DISCOVERY PARK MACRO STORMWATER REPORT

Prepared for:

Discovery Park Lee's Summit, LLC
Columbia, Missouri

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Olsson Project No. A21-04643

olsson

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1. INTRODUCTION

This Stormwater Drainage Study has been prepared to evaluate the stormwater hydrology of multiple developments (current and future) that are being proposed within the watershed. Once fully developed, the area treated by improvements proposed within this study will include:

- Aria Apartments: a 22.50-ac apartment development (Zoned RP-4)
- Discovery Park Phase 1: a 39.42-ac commercial development (Zoned CP-2, currently being rezoned to PMIX)
- Discovery Park Phase 2: a 19.82-ac commercial development (Zoned PMIX)
- Discovery Park Future: a 116.26-ac planned mixed use development (Zoned PMIX)
- A future Multi-Family Residential development of approximately 14.96-ac along the west side of NW Lee's Summit Road (Zoned RP-4)

The site is located at the northwest corner of NE Douglas Street and NE Colbern Road, in the NE ¼ of Section 30 & SE ¼ of Section 19, Township 48 North, Range 31 West, entirely within the City of Lee's Summit, Jackson County, Missouri.

Stormwater runoff from the project site is tributary to Unity Lake Number One and Unity Lake Number Two. Unity Lake Number One is approximately 1,000 feet downstream of the Discovery Park Future study area. Unity Lake Number Two is approximately 2,500 feet downstream of the Discovery Park Phase 1 and Aria study areas.

This report, intended to serve as the project Macro Stormwater Drainage Study for Aria, Discovery Park Phase 1, and a portion of the Discovery Park Phase 2 Development, has been prepared to evaluate the Existing Conditions stormwater hydrology to establish Allowable Release Rates and to review impacts the proposed development has on the existing hydrology. The Existing Conditions stormwater hydrology will be analyzed for the Discovery Park Future areas to establish Allowable Release Rates similar to the Macro-study area, however, no proposed detention will be analyzed. A future Macro-study for that development area will be required with its Preliminary Development Plan submittal. Refer to Section 7 for hydrologic model input data and simulation results for Existing- and Proposed Conditions. Refer to Section 8 for maps and exhibits depicting the watersheds evaluated in the analyses.

Vicinity Map

1.1. FEMA Floodplain Classification

The FEMA FIRM Panel 29095C-0409G (eff. 20 January, 2017) depict the proposed development areas as “Zone X.” This is the FEMA flood insurance rate zone that “corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less

than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFE's or base flood depths are shown for this zone." Refer to the attached FEMA Floodplain Map (Exhibit 8-1.1) for depiction of the established floodplains relative to the project site.

The lower reaches of the modeled sub-watershed that is the subject of this report does include a "Zone AE" boundary along the Little Cedar Creek – Tributary No. 2 channel that forms the main branch of the Unity Lake Number 2 impoundment. No construction proposed for these three areas is proposed to affect the boundaries of the defined floodway for this channel.

1.2. Soil Classification

Soil Maps published in the Soil Survey for Jackson County, Missouri categorizes soils in this watershed as:

Table 1.2-1. Soil Classifications

HSG	Map Symbol	Type	Land-Form
C	10000	Arisburg Silt Loam	1% to 5% Slopes
D	10024	Greenton-Urban Land Complex	5% to 9% Slopes
C	10026	Higginsville Silt Loam	5% to 9% Slopes
C	10082	Arisburg-Urban Land Complex	1% to 5% Slopes
D	10113	Oska Silty Clay Loam	5% to 9% Slopes, E
C/D	10116	Sampsel Silty Clay Loam	2% to 5% Slopes
C/D	10117	Sampsel Silty Clay Loam	5% to 9% Slopes
C	10120	Sharpsburg Silt Loam	2% to 5% Slopes
D	10128	Sharpsburg-Urban Land Complex	2% to 5% Slopes
D	10129	Sharpsburg-Urban Land Complex	5% to 9% Slopes
C	10132	Sibley Silt Loam	2% to 5% Slopes
C	10136	Sibley-Urban Land Complex	2% to 5% Slopes
D	10143	Snead-Urban Land Complex	9% to 30% Slopes
C	10179	Udarents-Urban Land-Oska Complex	5% to 9% Slopes
C	10180	Udarents-Urban Land-Sampsel Complex	2% to 5% Slopes
C/D	30080	Greenton Silty Clay Loam	5% to 9% Slopes
C	30180	Polo Silt Loam	5% to 9% Slopes
C	36083	Kennebec Silt Loam	1% to 4% Slopes, OF
D	40107	Snead-Rock Outcrop Complex, Warm	5% to 14% Slopes
D	40108	Snead-Rock Outcrop Complex, Warm	14% to 30% Slopes
-	99001	Water	-
-	99012	Urban Land, Upland	5% to 9% Slopes

(HSG = Hydrologic Soil Group, E=Eroded, OF=Occasionally Flooded)

NRCS Runoff Curve Numbers (CN's) in this study have been assigned to tributary areas based upon these Hydrologic Soil Groups and associated existing and proposed land use. The majority of land within the modeled sub-watersheds is previously developed, and the CN's are assigned accordingly. Refer to the Soils Map in Section 8 for distribution of soil types throughout the sub-watersheds.

2. METHODOLOGY

The hydrologic analysis provided in this report utilizes methods prescribed by the City of Lee's Summit, Missouri and the Kansas City Metropolitan Chapter of the APWA "Standard Specifications and Design Criteria," Division V, Section 5600 (February 2011) provides the overall framework for stormwater hydrology. The following approved methods were used in this report to model Existing- and Proposed Conditions for stormwater runoff.

- Haestad Methods, Inc. "PondPack" V8*i* (08.11.01.56).
- NRCS TR-55 Unit Hydrograph Method
- 2-, 10-, and 100-year Return Frequency, 24-hr. Storm Precipitation Depths (TP-40)
- ARC-II Soil Moisture Conditions
- 24-Hour NRCS Type II Rainfall Distribution
- Runoff Curve Numbers per NRCS TR-55 (Tables 2-2a – 2-2c) and APWA Sec.5602.3
- NRCS TR-55 Methods for determination of Time of Concentration and Travel Time.

NOTE: Where detailed information pertaining to channel geometry is unavailable, "length & velocity" estimates for channel-flow Travel Time is utilized per Section 5602.7, Kansas City Metropolitan Chapter- APWA Standard Specifications and Design Criteria.
NOTE: PondPack models utilize "Time of Concentration" rather than "Lag Time" for computing subarea hydrology.

Input data for the Existing- and Proposed Conditions hydrology models and results of computations are included in Section 7. Refer to the attached Drainage Area Maps for Existing- and Proposed Conditions subarea locations, weighted Runoff Curve Numbers, and tributary acreage included in Section 8.

Stormwater runoff models were created for the 2-, 10-, and 100-year design storm events. The precipitation depths used in the analyses have been interpolated from the "Technical Paper No. 40 Rainfall Frequency Atlas of the United States" (TP-40; May 1961) isopluvial maps. The following table depicts the rainfall depths used in this analysis:

Table 2-1. Precipitation Depths

Return Period:	24-hour Precipitation Depth (in):
Water Quality Storm[1]	1.37
2-Year (50% Storm)	3.50
10-Year (10% Storm)	5.34
100-Year (1% Storm)	7.71

[1]The "Water Quality Storm" is defined in the MARC & APWA "Manual of Best Management Practices for Stormwater Quality" as a 24-hr 1.37" rainfall depth. This particular storm event is utilized for proposed water quality analysis.

Each of the PondPack models constructed for this analysis evaluates multiple rainfall events using these three defined design storms.

The overall hydrology defines 9 modeled sub-watersheds (sub-watersheds “A,” “B,” “C,” “D,” “E,” “F,” “G,” “H,” “I”), and 30 subareas, encompassing approximately 998 acres overall.

Several offsite subareas are included in the models prepared for this report that will remain unaltered as a result of the proposed development areas. Sub-watersheds “B” and “C” are both offsite regions, as are some portions of sub-watershed “A,” “D,” “E,” “F,” “G,” “H,” “I”.

- The Aria site lies within portions of Subareas A3, A4(E), and A5(E).
- The Discovery Park Phase 1 site is located within Subareas A4(E), A4(W), A5(E) and A5(W).
- The Discovery Park Phase 2 site is located within Subareas A6 and D2.
- The Discovery Park Future site is located within Subareas D2, E1, F2, G2, H1 and I1.
- The future Multi-Family Residential development is located within Subarea A1(E).

In accordance with the City-specified criterion and design provision established in the 2011 edition of APWA Section 5600, the proposed stormwater management plan shall “be consistent with the Comprehensive Control Strategy.” This requirement establishes the maximum Allowable Release Rates for the 2-year (0.50 cfs/ac), 10-year (2.0 cfs/ac), and 100-year (3.0 cfs/ac) design storms. In addition to the large storm hydrology design constraints, this strategy requires extended detention (≥ 40hr.) of the “Water Quality Storm” runoff volume.

Points of Interest

The hydrologic models prepared for this stormwater Drainage Study includes 30 Points of Interest in total. The 17 critical points of interest to be analyzed are briefly described as:

- **Point A1,** located at the southern inlet to the Unity Lake Number 2 impoundment, the downstream point of interest modeled in this report.
- **Point A2** is the confluence of Channels A and B, located north of an existing sanitary holding basin. All stormwater runoff generated by the Aria and Discovery Park projects is conveyed to this point.
- **Point A3** is a culvert in Channel B crossing an access drive for the existing sanitary holding basin.
- **Point A4** is a point within Channel A, upstream of Point A2, Portions of the Aria and Discovery Park projects contribute flow to this point of interest.
- **Point A5** is the downstream end of an existing pond with a breached embankment within Channel A.
- **Point A6** is the downstream end of an existing culvert under NW Colbern Road. A portion of Discovery Park Phase 2 will contribute flow to this point of interest.

- **Point A7** is the downstream end of an existing culvert within Channel A, located at station 25+65 of NE Douglas Street. All stormwater runoff contributed to this point is generated by offsite areas.
- **Point B1** is the downstream end of an existing culvert within Channel B, located at station 45+15 of NE Douglas Street. All stormwater runoff contributed to this point is generated by offsite areas.
- **Point D1** is located at an eastern inlet to the Unity Lake Number 1 impoundment, the downstream point of interest of sub-watershed D. Portions of Discovery Park Phase 1, Discovery Park Phase 2 and Discovery Park Future will contribute flow to this point of interest.
- **Point D2** is the downstream end of an existing culvert under NW Colbern Road. Portions of Discovery Park Phase 2 and Discovery Park Future will contribute flow to this point of interest. This point is where the majority of offsite stormwater, from areas south of Interstate 470, will drain through the future development area.
- **Point D4** is the downstream end of an existing culvert under I-470 highway. All stormwater runoff contributed to this point is generated by offsite areas. The culvert represents a choke point for all the offsite area draining to Discovery Park Future from South of I-470.
- **Point E1** is the downstream end of an existing culvert under NW Colbern Road. A portion of Discovery Park Future will contribute flow to this point of interest.
- **Point F1** is located at a southeastern inlet to the Unity Lake Number 1 impoundment, the downstream point of interest of sub-watershed F. A portion of Discovery Park Future will contribute flow to this point of interest.
- **Point F2** is the downstream end of an existing culvert under NW Colbern Road. A portion of Discovery Park Future will contribute flow to this point of interest.
- **Point G1** is located at a southwestern inlet to the Unity Lake Number 1 impoundment, the downstream point of interest of sub-watershed G. A portion of Discovery Park Future will contribute flow to this point of interest.
- **Point G2** is the downstream end of an existing culvert under NW Colbern Road. A portion of Discovery Park Future will contribute flow to this point of interest.
- **Point H1** is the downstream end of an existing culvert under N Main Street that discharges directly to Little Cedar Creek. A portion of Discovery Park Future will contribute flow to this point of interest.
- **Point I1** is the downstream end of an existing culvert under N Main Street. A small portion of Discovery Park Future will contribute flow to this point of interest.

Several additional points are utilized in the models to assist with the hydrologic analysis for offsite areas. The locations of these points are depicted in the attached Drainage Area Maps,

and the results of the analyses are included in tables provided in this narrative, and in the attached modeling output.

In order to provide a direct comparison between the Existing and Proposed Conditions hydrology models, efforts have been made to ensure that the points of interest are consistent between these analyses with the exception of Point A5 as discussed in Section 4 of this report. As noted, additional points to those previously described are included in the hydrologic models, these junctions are of secondary interest to this particular development. Refer to the attached Drainage Area Maps for graphical representation of the modeled subareas and points of interest; refer to Section 7 for schematic view of the PondPack watershed model and connectivity between subareas, channel reaches, and points of interest.

3. EXISTING CONDITIONS ANALYSIS

The purpose of this report is to provide the Macro Stormwater Drainage analysis to ensure that the proposed site development is compliant with City of Lee's Summit, Missouri requirements. This section of the report will provide the Existing Conditions analysis, representing the current site hydrology. The results of this analysis will be used to establish the "Allowable Release Rates" for the project and will be compared to those of Proposed Conditions in order to determine the hydrologic effects of the development upon the receiving stormwater conveyances and sub-watersheds.

Runoff Curve Numbers have been developed based upon the current land use obtained from survey data, aerial photographs, and site visits. Refer to Section 7 for Existing Conditions weighted NRCS Runoff Curve Number (CN) and Time of Concentration (T_C) calculations. Table 3-1 contains the hydrologic parameters used to characterize subareas the Existing Conditions PondPack model. A graphical representation of the areas is provided on exhibit EX-300 in Section 8.

Table 3-1(a). Existing Conditions Input Data

	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):	NRCS Weighted CN:	T_C [1] (hr):
Subarea A1(e):	27.97				12.36	77	0.1736
Subarea A1(w):	43.14					76	0.2511
Subarea A2(e):	3.08					80	0.0875
Subarea A2(w):	23.41					73	0.2133
Subarea A3:	24.42	11.62				80	0.1284
Subarea A4(e):	9.85	5.99	3.35			81	0.1367
Subarea A4(w):	17.41		9.19			73	0.1656
Subarea A5(e):	15.16	4.88	8.00			80	0.1195
Subarea A5(w):	19.77		18.66			76	0.1578
Subarea A6:	13.45			9.21		80	0.1063
Subarea A7:	30.60					76	0.1596
Subarea A8:	21.56					81	0.1299
Subarea A9:	31.84					84	0.1420
Subarea A10:	12.23					94	0.1545
Subtotal:	*293.88*	*22.50*	*39.20*	*9.21*	*12.36*		
Subarea B1:	31.94					79	0.1385
Subarea B2:	48.54					78	0.1987
Subarea B3:	40.69					83	0.1447
Subarea B4-DET:	25.05					94	0.1155

	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):	NRCS Weighted CN:	T_C [1] (hr):
Subarea B4-BYP:	7.42					94	0.0787
Subtotal:	*153.64*						
Subarea C1:	45.21					90	0.2860
Subarea C2:	57.13					81	0.3308
Subarea C3:	52.36					83	0.1199
Subtotal:	154.70						
Subarea D1:	36.91		0.22			77	0.1275
Subarea D2:	47.00			10.62	24.74	78	0.1755
Subarea D3:	16.84					88	0.1561
Subarea D4:	112.38					88	0.1792
Subarea D5:	53.24					89	0.2652
Subtotal:	*266.37*		*0.22*	*10.62*	*24.74*		
Subarea E1:	22.59				20.68	80	0.1062
Subarea E2:	6.56					73	0.1021
Subtotal:	*29.15*				*20.68*		
Subarea F1:	7.85					77	0.0938
Subarea F2:	12.76				12.06	81	0.1260
Subtotal:	*20.60*				*12.06*		
Subarea G1:	14.04					81	0.1055
Subarea G2:	7.93				7.11	85	0.1175
Subtotal:	*21.96*				*7.11*		
Subarea H1:	56.17				51.06	78	0.1348
Subtotal:	*56.17*				*51.06*		
Subarea I1:	1.40				0.61	86	0.1019
Subtotal:	*1.40*				*0.61*		
Total:	***997.89***	***22.50***	***39.42***	***19.83***	***128.62***		

[1] ***Note:*** *Per TR-55 documentation, minimum T_C is 0.10 hours; model is configured with default value of 0.10 hr. minimum Tc.*

Table 3-1(b). Existing Conditions Input Sub-Watershed Data

	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):
Sub-W'Shed A Subtotal:	293.88	22.50	39.20	9.21	12.36
Sub-W'Shed B Subtotal:	153.64				
Sub-W'Shed C Subtotal:	154.70				
Sub-W'Shed D Subtotal:	266.37		0.22	10.62	24.74
Sub-W'Shed E Subtotal:	29.15				20.68
Sub-W'Shed F Subtotal:	20.60				12.06
Sub-W'Shed G Subtotal:	21.96				7.11
Sub-W'Shed H Subtotal:	56.17				51.06
Sub-W'Shed I Subtotal:	1.40				0.61
Modeled Total:	997.89	22.50	39.42	19.83	128.62

These tributary areas, Runoff Curve Numbers (CN), and Times of Concentration (T_C) for the corresponding subareas were used as input to the Existing Conditions PondPack model to evaluate the stormwater hydrology. The subareas representing Existing Conditions for the development and associated sub-watersheds are utilized in the PondPack model to compute the stormwater runoff for the three design storms. The resultant peak discharge rate (Q_P), peak time (T_P), and runoff volume (V_R) for the computed hydrographs of modeled subareas are included in Table 3-2.

Table 3-2. Hydrologic Information – Existing Conditions Summary (Subareas)

	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea A-1(e):	53.91	12.01	3.334	110.32	11.99	6.783	187.82	11.99	11.675
Subarea A-1(w):	70.15	12.05	4.908	146.86	12.05	10.132	252.55	12.05	17.597
Subarea A-2(e):	7.64	11.94	0.420	14.90	11.93	0.819	24.63	11.93	1.374
Subarea A-2(w):	34.59	12.03	2.301	76.77	12.03	4.975	136.28	12.03	8.884
Subarea A-3:	57.61	11.96	3.330	112.58	11.95	6.495	186.13	11.95	10.895
Subarea A-4(e):	23.97	11.96	1.402	45.97	11.96	2.698	75.15	11.96	4.488
Subarea A-4(w):	27.56	12.01	1.712	60.85	11.99	3.700	108.22	11.99	6.607
Subarea A-5(e):	36.40	11.95	2.067	70.90	11.95	4.031	116.98	11.95	6.762
Subarea A-5(w):	37.02	12.00	2.249	77.10	11.99	4.643	132.61	11.97	8.064
Subarea A-6:	37.98	11.93	2.083	70.54	11.93	3.904	113.19	11.93	6.389
Subarea A-7:	57.26	12.00	3.482	119.03	11.98	7.186	204.90	11.98	12.481
Subarea A-8:	53.05	11.96	3.070	101.89	11.95	5.907	166.82	11.95	9.826
Subarea A-9:	87.15	11.97	5.138	158.95	11.96	9.507	252.78	11.96	15.435
Subarea A-10:	45.61	11.97	2.890	72.57	11.97	4.733	106.86	11.97	7.128

	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea B-1:	70.94	11.97	4.168	140.29	11.96	8.242	234.20	11.95	13.944
Subarea B-2:	94.72	12.03	6.057	190.16	12.01	12.146	320.74	12.00	20.725
Subarea B-3:	106.50	11.97	6.302	197.62	11.96	11.812	317.37	11.96	19.332
Subarea B-4 (BYP):	30.29	11.93	1.753	48.22	11.92	2.871	71.04	11.92	4.324
Subarea B-4 (DET):	99.43	11.94	5.919	158.21	11.94	9.694	232.94	11.94	14.599
Subarea C-1:	124.83	12.05	9.223	209.38	12.05	15.842	317.10	12.05	24.565
Subarea C-2:	104.44	12.09	8.134	200.90	12.08	15.652	329.78	12.08	26.038
Subarea C-3:	142.61	11.95	8.110	264.83	11.94	15.199	425.51	11.94	24.875
Subarea D-1:	75.69	11.97	4.400	155.84	11.95	8.95	265.94	11.95	15.407
Subarea D-2:	99.28	12.00	6.134	195.91	12.00	12.128	326.27	11.98	20.518
Subarea D-3:	52.46	11.97	3.185	90.29	11.97	5.605	138.69	11.97	8.822
Subarea D-4:	338.74	11.99	21.246	582.43	11.99	37.391	894.20	11.99	58.857
Subarea D-5:	146.13	12.05	10.458	247.91	12.05	18.183	377.88	12.03	28.406
Subarea E-1:	55.42	11.94	3.080	107.96	11.94	6.008	178.18	11.93	10.078
Subarea E-2:	11.34	11.94	0.645	25.34	11.94	1.394	45.12	11.94	2.489
Subarea F-1:	16.88	11.94	0.935	34.70	11.93	1.903	59.21	11.93	3.275
Subarea F-2:	31.60	11.96	1.816	60.52	11.95	3.495	99.00	11.95	5.814
Subarea G-1:	36.14	11.94	1.999	69.23	11.93	3.846	113.41	11.93	6.398
Subarea G-2:	23.49	11.94	1.332	42.32	11.94	2.433	66.71	11.94	3.92
Subarea H-1:	119.73	11.97	7.009	240.97	11.96	14.056	406.72	11.95	23.984
Subarea I-1:	4.44	11.93	0.244	7.87	11.93	0.441	12.29	11.93	0.705

The PondPack models created for these analyses include 24 channel reaches modeled using the Muskingum Method. Various modeled points of interest are connected in the model by these channel reaches. The reach segments account for the time-lagging effect on the hydrograph peaks, including a relatively insignificant amount of peak flow rate attenuation as the flood wave travels downstream. Travel time for each reach is based upon the reach length and average bed-slope. The following table contains the input data for the channel reaches used in the Existing- and Proposed Conditions PondPack models.

Table 3-3. Muskingum Channel Reach Routing Information

Reach I.D.	K (hr.):	X *(coeff.)*:	No. of Sub-reaches	K *(ea. sub-reach) (hr.):*
Route A2~A1:	0.0826	0.25	9	0.0092
Route A4~A2:	0.0288	0.25	3	0.0097
Route A5~A4:	0.0203	0.25	3	0.0067
Route A3~A2:	0.0192	0.25	2	0.0097
Route A6~A5:	0.0378	0.25	4	0.0094
Route A7~A5:	0.0412	0.25	5	0.0083
Route A8~A7:	0.0340	0.25	4	0.0086
Route A9~A7:	0.0390	0.25	4	0.0097
Route A10~A9:	0.0636	0.25	7	0.0092
Route B1~A3:	0.0331	0.25	4	0.0083
Route B2~B1:	0.0162	0.25	2	0.0081
Route B3~B2:	0.0824	0.25	9	0.0092
Route B4~B3:	0.0587	0.25	6	0.0097
Route C1~B1:	0.0210	0.25	3	0.0069
Route C2~C1:	0.0701	0.25	8	0.0089
Route C3~C2:	0.0148	0.25	2	0.0075
Route D2~D1:	0.0428	0.25	8	0.0053
Route D3~D2:	0.0758	0.25	6	0.0126
Route D4~D2:	0.0598	0.25	6	0.0100
Route D5~D4:	0.0475	0.25	5	0.0095
Route E1~D1:	0.0339	0.25	6	0.0056
Route E2~E1:	0.0336	0.25	3	0.0112
Route F2~F1:	0.0192	0.25	3	0.0064
Route G2~G1:	0.0244	0.25	3	0.0081

The preceding stormwater conveyances have been incorporated into both the Existing and Proposed Conditions PondPack models. The results of the Existing Conditions hydrologic routing are provided in Table 3.2-1, in Section 3.2, which provides the summary data for the points of interest defined in this Stormwater Drainage Study. Refer to the Existing Conditions Drainage Area Map for the location of the points of interest, modeled subareas, channels, and conveyances, in relation to proposed development area.

The defined subareas and stormwater conveyances, with associated hydrograph attenuation effects have been incorporated into the Existing (and Proposed) Conditions PondPack models. There are also several offsite storage areas included in the Existing- and Proposed Conditions models for the project site. The following section of this report provides the geometric configuration and hydrologic routing summary for existing locations. The results of the Existing Conditions hydrologic routing at the designated Points of Interest are provided in the Section 3.2.

3.1. Existing Stormwater Storage Areas & Detention Facilities

The following information is provided to define the geometry of the outfall structure and storage capacity for the existing modeled storage areas and stormwater detention basins included in the Existing Conditions hydrology models. The routing summary tables provided for each location contain the Existing Conditions hydrologic routing summary for each of the design storm events considered in this analysis.

Point A3 – Culverts at Pump Station Drive Culverts:

An access drive extends across the channel that runs along the northern edge of the Aria project site. This restricted-access drive leads to the pump station that is positioned at the confluence of two channels that define the upper regions of the modeled sub-watershed. The Existing- and Proposed Conditions geometry of the culverts positioned across the existing access drive to the pump station are defined as follows:

Primary Outlet Structure:

Dual 84" Diameter *(modeled equivalent circular: 72" x 96" CMPA Culvert);* Length ≈ 66.6 L.F. Flowline In / Out ≈ 900.81 / 900.43 (ft; NAVD)

Secondary Outlet Structure:

Roadway (Weir)-

Station (ft):	0	22	43.1	76.73	124.4	157.13	223.83	251	265.18	270.32	277.43
Elevation (ft):	912	910	908.52	907.24	907.44	908.16	908.35	908.6	909	910	912

Culvert flow at the threshold of overtopping/weir-flow is approximately 255 cfs.

