

March 14, 2025

Aurora Water
Attn: Nina Khanzadeh
15151 E. Alameda Pkwy.
Aurora, CO 50012

RE: Green Valley Master Plan Amendment 3 Master Utility Report Conformance Letter

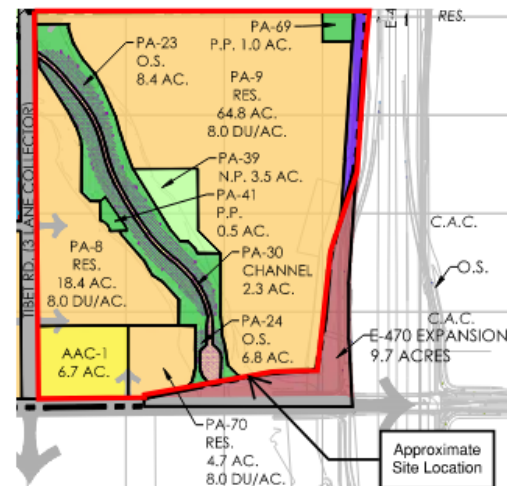
Dear Nina,

This letter is provided to Aurora Water to confirm that utility design for the Green Valley Master Plan Amendment 3, herein after called Site or the Project, conforms the to *Green Valley – Amendment 1 Master Utility Report* (EDN #218184). This narrative provides a description of the Project and a summary of the sanitary sewer and water infrastructure needed to serve the proposed uses and density with the Project.

The Project is located within Section 24 within Township 3 South, Range 66 West of the Sixth Principal Meridian, City of Aurora, County of Adams, and State of Colorado. The Site is bounded on the north by Windler properties, on the west by North Tibet Road, on the south by East 38th Avenue, and on the east by E-470. The Project comprises of a mix of proposed uses including residential and commercial with associated amenities, parks, and open spaces. The Project has been divided in to Planning Areas (PAs) to identify the areas and uses planned within the Site. A Vicinity Map has been provided as Figure 1 to depict the Project and the surrounding area. PA-8, PA-9, and PA-70 are zoned as residential (RES.), AAC-1 is Admin Activity Center (A.A.C.), PA-44 is Multi-use Easement (M.U.E.), and PA-23, 24, 39, 41, and 69 are parks and open space (N.P., P.P., & O.S.). For the purposes of this report, AAC-1 has been assumed to consist of High Density Residential in order to provide a conservative estimate for the demands generated from this area. Civil infrastructure will be developed to support the Project in the form of roadways, water distribution system, sanitary sewer system and storm sewer system. The *Green Valley – Amendment 1 Master Utility Report* (EDN #218184) was referenced while reviewing for utility design conformance. The *Windler Master Utility Study* (EDN #222155), and *Aurora Highlands Utility Report Amendment 2* (EDN #219069), were used for reviewing offsite sanitary flows that are tributary to the First Creek Lift Station.

Sanitary Sewer

The Site is located in two separate basins as previously identified within the Amendment 1 MUR. The west half of the Site, including PA-8, PA-70, and AAC-1, are in Basin 7 while the east half of the Site, including PA-9, is in Basin 5. Both of these basins are conveyed to the First Creek Lift Station, located near the intersection of East 48th Avenue and Rome Street. As a portion of the Green Valley Ranch East development, two sanitary sewer connection points were planned to provide outfall locations for the Site. A 10-inch sanitary sewer stub was built at the northern edge of PA-8 in North Tibet Road (EDN # 221249) for Basin 7. Meanwhile an 8-inch sanitary sewer stub was built at the northern edge of PA-9 in North Tibet Road (EDN # 221298) for Basin 5.



Average daily flows for the Site were calculated based on the recommended sewer loading rates in Section 5.03 of Aurora Water's 2024 Water, Sanitary Sewer & Storm Drainage Infrastructure Standards & Specifications. A minimum peaking factor of 1.7, maximum peaking factor of 4.0,

and minimum slopes of 0.4% were used to confirm pipe capacity percentages remain below 75% for peak flows for pipe sizes 12-inches or smaller and 80% for pipe sizes larger than 12-inches.

This amendment includes revisions to land use, area, density, and off-Site flows of Basins 5, 7, and OS-12. PA-9 makes up the entire 64.5 acres of Basin 5 with a proposed land use of Residential (8 du/ac). Basin 7 is 52.45 acres which is comprised of a portion of Filing 7 (EDN #221285), PA-8, PA-70, and AAC-1. For the purposes of this report, the A.A.C zoning for this Master Plan Amendment will be designed to the worst-case scenario land use permitted in this zoning. Therefore, AAC-1 has been assumed to consist of High Density Residential (20 du/ac) in order to provide a conservative estimate for the demands generated from this area. PA-8 and PA-70 are proposed as Residential (8 du/ac).

During the preparation of this letter, it was found that there appeared to be an area discrepancy for what the Green Valley - Amendment 1 Master Utility Report (EDN #218184) used for calculations for Basin 7 versus the area originally shown on the Master Utility Plan for Basin 7. The calculations for Basin 7 used 28.5 acres, meanwhile the actual area of Basin 7 in the utility map was closer to 60.5 acres. This means that the downstream sanitary sewer infrastructure was undersized even before the proposed changes implemented with this Amendment. However, based on email discussions with City of Aurora (COA) staff on 2/5/2025, flows from the Majestic Commerce Center (Basin OS-12) are now being directed southwest to connect to the new 24-inch sanitary sewer line. The original OS-12 basin flows were assumed to flow north across 38th Avenue and enter the Green Valley Ranch East development at Design Point 17. With these flows removed, this provides some relief in the pipe capacity proposed with the on-Site sanitary sewer system for PA-8. Additional information regarding the original MUR calculation discrepancy and COA direction is provided below and in the Appendix of this letter. With the updates to PA-8 with this Amendment and the design shown in the Green Valley Ranch East Subdivision Filing 7 Construction Documents (EDN #221285), the tributary area of Basin 7 is now anticipated to be 52.45 acres. Calculations showing Basin 7 with its updated area are also provided in the Appendix of this letter.

TABLE 1: PEAK FLOW + I&I COMPARISION – SCENARIO 1			
BASIN ID	AMENDMENT 1 (EDN #218184) (GPD)	PROPOSED (GPD)	DIFFERENCE (GPD)
Basin 5	342,720	398,494	55,774
Basin 7	138,240	352,776	214,536
Basin OS-12	649,440	0	-649,440

As can be seen above in Table 1, overall peak flows generated from Basin 5 & Basin 7 have been increased from Green Valley - Amendment 1 Master Utility Report (EDN #218184) but the total flow routed through the on-Site sanitary sewer system within PA-8 is less due to Basin OS-12 being removed and redirected southwest.

The proposed Site sanitary sewer infrastructure has been sized to service the proposed uses associated with Green Valley Master Plan Amendment 3 while also meeting the Aurora Water 2024 criteria. The proposed system will contain 8-inch and 10-inch gravity sewer mains which is consistent with the Green Valley - Amendment 1 Master Utility Report (EDN #218184) maps attached to this Report. Gravity sewer mains serving future PA-8, PA-70, and AAC-1 have the potential to be downsized to an 8-inch based on final site plan configuration. Deviation from the 10-inch gravity sewer proposed with this letter is allowed but must be justified and approved with the future Construction Documents. All calculations are provided in the Appendix of this letter.

TABLE 2: DESIGN POINT PIPE CAPACITY COMPARISON

DESIGN POINT	AMENDMENT 1 (EDN #218184)	AMENDMENT 1 W/ CORRECTED PA-8 AREA	PROPOSED
DP-17	56%	56%	N/A
DP-18	64%	71%	40%
DP-19	70%	77%	45%

Table 2 is provided to compare and confirm pipe capacity percentages between Amendment 1 and the proposed Site. The revised Amendment 1 calculations using the correct area assumption for PA-8 are shown above to detail that the downstream sanitary sewer infrastructure was undersized even before the proposed changes were implemented with this Amendment. However, since the flows from the Majestic Commerce Center (Basin OS-12) are now being directed southwest, depth of flow in the proposed or downstream sanitary sewer system does not exceed seventy-five percent (75%) capacity for pipes 12-inches or smaller.

Water System:

The Site was modeled for four scenarios: Average Day, Max Daily, Max Hour, and Fire Flow Analyses. PA-8, PA-9, and PA-70 are proposed as Residential (8 du/ac). AAC-1, part of Basin 7, is being zoned as AAC with this master plan amendment. However, due to the uncertainty of the future use of this PA, calculations with this letter assume worst case scenario in order to provide flexibility for the developer in the future. Worst case scenario flows for AAC-1 were calculated using a high-density residential use of 20 du/ac. As a portion of the Green Valley Ranch East development and 38th Avenue Roadway Plans, four (4) water connection points were intended for the Site to meet future demands. A 12-inch water line was installed with *38th Avenue Roadway Improvement Plans and Storm Water Management Plan, East of Tibet to E470 Phase II* (EDN #224183), *Green Valley Ranch East Tibet Road Phase 1* (EDN #221249), and *Green Valley Ranch East Tibet Road Phase 2* (EDN #221298) with five (5) future 8-inch PA-8 and PA-9 connections. PA-8 will tie into Junction J-4, J-7, J-100, and J-130 to provide a looped water system for the Planning Area as well as through AAC-1 to connect onto 38th Avenue at Junction J-5. PA-9 will tie into Junction J-132 located in Tibet Road Phase 1 as well as into Junction J-5 in PA-8.

The maximum (peak) hourly and maximum day demands are based on peaking factors of 4.5:1 for Max Hour: Average Day and 2.8:1 Max Day: Average Day as required per Section 5.02 of the 2024 Water, Sanitary Sewer & Storm Drainage Infrastructure Standards & Specifications. The system was analyzed by delineating major water mains on-Site to evaluate serviceability, fire flows and required minimum system pressures. The tables below present results and criteria used within the modeling analysis.

TABLE 3: MODEL RESULTS SUMMARY

Maximum Pressure	117 psi (Junction J-101, Max Hour)
Minimum Residual Pressure	104 psi (Junction J-1, Max Hour)
Peak Hour Maximum Pipe Velocity (8-12 inches)	2.04 fps, 1.1 ft/1000 ft Head loss, Pipe P-18

TABLE 4: MAX VELOCITY AND HEAD LOSS REQUIREMENTS BASED ON PIPE DIAMETER

PIPE DIAMETER (IN)	MAX VELOCITY (FPS)	HEAD LOSS NOT TO EXCEED (FT/1,000 FT)
6	2.5	5
8 to 12	3	5
16-24	4.5	5
Over 24	4.5	2

TABLE 5: FIRE FLOW DEMAND BY LAND USE TYPE

USE CLASSIFICATION	FIRE FLOW DEMAND
Residential	1500 gpm for 2 hours
Commercial/Multifamily	2500 gpm for 2 hours
Industrial	4000 gpm for 3 hours

We conclude that the proposed sanitary sewer and domestic water infrastructure for the Green Valley Amendment 3 Master Plan Amendment conforms to requirements determined by *The Green Valley – Amendment 1 Master Utility Report* (EDN #218184).

Sincerely,

Sue Sibel, PE

Senior Associate, Department Manager

APPENDIX

FIGURES AND SUPPORTING DOCUMENTS

Pages from Green Valley–Amendment 1 Master Utility Report

EDN #218184



GREEN VALLEY - AMENDMENT 1 SANITARY SEWER GENERATION

RESIDENTIAL		
Single-Family Population Density	2.77	People per Unit
Age Restricted Population Density	2.50	People per Unit
Average Flow Generation	68	gpcpd

MIXED USE	
Unit density of 10 units/acre was assumed and equivalent population was calculated with the Single-Family residential population density of 2.77	

COMMERCIAL		
Average Flow Generation	1,500	gpd/acre
	0.0023	cfs/acre
Equivalent Population	22	capita/acre

PEAKING FACTOR			
Where p = Population in thousands			
PF = 5/(p^0.167)			
Min. PF =	1.7	Max. PF =	4.0

SCHOOLS / INDUSTRIAL		
Average Flow Generation	1,200	gpd/acre
	0.0019	cfs/acre
Equivalent Population	18	capita/acre

PIPE CAPACITY (cfs) n = 0.011			
PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE	
8	0.82	0.65	
10	1.49	1.18	
12	2.43	1.92	
15	4.72	3.73	
18	7.67	6.07	
24	16.53	13.07	
30	29.97	23.69	
36	48.73	38.52	
42	73.50	58.11	

DESIGN POINT	BASIN	LAND USE	TOTAL ACRES	DENSITY (UNITS/AC)	NO. OF LOTS	EQUIVALENT POPULATION	AVG. DAY FLOW (CFS)	AVG. DAY FLOW (GPD)	AVG. DAY FLOW (GPM)	INFILTRATION @ 10% (GPM)	PEAKING FACTOR	PEAK FLOW (GPM)	PEAK FLOW + INFILTRATION (GPM)	PEAK FLOW + INFILTRATION (CFS)	Estimated Size at 0.4% (IN)	Pipe Percent Full at 0.4% (%)	Existing Pipe Size (IN)	COMMENTS	
1	Offsite Basin 310-1	Mixed Use	142.4		-	3,227	0.246	158,994	110	11.0	4.0	442	453	1.01	10	57		Offsite Basin 310-1	
2	Offsite Basin 310-2	SF Residential	57.9	5.0	290	802	0.084	54,530	38	3.8	4.0	151	155	0.35	8	43		Offsite Basin 310-2	
3	Offsite Basin 310-3	SF Residential	70.4	5.0	352	975	0.103	66,303	46	4.6	4.0	184	189	0.42	8	48		Offsite Basin 310-3	
3a	Design Point Total (Option 2 w/ 310-2)					1,777	0.187	120,833	84	8.4	4.0	336	344	0.77	8	71		Offsite Basin 310-2 + 310-3 (see Notes 1 and 4)	
4	Basin 1	SF Resid. (Age Restricted)	47.6	5.8	276	690	0.073	46,920	33	3.3	4.0	130	134	0.30	8	40		Basin 1	
	Design Point Total					690	0.073	46,920	33	3.3	4.0	130	134	0.30	8	40			
5	Basin 2	SF Resid. (Age Restricted)	32.6	5.8	189	473	0.050	32,130	22	2.2	4.0	89	91	0.20	8	32		Basin 1 + 2	
	Design Point Total					1,163	0.122	79,050	55	5.5	4.0	220	225	0.50	8	53			
6	Offsite Basin 4 (GVR D-6)	Mixed Use	106.5		-	2,785	0.345	222,979	155	15.5	4.0	619	635	1.41	10	72		Offsite Basin 4 (GVR D-6)	
	Design Point Total (Option 2 w/ 310-1)					6,012	0.591	381,973	265	26.5	3.7	983	1,010	2.25	12	71		Offsite Basin 4 + 310-1 (see Note 2)	
7	Basin 3	SF Resid. (Age Restricted)	29.3	5.8	169	423	0.044	28,730	20	2.0	4.0	80	82	0.18	8	30		Offsite Basin 4 + Basin 1 + 2 + 3	
	Design Point Total					3,208	0.337	218,110	151	15.1	4.0	606	621	1.38	10	70			
7a	Design Point Total (Option 2 w/ 310-1)					6,435	0.677	437,546	304	30.4	3.7	1,113	1,144	2.55	15	52		Offsite Basin 4 + Basin 1 + 2 + 3	
	Design Point Total					4,370	0.512	330,759	230	23.0	3.9	898	921	2.05	12	66			
8	Design Point Total (Option 2 w/ 310-1)					7,597	0.758	489,753	340	34.0	3.6	1,212	1,246	2.78	15	54		Offsite Basin 4 + Basin 1 + 2 + 3	
	Basin 4	SF Resid. (Age Restricted)	27.5	5.8	159	398	0.042	27,030	19	1.9	4.0	75	77	0.17	8	29			
	Design Point Total					1,373	0.144	93,333	65	6.5	4.0	259	266	0.59	8	59		Offsite Basin 310-3 + Basin 4 (see Note 4)	
	Design Point Total (Option 2 w/ 310-2)					2,174	0.229	147,863	103	10.3	4.0	411	421	0.94	10	54			
9	Design Point Total					6,905	0.778	503,142	349	34.9	3.6	1,265	1,300	2.90	15	56		Design Point 5 + Design Point 7 + Design Point 8 (see Note 4)	
	Design Point Total (Option 2 w/ 310-2)					7,707	0.965	623,975	433	43.3	3.6	1,541	1,584	3.53	15	64			
	Design Point Total (Option 2 w/ 310-1 & 310-2)					10,934	1.211	782,969	544	54.4	3.4	1,823	1,878	4.18	15	72			
																			(see Notes 1, 2 and 4)
10	Offsite Basin 310-4	Commercial	18.5			407	0.043	27,676	19	1.9	4.0	77	79	0.18	8	30		Offsite Basin 310-4	
11	TAH (DP 18)	Mixed Use	2,109.0			104,435	7.425	4,798,903	3333	333.3	2.3	7,667	8,000	17.82	30	55		From The Aurora Highlands (TAH) Master Utility Report	
12	Offsite Basin 5 (GVR D-7)	Mixed Use	62.8			1,423	0.187	120,861	84	8.4	4.0	336	344	0.77	8	71		From Lund Green Valley Report (GVR D-7)	
	Design Point Total					2,190.3	7.655	4,947,440	3436	343.6	2.3	7,881	8,225	18.32	30	56		TAH (see Note 3)	
13	Basin 5	SF Residential	70.4	6.3	443	1,227	0.129	83,443	58	5.8	4.0	232	238	0.53	8	55		Basin 5	
14	Offsite Basin 6 (GVR C-30)	Mixed Use	64.0			1,408	0.174	112,459	78	7.8	4.0	312	320	0.71	8	67		From Lund Green Valley Report (GVR C-30)	
	Design Point Total					134.4	0.303	195,903	136	13.6	4.0	544	558	1.24	10	65		Offsite Basin 6 + Basin 5	
15	Design Point Total					2,324.7	7.958	5,143,343	3572	357.2	2.3	8,160	8,517	18.88	30	57	36"	TAH + Offsite Basin 5 + 6 + Basin 5 (see Note 3)	
16	Basin 6	SF Residential	25.6	4.1	104	288	0.030	19,589	14	1.4	4.0	54	56	0.12	8	25		Basin 6	
	Design Point Total					2,350.3	7.988	5,162,932	3585	358.5	2.3	8,187	8,546	19.04	30	57	42"	TAH + Offsite Basin 5 + 6 + Basin 5 + 6 (see Note 3)	
17	Offsite Basin 12 (GV OFS-12)	Mixed Use	87.4		-	1,981	0.245	158,348	110	11.0	4.0	440	451	1.00	10	56		Offsite Basin 12 (GV OFS-12)	
18	Basin 7	SF Residential	28.5	6.3	179	496	0.052	33,716	23	2.3	4.0	94	96	0.21	8	33		Basin 7	
	Design Point Total					115.9	0.297	192,064	133	13.3	4.0	534	547	1.22	10	64		Basin 7 + Offsite Basin 12	
19	Basin 8	School	18.0	-	-	324	0.033	21,600	15	1.5	4.0	60	62	0.14	8	27		Basin 8	
	Design Point Total					133.9	0.331	213,664	148	14.8	4.0	594	608	1.36	10	70		Basins 7+8 + Offsite Basin 12	
20	Offsite Basin 13	Mixed Use		-	-							5,157	11.49	24	61	30" @ 0.15%		Offsite Basin 13	
21	Basin 9	SF Residential	90.9	6.3	572	1,584	0.167	107,742	75	7.5	4.0	299	307	0.68	8	65		Basin 9	
	Design Point Total											5,464	12.17	24	63	30" @ 0.15%		Basin 9 + Offsite Basin 13	
21.1	Basin 9.1	SF Residential	33.6	6.3	212	587	0.062	39,932	28	2.8	4.0	111	114	0.25	8	36		Basin 9.1	
	Design Point Total					125						5,577	12.43	24	64	30" @ 0.15%			
22	Basin 10	SF Residential	47.2	6.3	297	823	0.087	55,943	39	3.9	4.0	155	159	0.35	8	43		Basin 10	
	Design Point Total					297.0	0.714	246,399	171	17.1	4.0	684	702	1.56	12	55		Basins 7+8+10 and Offsite Basin 12	
22.1	Design Point Total											6,279	13.99	24	69	30" @ 0.15%		Basins 7+8+9+10 + Offsite Basins 12+13	
LS	Design Point Total											16,702	37.21	42	64			All Basins	
SITE TOTALS		SF Resid. (Age Restricted)	137.0		793	1,983	0.209	134,810	94	9.4	4.0	374	384	0.86					
		SF Residential	296.3		1807	5,005	0.465	340,367	236	23.6	3.8	903	927	2.06					
		School	18.0		-	324	0.033	21600	15	1.5	4.0	60	62	0.14					

