accordance with, and shall be subject to, the terms and conditions of the Master Agreement for Professional Services executed by and between Consultant and Client on the 28th of July 2022. The Term end date listed in Section 1.1.3 of the July 28, 2022, Master Agreement is hereby extended from 7/28/23 to 12/31/2023 and acknowledged by both parties' signatures below.

WORK ORDER PROJECT NAME: Munroe System Water Loss Study 2023

WORK ORDER PROJECT DESCRIPTION: Perform open channel flow measurements to help quantify system losses in the Munroe Canal upstream of the PVP.

SCWTA WORK ORDER BILLING NUMBER: 382058-GEN

CONSULTANT CONTACT : Dylan L. Armstrong. P.E. - (970) 223-5556, ArmstrongD@AyresAssociates.com

CLIENT CONTACT: Mark Kempton, P.E., CWP - (970) 482-3143, mkempton@soldiercanyon.com

SCOPE OF WORK: See attached SOW (the "**Work**").

FEE ARRANGEMENT: Time and Materials Not to Exceed $32,880.66.

SPECIAL TERMS AND CONDITIONS: Instructions for Payment: Please reference Work Order Billing Number on Invoice when submitting for payment. Please submit requests for payment to Invoices@soldiercanyon.com.

APPROPRIATION : Client represents that it has available and has appropriated sufficient funds to pay the anticipated costs associated with this Work Order.

Soldier Canyon Water Treatment Authority (Client)	Ayres Associates (Consultant)
By: _____	By: _____
Eric Reckentine Board Chairman	Name: Title:
Date: _____	Date: _____
Address: 4424 LaPorte Avenue Fort Collins, Colorado 80521 Phone: (970) 482-3143	Address: 3665 JFK Parkway, Bldg. 2, Suite 100 Fort Collins, CO 80525 Phone: (970) 223-5556

PROFESSIONAL SERVICE FEE FOR:

Project Name	**Munroe System Loss 2023**
Client Name	**Tri Districts Water Authority**
Client Contact	**Richard Raines**

Project Fee $32,880.66

Labor*	$27,865.03
Directs**	$5,015.63
Other Divisions	$0.00
Sub-Consultants***	$0.00

***APC (Associated Project Costs)**	3.85%
Percent (%) of labor that includes PPE, project specific software, in-house supplies, telecommunications charges, postage, and routine in-house reproductions	
****Directs Markup**	10%
Percentage amount added to the direct costs to cover administration of direct charges	

Ayres Project Manager

Dylan Armstrong

Date
04/21/23

AYRES

970.223.3556 | 3665 JFK Parkway | Building 2, Suite 100 | Fort Collins, CO 80525
www.AyresAssociates.com

Ingenuity, Integrity, and Intelligence.

MUNROE SYSTEM LOSS 2023– SCOPE OF WORK –

PROJECT OBJECTIVE: Perform open channel flow measurements to help quantify system losses in Munroe Canal before the Poudre Valley Pipeline (PVP) takeoff after a bentonite lining solution has been implemented. 3 cross section locations will be set downstream of the Munroe tunnel and Siphon to create repeatable measurement locations. Three separate flow levels at these locations will be measured to help support system loss results. One during peak flows, one during medium-level flows, and one during low-level flow when the water for the PVP is the only water being supplied to the canal.

GENERAL

This scope includes tasks necessary to complete the system loss study. This includes work for administrative duties, two field members, and associated equipment rental and field equipment costs.

Task 1 – Management

1.1 **Management and administration**. Project management, billing, administration work. Ayres will provide monthly billing to Tri-Districts who is the client.

1.2 **Meetings and coordination**. Project meetings with Tri-Districts as needed, this also covers the associated coordination needed to gain access to the measurement locations as well as any other coordination needed between any other of the water users or Northern Water staff on anticipated flow change dates.

Task 2 – System Loss Study

2.1. **Data Collection.** Measurements will be taken at low, medium, and high flow conditions. 2 days for each flow condition are scoped to be able to capture the differences in operational procedures, being either the settlement pond in operation or the canal in operation as the main source for PVP intake. 3 extra days are included in the scope for set-up, equipment testing, and data contingency. This totals 9 scoped field days, not all days will be used if data is found to be sufficient or if operational procedures cannot be changed for a flow condition. Two Ayres employees are needed to collect the data. Each day will comprise of multiple measurements at each cross-section location to add more statistic normalization to the data. Direct costs from this task include survey equipment rental fee, cross section set-up equipment, and associated mileage costs.

2.2. Data Analysis / Summary of Findings. Data analysis includes processing of all flow measurement and reported data. All data will be summarized with all measurement methods and assumptions and presented in a brief summary of findings report. A final presentation of the data will take place with Tri-Districts and any associated users. Time is included for internal QA/QC of all deliverables.

PROJECT DELIVERABLES

Summary of findings report including all supporting data and necessary information related to the system loss study. Additionally, a presentation will be provided at the Soldier Canyon Water Treatment Plant during one of the monthly stakeholder meetings.

Costs by Task

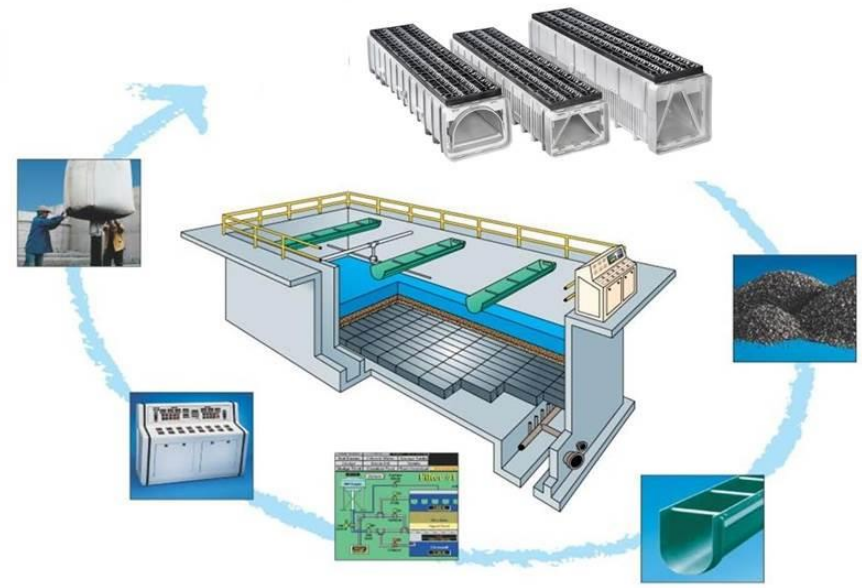
	Task #	Task Name	Project Fee	Directs	Other Services	Labor	Total Hours	Senior Project Manager	Project Manager I	Professional I	Admin
1		**Links to other sheets**									
2		Directs									
3		Other Services									
4		Schedule									
5		Summary Sheet									
6		Dashboard									
7		PM Sheet				$1,033.03					
8						**APC**					
9						**3.85%**					
10							Staff	Robinson	Armstrong	Rodgers	Smith
11							Rates	$190.00	$150.00	$120.00	$86.00
12		**Munroe System Loss 2023**	$32,870	$5,005	$0	$27,865	200	2	92	104	2
13	**Task 1**	**Management and Coordination**	**$2,318**	**$0**	**$0**	**$2,318**	**16**	**2**	**8**	**4**	**2**
14	1.1	Management and Administration	$802	$0	$0	$802	6		4		2
15	1.2	Meetings and Coordination	$1,516	$0	$0	$1,516	10	2	4	4	
24	**Task 2**	**Data Collection**	**$30,552**	**$5,005**	**$0**	**$25,547**	**184**	**0**	**84**	**100**	**0**
25	2.1	Data Collection	$25,182	$4,994	$0	$20,188	144		72	72	
26	2.2	Data Analysis / Summary of Findings Memo	$4,237	$0	$0	$4,237	32		8	24	
27	2.3	Final Presentation	$1,133	$12	$0	$1,122	8		4	4	
180											
181		Stats									
182		cost per role						$380	$13,800	$12,480	$172
183		percent cost per role						1%	50%	45%	1%
184		avg hourly rate					$139				

Exported on April 20, 2023 5:29:32 PM MDT

Proposal

Soldier Canyon WTP
FILTERS 5-8

Fort Collins, CO



Prepared for:

Fort Collins, CO

5/2/2023

Xylem Water Solutions USA, Inc.
108 Tomlinson Dr – Suite 400
Zelienople, PA 16063
Mr. Wayne Steen
Direct: 724-453-2111
Mobile: 724-272-2905
Email: wayne.steen@xylem.com

5/2/2023

Project name : Fort Collins, CO (Soldier Canyon WTP)
Project number : I22413 Rev01

To Whom It May Concern:

Based on your inquiry, we are pleased to forward the following proposal to your attention. Thank you for the opportunity to offer our equipment and services for the Fort Collins, CO Soldier Canyon WTP project.

We hope that our proposal comes up to your expectation. If you have any questions please do not hesitate to contact me or our local representative.

Respectfully,

Wayne Steen
Senior Sales Engineer

Table of Contents

1 Technical Description

1.1 SCOPE OF SUPPLY

We are pleased to offer the following materials and services by Xylem Water Solutions USA, Inc. This quotation has been prepared using the provided specifications dated September 2021 sections 46 61 13 & 46 61 17.

IMS® (INTEGRAL MEDIA SUPPORT) CAP:

Under this section, we propose to furnish 72 new IMS® (Integral Media Support) Cap for the make-up end underdrain blocks to receive the new air nipples for filters #5-#8. IMS® cap shall be made of plastic beads sintered together and molded to match the surface of the Leopold Universal Underdrain. The IMS® Cap shall be field installed to plastic block by the contractor.

Included in this section are the required #12 mounting screws and sealant. Also included are underdrain block air pipe nipples with all components to install air pipe nipples onto the existing Type SL Underdrain.

AIR HEADER PIPING:

Under this section, we propose to furnish four (4) Leopold Air Header Assemblies, manufactured from schedule 5, type 316 stainless steel pipe. The air header pipe shall measure 8" in diameter and will run the width of the filter cell. The air header shall commence with a flange approximately 6" above the center line of the air header pipe, inside the filter cell. Mating flange and hardware is to be supplied by others.

The air header pipe will have drop legs to provide air to each of the individual filter laterals.

Included with the air header pipe are the required type 316 stainless steel supports with securement hardware, PVC sleeves and adjustable stainless steel band hose clamps.