The potential storage area upstream from this roadway crossing is defined in the following table based upon storage area for a given elevation. As depicted below, the potential storage area is somewhat modest, relative to the existing conditions flows that are contributed to this location.

Table 3.1-1(a). Existing Storage Volume – Pump Station Drive Storage Area

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):
900.81	106	0	0.000
901	114	21	0.000
902	691	362	0.009
902.4	908	319	0.016
903	1,252	645	0.031
904	3,270	2,182	0.081
906	7,400	10,393	0.320
908	38,290	41,682	1.276
910	58,812	96,371	3.489
912	84,827	142,847	6.768

Note: *The conic method is used to compute the incremental volume between pond contours.*
The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation.

Utilizing these geometric parameters, the following table depicts the stormwater routing summary for this location.

Table 3.1-1(b). Existing Conditions Storage Area Routing – Point A3 – Pump Station Drive Culverts

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
WQv:	102.98	12.15	101.73	12.18	9.704	904.61	0.134
2-Year:	632.94	12.13	628.64	12.15	52.997	908.50	1.747
10-Year:	1,109.82	12.13	1,107.67	12.15	97.952	909.07	2.341
100-Year:	1,597.03	12.16	1,595.56	12.17	159.297	909.50	2.849

The preceding routing summary indicates that the culverts are somewhat under-sized for most large-storm events, though the Water Quality Volume storm event is readily conveyed by this system.

Point A5 – Former Pond:

The Existing Conditions geometry of the outfall structure for the former pond site that is located just north of the Discovery Park Phase 1 property is based upon field survey and LIDAR topographic data. This former pond-site has an embankment breach, and therefore provides relatively minimal attenuation for larger precipitation events. The feature does, however affect the hydrograph timing somewhat, and is therefore included in these models. The pond is proposed to be removed with the Discovery Park Phase 1 development. The following information provides the outfall geometry and storage area for the Existing Conditions PondPack model:

Primary Outlet Structure- Weir Cut through Embankment:

Station (ft):	0	23.88	64.85	167.91	238.1	246.58	251.38	253.1	257.52	263.49	268.12	273.3	297.08	333.5
Elevation (ft):	940	938	936	934	932	930	929	929	930	932	934	936	938	940

The potential storage area upstream from this pond embankment is defined in the following table based upon a stage versus storage area for a given elevation.

Table 3.1-2(a). Existing Storage Volume – Boone Creek Embankment

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):
929	20,212	0	0.000
930	34,209	26,905	0.618
932	75,878	107,357	3.082
934	98,561	173,945	7.075
936	130,004	227,841	12.306
938	171,091	300,156	19.197
940	226,998	396,774	28.305

Note: *The conic method is used to compute the incremental volume between pond contours.*
The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation.

The following table depicts the stormwater routing summary for this location under each of the modeled precipitation events.

Table 3.1-2(b): Existing Conditions Storage Area Routing – Point A5 – Former Pond

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
WQv:	47.52	12.08	22.44	12.24	3.428	930.22	0.800
2-Year:	315.36	12.05	242.32	12.15	20.98	932.48	3.940
10-Year:	552.78	12.05	489.66	12.12	39.91	933.43	5.828
100-Year:	847.10	12.05	799.19	12.10	66.087	934.15	7.413

Data provided in the preceding table indicates that, while larger storm events are not significantly affected by this feature, the more frequent events do exhibit some hydrograph attenuation at this location.

Point B1 – Lee's Summit Road RCB Culverts (Sta. 45+15):

Lee's Summit Road has a pair of RCB Culverts that convey stormwater across the roadway into the channel that runs along the northern edge of the Aria project site. This RCB includes stormwater flows generated by defined sub-watersheds "B" and "C." The following information provides the outfall geometry and storage area for this location in both Existing- and Proposed Conditions PondPack models:

Primary Outlet Structure:

Dual 10'-w x 7'-ht RCB Culvert; Length ≈ 174.4 L.F.
Flowline In / Out ≈ 916.22 / 911.54 (ft; NAVD)

Secondary Outlet Structure:

Roadway (Weir)-

Station (ft):	0	64.20	155.0	244.3	309.0
Elevation (ft):	930	929	928.68	929	930

Culvert flow at the threshold of overtopping/weir-flow is approximately 1,800 cfs.

Table 3.1-3(a). Existing Storage Volume – Pump Station Drive Storage Area

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):
916.22	377	0	0
917	2,013	848	0.019
918	8,841	5,024	0.135
919	14,303	11,463	0.398
920	18,052	16,141	0.769
921	21,576	19,788	1.223
922	25,405	23,464	1.761
923	29,240	27,300	2.388
924	39,203	34,100	3.171
925	50,630	44,795	4.199
926	60,928	55,700	5.478
927	71,454	66,121	6.996
928	83,880	77,584	8.777
929	139,252	110,403	11.312
930	178,519	158,480	14.950

Note: *The conic method is used to compute the incremental volume between pond contours.*
The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation.

The following table depicts the stormwater routing summary for this location under each of the modeled precipitation events.

Table 3.1-3(b). Existing Conditions Storage Area Routing – Point B1 – Lee's Summit Drive Culverts (Sta. 45+15)

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
WQv:	101.70	12.11	100.64	12.12	9.245	917.82	0.101
2-Year:	634.00	12.07	615.14	12.11	49.667	921.57	1.519
10-Year:	1,121.63	12.07	1,076.61	12.11	91.457	923.99	3.164
100-Year:	1,726.54	12.06	1,551.65	12.14	148.401	926.77	6.626

Data provided in the preceding table indicates that each of the modeled events are effectively conveyed by the culverts, and sufficient freeboard appears to be available for the 100-year design storm.

Point A7 – NE Douglas Street RCB Culvert (Sta. 25+65):

NE Douglas Street has another RCB Culvert that conveys stormwater across the roadway into the channel that runs into the eastern edge of the Discovery Park project site. This culvert conveys stormwater into the project area from upper portions of the defined sub-watershed "A." The following information provides the outfall geometry and storage area for this location in both Existing- and Proposed Conditions PondPack models:

Primary Outlet Structure:

13'-w x 7'-ht RCB Culvert; Length ≈ 174.4 L.F.
Flowline In / Out ≈ 945.3 / 937.5 (ft; NAVD)

Secondary Outlet Structure:

Roadway (Weir)-

Station (ft):	0	46.5	118.2	206.1	276.8	345.4	392.4
Elevation (ft):	958	957	956	955.65	956	957	958

Culvert flow at the threshold of overtopping/weir-flow is approximately 1,213 cfs.

Table 3.1-4(a): Existing Storage Volume – Point A7 – Lee's Summit Road RCB Culvert (Sta. 25+65)

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):
945.3	273	0	0.000
946	728	338	0.008
947	3,022	1,744	0.048
948	6,247	4,538	0.152
949	19,586	12,298	0.434
950	36,075	27,414	1.064
951	52,213	43,896	2.071
952	62,652	57,353	3.388
953	78,881	70,611	5.009
954	93,052	85,869	6.980
955	109,368	101,100	9.301
956	141,847	125,256	12.177
957	178,341	159,746	15.844
958	220,369	198,985	20.412

Note: *The conic method is used to compute the incremental volume between pond contours.*
The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation.

The following table depicts the stormwater routing summary for this location under each of the modeled precipitation events.

Table 3.1-4(b): Existing Conditions Storage Area Routing – Point A7 – Lee's Summit Drive Culverts (Sta.25+65)

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
WQv:	38.00	12.06	37.95	12.06	2.539	946.33	0.015
2-Year:	236.01	12.02	229.26	12.05	14.58	948.71	0.319
10-Year:	437.94	12.01	397.23	12.07	27.333	950.22	1.251
100-Year:	707.16	12.00	603.32	12.08	44.871	951.80	3.100

Data provided in the preceding table indicates that each of the modeled events is effectively conveyed by this existing culvert, and sufficient freeboard appears to be available for each design storm.

Sub-Basin B4- Stormwater Detention Facility:

The upper reaches of the sub-watershed "B" region includes a relatively large, impervious property that includes an onsite wet-basin stormwater detention facility. The following information provides the modeled outfall geometry and storage area for the Existing- and Proposed Conditions PondPack models:

Primary Outlet Structure:

Inlet Box: 4.2 S.F. Opening; Crest Elev. ≈ 992.0
36" Dia. RCP Discharge Culvert: Length = 280 L.F.
Flowline In / Out ≈ 981 / 976 (ft; NAVD)

Table 3.1-5(a): Existing Storage Volume – Proposed Sub-Basin B4 Detention Facility

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):
992	75,323	0	0.000
994	88,777	163,916	3.763
996	101,439	190,076	8.127
998	114,890	216,190	13.090

Note: *The conic method is used to compute the incremental volume between pond contours. The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation*.

The following table depicts the stormwater routing summary for this location under each of the modeled precipitation events.

Table 3.1-5(b). Existing Conditions Storage Area Routing – Sub-Basin B4 Detention Facility

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
WQv:	30.27	11.95	8.05	12.15	1.713	992.37	0.642
2-Year:	99.43	11.94	22.46	12.16	5.919	993.25	2.284
10-Year:	158.21	11.94	28.68	12.19	9.694	994.04	3.850
100-Year:	232.94	11.94	34.97	12.24	14.599	995.03	5.948

The preceding routing summary indicates that the existing wet-basin detention facility provides significant attenuation for the modeled events.

Point C2 – Storage Area~Inlet C2:

The Existing- and Proposed Conditions models include a relatively significant storage unit in the defined sub-watershed "C" area. Geometric parameters for this storage area are based upon LIDAR topography and GIS base data. The following information provides the modeled outfall geometry and storage area for the Existing- and Proposed Conditions PondPack models:

Primary Outlet Structure:

Grate Inlet; Crest Elev. ≈ 956.85
Opening Area: 27.2 S.F.
66" Dia. RCP Discharge Culvert: Length = 177 L.F.
Flowline In / Out ≈ 945.7 / 945.1 (ft; NAVD)

Table 3.1-6(a). Existing Storage Volume – Storage Area C2

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):
956.85	777	0	0
958	10,771	5,536	0.127
960	29,311	38,567	1.012
962	63,479	90,617	3.093
964	98,380	160,590	6.779
966	135,252	232,656	12.120
968	175,712	310,083	19.239
970	245,445	419,220	28.863
972	310,449	554,622	41.595

Note: *The conic method is used to compute the incremental volume between pond contours. The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation.*

The following table depicts the stormwater routing summary for this location under each of the modeled precipitation events.

Table 3.1-6(b). Existing Conditions Storage Area Routing – Storage Area C2

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
WQv:	21.38	12.02	21.36	12.02	1.338	956.90	0.001
2-Year:	142.28	11.96	137.26	12.00	8.110	957.95	0.115
10-Year:	264.20	11.96	219.81	12.05	15.199	959.67	0.804
100-Year:	423.95	11.96	285.13	12.07	24.875	961.59	2.539

The preceding routing summary indicates that, while the more frequent events are minimally affected by this feature, the larger events do undergo some attenuation.

<u>Point D4 – I-470 Highway Culvert</u>:

I-470 Highway has an RCB Culvert that conveys stormwater across the highway into the Discovery Park Future project site. This culvert conveys stormwater into the project area from upper portions of the defined sub-watershed “D.” The following information provides the outfall geometry and storage area for this location in the Existing-Conditions PondPack model:

Primary Outlet Structure:

5’-w x 8’-ht RCB Culvert; Length ≈ 323 L.F.
Flowline In / Out ≈ 952.00 / 948.00 (ft; NAVD)

Table 3.1-4(a): Existing Storage Volume – Point D4 – I-470 Highway Culvert

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):
956	14,459	0	0
958	38,781	51,280	1.177
960	77,382	113,963	3.793
962	119,729	195,577	8.283
964	164,668	283,206	14.785
966	324,776	480,468	25.815

Note: *The conic method is used to compute the incremental volume between pond contours.*
The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation.

The following table depicts the stormwater routing summary for this location under each of the modeled precipitation events.

Table 3.1-4(b): Existing Conditions Storage Area Routing – Point D4 – I-470 Highway Culvert

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
WQv:	98.35	12.04	95.20	12.07	6.953	954.62	0.188
2-Year:	447.33	12.02	377.63	12.10	31.704	958.57	2.269
10-Year:	761.81	12.02	526.54	12.14	55.574	960.91	6.129
100-Year:	1157.85	12.02	638.44	12.19	87.262	963.49	13.467

Data provided in the preceding table indicates that each of the modeled events is effectively conveyed by this existing culvert, and sufficient freeboard below I-470 Highway appears to be available for each design storm.

The previously defined modeled stormwater conveyances and the associated hydrograph attenuation effects from the existing storage areas have been incorporated into both Existing- and Proposed Conditions PondPack models. Each of these storage areas is offsite from the proposed development areas contemplated by this Macro Stormwater Drainage Study. The results of the Existing Conditions hydrologic routing are provided in the following section. Additional minor storage and conveyance systems are included in the PondPack model to further expand and represent existing conditions for the watersheds. These systems are available within the model output provided in Section 8, for review.

3.2. Existing Conditions Hydrologic Modeling Results

The stormwater storage areas and resultant hydrograph attenuation effects are incorporated into the Existing Conditions PondPack models. The results of this hydrologic routing of the hydrographs generated by the modeled subareas through the sub-watersheds are provided in the following summary tables. This information is provided at the defined Points of Interest.

Refer to the Existing Conditions Drainage Area Map for the location of the points in relation to the proposed development areas, modeled subareas, channels, and conveyances.

Table 3.2-1. Hydrologic Information – Existing Conditions Summary (Junctions)

	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	948.96	12.25	88.053	1,784.23	12.22	166.969	2,754.84	12.19	276.008
Point A2:	909.05	12.17	79.810	1,691.73	12.15	150.055	2,566.59	12.13	246.736
Point A3:	628.64	12.15	52.997	1,107.67	12.15	97.952	1,595.56	12.17	159.297
Point A4:	260.92	12.15	24.092	539.49	12.11	46.309	906.56	12.09	77.182
Point A5:	242.32	12.15	20.979	489.66	12.12	39.911	799.19	12.10	66.087
Point A6:	37.98	11.93	2.083	70.54	11.93	3.904	113.19	11.93	6.389
Point A7:	229.26	12.05	14.580	397.23	12.07	27.333	603.32	12.08	44.871
Point A8:	53.05	11.96	3.070	101.89	11.95	5.907	166.82	11.95	9.826
Point A9:	128.79	12.00	8.028	223.48	11.99	14.240	346.07	11.99	22.563
Point A10:	45.61	11.97	2.890	72.57	11.97	4.733	106.86	11.97	7.128
Point B1:	615.14	12.11	49.667	1,076.61	12.11	91.457	1,551.65	12.14	148.401
Point B2:	242.31	12.05	20.032	446.43	12.04	36.522	715.56	12.03	58.980
Point B3:	153.04	11.99	13.975	266.04	11.98	24.377	411.65	11.97	38.255
Point B4:	48.10	11.94	7.673	71.04	11.93	12.565	98.80	11.93	18.924
Point C1:	350.42	12.09	25.466	604.01	12.10	46.692	890.10	12.10	75.478
Point C2:	232.89	12.04	16.244	417.32	12.07	30.851	614.91	12.08	50.912
Point C3:	142.61	11.95	8.110	264.83	11.94	15.199	425.51	11.94	24.875
Point D1:	560.43	12.08	49.147	941.67	12.07	89.659	1,351.30	12.05	144.576
Point D2:	485.06	12.10	41.022	752.83	12.06	73.431	1,052.38	12.06	117.417
Point D3:	52.46	11.97	3.185	90.29	11.97	5.605	138.69	11.97	8.822
Point D4:	377.63	12.10	31.704	526.54	12.14	55.574	638.44	12.19	87.262
Point D5:	142.73	12.07	10.458	239.98	12.08	18.183	357.61	12.09	28.406
Point E1:	65.98	11.95	3.725	106.88	11.99	7.278	143.00	11.98	11.753
Point E2:	11.34	11.94	0.645	25.34	11.94	1.394	45.12	11.94	2.489
Point F1:	47.57	11.97	2.752	74.89	11.96	5.398	106.16	11.94	9.090
Point F2:	31.56	11.96	1.816	45.26	12.06	3.495	65.86	12.07	5.814
Point G1:	58.32	11.95	3.331	102.21	11.94	6.279	163.43	11.97	10.317
Point G2:	23.29	11.96	1.332	36.98	12.02	2.433	62.01	11.99	3.920
Point H1:	119.54	11.97	7.009	240.90	11.96	14.056	406.43	11.96	23.984
Point I1	4.44	11.93	0.244	7.87	11.93	0.441	12.29	11.93	0.705

The information obtained in this Existing Conditions analysis is utilized to establish the "Allowable Release Rates" (ARR) for the project areas based upon percentages of onsite and offsite area draining to the points of interest. A summary of the computation of these ARR's is provided in the following section.

3.3. Allowable Release Rate Calculations

The purpose of this Stormwater Drainage Study for the proposed development is to ensure compliance with the current specifications and design criteria in effect for the City of Lee's Summit, Missouri. The Proposed Conditions and Macro hydrologic analyses are provided in Section 4. Results of that analysis will be compared to the Section 3, Existing Conditions results. The variation in quantity and rate of stormwater discharge between these two models represents the hydrologic effect generated by development of the project site. The Actual- versus Allowable Release Rates for the fully developed, Proposed Conditions will be evaluated in Section 4 for the Macro-Study analysis in order to demonstrate compliance with the design objectives for this project.

The following tables are provided to compute the "Allowable Release Rate" (ARR) for the three design storm events in order to demonstrate compliance with the stated design objectives. The Proposed Conditions Macro- Models utilize five defined points of discharge that receive stormwater runoff from the project site. The proposed Stormwater Management Plan for the proposed development areas will evaluate the ARR's at each of these modeled outlet locations.

Allowable Release Rate Calculations:

This section of the Stormwater Drainage Study for the proposed development is provided to establish the project Allowable Release Rates. The ARR is based upon the "Comprehensive Control" strategy provided in the Section 5600 of the APWA "Standard Specifications and Design Criteria" (Feb, 2011). This strategy provides the maximum ARR for the 2-, 10-, and 100-Year Design Storms at 0.50, 2.0, and 3.0 cfs-per-acre, respectively. Additional requirements include Extended Detention of the "Water Quality" design storm (defined as a 1.37" precipitation event).

The following table is provided in order to establish the project ARR for the Discovery Park Macro Stormwater Drainage analysis. The ARR for each of the three modeled events is based upon the sum of the "Allowable Bypass" for offsite flows and the onsite "Allowable Release Rate." In order to prevent skewing the results, the ARR is based upon the Existing Conditions model. This ensures that the allowable bypass flows are not increased by onsite development, and that any diversions of tributary regions that takes place upon development is not incorporated into the allowable rates.

Information presented in the following table depicts the cumulative onsite and offsite areas for each of the Points, and the Existing Conditions peak discharge rates at these locations. From that information, the ARR is established in the second column from the right. The right-hand column depicts the relative difference in peak discharge rate that the proposed stormwater management plan would meet to achieve compliance with these targeted ARR's.

The Macro Study section of this report will provide a comparison of these Allowable Release Rates to the computed peak discharge rates at these Points of Interest to demonstrate compliance with the stated design objectives.

Table 3.3-1. Existing Conditions Allowable Release Rate Calculations

Location:	Return Event (Yr):	Existing Conditions Peak Flow Rate (cfs):	Total Area (ac):	Onsite ------ *(Offsite)* Area (ac):	Onsite ------ *(Offsite)* Area (%):	Allowable Bypass Flows (cfs):	Allowable Onsite Discharge Rate: (cfs):	Prop. Cond. ARR (cfs):	Difference in Flow Rate: (cfs):
Point A1			604.82	85.87	14%				
	2-Year:	948.96		------	------	814.24	42.93	857.17	-91.79
	10-Year:	1,784.23		*(518.96)*	*(86%)*	1530.93	171.73	1702.66	-81.57
	100-Year:	2,754.84				2363.74	257.60	2621.34	-133.50
Point A2			531.11	70.91	13%				
	2-Year:	909.05		------	------	787.68	35.46	823.14	-85.91
	10-Year:	1,691.73		*(460.20)*	*(87%)*	1465.86	141.82	1607.68	-84.05
	100-Year:	2,566.59				2223.92	212.73	2436.65	-129.94
Point A3			332.76	11.62	3%				
	2-Year:	628.64		------	------	606.69	5.81	612.50	-16.14
	10-Year:	1,107.67		*(321.14)*	*(97%)*	1068.99	23.24	1092.23	-15.44
	100-Year:	1,595.56				1539.85	34.86	1574.71	-20.85
Point A4			171.86	59.29	34%				
	2-Year:	260.92		------	------	170.90	29.65	200.55	-60.37
	10-Year:	539.49		*(112.57)*	*(66%)*	353.37	118.58	471.95	-67.54
	100-Year:	906.56				593.80	177.87	771.67	-134.89
Point A5			144.60	40.76	28%				
	2-Year:	242.32		------	------	174.02	20.38	194.40	-47.92
	10-Year:	489.66		*(103.85)*	*(72%)*	351.65	81.51	433.16	-56.50
	100-Year:	799.19				573.94	122.27	696.21	-102.98
Point A6			13.45	9.21	68%				
	2-Year:	37.98		------	------	11.97	4.61	16.57	-21.41
	10-Year:	70.54		*(4.24)*	*(32%)*	22.23	18.42	40.65	-29.89
	100-Year:	113.19				35.67	27.63	63.30	-49.89
Point A7			96.23	0.00	0%				
	2-Year:	229.26		------	------	229.26	0.00	229.26	0.00

Location:	Return Event (Yr):	Existing Conditions Peak Flow Rate (cfs):	Total Area (ac):	Onsite - - - - - - (Offsite) Area (ac):	Onsite - - - - - - (Offsite) Area (%):	Allowable Bypass Flows (cfs):	Allowable Onsite Discharge Rate: (cfs):	Prop. Cond. ARR (cfs):	Difference in Flow Rate: (cfs):
	10-Year:	397.23		*(96.23)*	*(100%)*	397.23	0.00	397.23	0.00
	100-Year:	603.32				603.32	0.00	603.32	0.00
Point B1			308.34	0.00	0%				
	2-Year:	615.14		- - - - - -	- - - - - -	615.14	0.00	615.14	0.00
	10-Year:	1,076.61		*(308.34)*	*(100%)*	1076.61	0.00	1076.61	0.00
	100-Year:	1,551.65				1551.65	0.00	1551.65	0.00
Point D1			295.52	56.26	19%				
	2-Year:	560.43		- - - - - -	- - - - - -	453.75	28.13	481.87	-78.56
	10-Year:	941.67		*(239.26)*	*(81%)*	762.41	112.51	874.92	-66.75
	100-Year:	1351.30				1094.07	168.77	1262.83	-88.47
Point D2			229.46	35.36	15%				
	2-Year:	485.06		- - - - - -	- - - - - -	410.31	17.68	427.99	-57.07
	10-Year:	752.83		*(194.10)*	*(85%)*	636.82	70.72	707.54	-45.29
	100-Year:	1052.38				890.21	106.08	996.29	-56.09
Point E1			29.15	20.68	71%				
	2-Year:	65.98		- - - - - -	- - - - - -	19.17	10.34	29.51	-36.47
	10-Year:	106.88		*(8.47)*	*(29%)*	31.06	41.36	72.41	-34.47
	100-Year:	143.00				41.55	62.03	103.59	-39.41
Point F1			20.60	12.06	59%				
	2-Year:	47.57		- - - - - -	- - - - - -	19.72	6.03	25.75	-21.82
	10-Year:	74.89		*(8.54)*	*(41%)*	31.05	24.12	55.17	-19.72
	100-Year:	106.16				44.02	36.18	80.20	-25.96
Point F2			12.76	12.06	95%				
	2-Year:	31.56		- - - - - -	- - - - - -	1.72	6.03	7.75	-23.81
	10-Year:	45.26		*(0.70)*	*(5%)*	2.47	24.12	26.59	-18.67
	100-Year:	65.86				3.59	36.18	39.78	-26.08
Point G1			21.96	7.11	32%				
	2-Year:	58.32		- - - - - -	- - - - - -	39.43	3.56	42.99	-15.33
	10-Year:	102.21		*(14.85)*	*(68%)*	69.10	14.23	83.33	-18.88
	100-Year:	163.43				110.49	21.34	131.84	-31.59
Point G2			7.93	7.11	90%				
	2-Year:	23.29		- - - - - -	- - - - - -	2.39	3.56	5.94	-17.35
	10-Year:	36.98		*(0.82)*	*(10%)*	3.79	14.23	18.02	-18.96
	100-Year:	62.01				6.35	21.34	27.70	-34.31
Point H1			56.17	51.06	91%				
	2-Year:	119.54		- - - - - -	- - - - - -	10.88	25.53	36.41	-83.13
	10-Year:	240.90		*(5.11)*	*(9%)*	21.93	102.12	124.05	-116.85

Location:	Return Event (Yr):	Existing Conditions Peak Flow Rate (cfs):	Total Area (ac):	Onsite - - - - - - *(Offsite)* Area (ac):	Onsite - - - - - - *(Offsite)* Area (%):	Allowable Bypass Flows (cfs):	Allowable Onsite Discharge Rate: (cfs):	Prop. Cond. ARR (cfs):	Difference in Flow Rate: (cfs):
	100-Year:	406.43				37.00	153.18	190.18	-216.25
Point I1			1.40	0.61	44%				
	2-Year:	4.44		- - - - - -	- - - - - -	2.49	0.31	2.80	-1.64
	10-Year:	7.87		*(0.78)*	*(56%)*	4.42	1.23	5.64	-2.23
	100-Year:	12.29				6.90	1.84	8.74	-3.55

The greatest required relative reduction in peak discharge rate occurs at the Point A2 location. This is the anticipated location for the greatest required impact, as that point is located at the confluence of the two channels that convey stormwater runoff from the three subareas (Sub's A3, A4(E), & A5(E)) that include portions of the proposed Discovery Park development site.