NOTE 1: For analysis purposes, Option 2 requires a lift station to convey flows from Basin 310-2 along Piccadilly Rd to Design Point 3a
NOTE 2: For analysis purposes, Option 2 requires a lift station to convey flows from Basin 310-1 along Tibet Rd to Design Point 6
NOTE 3: There is an existing 36" or 42" sanitary sewer main in this area
NOTE 4: Sanitary Sewer Pipe runs at 0.25% slope near and along Rome St (Design Points 7a, 8 and 9)

AVERAGE DAY FLOW for Offsite Basin 310-1 and TRIBUTARY AREA for Offsite Basins 310-2 and 310-3 taken from 310 West Master Utility Report by Calibre Engineering
AVERAGE DAY FLOW for Offsite Basins 4, 5, 6 and 12 taken from Master Utility Report for Green Valley by The Lund Partnership, Inc. (2006)
PEAK FLOW + INFILTRATION for Offsite Basin 13 taken from HDR First Creek Interceptor Technical Memorandum 3 provided by COA (Parcels 26 and Parcels 32-38) with peaking factor of 2.25
AVERAGE DAY FLOW for Offsite Basin TAH taken from Master Utility Report for The Aurora Highlands by Calibre Engineering (2018)
SITE TOTALS are flows from Green Valley - Amendment 1 only

Pages from Master Utility Report for Green Valley Master Plan Amendment 2

DA-1662-25

TABLE 1: SANITARY SEWER DEMANDS										
BASIN CHARACTERISTICS			RESIDENTIAL ¹					NON-RESIDENTIAL		TOTAL
BASIN	LAND USE	AREA (ACRES)	MAXIMUM NO. UNITS	DENSITY (unit/acre)	POPULATION	AVERAGE DAILY FLOW PER UNIT (gpd)	AVERAGE FLOW (gpd)	AVERAGE DAILY FLOW PER ACRE	AVERAGE FLOW (gpd)	TOTAL AVERAGE SEWAGE FLOW (gpd)
PA-45	RESIDENTIAL	27.8	222	8	617	188.36	41891.26			
	TOTAL						41891.26	0.00		41891.26
PA-46	RESIDENTIAL	38.1	305	8	845	188.36	57412.13	0		
	TOTAL						57412.13	0.00		57412.13
PA-47	MIXED USE	5	90	18	250	188.36	16952.40	1500	7500	
	TOTAL						16952.40	7500.00		24452.40
PA-48	MIXED USE	13.2	290	22	805	188.36	54699.74	1500	19800	
	TOTAL						54699.74	19800.00		74499.74
PA-49	MIXED USE	21.8	218	10	604	188.36	41062.48	1500	32700	
	TOTAL						41062.48	32700.00		73762.48
PA-50	MIXED USE	51.7	517	10	1433	188.36	97382.12	1500	77550	
	TOTAL						97382.12	77550.00		174932.12
PA-51	MIXED USE	15.3	77	5	212	188.36	14409.54	1500	22950	
	TOTAL						14409.54	22950.00		37359.54
PA-52	MIXED USE	9.6	48	5	133	188.36	9041.28	1500	14400	
	TOTAL						9041.28	14400.00		23441.28
PA-53	COMMERCIAL	17.5					0.00	1500	26250	
	TOTAL						0.00	26250.00		26250.00
PA-54	COMMERCIAL	27.3					0.00	1500	40950	
	TOTAL						0.00	40950.00		40950.00
Brandenburg Parcel										
PA-55 ³	MIXED USE	17.2	258	15	715	188.36	48596.88	1500	25800	
	TOTAL						48596.88	25800.00		74396.88

1. Residential based on 68 gallons per capita per day, 2.77 people per residence

2. Windler Homestead Sanitary not tributary to Aurora 310 per Windler Master Utility Report, Revised June 22, by Olsson

3. Basin accounted for within the Green Valley Ranch East Amendment 1 Master Utility Report as Basin 310-4. That Study estimated the gpd at 27,676

Updated flow used
for Basin 310-4

Pages from The Aurora Highlands Master Utility Report – Amendment 2

EDN #219069

Windler does not use DP 14 to recieve flows from TAH only DP 22

Aurora Highland Final Outfall to First Creek

Site Location

DESIGN POINT	PEAK FLOW (MGD)	ESTIMATED PIPE SLOPE (%)	ESTIMATED PIPE SIZE (IN)	PIPE NAME	ESTIMATED VELOCITY (FPS)	% FULL FLOW
1	1.97	0.40%	15	SS-1	4.1	56.9%
2.1	2.12	0.40%	15	SS-2	4.2	60.4%
2.2	0.66	0.40%	10	SS-3	3.2	57.2%
2.3	0.89	0.40%	10	SS-4	3.4	70.2%
2.4	0.20	0.40%	8	SS-5	2.3	40.4%
2.5	3.36	0.40%	18	SS-6	4.8	59.4%
2.6	1.01	0.40%	12	SS-7	3.5	55.1%
2.7	0.24	0.40%	8	SS-8	2.5	44.6%
3.1	1.30	0.40%	12	SS-9	3.7	64.9%
3.2	1.70	0.40%	15	SS-10	4.0	52.6%
3.3	4.79	0.40%	18	SS-11	5.1	77.6%
4	0.31	0.40%	8	SS-12	2.6	51.8%
5.1	0.37	0.40%	8	SS-13	2.7	57.8%
5.2	0.56	0.40%	10	SS-14	3.0	51.7%
5.3	0.15	0.40%	8	SS-15	2.2	34.6%
5.4	0.71	0.40%	10	SS-16	3.2	59.9%
5.5	5.59	0.40%	24	SS-17	5.4	50.7%
6	0.10	0.40%	8	SS-18	1.9	28.0%
7	0.49	0.40%	8	SS-19	2.9	70.1%
7.1	5.95	0.40%	24	SS-20	5.5	52.6%
7.2	3.27	0.25%	18	SS-21	3.9	68.6%
7.3	0.23	0.40%	8	SS-22	2.4	43.6%
7.4	0.38	0.40%	8	SS-23	2.8	58.8%
7.5	0.20	0.40%	8	SS-24	2.3	40.4%
7.6	0.81	0.40%	10	SS-25	3.3	65.5%
7.7	0.98	0.40%	12	SS-26	3.5	54.0%
7.8	4.27	0.25%	24	SS-27	4.2	49.7%
7.9	0.41	0.40%	8	SS-28	2.6	61.3%
7.10	6.06	0.25%	24	SS-29	4.6	61.7%
7.11	10.92	0.25%	30	SS-30	5.3	61.5%
7.12	10.95	0.25%	30	SS-31	5.3	61.6%
7.13	11.15	0.25%	30	SS-32	5.4	62.3%
7.14	0.05	0.50%	8	SS-33	2.8	35.1%
7.15	0.38	0.40%	8	SS-34	2.8	58.8%
7.16	0.85	0.40%	10	SS-35	3.3	67.8%
7.17	1.27	0.40%	12	SS-36	3.7	63.9%
7.18	0.09	0.50%	8	SS-37	2.0	25.1%
7.19	1.42	0.40%	12	SS-38	3.8	69.2%
7.20	1.69	0.40%	12	SS-39	3.7	15.6%
7.21	0.37	0.40%	8	SS-40	2.7	57.8%
7.22	0.46	0.40%	8	SS-41	2.9	66.9%
7.23	0.62	0.40%	10	SS-42	3.2	19.3%
7.24	13.16	0.40%	36	SS-43	6.6	44.5%
7.25	0.69	0.40%	12	SS-44	3.2	36.3%
7.26	1.19	0.40%	12	SS-45	3.7	61.1%
7.27	3.41	0.40%	18	SS-46	4.8	60.0%
7.28	1.73	0.40%	15	SS-47	4.0	53.2%
7.29	3.87	0.40%	18	SS-48	4.9	65.4%
7.30	1.66	0.40%	15	SS-49	4.0	51.9%
7.31	2.58	0.40%	15	SS-50	4.4	69.3%

DRAWN BY: KLH JOB DATE: 11/2022
APPROVED: RWL JOB NUMBER: 181211.47
CAD DATE: 11/22/2022 1:21:34 PM
CAD FILE: J:\2018\181211.47\CAD\Drawings\Exhibits\X-SS2_AM2.dwg

BAR IS ONE INCH ON OFFICIAL DRAWINGS.
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION
1	10/2019	KH	REMOVED SEC. 21 & 28 FROM PROJECT
2	11/2022	KH	REVISED AREA AND LAND USE IN PA-55

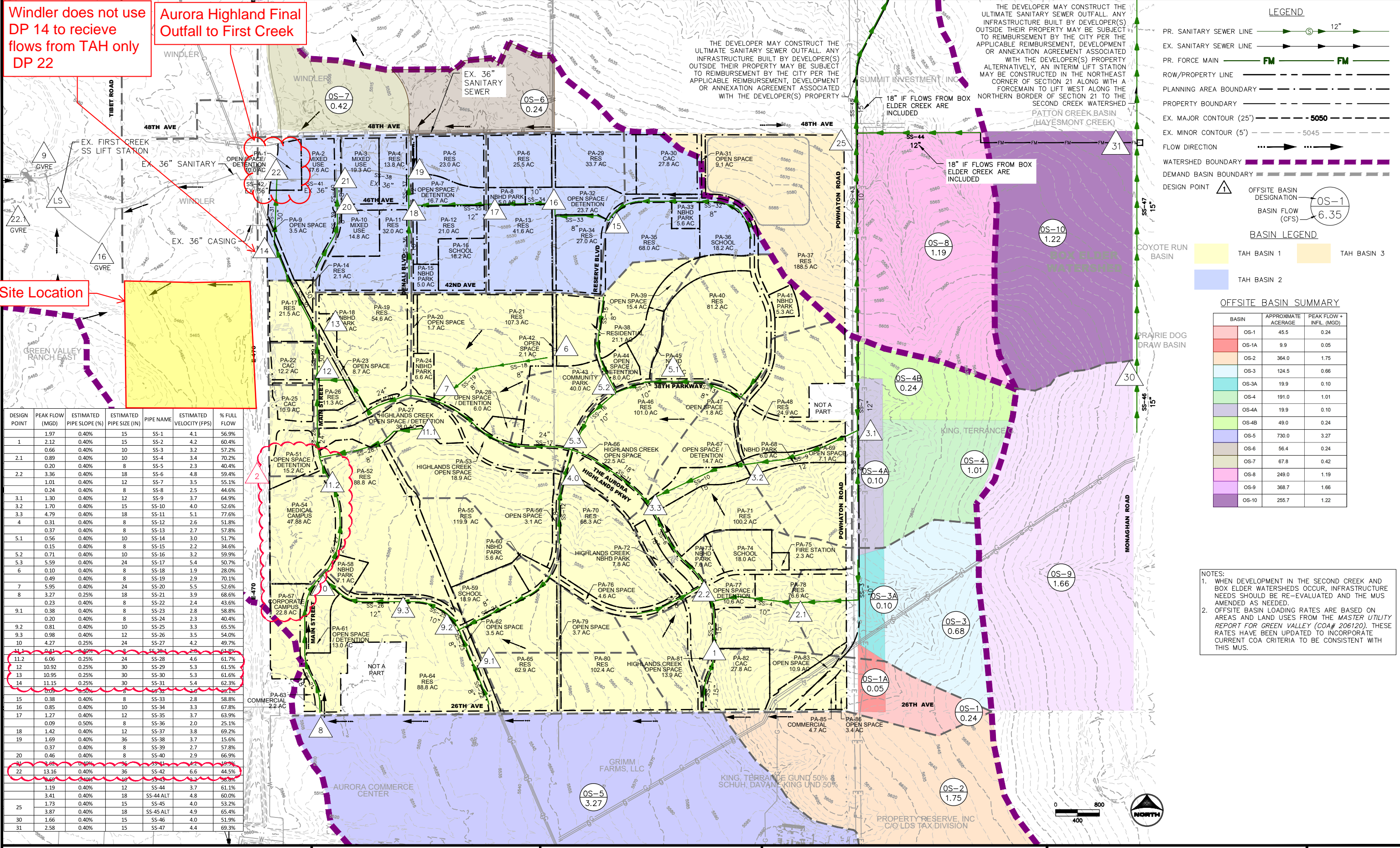


THE AURORA HIGHLANDS
AURORA HIGHLANDS, LLC
AURORA, COLORADO



MASTER UTILITY REPORT - AMENDMENT 2
SANITARY SEWER PLAN

SHEET NO.
SS2





SANITARY SEWER DEMAND CALCULATIONS

Project #: 181211.47
Project: The Aurora Highlands

Location: Aurora, CO
Plan Date: 11/2022

By K House
Checked R Littleton
Date 11/20/2022
Date 11/20/2022

POPULATION DENSITY		
Multi-Family	2.77	People per Unit
Single-Family	2.77	People per Unit
Age Restricted	2.77	People per Unit
Average Flow Generation	68	gpcpd

