November 1, 2022

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

RE: Cherry Creek HSPF Watershed Model 2030 Buildout Scenario

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

BACKGROUND

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

POINT SOURCE TIME-SERIES UPDATES

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

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

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

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

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

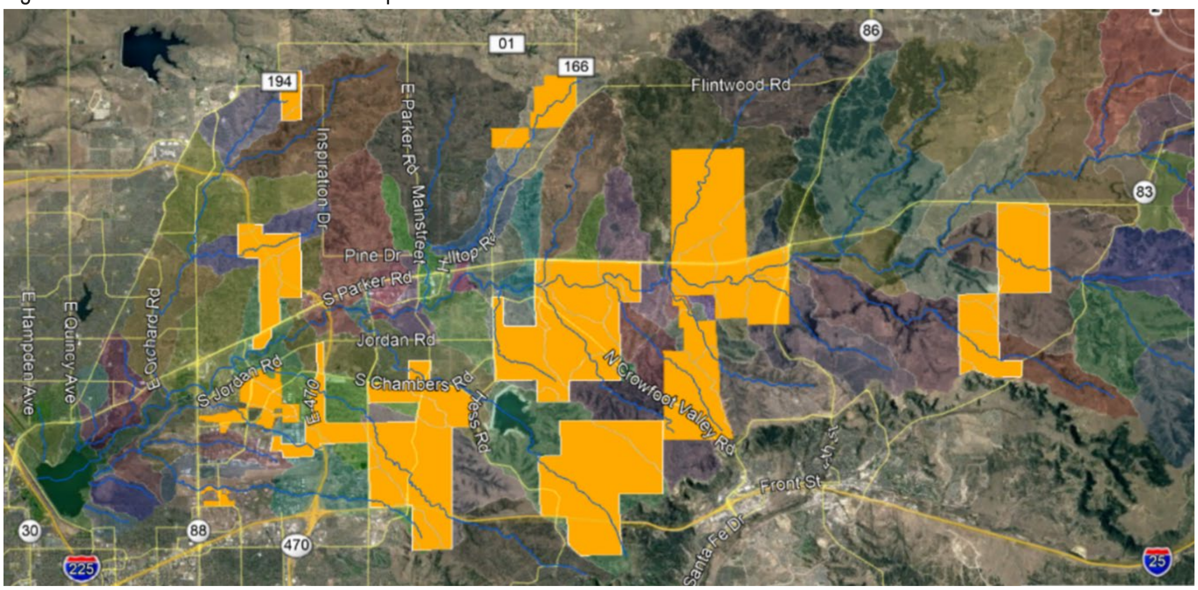
LAND COVER UPDATES

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

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

The areas expected to be developed by 2030 (not including open water and wetlands) that were not represented as developed in the NLCD 2016 land cover were represented using a different mass link so that reduced flows and improved water quality from improved development water quality requirements could be included. Surface runoff volume on the additional 2030 developed lands was initially reduced by 20 percent; TSS (sand, silt, and clay) was reduced by 50 percent; TP was reduced by 25 percent; and nitrogen was reduced by 10 percent from the base water quality runoff for the medium intensity developed land. These percentage reductions were based upon the monitored reductions presented in the "International Stormwater BMP Database – 2020 Summary Statistics", 2020. It should be noted that there were consistent shifts from low intensity developed land to open developed land (open land within developed areas) from the NLCD 2011 to the NLCD 2016 land cover. An additional scenario was run with the reduction of surface runoff volume from the additional 2030 developed lands of 40 percent (an additional of 20% as compared to other model runs) as described in the results portion of this memorandum.