When the northern Multi-Family Residential, Aria, Discovery Park Phase 2 and Discovery Park Future areas are to be developed it will need to be ensured that these allowable release rates are met. Detention basins will need to be provided to attenuate the peak flows generated from development, as needed. Those detention basins will be discussed in the future Macro-Studies to be prepared when each area is developed. Subareas D through I were analyzed to provide allowable release rates only for future development. These subareas will not be included in the proposed Macro analysis in this report.

4. MACRO ANALYSIS

This section of the Stormwater Drainage Study for the proposed development is provided to evaluate the Proposed Conditions hydrology for the project. As in the Existing Conditions analysis, the overall modeled stormwater drainage area for the Macro Study encompasses approximately 602 acres, including 74 acres within the proposed development site. Due to a diversion of approximately 0.20 acres from adjacent tributary areas, the overall drainage area is slightly increased to approximately 602.42 acres in the Macro Study. The following sub-section will provide the Proposed Conditions analysis for the Macro- analysis. As previously stated, this section will analyze and review the final macro conditions for subareas A, B, and C which includes the Aria, Discovery Park Phase 1, Discovery Park Phase 2, and the Multi-Family Residential developments. Subareas D through I are part of future Discovery Park developments, which will be further reviewed and analyzed with future Macro stormwater studies as those layouts and designs are further refined and Preliminary Development Plans are submitted for city review and approval.

The purpose of this report is to provide the Macro Stormwater Drainage analysis to ensure that the proposed site development is compliant with City of Lee's Summit requirements. This section of the report will provide the Proposed Conditions analysis, representing the fully developed hydrology for the site. The results of this analysis will be compared to those of Existing Conditions in order to determine the hydrologic effects of the development upon the receiving stormwater conveyances and sub-watersheds. Compliance with the project ARR's will also be evaluated through comparison of the Actual- versus Allowable Release Rates at the five defined Points of Interest.

4.1. Macro Stormwater Model: Proposed Conditions Analysis

This section of the Stormwater Drainage Study for the Discovery Park Phase 1 commercial development is provided to evaluate the Macro-Study Proposed Conditions hydrology for the project. The proposed development totals 74.06-acres including 39.42-acres of commercial development (office buildings, hotels, restaurants, multifamily residential buildings, associated drives, parking, utilities) and mass grading of the Aria and Discovery Park Phase 2 sites totaling 34.64-acres. As previously discussed, the existing pond located at point A5 is being removed with the proposed development, however all other existing flow-attenuating structures and features will remain unchanged.

Proposed Conditions Runoff Curve Numbers have been developed based upon the current Development Plan for this commercial project. Refer to Section 7 for Macro-Study Proposed Conditions weighted NRCS Runoff Curve Number (CN) and Time of Concentration (T_C) calculations.

The tributary areas, Runoff Curve Numbers (CN), and Times of Concentration (T_C) for the corresponding subareas that are provided in Table 4.1-1 are used as input into the Proposed Conditions PondPack model to evaluate the stormwater hydrology. Subareas included in the Proposed Conditions for the Discovery Park property are utilized in the PondPack model to compute the stormwater runoff for the three design storms. The resultant peak discharge rate (Q_P), peak time (T_P), and runoff volume (V_R) for the computed hydrographs of modeled subareas are included in Table 4.1-2(a). Areas that are unchanged from the Existing Conditions analysis are presented as *grey print* in the following tables.

Table 4.1-1(a). Macro-Study Proposed Conditions Input Data

	Total Area (ac):	**Aria Onsite Area (ac):**	**Discovery Park Phase 1 Onsite Area (ac):**	**Discovery Park Phase 2 Onsite Area (ac):**	**Macro-Study Onsite Area (ac):**	**NRCS Weighted CN:**	**T_C [1] (hr):**
Subarea A1(e):	*27.97*				*12.36*	*77*	*0.1736*
Subarea A1(w):	*43.14*					*76*	*0.2511*
Subarea A2(e):	*3.08*					*80*	*0.0875*
Subarea A2(w):	*23.41*					*73*	*0.2133*
Subarea A3:	24.06	11.07			11.07	82	0.0714
Subarea A4(e):	1.48	0.14	0.84		0.98	88	0.0184
Subarea A4(w):	8.75		0.59		0.59	72	0.1095
Subarea A5(e):	19.12	11.29	6.92		18.20	86	0.0769
Subarea A5(w):	33.42		31.08		31.08	95	0.0647
Subarea A6:	13.42			9.88	9.88	83	0.0842
Subarea A7:	*30.60*					*76*	*0.1596*
Subarea A8:	*21.56*					*81*	*0.1299*
Subarea A9:	*31.84*					*84*	*0.1420*
Subarea A10:	*12.23*					*94*	*0.1545*
Subtotal:	*294.08*	*22.50*	*39.42*	*9.88*	*84.15*		
Subarea B1:	*31.94*					*79*	*0.1385*
Subarea B2:	*48.54*					*78*	*0.1987*
Subarea B3:	*40.69*					*83*	*0.1447*
Subarea B4-DET:	*25.05*					*94*	*0.1155*
Subarea B4-BYP:	*7.42*					*94*	*0.0787*
Subtotal:	*153.64*						
Subarea C1:	*45.21*					*90*	*0.2860*
Subarea C2:	*57.13*					*81*	*0.3308*
Subarea C3:	*52.36*					*83*	*0.1199*
Subtotal:	154.70						
Total:	**602.42**	**22.50**	**39.42**	**9.88**			

[1] ***Note:*** *Per TR-55 documentation, minimum T_C is 0.10 hours; model is configured with default value of 0.10 hr. minimum Tc.*

Table 4.1-1(b). Macro-Study Proposed Conditions Input Sub-Watershed Data

	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):
Sub-W'Shed A Subtotal:	294.08	22.50	39.42	9.88	84.15
Sub-W'Shed B Subtotal:	*153.64*				
Sub-W'Shed C Subtotal:	*154.70*				
Modeled Total:	602.42	22.50	39.42	*9.88*	84.15

These tributary areas, Runoff Curve Numbers (CN), and Times of Concentration (T_C) for the corresponding subareas were used as input to the Proposed Conditions PondPack model to evaluate the stormwater hydrology for this Macro-Study. The subareas representing Existing-(offsite) and Proposed Conditions (onsite) for the Discovery Park site are utilized in the PondPack model to compute the stormwater runoff for the three design storms. The resultant peak discharge rate (Q_P), peak time (T_P), and runoff volume (V_R) for the computed hydrographs of modeled subareas are included in Table 4.1-2.

Table 4.1-2(a). Hydrologic Information – Macro-Study Proposed Conditions Summary (Subareas)

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea A-1(e):	*53.91*	*12.01*	*3.334*	*110.32*	*11.99*	*6.783*	*187.82*	*11.99*	*11.675*
Subarea A-1(w):	*70.15*	*12.05*	*4.908*	*146.86*	*12.05*	*10.132*	*252.55*	*12.05*	*17.597*
Subarea A-2(e):	*7.64*	*11.94*	*0.420*	*14.90*	*11.93*	*0.819*	*24.63*	*11.93*	*1.374*
Subarea A-2(w):	*34.59*	*12.03*	*2.301*	*76.77*	*12.03*	*4.975*	*136.28*	*12.03*	*8.884*
Subarea A-3:	65.13	11.93	3.574	122.96	11.93	6.787	199.22	11.93	11.198
Subarea A-4(e):	5.05	11.93	0.279	8.68	11.93	0.491	13.33	11.93	0.773
Subarea A-4(w):	14.08	11.96	0.817	32.12	11.94	1.796	58.07	11.94	3.239
Subarea A-5(e):	60.82	11.93	3.344	107.76	11.93	6.033	168.25	11.93	9.642
Subarea A-5(w):	139.52	11.92	8.184	219.80	11.92	13.246	322.03	11.92	19.806
Subarea A-6:	37.88	11.93	2.077	70.35	11.93	3.893	112.88	11.93	6.372
Subarea A-7:	*57.26*	*12.00*	*3.482*	*119.03*	*11.98*	*7.186*	*204.90*	*11.98*	*12.481*
Subarea A-8:	*53.05*	*11.96*	*3.070*	*101.89*	*11.95*	*5.907*	*166.82*	*11.95*	*9.826*
Subarea A-9:	*87.15*	*11.97*	*5.138*	*158.95*	*11.96*	*9.507*	*252.78*	*11.96*	*15.435*
Subarea A-10:	*45.61*	*11.97*	*2.890*	*72.57*	*11.97*	*4.733*	*106.86*	*11.97*	*7.128*
Subarea B-1:	*70.94*	*11.97*	*4.168*	*140.29*	*11.96*	*8.242*	*234.20*	*11.95*	*13.944*
Subarea B-2:	*94.72*	*12.03*	*6.057*	*190.16*	*12.01*	*12.146*	*320.74*	*12.00*	*20.725*
Subarea B-3:	*106.50*	*11.97*	*6.302*	*197.62*	*11.96*	*11.812*	*317.37*	*11.96*	*19.332*
Subarea B-4 (BYP):	*30.29*	*11.93*	*1.753*	*48.22*	*11.92*	*2.871*	*71.04*	*11.92*	*4.324*

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea B-4 (DET):	*99.43*	*11.94*	*5.919*	*158.21*	*11.94*	*9.694*	*232.94*	*11.94*	*14.599*
Subarea C-1:	*124.83*	*12.05*	*9.223*	*209.38*	*12.05*	*15.842*	*317.10*	*12.05*	*24.565*
Subarea C-2:	*104.44*	*12.09*	*8.134*	*200.90*	*12.08*	*15.652*	*329.78*	*12.08*	*26.038*
Subarea C-3:	*142.61*	*11.95*	*8.110*	*264.83*	*11.94*	*15.199*	*425.51*	*11.94*	*24.875*

The hydrologic impact resulting from the Macro-Study Proposed Conditions results is partially revealed by the comparison of the preceding subarea data to those established in Section 3 (Existing Conditions) of this report. The hydrologic conditions for offsite subareas remain unchanged between Existing- and Proposed Conditions analyses. However, the onsite subareas do exhibit changes in impervious cover and diversion of tributary area under Proposed Conditions. The hydrologic impact to the overall sub-watershed of these modified areas will become apparent in the summary tables for the Points of Interest.

The variation in quantity and rate of stormwater discharge between these two models represents the hydrologic effect generated by the proposed development project for given subareas. The following table depicts the difference in computed subarea hydrology between the Existing- and Proposed Conditions models.

Table 4.1-2(b). Hydrologic Information –
Macro-Study Proposed vs. Existing Conditions Summary (Subareas)

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea A-1(e):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-1(w):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-2(e):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-2(w):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-3:	7.52	-0.03	0.244	10.38	-0.02	0.292	13.09	-0.02	0.303
Subarea A-4(e):	-18.92	-0.03	-1.123	-37.29	-0.03	-2.207	-61.82	-0.03	-3.715
Subarea A-4(w):	-13.48	-0.05	-0.895	-28.73	-0.05	-1.904	-50.15	-0.05	-3.368
Subarea A-5(e):	24.42	-0.02	1.277	36.86	-0.02	2.002	51.27	-0.02	2.88
Subarea A-5(w):	102.50	-0.08	5.935	142.70	-0.07	8.603	189.42	-0.05	11.742
Subarea A-6:	-0.10	n/c	-0.006	-0.19	n/c	-0.011	-0.31	n/c	-0.017
Subarea A-7:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-8:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-9:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-10:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea B-4 (BYP):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-4 (DET):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea C-1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea C-2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea C-3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

The sign-convention used in the preceding table is: Proposed Conditions minus Existing Conditions. Therefore, negative values indicate a reduction in computed value, whereas positive values reflect an increase. Those locations that do not exhibit any change in computed values are identified by "n/c."

The previously defined stormwater detention basins, outfall structures, and resultant hydrograph attenuation effects have been incorporated into the Proposed Conditions PondPack model. The channel reaches defined in the Existing Conditions analysis are also included in this routing. Results of this Proposed Conditions hydrologic routing are provided in the following summary table. This information is provided at the same "Points of Interest" used in the Existing Conditions hydrologic analysis for this Stormwater Drainage Study. Refer to the Proposed Conditions Drainage Area Map for the location of the points of interest in relation to the development site, modeled subareas, channels and conveyances. As in the preceding tables, locations that are unchanged from the Existing Conditions analysis are presented as grey print in the following tables.

Table 4.1-3(a). Hydrologic Information–Macro-Study Proposed Conditions Summary (Junctions)
Un-Detained Hydrology (for Proposed Discovery Park Basin)

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	1,036.29	12.19	91.367	1,891.07	12.16	171.623	2,890.34	12.14	281.712
Point A2:	979.74	12.11	83.974	1,759.80	12.09	155.560	2.641.51	12.08	253.290
Point A3:	625.11	12.16	52.191	1,100.39	12.15	97.194	1,586.54	12.08	158.549
Point A4:	414.66	12.03	29.282	697.74	12.03	52.792	1,047.68	12.03	84.703
Point A6:	37.88	11.94	2.077	70.35	11.93	3.893	112.88	11.93	6.372
Point A7:	*229.26*	*12.05*	*14.580*	*397.23*	*12.07*	*27.333*	*603.32*	*12.08*	*44.871*
Point A8:	*53.05*	*11.96*	*3.070*	*101.89*	*11.95*	*5.907*	*166.82*	*11.95*	*9.826*
Point A9:	*128.79*	*12.00*	*8.028*	*223.48*	*11.99*	*14.240*	*346.07*	*11.99*	*22.563*
Point A10:	*45.61*	*11.97*	*2.890*	*72.57*	*11.97*	*4.733*	*106.86*	*11.97*	*7.128*
Point B1:	*615.14*	*12.11*	*49.667*	*1,076.61*	*12.11*	*91.457*	*1,551.65*	*12.14*	*148.401*
Point B2:	*242.31*	*12.05*	*20.032*	*446.43*	*12.04*	*36.522*	*715.56*	*12.03*	*58.980*
Point B3:	*153.04*	*11.99*	*13.975*	*266.04*	*11.98*	*24.377*	*411.65*	*11.97*	*38.255*
Point B4:	*48.10*	*11.94*	*7.673*	*71.04*	*11.93*	*12.565*	*98.80*	*11.93*	*18.924*
Point C1:	*350.42*	*12.09*	*25.466*	*604.01*	*12.10*	*46.692*	*890.10*	*12.10*	*75.478*

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point C2:	*232.89*	*12.04*	*16.244*	*417.32*	*12.07*	*30.851*	*614.91*	*12.08*	*50.912*
Point C3:	*142.61*	*11.95*	*8.110*	*264.83*	*11.94*	*15.199*	*425.51*	*11.94*	*24.875*

As previously evaluated for the modeled Subareas, these Proposed Conditions results for the Points of Interest will be compared to those established in Section 3 (Existing Conditions) of this report. The points represent similar locations in both Existing- and Proposed Conditions analyses. Therefore, the variation in quantity and rate of stormwater discharge between these two models represents the hydrologic effect generated by the proposed development. The following table depicts the difference between the Existing- and Proposed Conditions models.

Table 4.1-3(b). Hydrologic Information – Comparison of Results:
Macro- Proposed vs. Existing Conditions Summary (Junctions) Un-Detained Hydrology

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	84.85	-0.06	3.32	102.45	-0.06	4.660	130.62	-0.05	5.706
Point A2:	68.10	-0.06	4.173	62.88	-0.06	5.511	66.98	-0.04	6.556
Point A3:	-5.18	0.01	-0.821	-10.28	n/c	-0.777	-12.83	-0.09	-0.796
Point A4:	152.42	-0.13	5.214	156.66	-0.09	6.518	140.21	-0.06	7.572
Point A6:	0.88	-0.03	-0.813	0.78	n/c	0.011	1.10	n/c	0.018
Point A7:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A8:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A9:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A10:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B4:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

The sign-convention used in the preceding table is: Proposed Conditions minus Existing Conditions. Therefore, negative values indicate a reduction in computed value, whereas positive values reflect an increase. Those locations that do not exhibit any change in computed values are identified by "n/c."

Information presented in the preceding table exhibits a reduction in peak rates, relative to the existing conditions model. This is the result of reduced times of concentration that occur with Discovery Park development. Overall runoff volumes exhibit modest increase.

The following table is provided to examine the difference between the computed peak discharge rates and the established ARR's for the Discovery Park Macro-Study.

Table 4.1-4. Allowable Release Rate Evaluation – Proposed Conditions Macro Model – Without Detention

Location:	Event:	Computed Peak Discharge Rate (cfs):	ARR (cfs):	Difference (cfs):
Point A1	2-Year:	1,036.29	927.14	109.15
	10-Year:	1,891.07	1,766.79	124.28
	100-Year:	2,890.34	2,724.11	166.23
Point A2	2-Year:	979.74	884.27	95.57
	10-Year:	1,759.80	1,670.03	89.77
	100-Year:	2,641.51	2,532.96	108.55
Point A3	2-Year:	625.11	613.94	11.17
	10-Year:	1,100.39	1,094.99	5.40
	100-Year:	1,586.54	1,578.20	8.34
Point A4	2-Year:	414.66	251.18	163.48
	10-Year:	697.74	528.69	169.05
	100-Year:	1,047.68	882.87	164.81
Point A6	2-Year:	37.88	16.57	21.31
	10-Year:	70.35	40.65	29.70
	100-Year:	112.88	63.30	49.58

The sign-convention utilized for the information presented in the preceding table is based upon "Computed Rate minus ARR." Therefore, positive values indicate an exceedance of the Allowable Release Rate, whereas negative values would indicate a peak rate that is lower than the ARR, thereby meeting the targeted peak discharge rates. The difference in the rates depicted in this table are all in exceedance of the targeted rates, therefore stormwater detention is required for the project.

Proposed Discovery Park Stormwater Detention Facility:

Based upon the Proposed Conditions analysis, it is apparent that some form of stormwater detention will be required for this project. A wet detention basin will be constructed in the northwest corner of Discovery Park Phase 1 that will serve both Discovery Park and Aria. The basin is proposed to be constructed for detention only, without any water quality treatment in the basin. The areas A-4 and A-5 are proposed to discharge into the basin, with flows from area A-7 (East of Douglas Street), discharging into the basin through a proposed culvert directing flows into the basin.

Following is the Proposed Conditions geometry for the outlet structure:

Primary Outlet Structure:

Two (2) 5'(W) x 4' (H) RCB Culverts; Length ≈ 202 L.F.

Flowline In / Out ≈ 929.00 / 906.20(ft; NAVD)

Secondary Outlet Structure:

Emergency Spillway (Weir) 413' L x 1.0' H with 3:1 side slopes; Crest Elev. = 937.50

The proposed basin's storage area is provided in the following table. This proposed storage area is designed as the final configuration for the facility; it is intended to provide the necessary detention for the three separate development areas.

Table 4.1-5(a). Proposed Conditions Storage Volume – Discovery Park Stormwater Detention Facility

Elevation (ft; NAVD):	Storage Area (sq. ft.):	Incremental Volume (ft^3):	Cumulative Volume (ac-ft):	Cumulative Volume (Dry) (ac-ft):
920	89,372.00	0.00	0.00	0.00
921	94,134.00	91,742.70	2.11	0.00
922	98,954.00	96,533.97	4.32	0.00
923	103,829.00	101,381.73	6.65	0.00
924	108,761.00	106,285.46	9.09	0.00
925	113,750.00	111,246.18	11.64	0.00
926	118,795.00	116,263.38	14.31	0.00
927	123,897.00	121,337.06	17.10	0.00
928	129,055.00	126,467.23	20.00	0.00
929	134,270.00	131,653.89	23.02	0.00
930	140,150.00	137,199.50	26.17	3.15
931	145,315.00	142,724.71	29.45	6.43
932	150,465.00	147,882.53	32.84	9.83
933	155,331.00	152,891.55	36.35	13.34
934	160,582.00	157,949.23	39.98	16.96
935	166,505.00	163,534.56	43.73	20.72
936	170,375.00	168,436.30	47.60	24.58
937	189,499.00	179,852.25	51.73	28.71
938	209,384.00	199,358.84	56.31	33.29

Note: *The conic method is used to compute the incremental volume between pond contours.*
The sum of the computed incremental volumes provides the cumulative pond volume for a given elevation.

Utilizing these geometric parameters in the Proposed Conditions model, the following table depicts the stormwater routing summary for this location.

Table 4.1-5(b). Macro-Study Proposed Conditions Hydrologic Routing Summary– Discovery Park Stormwater Detention Facility

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
2-Year:	415.53	12.01	149.69	12.23	29.282	932.34	11.012
10-Year:	699.01	12.02	309.02	12.24	52.792	934.42	18.514
100-Year:	1,049.30	12.01	518.01	12.25	84.703	936.65	27.201

The preceding routing summary indicates that the detention aspect of this facility provides substantial attenuation of the all storm events.

The proposed stormwater detention facility is included in the PondPack modeling for the following table output. These Macro-Study Proposed Conditions results will be compared to the Existing Conditions in the following table. Areas that are unchanged from the Existing Conditions analysis are presented as *grey print* in the following tables.

Table 4.1-6(a). Hydrologic Information – Macro- Proposed Conditions Summary (Junctions) Including Proposed Discovery Park Detention Basin

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	822.31	12.25	91.367	1,511.28	12.24	171.623	2,280.25	12.24	281.712
Point A2:	782.43	12.18	83.974	1,425.45	12.17	155.560	2,141.89	12.19	253.290
Point A3:	625.11	12.16	52.191	1,100.39	12.15	97.194	1,586.54	12.17	158.549
Point A4:	149.63	12.25	29.282	308.87	12.26	52.792	517.84	12.27	84.703
Point A6:	37.88	11.93	2.077	70.35	11.93	3.893	112.88	11.93	6.372
Point A7:	*229.26*	*12.05*	*14.580*	*397.23*	*12.07*	*27.333*	*603.32*	*12.08*	*44.871*
Point A8:	*53.05*	*11.96*	*3.070*	*101.89*	*11.95*	*5.907*	*166.82*	*11.95*	*9.826*
Point A9:	*128.79*	*12.00*	*8.028*	*223.48*	*11.99*	*14.240*	*346.07*	*11.99*	*22.563*
Point A10:	*45.61*	*11.97*	*2.890*	*72.57*	*11.97*	*4.733*	*106.86*	*11.97*	*7.128*
Point B1:	*615.14*	*12.11*	*49.667*	*1,076.61*	*12.11*	*91.457*	*1,551.65*	*12.14*	*148.401*
Point B2:	*242.31*	*12.05*	*20.032*	*446.43*	*12.04*	*36.522*	*715.56*	*12.03*	*58.980*
Point B3:	*153.04*	*11.99*	*13.975*	*266.04*	*11.98*	*24.377*	*411.65*	*11.97*	*38.255*
Point B4:	*48.10*	*11.94*	*7.673*	*71.04*	*11.93*	*12.565*	*98.80*	*11.93*	*18.924*
Point C1:	*350.42*	*12.09*	*25.466*	*604.01*	*12.10*	*46.692*	*890.10*	*12.10*	*75.478*
Point C2:	*232.89*	*12.04*	*16.244*	*417.32*	*12.07*	*30.851*	*614.91*	*12.08*	*50.912*
Point C3:	*142.61*	*11.95*	*8.110*	*264.83*	*11.94*	*15.199*	*425.51*	*11.94*	*24.875*

The following table provides a comparison between the Macro-Study Proposed Conditions (with detention) and the Existing Conditions modeled results. As indicated by the grey font, the lowest six modeled points within the sub-watershed are the only locations that exhibit hydrologic impacts.

Table 4.1-6(b). Hydrologic Information – Comparison of Results:
Macro- Proposed vs. Existing Conditions Summary (Junctions) Detained Hydrology

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	-126.65	0.00	3.314	-272.95	0.02	4.654	-474.59	0.05	5.704
Point A2:	-126.62	0.00	4.164	-266.28	0.02	5.505	-424.70	0.06	6.554
Point A3:	-3.53	0.00	0.806	-7.28	0.00	0.758	-9.02	0.00	0.748
Point A4:	-111.29	0.08	5.190	-230.62	0.13	6.483	-388.72	0.16	7.521
Point A6:	0.10	-0.01	0.006	0.19	-0.01	0..011	0.31	-0.01	0.017
Point A7:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A8:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A9:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A10:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B4:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

The sign-convention used in the preceding table is: Proposed Conditions minus Existing Conditions. Therefore, negative values indicate a reduction in computed value, whereas positive values reflect an increase. Those locations that do not exhibit any change in computed values are identified by "n/c."