COMMERCIAL / SCHOOLS / INDUSTRIAL			
	Commercial	Schools / Industrial	
Average Flow Generation	1,500	1,200	gpd/acre
Equivalent Population	0.0023	0.0019	cfs/acre
	22	18	capita

PEAKING FACTOR			
PF = 5/(p^0.167)		Where p = Population in thousands	
Min. PF =	1.7	Max. PF =	4.0

75 % FULL	PIPIE CAPACITY (mgd) (n=.011)		
	PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE
	8	0.53	0.42
	10	0.97	0.76
12	1.57	1.24	

80 % FULL	PIPIE CAPACITY (mgd) (n=.011)		
	PIPE SIZE (IN)	0.4% SLOPE	0.25% SLOPE
	15	3.05	2.41
	18	4.96	3.92
	24	10.68	8.44
	30	19.37	15.31
36	31.49	24.90	

Design Point	Planning Area	Flow Split	RESIDENTIAL SINGLE FAMILY							Average Day Flow (gpm)	RESIDENTIAL MULTI FAMILY							Land Use	COMMERCIAL / SCHOOLS / INDUSTRIAL						Average Day Flow (gpm)	CUMMULATIVE TOTALS							Peak Flow + Infil. (gpm)	PIPE PARAMETERS				
			Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)		Total Acres	Development Density (DU/acre)	No. of Units	Population Density (people/unit)	Equivalent Population	Average Flow Generation (gpcpd)	Average Day Flow (mgd)		Total Acres	Population Density	Equivalent Population	Average Flow Generation (gpd/acre)	Average Day Flow (mgd)	Total Acres		Infil. @ 10% (mgd)	Cumulative Population	Peak Factor	Peak Flow (mgd)	Peak Flow + Infil. (mgd)	Estimated Pipe Slope (%)	Estimated Size at Given Slope		Pipe Name	Velocity (ft/sec)	Percent Full at Given Slope		
9.2	PA-59	100%	0.0		0			0.00	0.0		0			0	0.00	School	18.9	18	340	1,200	0.023		18.90	0.002	340	4.0	0.09	0.09		0.40%	8							
	PA-65	50%	31.5	5.9	185	2.77	511	68	0.035	0.0				0	0.00							31.45	0.003	511	4.0	0.14	0.14		0.40%	8								
	PA-80	50%	43.6	5.9	256	2.77	709	68	0.048	0.0				0	0.00							43.60	0.005	709	4.0	0.19	0.20		0.40%	8	SS-24	2.3	40.4%					
	Design Point Total	DP9.1 - 9.2	106.5	5.9	625		1,731		0.118	15.2	20.0	304		842	0.057		18.9		340		0.023		140.60	0.020	2,914	4.0	0.79	0.81		0.40%	10	SS-25	3.3	65.5%				
9.3	PA-64	50%	37.3	5.9	219	2.77	607	68	0.041	0.0				0	0.00							37.25	0.004	607	4.0	0.17	0.17		0.25%	8								
	Design Point Total	DP9.1 - 9.3	143.8	5.9	844		2,338		0.159	15.2	20.0	304		842	0.057		18.9		340		0.023		177.85	0.024	3,520	4.0	0.96	0.98		0.40%	12	SS-26	3.5	54.0%				
10	PA-63	100%								0.0				0	0.00	Com.	2.2	22	48	1,500	0.003		2.20	0.000	48	4.0	0.01	0.01		0.25%	8							
	PA-64	50%	37.3	5.9	219	2.77	607	68	0.041	14.3	20.0	286	2.77	792	68	0.054						51.55	0.010	1,399	4.0	0.38	0.39		0.25%	8								
	PA-57	100%	0.0	0					0.00	0.0				0	0.00	Com.	22.8	22	501	1,500	0.034		22.77	0.003	501	4.0	0.14	0.14		0.25%	8							
	On-Site Total	DP8 - DP10	181.0		1,063		2,945		0.200	29.5		590		1,634	0.111		43.9		890		0.060		254.37	0.037	5,468	3.8	1.40	1.44		0.25%	15							
11.1	Design Point Total		400.0	5.7	2,268		6,281		0.427	29.5	20.0	590		1,634	0.111		554.9		12,132		0.827		984.37	0.136	20,047	3.0	4.14	4.27		0.25%	24	SS-27	4.2	49.7%				
	PA-55	75%	89.9	5.9	528.0	2.8	1,462.6	68.0	0.1	0.0		0		0	0.000		0.0		0		0.000		89.9	0.0	1,462.6	4.0	0.4	0.41		0.40%	8							
11.2	Design Point Total	DP11.1	89.9	5.9	528		1,463		0.099	0.0		0		0	0.000		0.0		0		0.000		89.93	0.010	1,463	4.0	0.40	0.41		0.40%	8	SS-28.1	2.8	61.8%				
	PA-52	100%	88.8	5.9	521	2.77	1,443	68	0.098	0.0				0	0.00		0.0					88.80	0.010	1,443	4.0	0.39	0.40		0.25%	8								
	PA-54	100%	0.0	0					0.00	0.0		0		0	0.00	Hospital	47.9	22	1,053	8,443	0.404		47.88	0.040	1,053	4.0	1.62	1.66	1,151	0.25%	15							
	PA-55	25%	30.0	5.9	176	2.77	488	68	0.033	0.0				0	0.00							29.98	0.003	488	4.0	0.13	0.14		0.25%	8								
12	On-Site Total	DP8 - DP11.2	389.7		2,288		6,338		0.431	29.5		590		1,634	0.111		91.8		1,943		0.464		510.95	0.101	9,915	3.4	3.43	3.53		0.25%	18							
	Design Point Total		608.7	5.7	3,493		9,674		0.658	29.5	20.0	590		1,634	0.111		602.8		13,185		1.231		1,240.95	0.200	24,493	2.9	5.86	6.06		0.25%	24	SS-28	4.6	61.7%				
	PA-19	100%	54.6	5.9	321	2.77	889	68	0.060	0.0				0	0.00		0.0					54.60	0.006	889	4.0	0.24	0.25		0.25%	8								
	PA-25	100%	0.0	0					0.00	0.0				0	0.00	Civic	10.9	18	196	1,200	0.013		10.90	0.001	196	4.0	0.05	0.05		0.25%	8							
13	PA-26	100%	11.3	5.8	66	2.77	183	68	0.012	0.0		0		0	0.00		0.0					11.30	0.001	183	4.0	0.05	0.05		0.25%	8								
	On-Site Total	DP1 - DP12	1,181.9		6,939		19,220		1.307	45.8		1,079		2,989	0.203		244.2		4,818		0.657		1,471.89	0.217	27,026	2.9	6.25	6.47		0.25%	24							
	Design Point Total		1,723.0	5.8	9,915		27,464		1.868	45.8	23.6	1,079		2,989	0.203		1,167.9		25,099		2.040		2,936.74	0.411	55,552	2.6	10.51	10.92		0.25%	30	SS-29	5.3	61.5%				
	PA-22	100%	0.0	0					0.00	0.0		0		0	0.00	Civic	12.2	18	220	1,200	0.015		12.20	0.001	220	4.0	0.06	0.06		0.25%	8							
14	On-Site Total	DP1 - DP13	1,181.9		6,939		19,220		1.307	45.8		1,079		2,989	0.203		256.4		5,037		0.672		1,484.09	0.218	27,246	2.9	6.28	6.50		0.25%	24							
	Design Point Total		1,723.0	5.8	9,915		27,464		1.868	45.8	23.6	1,079		2,989	0.203		1,180.1		25,319		2.054		2,948.94	0.413	55,772	2.6	10.54	10.95		0.25%	30	SS-30	5.3	61.6%				
	PA-14	100%	2.1	5.7	12	2.77	33	68	0.00	0.0				0	0.00		0.0					2.10	0.000	33	4.0	0.00	0.00		0.25%	8								
	PA-17	100%	5.0	5.8	29	2.77	80	68	0.00	16.5	30.0	495	2.77	1,371	68	0.093		0.0				21.50	0.009	1,451	4.0	0.37	0.38		0.25%	8								
15	On-Site Total	DP1 - DP13	1,189.0		6,980		19,333		1.307	62.3		1,574		4,360	0.296		256.4		5,037		0.672		1,507.69	0.228	28,730	2.9	6.49	6.72		0.25%	24							
	Design Point Total		1,730.1	5.8	9,956		27,578		1.868	62.3	25.3	1,574		4,360	0.296		1,180.1		25,319		2.054		2,972.54	0.422	57,256	2.5	10.73	11.15	7,744	0.25%	30	SS-31	5.4	62.3%				
	PA-30	100%	0.0	0					0.00	0.0		0		0	0.00	Com.	27.8	18	500	1,200	0.033		27.80	0.003	500	4.0	0.13	0.14		0.40%	8							
	PA-35	50%	34.0	5.9	200	2.77	553	68	0.038	0.0		0		0	0.00		0.0					34.00	0.004	553	4.0	0.15	0.15		0.40%	8								
16	PA-36	100%	0.0	0					0.00	0.0		0		0	0.00	School	18.2	18	328	1,200	0.022		18.20	0.002	328	4.0	0.09	0.09		0.50%	8	SS-32	2.0	25.1%				
	Design Point Total	DP15	34.0	5.9	200		553		0.038	0.0		0		0	0.000		46.0		828		0.055		80.00	0.009	1,381	4.0	0.37	0.38	264	0.40%	8	SS-33	2.8	58.8%				
	PA-29	100%	16.2	5.9	95	2.77	263	68	0.018	17.5	20.0	350	2.77	970	68	0.066		0.0				33.70	0.008	1,233	4.0	0.34	0.34		0.40%	8								
	PA-34	100%	27.0	5.9	159	2.77	440	68	0.030	0.0				0	0.00		0.0					27.00	0.003	440	4.0	0.12	0.12		0.40%	8								
17	Design Point Total	DP15 + DP16	77.2	5.9	454		1,256		0.085	17.5	20.0	350		970	0.066		46.0		828		0.055		140.70	0.021	3,054	4.0	0.83	0.85	588	0.40%	10	SS-34	3.3	67.8%				
	PA-6	100%	10.4	5.9	61	2.77	169	68	0.011	15.1	20.0	302	2.77	837	68	0.057		0.0				25.50	0.007	1,006	4.0	0.27	0.28		0.40%	8								
	PA-13	100%	41.6	5.9	244	2.77	676	68																														

Pages from Windler Master Utility Study

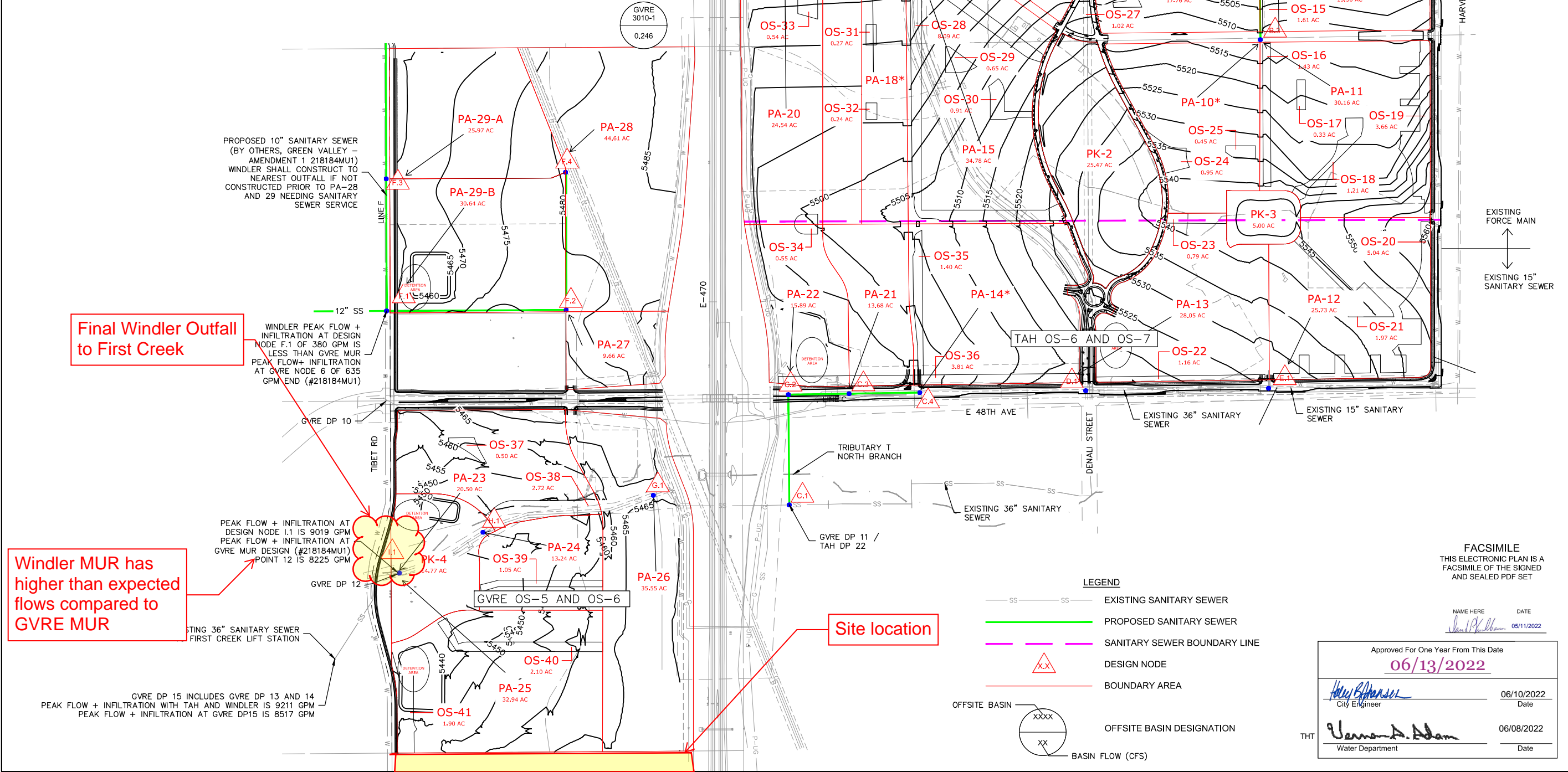
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LINE A	From Node	To Node	MAP AREA CODE	Peak Flow + Infiltration (CFS)	Avg Day + Infiltration (CFS)	Pipe Size (in)	Pipe Percent Full (Peak Flow)	Avg Day Velocity (FT/S)	
	A.9	A.8	PA-16	0.07	0.02	8	3%	2.1	
	A.8	A.6	PA-15	0.44	0.12	8	22%	3.2	
	A.7	A.6	PA-20	0.23	0.06	8	15%	2.2	
	A.6	A.5	PA-18, PA-19	1.04	0.28	8	73%	3.2	
	A.5	A.4	PA-1	1.33	0.36	10	61%	2.9	
	A.12	A.11	PA-17	0.19	0.05	8	7%	3.2	
	A.11	A.4	PA-3	0.67	0.18	8	33%	3.6	
	A.4	A.3	PA-2	2.67	0.77	12	63%	4.1	
	A.3	A.2.5	PA-5	2.98	0.87	12	71%	4.2	
LINE B	From Node	To Node	MAP AREA CODE	Peak Flow + Infiltration (CFS)	Avg Day + Infiltration (CFS)	Pipe Size (in)	Pipe Percent Full (Peak Flow)	Avg Day Velocity (FT/S)	
	A.2.5	A.2	Line B	3.64	1.13	15	57%	3.9	
	A.2	A.1	PA-6	3.86	1.21	15	60%	4.0	
	A.10	A.1	PA-7	0.20	0.05	8	10%	2.5	
	B.3	B.2	PA-10, PA-11	0.58	0.16	8	23%	4.0	
	B.2	B1	PA-8, PA-9	0.70	0.19	8	31%	3.9	
	B1	A.2.5	PA-4	0.97	0.26	10	26%	3.9	