Figure 1: Modeled additional 2030 development areas after 2016



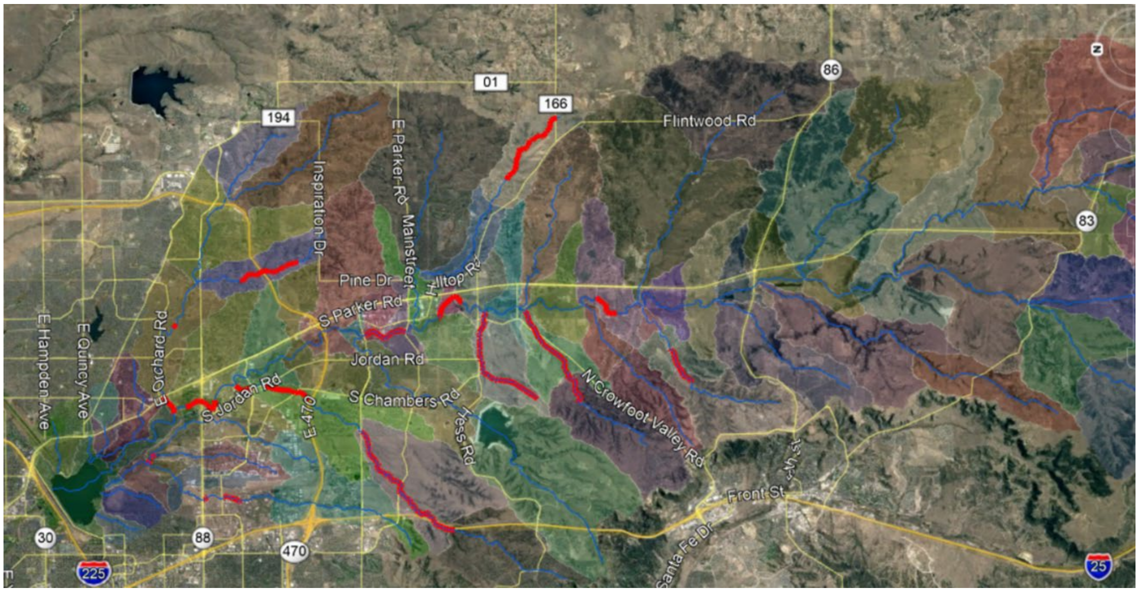
NEW PRF / STREAM RESTORATION REPRESENTATIONS

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

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

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

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



SCENARIO SEQUENCING

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

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

RESULTS

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

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

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

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

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

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

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

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

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

CONCLUSIONS

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

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

RECOMMNENDATIONS AND NEXT STEPS

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

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

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

Sincerely,

Alan J. Leak

Alan Leak, P.E.
Principal

APPENDIX A

Figure 3: Modeled 2030 flow into Cherry Creek Reservoir.

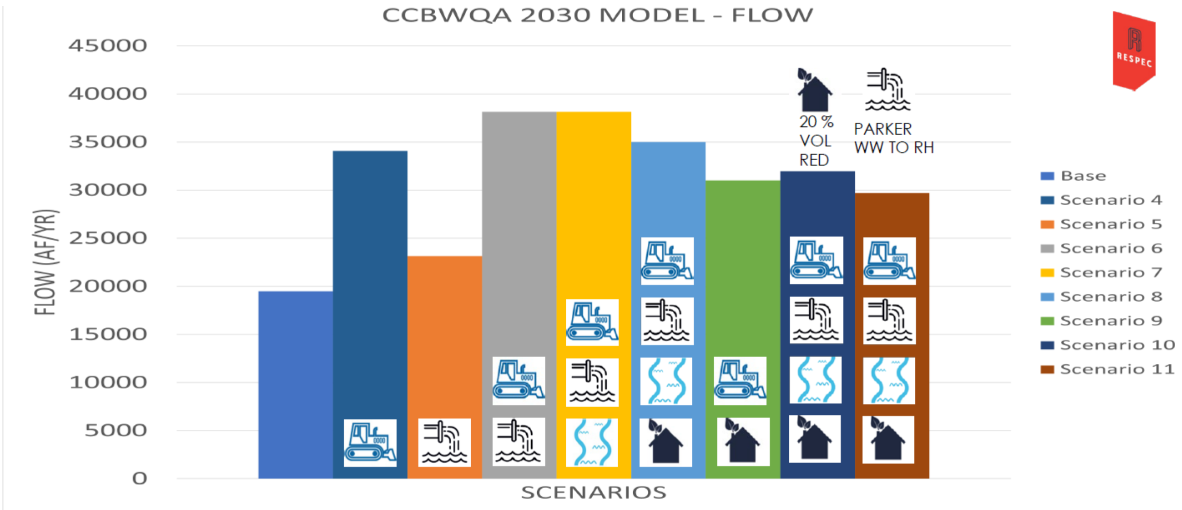


Figure 4: Modeled 2030 total phosphorus load into Cherry Creek Reservoir.