Information presented in the preceding table exhibits a reduction in peak rates, relative to the existing conditions model. Overall runoff volumes exhibit modest increase.

The following table is provided to examine the difference between the computed peak discharge rates and the established ARR's for the Discovery Park Macro-Study.

Table 4.1-7. Allowable Release Rate Evaluation – Proposed Conditions Macro Study (With Detention)

Location:	Event:	Computed Peak Discharge Rate (cfs):	ARR (cfs):	Difference (cfs):
Point A1	2-Year:	822.31	859.38	-37.07
	10-Year:	1511.28	1704.07	-192.79
	100-Year:	2280.25	2623.74	-343.49
Point A2	2-Year:	782.43	823.14	-40.71
	10-Year:	1425.45	1607.68	-182.23
	100-Year:	2141.89	2436.65	-294.76
Point A3	2-Year:	625.11	612.50	12.61
	10-Year:	1100.39	1092.23	8.16
	100-Year:	1586.54	1574.71	11.83
Point A4	2-Year:	149.63	200.55	-50.92
	10-Year:	308.87	471.95	-163.08
	100-Year:	518.04	771.67	-253.66
Point A6	2-Year:	37.88	16.57	21.31
	10-Year:	70.35	40.65	29.70
	100-Year:	112.88	63.30	49.58

Note: The sign-convention utilized for the information presented in the preceding table is based upon "Computed Rate minus ARR." Positive values indicate an exceedance of the ARR; negative values indicate that the peak rate is lower than the ARR.

The difference in the rates depicted in this table are generally in compliance with the targeted rates; the proposed stormwater management facility provides adequate attenuation for the primary Channel "A" tributary. The information provided in the preceding table does demonstrate that there are a few exceptions: Peak rates at Point A3 and A6. Point A3 is the terminal end of the Channel "B" tributary, immediately upstream from confluence at Point A2, while point A6 flows directly into the proposed basin.

Although the ARR is exceeded at the Point A3 location, the Proposed Conditions analysis does exhibit that areas further downstream are below ARR at all storm events. ARR is also exceeded at Point A6 during all storm events, however this point is located upstream of the proposed detention basin, and is routed through the basin for attenuation.

4.2. Macro Stormwater Model: Fully-Developed Conditions Analysis

This section of the Stormwater Drainage Study for the Discovery Park commercial development is provided to evaluate the Fully-Developed Proposed Conditions hydrology for the Unity Lake #2 tributary. Proposed conditions include the fully-developed condition of Aria, Discovery Park, and the Multi-Family Residential developments.

Fully-Developed Conditions Runoff Curve Numbers have been developed based upon the current Aria and Discovery Park Phase 1 Development Plans and for the future Multi-Family Residential development and a portion of the Discovery Park Phase 2 development. Refer to Section 7 for Macro-Study Fully-Developed Conditions weighted NRCS Runoff Curve Number (CN) and Time of Concentration (T_C) calculations. These values, summarized in Table 4.2-1(a) are used as input into the Fully-Developed Conditions PondPack model to evaluate the Macro-Study Fully Developed Conditions stormwater runoff for the three design storms. The resultant peak discharge rate (Q_P), peak time (T_P), and runoff volume (V_R) for the computed hydrographs of modeled subareas are included in Tale 4.2-2(a). Areas that are unchanged from the Existing Conditions analysis are presented as *grey print* in the following tables.

Table 4.2-1(a). Macro-Study Fully-Developed Conditions Input Data

	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):	NRCS Weighted CN:	T_C [1] (hr):
Subarea A1(e):	30.57				*14.96*	85	0.1401
Subarea A1(w):	*43.14*					*76*	*0.2511*
Subarea A2(e):	*3.08*					*80*	*0.0875*
Subarea A2(w):	*23.41*					*73*	*0.2133*
Subarea A3:	24.06	11.07			11.07	87	0.0717
Subarea A4(e):	1.48	0.14	0.84		0.98	89	0.0184
Subarea A4(w):	8.75		0.59		0.59	72	0.1095
Subarea A5(e):	19.12	11.29	6.92		18.20	92	0.0615
Subarea A5(w):	33.42		31.08		31.08	95	0.0647
Subarea A6:	13.42			9.88	9.88	94	0.0842
Subarea A7:	*30.60*					*76*	*0.1596*
Subarea A8:	*21.56*					*81*	*0.1299*
Subarea A9:	*31.84*					*84*	*0.1420*
Subarea A10:	*12.23*					*94*	*0.1545*
Subtotal:	*296.68*	*22.50*	*39.42*	*9.88*	*86.76*		
Subarea B1:	*31.94*					*79*	*0.1385*
Subarea B2:	*48.54*					*78*	*0.1987*

	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):	NRCS Weighted CN:	T_C [1] (hr):
Subarea B3:	*40.69*					*83*	*0.1447*
Subarea B4-DET:	*25.05*					*94*	*0.1155*
Subarea B4-BYP:	*7.42*					*94*	*0.0787*
Subtotal:	*153.64*						
Subarea C1:	*45.21*					*90*	*0.2860*
Subarea C2:	*57.13*					*81*	*0.3308*
Subarea C3:	*52.36*					*83*	*0.1199*
Subtotal:	154.70						
Modeled Total:	605.02	22.50	39.42	9.88	86.76		

[1] ***Note:*** *Per TR-55 documentation, minimum T_C is 0.10 hours; model is configured with default value of 0.10 hr. minimum Tc.*

Table 4.2-1(b). Macro-Study Fully-Developed Conditions Input Sub-Watershed Data

	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):
Sub-W'Shed A Subtotal:	296.68	22.50	39.42	9.88	86.76
Sub-W'Shed B Subtotal:	*153.64*				
Sub-W'Shed C Subtotal:	*154.70*				
Modeled Total:	605.02	22.50	39.42	*9.88*	86.76

As noted, these tributary areas, Runoff Curve Numbers (CN), and Times of Concentration (T_C) for the corresponding subareas were used as input to the Proposed Conditions PondPack model to evaluate the stormwater hydrology for the Fully-Developed section of this report. The subareas representing Existing- (offsite) and Proposed Conditions (onsite) for the development sites are utilized in the PondPack model to compute the stormwater runoff for the three design storms. The resultant peak discharge rate (Q_P), peak time (T_P), and runoff volume (V_R) for the computed hydrographs of modeled subareas are included in Table 4.2-2(a).

Table 4.2-2(a). Hydrologic Information – Macro- Fully-Developed Conditions Summary (Subareas)

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea A-1(e):	87.32	11.96	5.137	157.07	11.96	9.384	247.45	11.96	15.116
Subarea A-1(w):	*70.15*	*12.05*	*4.908*	*146.86*	*12.05*	*10.132*	*252.55*	*12.05*	*17.597*
Subarea A-2(e):	*7.64*	*11.94*	*0.420*	*14.90*	*11.93*	*0.819*	*24.63*	*11.93*	*1.374*
Subarea A-2(w):	*34.59*	*12.03*	*2.301*	*76.77*	*12.03*	*4.975*	*136.28*	*12.03*	*8.884*
Subarea A-3:	79.39	11.93	4.376	138.56	11.93	7.797	214.51	11.93	12.366
Subarea A-4(e):	5.22	11.93	0.290	8.85	11.93	0.504	13.49	11.92	0.788
Subarea A-4(w):	14.08	11.96	0.817	32.12	11.94	1.796	58.07	11.94	3.239
Subarea A-5(e):	74.12	11.93	4.202	120.76	11.93	7.047	180.16	11.92	10.767
Subarea A-5(w):	139.52	11.92	8.184	219.79	11.92	13.245	322.02	11.92	19.806
Subarea A-6:	54.75	11.93	3.169	87.16	11.92	5.190	128.41	11.92	7.817
Subarea A-7:	*57.26*	*12.00*	*3.482*	*119.03*	*11.98*	*7.186*	*204.90*	*11.98*	*12.481*
Subarea A-8:	*53.05*	*11.96*	*3.070*	*101.89*	*11.95*	*5.907*	*166.82*	*11.95*	*9.826*
Subarea A-9:	*87.15*	*11.97*	*5.138*	*158.95*	*11.96*	*9.507*	*252.78*	*11.96*	*15.435*
Subarea A-10:	*45.61*	*11.97*	*2.890*	*72.57*	*11.97*	*4.733*	*106.86*	*11.97*	*7.128*
Subarea B-1:	*70.94*	*11.97*	*4.168*	*140.29*	*11.96*	*8.242*	*234.20*	*11.95*	*13.944*
Subarea B-2:	*94.72*	*12.03*	*6.057*	*190.16*	*12.01*	*12.146*	*320.74*	*12.00*	*20.725*
Subarea B-3:	*106.50*	*11.97*	*6.302*	*197.62*	*11.96*	*11.812*	*317.37*	*11.96*	*19.332*
Subarea B-4 (BYP):	*30.29*	*11.93*	*1.753*	*48.22*	*11.92*	*2.871*	*71.04*	*11.92*	*4.324*
Subarea B-4 (DET):	*99.43*	*11.94*	*5.919*	*158.21*	*11.94*	*9.694*	*232.94*	*11.94*	*14.599*
Subarea C-1:	*124.83*	*12.05*	*9.223*	*209.38*	*12.05*	*15.842*	*317.10*	*12.05*	*24.565*
Subarea C-2:	*104.44*	*12.09*	*8.134*	*200.90*	*12.08*	*15.652*	*329.78*	*12.08*	*26.038*
Subarea C-3:	*142.61*	*11.95*	*8.110*	*264.83*	*11.94*	*15.199*	*425.51*	*11.94*	*24.875*

As in the previous section, the hydrologic impact resulting from the Fully-Developed Conditions results is partially revealed by the comparison of the preceding subarea data to those established in Section 3 (Existing Conditions) of this report. The hydrologic conditions for offsite subareas remain unchanged between Existing- and Proposed Conditions analyses. Onsite subareas do exhibit changes in impervious cover and diversion of tributary area under Fully-Developed Conditions. The hydrologic impact to the overall sub-watershed of these modified areas will become apparent in the summary tables for the Points of Interest.

The variation in quantity and rate of stormwater discharge between these two models represents the hydrologic effect generated by the proposed development project for given subareas. The following table depicts the difference in computed subarea hydrology between the Existing- and Fully-Developed Conditions models.

Table 4.2-2(b). Hydrologic Information – Macro- Fully-Developed Conditions Summary (Subareas)

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Subarea A-1(e):	33.41	-0.05	1.803	46.75	-0.03	2.601	59.63	-0.03	3.441
Subarea A-1(w):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-2(e):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-2(w):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-3:	21.78	-0.03	1.046	25.98	-0.02	1.302	28.38	-0.02	1.471
Subarea A-4(e):	-18.75	-0.03	-1.112	-37.12	-0.03	-2.194	-61.66	-0.04	-3.7
Subarea A-4(w):	-13.48	-0.05	-0.895	-28.73	-0.05	-1.904	-50.15	-0.05	-3.368
Subarea A-5(e):	37.72	-0.02	2.135	49.86	-0.02	3.016	63.18	-0.03	4.005
Subarea A-5(w):	102.50	-0.08	5.935	142.69	-0.07	8.602	189.41	-0.05	11.742
Subarea A-6:	16.77	n/c	1.086	16.62	-0.01	1.286	15.22	-0.01	1.428
Subarea A-7:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-8:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-9:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea A-10:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-4 (BYP):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea B-4 (DET):	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea C-1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea C-2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Subarea C-3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

The sign-convention used in the preceding table is: Proposed Conditions minus Existing Conditions. Therefore, negative values indicate a reduction in computed value, whereas positive values reflect an increase. Those locations that do not exhibit any change in computed values are identified by "n/c."

The previously defined stormwater detention basins, outfall structures and resultant hydrograph attenuation effects have been incorporated into the Fully-Developed Conditions PondPack model. The channel reaches defined in the Existing Conditions analysis are also included in this routing. Results of this Fully-Developed Conditions hydrologic routing are provided in the following summary table. This information is provided at the same "Points of Interest" used in the Existing Conditions hydrologic analysis for this Stormwater Drainage Study. Refer to the Macro- Fully-Developed Drainage Area Map for the location of the points of interest in relation to the development sites, modeled subareas, channels and conveyances. As in the preceding tables, locations that are unchanged from the Existing Conditions analysis are presented as *grey print* in the following tables.

Table 4.2-3(a). Hydrologic Information – Macro- Fully-Developed Conditions Summary (Junctions)
Un-Detained Hydrology (for Proposed Discovery Park Basin)

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	1,074.58	12.17	95.932	1,932.54	12.16	177.559	2,939.19	12.14	288.906
Point A2:	1,005.57	12.10	86.736	1,784.23	12.09	158.893	2,665.36	12.08	257.043
Point A3:	627.78	12.15	52.992	1,103.02	12.15	98.204	1,588.55	12.17	159.717
Point A4:	436.65	12.03	31.243	718.69	12.03	55.115	1,066.26	12.03	87.287
Point A6:	54.75	11.93	3.169	87.16	11.92	5.190	128.41	11.92	7.817
Point A7:	*229.26*	*12.05*	*14.580*	*397.23*	*12.07*	*27.333*	*603.32*	*12.08*	*44.871*
Point A8:	*53.05*	*11.96*	*3.070*	*101.89*	*11.95*	*5.907*	*166.82*	*11.95*	*9.826*
Point A9:	*128.79*	*12.00*	*8.028*	*223.48*	*11.99*	*14.240*	*346.07*	*11.99*	*22.563*
Point A10:	*45.61*	*11.97*	*2.890*	*72.57*	*11.97*	*4.733*	*106.86*	*11.97*	*7.128*
Point B1:	*615.14*	*12.11*	*49.667*	*1,076.61*	*12.11*	*91.457*	*1,551.65*	*12.14*	*148.401*
Point B2:	*242.31*	*12.05*	*20.032*	*446.43*	*12.04*	*36.522*	*715.56*	*12.03*	*58.980*
Point B3:	*153.04*	*11.99*	*13.975*	*266.04*	*11.98*	*24.377*	*411.65*	*11.97*	*38.255*
Point B4:	*48.10*	*11.94*	*7.673*	*71.04*	*11.93*	*12.565*	*98.80*	*11.93*	*18.924*
Point C1:	*350.42*	*12.09*	*25.466*	*604.01*	*12.10*	*46.692*	*890.10*	*12.10*	*75.478*
Point C2:	*232.89*	*12.04*	*16.244*	*417.32*	*12.07*	*30.851*	*614.91*	*12.08*	*50.912*
Point C3:	*142.61*	*11.95*	*8.110*	*264.83*	*11.94*	*15.199*	*425.51*	*11.94*	*24.875*

As previously evaluated for the modeled Subareas, these Fully-Developed Proposed Conditions results for the Points of Interest will be compared to those established in Section 3 (Existing Conditions) of this report. The points represent similar locations in both Existing- and Proposed Conditions analyses. Therefore, the variation in quantity and rate of stormwater discharge between these two models represents the hydrologic effect generated by the proposed development. The following table depicts the difference between the Existing- and Fully-Developed Conditions models without provisions for onsite stormwater detention.

Table 4.2-3(b). Hydrologic Information – Comparison of Results:
Macro- Fully-Developed vs. Existing Conditions Summary (Junctions) Un-Detained Hydrology

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	123.14	-0.08	7.888	143.92	-0.06	10.596	179.47	-0.05	12.900
Point A2:	93.93	-0.07	6.935	87.31	-0.06	8.844	90.83	-0.05	10.309
Point A3:	-2.51	n/c	-0.02	-7.65	n/c	0.223	-10.82	n/c	0.372
Point A4:	174.41	-0.12	7.175	177.61	-0.09	8.841	158.79	-0.06	10.156
Point A6:	17.21	-0.01	1.086	17.59	-0.01	1.286	21.55	-0.01	1.427
Point A7:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A8:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A9:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A10:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B4:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

The sign-convention used in the preceding table is: Proposed Conditions minus Existing Conditions. Therefore, negative values indicate a reduction in computed value, whereas positive values reflect an increase. Those locations that do not exhibit any change in computed values are identified by "n/c."

Information presented in the preceding table exhibits an increase in peak rates at most Points of Interest, relative to the existing conditions model. This is the result of the substantial increased imperviousness for the onsite areas.

Additional analysis is required to determine whether the performance of the proposed development is able to establish compliance with the proposed stormwater management objectives. The following table is provided to examine the difference between the computed peak discharge rates and the established ARR's for the Discovery Park Macro-Study.

Table 4.2-4. Allowable Release Rate Evaluation –
Macro- Fully-Developed Conditions Summary Model – Without Detention

Location:	Event:	Computed Peak Discharge Rate (cfs):	ARR (cfs):	Difference (cfs):
Point A1	2-Year:	1,074.58	881.71	192.87
	10-Year:	1,932.54	1,725.98	206.56
	100-Year:	2,939.19	2,657.53	281.66
Point A2	2-Year:	1,005.57	848.13	157.44
	10-Year:	1,784.23	1,634.53	149.70
	100-Year:	2,665.36	2,478.07	187.29
Point A3	2-Year:	627.78	613.94	13.84
	10-Year:	1,103.02	1,094.99	8.03
	100-Year:	1,588.55	1,578.20	10.35

Point A4	2-Year:	436.65	220.67	215.98
	10-Year:	718.69	494.51	224.18
	100-Year:	1,066.26	815.03	251.23
Point A6	2-Year:	54.75	16.57	38.18
	10-Year:	87.16	40.65	46.51
	100-Year:	128.41	63.30	65.11

The sign-convention utilized for the information presented in the preceding table is based upon "Computed Rate minus ARR." Therefore, positive values indicate an exceedance of the Allowable Release Rate, whereas negative values would indicate a peak rate that is lower than the ARR, thereby meeting the targeted peak discharge rates. The difference in the rates depicted in this table are all in exceedance of the targeted rates. Though the increased peak discharge rates at the defined Points of Interest are relatively moderate, these exceedances are of noticeably greater magnitude.

Proposed Discovery Park Stormwater Detention Facility:

The proposed stormwater management facility that is defined in the Macro Study section of this report is configured for the fully-developed geometry. Therefore, the basin geometry is not repeated in this section. Utilizing the effects of this basin, the following table depicts the stormwater routing summary for the Macro-Study Fully-Developed Conditions.

Table 4.2-5. Fully-Developed Conditions Hydrologic Routing Summary– Discovery Park Stormwater Detention Facility

	Peak Q In (cfs):	T_P In (hr.):	Peak Q Out (cfs):	T_P Out (hr.):	V_R (ac-ft):	Peak WSEL (ft; NAVD):	Max. Storage Volume (ac-ft):
2-Year:	447.89	12.01	163.97	12.21	31.243	932.55	11.748
10-Year:	738.58	12.01	325.43	12.22	55.115	934.61	19.231
100-Year:	1,095.79	12.01	535.06	12.23	87.287	936.81	27.902

The preceding routing summary indicates that, under Fully-Developed Conditions, this basin provides substantial attenuation of the modeled design storm events. Section 8 of this report includes hydrographs for this proposed stormwater management facility.

An emergency spillway is to be constructed on the northwest side of the basin at an elevation of 937.50. The spillway is designed to, should the primary outfall structure be clogged or completely fail, route the 100 year storm into the existing stream. The 100 year storm is calculated as a peak flow of 1,095.79 cfs. The spillway length is designed as 413 LF. In the 100 year storm, the water surface elevation in the weir is calculated as 938.08. The top of the basin is set at 938.25, giving the basin 1.07 LF of freeboard.

Results of this Fully-Developed Conditions hydrologic routing, including the proposed stormwater detention facility are provided in the following summary table. This information is provided at the same "Points of Interest" used in the Existing Conditions hydrologic analysis for this Stormwater Drainage Study. Refer to the Macro Fully-Developed Conditions Drainage Area Map for the location of the points of interest in relation to the development sites, modeled subareas, channels and conveyances. As in the preceding tables, locations that are unchanged from the Existing Conditions analysis are presented as *grey print* in the following tables.

Table 4.2-6(a). Hydrologic Information – Macro- Fully-Developed Conditions Summary (Junctions) Including Proposed Discovery Park Detention Basin

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	846.59	12.25	95.932	1,539.67	12.24	177.559	2,309.68	12.24	288.906
Point A2:	803.35	12.18	86.736	1,451.96	12.17	158.893	2,169.95	12.19	257.043
Point A3:	627.78	12.15	52.992	1,103.02	12.15	98.204	1,588.55	12.17	159.717
Point A4:	163.90	12.23	31.243	325.28	12.24	55.115	534.89	12.25	87.287
Point A6:	54.75	11.93	3.169	87.16	11.93	5.190	128.41	11.92	7.817
Point A7:	*229.26*	*12.05*	*14.580*	*397.23*	*12.07*	*27.333*	*603.32*	*12.08*	*44.871*
Point A8:	*53.05*	*11.96*	*3.070*	*101.89*	*11.95*	*5.907*	*166.82*	*11.95*	*9.826*
Point A9:	*128.79*	*12.00*	*8.028*	*223.48*	*11.99*	*14.240*	*346.07*	*11.99*	*22.563*
Point A10:	*45.61*	*11.97*	*2.890*	*72.57*	*11.97*	*4.733*	*106.86*	*11.97*	*7.128*
Point B1:	*615.14*	*12.11*	*49.667*	*1,076.61*	*12.11*	*91.457*	*1,551.65*	*12.14*	*148.401*
Point B2:	*242.31*	*12.05*	*20.032*	*446.43*	*12.04*	*36.522*	*715.56*	*12.03*	*58.980*
Point B3:	*153.04*	*11.99*	*13.975*	*266.04*	*11.98*	*24.377*	*411.65*	*11.97*	*38.255*
Point B4:	*48.10*	*11.94*	*7.673*	*71.04*	*11.93*	*12.565*	*98.80*	*11.93*	*18.924*
Point C1:	*350.42*	*12.09*	*25.466*	*604.01*	*12.10*	*46.692*	*890.10*	*12.10*	*75.478*
Point C2:	*232.89*	*12.04*	*16.244*	*417.32*	*12.07*	*30.851*	*614.91*	*12.08*	*50.912*
Point C3:	*142.61*	*11.95*	*8.110*	*264.83*	*11.94*	*15.199*	*425.51*	*11.94*	*24.875*

As with the previous section, these Fully-Developed Conditions results for the Points of Interest will be compared to those established in Section 3 (Existing Conditions) of this report. The points represent similar locations in both Existing- and Proposed Conditions analyses. Therefore, the variation in quantity and rate of stormwater discharge between these two models represents the hydrologic effect generated by the proposed development. The following table depicts the difference between the Existing- and Fully-Developed Conditions models, including the effects of the proposed onsite stormwater detention facility.

Table 4.2-6(b). Hydrologic Information – Comparison of Results:
Macro- Fully-Developed Conditions Summary (Junctions) Detained Hydrology

Location:	Q_{P-2} (cfs):	T_{P-2} (hr.):	V_{R-2} (ac-ft):	Q_{P-10} (cfs):	T_{P-10} (hr.):	V_{R-10} (ac-ft):	Q_{P-100} (cfs):	T_{P-100} (hr.):	V_{R-100} (ac-ft):
Point A1:	-102.37	0.00	7.882	-244.56	0.02	10.59	-445.16	0.05	12.898
Point A2:	-105.70	0.00	6.926	-239.77	0.02	8.838	-396.64	0.06	10.307
Point A3:	-0.86	0.00	0.005	-4.65	0.00	0.252	-7.01	0.00	0.420
Point A4:	97.02	0.08	7.151	-214.21	0.13	8.806	-371.50	0.16	10.105
Point A6:	16.77	-0.01	1.086	16.62	-0.01	.286	*15.22*	-0.01	1.428
Point A7:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A8:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A9:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point A10:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point B4:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C1:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C2:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*
Point C3:	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*	*n/c*

The sign-convention used in the preceding table is: Proposed Conditions minus Existing Conditions. Therefore, negative values indicate a reduction in computed value, whereas positive values reflect an increase. Those locations that do not exhibit any change in computed values are identified by "n/c."

Data presented in the preceding table depicts the significant reduction in peak rates relative to the Existing Conditions model along the Channel "A" tributary. There is no change from the Macro-Study Proposed Conditions at the Point A3 location. Although the peak discharge rates are reduced at the modeled Points of Interest, further analysis is required to establish compliance with the project's stormwater management objectives.

The following table is provided to examine the difference between the computed Fully-Developed Conditions peak discharge rates and the established ARR's for the overall development.

Table 4.2-7. Allowable Release Rate Evaluation – Fully-Developed Conditions Macro Study (W/Detention)

Location:	Event:	Computed Peak Discharge Rate (cfs):	ARR (cfs):	Difference (cfs):
Point A1	2-Year:	846.59	859.38	-12.79
	10-Year:	1539.67	1704.07	-164.40
	100-Year:	2309.68	2623.74	-314.06
Point A2	2-Year:	803.35	823.14	-19.79
	10-Year:	1451.96	1607.68	-155.72
	100-Year:	2169.95	2436.65	-266.70
Point A3	2-Year:	627.78	612.50	15.28
	10-Year:	1103.02	1092.23	10.79
	100-Year:	1588.55	1574.71	13.84
Point A4	2-Year:	163.90	200.55	-36.65
	10-Year:	325.28	471.95	-146.67
	100-Year:	534.89	771.67	-236.78
Point A6	2-Year:	54.75	16.57	38.18
	10-Year:	87.16	40.65	46.45
	100-Year:	128.41	63.30	65.11

Note: The sign-convention utilized for the information presented in the preceding table is based upon "Computed Rate minus ARR." Positive values indicate an exceedance of the ARR; negative values indicate that the peak rate is lower than the ARR.