FILTER MEDIA:

Four (4) filter cells, 360 square feet each
TOTAL FILTER AREA: 1,440 square feet

1,575 cubic feet — SILICA SAND – 12” Depth plus
1/2” skimming allowance and 5% extra
Effective size: 0.45 mm to 0.55 mm
Uniformity coefficient: 1.40
79 Tons

4,080 cubic feet — FILTER ANTHRACITE – 33” Depth plus
1” skimming allowance
Effective Size: 0.90 mm to 1.10 mm
Uniformity coefficient: 1.30
102 Tons

Submittals:

Materials meet and/or exceed American Water Works Association Standard B100 (latest revision) for Filtering Material. Typical samples and/or test reports detailing the physical and chemical characteristics of the filtering material will be provided for review and approval as required by the specification. If independent testing is required per specification, test reports of the actual material produced will be submitted for approval prior to release for shipment.

Packaging and Placement of Materials:

Material will be packaged in semi-bulk containers, "Super Bags," with lifting sleeves and bottom discharge spout, containing approximately 2,000 to 4,000 pounds per sack and palletized with UV covers.

Quantities:

Quantities indicated above are Xylem Water Solutions USA, Inc best calculations of the quantity requirements. Five percent (5%) extra sand is included to cover incidental damage or loss. Any additional loss of material due to storage or handling is not covered by this proposal.

1.2 SERVICES

MANUFACTURER'S SERVICES (FILTER EQUIPMENT):

The services of a qualified Leopold technical representative to instruct the Contractor's personnel about the proper installation technique of the **filter equipment** will be provided for a period of six (6) days (8 hr/day) on site plus four (4) days travel time to and from the job-site in two (2) trips. Additional services may be obtained at the current prevailing rate plus living and travel expenses.

2 Price & Scope of Supply

2.1 MAIN SCOPE

BASIS of PRICING:

Any items and/or accessories not specifically called out in this quotation must be construed as being furnished by others.

This quotation is considered firm for 60 days. Any order received more than 60 days after the date of this quotation is reviewed by Xylem Water Solutions USA, Inc. before acceptance and is subject to changes in prices or delivery depending on conditions existing at the time of entry. Quoted prices are firm for delivery within 12 months from the delivery date stipulated in the plans & specifications or mutually agreed upon by Xylem Water Solutions USA, Inc. and Purchase Order issuer at time of order placement.

Due to the adverse global economic conditions currently affecting shipping costs, where included in this proposal, such costs are provided on a strict budgetary basis only. Xylem Leopold reserves the right to amend all quoted shipping costs prior to acceptance of any order and agreement of the delivery schedule. We further reserve the right to amend quoted shipping rates should the delivery schedule be changed during order execution through no fault of Xylem Leopold.

We do not include any applicable taxes.

Orders resulting from this quotation should be addressed to Xylem Water Solutions USA, Inc. 108 Tomlinson Drive Suite 400 – Zelienople, PA 16063, USA.

We propose to furnish the material described in this document for **a total selling price of: $379,580.00 .**
Pricing for the equipment and field services outlined in this proposal, DAP Jobsite per Incoterms 2020.

For further information pertaining to the equipment contained in this proposal, please contact our area representative, who is:

ISI West
4175 Mulligan Dr.
Longmont, CO. 80504
Phone: 970-535-0571

Attention: Frank Henderson

Pricing is based on the following payment terms (net 30 days):

10% following initial submittal for approval

80% following the date of the respective shipments of the product

5% following installation, not to exceed 150 days after shipment of the product *(whichever comes first)*

5% following start-up, not to exceed 180 days after shipment of the product *(whichever comes first)*

3 Commercial Terms & Conditions

3.1 DELIVERY SCHEDULE

3.1.1 Delivery time

Delivery of fabricated items should be 14 to 16 weeks and filter media 36 to 40 weeks after drawing approval.

3.1.2 Production schedule

Submittal of mechanical drawings for approval 4 to 6 weeks after order acceptance.

FILTER MEDIA WARRANTY (if applicable): SELLER warrants that its filter media products will meet the standards established by the latest edition of AWWA (American Water Works Association) B100. SELLER shall be responsible for verifying that the filter media meets or exceeds the AWWA B100 Standard at the point of sale. Testing shall be by an independent laboratory, which regularly performs testing of filter media. BUYER shall notify Xylem Water Solutions USA, Inc. immediately upon discovery of any defective product. The SELLER shall have the right to inspect said product and BUYER shall, if requested, return the defective product to the SELLER with transportation prepaid. NO LIABILITY IS ASSUMED BY THE SELLER UNDER ANY CIRCUMSTANCES FOR LABOR, MATERIAL OR OTHER COSTS ASSOCIATED WITH THE REMOVAL OR REPLACEMENT OF MEDIA UNLESS PREVIOUSLY APPROVED IN WRITING BY AN AUTHORIZED EMPLOYEE OF THE SELLER.

3.2 TERMS AND CONDITIONS OF SALE – NORTH AMERICA

This order is subject to the Standard Terms and Conditions of Sale – Xylem Americas effective on the date the order is accepted. Terms are available at http://www.xyleminc.com/en-us/Pages/terms-conditions-of-sale.aspx and incorporated herein by reference and made a part of the agreement between parties.
Different terms are hereby rejected unless expressly assented to in writing.

AGREEMENT TO PURCHASE: BUYER agrees to purchase the equipment and services herein in accordance with the terms and conditions set forth above.

_____
(BUYER)

BY:_____

_____

_____

_____, 20 _____

ACCEPTANCE: SELLER hereby accepts BUYER'S offer to purchase.

Xylem Water Solutions USA, Inc.

BY:_____

_____

_____

_____, 20 _____

Stantec

SOLDIER CANYON FILTER PLANT CAPACITY EXPANSION FEASIBILITY STUDY - DRAFT REPORT

April 28, 2023

Prepared for:
Soldier Canyon Water Treatment Authority

Prepared by:
Stantec Consulting Services, Inc.

Project Number: 181301565

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
1.0	Draft	M. Peters, S. Espinoza, A. Nishihara, S. Elliott	4/28/23	S. Trujillo	4/21/23	P. Kreft	4/21/23

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LIST OF FIGURES

Executive Summary

1 Introduction

The Soldier Canyon Water Treatment Authority (Authority) owns and operates the Soldier Canyon Filter Plant (SCFP). The Authority is comprised of East Larimer County Water District, Fort Collins-Loveland Water District and the North Weld County Water District. In 2021, the Authority completed upgrades to the SCFP to achieve 60 million gallons per day (mgd) plant production capacity and construct other needed improvements.

The SCFP treats raw water from two sources: the Poudre River via a connection to the Pleasant Valley Pipeline (PVP) and Horsetooth Reservoir. Current treatment facilities are based on conventional coagulation, flocculation, sedimentation, filtration, and disinfection processes. The plant was first constructed in 1962 with a single clarifier and four filters. It has been expanded on several occasions since then with new flocculation, sedimentation, filtration, disinfection, chemical systems, solids handling, and other related processes.

In anticipation of the next required expansion, the Authority retained Stantec to perform a desktop evaluation of the feasibility of up-rating existing infrastructure to achieve 72 mgd capacity and minimize the need to construct additional process units. The purpose of this report is to document the analysis performed for each process area, and to provide recommendations for future expansion planning.

2 Summary of Recommendations

Each process area was evaluated to identify the potential maximum capacity. Overall plant hydraulics were reviewed to determine the maximum potential hydraulic capacity of each segment of the plant. The results of these evaluations are summarized in Table ES-1 and Figure ES-1.

Table ES-1: Potential Process Capacities

Process	Potential Capacity	Note
Raw Water Piping	42" HT Pipeline = 50 mgd (8 fps) 36" PV Pipeline = 36 mgd (8 fps)	
Pretreatment	South Basins – 30 mgd North Basins – 37 mgd	• Testing recommended to increase loading on North Basins
Filters	70-79 mgd (would require re-rating with CDPHE to 8-9 gpm/SF)	• Requires testing; Current hydraulics limit flow to filters to 60 mgd
Disinfection	72 mgd	• Requires lower Finished Water Tank level
Finished Water Piping	72 mgd (4.6 fps in 66" piping)	
Finished Water Storage	1.7 hours at 72 mgd	• Evaluate adding more storage
Residuals Management	72 mgd	• Consider mechanical dewatering
Chemical Storage	72 mgd with minimum 15 days storage at average dose/average flow except soda ash	• Soda ash requires 2nd silo to meet criteria
Hydraulics	Limits SCFP to 60 mgd with current infrastructure (all filters operating at same flow; maximum Finished Water Tank Level maintained at 5241' elevation)	• Additional pretreatment basins required for 72 mgd; existing filters could achieve 72 mgd if Filters 1-4 are operated at current capacity and flows through Filters 5-20 are increased • Filter Effluent to FW tanks capable of 72 mgd with 0.75-ft decrease in Finished Water Tank Level

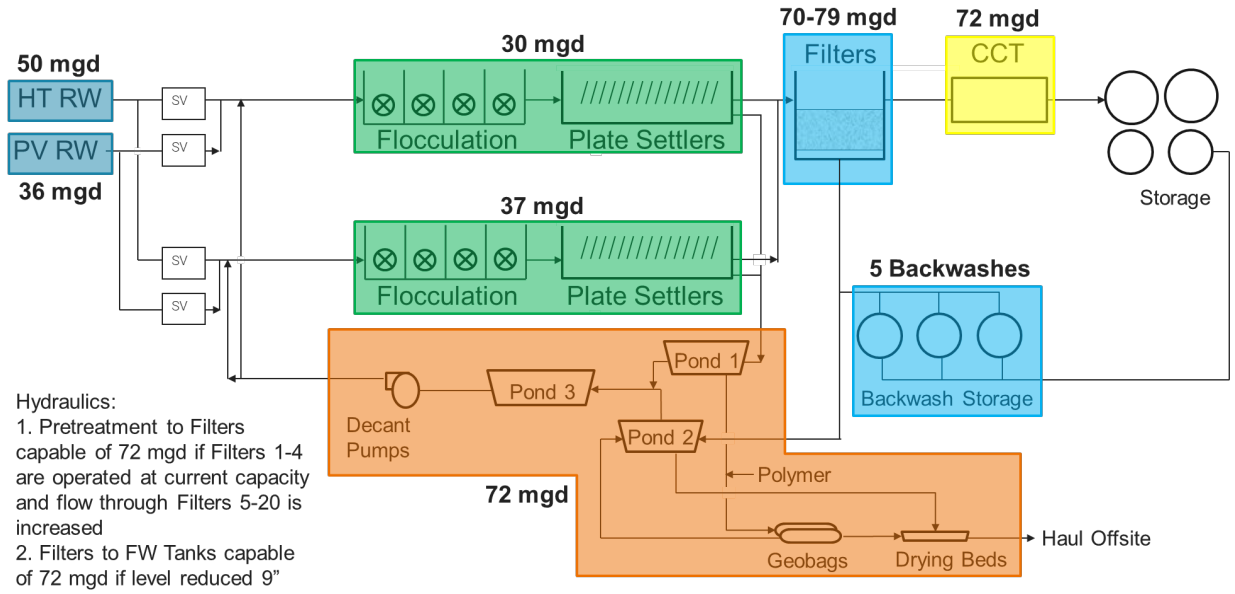

Figure ES-1: Potential Process Capacities

Acronyms / Abbreviations

Term	Definition
AVG	Average
°C	degrees Celsius
$CaCO_3$	calcium carbonate
CCT	Chlorine contact tank
CDPHE	Colorado Department of Public Health and Environment
ClO_2	Chlorine Dioxide
CT	Contact time
DBP	Disinfection by-product
FCWTP	Fort Collins Water Treatment Plant
ft	feet
fps	Feet per second
gal	gallons
gph	Gallons per hour
gpm	Gallons per minute
gpm/sf	Gallons per minute per square feet
HADES	Hydraulic Analysis Design and Evaluation System
HMW	High molecular weight
HRT	Hydraulic residence time
HT	Horsetooth Reservoir
HVAC	Heating, ventilation, and air conditioning
Lbs	pounds
MAX	Maximum
MG	Million gallons
Mgd	Million gallons per day
mg/L	milligrams per liter
mg/L-min	Milligrams per liter per minute (chlorination time value)
min	minute
NTU	Nephelometric turbidity units
PAC	Powdered Activated Carbon
PFD	Process Flow Diagram
pH	Potential Hydrogen
PVP	Pleasant Valley Pipeline
Poly 1	Polymer No.1