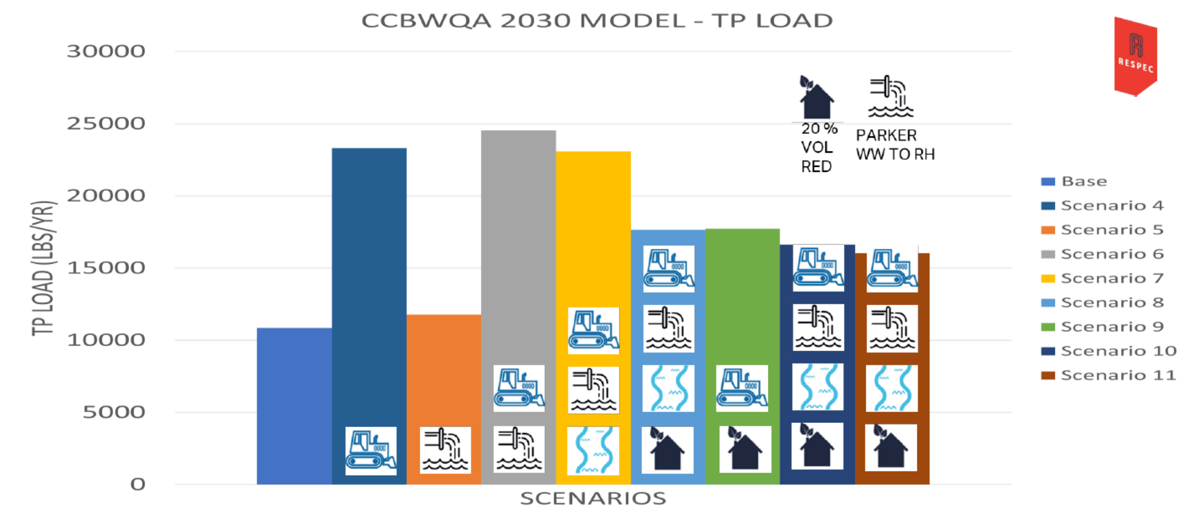


Figure 5: Modeled 2030 total phosphorus concentration into Cherry Creek Reservoir.

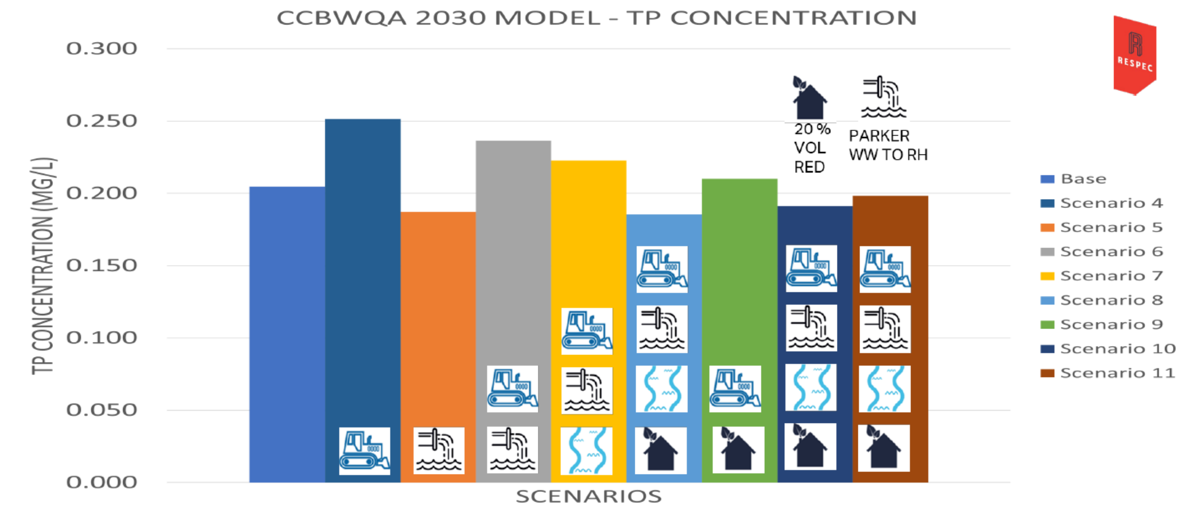


Figure 6: Modeled 2030 total nitrogen load into Cherry Creek Reservoir.