The difference in the rates depicted in this table are generally in compliance with the targeted rates; the proposed stormwater management facility provides adequate attenuation for the primary Channel "A" tributary. The information provided in the preceding table does demonstrate that there are a few exceptions: Peak rates at Point A3 and A6. Point A3 is the terminal end of the Channel "B" tributary, immediately upstream from confluence at Point A2, while point A6 flows directly into the proposed basin.

Although the ARR is exceeded at the Point A3 location, the Proposed Conditions analysis does exhibit that areas further downstream are below ARR at all storm events. ARR is also exceeded at Point A6 during all storm events, however this point is located upstream of the proposed detention basin, and is routed through the basin for attenuation.

4.3. Proposed Stormwater Best Management Practices

This section of the study will address water quality treatment for the proposed development. While the City of Lee's Summit has not adopted the Mid America Regional Council and American Public Works Association "Manual of Best Management Practices for Stormwater Quality" (Oct. 2012), 40-hr extended detention of the water quality storm volume generated by the development is required.

The proposed wet detention basin provides sufficient storage and peak rate attenuation to meet all Allowable Release Rate requirements for the development, however it is not providing the required 40-hr extended detention of the water quality storm event. Alternative design for water quality treatment that provides an equal or greater Level of Service, as calculated by the MARC BMP Manual, is allowed in lieu of providing 40-hr extended detention. The Level of Service provided by 40-hr extended dry detention is 4.0. Micro stormwater studies required to be submitted with each Final Development Plan will need to demonstrate that the proposed development will provide water quality treatment that is equal to or greater than the Level of Service of 4.0 that is required for the land area proposed to be developed.

In accordance with the Lee's Summit Design and Construction Manual (DCM) Section 1002.A, a waiver is being requested to remove 10.3 acres of stream buffer located within the project site (outlined in Section 5605 of KC-APWA Section 5600). The need to remove the existing creek channel, as shown on the attached exhibit, is driven by:

- The site layout approved by the city TIF commission, which includes a wet-bottom detention basin that is part of a development amenity space with a pond, parkland, and walking trail.
- A required entrance drive off of NE Douglas Road with minimum spacing allowed by the project traffic study to the adjacent intersection placing it in conflict with the existing creek channel.
- A clubhouse with swimming pool between the proposed detention basin and entrance drive.

The upstream end of the existing creek channel begins at the outlet point of an existing concrete box culvert under NE Douglas Street. This box culvert will be extended approximately 670 linear feet and discharge into the proposed wet-bottom detention basin.

The proposed development has been extensively coordinated with Unity Village, the owner/operator of Unity Lake #2, an existing lake that is located approximately ½ mile downstream of the proposed stream buffer impacts. As indicated in the attached letter from Unity Village, with the level of storm water quality treatment and peak runoff rate control being provided by the proposed improvements, this project has their full support.

As part of the due diligence performed for the development, the following reviews were completed:

- A jurisdictional determination was requested by the United States Army Corps of Engineers (USACE). The USACE provided a determination letter (attached with this request) that states the affected creek channel and attached wetlands are not jurisdictional water of the US.
- Review of existing FEMA floodplains was completed and no regulated floodplains exist within the affected creek channel as shown on the attached FEMA FIRM panel.

As a part of any development, the City of Lee's Summit requires that 40-hour extended dry detention of the water quality storm event be provided for the project site or equivalent on-site water quality treatment per the APWA BMP Manual. This is to promote the removal of pollutants and debris out of storm water prior to being discharged downstream of the development site. Due to the existing culvert under NE Douglas Street being routed into the proposed wet-bottom detention basin, the water quality volume exceeds what the proposed detention basin could treat while still meeting required basin water surface elevation parameters outlined in KC-AWPA Section 5608.4. In lieu of 40-hr extended dry detention of the water quality storm, best management practices (BMPs) will be constructed upstream of the proposed detention basin, internal to the project site, closer to the source point of the pollutant. The BMPs will be required to provide an equivalent or greater level of service than 40-hr extended dry detention. Water quality analysis treatment measures will be provided in future micro stormwater studies as each phase of the project is finalized through the Final Development Plan process.

Furthermore, with the culvert discharging into the wet-bottom detention basin with approximately 680 feet of travel length through a permanent pool of water, suspended solids and floatables that are conveyed into the basin from upstream (offsite) areas, not required to be treated by this development, will have an opportunity to settle out or be collected and disposed of. Discharging the culvert extension directly into the permanent pool basin will also provide scour and erosion protection that is a common problem at pipe outlets into dry basins or creek channels. Permanent pool detention basins also promote wildlife and aquatic habitats where dry basins are typically mowed and maintained to prevent vegetation, often deemed as 'unsightly' by land owners, from growing.

To improve the aesthetics and quality of the proposed wet detention basin, landscape design guidelines are being established for the development. The proposed guidelines require a 15-ft buffer of native plantings around the perimeter of the pond, restricting the use of turf grass in that zone. The taller native plantings and grasses provide wildlife habitat and refuse while filtering physical and chemical pollutants. Native planted buffer zones in conjunction with the existing old growth tree preservation (when possible) will enhance wildlife habitat and connectivity.

In addition to the water quality treatment being provided for the development prior to discharging runoff into the creek, 5.2 acres of enhanced stream buffer is being proposed to be set aside downstream of the impacted creek channel to further offset any environmental/wildlife impact caused by removing stream buffer described.

5. SUMMARY

See Tables 5-1 and 5-2, below, for a summary comparison of Existing, Allowable, and Proposed peak flowrates during the Macro conditions.

Table 5-1. Macro- Proposed Peak Flowrate Comparison

Location:	Event:	Existing Flowrate (cfs):	ARR (cfs):	Proposed Flowrate (cfs):	Difference (Existing vs. Proposed) (cfs):	Difference (ARR vs. Proposed) (cfs):
Point A1	2-Year:	948.96	859.38	822.31	-126.65	-37.07
	10-Year:	1,748.23	1704.07	1511.28	-236.95	-192.79
	100-Year:	2,754.84	2623.74	2280.25	-474.59	-343.49
Point A2	2-Year:	909.05	823.14	782.43	-126.62	-40.71
	10-Year:	1,691.73	1607.68	1425.45	-266.28	-182.23
	100-Year:	2,566.59	2436.65	2141.89	-424.70	-294.76
Point A3	2-Year:	628.64	612.50	625.11	-3.53	12.61
	10-Year:	1,107.67	1092.23	1100.39	-7.28	8.16
	100-Year:	1,595.56	1574.71	1586.54	-9.02	11.83
Point A4	2-Year:	260.92	200.55	149.63	-111.29	-50.92
	10-Year:	539.49	471.95	308.87	-230.62	-163.08
	100-Year:	906.56	771.67	518.01	-388.72	-253.66
Point A6	2-Year:	37.98	16.57	37.88	-0.10	21.31
	10-Year:	70.54	40.65	70.35	-0.19	29.70
	100-Year:	113.19	63.30	112.88	-0.31	49.58

Note: The sign-convention utilized for the information presented in the preceding table is based upon "Proposed Rate minus Existing (or ARR)." Positive values indicate an exceedance of the Existing (or ARR); negative values indicate that the peak rate is lower than the Existing (or ARR).

Table 5-2. Macro-Fully Developed- Peak Flowrate Comparison

Location:	Event:	Existing Flowrate (cfs):	ARR (cfs):	Proposed Flowrate (cfs):	Difference (Existing vs. Proposed) (cfs):	Difference (ARR vs. Proposed) (cfs):
Point A1	2-Year:	948.96	857.17	846.59	-102.37	-12.79
	10-Year:	1,748.23	1702.66	1539.67	-208.56	-164.40
	100-Year:	2,754.84	2621.34	2309.68	-445.16	-314.06
Point A2	2-Year:	909.05	823.14	803.35	-105.70	-19.79
	10-Year:	1,691.73	1607.68	1451.96	-239.77	-155.72
	100-Year:	2,566.59	2436.65	2169.95	-396.64	-266.70
Point A3	2-Year:	628.64	612.5	627.78	-0.86	15.28
	10-Year:	1,107.67	1092.23	1103.02	-4.65	10.79
	100-Year:	1,595.56	1574.71	1588.55	-7.01	13.84
Point A4	2-Year:	260.92	200.55	163.90	-97.02	-36.65
	10-Year:	539.49	471.95	325.28	-214.21	-146.67
	100-Year:	906.56	771.67	534.89	-371.67	-236.78
Point A6	2-Year:	37.98	16.57	54.75	16.77	38.18
	10-Year:	70.54	40.65	87.16	16.62	46.45
	100-Year:	113.19	63.3	128.41	15.22	65.11

Note: The sign-convention utilized for the information presented in the preceding table is based upon "Proposed Rate minus Existing (or ARR)." Positive values indicate an exceedance of the Existing (or ARR); negative values indicate that the peak rate is lower than the Existing (or ARR).

Table 5-3. Macro ARR Comparison

Location:	Return Event (Yr):	Existing Conditions Flow Rate	ARR (cfs):
Point A7			
	2-Year:	229.26	229.26
	10-Year:	397.23	397.23
	100-Year:	603.32	603.32
Point B1			
	2-Year:	615.14	615.14
	10-Year:	1,076.61	1076.61
	100-Year:	1,551.65	1551.65
Point D1			
	2-Year:	560.43	481.87
	10-Year:	941.67	874.92
	100-Year:	1351.30	1262.83
Point D2			
	2-Year:	485.06	427.99
	10-Year:	752.83	707.54
	100-Year:	1052.38	996.29
Point E1			
	2-Year:	65.98	29.51
	10-Year:	106.88	72.41
	100-Year:	143.00	103.59
Point F1			
	2-Year:	47.57	25.75
	10-Year:	74.89	55.17
	100-Year:	106.16	80.20
Point F2			
	2-Year:	31.56	7.75
	10-Year:	45.26	26.59
	100-Year:	65.86	39.78
Point G1			
	2-Year:	58.32	42.99
	10-Year:	102.21	83.33
	100-Year:	163.43	131.84
Point G2			
	2-Year:	23.29	5.94
	10-Year:	36.98	18.02
	100-Year:	62.01	27.70

Location:	Return Event (Yr):	Existing Conditions Flow Rate	ARR (cfs):
Point H1			
	2-Year:	119.54	36.41
	10-Year:	240.90	124.05
	100-Year:	406.43	190.18
Point I1			
	2-Year:	4.44	2.80
	10-Year:	7.87	5.64
	100-Year:	12.29	8.74

The above table establishes ARR rates for locations unaffected in the Phase 1 Fully-Developed conditions. Future developments within the areas will by analyzed by their respective macro studies.

A design waiver is being requested to remove 10.3 acres of stream buffer located within the project site to allow for construction of a permanent pool detention basin, entrance drive off of NE Douglas Road, and clubhouse/pool amenity space for the development. Upstream water quality treatment is being provided to treat pollutants closer to the point source within the development, enhanced landscaping is required around the detention basin to promote wildlife and pollutant removal, and offsite discharges will be routed through the pond to allow for settlement and collection of suspended solids and floatable debris.

6. CONCLUSION

This study has been prepared to provide an analysis of the impacts that the fully-developed conditions of project site areas tributary to Unity Lake #2, and provide prescriptive release rate requirements for future development areas within the Discovery Park development. Once fully developed, the area treated by the proposed detention basin and water quality systems include:

- Aria Apartments: a 22.50-ac apartment development (Zoned RP-4)
- Discovery Park Phase 1: a 39.42-ac commercial development (Zoned CP-2)
- Discovery Park Phase 2: a 19.82-ac commercial development (currently zoned AG and to be rezoned at a future time)

As shown in the tables presented in the sections above, it has been determined that with the proposed development and detention basin, the peak runoff rates for the study area are reduced from the pre-developed conditions at all points analyzed. Comprehensive Control requirements are also met at the outfall point in the 2, 10 and 100 year storm events.

The existing basin located at Point A5 provides a slight attenuation of peak flows and delays in timing for offsite points A7, A8, A9 and A10. With construction of the new basin, the existing basin will be removed and flows from Point A7 will be rerouted into the proposed basin by extending the existing box culvert under Douglas Street. A design waiver is being requested to remove 10.3 acres of stream buffer while providing water quality treatment via upstream water quality systems to promote pollutant removal.

The results of this study demonstrate the overall general compliance with the City of Lee's Summit design criteria and a waiver is being submitted for approval of a deviation from the design criteria. We therefore request approval of this stormwater management report.

7. CALCULATIONS AND MODEL RESULTS

Discovery Park Macro Stormwater Drainage Study
NRCS Curve Number Calculations
Existing Conditions
3/31/2023

Location ID:	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):	Weighted NRCS CN:
Subarea A1(e):	27.97				12.36	77
Subarea A1(w):	43.14					76
Subarea A2(e):	3.08					80
Subarea A2(w):	23.41					73
Subarea A3:	24.42	11.62				80
Subarea A4(e):	9.85	5.99	3.35			81
Subarea A4(w):	17.41		9.19			73
Subarea A5(e):	15.16	4.88	8.00			80
Subarea A5(w):	19.77		18.66			76
Subarea A6:	13.45			9.21		83
Subarea A7:	30.60					76
Subarea A8:	21.56					81
Subarea A9:	31.84					84
Subarea A10:	12.23					94
Subtotal:	*293.88*	*22.50*	*39.20*	*9.21*	*12.36*	
Subarea B1:	31.94					79
Subarea B2:	48.54					78
Subarea B3:	40.69					83
Subarea B4-DET:	25.05					94
Subarea B4-BYP:	7.42					94
Subtotal:	*153.64*					
Subarea C1:	45.21					90
Subarea C2:	57.13					81
Subarea C3:	52.36					83
Subtotal:	154.70					
Subarea D1:	36.91		0.22			77
Subarea D2:	47.00			10.62	24.74	79
Subarea D3:	16.84					88
Subarea D4:	112.38					88
Subarea D5:	53.24					89
Subtotal:	*266.37*		*0.22*	*10.62*	*24.74*	
Subarea E1:	22.59				20.68	80
Subarea E2:	6.56					73
Subtotal:	*29.15*				*20.68*	
Subarea F1:	7.85					77
Subarea F2:	12.76				12.06	81
Subtotal:	*20.60*				*12.06*	
Subarea G1:	14.04					81
Subarea G2:	7.93				7.11	85
Subtotal:	*21.96*				*7.11*	
Subarea H1:	56.17				51.06	78
Subtotal:	*56.17*				*51.06*	
Subarea I1:	1.40				0.61	86
Subtotal:	*1.40*				*0.61*	

Sub-W'Shed Subtotal:					
Sub-W'Shed A Subtotal:	293.88	22.50	39.20	9.21	12.36
Sub-W'Shed B Subtotal:	153.64				
Sub-W'Shed C Subtotal:	154.70				
Sub-W'Shed D Subtotal:	266.37		0.22	10.62	24.74
Sub-W'Shed E Subtotal:	29.15				20.68
Sub-W'Shed F Subtotal:	20.60				12.06
Sub-W'Shed G Subtotal:	21.96				7.11
Sub-W'Shed H Subtotal:	56.17				51.06
Sub-W'Shed I Subtotal:	1.40				0.61
Modeled Total:	997.89	22.50	39.42	19.83	128.62

Land Use:	Water/ Impervious	Commercial		R/W		Multi-Family Residential		2-ACRE Single-Family Residential		1/2 ACRE Single-Family Residential		Row Crops SR (Good)		Row Crops C & T (Good)		Pasture (Fair)		Pasture (Good)		Woods-Grass Combination (Fair)		Woods-Grass Combination (Good)		Meadow (Good)		Open Space (Fair)		Open Space (Good)		Woods (Fair)		Woods (Good)		Weighted CN:
HSG:		Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	Type C	Type D	
CN:	**98**	**94**	**95**	**92**	**93**	**88**	**91**	**77**	**82**	**80**	**85**	**85**	**89**	**80**	**82**	**79**	**84**	**74**	**80**	**76**	**82**	**72**	**79**	**71**	**78**	**79**	**84**	**74**	**80**	**73**	**79**	**70**	**77**	
Subarea A1(e):	0.27			0.61				2.12										8.98	6.67													2.83	6.49	76.58
Subarea A1(w):	0.49													6.69	1.93			8.39	1.58											6.09	0.67	4.94	12.36	76.11
Subarea A2(e):				0.14														0.34	2.60															79.92
Subarea A2(w):														4.39															1.55	0.79		15.98	0.70	72.85
Subarea A3:	0.26			2.98	1.25			1.45	0.42			0.93						10.08	4.84												2.22			79.79
Subarea A4(e):	0.07											4.58	0.30					0.05	0.12											1.46	3.28			81.37
Subarea A4(w):														1.34		3.25														4.32		8.51		73.19
Subarea A5(e):				1.81	0.46							1.54		1.14	0.26	5.12	0.12													4.64	0.07			79.92
Subarea A5(w):				1.08	0.03									4.61	0.13	1.65	0.06													11.93	0.29			76.38
Subarea A6:	0.09			2.20	1.26			0.09	1.49							4.75			3.36							0.21								83.21
Subarea A7:				1.90	0.63					2.50																		25.57						76.00
Subarea A8:				2.25	3.11																							8.00	8.20					80.91
Subarea A9:		11.46	2.18	1.39	0.22																							16.59						83.56
Subarea A10:		4.05	5.86	1.04	1.28																													94.19
Subtotal:																																		
Subarea B1:				1.50	0.46			20.14	1.46	7.19	1.19																							79.13
Subarea B2:				11.26																								37.28						78.17
Subarea B3:		8.29	0.97			13.51																						17.92						83.23
Subarea B4-DET:		14.71	9.25	0.40	0.69																													94.31
Subarea B4-BYP:		4.33	2.76	0.12	0.21																													94.31
Subtotal:																																		
Subarea C1:		15.20		22.85																								7.16						89.82
Subarea C2:				21.60																								35.53						80.81
Subarea C3:	17.56	1.77				1.29																						31.74						83.06
Subtotal:																																		
Subarea D1:	2.92	1.29		1.06	1.00													0.22				8.01					1.02	7.93				7.12	6.33	77.21
Subarea D2:	3.33			0.85	0.40				0.37			4.03	0.10			12.32			2.70							3.08	3.44					11.17	5.21	79.32
Subarea D3:	7.42																									6.84	2.58							88.14
Subarea D4:	2.60	34.36	33.19	5.12	3.90					0.49	1.13															4.38	2.40	4.42	0.71	6.12	0.11	13.42		88.41
Subarea D5:	1.09	9.83	19.60	1.06	3.38						0.10											1.35	0.52				0.88	4.14	8.32				2.96	88.77
Subtotal:																																		
Subarea E1:	0.32			0.22	0.32							8.55	0.62													0.71						4.77	7.09	79.61
Subarea E2:	0.52																							0.12		0.65						5.26		73.14
Subtotal:																																		
Subarea F1:				0.42	0.16							1.00																				2.06	4.20	77.32
Subarea F2:				0.68	0.02							8.24																				3.82		80.89
Subtotal:																																		
Subarea G1:				0.29	0.41							3.44	1.57																			1.16	7.16	80.51
Subarea G2:				0.39	0.43							6.27	0.16																			0.32	0.37	84.87
Subtotal:																																		
Subarea H1:	1.16							0.09	1.61			14.30						1.21	6.08	1.74	1.40					0.99						14.87	12.71	78.15
Subtotal:																																		
Subarea I1:				0.45	0.33			0.09	0.15			0.07						0.24	0.01													0.05		85.86
Subtotal:																																		

Discovery Park Macro Stormwater Drainage Study
NRCS Curve Number Calculations
Fully Developed Conditions
3/31/2023

Location ID:	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):	Weighted NRCS CN:
Subarea A1(e):	30.57				*14.96*	85
Subarea A1(w):	*43.14*					*76*
Subarea A2(e):	*3.08*					*80*
Subarea A2(w):	*23.41*					*73*
Subarea A3:	24.06	11.07			11.07	87
Subarea A4(e):	1.48	0.14	0.84		0.98	89
Subarea A4(w):	8.75		0.59		0.59	72
Subarea A5(e):	19.12	11.29	6.92		18.20	92
Subarea A5(w):	33.42		31.08		31.08	95
Subarea A6:	13.42			9.88	9.88	94
Subarea A7:	*30.60*					*76*
Subarea A8:	*21.56*					*81*
Subarea A9:	*31.84*					*84*
Subarea A10:	*12.23*					*94*
Subtotal:	*296.68*	*22.50*	*39.42*	*9.88*	*86.76*	
Subarea B1:	*31.94*					*79*
Subarea B2:	*48.54*					*78*
Subarea B3:	*40.69*					*83*
Subarea B4-DET:	*25.05*					*94*
Subarea B4-BYP:	*7.42*					*94*
Subtotal:	*153.64*					
Subarea C1:	*45.21*					*90*
Subarea C2:	*57.13*					*81*
Subarea C3:	*52.36*					*83*
Subtotal:	154.70					

Sub-W'Shed A Subtotal:	296.68	22.50	39.42	9.88	86.76
Sub-W'Shed B Subtotal:	*153.64*	*0.00*	*0.00*	*0.00*	*0.00*
Sub-W'Shed C Subtotal:	*154.70*	*0.00*	*0.00*	*0.00*	*0.00*
Modeled Total:	605.02	22.50	39.42	9.88	86.76

										2-ACRE		1/2 ACRE														
Land Use:	**Water/ Impervious**	**Commercial**		**R/W**		**Multi-Family Residential**		**Single-Family Residential**		**Single-Family Residential**		**Row Crops C & T (Good)**		**Meadow (Good)**		**Pasture (Good)**		**Woods-Grass Combination (Fair)**		**Open Space (Good)**		**Woods (Fair)**		**Woods (Good)**		
HSG:		**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Weighted CN:**
CN:	**98**	**94**	**95**	**92**	**93**	**88**	**91**	**77**	**82**	**80**	**85**	**80**	**82**	**71**	**78**	**74**	**80**	**76**	**82**	**74**	**80**	**73**	**79**	**70**	**77**	
	0.27			*0.61*			14.96	*0.00*								*1.37*	*6.15*							*1.32*	*5.89*	84.50
	0.49											*6.69*	*1.93*			*8.39*	*1.58*					*6.09*	*0.67*	*4.94*	*12.36*	*76.12*
				0.14												*0.34*	*2.60*									*79.88*
												4.39									*1.55*	*0.79*		*15.98*	*0.70*	*72.85*
	0.26			3.17	1.25		11.07	1.45	0.42							0.50	3.85								2.10	86.98
	0.07		0.84				0.14																		0.42	89.35
			0.59																					8.16		71.67
			6.92	0.92			11.29																			92.49
			31.08	1.78	0.49																			0.06		94.76
			9.39	2.25	1.29												0.49									93.76
				1.90	*0.63*					*2.50*										*25.57*						*76.00*
				2.25	*3.11*															*8.00*	*8.20*					*80.90*
		11.46	*2.18*	*1.39*	*0.22*															*16.59*						*83.55*
		4.05	*5.86*	*1.04*	*1.28*																					*94.20*
				1.50	*0.46*			*20.14*	*1.46*	*7.19*	*1.19*															*79.14*
				11.26																*37.28*						*78.18*
		8.29	*0.97*			*13.51*														*17.92*						*83.22*
		14.71	*9.25*	*0.40*	*0.69*																					*94.31*
		4.33	*2.76*	*0.12*	*0.21*																					*94.31*
		15.20		*22.85*																*7.16*						*89.82*
				21.60																*35.53*						*80.81*
	17.56	*1.77*				*1.29*														*31.74*						*83.07*

Discovery Park Macro Stormwater Drainage Study
NRCS Curve Number Calculations
Proposed Conditions
3/31/2023

Location ID:	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Phase 1 Onsite Area (ac):	Discovery Park Phase 2 Onsite Area (ac):	Macro-Study Onsite Area (ac):	Weighted NRCS CN:
Subarea A1(e):	*27.97*				*12.36*	*77*
Subarea A1(w):	*43.14*					*76*
Subarea A2(e):	*3.08*					*80*
Subarea A2(w):	*23.41*					*73*
Subarea A3:	24.06	11.07			11.07	82
Subarea A4(e):	1.48	0.14	0.84		0.98	88
Subarea A4(w):	8.75		0.59		0.59	72
Subarea A5(e):	19.12	11.29	6.92		18.20	86
Subarea A5(w):	33.42		31.08		31.08	95
Subarea A6:	13.42			9.88	9.88	83
Subarea A7:	*30.60*					*76*
Subarea A8:	*21.56*					*81*
Subarea A9:	*31.84*					*84*
Subarea A10:	*12.23*					*94*
Subtotal:	*294.08*	*22.50*	*39.42*	*9.88*	*84.15*	
Subarea B1:	*31.94*					*79*
Subarea B2:	*48.54*					*78*
Subarea B3:	*40.69*					*83*
Subarea B4-DET:	*25.05*					*94*
Subarea B4-BYP:	*7.42*					*94*
Subtotal:	*153.64*					
Subarea C1:	*45.21*					*90*
Subarea C2:	*57.13*					*81*
Subarea C3:	*52.36*					*83*
Subtotal:	154.70					