Term	Definition
Poly 2	Polymer No. 2
Poly 3	Polymer No. 3 (Flocculation Aid polymer)
ppd	Pounds per day
SCFP	Soldier Canyon Filter Plant
Authority	Soldier Canyon Water Treatment Authority
sf	Square feet
TOC	Total organic carbon
Tpd	Tons per day
UFRV	Unit filter run volume

1 Introduction

The Soldier Canyon Water Treatment Authority (Authority) owns and operates the Soldier Canyon Filter Plant (SCFP). The Authority is comprised of East Larimer County Water District, Fort Collins-Loveland Water District and the North Weld County Water District. In 2021, the Authority completed upgrades to the SCFP to achieve 60 million gallons per day (mgd) production capacity and construct other needed improvements.

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1.1 Purpose

In anticipation of the next required expansion, the Authority retained Stantec to perform a desktop evaluation of the feasibility of up-rating existing infrastructure to achieve 72 mgd capacity and minimize the need to construct additional process units. This report documents the analyses performed for each process area and to provide recommendations for future expansion planning.

1.2 Report Organization

The report is organized as follows:

- Introduction
- Summary of Existing Conditions
- Capacity Evaluations
    - Hydraulics
    - Raw Water Piping
    - Flash Mix
    - Flocculation and Sedimentation
    - Filtration
    - Disinfection (Chlorine Contact Tank)
    - Finished Water Piping
    - Finished Water Storage
    - Chemical Feed and Storage
    - Solids Management
- Summary and Recommendations

2 Summary of Existing Conditions

The SCFP is located on the northwest side of the Horsetooth Reservoir and receives water from two sources: 1) the Horsetooth Reservoir via an intake and raw water pipeline, and 2) the Poudre River via the Pleasant Valley Pipeline (PVP). The Horsetooth Reservoir intake and PVP also deliver water to the Fort Collins Water Treatment Plant (FCWTP) located across the street from the SCFP. The location of the SCFP and two raw water supplies are shown in Figure 2-1.

Figure 2-1: SCFP Vicinity Map

The SCFP is a conventional water treatment facility consisting of the following processes:

- Rapid mix
- Flocculation with horizontal paddlewheel flocculators
- Plate settler sedimentation basins
- Dual media deep bed filters
- Chlorine contact tank
- Finished water storage
- Chemical storage and feed facilities
- Decant ponds
- Solids drying beds

The process flow diagram (PFD) and site plan for the SCFP is shown in Figure 2-2 and Figure 2-3, respectively.

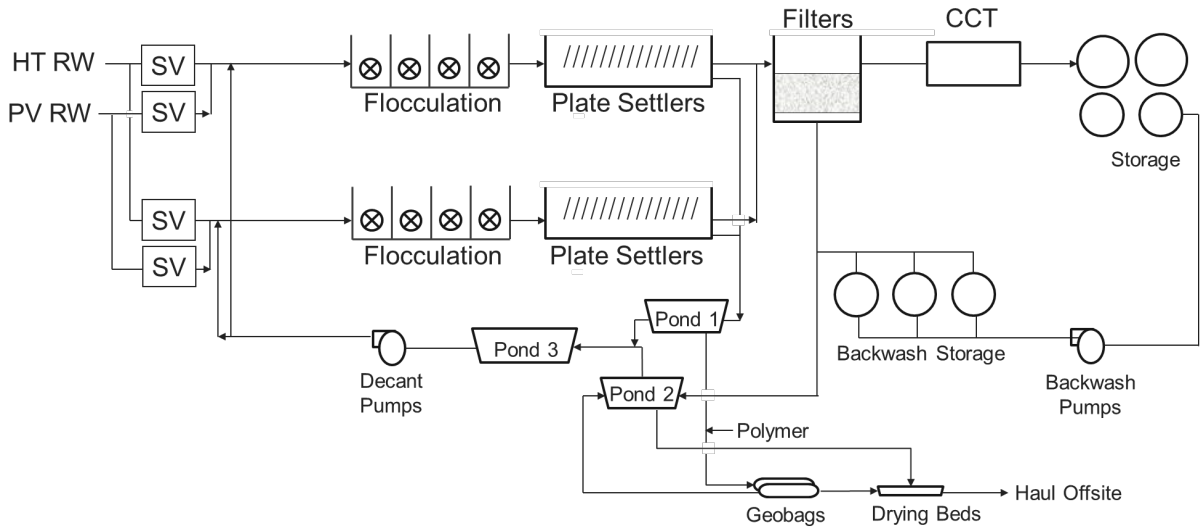


Figure 2-2: SCFP Process Flow Diagram

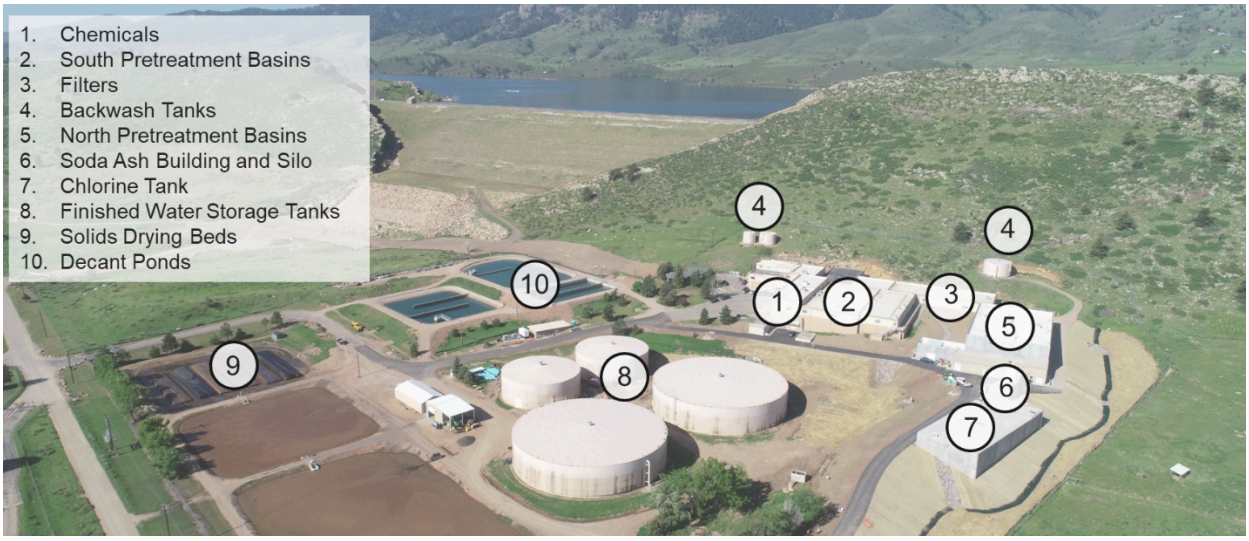


Figure 2-3: SCFP Site Layout

2.1 Flows and Water Quality Evaluation

This section presents a summary of flows and raw water quality for the SCFP.

2.1.1 FLOWS

Historical raw water flow data from 2020-2022 are summarized in Figure 2-4. The total flow to distribution ranged from 8 to 46 mgd during this time period, with an average annual flow of 23 mgd.

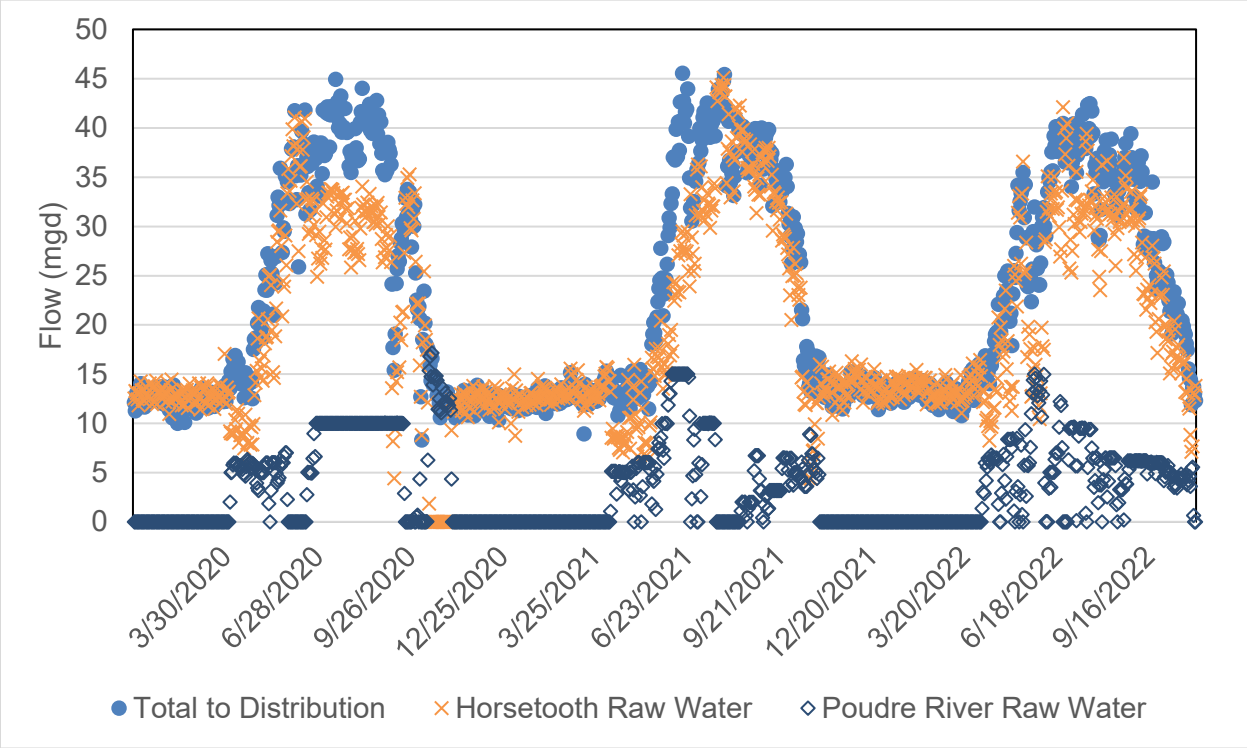


Figure 2-4: SCFP Flows from 2020-2022

2.1.2 WATER QUALITY

Key raw water quality parameters for the SCFP from 2020-2021 for the combined raw water supply are summarized in Table 2-1. Based on this data, the raw water quality for the SCFP has remained stable since the design of the 60 mgd expansion.