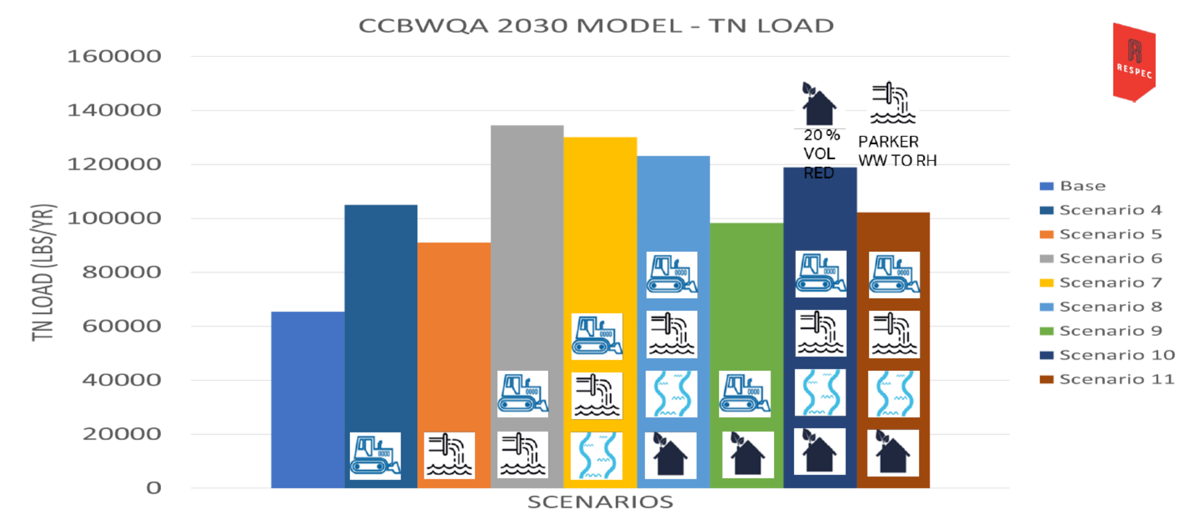


Figure 7: Modeled 2030 total nitrogen concentration into Cherry Creek Reservoir.

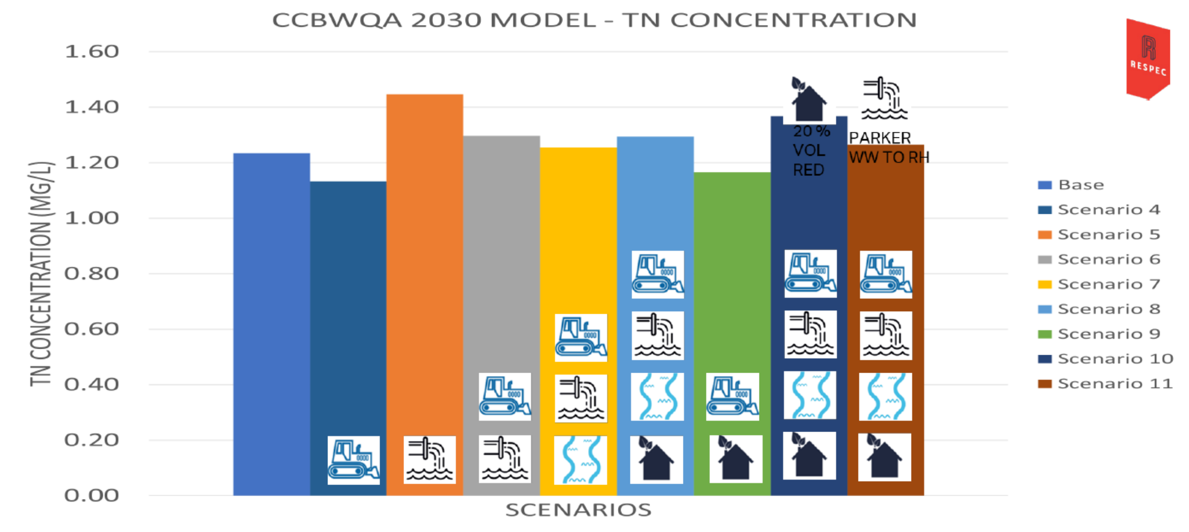


Figure 8: Modeled 2030 total suspended solids load into Cherry Creek Reservoir.