NOTE: MINIMUM PIPE SIZE IN PLANNING AREAS (PA) SHALL BE 8-INCH

LINE C	From Node	To Node	MAP AREA CODE	Peak Flow + Infiltration (CFS)	Avg Day + Infiltration (CFS)	Pipe Size (in)	Pipe Percent Full (Peak Flow)	Avg Day Velocity (FT/S)	
	C.4	C.3	PA-14	0.42	0.11	8	29%	2.4	
	C.3	C.2	PA-21	0.80	0.21	8	56%	2.9	
LINE D	From Node	To Node	MAP AREA CODE	Peak Flow + Infiltration (CFS)	Avg Day + Infiltration (CFS)	Pipe Size (in)	Pipe Percent Full (Peak Flow)	Avg Day Velocity (FT/S)	
	C.2	C.1	PA-22	1.24	0.33	8	53%	4.8	
LINE E	From Node	To Node	MAP AREA CODE	Peak Flow + Infiltration (CFS)	Avg Day + Infiltration (CFS)	Pipe Size (in)	Pipe Percent Full (Peak Flow)	Avg Day Velocity (FT/S)	
	D.1	EX 36"	PA-13, PK-2	0.52	0.14	8	18%	4.2	
LINE F	From Node	To Node	MAP AREA CODE	Peak Flow + Infiltration (CFS)	Avg Day + Infiltration (CFS)	Pipe Size (in)	Pipe Percent Full (Peak Flow)	Avg Day Velocity (FT/S)	
	E.1	EX 36"	PA-12	0.28	0.07	8	10%	3.5	
	F.3	F.1	PA-29A, GVRE 310-1	1.20	0.32	10	66%	2.5	
	F.4	F.2	PA-28	0.34	0.09	8	28%	2.0	
	F.2	F.1	PA-27, PA-28	0.41	0.11	8	26%	2.6	
	F.1	GVRE 12"	PA-27, PA-28, PA-29A, PA-29B, GVRE 310-1	1.76	0.50	12	59%	2.8	
LINE G	From Node	To Node	MAP AREA CODE	Peak Flow + Infiltration (CFS)	Avg Day + Infiltration (CFS)	Pipe Size (in)	Pipe Percent Full (Peak Flow)	Avg Day Velocity (FT/S)	
	G.1	EX 36"	PA-26	0.27	0.07	8	19%	2.1	
	H.1	EX 36"	PA-24	0.14	0.04	8	8%	2.0	
	I.1	EX 36"	PA-23, PA-25, PK-4	0.67	0.18	8	47%	2.8	



PROPOSED 30" SECOND CREEK SANITARY SEWER TO SECOND CREEK LIFT STATION (BY OTHERS)

WINDLER PEAK FLOW + INFILTRATION AT DESIGN NODE A.1 OF 3.89 CFS IS LESS THAN FULENWIDER MUS PEAK FLOW + INFILTRATION AT FULENWIDER NODE T OF 4.377 EDN #220131MU1

olsson

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Suite 400
Denver, CO 80204

TEL 303.237.2072
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NOTE
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OLSSON ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS (HORIZONTAL OR VERTICAL). THE EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS HOWEVER THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.

REV.	NO.	DATE	REVISIONS DESCRIPTION

SANITARY SEWER MASTER PLAN

WINDLER MIXED USE DEVELOPMENT MASTER UTILITY PLAN

2021

AURORA, CO

Approved For One Year From This Date

06/13/2022

NAME HERE DATE
David Phibbs 05/11/2022

drawn by:	
checked by:	
approved by:	
QA/QC by:	
project no.:	
drawing no.:	
date:	

THT *Vernon A. Adam* 06/08/2022
Water Department Date

SHEET B.1

36-inch Interceptor

Peak Flow Analysis to TAH DP 22 (GVR DP 11)

Development	Basin	Avg Day Flow (mgd)	Avg Day Flow (gpm)	Infiltration (10%)	Cumulative Population	Peak Factor	Peak Flow + Infl (mgd)	Peak Flow + Infl (gpm)	Peak Flow + Infl (MGD)
Re: The Aurora Highlands Master Utility Report - Amendment 1 (#219069MU2)									
Windler PA-12 and PA-13 comprise TAH basin OS-6									
TAH	OS-6	0.059	41		874				
Windler	PA-12	0.044	30		641				
	PA-13	0.082	57		1,058				
Windler total		0.125	87		1,700				
Windler average day flow and population from PA-12 and PA-13 greater than that assumed in TAH MUR									
		0.066	46		826				
Windler PA-14, PA-21 and PA-22 comprise TAH basin OS-7									
TAH	OS-7	0.102	71		1,492				
Windler	PA-14	0.065	45		963				
	PA-21	0.060	42		886				
	PA-22	0.070	49		1,029				
Windler total		0.196	136		2,878				
Windler average day flow and population from PA-14, PA-21 and PA-22 greater than that assumed in TAH MUR									
		0.094	65		1,386				
TAH DP 22 (peak flow + infiltration at DP22 is 550 gpm higher than that assumed in the GVR MUR)									
		4.822	3,349	335	71,041	2.5		8,550	12.31
Windler average day flow and population from PA-12, PA-13, PA-14, PA-21 and PA-22 greater than that assumed in TAH MUR									
		0.160	111	11	2,211				
TAH DP 22 with Windler		4.982	3,460	346	73,252	2.4		8,791	12.66
Peak flow + infiltration greater than that from TAH MUR									
								241	0.35

36-inch Interceptor
Peak Flow Analysis to GVR DP 15

Development	Basin	Avg Day Flow (mgd)	Avg Day Flow (gpm)	Infiltration (10%)	Cumulative Population	Peak Factor	Peak Flow + Infl (mgd)	Peak Flow + Infl (gpm)	Peak Flow + Infl (MGD)
Re: Green Valley - Amendment 1 Master Utility Report (#218184MU1)									
Windler PA-23, PA-24, PA-25, PA-26 and PK-4 comprise GVR basins OS-5 and OS-6									
GVR	OS-5	0.121	84	8	1,423	4.00		344	0.50
GVR	OS-6	0.112	78	8	1,408	4.00		320	0.46
GVR total		0.233	162	16	2,831	4.00		664	0.96
Windler	PA-23	0.039	27		579				
	PA-24	0.022	15		327				
	PA-25	0.052	36		765				
	PA-26	0.043	30		640				
	PK-4	0.015	10						
Windler total		0.171	119	12	2,310	4.00		488	0.70
Net peak flow change for GVR basins OS-5 and OS-6 attributed to Windler		-0.062	-43					-176	(0.25)
GVR DP 13	5	0.083	58		1,227				
GVR DP 10	310-4	0.028	19		407				
GVR DP 12	Windler PA-23, PA-24, PA-25, PA-26 and PK-4	0.171	119		2,310				
TAH DP 22 with Windler (GVR DP 11)		4.982	3460		73,252				
Updated total at GVR DP 15		5.264	3,656	366	77,197	2.42		9,211	13.26
GVR DP 15 (peak flow +infiltration from GVR MUR		5.143	3,572	357	108,900	2.28		8,517	12.26
Peak flow + infiltration greater than that from GVR MUR								694.00	1.00

Estimated Peak Flow Increase + Infiltration Atributed to Windler and TAH at GVR DP 15

Total population at TAH DP 22	71,041
minus OS-6 population (Windler)	-874
minus OS-7 population (Windler)	-1,492
TAH population without Windler at TAH DP 22	68,675

Windler population at GVR DP 15	
PA-12	641
PA-13	1,058
PA-14	963
PA-21	886
PA-22	1,029
PA-23	579
PA-24	327
PA-25	765
PA-26	640
Total Windler population at GVR DP 15	6,888

Total population TAH and Windler at GVR DP 15 75,563

Estimated peak flow increase + infiltration attributed to Windler at GVR DP 15	63 gpm	0.09 MGD
Estimated peak flow increase + infiltration attributed to TAH at GVR DP 15	631 gpm	0.91 MGD
Peak flow + infiltration greater than that from GVR MUR at GVR DP 15	694 gpm	1.00 MGD

Windler - Projected Sanitary Sewer Demands

Non-Residential Criteria

	Avg Day (gdp/ac)	Equivalent Pop / Ac
Commercial	1,500	22
Industrial (schools)	1,200	18

Residential Criteria

People / unit	2.77
Avg day / capita (gpd)	68

Peaking Factors

MIN	1.7
MAX	4

$$\text{Peaking Factor} = 5 \div p^{0.167}$$

p= population in thousands

INFILTRATION

AVG * 10% of average, do not peak I&I

Based on Windler Land Use Summary - 03/24/2022

Map Area Code	Land Use	Total Acres	Proposed DUs	Population	Avg Daily Flow (GPD)	Peaking Factor	Peak Flow (GPD)	Infiltration (GPD)	Avg Day + Infiltration (GPD)	Avg Day + Infiltration (CFS)	Avg Day + Infiltration (GPM)	Peak Flow + Infiltration (GPD)	Peak Flow + Infiltration (CFS)	Peak Flow + Infiltration (GPM)
PA-1	MIXED COMM	31		684	46,605	4.0	186,420	4,661	51,266	0.079	36	191,081	0.296	133
PA-10	SFD/SFA FLEX	24	213	589	40,075	4.0	160,302	4,008	44,083	0.068	31	164,309	0.254	114
PA-11	SFD/SFA FLEX	30	271	752	51,128	4.0	204,514	5,113	56,241	0.087	39	209,627	0.324	146
PA-12	SFD/SFA FLEX	26	232	641	43,619	4.0	174,474	4,362	47,980	0.074	33	178,836	0.277	124
PA-13	SFD/SFA FLEX	21	183	507	34,470	4.0	137,880	3,447	37,917	0.059	26	141,327	0.219	98
PA-13	MF	7	195	540	36,730	4.0	146,921	3,673	40,403	0.063	28	150,594	0.233	105
PA-13	COMMERCIAL	1		11	750	4.0	3,000	75	825	0.001	1	3,075	0.005	2
PA-14	SFD/SFA	18	160	444	30,209	4.0	120,837	3,021	33,230	0.051	23	123,858	0.192	86
PA-14	MF	4	108	298	20,286	4.0	81,145	2,029	22,315	0.035	15	83,174	0.129	58
PA-14	COMMERCIAL	10		220	15,000	4.0	60,000	1,500	16,500	0.026	11	61,500	0.095	43
PA-15	SFD/SFA FLEX	35	313	867	58,960	4.0	235,842	5,896	64,856	0.100	45	241,738	0.374	168
PA-16	SFD/SFA FLEX	7	59	162	11,036	4.0	44,144	1,104	12,140	0.019	8	45,248	0.070	31
PA-17	SFD/SFA FLEX	17	152	421	28,633	4.0	114,530	2,863	31,496	0.049	22	117,394	0.182	82
PA-17	COMMERCIAL	1		22	1,500	4.0	6,000	150	1,650	0.003	1	6,150	0.010	4
PA-18	SFD/SFA FLEX	16	142	393	26,700	4.0	106,800	2,670	29,370	0.045	20	109,470	0.169	76
PA-19	SFA	18	161	446	30,311	4.0	121,244	3,031	33,342	0.052	23	124,275	0.192	86
PA-2	MF	24	711	1,969	133,924	4.0	535,696	13,392	147,316	0.228	102	549,088	0.850	381
PA-20	MIXED COMM	25		540	36,810	4.0	147,240	3,681	40,491	0.063	28	150,921	0.233	105
PA-21	MIXED COMM	4		90	6,156	4.0	24,624	616	6,772	0.010	5	25,240	0.039	18
PA-21	MF	10	287	796	54,112	4.0	216,448	5,411	59,523	0.092	41	221,859	0.343	154
PA-22	MF	11	334	924	62,854	4.0	251,415	6,285	69,139	0.107	48	257,701	0.399	179
PA-22	MIXED COMM	15		105	7,151	4.0	28,602	715	7,866	0.012	5	29,317	0.045	20
PA-23	SFD/SFA FLEX	21	209	579	39,367	4.0	157,469	3,937	43,304	0.067	30	161,406	0.250	112
PA-24	SFD/SFA FLEX	13	118	327	22,226	4.0	88,906	2,223	24,449	0.038	17	91,129	0.141	63
PA-25	SFD/SFA FLEX	33	276	765	51,987	4.0	207,949	5,199	57,186	0.088	40	213,148	0.330	148
PA-26	IND-3.3.5.Y	36		640	42,660	4.0	170,640	4,266	46,926	0.073	33	174,906	0.271	121
	IND-3.3.5.Z													

Areas used for OS-5

Windler - Projected Sanitary Sewer Demands

Non-Residential Criteria

	Avg Day (gdp/ac)	Equivalent Pop / Ac
Commercial	1,500	22
Industrial (schools)	1,200	18

Residential Criteria

People / unit	2.77
Avg day / capita (gpd)	68

Peaking Factors

MIN	1.7
MAX	4
Peaking Factor = $5 \div p^{0.167}$	
p= population in thousands	

INFILTRATION

AVG * 10% of average, do not peak I&I

Based on Windler Land Use Summary - 03/24/2022

Map Area Code	Land Use	Total Acres	Proposed DUs	Population	Avg Daily Flow (GPD)	Peaking Factor	Peak Flow (GPD)	Infiltration (GPD)	Avg Day + Infiltration (GPD)	Avg Day + Infiltration (CFS)	Avg Day + Infiltration (GPM)	Peak Flow + Infiltration (GPD)	Peak Flow + Infiltration (CFS)	Peak Flow + Infiltration (GPM)
PA-27	IND-3.3.5.Y, IND-3.3.5.Z	10		174	11,592	4.0	46,368	1,159	12,751	0.020	9	47,527	0.074	33
PA-28	IND-3.3.5.Y, IND-3.3.5.Z	45		803	53,532	4.0	214,128	5,353	58,885	0.091	41	219,481	0.340	152
PA-29	IND-3.3.5.Y, IND-3.3.5.Z													
PA-29A		26		464	30,900	4.00	123,600	3,090	33,990	0.053	24	126,690	0.196	88
PA-29B		31		555	37,032	4.00	148,128	3,703	40,735	0.063	28	151,831	0.235	105
PA-3	SFA	7	76	212	14,400	4.0	57,600	1,440	15,840	0.025	11	59,041	0.091	41
PA-3	COMMERCIAL	1		22	1,500	4.0	6,000	150	1,650	0.003	1	6,150	0.010	4
PA-4	SFD/SFA-FLEX	33	316	874	59,462	4.0	237,850	5,946	65,409	0.101	45	243,796	0.377	169
PA-5	MF	10.61	228	632	43,003	4.0	172,010	4,300	47,303	0.073	33	176,311	0.273	122
PA-6	MF	16.22	322	891	60,577	4.0	242,306	6,058	66,634	0.103	46	248,364	0.384	172
PA-7	SFD/SFA-FLEX	29.87	269	745	50,637	4.0	202,547	5,064	55,701	0.086	39	207,611	0.321	144
PA-7	COMMERCIAL	0.50		11	750	4.0	3,000	75	825	0.001	1	3,075	0.005	2
PA-8	SFD/SFA-FLEX	17.76	160	443	30,107	4.0	120,430	3,011	33,118	0.051	23	123,441	0.191	86
PA-9	SCHOOL	15.50		279	18,600	4.0	74,400	1,860	20,460	0.032	14	76,260	0.118	53
PK-2	Event Center	6.50		143	9,750	4.0	39,000	975	10,725	0.017	7	39,975	0.062	28
PK-4	NEIGHBORHOOD PARK	14.77			15,000	4.0	60,000	1,500	16,500	0.026	11	61,500	0.095	43
***Assume 15,000 gpd in PK-4 to account for planned restaurant and education venues.														

Area used for OS-5

	707	5,494	19,980	1,370,102		137,010	1,507,113		1,047					
Residential	446	5,494	15,218	1,034,815		103,481	1,138,296							
Commercial	99	-	1,848	140,972		14,097	155,069							
Industrial (School)	162		2,915	194,316		19,432	213,748							
	707	5,494	19,980	1,370,102		137,010	1,507,113							
Second Creek	358	3,392	10,954	744,719	3.35	2,496,635	74,472	819,191		569	2,571,107	3.98	1,785	
First Creek	349	2,102	9,026	625,384	3.46	2,165,438	62,538	687,922		478	2,227,976	3.45	1,547	
	707	5,494	19,980	1,370,102		4,662,072	137,010	1,507,113		1047	4,799,083	7.42	3,333	
											4,799,083		3,333	

Email Correspondence with City of Aurora

From: Menah, Julie
Sent: Wednesday, February 5, 2025 2:48 PM
To: Rome, Conner
Subject: FW: GVRE PA8&9 Master Plan Amendment #3 - Sanitary Sewer Discussion

Julie Menah, EI

Staff Engineer
D 321.354.9622
www.dewberry.com

From: Dekoskie, Steven <sdekoski@auroragov.org>
Sent: Wednesday, February 5, 2025 1:24 PM
To: Menah, Julie <jmenah@Dewberry.com>
Cc: Sibel, Sue <ssibel@Dewberry.com>; Smith, Joshua <jsmith@Dewberry.com>; Wyszynski, Brandon <bwyszynski@oakwoodhomesco.com>; Carro, Dave <DCarro@OakwoodHomesCO.com>; Woo, Chong <cwoo@auroragov.org>
Subject: RE: GVRE PA8&9 Master Plan Amendment #3 - Sanitary Sewer Discussion

[CAUTION] External Email. DO NOT click links or open attachments unless expected. Please use the "Phish Alert" button to report all suspicious emails.