Table 2-1: Summary of Combined Raw Water Quality for 2020-2021

Parameter	Combined Raw Water		
	Minimum	Average	Maximum
Turbidity, NTU	0.4	1.8	21.1
Total Organic Carbon, mg/L	1.8	3.6	6.2
Temperature, deg C	1.0	7.0	17.8
pH	6.8	7.4	8.0
Alkalinity, mg/L as $CaCO_3$	18	27	44

2.2 Summary of Site Visit

A site visit was conducted on October 18, 2022 to discuss current operations with plant staff and to solicit feedback on the current performance of the plant to better understand the potential ability of the plant to operate at a higher capacity. Table 2-1 summarizes the key notes and observations from the site visit by process area.

Table 2-2: Summary of Observations from Site Visit

Plant Area	Notes
Overall Plant	• Summer hourly peak flow = 49.9 mgd, • Sustained low flow = 20 mgd • Poudre River source is shutoff when it rains due to high turbidity from wildfire burn areas in the watershed • Chlorine dioxide is not being used for disinfection credits • A new multilevel intake is being installed at Horsetooth Reservoir to allow water to be drawn from the depth with the most favorable water quality • Finished water storage tanks may be nearing end of life
North Flash Mix	• HVAC issues in the summer. Condensation is causing rusting.
Floc/Sed basins	• Operations is planning on having another backfill valve installed to be able to backfill both basins with clean water when a basin is brought back online. • The plant has observed a 50/50 split into each train. • South (1-4) and North (5-6) trains can be operated at different flow rates, but this is not the plant's preferred mode of operation. • Turbulence has been observed at beginning of floc train. When it is being refilled after maintenance, the water will cascade due to the entry being up top and the basin empty.
Filters	• Filters 1-4 were rehabbed including re-coating concrete. • Filters 5-8 will be rehabbed next. • Filter backwash tanks are getting old. Condition assessment is planned.
Chlorine Contact Tank	• Maintenance concerns: manganese build up, tank requires pumping to drain • Ladders are corroding.
Chemicals	• Overall chemical optimization would be beneficial. Streaming current analyzer is not being utilized. • Chlorine dioxide: Goulds pump failed. • Soda ash - Solution concentration changed to 0.5%

Plant Area	Notes
	- Issues with level probes. No scale provided, so operations is having issues with knowing exactly how much is inside silo. There is caking inside silo. - There was an error in the programming of the soda ash pumps. After a power outage, a reset must be done at the PLC. • PAC has not been used. System was built inside similar to the Longmont WTP.
Solids	• New decant pond is performing well • Expanding drying beds will be an issue due to limited space • Mechanical dewatering would help mitigate space issues for expansion. Nearby utilities use mechanical dewatering. Betasso Water Treatment Facility in Boulder has a belt press. Ft. Collins has a 50% design for mechanical dewatering.

3 Hydraulics

This section presents the evaluation of the hydraulic capacity of the plant, including the capacity of the raw water piping, overall gravity hydraulics from and the capacity of the raw and finished water piping and provides a summary of the recommended hydraulic capacity through each segment of the SCFP.

3.1 Raw Water Piping

Raw water piping capacity was evaluated based on a recommended maximum sustained velocity of 8 feet per second (fps). It should be noted that the existing pipes may be able to withstand higher sustained velocities, however the condition of some of them is unknown, therefore this was a conservative velocity that was selected for this evaluation. Table 3-1 presents the recommended capacities of the raw water piping for both sources based on this criteria. There was a parallel Horsetooth Reservoir (HT) pipeline installed during the 60 mgd expansion for redundancy. There is a short section where both lines combine and therefore the overall capacity of the 42” pipeline is based on flow through a single 42” pipe.

Table 3-1: Recommended Capacities of Raw Water Piping

Raw Water Piping	Recommended Capacity (Note 1)
42” HT Piping and Valves	50 mgd
36” PVP Piping and Valves	36 mgd (Note 2)
18” Sleeve Valve (PVP North Pretreatment Flow Control)	30 mgd (Note 3)
24” Sleeve Valve (HT North Pretreatment Flow Control)	60 mgd (Note 3)
24” Sleeve Valve (PVP South Pretreatment Flow Control)	60 mgd (Note 3)
24” Sleeve Valve (HT South Pretreatment Flow Control)	60 mgd (Note 3)

1. Based on maximum recommended velocity of 8 fps for pressurized pipe
2. Onsite Pleasant Valley Pipeline capacity. More capacity available in shared PV pipeline upstream.
3. Per manufacturer recommendation.

3.2 Gravity Hydraulics

During the recently completed 60 mgd expansion, significant modifications were made to the filter inlet piping and finished water piping to increase the hydraulic throughput to 60 mgd. During design, a full plant hydraulic model was developed using Stantec's Hydraulic Analysis Design and Evaluation System (HADES) software. Under the scope of this study, model runs up to 72 mgd were performed to evaluate the maximum recommended hydraulic capacity through the plant.

3.2.1 PRETREATMENT TO FILTER INFLUENT

Figure 3-1 shows schematically the flow path from the sedimentation basin effluent channels from the North and South Pretreatment Basins to each of the 20 filters. One of the primary limiting factors on hydraulic capacity through the plant upstream of the filters is the long distance the water must flow from the sedimentation basins to Filters 1 through 4. Without decreasing the maximum operating water surface elevation (which would decrease available filter driving head) or operating Filters 1-4 at a lower flow rate than Filters 5-20, the hydraulic capacity in this part of the plant is limited to 60 mgd. Modifications were made throughout the filter influent piping during the 60 mgd expansion to reduce headloss through the system and there are limited opportunities for further headloss reduction(s) in the existing system. Capacity could be increased to 72 mgd if Filters 1-4 are operated at the current rated capacity and Filters 5-20 are operated at higher rates.

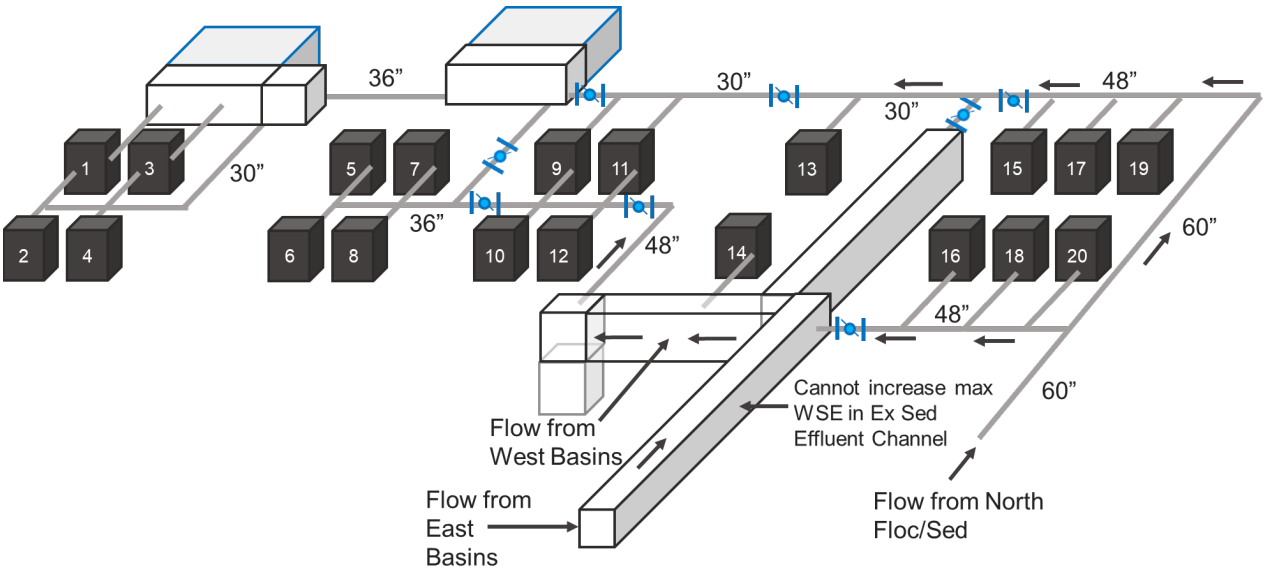


Figure 3-1: Flow Schematic from Sedimentation Basin Effluent to Filter Influent

3.2.2 FILTER EFFLUENT CHANNEL TO FINISHED WATER TANKS

Figure 3-2 shows the flow path from the filter effluent channel to the Finished Water Tanks and highlights the primary hydraulic constraints in the system, including the design of the CCT overflow weir and the maximum operating water surface elevation in the Finished Water Tanks. The CCT overflow weir was

designed to accommodate a potential 30 mgd overflow with 3” of freeboard between the overflow water surface elevation and the top of the filter effluent channel. Alarms will engage if the level in the CCT starts to rise, allowing an operator to shut off or turn down flow before a surcharge condition is fully realized. The filter effluent channel was not structurally designed to operate in a surcharged condition, so this is an important design feature to help protect the integrity of this structure. Due to both of these constraints, the hydraulic capacity from the filter effluent channel to the Finished Water Tanks is 60 mgd. If the finished water tank maximum level is decreased by 9 inches (0.75-ft), the capacity could be increased to 72 mgd. Storage implications of adjusting the maximum water surface elevation are discussed later in this report in the section on finished water storage capacity.