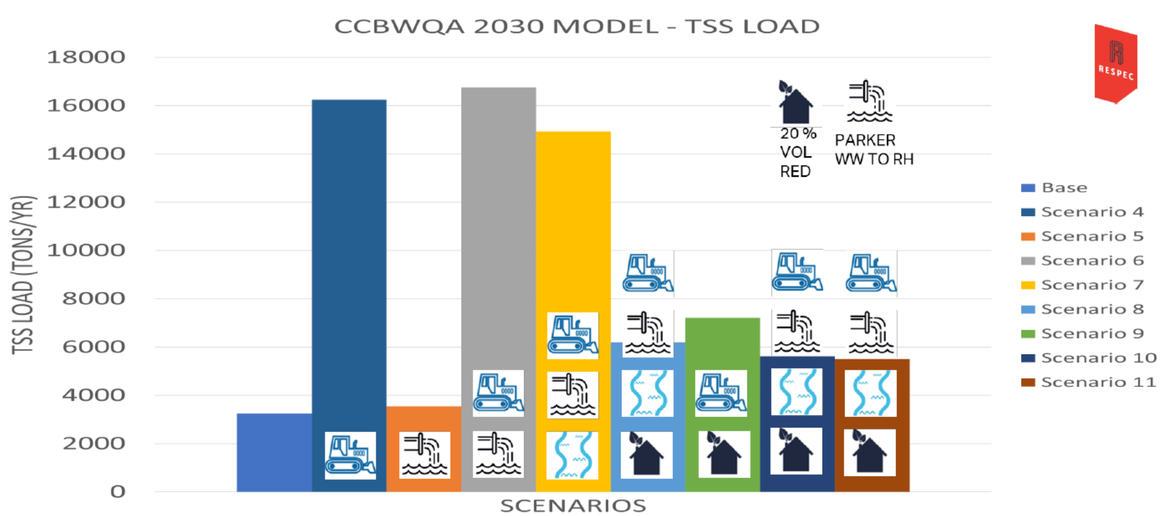
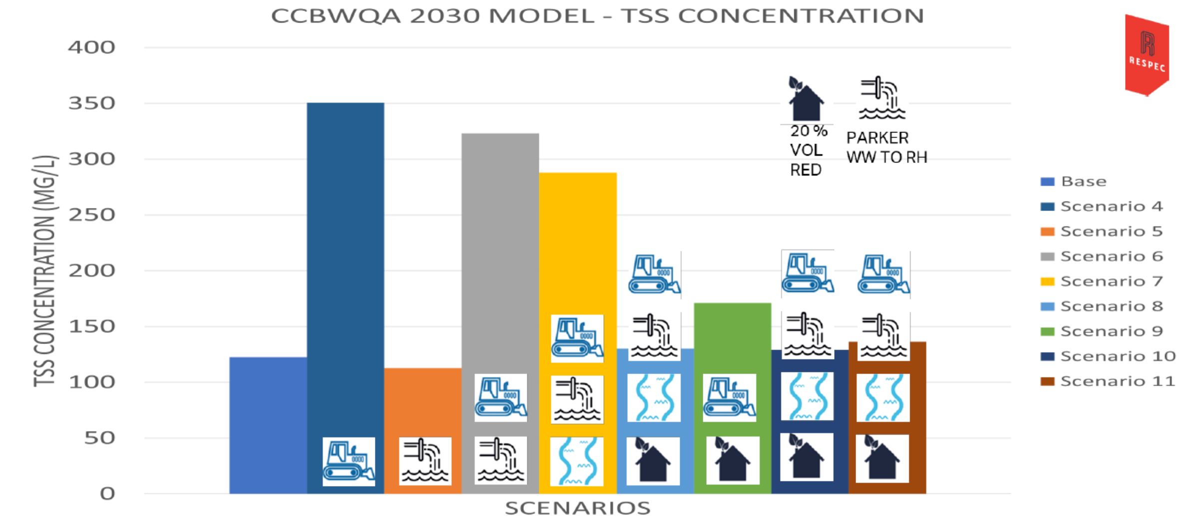