Hi Julie,

All of OS-12 (87.4 acres) will be directed to the 24" sanitary, (south of E. 38th Ave).

Thanks,

Steve DeKoskie
Engineer | City of Aurora | Aurora Water
office 303.739.7490



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From: Menah, Julie <jmenah@Dewberry.com>
Sent: Wednesday, February 5, 2025 12:14 PM
To: Dekoskie, Steven <sdekoski@auroragov.org>
Cc: Sibel, Sue <ssibel@Dewberry.com>; Smith, Joshua <jsmith@Dewberry.com>; Wyszynski, Brandon <bwyszynski@oakwoodhomesco.com>; Carro, Dave <DCarro@OakwoodHomesCO.com>; Woo, Chong

[<cwoo@auroragov.org>](mailto:cwoo@auroragov.org)

Subject: RE: GVRE PA8&9 Master Plan Amendment #3 - Sanitary Sewer Discussion

Hi Steve-

Thanks so much for the quick response. Do you have a new basin map or exhibit you can provide us that show exactly what area they are taking southwest of their Site? Is it the entire 87.4 acres of Basin OS-12 going southwest or just a portion of this area?

Anything you can provide us on that area would be greatly appreciated-

Thanks,

Julie Menah, EI

Staff Engineer
D 321.354.9622

www.dewberry.com

From: Dekoskie, Steven [<sdekoski@auroragov.org>](mailto:sdekoski@auroragov.org)

Sent: Wednesday, February 5, 2025 12:06 PM

To: Menah, Julie [<jmenah@dewberry.com>](mailto:jmenah@dewberry.com)

Cc: Sibel, Sue [<:ssibel@dewberry.com>](mailto:ssibel@dewberry.com); Smith, Joshua [<jsmith@dewberry.com>](mailto:jsmith@dewberry.com); Wyszynski, Brandon [<bwyszynski@oakwoodhomesco.com>](mailto:bwyszynski@oakwoodhomesco.com); Carro, Dave [<DCarro@OakwoodHomesCO.com>](mailto:DCarro@OakwoodHomesCO.com); Woo, Chong [<cwoo@auroragov.org>](mailto:cwoo@auroragov.org)

Subject: RE: GVRE PA8&9 Master Plan Amendment #3 - Sanitary Sewer Discussion

[CAUTION] External Email. DO NOT click links or open attachments unless expected. Please use the "Phish Alert" button to report all suspicious emails.

Hi Julie,

The Majestic Commerce Center OS-12 basin flows are now being directed to the southwest of their site to connect to the new 24" sanitary sewer. That should provide some relief in pipe capacity proposed for GVRE PA 8.

Please provide the new flows and pipe capacities for design points 18 & 19 in GVRE. A variance request will be required if flows exceed 75% pipe capacity.

Let me know if you have any questions or would like to jump on a call to discuss.

Thank you,

Steve DeKoskie

Engineer | City of Aurora | Aurora Water
office 303.739.7490



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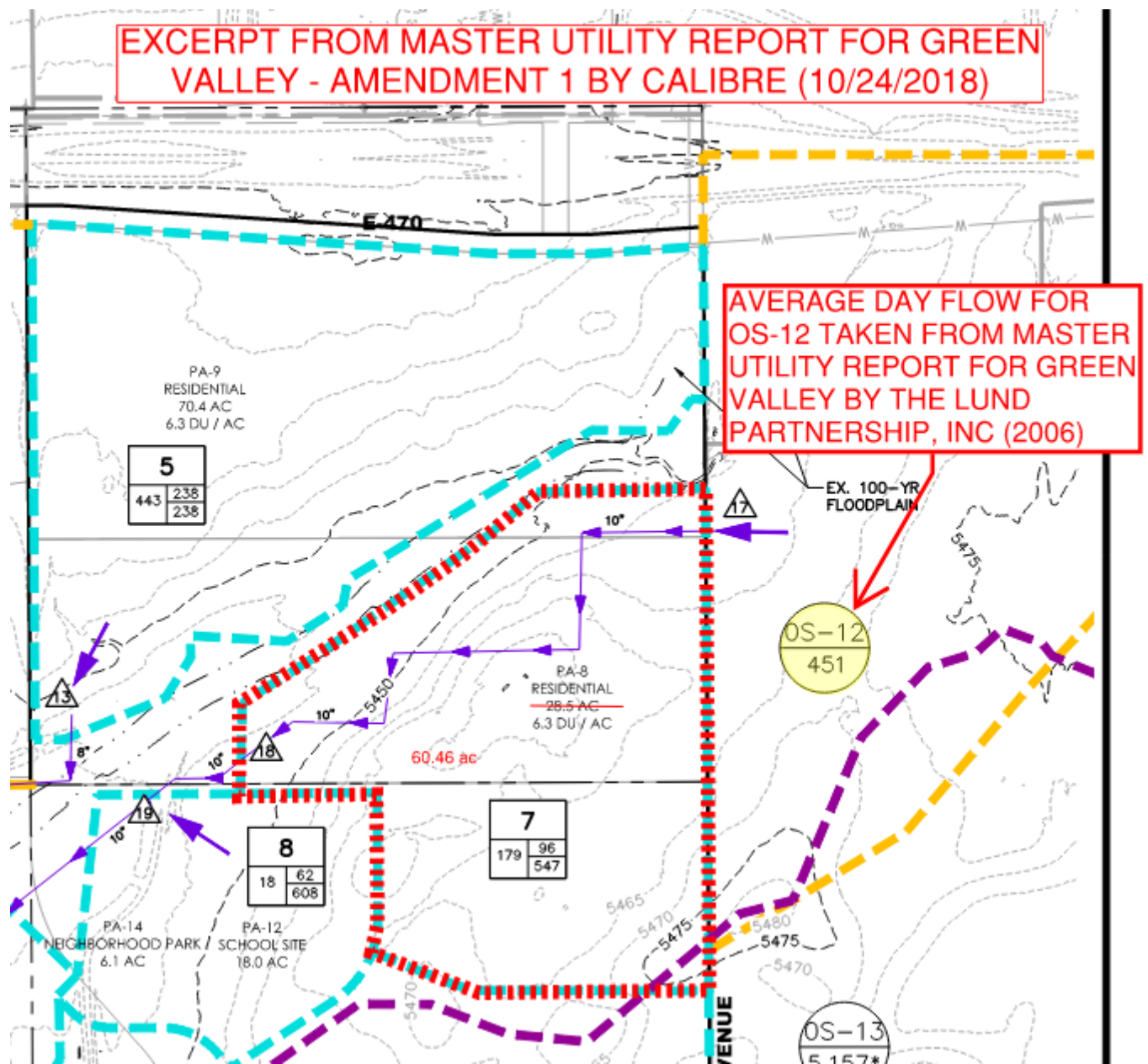
From: Menah, Julie <jmenah@Dewberry.com>
Sent: Wednesday, February 5, 2025 8:51 AM
To: Dekoskie, Steven <sdekoski@auroragov.org>
Cc: Sibel, Sue <ssibel@Dewberry.com>; Smith, Joshua <jsmith@Dewberry.com>; Wyszynski, Brandon <bwyszynski@oakwoodhomesco.com>; Carro, Dave <DCarro@OakwoodHomesCO.com>
Subject: GVRE PA8&9 Master Plan Amendment #3 - Sanitary Sewer Discussion

Hi Steve-

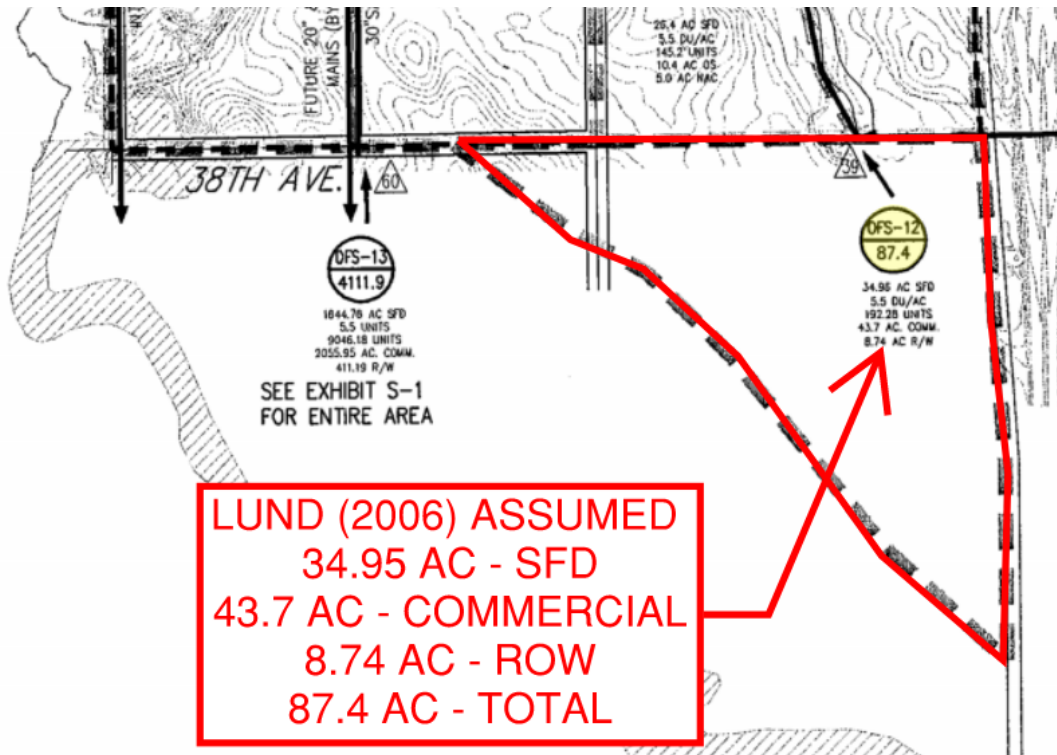
Just wanted to check back in on this. Have you had a chance to discuss with Vern if COA would allow for any variances to the sanitary sewer pipe capacity % since there was a discrepancy in the original MUR? The Oakwood team is aiming to submit the GVRE PA8&9 Master Plan Amendment #3 package by the end of this week – which will include our MUR and MDR conformance letters.

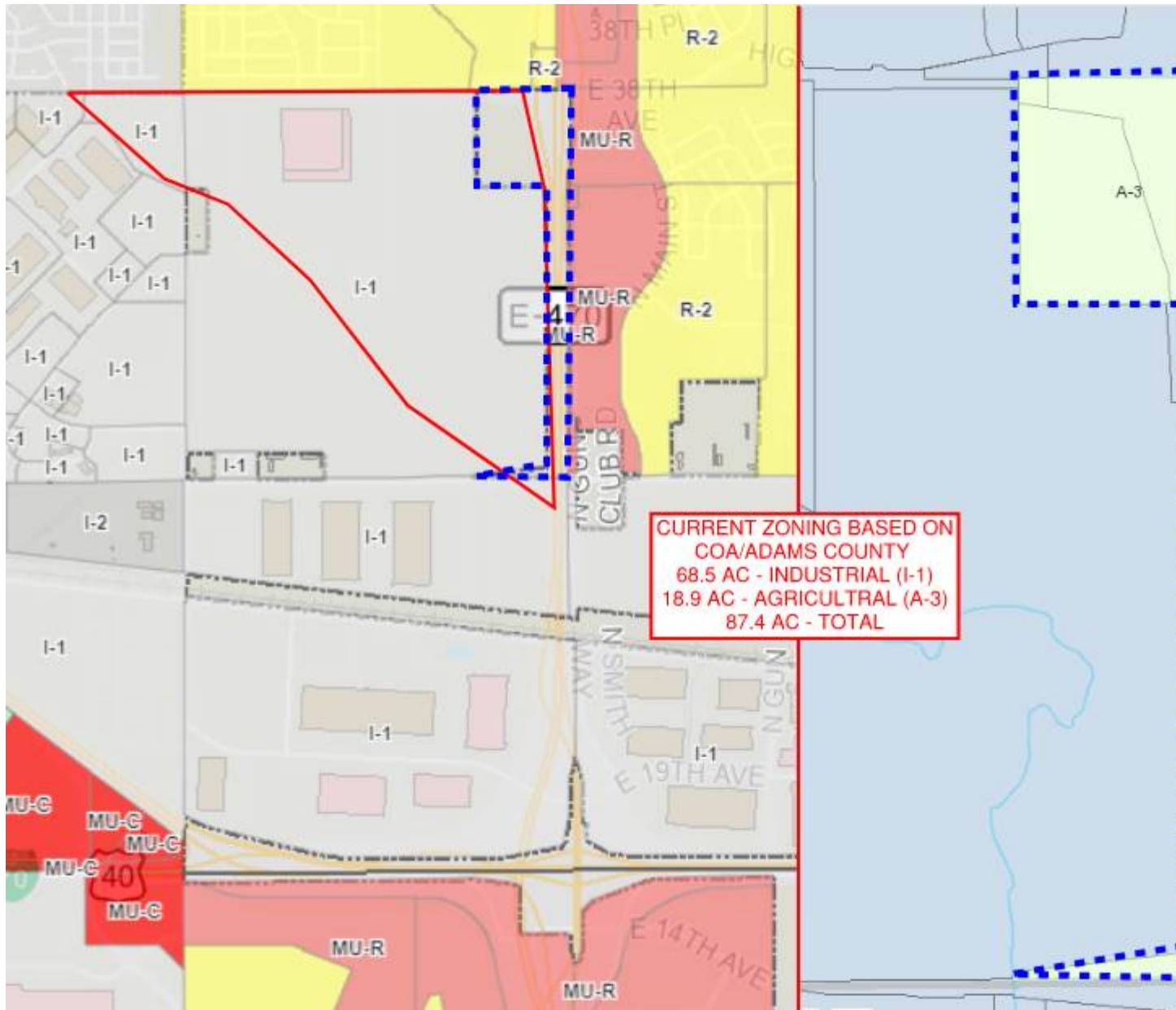
We also wanted to circle back on the preliminary discussion we had last Thursday regarding the offsite flow from the 87.4 acres of Majestic and Aurora Highland developments (Basin OS-12) entering GVRE at DP-17. Please see the annotated PDF attached and clips below.

The Master Utility Report for Green Valley – Amendment 1 by Calibre (2018) referenced the 2006 Lund MUR for the development south of 38th Ave (Majestic and Aurora Highlands).



The 2006 LUND MUR flows were calculated with land uses that are no longer accurate based on current COA/Adams County zoning for these sites.





Our question for you is – would COA allow for us to amend the land use assumptions for offsite basin OS-12 based on current zoning – since the original MUR flow assumptions come from Green Valley Master Reports?

And if this is an agreeable approach – what demand would COA prefer to see placed on the 18.9 ac Adams County agricultural parcel?

Since COA does not have a standard sewer loading for Agricultural parcel, we ran preliminary calculations for the 18.9 acres with both a low density residential demand as well as no demand if assumed fully agricultural. Both options give a much lower flow than was assumed with the 2006 LUND MUR and could potentially alleviate the need for a pipe capacity % variance if this approach is acceptable.