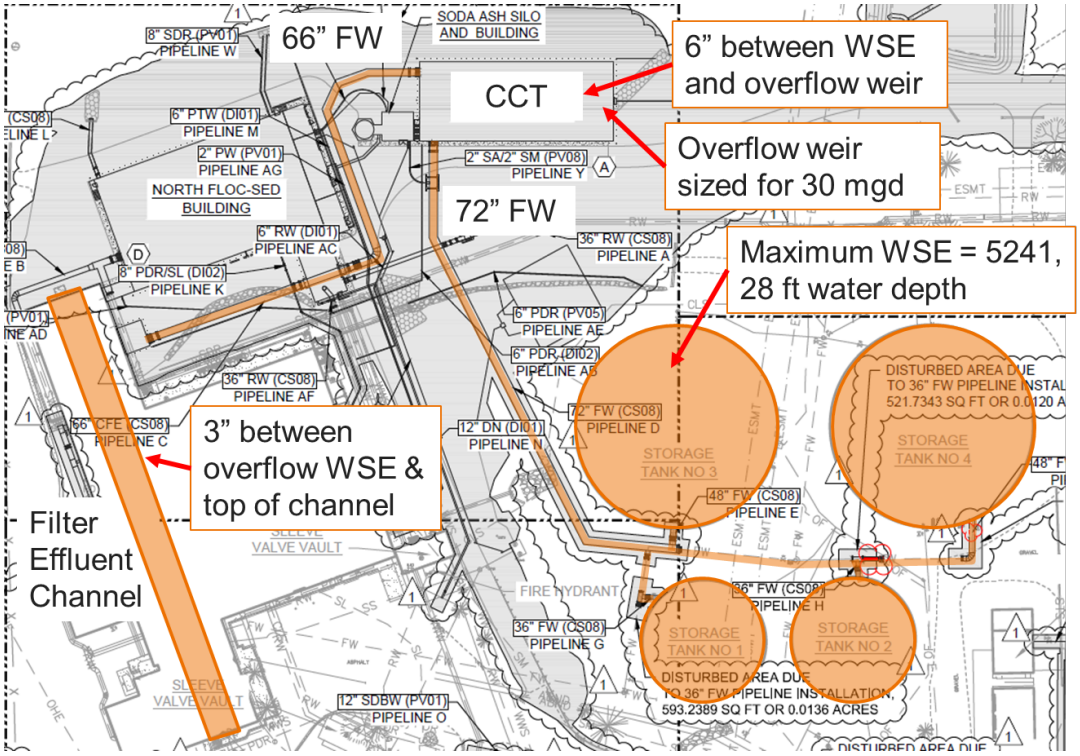


Figure 3-2: Filter Effluent Channel to Finished Water Tanks Flow Path and Hydraulic Constraints

3.3 Finished Water Piping

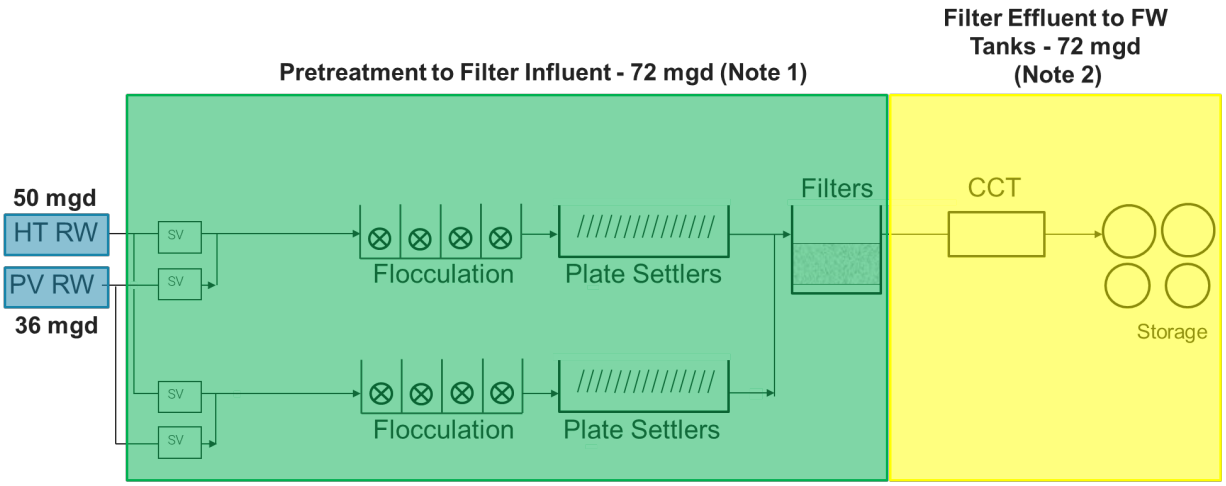
The 66” and 72” finished water piping is shown in Figure 3-2. The pipe velocities at the proposed 72 mgd are summarized in **Table 3-2.** Velocities through both sections are acceptable.

Table 3-2: Finished Water Pipe Velocities at 72 mgd

Pipe	Velocity at 72 mgd
66” FW	4.7 fps
72” FW	3.9 fps

3.4 Hydraulic Capacity Summary

The recommended hydraulic capacities through each segment on the plant are summarized in Figure 3-3.



Note 1: 72 mgd feasible if Filters 1-4 are operated at lower flows than Filters 5-20 but pretreatment limited to 67 mgd
Note 2: 72 mgd feasible if max storage tank operating level is decreased by 9”

Figure 3-3: Recommended Maximum Hydraulic Capacities

4 Flash Mix

The SCFP has two flash mix systems: one dedicated to the South Pretreatment Basins (1-4) and one for the North Pretreatment Basins (5-6). The capacities through the flash mix systems were evaluated based on maximum pipe velocity (8 fps). It should be noted that the existing pipes may be able to withstand higher sustained velocities, however the condition of some of them is unknown, therefore this was a conservative velocity that was selected for this evaluation. Table 4-1 summarizes the velocities under different flow conditions. Based on 8 fps velocity, the existing south basin piping can convey a maximum of 51 mgd and the north basin piping can convey a maximum of 37 mgd.

Table 4-1: Flash Mix Pipe Velocities at Different Flow Rates

Floc/Sed Basins	Flow	Pipe Velocity	Notes
South Basins (1-4) 42” Piping	30 mgd	4.8 fps	Current Operating Capacity
	40 mgd	6.4 fps	Design Capacity
	51 mgd	8.2 fps	Max Floc Basin Capacity
North Basins (5-6) 36 Piping	30 mgd	6.6 fps	Design Capacity
	37 mgd	8.1 fps	Potential Max Sed Basin Capacity
	42 mgd	9.2 fps	12 mgd expansion of North Basins

5 Flocculation/Sedimentation

Flocculation and sedimentation capacity is split between the South Basins (Flocculation and Sedimentation Basins 1-4) and North Basins (Flocculation and Sedimentation Basins 5-6). The capacity of the flocculation and sedimentation basins were evaluated based on the following considerations:

- Minimum flocculation hydraulic residence time (HRT) of 30 minutes per Colorado Drinking Water Design Criteria
- Current sedimentation basin performance (less than 1 NTU settled water turbidity)
- Maximum Loading Rate per Colorado Drinking Water Design Criteria = 0.40 gpm/sf
- Historic performance at higher flows rates (South Basins only)

Table 5-1 summarizes the current and potential maximum capacities of the South and North Pretreatment Basins. The current sedimentation basin performance is excellent, with settled water turbidities typically less than 1 NTU.

Table 5-1: Flocculation/Sedimentation Capacity Anaylsis

Parameter	South Basins (1-4)	North Basins (5-6)
Current Maximum Operating Flow	30 mgd	30 mgd
Current Flocculation HRT	51.4 min	37.6 min
Potential Maximum Flocculation Capacity @ 30 min HRT	51 mgd	37 mgd
Current Maximum Sedimentation Operating Flow	30 mgd (40 mgd design)	30 mgd (@ 0.32 gpm/sf)
Potential Maximum Sedimentation Operating Flow	40 mgd	37 mgd (@ 0.4 gpm/sf)

Basins 1-4 Recommendation

Sedimentation performance of the South Basins has historically deteriorated at flowrates greater than 30 mgd. Coagulation optimization may help improve performance, but there are several hydraulic issues that were identified in the SCFP Upgrades Evaluation Report (Stantec, July 2017) that likely contribute to poor performance at flows above 30 mgd:

1. Multiple 90-degree bends between floc/sed basins
2. Weir plate is below top of plates
3. Uneven plate installation

Straightening out the contorted flow path from flocculation to sedimentation would be a major upgrade and would be difficult and costly to achieve with the current arrangement. It was evaluated during the evaluation and was one of the most expensive options. Because of this, and operator experience of flows

higher than this resulting in poor performance, it is recommended the maximum operating capacity of 30 mgd be maintained.

Basins 5-6 Recommendation

At the maximum loading rate per Colorado Drinking Water Design Criteria, capacity could be 37 mgd. Although the combined settled water turbidity is typically below 1 NTU, data was not available to review current performance of Basins 5-6 independently of Basins 1-4. Review of Basins 5-6 performance during challenging water quality periods and full scale testing is recommended to determine how much the loading rate could be increased while maintaining performance.

6 Filtration

After sedimentation, settled water is collected in a combined effluent channel in the North and South Pretreatment Basins and conveyed to the existing filters. Modifications were made to the filter influent piping to allow settled water from the new Pretreatment Building to flow to all filters and ease existing hydraulic bottlenecks. These improvements also allowed for Filters 1-4, which previously received water from two antiquated clarifiers to now receive settled water with improved water quality.

SCFP performed pilot and full-scale testing from March 2017 to June 2017 to demonstrate the capability of the treatment facility's twenty (20) existing filters to support a higher loading rate. High-rate pilot data is shown on Figure 7-1. In October 2017, SCFP received approval from CDPHE to operate the existing filters at a maximum filtration rate of 7 gpm/sf. As a result of this up-rating, the existing filters can accommodate 60 mgd with up to three filters out of service (Table 6-1).

SCFP has also been implementing a program to replace media in all its filters. The latest project added air scour to Filters 1-4, in addition to the replacement of media. Plant staff have indicated that Filters 1-4 are the best performing with some of the longest unit filter run values (UFRVs). However, there has been some reported issues with the filtered water turbidimeters that can lose reliable flow as Filters 1-4 approach terminal headloss (between 9 to 10 feet). Staff is looking into the possibility of pumping or lowering the turbidimeters to resolve the issue.