Figure 9: Modeled 2030 total suspended solids concentration into Cherry Creek Reservoir


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

RESPEC

Table 3: 2030 Model Results

	Base_v2 Model				Scen004 Model				Scen005 Model				Scen006 Model				Scen007 Model			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**
Cherry Creek Surface Flow	14473	2845	9447	43356	27991	15730	21495	80410	17815	3146	10367	65972	31706	16238	22682	106792	31706	14413	21252	102499
Cottonwood Creek Surface Flow	4340	280	839	18568	5195	395	1132	20374	4647	281	853	21561	5503	396	1147	23377	5503	396	1136	23280
Other Surface Inflow	679	122	560	3520	903	123	685	4260	679	122	561	3525	935	123	703	4367	935	123	703	4367
Total Inflow	19491	3247	10846	65444	34090	16249	23312	105043	23141	3549	11781	91058	38144	16757	24532	134535	38144	14932	23092	130146
FWMC	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**
Cherry Creek Surface Flow	20.0	145	0.240	1.10	38.7	413	0.282	1.06	24.6	130	0.214	1.36	43.80	377	0.263	1.24	43.80	334	0.246	1.19
Cottonwood Creek Surface Flow	5.99	47.4	0.071	1.57	7.18	55.9	0.080	1.44	6.42	44.4	0.068	1.71	7.60	53	0.077	1.56	7.60	53	0.076	1.56
Other Surface Inflow	0.937	133	0.303	1.91	1.248	100	0.279	1.73	0.937	133	0.304	1.91	1.29	97	0.277	1.72	1.29	97	0.277	1.72
Total Inflow	26.9	123	0.205	1.23	47.1	351	0.251	1.13	32.0	113	0.187	1.45	53	323.1	0.237	1.30	53	287.9	0.223	1.25

	Scen008 Model				Scen009 Model				Scen010 Model				Scen011 Model			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**
Cherry Creek Surface Flow	28756	5721	15883	95788	25101	6738	15973	73909	25929	5145	14903	91773	23680	5037	14321	75123
Cottonwood Creek Surface Flow	5353	354	1084	23166	5046	353	1080	20257	5203	349	1068	23057	5203	349	1068	23057
Other Surface Inflow	906	123	687	4273	873	123	668	4159	852	123	657	4094	830	123	645	4020
Total Inflow	35015	6198	17655	123227	31019	7214	17721	98326	31984	5617	16628	118924	29713	5509	16034	102200
FWMC	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**
Cherry Creek Surface Flow	39.72	146	0.203	1.22	34.67	197	0.234	1.08	35.81	146	0.211	1.30	32.71	156	0.222	1.17
Cottonwood Creek Surface Flow	7.39	49	0.074	1.59	6.97	51	0.079	1.48	7.19	49	0.076	1.63	7.19	49	0.076	1.63
Other Surface Inflow	1.25	100	0.279	1.73	1.21	104	0.281	1.75	1.18	106	0.284	1.77	1.15	109	0.286	1.78
Total Inflow	48	130.2	0.185	1.29	43	171.0	0.210	1.17	44	129.2	0.191	1.37	41	136.4	0.198	1.26