FLOW COMPARISON

OS-12 = 0.65 MGD **LUND (2006)**

OS-12 = 0.34 MGD (Industrial & Agricultural) **CURRENT ZONING (2025)**

OS-12 = 0.43 MGD (Industrial & SFD) **CURRENT ZONING (2025)**

Let us know what you think or if a TEAMS meeting is needed to discuss further-

Thanks,

Julie Menah, EI

Staff Engineer

D [321.354.9622](tel:321.354.9622)

www.dewberry.com

From: Menah, Julie

Sent: Thursday, January 30, 2025 12:56 PM

To: Dekoskie, Steven <sdekoski@auroragov.org>

Cc: Sibel, Sue <ssibel@Dewberry.com>; Smith, Joshua <jsmith@Dewberry.com>;
Wyszynski, Brandon <bwyszynski@oakwoodhomesco.com>

Subject: RE: GVRE PA8&9 Master Plan Amendment #3 - Sanitary Sewer Discussion

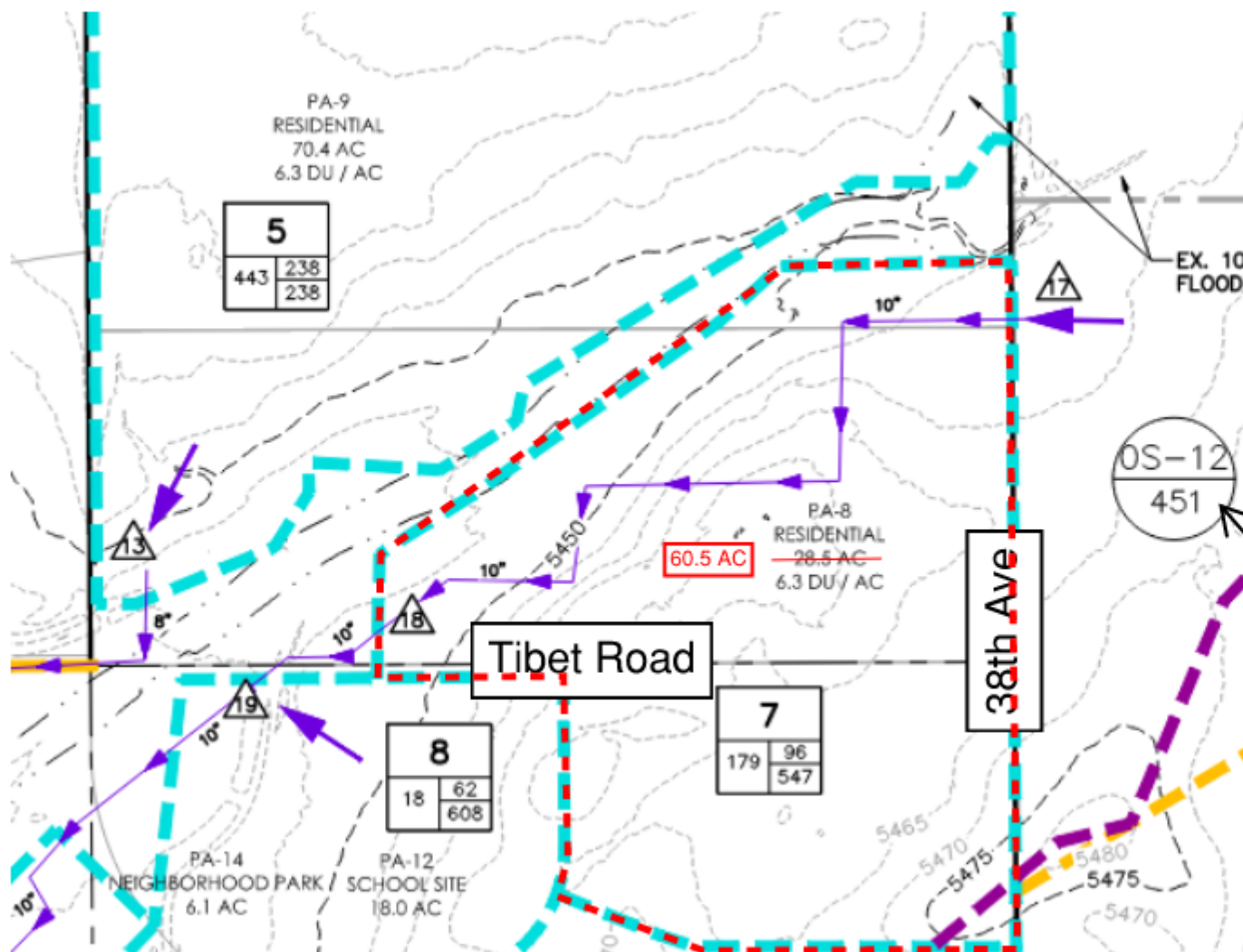
Hi Steve-

Thanks again for meeting with us this morning.

As discussed- there was an error in the original Calibre report for the PA-8/Basin 7 area. Approved calculations for Basin 7 used an area of 28.5 acres when the true area reflects around 60.5 acres. Original flows from the Calibre MUR show pipe capacity at 70% (Scenario 1 – clip below). However, when these flows are re-run with the correct area, pipe capacity rises to 77% - which is over the 75% capacity set by COA criteria (Scenario 2 – clip below). Scenario 3 below calculates what the pipe capacity would be for the PA-8 area with the latest proposed site plan, in which pipe capacity is calculated at 79%.

Will COA allow for any variances to the pipe capacity % since there was a discrepancy in the original MUR?

Clip of Calibre's MUR map for PA-8 & PA-9 annotated:



Original flows from the Calibre MUR:

SCENARIO 1:

Scenario	Design Point	Design Flow (mgd)	Pipe Capacity
Original Calibre MUR Flows	DP-17	0.65	56%
	DP-18	0.79	64%
	DP-19	0.88	70%

Updated flows from the Calibre MUR w/ corrected area:

SCENARIO 2:

Scenario	Design Point	Design Flow (mgd)	Pipe Capacity
Original Calibre MUR Flows With Corrected PA-8 Area	DP-17	0.65	56%
	DP-18	0.90	71%
	DP-19	0.99	77%

Updated flows calculated assuming proposed PA-8 site plan with residential and commercial use:

SCENARIO 3:

Scenario	Design Point	Design Flow (mgd)	Pipe Capacity
Calibre Off-site Flows (0.65 MGD) & PA-56 is commercial	DP-17	0.65	56%
	DP-18	0.94	73%
	DP-19	1.03	79%

Let us know what you think-

Thanks much,

Julie Menah, EI

Staff Engineer

D 321.354.9622

www.dewberry.com

Supporting Calculations

Sanitary Sewer Calculations

TABLE 1: SANITARY SEWER DEMANDS										
BASIN CHARACTERISTICS				RESIDENTIAL					NON-RESIDENTIAL	TOTAL
BASIN		LAND USE	AREA (ACRES)	MAXIMUM NO. UNITS	DENSITY (unit/acre)	POPULATION	AVERAGE DAILY FLOW PER UNIT (gpd)	AVERAGE FLOW (gpd)	AVERAGE DAILY FLOW PER ACRE	TOTAL AVERAGE SEWAGE FLOW (gpd)
Basin 5	PA-9	RESIDENTIAL	64.5	516	8	1430	188.36	97193.76		
		TOTAL						97193.76		97193.76
Basin 6 (Filing 22)(PA-5) ¹		RESIDENTIAL	24.6	180	7.4	499	188.36	33904.80		
		TOTAL						33904.80		33904.80
	Filing 7 (PA-7)	RESIDENTIAL	22.65	138	6.09	383	188.36	25993.68		
	PA-8	RESIDENTIAL	18.4	147	8	408	188.36	27726.59		
	PA-70	RESIDENTIAL	4.7	38	8	105	188.36	7082.34		
	AAC-1 ²	RESIDENTIAL	6.7	134	20	372	188.36	25240.24		
Basin 7		TOTAL						86042.85		86042.85
Basin 310-4 ³		MIXED USE	17.2	258	15	715	188.36	48596.88	1500	25800.00
		TOTAL						48596.88	25800.00	74396.88
Offsite flows per Windler MUR and Aurora Highlands MUR										
TAH ⁴		MIXED USE	3494.24	14853	5.8	41142	188.36	2790000.00	2362000.00	
		TOTAL						2790000.00	2362000.00	5152000.00
Windler ⁵		RESIDENTIAL AND PARKS	117.77	139	2310	1981	188.36	156240.00	15000.00	
		TOTAL						156240.00	15000.00	171240.00
Basin 8		SCHOOL	18.0						1200	21600.00
									21600.00	21600.00

1: Basin 6 updated with Filing 22 Utility Letter. (RSN #1849820)

2. AAC-1, part of Basin 7, is being zoned as AAC with this Master Plan Amendment. However, due to the uncertainty of the future use of this PA, calculations with this letter assume worst case scenario in order to provide flexibility for the developer in the future. Worst case scenario flows for AAC-1 were calculated using a high-density residential use of 20 du/ac.

3. Basin 310-4 updated per the Green Valley Ranch Master Utility Report Amendment 2 (DA-1662-25)

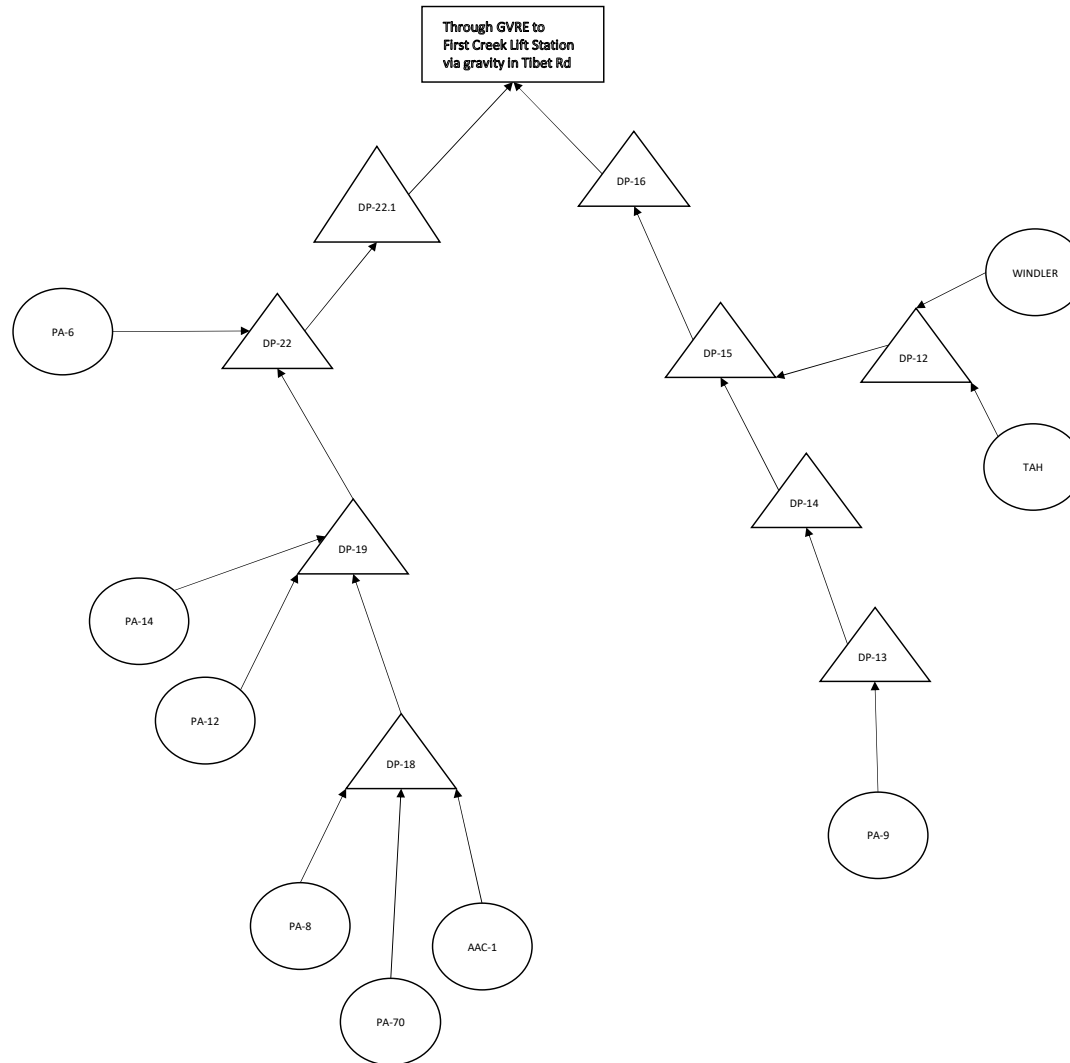
4. Basin flow values from the Aurora Master Utility Report (EDN #219069)

5. Basin flow values from the Windler Master Utility Report (EDN #222155)

TABLE 2: SANITARY SEWER ROUTING														
Design Point	Basin(s)	Average Daily Flow (gpd)	Cumulative Equivalent Pop ¹	Peak Factor	Peak Flow (gpd)	Inflow and Infiltration (gpd)	Design Flow (gpd)	Design Flow (mgd)	Design Flow (cfs)	Req'd Pipe Diameter (in)	Req'd PipeSlope (Percent)	Velocity (ft/s)	Depth of Flow (in)	Depth of Ratio (Percent)
DP-18	Basin 7	86042.85	1265.34											
Total		86042.85	1265.34	4.00	344171.39	8604.28	352775.68	0.35	0.55	10.00	0.4%	2.70	4.0	40%
DP-19	Basin 7	86042.85	1265.34											
	Basin 8	21600.00	317.65											
Total		107642.85	1582.98	4.00	430571.39	10764.28	441335.68	0.44	0.68	10.00	0.4%	2.87	4.5	45%
DP-13	Basin 5	97193.76												
Total		97193.76	1429.32	4.00	388775.04	9719.38	398494.42	0.40	0.62	8.00	0.4%	2.79	4.9	61%
DP-15	Basin 310-43	74396.88	1094.07											
	TAH4	5152000.00	75764.71											
	Windler5	171240.00	2518.24											
	Basin 6	33904.80	498.60											
	Basin 5	97193.76	1429.32											
Total		5528735.44	81304.93	2.40	13261916.57	552873.54	13814790.11	13.81	21.37	36.00	0.4%	6.78	16.5	46%

1. Cumulative Equivalent Population = Total Average Daily Flow at a design point ÷ 68 gallons per day

Green Valley Master Plan Amendment 2 Routing Schematic



Worksheet for DP-13

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.004 ft/ft
Diameter	8.0 in
Discharge	0.62 cfs
Results	
Normal Depth	4.9 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.2 ft
Hydraulic Radius	2.2 in
Top Width	0.65 ft
Critical Depth	4.4 in
Percent Full	60.9 %
Critical Slope	0.005 ft/ft
Velocity	2.79 ft/s
Velocity Head	0.12 ft
Specific Energy	0.53 ft
Froude Number	0.841
Maximum Discharge	0.97 cfs
Discharge Full	0.90 cfs
Slope Full	0.002 ft/ft
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	4.9 in
Critical Depth	4.4 in
Channel Slope	0.004 ft/ft
Critical Slope	0.005 ft/ft

Worksheet for DP-15

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.004 ft/ft
Diameter	36.0 in
Discharge	21.37 cfs
Results	
Normal Depth	16.5 in
Flow Area	3.2 ft ²
Wetted Perimeter	4.5 ft
Hydraulic Radius	8.5 in
Top Width	2.99 ft
Critical Depth	17.8 in
Percent Full	45.7 %
Critical Slope	0.003 ft/ft
Velocity	6.78 ft/s
Velocity Head	0.71 ft
Specific Energy	2.09 ft
Froude Number	1.164
Maximum Discharge	53.62 cfs
Discharge Full	49.85 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	45.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	16.5 in
Critical Depth	17.8 in
Channel Slope	0.004 ft/ft
Critical Slope	0.003 ft/ft

Worksheet for DP-18

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.004 ft/ft
Diameter	10.0 in
Discharge	0.55 cfs
Results	
Normal Depth	4.0 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.1 ft
Hydraulic Radius	2.1 in
Top Width	0.82 ft
Critical Depth	3.9 in
Percent Full	39.9 %
Critical Slope	0.004 ft/ft
Velocity	2.70 ft/s
Velocity Head	0.11 ft
Specific Energy	0.45 ft
Froude Number	0.955
Maximum Discharge	1.76 cfs
Discharge Full	1.64 cfs
Slope Full	0.000 ft/ft
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	4.0 in
Critical Depth	3.9 in
Channel Slope	0.004 ft/ft
Critical Slope	0.004 ft/ft