Sub-W'Shed A Subtotal:	294.08	22.50	39.42	9.88	84.15	
Sub-W'Shed B Subtotal:	*153.64*	*0.00*	*0.00*	*0.00*	*0.00*	
Sub-W'Shed C Subtotal:	*154.70*	*0.00*	*0.00*	*0.00*	*0.00*	
Modeled Total:	602.42	22.50	39.42	9.88	84.15	

										2-ACRE		1/2 ACRE															
Land Use:	**Water/ Impervious**	**Commercial**		**R/W**		**Multi-Family Residential**		**Single-Family Residential**		**Single-Family Residential**		**Row Crops C & T (Good)**		**Meadow (Good)**		**Pasture (Good)**		**Woods-Grass Combination (Fair)**		**Open Space (Good)**		**Woods (Fair)**		**Woods (Good)**		
HSG:		**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	**Type C**	**Type D**	
CN:	**98**	**94**	**95**	**92**	**93**	**88**	**91**	**77**	**82**	**80**	**85**	**80**	**82**	**71**	**78**	**74**	**80**	**76**	**82**	**74**	**80**	**73**	**79**	**70**	**77**	**Weighted CN:**
	0.27			*0.61*				*2.12*								*8.98*	*6.67*							*2.83*	*6.49*	*76.58*
	0.49											*6.69*	*1.93*			*8.39*	*1.58*					*6.09*	*0.67*	*4.94*	*12.36*	*76.12*
				0.14												*0.34*	*2.60*									*79.88*
												4.39									*1.55*	*0.79*		*15.98*	*0.70*	*72.85*
	0.26			3.16	1.25			1.45	0.42							0.50	3.85				11.07				2.10	81.91
	0.07		0.84																		0.14				0.42	88.28
			0.59																					8.16		71.67
			6.92	0.92																	11.29					86.00
			31.08	1.78	0.49																			0.06		94.76
				2.25	1.29												0.49				9.39					83.26
				1.90	*0.63*					*2.50*										*25.57*						*76.00*
				2.25	*3.11*															*8.00*	*8.20*					*80.90*
		11.46	*2.18*	*1.39*	*0.22*															*16.59*						*83.55*
		4.05	*5.86*	*1.04*	*1.28*																					*94.20*
				1.50	*0.46*			*20.14*	*1.46*	*7.19*	*1.19*															*79.14*
				11.26																*37.28*						*78.18*
		8.29	*0.97*			*13.51*														*17.92*						*83.22*
		14.71	*9.25*	*0.40*	*0.69*																					*94.31*
		4.33	*2.76*	*0.12*	*0.21*																					*94.31*
		15.20		*22.85*																*7.16*						*89.82*
				21.60																*35.53*						*80.81*
	17.56	*1.77*				*1.29*														*31.74*						*83.07*

Discovery Park Macro Stormwater Drainage Study
Allowable Release Rate (ARR) Calculations
12/12/2022

Total Area (ac):	Total Trib. Area (ac):	Aria Onsite Area (ac):	Discovery Park Onsite Area (ac):	Macro Onsite Area (ac):
Point A7:	96.23	0.00	0.00	0.00
Point A5:	144.60	4.88	26.66	31.54
Point A4:	171.86	10.74	38.03	48.77
Point B1:	308.34	0.00	0.00	0.00
Point A3:	332.76	11.62	0.00	11.62
Point A2:	531.11	22.36	38.03	60.39
Point A1:	602.22	22.36	38.03	72.75

Storm Event:	Onsite ARR (cfs/ac)
2-Yr:	0.5
10-Yr:	2
100-Yr:	3

Project Site:	Onsite ARR (cfs/ac)
Aria (ac):	22.36
Discovery Park (ac):	38.03
North-MFR (ac):	12.36

Existing Conditions Release Rate Calculations:

	Return Event (yr):	Peak Flow Rate (cfs):	Total Area (ac):	Existing Conditions Release Rate (cfs/ac):	Aria: Onsite Area (ac):	Discovery Park: Onsite Area (ac):	Macro - Model: Onsite Area (ac):	Aria: Allowable Bypass (ac):	Discovery Park: Allowable Bypass (ac):	Macro - Model: Allowable Bypass (ac):	Aria: Allowable Onsite Discharge (cfs):	Discovery Park: Allowable Onsite Discharge (cfs):	Macro - Model: Allowable Onsite Discharge (cfs):	Aria: Proposed Conditions ARR (cfs):	Discovery Park: Proposed Conditions ARR (cfs):	Macro - Model: Proposed Conditions ARR (cfs):	Aria: Difference in Flow Rate (cfs)	Discovery Park: Difference in Flow Rate (cfs)	Macro - Model: Difference in Flow Rate (cfs)
																			Point A1
Point A1			602.22																
	2	951.44	602.22	1.58	22.36	38.03	72.75	916.11	891.36	836.50	11.18	19.02	36.38	927.29	910.37	872.88	-24.15	-41.07	-78.56
	10	1,788.62	602.22	2.97				1722.21	1675.67	1572.55	44.72	76.06	145.50	1766.93	1751.73	1718.05	-21.69	-36.89	-70.57
	100	2,759.72	602.22	4.58				2657.25	2585.44	2426.34	67.08	114.09	218.25	2724.33	2699.53	2644.59	-35.39	-60.19	-115.13
Point A2			531.11																
	2	911.64	531.11	1.72	22.36	38.03	60.39	873.26	846.36	807.98	11.18	19.02	30.20	884.44	865.38	838.18	-27.20	-46.26	-73.46
	10	1,696.92	531.11	3.20				1625.48	1575.41	1503.97	44.72	76.06	120.78	1670.20	1651.47	1624.75	-26.72	-45.45	-72.17
	100	2,574.53	531.11	4.85				2466.14	2390.18	2281.79	67.08	114.09	181.17	2533.22	2504.27	2462.96	-41.31	-70.26	-111.57
Point A3			332.87																
	2	630.29	332.87	1.89	11.62	0.00	11.62	608.29	630.29	608.29	5.81	0.00	5.81	614.10	630.29	614.10	-16.19	0.00	-16.19
	10	1,110.67	332.87	3.34				1071.90	1110.67	1071.90	23.24	0.00	23.24	1095.14	1110.67	1095.14	-15.53	0.00	-15.53
	100	1,599.37	332.87	4.80				1543.54	1599.37	1543.54	34.86	0.00	34.86	1578.40	1599.37	1578.40	-20.97	0.00	-20.97
Point A4			171.75																
	2	262.24	171.75	1.53	10.74	38.03	48.77	245.84	204.17	187.77	5.37	19.02	24.39	251.21	223.19	212.16	-11.03	-39.05	-50.08
	10	541.08	171.75	3.15				507.24	421.27	387.44	21.48	76.06	97.54	528.72	497.33	484.98	-12.36	-43.75	-56.10
	100	907.47	171.75	5.28				850.72	706.53	649.79	32.22	114.09	146.31	882.94	820.62	796.10	-24.53	-86.85	-111.37
Point A5			144.6																
	2	244.35	144.6	1.69	4.88	26.66	31.54	236.10	199.30	191.05	2.44	13.33	15.77	238.54	212.63	206.82	-5.81	-31.72	-37.53
	10	493.17	144.6	3.41				476.53	402.24	385.60	9.76	53.32	63.08	486.29	455.56	448.68	-6.88	-37.61	-44.49
	100	804.09	144.6	5.56				776.95	655.84	628.70	14.64	79.98	94.62	791.59	735.82	723.32	-12.50	-68.27	-80.77
Point A7			96.23																
	2	229.26	96.23	2.38	0.00	0.00	0.00	229.26	229.26	229.26	0.00	0.00	0.00	229.26	229.26	229.26	0.00	0.00	0.00
	10	397.23	96.23	4.13				397.23	397.23	397.23	0.00	0.00	0.00	397.23	397.23	397.23	0.00	0.00	0.00
	100	603.32	96.23	6.27				603.32	603.32	603.32	0.00	0.00	0.00	603.32	603.32	603.32	0.00	0.00	0.00
Point B1			308.34																
	2	615.14	308.34	2.00	0.00	0.00	0.00	615.14	615.14	615.14	0.00	0.00	0.00	615.14	615.14	615.14	0.00	0.00	0.00
	10	1,076.61	308.34	3.49				1076.61	1076.61	1076.61	0.00	0.00	0.00	1076.61	1076.61	1076.61	0.00	0.00	0.00
	100	1,551.65	308.34	5.03				1551.65	1551.65	1551.65	0.00	0.00	0.00	1551.65	1551.65	1551.65	0.00	0.00	0.00

Discovery Park Macro Stormwater Drainage Study
Time of Concentration (Tc) and Travel Time (TT)
Macro Study - Fully Developed Conditions
3/31/2023

Subarea:	A1(e)	A1(w)	A2(e)	A2(w)	A3	A4(e)	A4(w)	A5(e)	A5(w)	A6	A7	A8	A9	A10	B1	B2	B3	B4(DT)	B4(BP)	C1	C2	C3
Sheet Flow:																						
Manning's "n":	0.050	0.060	0.060	0.060	0.013	0.013	0.060	0.013	0.013	0.060	0.060	0.050	0.050	0.050	0.060	0.060	0.050	0.013	0.013	0.013	0.013	0.013
Flow Length, L (ft):	93	100	100	90	74	100	100	45	68	100	100	100	100	100	100	100	100	149	100	140	110	125
Two-Year Rainfall, P2 (in):	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Land Slope, S (ft/ft):	0.0428	0.0116	0.0374	0.0079	0.0200	0.1737	0.0365	0.0200	0.0256	0.0374	0.0285	0.0184	0.0219	0.0635	0.0235	0.0157	0.0176	0.0404	0.0396	0.0070	0.0040	0.0110
(0.007(nL)^0.8) / (P2^0.5*S^0.4)	**0.0451**	**0.0933**	**0.0584**	**0.1000**	**0.0173**	**0.0093**	**0.0590**	**0.0117**	**0.0147**	**0.0584**	**0.0651**	**0.0670**	**0.0625**	**0.0408**	**0.0703**	**0.0826**	**0.0682**	**0.0229**	**0.0168**	**0.0440**	**0.0453**	**0.0335**
Shallow Concentrated Flow:																						
Surface Description	PAVED	UNPAVED	UNPAVED	UNPAVED	PAVED	UNPAVED	UNPAVED	PAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED	PAVED	UNPAVED	UNPAVED	UNPAVED	PAVED	PAVED	UNPAVED	UNPAVED	PAVED
Flow Length, L (ft)	360	1306	340	1246	0	174	300	0	123	150	873	605	467	1075	508	907	425	972	656	1020	1294	544
Watercourse Slope, S (ft/ft)	0.0375	0.0643	0.0941	0.0626	0.0200	0.1073	0.0779	0.0200	0.1185	0.0765	0.0504	0.0496	0.0600	0.0167	0.0590	0.0640	0.0800	0.0206	0.0210	0.0098	0.0077	0.0220
Average Velocity, V (ft/s)	3.94	4.09	4.95	4.04	2.87	5.29	4.50	2.87	5.55	4.46	3.62	3.59	3.95	2.63	3.92	4.08	4.56	2.92	2.95	1.60	1.42	3.02
L/(3600*V)	**0.0254**	**0.0887**	**0.0191**	**0.0857**	**0.0000**	**0.0091**	**0.0185**	**0.0000**	**0.0062**	**0.0093**	**0.0669**	**0.0468**	**0.0328**	**0.1137**	**0.0360**	**0.0617**	**0.0259**	**0.0925**	**0.0619**	**0.1774**	**0.2539**	**0.0501**
Channel Flow:																						
Flow Length, L (ft)	1754	1742	252	695	1955	0	1151	1795	1579	592	695	579	1175	0	1158	1368	1275	0	0	1630	1138	1307
Channel Slope, S (ft/ft)	0.0137	0.0138	0.0079	0.0173	0.0339	0.0200	0.0494	0.0313	0.0292	0.0263	0.0167	0.0242	0.0136		0.0294	0.0124	0.0141			0.0061	0.0299	0.0214
Velocity (ft/s)[1]	7.00	7.00	7.00	7.00	10.00	10.00	10.00	10.00	10.00	10.00	7.00	10.00	7.00	7.00	10.00	7.00	7.00	7.00	7.00	7.00	10.00	10.00
T3 (hr):	**0.0696**	**0.0691**	**0.0100**	**0.0276**	**0.0543**	**0.0000**	**0.0320**	**0.0499**	**0.0439**	**0.0164**	**0.0276**	**0.0161**	**0.0466**	**0.0000**	**0.0322**	**0.0543**	**0.0506**	**0.0000**	**0.0000**	**0.0647**	**0.0316**	**0.0363**
[2] T_c =T1 + T2 + T3:	**0.1401**	**0.2511**	**0.0875**	**0.2133**	**0.0717**	**0.0184**	**0.1095**	**0.0615**	**0.0647**	**0.0842**	**0.1596**	**0.1299**	**0.1420**	**0.1545**	**0.1385**	**0.1987**	**0.1447**	**0.1155**	**0.0787**	**0.2860**	**0.3308**	**0.1199**

[1] ***Note: Where indicated, Channel Flow is approximated by Length & Velocity per APWA 5602.7 B.***

[2] ***Note: Time of concentration shall not be below 6 min (0.1000 hrs) per APWA 5602.7 A.***

Travel Time:	A2~A1	A3~A2	A4~A2	A5~A4	A6~A5	A7~A5	A8~A7	A9~A7	A10~A9	B1~A3	B2~B1	C1~B1	B3~B2	B4~B3	C2~C1	C3~C2
Reach Length, L (ft)	2081	485	726	732	470	1038	858	983	1603	835	409	530	2076	1480	1766	534
Channel Slope, S (ft/ft)	0.0125	0.0124	0.0165	0.0328	0.0256	0.0077	0.0163	0.0142	0.0187	0.0145	0.0147	0.0151	0.0106	0.0166	0.0102	0.0389
Velocity (ft/s)[1]	7.00	7.00	7.00	10.00	10.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	10.00
T3 (hr)	**0.0826**	**0.0192**	**0.0288**	**0.0203**	**0.0131**	**0.0412**	**0.0340**	**0.0390**	**0.0636**	**0.0331**	**0.0162**	**0.0210**	**0.0824**	**0.0587**	**0.0701**	**0.0148**

[1] ***Note: Where indicated, Channel Flow is approximated by Length & Velocity per APWA 5602.7 B and Mannings Eq.***

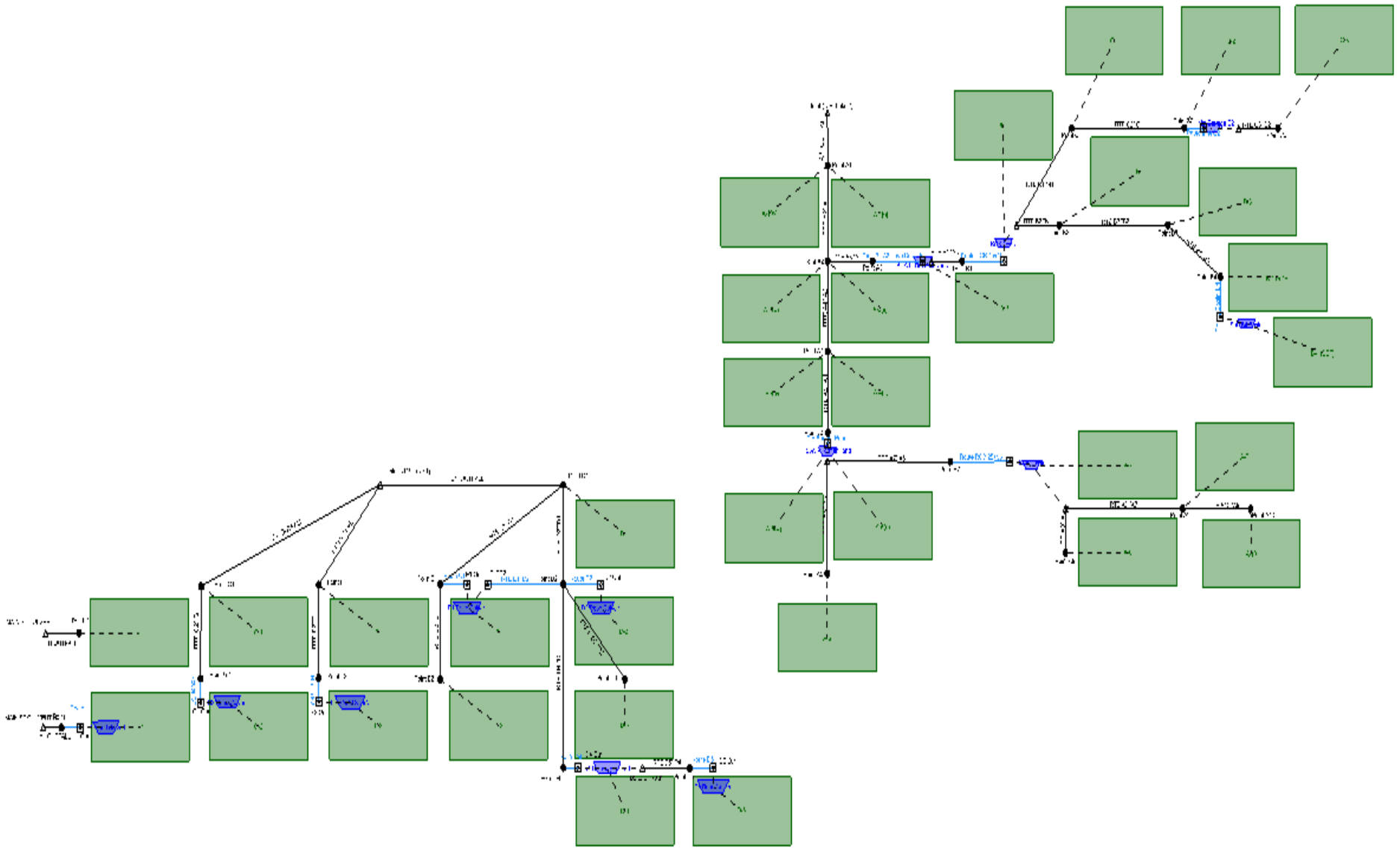
Discovery Park Macro Stormwater Drainage Study
Time of Concentration (Tc) and Travel Time (TT)
Macro Study - Proposed Conditions
3/31/2023

Subarea:	A1(e)	A1(w)	A2(e)	A2(w)	A3	A4(e)	A4(w)	A5(e)	A5(w)	A6	A7	A8	A9	A10	B1	B2	B3	B4(DT)	B4(BP)	C1	C2	C3
Sheet Flow:																						
Manning's "n":	0.050	0.060	0.060	0.060	0.013	0.013	0.060	0.030	0.013	0.060	0.060	0.050	0.050	0.050	0.060	0.060	0.050	0.013	0.013	0.013	0.013	0.013
Flow Length, L (ft):	93	100	100	90	74	100	100	100	68	100	100	100	100	100	100	100	100	149	100	140	110	125
Two-Year Rainfall, P2 (in):	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Land Slope, S (ft/ft):	0.0428	0.0116	0.0374	0.0079	0.0200	0.1737	0.0365	0.0483	0.0256	0.0374	0.0285	0.0184	0.0219	0.0635	0.0235	0.0157	0.0176	0.0404	0.0396	0.0070	0.0040	0.0110
(0.007(nL)^0.8) / (P2^0.5*S^0.4)	**0.0451**	**0.0933**	**0.0584**	**0.1000**	**0.0173**	**0.0093**	**0.0590**	**0.0303**	**0.0147**	**0.0584**	**0.0651**	**0.0670**	**0.0625**	**0.0408**	**0.0703**	**0.0826**	**0.0682**	**0.0229**	**0.0168**	**0.0440**	**0.0453**	**0.0335**
Shallow Concentrated Flow:																						
Surface Description	UNPAVED	UNPAVED	UNPAVED	UNPAVED	PAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED	UNPAVED	PAVED	UNPAVED	UNPAVED	UNPAVED	PAVED	PAVED	UNPAVED	UNPAVED	PAVED
Flow Length, L (ft)	868	1306	340	1246	0	174	300	421	123	150	873	605	467	1075	508	907	425	972	656	1020	1294	544
Watercourse Slope, S (ft/ft)	0.0645	0.0643	0.0941	0.0626	0.0200	0.1073	0.0779	0.0412	0.1185	0.0765	0.0504	0.0496	0.0600	0.0167	0.0590	0.0640	0.0800	0.0206	0.0210	0.0098	0.0077	0.0220
Average Velocity, V (ft/s)	4.10	4.09	4.95	4.04	2.87	5.29	4.50	3.27	5.55	4.46	3.62	3.59	3.95	2.63	3.92	4.08	4.56	2.92	2.95	1.60	1.42	3.02
L/(3600*V)	**0.0588**	**0.0887**	**0.0191**	**0.0857**	**0.0000**	**0.0091**	**0.0185**	**0.0357**	**0.0062**	**0.0093**	**0.0669**	**0.0468**	**0.0328**	**0.1137**	**0.0360**	**0.0617**	**0.0259**	**0.0925**	**0.0619**	**0.1774**	**0.2539**	**0.0501**
Channel Flow:																						
Flow Length, L (ft)	1754	1742	252	695	1945	0	1151	588	1579	592	695	579	1175	0	1158	1368	1275	0	0	1630	1138	1307
Channel Slope, S (ft/ft)	0.0137	0.0138	0.0079	0.0173	0.0341	0.0200	0.0494	0.0578	0.0292	0.0263	0.0167	0.0242	0.0136		0.0294	0.0124	0.0141			0.0061	0.0299	0.0214
Velocity (ft/s)[2]	7.00	7.00	7.00	7.00	10.00	10.00	10.00	15.00	10.00	10.00	7.00	10.00	7.00	7.00	10.00	7.00	7.00	7.00	7.00	7.00	10.00	10.00
T3 (hr):	**0.0696**	**0.0691**	**0.0100**	**0.0276**	**0.0540**	**0.0000**	**0.0320**	**0.0109**	**0.0439**	**0.0164**	**0.0276**	**0.0161**	**0.0466**	**0.0000**	**0.0322**	**0.0543**	**0.0506**	**0.0000**	**0.0000**	**0.0647**	**0.0316**	**0.0363**
[2] T_c =T1 + T2 + T3:	**0.1736**	**0.2511**	**0.0875**	**0.2133**	**0.0714**	**0.0184**	**0.1095**	**0.0769**	**0.0647**	**0.0842**	**0.1596**	**0.1299**	**0.1420**	**0.1545**	**0.1385**	**0.1987**	**0.1447**	**0.1155**	**0.0787**	**0.2860**	**0.3308**	**0.1199**

[1] Note: Where indicated, Channel Flow is approximated by Length & Velocity per APWA 5602.7 B.
[2] Note: Time of concentration shall not be below 6 min (0.1000 hrs) per APWA 5602.7 A.

Travel Time:	A2~A1	A3~A2	A4~A2	A5~A4	A6~A5	A7~A5	A8~A7	A9~A7	A10~A9	B1~A3	B2~B1	C1~B1	B3~B2	B4~B3	C2~C1	C3~C2
Reach Length, L (ft)	2081	485	726	732	470	1038	858	983	1603	835	409	530	2076	1480	1766	534
Channel Slope, S (ft/ft)	0.0125	0.0124	0.0165	0.0328	0.0256	0.0077	0.0163	0.0142	0.0187	0.0145	0.0147	0.0151	0.0106	0.0166	0.0102	0.0389
Velocity (ft/s)[1]	7.00	7.00	7.00	10.00	10.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	10.00
T3 (hr)	**0.0826**	**0.0192**	**0.0288**	**0.0203**	**0.0131**	**0.0412**	**0.0340**	**0.0390**	**0.0636**	**0.0331**	**0.0162**	**0.0210**	**0.0824**	**0.0587**	**0.0701**	**0.0148**

[1] Note: Where indicated, Channel Flow is approximated by Length & Velocity per APWA 5602.7 B and Mannings Eq.