Ending Headloss (in)	93	82	107	107	88	71	100	105	83	74	115	114	83	71	103	101	107	104	105	100	102	98	90	89	101	103	84	71
Ending Turbidity (NTU)	0.02	0.03	0.24	0.28	0.08	0.07	0.03	0.03	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.03	0.02	0.02	0.03
Settled Water Turbidity (NTU)	0.4	0.4	0.79	0.79	0.43	0.43	0.42	0.42	0.26	0.26	0.41	0.41	0.21	0.21	0.22	0.22	0.74	0.74	0.33	0.33	0.02	0.02	0.26	0.26	0.36	0.36	0.32	0.32
Filter Media	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C
Plant Flowrate (MGD)	26.5		17.87		17.32		20.49		17.72		36.07		15.32		14.95		43.03		42.62		15.17		22.6		33		42.82	
Start Date	5/30/2017		4/10/2017		4/12/2017		4/17/2017		4/24/2017		6/12/2017		4/26/2017		5/1/2017		6/19/2017		6/26/2017		5/4/2017		5/15/2017		6/6/2017		6/27/2017	
Filtraton Rate (gpm/sf)	5		7										8								9		10					

Figure 6-1: SCFP High-Rate Pilot Test Data (2017)

Table 6-1: Filtration Rate at Various Flows and Filter Operational Status

Parameter	Original 50 mgd	Current 60 mgd	Future 70 mgd	Future 72 mgd	Future 79 mgd
All filters on-line (20)	4.8 gpm/sf	5.8 gpm/sf	6.8 gpm/sf	6.9 gpm/sf	7.6 gpm/sf
One filter out of service (19)	5.1 gpm/sf	6.1 gpm/sf	7.1 gpm/sf	7.3 gpm/sf	8.0 gpm/sf
Two filters out of service (18)	5.4 gpm/sf	6.4 gpm/sf	7.5 gpm/sf	7.7 gpm/sf	8.5 gpm/sf
Three filters out of service (17)	5.7 gpm/sf	6.8 gpm/sf	7.9 gpm/sf	8.2 gpm/sf	9.0 gpm/sf

Filters 5-8 are the last filters to be improved and will have an implementation scope similar to Filters 1-4. Once this work is complete, it is anticipated that media will not need full replacement for another 10-20 years.

SCFP staff monitors filter bed depth on a routine basis and has trained staff how to minimize media attrition or damage during backwashes. The plant has some supersacks of anthracite on hand for annual top-offs, but in recent years has not needed to supplement more than an inch of media per filter.

SCFP currently has 268,000 gallons of backwash water storage. Based on the average filter backwash volume of 54,000 gallons (SCFP Upgrades Evaluation Report 2017), this equates to approximately 5 backwashes.

Recommendation

Based on the pilot testing from 2017, it is possible that the existing filters can be up-rated further. A realistic filtration rate between 8 to 9 gpm/sf could still give adequate performance for UFRV and an overall filtration capacity between 70 and 79 mgd. However, higher filtration rates will lead to shorter overall run times, and plant staff would need to dedicate more time to backwashing filters since it is currently a manual process. A recommendation to allow the flexibility to maximize the filtration rate, would be to add automation to the filter backwash system. The existing manual backwash system of the 20 filters requires significant operator attention, and the shortened run times is likely not a feasible option with manual operation. Current backwash storage capacity is sufficient for 72 mgd.

7 Disinfection

The disinfection system at the SCFP consists of primary disinfection with chlorine gas solution with the filter effluent pipe and chlorine contact tank (CCT) used to provide the required contact time (CT) to meet a 0.5-log G*iardia* inactivation and 2-log virus inactivation.

Disinfection capacity was evaluated based on the following considerations:

- Design summer flow conditions (June to August)
- Disinfection Requirements: 0.5 log *Giardia* / 2 log Viruses
- Design vs Current CCT Performance

7.1 Design Criteria

The disinfection system was designed based on summer conditions of 60 mgd peak flow. Design criteria are summarized in Table 7-1.

Table 7-1: Current Design Flow Design Criteria

Parameter	Units	Design (60 mgd)
Disinfection Requirement		0.5-log *Giardia*; 2-log virus inactivation
Design pH		7.8
Design Temperature	˚C	10
Design Free Chlorine Residual	mg/L	1.0
CCT Volume	MG	1.46
Hydraulic Residence Time at Max. Flow	min	35.0 minutes
CCT Overall Dimensions		142 ft x 56 ft x 29 ft
CCT Length to Width Ratio		41.08
Baffling Factor[1]		0.7
Pipeline Contactor Length	ft	370
Pipeline Contactor Diameter	ft	5.5

Parameter	Units	Design (60 mgd)
Pipeline Baffle Factor		0.7
CT Required (*Giardia*/Virus)	mg/L-min	150.19 *Giardia* / 6 virus
T (10)	min	25.6
CT Provided	mg/L-min	25.6
Log Inactivation Achieved		0.51-log *Giardia;* 16.3-log virus
[1]Assumed BF is conservative compared to the calculated BF of 0.76 and 0.72 based on CFD model.		

The current disinfection system using the design parameters listed above is not able to meet the disinfection requirements (i.e., 0.5-log *Giardia*; 2-log virus inactivation) at flow rates higher than 62 mgd. Recent operational data indicates the CCT is currently operating with a lower pH and higher chlorine residual than designed (Table 7-2). Based on this recent data, the disinfection system may be able to meet the disinfection requirements at 72 mgd, as the design conditions were conservative.

Table 7-2: CCT Recent Operational Data

Month	Max CFE pH	Min CFE Temp (Deg C)	Min Chlorine Residual (mg/L)
Nov-21	7.25	8.9	1.23
Dec-21	7.36	5.9	1.14
Feb-22	7.61	4.5	1.16
Mar-22	7.46	3.8	1.14
Apr-22	7.39	4.8	1.2
May-22	7.34	5.9	1.21
Jun-22	7.23	6.4	1.12
Jul-22	7.19	9.4	1.19
Aug-22	7.15	10.3	1.16
Sep-22	7.09	10.8	1.17
Oct-22	7.13	12.3	1.21
Nov-22	7.46	11	1.25
Dec-22	7.48	10	1.23

As peak flow occurs during the summer months, the highlighted months above are the values for chlorine residual, pH, and temperature that were used for the uprating analysis. The resulting pH and temperature for summer is lower than the designed pH and temperature (noted in Table 7-1). The resultant design criteria at 72 mgd is summarized in Table 7-3.

Table 7-3: Uprated CCT Flow Design Criteria

Parameter	Units	Uprating to 72 mgd
Disinfection Requirement		0.5-log *Giardia*; 2-log virus inactivation
Design pH		7.16
Design Temperature	˚C	9.4
Design Free Chlorine Residual	mg/L	1.16
CCT Volume	MG	1.46
Hydraulic Residence Time at Max. Flow	min	35.0 minutes
CCT Overall Dimensions		142 ft x 56 ft x 29 ft
CCT Length to Width Ratio		41.08
Baffling Factor[1]		0.7
Pipeline Contactor Length	Ft	370
Pipeline Contactor Diameter	Ft	5.5
Pipeline Baffle Factor		0.7
CT Required (*Giardia*/Virus)	mg/L-min	122.60*Giardia* / 6 virus
T (10)	min	25.39
CT Provided	mg/L-min	24.3
Log Inactivation Achieved		0.55-log *Giardia*; 16.03-log virus
[1]Assumed BF is conservative compared to the calculated BF of 0.76 and 0.72 based on CFD model.		

CCT can achieve a minimum of 0.5-log Giardia removal at 72 mgd with the current operating pH and chlorine residual. The maximum operating water surface elevation of the Finished Water Tanks would need be lowered as discussed in Section 3 and Section 8 in order to hydraulically convey 72 mgd through the CCT.

7.2 Recommendation

As a result of the hydraulic limitations, the recommendations noted in the hydraulic and finished water storage sections of this report will dictate the direction for the CCT.

8 Finished Water Storage

SCFP has four finished water storage tanks with a total of 11 million gallons of capacity. The operation of the finished water storage tanks is tied to the distribution system hydraulics. Currently, the tank level can fluctuate between 14 and 28 feet without losing pressure in the distribution system, limiting the effective storage capacity to half of each tank's capacity.

The North Weld County Water District Distribution System Master Plan is currently underway and it is possible that improvements implemented as a result of this effort will allow the full depth of the storage

tanks to be utilized. The amount of storage in hours for each flow rate is summarized in Table 8-1. At 72 mgd, SCFP has approximately 1.7 hours of storage available onsite. This means that plant staff have a challenging job trying to match influent flow to SCFP to the effluent demand and changing levels in the tanks. It is recommended that additional storage needs at SCFP be considered as part of the upcoming SCFP Master Plan.

Table 8-1: Finished Water Storage at SCFP

Flow	Storage (14 ft Depth)
72 mgd	1.7 hours
Maximum Capacity (60 mgd)	2 hours
Summer Demand (35 mgd)	3.5 hours
Winter Demand (17 mgd)	7 hours

9 Chemical Systems

Table 9-1 summarizes the chemicals and locations currently in use at SCFP.

Table 9-1 SCFP Chemical Summary

Chemical	Purpose	Dosing Location
Aluminum Sulfate (Alum) CalChem 2000 (Polymer No. 1) CalChem 2215 (Polymer No. 2)	• Coagulation	• Flash Mix
Drew Floc 409 (Polymer No. 3)	• Flocculation aid	• Flocculation Basins Stage 1
Sodium Chlorite	• ClO_2 on-site generation	• Not directly injected
Chlorine Dioxide	• Mn oxidation and & pre-oxidation of particles • Preliminary disinfection	• Raw Water
Sodium Fluorosilicate	• Fluoridation	• Finished Water
Sodium Carbonate (Soda Ash)	• Corrosion control (pH & alkalinity adjustment)	• Finished Water
Nalclear 7766 Plus	• Sludge conditioning	• Dewatering Building, prior to discharge of sludge to drying beds and/or geobags
Chlorine Gas (dosed as chlorine solution)	• Primary and residual disinfection • Pre-oxidation • Backwash chlorination • Chlorine dioxide generation	• Primarily filter effluent, but can be dosed at various other locations.
Powdered Activated Carbon	• Taste and Odor adsorption	• North Flash Mix • North Stage 1 Flocculation

The chemical systems were evaluated for storage and equipment capacity for flows up to 72 mgd using design criteria from the 60 mgd expansion project, because performance data was unavailable. The sizing criteria used are summarized in Table 9-2. Due to changes in supply chain reliability since the time of design, it is recommended that the chemical storage sizing criteria be reviewed as part of the Master Plan. Evaluations for each chemical system are described in the following sections and summarized in Table 9-3.

Table 9-2: Chemical Storage and Feed System Sizing Criteria

System	**Sizing Criteria**
Chemical Storage	Sized for 15 days at average flow and average dose
Chemical Feed Pumps	Sized to achieve range of flow from minimum dose/flow to maximum dose/maximum flow

9.1 Coagulant Chemicals - Aluminum Sulfate, Polymer No. 1 and Polymer No. 2

Aluminum sulfate (Alum), aluminum chlorohydrate (ACH) (referred to by SCFP as Polymer No. 1 and commercially as CalChem 2000) and ACH with propriety compound (referred to by SCFP as Polymer No. 2 and commercially as CalChem 2215) are delivered to the SCFP in liquid form and stored in bulk tanks. Each chemical is provided with a single day tank that supplies metering pumps that are dedicated to the North or South Pretreatment Basins. Alum is commonly used during summer months, primarily when the SCFP is being partly supplied with Poudre River water, while the Poly 1 and 2 are used year-round. As shown in Table 9-3, the current systems meet the sizing criteria and are sufficient for 72 mgd.