Worksheet for DP-19

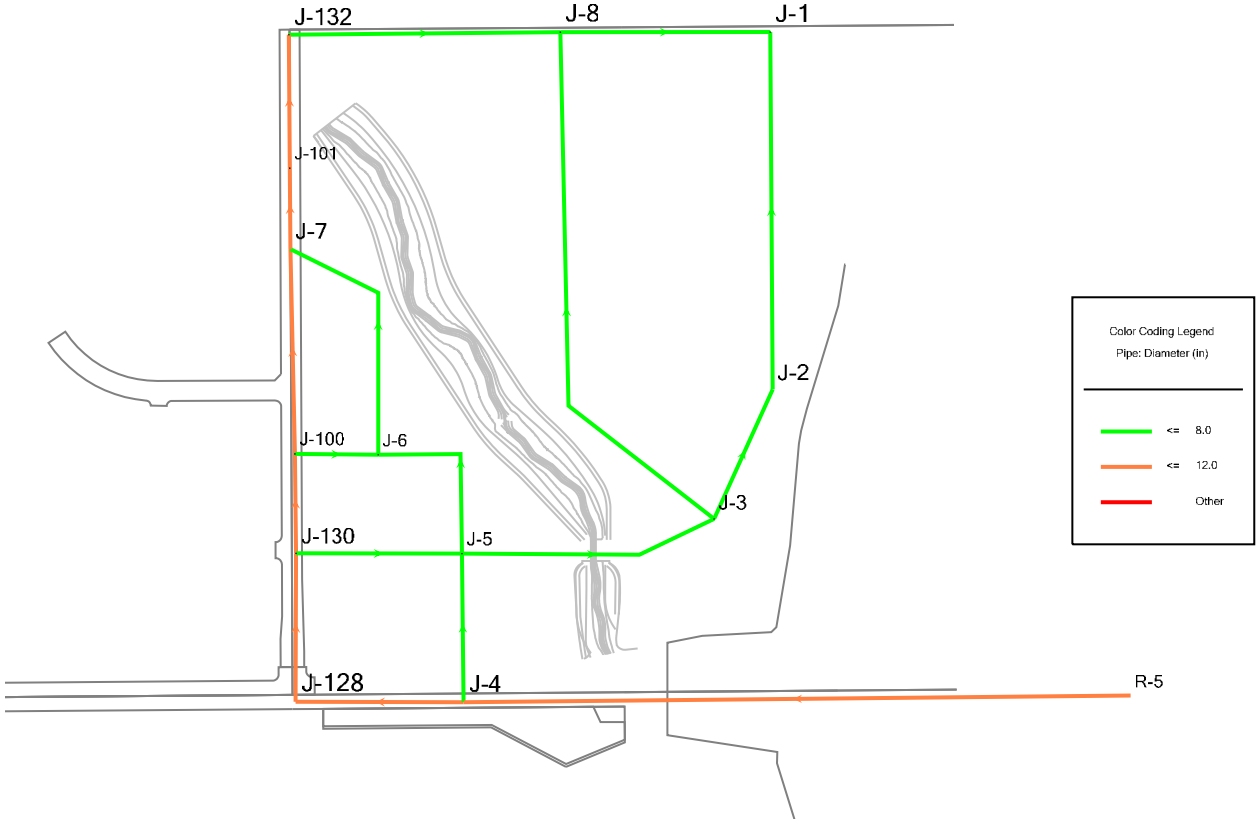
Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.011
Channel Slope	0.004 ft/ft
Diameter	10.0 in
Discharge	0.68 cfs
Results	
Normal Depth	4.5 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.2 ft
Hydraulic Radius	2.3 in
Top Width	0.83 ft
Critical Depth	4.4 in
Percent Full	44.9 %
Critical Slope	0.004 ft/ft
Velocity	2.87 ft/s
Velocity Head	0.13 ft
Specific Energy	0.50 ft
Froude Number	0.944
Maximum Discharge	1.76 cfs
Discharge Full	1.64 cfs
Slope Full	0.001 ft/ft
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	4.5 in
Critical Depth	4.4 in
Channel Slope	0.004 ft/ft
Critical Slope	0.004 ft/ft

Water Calculations

TABLE 1: ON-SITE WATER DEMANDS													
Planning Area	Max # of SFD/SFD Units	Residential People/Units	Total People	Non-Residential Acreage	Use	Demand (GPD/Acre)	Avg. Daily Demand (GPD)	Avg. Daily Demand (GPM)	Max. Daily Demand (GPD)	Max. Daily Demand (GPM)	Max. Hour Demand (GPD)	Max. Hour Demand (GPM)	Node(s)
PA-9							149434.00	103.77	418415.20	290.57	633573.00	439.98	J-1, J-2, J-3, J-8, J-132
	503	2.77	1394		Residential		140794.00	97.77	394223.20	273.77	633573.00	439.98	
				4.8	PA-39 & PA-69	1800	8640.00	6.00	24192.00	16.80	N/A	N/A	
PA-8							42108.00	29.24	117902.40	81.88	185436.00	128.78	J-5, J-6, J-7, J-100, J-130
	147	2.77	408		Residential		41208.00	28.62	115382.40	80.13	185436.00	128.78	
				0.5	PA-41	1800	900.00	0.63	2520.00	1.75	N/A	N/A	
PA-70	38	2.77	105		Residential		10605.00	7.36	29694.00	20.62	47722.50	33.14	J-4, J-5
AAC-1 ¹	134	2.77	372		MF Residential		37572.00	26.09	105201.60	73.06	169074.00	117.41	J-4, J-5, J-128, J-130
Totals:							239719.00	166.47	671213.20	466.12	1035805.50	719.31	

1: AAC-1, part of Basin 7, is being zoned as AAC with this Master Plan Amendment. However, due to the uncertainty of the future use of this PA, calculations with this letter assume worst case scenario in order to provide flexibility for the developer in the future. Worst case scenario flows for AAC-1 were calculated using a high-density residential use of 20 du/ac

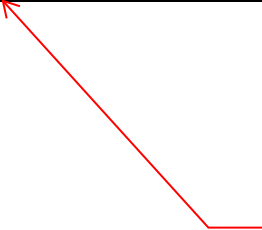
Green Valley Master Plan Amendment 3



Average Daily

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-5	5,719.80	167	5,719.80



Reservoir elevation referenced from
R-5 within the Green Valley -
Amendment 1 Master Utility Report
(EDN #218184)

Average Daily
Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Fire Flow (Needed) (gpm)
J-1	5,474.30	<Collection: 1 item>	21	5,719.50	106	2,500
J-8	5,462.36	<Collection: 1 item>	21	5,719.50	111	2,500
J-2	5,470.21	<Collection: 1 item>	21	5,719.50	108	2,500
J-3	5,468.11	<Collection: 1 item>	21	5,719.50	109	2,500
J-4	5,455.19	<Collection: 2 items>	10	5,719.61	114	2,500
J-128	5,467.79	<Collection: 1 item>	7	5,719.58	109	2,500
J-130	5,467.31	<Collection: 2 items>	12	5,719.57	109	2,500
J-100	5,459.73	<Collection: 1 item>	6	5,719.56	112	2,500
J-7	5,447.37	<Collection: 1 item>	6	5,719.55	118	2,500
J-5	5,464.18	<Collection: 3 items>	16	5,719.56	110	2,500
J-132	5,441.51	<Collection: 1 item>	21	5,719.55	120	2,500
J-6	5,461.42	<Collection: 1 item>	6	5,719.56	112	2,500
J-101	5,445.16	<Collection: 0 items>	0	5,719.55	119	2,500

Average Daily
Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-1	835	J-1	J-8	8.0	PVC	150.0	-20	0.13	0.010
P-2	1,081	J-8	J-132	8.0	PVC	150.0	-39	0.25	0.034
P-4	816	J-7	J-100	12.0	PVC	150.0	-52	0.15	0.007
P-5	396	J-100	J-130	12.0	PVC	150.0	-61	0.17	0.011
P-6	591	J-130	J-128	12.0	PVC	150.0	-86	0.24	0.021
P-7	669	J-128	J-4	12.0	PVC	150.0	-92	0.26	0.024
P-10	566	J-3	J-2	8.0	PVC	150.0	21	0.14	0.011
P-11	1,424	J-2	J-1	8.0	PVC	150.0	0	0.00	0.000
P-12	2,223	J-8	J-3	8.0	PVC	150.0	-3	0.02	0.000
P-13	1,036	J-3	J-5	8.0	PVC	150.0	-44	0.28	0.044
P-14	660	J-5	J-130	8.0	PVC	150.0	-12	0.08	0.003
P-17	592	J-5	J-4	8.0	PVC	150.0	-64	0.41	0.087
P-18	2,655	J-4	R-5	12.0	PVC	150.0	-167	0.47	0.070
P-15(1)	724	J-5	J-6	8.0	PVC	150.0	16	0.10	0.007
P-15(2)	332	J-6	J-100	8.0	PVC	150.0	-4	0.02	0.000
P-19	1,035	J-7	J-6	8.0	PVC	150.0	-14	0.09	0.005
P-3(1)	531	J-132	J-101	12.0	PVC	150.0	-59	0.17	0.011
P-3(2)	323	J-101	J-7	12.0	PVC	150.0	-59	0.17	0.011

Max Daily
Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Fire Flow (Needed) (gpm)
J-1	5,474.30	<Collection: 1 item>	58	5,717.76	105	2,500
J-8	5,462.36	<Collection: 1 item>	58	5,717.81	111	2,500
J-2	5,470.21	<Collection: 1 item>	58	5,717.76	107	2,500
J-3	5,468.11	<Collection: 1 item>	58	5,717.81	108	2,500
J-4	5,455.19	<Collection: 2 items>	29	5,718.54	114	2,500
J-128	5,467.79	<Collection: 1 item>	18	5,718.29	108	2,500
J-130	5,467.31	<Collection: 2 items>	35	5,718.22	109	2,500
J-100	5,459.73	<Collection: 1 item>	16	5,718.17	112	2,500
J-7	5,447.37	<Collection: 1 item>	16	5,718.13	117	2,500
J-5	5,464.18	<Collection: 3 items>	45	5,718.20	110	2,500
J-132	5,441.51	<Collection: 1 item>	58	5,718.09	120	2,500
J-6	5,461.42	<Collection: 1 item>	16	5,718.17	111	2,500
J-101	5,445.16	<Collection: 0 items>	0	5,718.12	118	2,500

Max Daily

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-1	835	J-1	J-8	8.0	PVC	150.0	-57	0.36	0.069
P-2	1,081	J-8	J-132	8.0	PVC	150.0	-108	0.69	0.227
P-4	816	J-7	J-100	12.0	PVC	150.0	-144	0.41	0.054
P-5	396	J-100	J-130	12.0	PVC	150.0	-172	0.49	0.075
P-6	591	J-130	J-128	12.0	PVC	150.0	-240	0.68	0.138
P-7	669	J-128	J-4	12.0	PVC	150.0	-258	0.73	0.158
P-10	566	J-3	J-2	8.0	PVC	150.0	59	0.38	0.075
P-11	1,424	J-2	J-1	8.0	PVC	150.0	1	0.01	0.000
P-12	2,223	J-8	J-3	8.0	PVC	150.0	-7	0.04	0.002
P-13	1,036	J-3	J-5	8.0	PVC	150.0	-125	0.79	0.296
P-14	660	J-5	J-130	8.0	PVC	150.0	-33	0.21	0.026
P-17	592	J-5	J-4	8.0	PVC	150.0	-180	1.15	0.583
P-18	2,655	J-4	R-5	12.0	PVC	150.0	-466	1.32	0.473
P-15(1)	724	J-5	J-6	8.0	PVC	150.0	44	0.28	0.043
P-15(2)	332	J-6	J-100	8.0	PVC	150.0	-11	0.07	0.003
P-19	1,035	J-7	J-6	8.0	PVC	150.0	-38	0.24	0.033
P-3(1)	531	J-132	J-101	12.0	PVC	150.0	-166	0.47	0.070
P-3(2)	323	J-101	J-7	12.0	PVC	150.0	-166	0.47	0.069

Max Hour
Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Fire Flow (Needed) (gpm)
J-1	5,474.30	<Collection: 1 item>	88	5,715.28	104	2,500
J-8	5,462.36	<Collection: 1 item>	88	5,715.39	109	2,500
J-2	5,470.21	<Collection: 1 item>	88	5,715.28	106	2,500
J-3	5,468.11	<Collection: 1 item>	88	5,715.40	107	2,500
J-4	5,455.19	<Collection: 2 items>	46	5,716.99	113	2,500
J-128	5,467.79	<Collection: 1 item>	29	5,716.43	108	2,500
J-130	5,467.31	<Collection: 2 items>	55	5,716.28	108	2,500
J-100	5,459.73	<Collection: 1 item>	26	5,716.16	111	2,500
J-7	5,447.37	<Collection: 1 item>	26	5,716.09	116	2,500
J-5	5,464.18	<Collection: 3 items>	72	5,716.23	109	2,500
J-132	5,441.51	<Collection: 1 item>	88	5,716.00	119	2,500
J-6	5,461.42	<Collection: 1 item>	26	5,716.16	110	2,500
J-101	5,445.16	<Collection: 0 items>	0	5,716.05	117	2,500

Max Hour

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-1	835	J-1	J-8	8.0	PVC	150.0	-86	0.55	0.150
P-2	1,081	J-8	J-132	8.0	PVC	150.0	-163	1.04	0.488
P-4	816	J-7	J-100	12.0	PVC	150.0	-219	0.62	0.117
P-5	396	J-100	J-130	12.0	PVC	150.0	-262	0.74	0.162
P-6	591	J-130	J-128	12.0	PVC	150.0	-368	1.04	0.305
P-7	669	J-128	J-4	12.0	PVC	150.0	-397	1.13	0.352
P-10	566	J-3	J-2	8.0	PVC	150.0	90	0.57	0.162
P-11	1,424	J-2	J-1	8.0	PVC	150.0	2	0.01	0.000
P-12	2,223	J-8	J-3	8.0	PVC	150.0	-11	0.07	0.003
P-13	1,036	J-3	J-5	8.0	PVC	150.0	-189	1.20	0.639
P-14	660	J-5	J-130	8.0	PVC	150.0	-51	0.32	0.056
P-17	592	J-5	J-4	8.0	PVC	150.0	-276	1.76	1.295
P-18	2,655	J-4	R-5	12.0	PVC	150.0	-719	2.04	1.057
P-15(1)	724	J-5	J-6	8.0	PVC	150.0	67	0.43	0.093
P-15(2)	332	J-6	J-100	8.0	PVC	150.0	-17	0.11	0.008
P-19	1,035	J-7	J-6	8.0	PVC	150.0	-58	0.37	0.071
P-3(1)	531	J-132	J-101	12.0	PVC	150.0	-251	0.71	0.152
P-3(2)	323	J-101	J-7	12.0	PVC	150.0	-251	0.71	0.150