	Scen004 - SCH only				Scen005 - WWTF only				Scen006 - SCH & WWTF				Scen007 - SCH, WWTF, & PRF			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	93	453	128	85	23	11	10	52	119	471	140	146	119	407	125	136
Cottonwood Creek Surface Flow	20	41	35	10	7	0	2	16	27	42	37	26	27	42	35	25
Other Surface Inflow	33	1	22	21	0	0	0	0	38	1	26	24	38	1	26	24
Total Inflow	75	400	115	61	19	9	9	39	96	416	126	106	96	360	113	99
FWMC	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	93	186	18	-4	23	-10	-11	24	119	161	10	12	119	131	3	8
Cottonwood Creek Surface Flow	20	18	13	-8	7	-6	-5	8	27	12	8	-1	27	12	7	-1
Other Surface Inflow	33	-24	-8	-9	0	0	0	0	38	-27	-9	-10	38	-27	-9	-10
Total Inflow	75	186	23	-8	19	-8	-9	17	96	164	16	5	96	135	9	2

	Scen008 - SCH, WWTF, PRF, & LID				Scen009 - SCH & LID				Scen010 - 008 with Flow eff X 2				Scen011 - 010 w/ Base Parker WWTF			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	99	101	68	121	73	137	69	70	79	81	58	112	64	77	52	73
Cottonwood Creek Surface Flow	23	26	29	25	16	26	29	9	20	25	27	24	20	25	27	24
Other Surface Inflow	34	1	23	21	29	1	19	18	26	1	17	16	22	1	15	14
Total Inflow	80	91	63	88	59	122	63	50	64	73	53	82	52	70	48	56
FWMC	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	99	1	-15	11	73	37	-3	-2	79	1	-12	18	64	8	-7	6
Cottonwood Creek Surface Flow	23	2	5	1	16	8	11	-6	20	4	6	4	20	4	6	4
Other Surface Inflow	34	-25	-8	-9	29	-22	-7	-8	26	-20	-6	-7	22	-18	-6	-7
Total Inflow	80	6	-9	5	59	40	3	-6	64	5	-7	11	52	11	-3	2

	Base Model Results				2030 Buildout Results (008)				2030 Buildout Results (010)				2030 Buildout Results (011)			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**	**AF/YR**	**TON/YR**	**LB/YR**	**LB/YR**
Cherry Creek Surface Flow	14473	2845	9447	43356	28756	5721	15883	95788	25929	5145	14903	91773	23680	5037	14321	75123
Cottonwood Creek Surface Flow	4340	280	839	18568	5353	354	1084	23166	5203	349	1068	23057	5203	349	1068	23057
Other Surface Inflow	679	122	560	3520	906	123	687	4273	852	123	657	4094	830	123	645	4020
Total Inflow	19491	3247	10846	65444	35015	6198	17655	123227	31984	5617	16628	118924	29713	5509	16034	102200
FWMC	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**mg/L**	**mg/L**	**mg/L**
Cherry Creek Surface Flow	20.0	145	0.240	1.10	39.72	146	0.203	1.22	35.81	146	0.211	1.30	32.71	156	0.222	1.17
Cottonwood Creek Surface Flow	5.99	47.4	0.071	1.57	7.39	49	0.074	1.59	7.19	49	0.076	1.63	7.19	49	0.076	1.63
Other Surface Inflow	0.937	133	0.303	1.91	1.25	100	0.279	1.73	1.18	106	0.284	1.77	1.15	109	0.286	1.78
Total Inflow	26.9	123	0.205	1.23	48	130.2	0.185	1.29	44	129.2	0.191	1.37	41	136.4	0.198	1.26

	Scen008 - SCH, WWTF, PRF, & LID				Scen010 - 008 with Flow eff X 2				Scen011 - 010 w/ Base Parker WWTF			
Loadings	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**	**Flow**	**TSS**	**TP**	**TN**
Source	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	99	101	68	121	79	81	58	112	64	77	52	73
Cottonwood Creek Surface Flow	23	26	29	25	20	25	27	24	20	25	27	24
Other Surface Inflow	34	1	23	21	26	1	17	16	22	1	15	14
Total Inflow	80	91	63	88	64	73	53	82	52	70	48	56
FWMC	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**	**% Δ**
Cherry Creek Surface Flow	99	1	-15	11	79	1	-12	18	64	8	-7	6
Cottonwood Creek Surface Flow	23	2	5	1	20	4	6	4	20	4	6	4
Other Surface Inflow	34	-25	-8	-9	26	-20	-6	-7	22	-18	-6	-7
Total Inflow	80	6	-9	5	64	5	-7	11	52	11	-3	2