9.2 Polymer No. 3

Polymer No. 3 (DrewFloc 409) is delivered to the SCFP as a 100% dry chemical in 50 lb. bags. There are two dedicated dry chemical makeup equipment systems to the North or South Floc/Sed Trains which are fed to the first stage of the flocculation basins. Each system consists of a loading hopper, volumetric feeder, and two day tanks which serve to mix, age and dilute the chemical prior to dosing. Metering pumps draw from the day tanks and feed the chemical to each of the four flocculation basins. As shown in Table 9-3, the current systems meet the sizing criteria and are sufficient for 72 mgd.

Table 9-3: Storage and Equipment Summary

Chemical	Average Design Dose	Max Design Dose	Current Storage	Pumps (Duty + Standby)	Total Capacity	Metering Rate at 72 mgd Capacity[2]	Storage at 60 MGD		Storage at 72 MGD	
							Average[1]	Max[2]	Average[1]	Max[2]
Alum	6 mg/L	20 mg/L	18,000 gal	3 + 3	119.3 gpm	99.6 gpm	58 days	9 days	49 days	7 days
Poly 1	11 mg/L	20 mg/L	18,000 gal	3 + 3	99.9 gpm	44.8 gpm	44 days	12 days	37 days	10 days
Poly 2	3 mg/L	15 mg/L	12,000 gal	3 + 3	99.9 gpm	33.6 gpm	161 days	16 days	134 days	13 days
Poly 3	0.15 mg/L	0.25 mg/L	2 pallets	7 + 2	266 gpm	189.5 gpm	0.75 bags per day used	2.5 bags per day used	0.9 bags per day used	3 bags per day used
Chlorine Gas	2.2 mg/L	4 mg/L	16,000 lbs	Generators	3600 gpm	2306 gpm	24 days	7 days	20 days	6 days
Sodium Chlorite	1.33 mg/L	1.74 mg/L	6,000 gal	Generators	1000 gpm	781 gpm	41 days	15 days	34 days	13 days
Chlorine Dioxide	0.9 mg/L	1.3 mg/L	16,000 gal	2 + 1	1560 gpm	1656 gpm	24 days	7 days	20 days	6 days
Soda Ash	15 mg/L	40 mg/L	32 tons	2 + 1 (1)	5298 gpm	3815 gpm	53.2 days	10 days	44.4 days	8.3 days
Sodium Fluorosilicate	0.5 mg/L	0.7 mg/L	2 pallets	1 + 1	762 gpm	911 gpm	4 bags per day used	12 bags per day used	5 bags per day used	15 bags per day used
Powdered Activated Carbon (PAC)	15 mg/L	25 mg/L	Supersacks	N/A	261 lbs/hr	313 lbs/hr	3.2 supersacks per day used (max dose)	N/A	3.8 supersacks per day used (max dose)	N/A
Anionic Polymer	29 mg/L	50 mg/L	500 gallons	1 + 1	176 gpm	85 gpm	566 days	58 days	402 days	48.8 days

1. Average flow (30 mgd - current or 36 mgd - uprated) and average dose
2. Maximum flow and maximum dose

9.3 Sodium Fluorosilicate

Sodium fluorosilicate (Na2[SiF6]) is delivered to the SCFP as a 95% dry chemical in 50 lb bags. Dry chemical makeup equipment consists of a loading hopper, volumetric feeder, and mixing tank. Chemical solution was designed to be fed by feed pumps to the combined filter effluent before it enters the CCT. As shown in Table 9-3, the current systems meet the sizing criteria and are sufficient for 72 mgd

9.4 Soda Ash

Soda ash (sodium carbonate) is delivered to SCFP as a 100% dry chemical and pneumatically transferred directly from the delivery truck into one of three bulk silos. Feeders, augers and slurry tanks are then used to create a 0.5% solution which is pumped to the finished water after the CCT and before the Finished Water Storage Tanks.

The soda ash system provided in the 60 mgd expansion was sized for 60 mgd (and therefore do not meet the storage sizing criteria at 72 mgd) and the systems in the South Chemical Building were kept in use for redundancy. Because the older systems were only meant as backup, a single pump and day tank were installed. Plant staff have indicated that they operate all soda ash systems in a lead-lag configuration. The single pump in the south can be a point of failure for that system. It is recommended that the mechanical appurtenances for the south systems be evaluated for remaining useful life as they are over 30 years old to determine if keeping these in service or if installing a new silo is a better value to SCFP during the next expansion. There is additional space at the North Soda Ash Building for a second silo if the south equipment should be decommissioned.

9.5 Anionic Polymer

SCFP uses the high molecular weight (HMW) emulsion-type anionic polymer Nalclear 7766 Plus for solids dewatering. Polymer is delivered to site in 250-gallon totes which feed to a blending unit where polymer is mixed with dilution water to approximately 0.5 percent concentration. The solution is dosed to the solids piping. The system can meet 72 mgd, but redundancy is not provided. The uninstalled spare pump could be permanently mounted for redundancy purposes and to provide for additional capacity to meet summer production periods.

9.6 Chlorine

Chlorine gas is delivered to the site in pressurized steel containers with a capacity of 2,000 lbs. (one ton) each. Individual vacuum regulators are mounted directly to each container. The system has since been redesigned to accommodate two vacuum regulators which are connected to a common vacuum manifold. Six containers are connected to the manifold, with four used for duty and two in standby mode. Together, they supply six chlorinators. As shown in Table 9-3, the current systems meet the sizing criteria and are sufficient for 72 mgd.

9.7 Powdered Activated Carbon

A powdered activated carbon (PAC) system is installed at SCFP for taste and odor control. PAC is delivered as 2000-lb SuperSacks which are mounted to a feed system. It is metered and then diluted with carrier water to the North Flocculation Basins. The system is sized for 30 mgd and 5 days of storage. If SCFP has a taste and odor event, 3-4 SuperSacks per day would need to be delivered to site. If the North Pretreatment Basins were uprated to 37 mgd, changes to this system are not recommended due to the infrequent nature of taste and odor events.

9.8 Summary

Most of the existing chemical systems meet the sizing criteria shown in Table 9-2 at 72 mgd. The following improvements may be required for 72 mgd based on the design doses and sizing criteria established during the 60 mgd expansion:

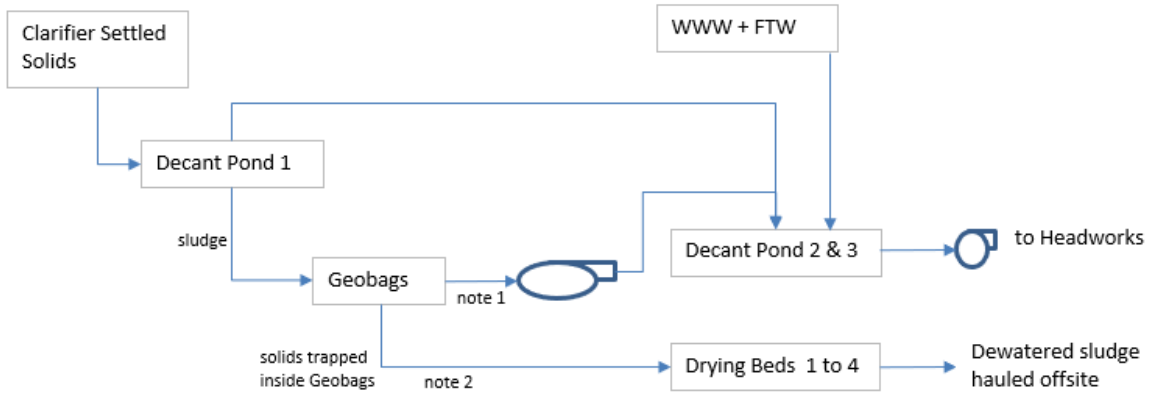
- An additional soda ash silo may be required to meet the storage sizing criteria. An evaluation of the remaining useful life of the existing soda ash systems at the South Chemical Building to determine if an additional soda ash silo should be installed at the Soda Ash Building during the next expansion. If the South Chemical Building soda ash systems remain in operation at the next expansion, an additional soda ash pump will likely be required.
- An additional pump may be needed for chlorine dioxide at maximum conditions
- An additional pump may be needed for sodium fluorosilicate at maximum conditions.
- It is recommended that a comprehensive evaluation of the chemicals used, design chemical doses, and storage sizing criteria be performed as part of the SCFP Master Plan. A full chemical study and additional jar testing have the potential to optimize the type of chemicals used as well as possibly reduce the number of coagulants. Plant performance data should also be reviewed to see if the doses are optimized.

10 Residuals Management

The residuals management system at the SCFP consists of decant ponds, geobags, and drying beds, and the PFD is shown in Figure 10-1.

The following were used to evaluate the capacity of the existing system:

- Average and Maximum Chemical Dosages
- Average and Maximum Water Quality
- Solids Balance Calculation



Notes:
1. Liquid which is extruded from Geobag fabric is assumed to be recycled to Decant Pond #2. In practice, however, a large portion will be evaporated.
2. Solids captured in the Geobags are windrowed in one of several drying beds. Fully dewatered solids are hauled to a landfill.

Figure 10-1 Residuals Management Process Flow Diagram

The residual management system was designed based on the raw water quality and corresponding chemical dosages summarized in Table 12-1.

Table 10-1 Current Designed Flow Design Criteria

Design Criteria	Average	Maximum	PAC[1]
Flow, (mgd)	60	60	60
Raw Water Turbidity (NTU)	2.0	5.6	5.6
Raw Water TOC (mg/L)	3.6	6.0	6.0
Coagulant Dosage (mg/L)	6	20	20
Polymer 1 Dose (mg/L)	11	20	20
Polymer 2 Dose (mg/L)	3	15	15
Solids to Landfill, (tpd)	1.6	3.9	7.2
Solids Hauling weight, wet tons (tpd)	2	5.5	10.2
Days in Geobags, (days)	17.3	7.1	2.6

[1]Assumed PAC dose is 25 mg/L on half of raw water flow.

The current residuals management system with no modifications has the capacity to treat the solids production at 72 mgd as a result of the small incremental increase in solids production. However, at flows higher than 72 mgd, the solids production will be significant and converting to mechanical dewatering should be considered. The solids production at 72- and 100 mgd is summarized in **Table 10-2** assuming the same average and maximum water quality and chemical dosages as the current design. Also, plant performance data for the solids management system was not available but could prove to be very insightful on the capacity of the residuals system. PAC does have a large impact on the quantity of residuals, but it also reportedly dries much faster. At the time of writing this report, the PAC system had not been operated and the actual solids production had not been measured.