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Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
A-1(e)	2-Yr (TP-40)	2	3.334	12.0100	53.91
A-1(e)	10-Yr (TP-40)	10	6.783	11.9900	110.32
A-1(e)	100-Yr (TP-40)	100	11.675	11.9900	187.82
A-1(w)	2-Yr (TP-40)	2	4.908	12.0500	70.15
A-1(w)	10-Yr (TP-40)	10	10.132	12.0500	146.86
A-1(w)	100-Yr (TP-40)	100	17.597	12.0500	252.55
A-2(e)	2-Yr (TP-40)	2	0.420	11.9400	7.64
A-2(e)	10-Yr (TP-40)	10	0.819	11.9300	14.90
A-2(e)	100-Yr (TP-40)	100	1.374	11.9300	24.63
A-2(w)	2-Yr (TP-40)	2	2.301	12.0300	34.59
A-2(w)	10-Yr (TP-40)	10	4.975	12.0300	76.77
A-2(w)	100-Yr (TP-40)	100	8.884	12.0300	136.28
A-3	2-Yr (TP-40)	2	3.330	11.9600	57.61
A-3	10-Yr (TP-40)	10	6.495	11.9500	112.58
A-3	100-Yr (TP-40)	100	10.895	11.9500	186.13
A-4(e)	2-Yr (TP-40)	2	1.402	11.9600	23.97
A-4(e)	10-Yr (TP-40)	10	2.698	11.9600	45.97
A-4(e)	100-Yr (TP-40)	100	4.488	11.9600	75.15
A-4(w)	2-Yr (TP-40)	2	1.712	12.0100	27.56
A-4(w)	10-Yr (TP-40)	10	3.700	11.9900	60.85
A-4(w)	100-Yr (TP-40)	100	6.607	11.9900	108.22
A-5(e)	2-Yr (TP-40)	2	2.067	11.9500	36.40
A-5(e)	10-Yr (TP-40)	10	4.031	11.9500	70.90
A-5(e)	100-Yr (TP-40)	100	6.762	11.9500	116.98
A-5(w)	2-Yr (TP-40)	2	2.249	12.0000	37.02
A-5(w)	10-Yr (TP-40)	10	4.643	11.9900	77.10
A-5(w)	100-Yr (TP-40)	100	8.064	11.9700	132.61
A-6	2-Yr (TP-40)	2	2.083	11.9300	37.98
A-6	10-Yr (TP-40)	10	3.904	11.9300	70.54
A-6	100-Yr (TP-40)	100	6.389	11.9300	113.19
A-7	2-Yr (TP-40)	2	3.482	12.0000	57.26
A-7	10-Yr (TP-40)	10	7.186	11.9800	119.03
A-7	100-Yr (TP-40)	100	12.481	11.9800	204.90
A-8	2-Yr (TP-40)	2	3.070	11.9600	53.05
A-8	10-Yr (TP-40)	10	5.907	11.9500	101.89
A-8	100-Yr (TP-40)	100	9.826	11.9500	166.82
A-9	2-Yr (TP-40)	2	5.138	11.9700	87.15
A-9	10-Yr (TP-40)	10	9.507	11.9600	158.95
A-9	100-Yr (TP-40)	100	15.435	11.9600	252.78
A-10	2-Yr (TP-40)	2	2.890	11.9700	45.61
A-10	10-Yr (TP-40)	10	4.733	11.9700	72.57
A-10	100-Yr (TP-40)	100	7.128	11.9700	106.86
B-1	2-Yr (TP-40)	2	4.168	11.9700	70.94
B-1	10-Yr (TP-40)	10	8.242	11.9600	140.29
B-1	100-Yr (TP-40)	100	13.944	11.9500	234.20
B-2	2-Yr (TP-40)	2	6.057	12.0300	94.72
B-2	10-Yr (TP-40)	10	12.146	12.0100	190.16

Macro Existing Conditions

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
B-2	100-Yr (TP-40)	100	20.725	12.0000	320.74
B-3	2-Yr (TP-40)	2	6.302	11.9700	106.50
B-3	10-Yr (TP-40)	10	11.812	11.9600	197.62
B-3	100-Yr (TP-40)	100	19.332	11.9600	317.37
B-4 (BYP)	2-Yr (TP-40)	2	1.753	11.9300	30.29
B-4 (BYP)	10-Yr (TP-40)	10	2.871	11.9200	48.22
B-4 (BYP)	100-Yr (TP-40)	100	4.324	11.9200	71.04
C-1	2-Yr (TP-40)	2	9.223	12.0500	124.83
C-1	10-Yr (TP-40)	10	15.842	12.0500	209.38
C-1	100-Yr (TP-40)	100	24.565	12.0500	317.10
C-2	2-Yr (TP-40)	2	8.134	12.0900	104.44
C-2	10-Yr (TP-40)	10	15.652	12.0800	200.90
C-2	100-Yr (TP-40)	100	26.038	12.0800	329.78
C-3	2-Yr (TP-40)	2	8.110	11.9500	142.61
C-3	10-Yr (TP-40)	10	15.199	11.9400	264.83
C-3	100-Yr (TP-40)	100	24.875	11.9400	425.51
B-4 (DET)	2-Yr (TP-40)	2	5.919	11.9400	99.43
B-4 (DET)	10-Yr (TP-40)	10	9.694	11.9400	158.21
B-4 (DET)	100-Yr (TP-40)	100	14.599	11.9400	232.94
D-5	2-Yr (TP-40)	2	10.458	12.0500	146.13
D-5	10-Yr (TP-40)	10	18.183	12.0500	247.91
D-5	100-Yr (TP-40)	100	28.406	12.0300	377.88
D-4	2-Yr (TP-40)	2	21.246	11.9900	338.74
D-4	10-Yr (TP-40)	10	37.391	11.9900	582.43
D-4	100-Yr (TP-40)	100	58.857	11.9900	894.20
D-3	2-Yr (TP-40)	2	3.185	11.9700	52.46
D-3	10-Yr (TP-40)	10	5.605	11.9700	90.29
D-3	100-Yr (TP-40)	100	8.822	11.9700	138.69
D-2	2-Yr (TP-40)	2	6.134	12.0000	99.28
D-2	10-Yr (TP-40)	10	12.128	12.0000	195.91
D-2	100-Yr (TP-40)	100	20.518	11.9800	326.27
D-1	2-Yr (TP-40)	2	4.400	11.9700	75.69
D-1	10-Yr (TP-40)	10	8.950	11.9500	155.84
D-1	100-Yr (TP-40)	100	15.407	11.9500	265.94
E-2	2-Yr (TP-40)	2	0.645	11.9400	11.34
E-2	10-Yr (TP-40)	10	1.394	11.9400	25.34
E-2	100-Yr (TP-40)	100	2.489	11.9400	45.12
E-1	2-Yr (TP-40)	2	3.080	11.9400	55.42
E-1	10-Yr (TP-40)	10	6.008	11.9400	107.96
E-1	100-Yr (TP-40)	100	10.078	11.9300	178.18
F-1	2-Yr (TP-40)	2	0.935	11.9400	16.88
F-1	10-Yr (TP-40)	10	1.903	11.9300	34.70
F-1	100-Yr (TP-40)	100	3.275	11.9300	59.21
F-2	2-Yr (TP-40)	2	1.816	11.9600	31.60
F-2	10-Yr (TP-40)	10	3.495	11.9500	60.52
F-2	100-Yr (TP-40)	100	5.814	11.9500	99.00
G-1	2-Yr (TP-40)	2	1.999	11.9400	36.14

Macro Existing Conditions

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
G-1	10-Yr (TP-40)	10	3.846	11.9300	69.23
G-1	100-Yr (TP-40)	100	6.398	11.9300	113.41
G-2	2-Yr (TP-40)	2	1.332	11.9400	23.49
G-2	10-Yr (TP-40)	10	2.433	11.9400	42.32
G-2	100-Yr (TP-40)	100	3.920	11.9400	66.71
H-1	2-Yr (TP-40)	2	7.009	11.9700	119.73
H-1	10-Yr (TP-40)	10	14.056	11.9600	240.97
H-1	100-Yr (TP-40)	100	23.984	11.9500	406.72
I-1	2-Yr (TP-40)	2	0.244	11.9300	4.44
I-1	10-Yr (TP-40)	10	0.441	11.9300	7.87
I-1	100-Yr (TP-40)	100	0.705	11.9300	12.29

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Point A1	2-Yr (TP-40)	2	88.053	12.2500	948.96
Point A1	10-Yr (TP-40)	10	166.969	12.2200	1,784.23
Point A1	100-Yr (TP-40)	100	276.008	12.1900	2,754.84
Point A2	2-Yr (TP-40)	2	79.810	12.1700	909.05
Point A2	10-Yr (TP-40)	10	150.055	12.1500	1,691.73
Point A2	100-Yr (TP-40)	100	246.736	12.1300	2,566.59
Point A3	2-Yr (TP-40)	2	52.997	12.1500	628.64
Point A3	10-Yr (TP-40)	10	97.952	12.1500	1,107.67
Point A3	100-Yr (TP-40)	100	159.297	12.1700	1,595.56
Point A4	2-Yr (TP-40)	2	24.092	12.1500	260.92
Point A4	10-Yr (TP-40)	10	46.309	12.1100	539.49
Point A4	100-Yr (TP-40)	100	77.182	12.0900	906.56
Point A5	2-Yr (TP-40)	2	20.979	12.1500	242.32
Point A5	10-Yr (TP-40)	10	39.911	12.1200	489.66
Point A5	100-Yr (TP-40)	100	66.087	12.1000	799.19
Point A6	2-Yr (TP-40)	2	2.083	11.9300	37.98
Point A6	10-Yr (TP-40)	10	3.904	11.9300	70.54
Point A6	100-Yr (TP-40)	100	6.389	11.9300	113.19
Point A7	2-Yr (TP-40)	2	14.580	12.0500	229.26
Point A7	10-Yr (TP-40)	10	27.333	12.0700	397.23
Point A7	100-Yr (TP-40)	100	44.871	12.0800	603.32
Point A8	2-Yr (TP-40)	2	3.070	11.9600	53.05
Point A8	10-Yr (TP-40)	10	5.907	11.9500	101.89
Point A8	100-Yr (TP-40)	100	9.826	11.9500	166.82
Point A9	2-Yr (TP-40)	2	8.028	12.0000	128.79
Point A9	10-Yr (TP-40)	10	14.240	11.9900	223.48
Point A9	100-Yr (TP-40)	100	22.563	11.9900	346.07
Point A10	2-Yr (TP-40)	2	2.890	11.9700	45.61
Point A10	10-Yr (TP-40)	10	4.733	11.9700	72.57
Point A10	100-Yr (TP-40)	100	7.128	11.9700	106.86
Point B1	2-Yr (TP-40)	2	49.667	12.1100	615.14

Macro Existing Conditions

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Point B1	10-Yr (TP-40)	10	91.457	12.1100	1,076.61
Point B1	100-Yr (TP-40)	100	148.401	12.1400	1,551.65
Point B2	2-Yr (TP-40)	2	20.032	12.0500	242.31
Point B2	10-Yr (TP-40)	10	36.522	12.0400	446.43
Point B2	100-Yr (TP-40)	100	58.980	12.0300	715.56
Point B3	2-Yr (TP-40)	2	13.975	11.9900	153.04
Point B3	10-Yr (TP-40)	10	24.377	11.9800	266.04
Point B3	100-Yr (TP-40)	100	38.255	11.9700	411.65
Point B4	2-Yr (TP-40)	2	7.673	11.9400	48.10
Point B4	10-Yr (TP-40)	10	12.565	11.9300	71.04
Point B4	100-Yr (TP-40)	100	18.924	11.9300	98.80
Point C1	2-Yr (TP-40)	2	25.466	12.0900	350.42
Point C1	10-Yr (TP-40)	10	46.692	12.1000	604.01
Point C1	100-Yr (TP-40)	100	75.478	12.1000	890.10
Point C2	2-Yr (TP-40)	2	16.244	12.0400	232.89
Point C2	10-Yr (TP-40)	10	30.851	12.0700	417.32
Point C2	100-Yr (TP-40)	100	50.912	12.0800	614.91
Point C3	2-Yr (TP-40)	2	8.110	11.9500	142.61
Point C3	10-Yr (TP-40)	10	15.199	11.9400	264.83
Point C3	100-Yr (TP-40)	100	24.875	11.9400	425.51
Inlet-(U.V. Lake 2)	2-Yr (TP-40)	2	88.053	12.2500	948.96
Inlet-(U.V. Lake 2)	10-Yr (TP-40)	10	166.969	12.2200	1,784.23
Inlet-(U.V. Lake 2)	100-Yr (TP-40)	100	276.008	12.1900	2,754.84
Inlet-(U.V. Lake 1)	2-Yr (TP-40)	2	55.229	12.0600	636.59
Inlet-(U.V. Lake 1)	10-Yr (TP-40)	10	101.336	12.0500	1,087.31
Inlet-(U.V. Lake 1)	100-Yr (TP-40)	100	163.983	12.0400	1,592.51
Point D5	2-Yr (TP-40)	2	10.458	12.0700	142.73
Point D5	10-Yr (TP-40)	10	18.183	12.0800	239.98
Point D5	100-Yr (TP-40)	100	28.406	12.0900	357.61
Point D4	2-Yr (TP-40)	2	31.704	12.1000	377.63
Point D4	10-Yr (TP-40)	10	55.574	12.1400	526.54
Point D4	100-Yr (TP-40)	100	87.262	12.1900	638.44
Point D3	2-Yr (TP-40)	2	3.185	11.9700	52.46
Point D3	10-Yr (TP-40)	10	5.605	11.9700	90.29
Point D3	100-Yr (TP-40)	100	8.822	11.9700	138.69
Point D2	2-Yr (TP-40)	2	41.022	12.1000	485.06
Point D2	10-Yr (TP-40)	10	73.431	12.0600	752.83
Point D2	100-Yr (TP-40)	100	117.417	12.0600	1,052.38
Point D1	2-Yr (TP-40)	2	49.147	12.0800	560.43
Point D1	10-Yr (TP-40)	10	89.659	12.0700	941.67
Point D1	100-Yr (TP-40)	100	144.576	12.0500	1,351.30
Point E1	2-Yr (TP-40)	2	3.725	11.9500	65.98
Point E1	10-Yr (TP-40)	10	7.278	11.9900	106.88
Point E1	100-Yr (TP-40)	100	11.753	11.9800	143.00
Point E2	2-Yr (TP-40)	2	0.645	11.9400	11.34
Point E2	10-Yr (TP-40)	10	1.394	11.9400	25.34
Point E2	100-Yr (TP-40)	100	2.489	11.9400	45.12

Macro Existing Conditions

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Point F2	2-Yr (TP-40)	2	1.816	11.9600	31.56
Point F2	10-Yr (TP-40)	10	3.495	12.0600	45.26
Point F2	100-Yr (TP-40)	100	5.814	12.0700	65.86
Point F1	2-Yr (TP-40)	2	2.752	11.9700	47.57
Point F1	10-Yr (TP-40)	10	5.398	11.9600	74.89
Point F1	100-Yr (TP-40)	100	9.090	11.9400	106.16
Point G2	2-Yr (TP-40)	2	1.332	11.9600	23.29
Point G2	10-Yr (TP-40)	10	2.433	12.0200	36.98
Point G2	100-Yr (TP-40)	100	3.920	11.9900	62.01
Point G1	2-Yr (TP-40)	2	3.331	11.9500	58.32
Point G1	10-Yr (TP-40)	10	6.279	11.9400	102.21
Point G1	100-Yr (TP-40)	100	10.317	11.9700	163.43
Point H1	2-Yr (TP-40)	2	7.009	11.9700	119.54
Point H1	10-Yr (TP-40)	10	14.056	11.9600	240.90
Point H1	100-Yr (TP-40)	100	23.984	11.9600	406.43
MAIN ST CULVERT H	2-Yr (TP-40)	2	7.009	11.9700	119.53
MAIN ST CULVERT H	10-Yr (TP-40)	10	14.056	11.9600	240.92
MAIN ST CULVERT H	100-Yr (TP-40)	100	23.984	11.9600	406.43
MAIN ST CULVERT I	2-Yr (TP-40)	2	0.244	11.9400	4.43
MAIN ST CULVERT I	10-Yr (TP-40)	10	0.447	11.8800	8.41
MAIN ST CULVERT I	100-Yr (TP-40)	100	0.710	11.8100	8.41
Point I1	2-Yr (TP-40)	2	0.244	11.9300	4.44
Point I1	10-Yr (TP-40)	10	0.441	11.9300	7.87
Point I1	100-Yr (TP-40)	100	0.705	11.9300	12.29

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
RCB 25+65 (IN)	2-Yr (TP-40)	2	14.580	12.0200	236.01	(N/A)	(N/A)
RCB 25+65 (OUT)	2-Yr (TP-40)	2	14.580	12.0500	229.26	948.7083	0.319
RCB 25+65 (IN)	10-Yr (TP-40)	10	27.333	12.0100	437.94	(N/A)	(N/A)
RCB 25+65 (OUT)	10-Yr (TP-40)	10	27.333	12.0700	397.23	950.2162	1.251
RCB 25+65 (IN)	100-Yr (TP-40)	100	44.871	12.0000	707.16	(N/A)	(N/A)
RCB 25+65 (OUT)	100-Yr (TP-40)	100	44.871	12.0800	603.32	951.7960	3.100
RCB 45+15 (IN)	2-Yr (TP-40)	2	49.667	12.0700	634.00	(N/A)	(N/A)
RCB 45+15 (OUT)	2-Yr (TP-40)	2	49.667	12.1100	615.14	921.5701	1.519

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
RCB 45+15 (IN)	10-Yr (TP-40)	10	91.457	12.0700	1,121.63	(N/A)	(N/A)
RCB 45+15 (OUT)	10-Yr (TP-40)	10	91.457	12.1100	1,076.61	923.9927	3.164
RCB 45+15 (IN)	100-Yr (TP-40)	100	148.401	12.0600	1,726.54	(N/A)	(N/A)
RCB 45+15 (OUT)	100-Yr (TP-40)	100	148.401	12.1400	1,551.65	926.7702	6.626
Inlet Storage C2 (IN)	2-Yr (TP-40)	2	8.110	11.9600	142.28	(N/A)	(N/A)
Inlet Storage C2 (OUT)	2-Yr (TP-40)	2	8.110	12.0000	137.26	957.9495	0.115
Inlet Storage C2 (IN)	10-Yr (TP-40)	10	15.199	11.9600	264.20	(N/A)	(N/A)
Inlet Storage C2 (OUT)	10-Yr (TP-40)	10	15.199	12.0500	219.81	959.6693	0.804
Inlet Storage C2 (IN)	100-Yr (TP-40)	100	24.875	11.9600	423.95	(N/A)	(N/A)
Inlet Storage C2 (OUT)	100-Yr (TP-40)	100	24.875	12.0700	285.13	961.5938	2.539
Sub-B4 Basin (IN)	2-Yr (TP-40)	2	5.919	11.9400	99.43	(N/A)	(N/A)
Sub-B4 Basin (OUT)	2-Yr (TP-40)	2	5.919	12.1600	22.46	993.2524	2.284
Sub-B4 Basin (IN)	10-Yr (TP-40)	10	9.694	11.9400	158.21	(N/A)	(N/A)
Sub-B4 Basin (OUT)	10-Yr (TP-40)	10	9.694	12.1900	28.68	994.0428	3.850
Sub-B4 Basin (IN)	100-Yr (TP-40)	100	14.599	11.9400	232.94	(N/A)	(N/A)
Sub-B4 Basin (OUT)	100-Yr (TP-40)	100	14.599	12.2400	34.97	995.0349	5.948
Pt. A3 - Drive-Culverts (IN)	2-Yr (TP-40)	2	52.997	12.1300	632.94	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	2-Yr (TP-40)	2	52.997	12.1500	628.64	908.5044	1.747
Pt. A3 - Drive-Culverts (IN)	10-Yr (TP-40)	10	97.952	12.1300	1,109.82	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	10-Yr (TP-40)	10	97.952	12.1500	1,107.67	909.0685	2.341
Pt. A3 - Drive-Culverts (IN)	100-Yr (TP-40)	100	159.297	12.1600	1,597.02	(N/A)	(N/A)

Macro Existing Conditions

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pt. A3 - Drive-Culverts (OUT)	100-Yr (TP-40)	100	159.297	12.1700	1,595.56	909.5023	2.849
Pt. A5 - Former Pond (IN)	2-Yr (TP-40)	2	20.979	12.0500	315.36	(N/A)	(N/A)
Pt. A5 - Former Pond (OUT)	2-Yr (TP-40)	2	20.979	12.1500	242.32	932.4766	3.940
Pt. A5 - Former Pond (IN)	10-Yr (TP-40)	10	39.911	12.0500	552.78	(N/A)	(N/A)
Pt. A5 - Former Pond (OUT)	10-Yr (TP-40)	10	39.911	12.1200	489.66	933.4288	5.828
Pt. A5 - Former Pond (IN)	100-Yr (TP-40)	100	66.087	12.0500	847.10	(N/A)	(N/A)
Pt. A5 - Former Pond (OUT)	100-Yr (TP-40)	100	66.087	12.1000	799.19	934.1476	7.413
H1 Road Culvert (IN)	2-Yr (TP-40)	2	7.009	11.9700	119.73	(N/A)	(N/A)
H1 Road Culvert (OUT)	2-Yr (TP-40)	2	7.009	11.9700	119.54	912.4382	0.060
H1 Road Culvert (IN)	10-Yr (TP-40)	10	14.056	11.9600	240.97	(N/A)	(N/A)
H1 Road Culvert (OUT)	10-Yr (TP-40)	10	14.056	11.9600	240.90	912.7758	0.103
H1 Road Culvert (IN)	100-Yr (TP-40)	100	23.984	11.9500	406.72	(N/A)	(N/A)
H1 Road Culvert (OUT)	100-Yr (TP-40)	100	23.984	11.9600	406.43	912.9683	0.138
G2 Road Culvert (IN)	2-Yr (TP-40)	2	1.332	11.9400	23.49	(N/A)	(N/A)
G2 Road Culvert (OUT)	2-Yr (TP-40)	2	1.332	11.9600	23.29	947.0866	0.010
G2 Road Culvert (IN)	10-Yr (TP-40)	10	2.433	11.9400	42.32	(N/A)	(N/A)
G2 Road Culvert (OUT)	10-Yr (TP-40)	10	2.433	12.0200	36.98	948.5853	0.077
G2 Road Culvert (IN)	100-Yr (TP-40)	100	3.920	11.9400	66.71	(N/A)	(N/A)

Macro Existing Conditions

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
G2 Road Culvert (OUT)	100-Yr (TP-40)	100	3.920	11.9900	62.01	949.3764	0.184
D2 Road Culvert (IN)	2-Yr (TP-40)	2	6.134	12.0000	99.28	(N/A)	(N/A)
D2 Road Culvert (OUT)	2-Yr (TP-40)	2	6.134	12.0200	98.92	928.3513	0.060
D2 Road Culvert (IN)	10-Yr (TP-40)	10	12.128	12.0000	195.91	(N/A)	(N/A)
D2 Road Culvert (OUT)	10-Yr (TP-40)	10	12.128	12.0100	194.04	929.6699	0.173
D2 Road Culvert (IN)	100-Yr (TP-40)	100	20.518	11.9800	326.27	(N/A)	(N/A)
D2 Road Culvert (OUT)	100-Yr (TP-40)	100	20.518	12.0300	315.15	931.0563	0.479
F1 Road Culvert (IN)	2-Yr (TP-40)	2	1.816	11.9600	31.60	(N/A)	(N/A)
F1 Road Culvert (OUT)	2-Yr (TP-40)	2	1.816	11.9600	31.56	943.9776	0.012
F1 Road Culvert (IN)	10-Yr (TP-40)	10	3.495	11.9500	60.52	(N/A)	(N/A)
F1 Road Culvert (OUT)	10-Yr (TP-40)	10	3.495	12.0600	45.26	946.0560	0.227
F1 Road Culvert (IN)	100-Yr (TP-40)	100	5.814	11.9500	99.00	(N/A)	(N/A)
F1 Road Culvert (OUT)	100-Yr (TP-40)	100	5.814	12.0700	65.86	947.6705	0.736
D4 Highway Culvert (IN)	2-Yr (TP-40)	2	31.704	12.0200	447.33	(N/A)	(N/A)
D4 Highway Culvert (OUT)	2-Yr (TP-40)	2	31.704	12.1000	377.63	958.5690	2.269
D4 Highway Culvert (IN)	10-Yr (TP-40)	10	55.574	12.0200	761.81	(N/A)	(N/A)
D4 Highway Culvert (OUT)	10-Yr (TP-40)	10	55.574	12.1400	526.54	960.9142	6.129
D4 Highway Culvert (IN)	100-Yr (TP-40)	100	87.262	12.0200	1,157.85	(N/A)	(N/A)
D4 Highway Culvert (OUT)	100-Yr (TP-40)	100	87.262	12.1900	638.44	963.4942	13.467

Macro Existing Conditions

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
E1 Road Culvert (IN)	2-Yr (TP-40)	2	3.080	11.9400	55.42	(N/A)	(N/A)
E1 Road Culvert (OUT)	2-Yr (TP-40)	2	3.080	11.9500	55.34	930.6110	0.020
E1 Road Culvert (IN)	10-Yr (TP-40)	10	6.008	11.9400	107.96	(N/A)	(N/A)
E1 Road Culvert (OUT)	10-Yr (TP-40)	10	6.008	12.0200	92.57	931.6780	0.256
E1 Road Culvert (IN)	100-Yr (TP-40)	100	10.078	11.9300	178.18	(N/A)	(N/A)
E1 Road Culvert (OUT)	100-Yr (TP-40)	100	10.078	12.0200	148.28	932.2909	0.722
D5 Road Culvert (IN)	2-Yr (TP-40)	2	10.458	12.0500	146.13	(N/A)	(N/A)
D5 Road Culvert (OUT)	2-Yr (TP-40)	2	10.458	12.0700	142.73	978.6959	0.301
D5 Road Culvert (IN)	10-Yr (TP-40)	10	18.183	12.0500	247.91	(N/A)	(N/A)
D5 Road Culvert (OUT)	10-Yr (TP-40)	10	18.183	12.0800	239.98	980.6424	0.610
D5 Road Culvert (IN)	100-Yr (TP-40)	100	28.406	12.0300	377.88	(N/A)	(N/A)
D5 Road Culvert (OUT)	100-Yr (TP-40)	100	28.406	12.0900	357.61	982.6928	1.126