Fire Flow

Junction Table - Time: 0.00 hours

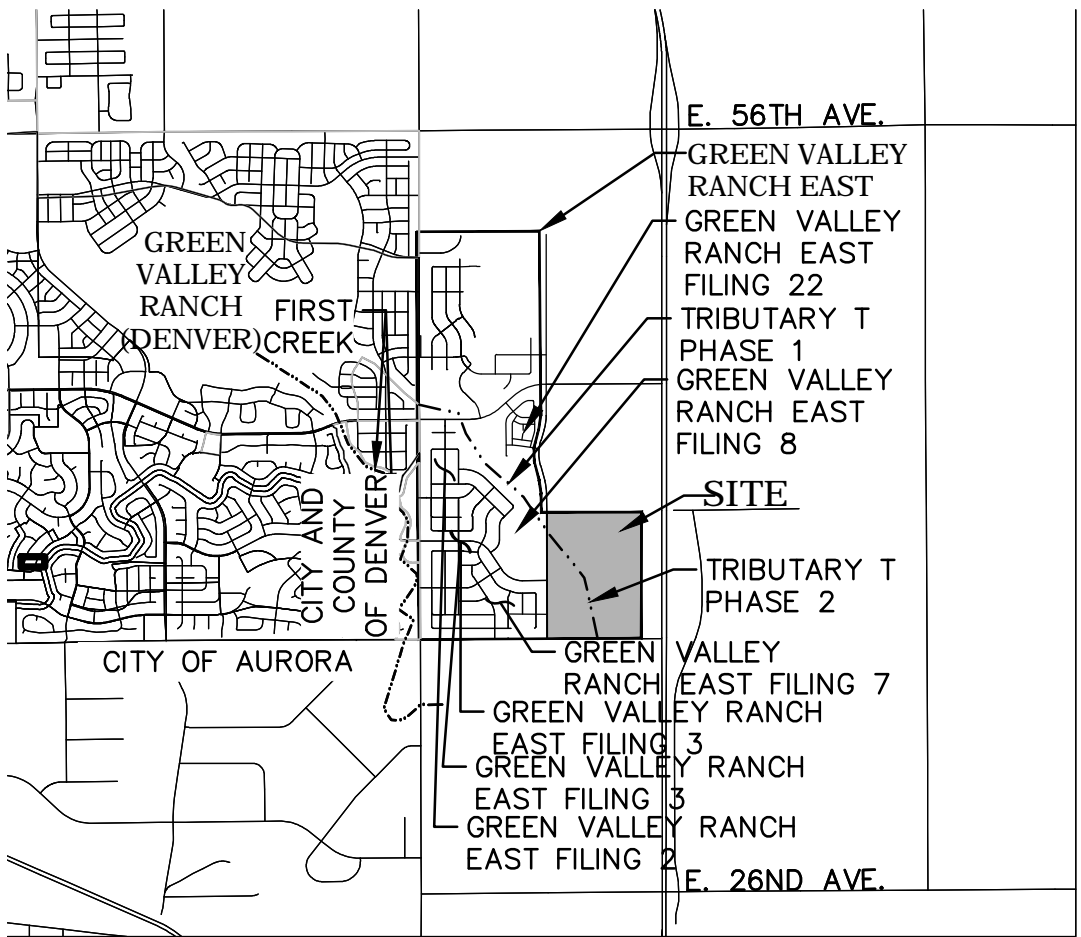
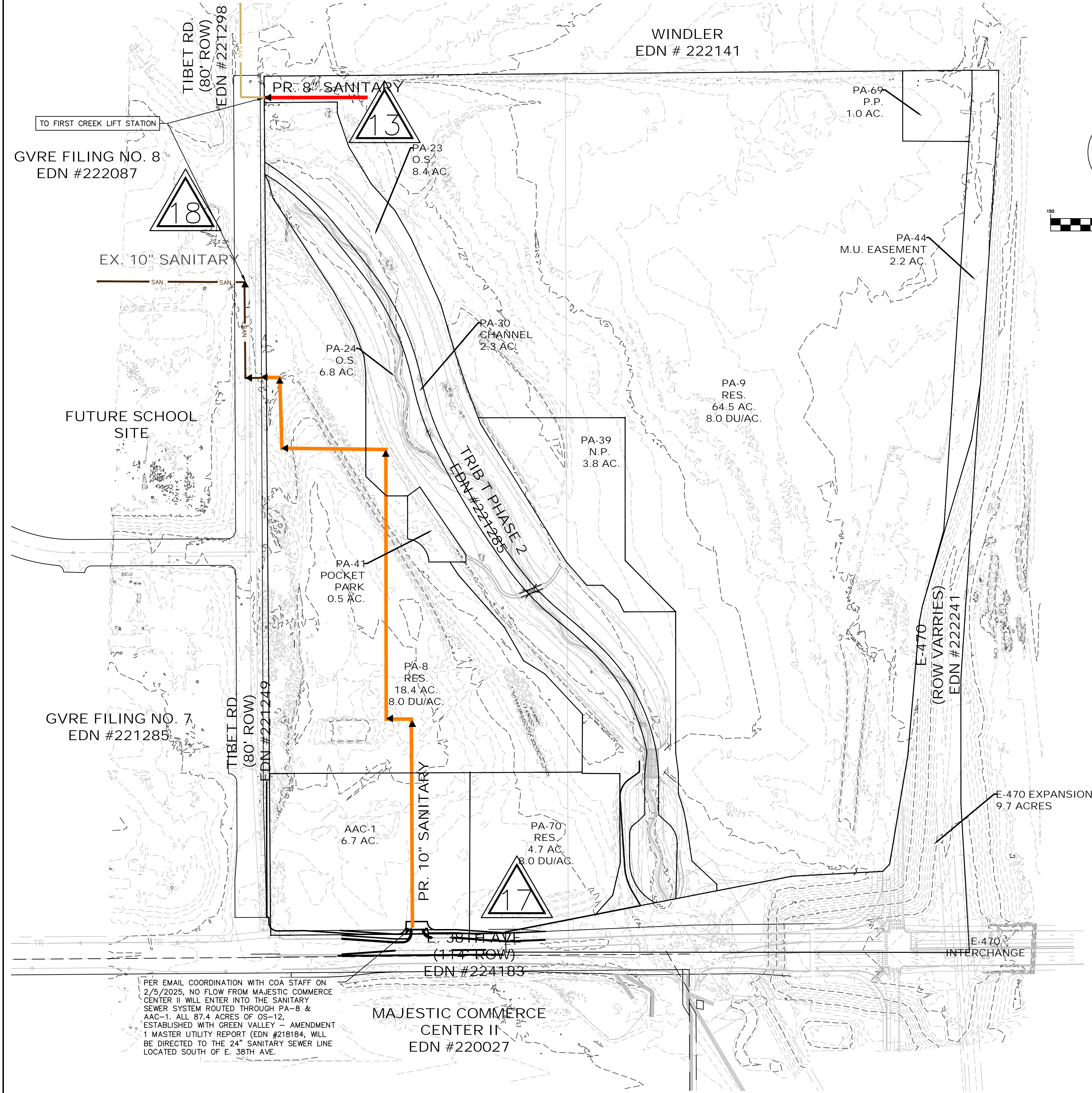
Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Fire Flow (Needed) (gpm)
J-1	5,474.30	<Collection: 1 item>	58	5,717.76	105	2,500
J-8	5,462.36	<Collection: 1 item>	58	5,717.81	111	2,500
J-2	5,470.21	<Collection: 1 item>	58	5,717.76	107	2,500
J-3	5,468.11	<Collection: 1 item>	58	5,717.81	108	2,500
J-4	5,455.19	<Collection: 2 items>	29	5,718.54	114	2,500
J-128	5,467.79	<Collection: 1 item>	18	5,718.29	108	2,500
J-130	5,467.31	<Collection: 2 items>	35	5,718.22	109	2,500
J-100	5,459.73	<Collection: 1 item>	16	5,718.17	112	2,500
J-7	5,447.37	<Collection: 1 item>	16	5,718.13	117	2,500
J-5	5,464.18	<Collection: 3 items>	45	5,718.20	110	2,500
J-132	5,441.51	<Collection: 1 item>	58	5,718.09	120	2,500
J-6	5,461.42	<Collection: 1 item>	16	5,718.17	111	2,500
J-101	5,445.16	<Collection: 0 items>	0	5,718.12	118	2,500

Fire Flow

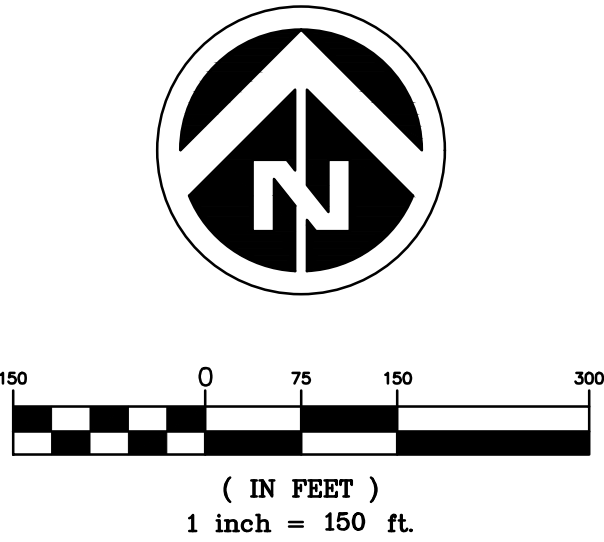
Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen- Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-1	835	J-1	J-8	8.0	PVC	150.0	-57	0.36	0.069
P-2	1,081	J-8	J-132	8.0	PVC	150.0	-108	0.69	0.227
P-4	816	J-7	J-100	12.0	PVC	150.0	-144	0.41	0.054
P-5	396	J-100	J-130	12.0	PVC	150.0	-172	0.49	0.075
P-6	591	J-130	J-128	12.0	PVC	150.0	-240	0.68	0.138
P-7	669	J-128	J-4	12.0	PVC	150.0	-258	0.73	0.158
P-10	566	J-3	J-2	8.0	PVC	150.0	59	0.38	0.075
P-11	1,424	J-2	J-1	8.0	PVC	150.0	1	0.01	0.000
P-12	2,223	J-8	J-3	8.0	PVC	150.0	-7	0.04	0.002
P-13	1,036	J-3	J-5	8.0	PVC	150.0	-125	0.79	0.296
P-14	660	J-5	J-130	8.0	PVC	150.0	-33	0.21	0.026
P-17	592	J-5	J-4	8.0	PVC	150.0	-180	1.15	0.583
P-18	2,655	J-4	R-5	12.0	PVC	150.0	-466	1.32	0.473
P-15(1)	724	J-5	J-6	8.0	PVC	150.0	44	0.28	0.043
P-15(2)	332	J-6	J-100	8.0	PVC	150.0	-11	0.07	0.003
P-19	1,035	J-7	J-6	8.0	PVC	150.0	-38	0.24	0.033
P-3(1)	531	J-132	J-101	12.0	PVC	150.0	-166	0.47	0.070
P-3(2)	323	J-101	J-7	12.0	PVC	150.0	-166	0.47	0.069

GREEN VALLEY MASTER PLAN AMENDMENT 3



VICINITY MAP
SCALE: 1"=4000'



LEGEND

8" SANITARY —

10" SANITARY —

EX. 8" SANITARY — SAN

EX. 10" SANITARY — SAN

SANITARY DESIGN POINT

NOTE:
GRAVITY SEWER MAINS SERVING FUTURE PA-8, PA-70, AND AAC-1 HAVE THE POTENTIAL TO BE DOWN-SIZED TO AN 8-INCH BASED ON FINAL SITE PLAN CONFIGURATION. DEVIATION FROM THE 10-INCH GRAVITY SEWER PROPOSED WITH THIS LETTER IS ALLOWED BUT MUST BE JUSTIFIED AND APPROVED WITH THE FUTURE CONSTRUCTION DOCUMENTS.

Approved For One Year From This Date

City Engineer		Date
Water Department		Date
Parks, Recreation and Open Space		Date
Fire Department		Date
Traffic Manager		Date

Dewberry
Dewberry Engineers Inc.
2011 Cherry Street, Suite 206
Louisville, CO 80027
720.975.0177
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Email: kcecil@dewberry.com

GREEN VALLEY MASTER PLAN AMENDMENT 3
MASTER UTILITY STUDY
SEWER MAIN MODELING EXHIBIT

Client Information
OAKWOOD HOMES
18655 GREEN VALLEY
RANCH BLVD
DENVER, CO 80249
Tel: 303-486-8734
Contact: DAVID CARRO

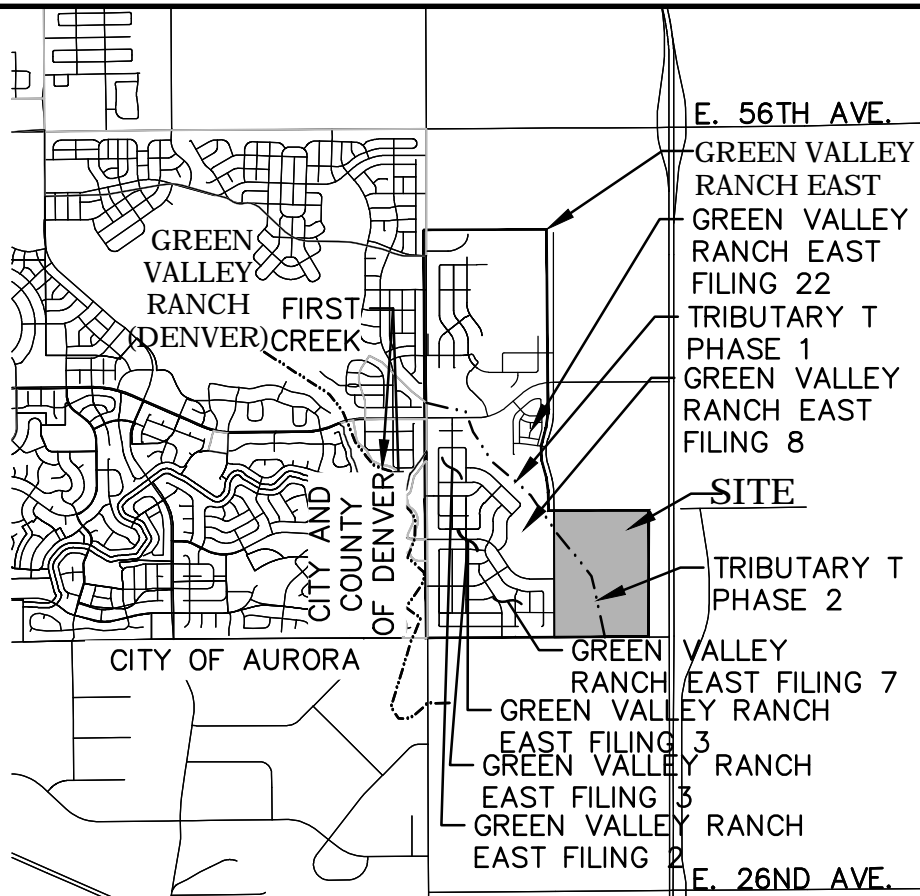
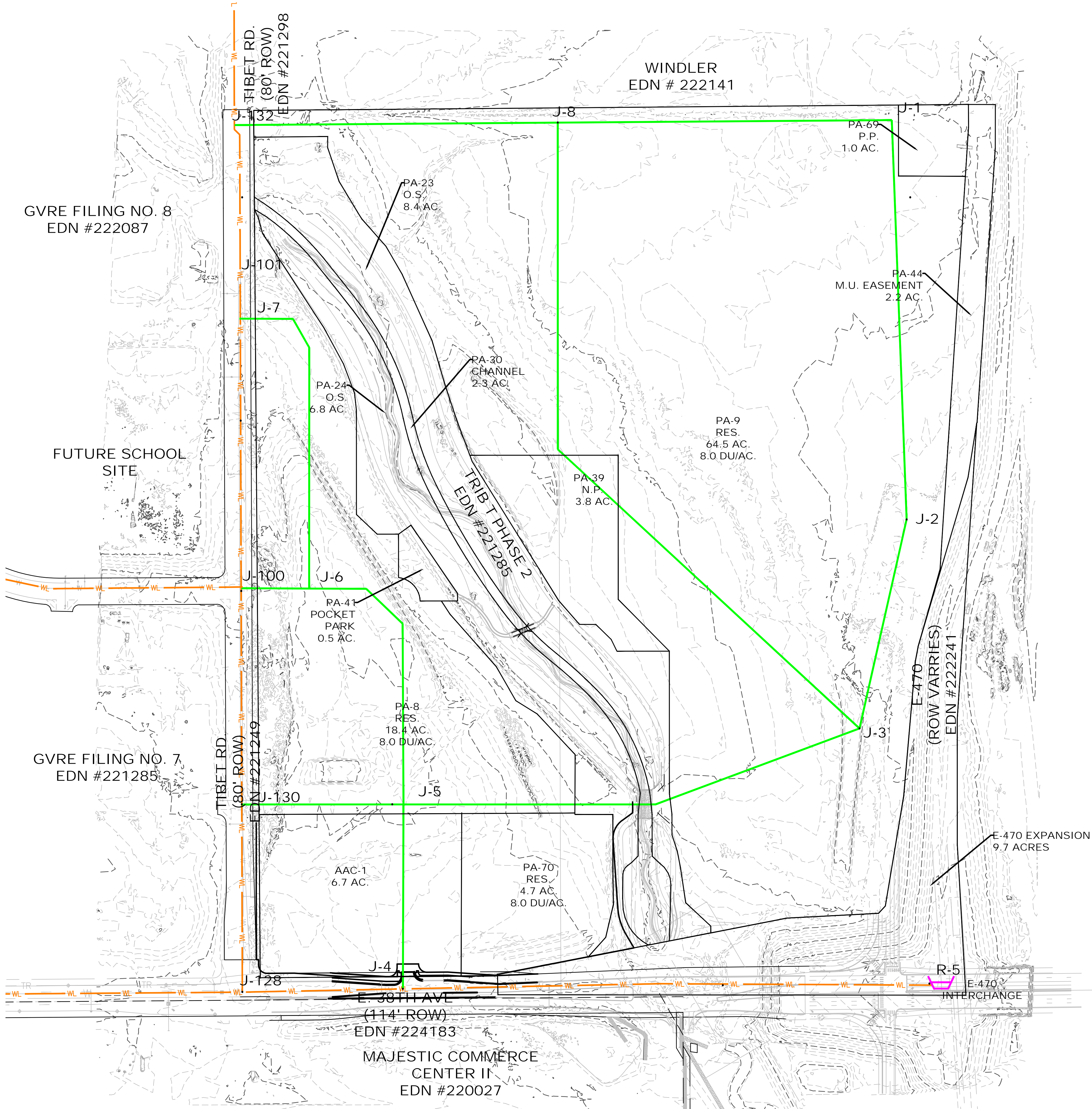
No.	Date	Description
1	2/14/2025	FIRST SUBMITTAL

DOCUMENT AMENDMENTS

PRELIMINARY
NOT FOR
CONSTRUCTION

Project Number: 50145755	Designed By: CJR	Drawn By: CJR	Checked By: JS	Sheet Number:
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GREEN VALLEY MASTER PLAN AMENDMENT 3



VICINITY MAP
SCALE: 1"=4000'

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GREEN VALLEY MASTER PLAN AMENDMENT 3
MASTER UTILITY STUDY
WATER MAIN MODELING EXHIBIT

Client Information
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RANCH BLVD
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No.	Date	Description
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Project Number: 50145755
Designed By: CJR
Checked By: JS
Sheet Number:

Approved For One Year From This Date

City Engineer	
Water Department	Date
Parks, Recreation and Open Space	Date
Fire Department	Date
Traffic Manager	Date