Table 10-2 Solids Design Criteria at 72 and 100 mgd

Design Criteria	Average			Maximum			PAC[1]		
Flow, (mgd)	60	72	100	60	72	100	60	72	100
Solids to Landfill, (tpd)	1.6	1.9	2.6	3.9	4.6	5.9	7.2	8.6	11.9
Solids Hauling weight, wet tons (tpd)	2	3	3.8	5.5	6.6	8.4	10.2	12.3	16.9
Days in Geobags, (days)	17.3	14.5	10.4	7.1	6.0	4.7	2.6	2.2	1.6

[1]Assumed PAC dose is 25 mg/L on half of raw water flow.

Recommendations

The solids management system has the capacity to meet flows up to 72 mgd. It is recommended to evaluate converting to a mechanical system at either flows higher than 72 mgd or if dosing PAC more frequently is needed. However, the current solids management system requires a large footprint; therefore, to minimize necessary land acquisition for future expansions evaluating conversion to mechanical dewatering is recommended.

11 Summary of Recommendations

The potential capacities for each process area identified through this study are summarized in Table 11-1 and Figure 11-1. Based on this analysis, the SCFP may be able to be uprated to 67 mgd using the existing infrastructure, but additional pretreatment process units will be required to achieve 72 mgd through the plant. The other capacity limitations identified in the filter influent piping and CCT may be resolved by operating Filters 1-4 at the current operating capacity, increasing flow through Filters 5-20 and lowering the maximum water surface elevation in the Finished Water Tanks.

Table 11-1: Potential Process Capacities

Process	Potential Capacity	Note
Raw Water Piping	42" HT Pipeline = 50 mgd (8 fps) 36" PV Pipeline = 36 mgd (8 fps)	
Pretreatment	South Basins – 30 mgd North Basins – 37 mgd	• Testing recommended to increase loading on North Basins
Filters	70-79 mgd (would require re-rating with CDPHE to 8-9 gpm/SF)	• Requires testing; Current hydraulics limit flow to filters to 60 mgd
Disinfection	72 mgd	• Requires lower Finished Water Tank level
Finished Water Piping	72 mgd (4.6 fps in 66" piping)	
Finished Water Storage	1.7 hours at 72 mgd	• Evaluate adding more storage
Residuals Management	72 mgd	• Consider mechanical dewatering
Chemical Storage	72 mgd with minimum 15 days storage at average dose/average flow except soda ash	• Soda ash requires 2nd silo to meet criteria
Hydraulics	Limits SCFP to 60 mgd with current infrastructure (all filters operating at same flow; maximum Finished Water Tank Level maintained at 5241' elevation)	• Additional pretreatment basins required for 72 mgd; existing filters could achieve 72 mgd if Filters 1-4 are operated at current capacity and flows through Filters 5-20 are increased • Filter Effluent to FW tanks capable of 72 mgd with 0.75-ft decrease in Finished Water Tank Level

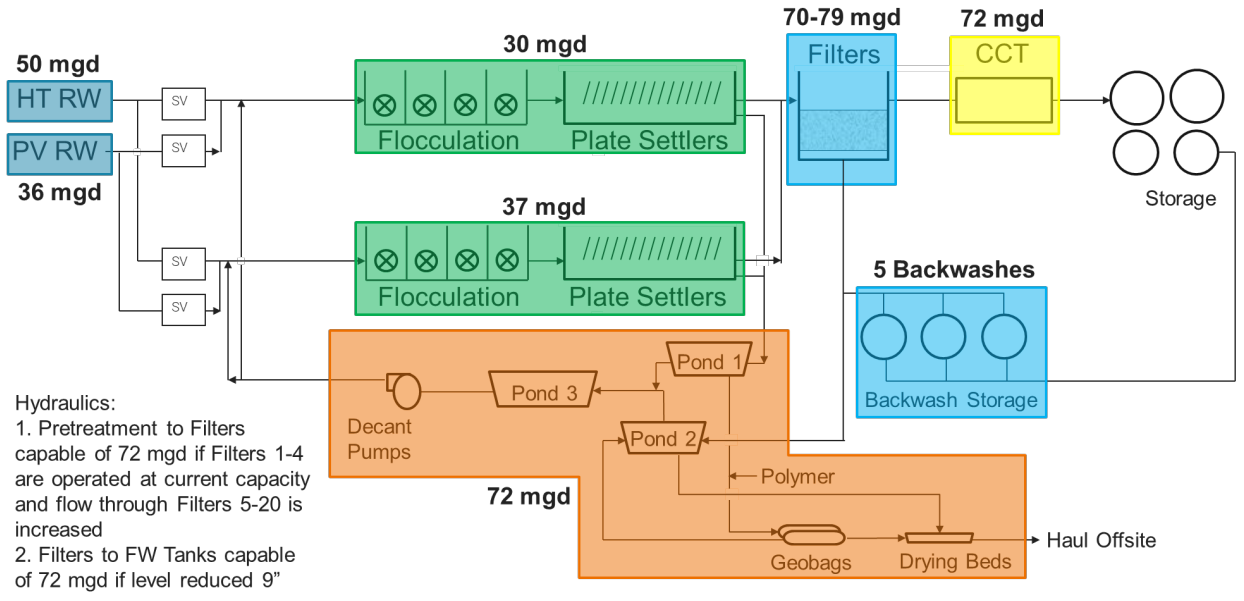


Figure 11-1: Potential Process Capacities

It is recommended that the ultimate future site layout be developed to inform the next incremental capacity expansion. Considerations for future expansion include:

- Varying geotechnical requirements across the site; hillside expansion requires expensive pier foundations
- Economics of gravity hydraulics versus pumping to storage
- Routing pipes to new process units
- Minimizing need for land acquisition

A potential future site layout at 120 mgd that limits future property acquisition by conversion to mechanical dewatering and limits hillside expansion is provided in Figure 11-2.

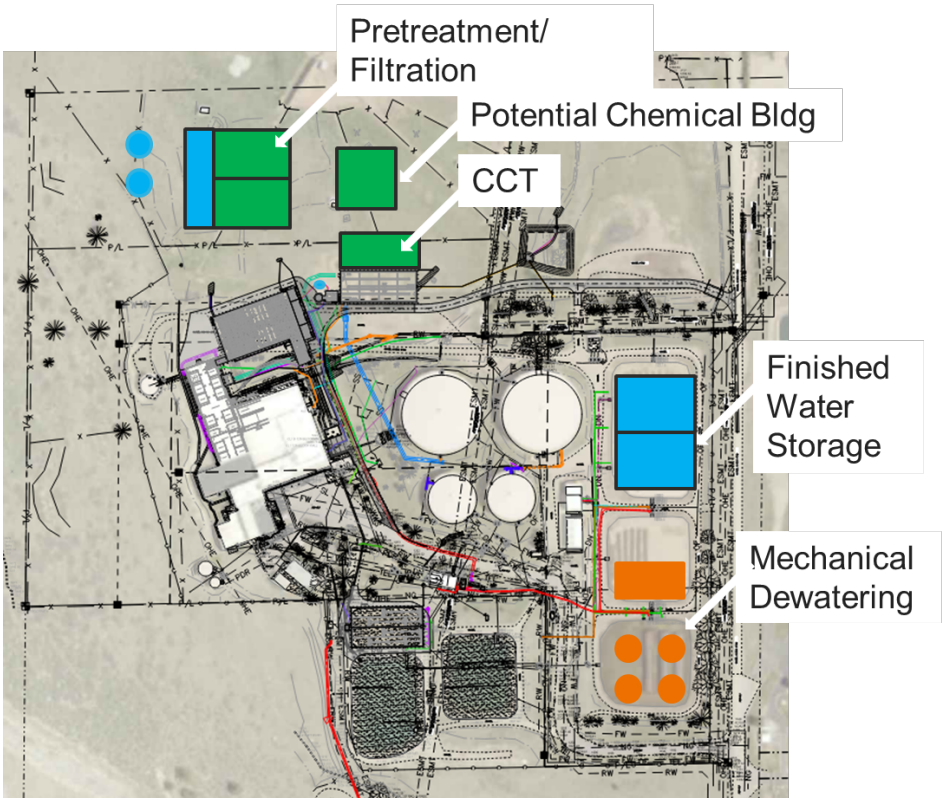


Figure 11-2: Potential Future Site Layout at 120 mgd

SOLDIER CANYON WATER TREATMENT AUTHORITY

To: Soldier Canyon Water Treatment Authority Board

From: Mark Kempton, P.E., CWP

Date: May 11, 2023

Re: Proposed amendment to Authority Creation Agreement to include ownership of the Pleasant Valley Pipeline (PVP), Sed Basin, Screen and Horsetooth facilities

Table 1: Tentative Ownership in the PVP (Source: Interim PVP Agreement Capital Costs - June 1999 Soldier Canyon Filter Plant Steering Committee Meeting Minutes)

	Capacity in the PVP		
Fort Collins	**ELCO**	**FCLWD**	**NWCWD**
50%	11.87%/11.1 cfs	19.38%/18 cfs	18.74%/17.4 cfs

Table 2: Proposed Capacity in the PVP Sed Basin(Source: Fort Collins IGA based on PVP flows)

	Capacity in the PVP Sed Basin		
Fort Collins	**ELCO**	**FCLWD**	**NWCWD**
53%	11%	18%	18%

Table 3: Proposed Capacity in the PVP Screen (Source: Based on 50/50 PVP ownership and %s in Table 2 - Fort Collins IGA)

	Capacity in the PVP Screen		
Fort Collins	**ELCO**	**FCLWD**	**NWCWD**
50%	11.6%	19.2%	19.2%

Table 4 is for Reference and comparison purposes only.

Table 4: Authority Ownership (Source: 2017 Authority Creation Agreement)

	Authority Ownership		
	ELCO	**FCLWD**	**NWCWD**
	22.865%	38.405%	38.73%
50% for comparison to numbers above	11.43%	19.2%	19.37%

Tables 5 and 6 are for existing executed agreements with the individual Districts and have been requested to be included in the Creation Agreement for reference only.

Table 5: Northern Water 57-inch Horsetooth Outlet Pipe Capacities (Source: 1977 Agreement/w individual Districts and Northern Water)

	Capacity in the HT Outlet Line - %/cfs/MGD		
	ELCO	**FCLWD**	**NWCWD**
	12%/54.9 cfs/35 MGD	3%/14.2 cfs/9.1 MGD	5%/25.3 cfs/16.4 MGD

Table 6: Horsetooth Outlet Project Pump Station – 35 MGD maximum capacity (Source: April 2020 Agreement/w individual Districts and Fort Collins)

	Capacity in the HOP Pump Station - %/cfs		
Fort Collins	**ELCO**	**FCLWD**	**NWCWD**
43.3%/23.7 cfs	8.5%/4.6 cfs	14.2%/7.7 cfs	34%/18.6 cfs