Macro Existing Conditions

Subsection: Unit Hydrograph Summary
Label: A-1(e)
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1736 hours
Area (User Defined)	1,218,373.200 ft²

Computational Time Increment	0.0231 hours
Time to Peak (Computed)	11.9900 hours
Flow (Peak, Computed)	187.83 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9900 hours
Flow (Peak Interpolated Output)	187.82 ft³/s

Drainage Area	
SCS CN (Composite)	77.000
Area (User Defined)	1,218,373.200 ft²
Maximum Retention (Pervious)	2.99 in
Maximum Retention (Pervious, 20 percent)	0.60 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.01 in
Runoff Volume (Pervious)	11.675 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	11.675 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1736 hours
Computational Time Increment	0.0231 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	182.55 ft³/s
Unit peak time, Tp	0.1157 hours
Unit receding limb, Tr	0.4629 hours
Total unit time, Tb	0.5787 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2511 hours
Area (User Defined)	1,879,178.401 ft²

Computational Time Increment	0.0335 hours
Time to Peak (Computed)	12.0528 hours
Flow (Peak, Computed)	252.68 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0500 hours
Flow (Peak Interpolated Output)	252.55 ft³/s

Drainage Area	
SCS CN (Composite)	76.000
Area (User Defined)	1,879,178.401 ft²
Maximum Retention (Pervious)	3.16 in
Maximum Retention (Pervious, 20 percent)	0.63 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.89 in
Runoff Volume (Pervious)	17.597 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	17.597 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2511 hours
Computational Time Increment	0.0335 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	194.66 ft³/s
Unit peak time, Tp	0.1674 hours
Unit receding limb, Tr	0.6696 hours
Total unit time, Tb	0.8370 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1545 hours
Area (User Defined)	532,738.800 ft²

Computational Time Increment	0.0206 hours
Time to Peak (Computed)	11.9686 hours
Flow (Peak, Computed)	106.99 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9700 hours
Flow (Peak Interpolated Output)	106.86 ft³/s

Drainage Area	
SCS CN (Composite)	94.000
Area (User Defined)	532,738.800 ft²
Maximum Retention (Pervious)	0.64 in
Maximum Retention (Pervious, 20 percent)	0.13 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.99 in
Runoff Volume (Pervious)	7.128 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	7.128 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1545 hours
Computational Time Increment	0.0206 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	89.69 ft³/s
Unit peak time, Tp	0.1030 hours
Unit receding limb, Tr	0.4120 hours
Total unit time, Tb	0.5150 hours

Subsection: Unit Hydrograph Summary
Label: A-10
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	134,164.800 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	24.66 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	24.63 ft³/s

Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	134,164.800 ft²
Maximum Retention (Pervious)	2.50 in
Maximum Retention (Pervious, 20 percent)	0.50 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.35 in
Runoff Volume (Pervious)	1.374 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.374 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	34.90 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2133 hours
Area (User Defined)	1,019,739.600 ft²

Computational Time Increment	0.0284 hours
Time to Peak (Computed)	12.0301 hours
Flow (Peak, Computed)	136.29 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0300 hours
Flow (Peak Interpolated Output)	136.28 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	1,019,739.600 ft²
Maximum Retention (Pervious)	3.70 in
Maximum Retention (Pervious, 20 percent)	0.74 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.55 in
Runoff Volume (Pervious)	8.884 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	8.884 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2133 hours
Computational Time Increment	0.0284 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	124.35 ft³/s
Unit peak time, Tp	0.1422 hours
Unit receding limb, Tr	0.5688 hours
Total unit time, Tb	0.7110 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1284 hours
Area (User Defined)	1,063,798.710 ft²

Computational Time Increment	0.0171 hours
Time to Peak (Computed)	11.9498 hours
Flow (Peak, Computed)	186.17 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9500 hours
Flow (Peak Interpolated Output)	186.13 ft³/s

Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	1,063,798.710 ft²
Maximum Retention (Pervious)	2.50 in
Maximum Retention (Pervious, 20 percent)	0.50 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.35 in
Runoff Volume (Pervious)	10.895 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	10.895 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1284 hours
Computational Time Increment	0.0171 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	215.50 ft³/s
Unit peak time, Tp	0.0856 hours
Unit receding limb, Tr	0.3424 hours
Total unit time, Tb	0.4280 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1367 hours
Area (User Defined)	428,925.950 ft²

Computational Time Increment	0.0182 hours
Time to Peak (Computed)	11.9567 hours
Flow (Peak, Computed)	75.35 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9600 hours
Flow (Peak Interpolated Output)	75.15 ft³/s

Drainage Area	
SCS CN (Composite)	81.000
Area (User Defined)	428,925.950 ft²
Maximum Retention (Pervious)	2.35 in
Maximum Retention (Pervious, 20 percent)	0.47 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.47 in
Runoff Volume (Pervious)	4.488 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4.488 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1367 hours
Computational Time Increment	0.0182 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	81.62 ft³/s
Unit peak time, Tp	0.0911 hours
Unit receding limb, Tr	0.3645 hours
Total unit time, Tb	0.4557 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1656 hours
Area (User Defined)	758,410.700 ft²

Computational Time Increment	0.0221 hours
Time to Peak (Computed)	11.9894 hours
Flow (Peak, Computed)	108.26 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9900 hours
Flow (Peak Interpolated Output)	108.22 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	758,410.700 ft²
Maximum Retention (Pervious)	3.70 in
Maximum Retention (Pervious, 20 percent)	0.74 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.55 in
Runoff Volume (Pervious)	6.607 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6.607 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1656 hours
Computational Time Increment	0.0221 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	119.12 ft³/s
Unit peak time, Tp	0.1104 hours
Unit receding limb, Tr	0.4416 hours
Total unit time, Tb	0.5520 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1195 hours
Area (User Defined)	660,258.090 ft²

Computational Time Increment	0.0159 hours
Time to Peak (Computed)	11.9500 hours
Flow (Peak, Computed)	116.98 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9500 hours
Flow (Peak Interpolated Output)	116.98 ft³/s

Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	660,258.090 ft²
Maximum Retention (Pervious)	2.50 in
Maximum Retention (Pervious, 20 percent)	0.50 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.35 in
Runoff Volume (Pervious)	6.762 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6.762 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1195 hours
Computational Time Increment	0.0159 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	143.72 ft³/s
Unit peak time, Tp	0.0797 hours
Unit receding limb, Tr	0.3187 hours
Total unit time, Tb	0.3983 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1578 hours
Area (User Defined)	861,206.550 ft²

Computational Time Increment	0.0210 hours
Time to Peak (Computed)	11.9718 hours
Flow (Peak, Computed)	132.83 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9700 hours
Flow (Peak Interpolated Output)	132.61 ft³/s

Drainage Area	
SCS CN (Composite)	76.000
Area (User Defined)	861,206.550 ft²
Maximum Retention (Pervious)	3.16 in
Maximum Retention (Pervious, 20 percent)	0.63 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.89 in
Runoff Volume (Pervious)	8.064 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	8.064 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1578 hours
Computational Time Increment	0.0210 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	141.96 ft³/s
Unit peak time, Tp	0.1052 hours
Unit receding limb, Tr	0.4208 hours
Total unit time, Tb	0.5260 hours

Subsection: Unit Hydrograph Summary
Label: A-5(w)
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	585,818.130 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	113.28 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	113.19 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	585,818.130 ft²
Maximum Retention (Pervious)	2.05 in
Maximum Retention (Pervious, 20 percent)	0.41 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.70 in
Runoff Volume (Pervious)	6.389 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6.389 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	152.38 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Subsection: Unit Hydrograph Summary
Label: A-6
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1596 hours
Area (User Defined)	1,332,936.000 ft²

Computational Time Increment	0.0213 hours
Time to Peak (Computed)	11.9806 hours
Flow (Peak, Computed)	204.96 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9800 hours
Flow (Peak Interpolated Output)	204.90 ft³/s

Drainage Area	
SCS CN (Composite)	76.000
Area (User Defined)	1,332,936.000 ft²
Maximum Retention (Pervious)	3.16 in
Maximum Retention (Pervious, 20 percent)	0.63 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.89 in
Runoff Volume (Pervious)	12.482 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	12.481 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1596 hours
Computational Time Increment	0.0213 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	217.24 ft³/s
Unit peak time, Tp	0.1064 hours
Unit receding limb, Tr	0.4256 hours
Total unit time, Tb	0.5320 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1299 hours
Area (User Defined)	939,153.600 ft²

Computational Time Increment	0.0173 hours
Time to Peak (Computed)	11.9508 hours
Flow (Peak, Computed)	166.91 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9500 hours
Flow (Peak Interpolated Output)	166.82 ft³/s

Drainage Area	
SCS CN (Composite)	81.000
Area (User Defined)	939,153.600 ft²
Maximum Retention (Pervious)	2.35 in
Maximum Retention (Pervious, 20 percent)	0.47 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.47 in
Runoff Volume (Pervious)	9.826 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9.826 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1299 hours
Computational Time Increment	0.0173 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	188.06 ft³/s
Unit peak time, Tp	0.0866 hours
Unit receding limb, Tr	0.3464 hours
Total unit time, Tb	0.4330 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1420 hours
Area (User Defined)	1,386,950.400 ft²

Computational Time Increment	0.0189 hours
Time to Peak (Computed)	11.9659 hours
Flow (Peak, Computed)	252.90 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9600 hours
Flow (Peak Interpolated Output)	252.78 ft³/s

Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	1,386,950.400 ft²
Maximum Retention (Pervious)	1.90 in
Maximum Retention (Pervious, 20 percent)	0.38 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.82 in
Runoff Volume (Pervious)	15.435 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	15.435 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1420 hours
Computational Time Increment	0.0189 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	254.06 ft³/s
Unit peak time, Tp	0.0947 hours
Unit receding limb, Tr	0.3787 hours
Total unit time, Tb	0.4733 hours

Subsection: Unit Hydrograph Summary
Label: A-9
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1385 hours
Area (User Defined)	1,391,306.400 ft²

Computational Time Increment	0.0185 hours
Time to Peak (Computed)	11.9479 hours
Flow (Peak, Computed)	234.20 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9500 hours
Flow (Peak Interpolated Output)	234.20 ft³/s

Drainage Area	
SCS CN (Composite)	79.000
Area (User Defined)	1,391,306.400 ft²
Maximum Retention (Pervious)	2.66 in
Maximum Retention (Pervious, 20 percent)	0.53 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.24 in
Runoff Volume (Pervious)	13.943 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	13.944 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1385 hours
Computational Time Increment	0.0185 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	261.30 ft³/s
Unit peak time, Tp	0.0923 hours
Unit receding limb, Tr	0.3693 hours
Total unit time, Tb	0.4617 hours

Subsection: Unit Hydrograph Summary
Label: B-1
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1987 hours
Area (User Defined)	2,114,402.401 ft²

Computational Time Increment	0.0265 hours
Time to Peak (Computed)	12.0015 hours
Flow (Peak, Computed)	321.22 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0000 hours
Flow (Peak Interpolated Output)	320.74 ft³/s

Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	2,114,402.401 ft²
Maximum Retention (Pervious)	2.82 in
Maximum Retention (Pervious, 20 percent)	0.56 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.12 in
Runoff Volume (Pervious)	20.725 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	20.725 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1987 hours
Computational Time Increment	0.0265 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	276.79 ft³/s
Unit peak time, Tp	0.1325 hours
Unit receding limb, Tr	0.5299 hours
Total unit time, Tb	0.6623 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1447 hours
Area (User Defined)	1,772,456.401 ft²

Computational Time Increment	0.0193 hours
Time to Peak (Computed)	11.9619 hours
Flow (Peak, Computed)	317.74 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9600 hours
Flow (Peak Interpolated Output)	317.37 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	1,772,456.401 ft²
Maximum Retention (Pervious)	2.05 in
Maximum Retention (Pervious, 20 percent)	0.41 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.70 in
Runoff Volume (Pervious)	19.331 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	19.332 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1447 hours
Computational Time Increment	0.0193 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	318.61 ft³/s
Unit peak time, Tp	0.0965 hours
Unit receding limb, Tr	0.3859 hours
Total unit time, Tb	0.4823 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	323,215.200 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9200 hours
Flow (Peak, Computed)	71.04 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9200 hours
Flow (Peak Interpolated Output)	71.04 ft³/s

Drainage Area	
SCS CN (Composite)	94.000
Area (User Defined)	323,215.200 ft²
Maximum Retention (Pervious)	0.64 in
Maximum Retention (Pervious, 20 percent)	0.13 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.99 in
Runoff Volume (Pervious)	4.324 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4.324 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	84.07 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Subsection: Unit Hydrograph Summary
Label: B-4 (BYP)
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1155 hours
Area (User Defined)	1,091,178.000 ft²

Computational Time Increment	0.0154 hours
Time to Peak (Computed)	11.9350 hours
Flow (Peak, Computed)	233.88 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9400 hours
Flow (Peak Interpolated Output)	232.94 ft³/s

Drainage Area	
SCS CN (Composite)	94.000
Area (User Defined)	1,091,178.000 ft²
Maximum Retention (Pervious)	0.64 in
Maximum Retention (Pervious, 20 percent)	0.13 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.99 in
Runoff Volume (Pervious)	14.599 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	14.599 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1155 hours
Computational Time Increment	0.0154 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	245.74 ft³/s
Unit peak time, Tp	0.0770 hours
Unit receding limb, Tr	0.3080 hours
Total unit time, Tb	0.3850 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2860 hours
Area (User Defined)	1,969,347.601 ft²

Computational Time Increment	0.0381 hours
Time to Peak (Computed)	12.0501 hours
Flow (Peak, Computed)	317.13 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0500 hours
Flow (Peak Interpolated Output)	317.10 ft³/s

Drainage Area	
SCS CN (Composite)	90.000
Area (User Defined)	1,969,347.601 ft²
Maximum Retention (Pervious)	1.11 in
Maximum Retention (Pervious, 20 percent)	0.22 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.52 in
Runoff Volume (Pervious)	24.565 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	24.565 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2860 hours
Computational Time Increment	0.0381 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	179.11 ft³/s
Unit peak time, Tp	0.1907 hours
Unit receding limb, Tr	0.7627 hours
Total unit time, Tb	0.9533 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.3308 hours
Area (User Defined)	2,488,582.801 ft²

Computational Time Increment	0.0441 hours
Time to Peak (Computed)	12.0852 hours
Flow (Peak, Computed)	330.94 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0800 hours
Flow (Peak Interpolated Output)	329.78 ft³/s

Drainage Area	
SCS CN (Composite)	81.000
Area (User Defined)	2,488,582.801 ft²
Maximum Retention (Pervious)	2.35 in
Maximum Retention (Pervious, 20 percent)	0.47 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.47 in
Runoff Volume (Pervious)	26.038 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	26.038 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.3308 hours
Computational Time Increment	0.0441 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	195.68 ft³/s
Unit peak time, Tp	0.2205 hours
Unit receding limb, Tr	0.8821 hours
Total unit time, Tb	1.1027 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1199 hours
Area (User Defined)	2,280,801.601 ft²

Computational Time Increment	0.0160 hours
Time to Peak (Computed)	11.9420 hours
Flow (Peak, Computed)	426.20 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9400 hours
Flow (Peak Interpolated Output)	425.51 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	2,280,801.601 ft²
Maximum Retention (Pervious)	2.05 in
Maximum Retention (Pervious, 20 percent)	0.41 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.70 in
Runoff Volume (Pervious)	24.875 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	24.875 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1199 hours
Computational Time Increment	0.0160 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	494.80 ft³/s
Unit peak time, Tp	0.0799 hours
Unit receding limb, Tr	0.3197 hours
Total unit time, Tb	0.3997 hours

Subsection: Unit Hydrograph Summary
Label: C-3
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1275 hours
Area (User Defined)	1,607,778.500 ft²

Computational Time Increment	0.0170 hours
Time to Peak (Computed)	11.9510 hours
Flow (Peak, Computed)	266.11 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9500 hours
Flow (Peak Interpolated Output)	265.94 ft³/s

Drainage Area	
SCS CN (Composite)	77.000
Area (User Defined)	1,607,778.500 ft²
Maximum Retention (Pervious)	2.99 in
Maximum Retention (Pervious, 20 percent)	0.60 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.01 in
Runoff Volume (Pervious)	15.407 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	15.407 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1275 hours
Computational Time Increment	0.0170 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	328.00 ft³/s
Unit peak time, Tp	0.0850 hours
Unit receding limb, Tr	0.3400 hours
Total unit time, Tb	0.4250 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1755 hours
Area (User Defined)	2,047,412.440 ft²

Computational Time Increment	0.0234 hours
Time to Peak (Computed)	11.9808 hours
Flow (Peak, Computed)	326.57 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9800 hours
Flow (Peak Interpolated Output)	326.27 ft³/s

Drainage Area	
SCS CN (Composite)	79.000
Area (User Defined)	2,047,412.440 ft²
Maximum Retention (Pervious)	2.66 in
Maximum Retention (Pervious, 20 percent)	0.53 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.24 in
Runoff Volume (Pervious)	20.518 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	20.518 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1755 hours
Computational Time Increment	0.0234 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	303.45 ft³/s
Unit peak time, Tp	0.1170 hours
Unit receding limb, Tr	0.4680 hours
Total unit time, Tb	0.5850 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1561 hours
Area (User Defined)	733,712.810 ft²

Computational Time Increment	0.0208 hours
Time to Peak (Computed)	11.9677 hours
Flow (Peak, Computed)	138.90 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9700 hours
Flow (Peak Interpolated Output)	138.69 ft³/s

Drainage Area	
SCS CN (Composite)	88.000
Area (User Defined)	733,712.810 ft²
Maximum Retention (Pervious)	1.36 in
Maximum Retention (Pervious, 20 percent)	0.27 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.28 in
Runoff Volume (Pervious)	8.822 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	8.822 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1561 hours
Computational Time Increment	0.0208 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	122.26 ft³/s
Unit peak time, Tp	0.1041 hours
Unit receding limb, Tr	0.4163 hours
Total unit time, Tb	0.5203 hours

Subsection: Unit Hydrograph Summary
Label: D-3
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1792 hours
Area (User Defined)	4,895,129.650 ft²

Computational Time Increment	0.0239 hours
Time to Peak (Computed)	11.9945 hours
Flow (Peak, Computed)	894.83 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9900 hours
Flow (Peak Interpolated Output)	894.20 ft³/s

Drainage Area	
SCS CN (Composite)	88.000
Area (User Defined)	4,895,129.650 ft²
Maximum Retention (Pervious)	1.36 in
Maximum Retention (Pervious, 20 percent)	0.27 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.28 in
Runoff Volume (Pervious)	58.857 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	58.857 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1792 hours
Computational Time Increment	0.0239 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	710.53 ft³/s
Unit peak time, Tp	0.1195 hours
Unit receding limb, Tr	0.4779 hours
Total unit time, Tb	0.5973 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2652 hours
Area (User Defined)	2,319,189.150 ft²

Computational Time Increment	0.0354 hours
Time to Peak (Computed)	12.0224 hours
Flow (Peak, Computed)	377.90 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0300 hours
Flow (Peak Interpolated Output)	377.88 ft³/s

Drainage Area	
SCS CN (Composite)	89.000
Area (User Defined)	2,319,189.150 ft²
Maximum Retention (Pervious)	1.24 in
Maximum Retention (Pervious, 20 percent)	0.25 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.40 in
Runoff Volume (Pervious)	28.406 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	28.406 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2652 hours
Computational Time Increment	0.0354 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	227.47 ft³/s
Unit peak time, Tp	0.1768 hours
Unit receding limb, Tr	0.7072 hours
Total unit time, Tb	0.8840 hours

Subsection: Unit Hydrograph Summary
Label: D-5
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1062 hours
Area (User Defined)	983,972.820 ft²

Computational Time Increment	0.0142 hours
Time to Peak (Computed)	11.9369 hours
Flow (Peak, Computed)	178.76 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	178.18 ft³/s

Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	983,972.820 ft²
Maximum Retention (Pervious)	2.50 in
Maximum Retention (Pervious, 20 percent)	0.50 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.35 in
Runoff Volume (Pervious)	10.078 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	10.078 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1062 hours
Computational Time Increment	0.0142 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	241.00 ft³/s
Unit peak time, Tp	0.0708 hours
Unit receding limb, Tr	0.2832 hours
Total unit time, Tb	0.3540 hours

Subsection: Unit Hydrograph Summary
Label: E-1
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1021 hours
Area (User Defined)	285,700.370 ft²

Computational Time Increment	0.0136 hours
Time to Peak (Computed)	11.9389 hours
Flow (Peak, Computed)	45.19 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9400 hours
Flow (Peak Interpolated Output)	45.12 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	285,700.370 ft²
Maximum Retention (Pervious)	3.70 in
Maximum Retention (Pervious, 20 percent)	0.74 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.55 in
Runoff Volume (Pervious)	2.489 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.489 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1021 hours
Computational Time Increment	0.0136 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	72.79 ft³/s
Unit peak time, Tp	0.0681 hours
Unit receding limb, Tr	0.2723 hours
Total unit time, Tb	0.3403 hours

Subsection: Unit Hydrograph Summary
Label: E-2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	341,811.630 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	59.32 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	59.21 ft³/s

Drainage Area	
SCS CN (Composite)	77.000
Area (User Defined)	341,811.630 ft²
Maximum Retention (Pervious)	2.99 in
Maximum Retention (Pervious, 20 percent)	0.60 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.01 in
Runoff Volume (Pervious)	3.275 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.275 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	88.91 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Subsection: Unit Hydrograph Summary
Label: F-1
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1260 hours
Area (User Defined)	555,711.140 ft²

Computational Time Increment	0.0168 hours
Time to Peak (Computed)	11.9448 hours
Flow (Peak, Computed)	99.29 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9500 hours
Flow (Peak Interpolated Output)	99.00 ft³/s

Drainage Area	
SCS CN (Composite)	81.000
Area (User Defined)	555,711.140 ft²
Maximum Retention (Pervious)	2.35 in
Maximum Retention (Pervious, 20 percent)	0.47 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.47 in
Runoff Volume (Pervious)	5.814 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5.814 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1260 hours
Computational Time Increment	0.0168 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	114.72 ft³/s
Unit peak time, Tp	0.0840 hours
Unit receding limb, Tr	0.3360 hours
Total unit time, Tb	0.4200 hours

Subsection: Unit Hydrograph Summary
Label: F-2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1055 hours
Area (User Defined)	611,472.170 ft²

Computational Time Increment	0.0141 hours
Time to Peak (Computed)	11.9285 hours
Flow (Peak, Computed)	113.48 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	113.41 ft³/s

Drainage Area	
SCS CN (Composite)	81.000
Area (User Defined)	611,472.170 ft²
Maximum Retention (Pervious)	2.35 in
Maximum Retention (Pervious, 20 percent)	0.47 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.47 in
Runoff Volume (Pervious)	6.398 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6.398 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1055 hours
Computational Time Increment	0.0141 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	150.76 ft³/s
Unit peak time, Tp	0.0703 hours
Unit receding limb, Tr	0.2813 hours
Total unit time, Tb	0.3517 hours

Subsection: Unit Hydrograph Summary
Label: G-1
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1175 hours
Area (User Defined)	345,304.250 ft²

Computational Time Increment	0.0157 hours
Time to Peak (Computed)	11.9380 hours
Flow (Peak, Computed)	66.80 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9400 hours
Flow (Peak Interpolated Output)	66.71 ft³/s

Drainage Area	
SCS CN (Composite)	85.000
Area (User Defined)	345,304.250 ft²
Maximum Retention (Pervious)	1.76 in
Maximum Retention (Pervious, 20 percent)	0.35 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.93 in
Runoff Volume (Pervious)	3.920 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.920 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1175 hours
Computational Time Increment	0.0157 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	76.44 ft³/s
Unit peak time, Tp	0.0783 hours
Unit receding limb, Tr	0.3133 hours
Total unit time, Tb	0.3917 hours

Subsection: Unit Hydrograph Summary
Label: G-2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1348 hours
Area (User Defined)	2,446,892.920 ft²

Computational Time Increment	0.0180 hours
Time to Peak (Computed)	11.9523 hours
Flow (Peak, Computed)	407.68 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9500 hours
Flow (Peak Interpolated Output)	406.72 ft³/s

Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	2,446,892.920 ft²
Maximum Retention (Pervious)	2.82 in
Maximum Retention (Pervious, 20 percent)	0.56 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.12 in
Runoff Volume (Pervious)	23.984 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	23.984 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1348 hours
Computational Time Increment	0.0180 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	472.15 ft³/s
Unit peak time, Tp	0.0899 hours
Unit receding limb, Tr	0.3595 hours
Total unit time, Tb	0.4493 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Yr (TP-40)
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1019 hours
Area (User Defined)	60,899.990 ft²

Computational Time Increment	0.0136 hours
Time to Peak (Computed)	11.9291 hours
Flow (Peak, Computed)	12.30 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	12.29 ft³/s

Drainage Area	
SCS CN (Composite)	86.000
Area (User Defined)	60,899.990 ft²
Maximum Retention (Pervious)	1.63 in
Maximum Retention (Pervious, 20 percent)	0.33 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.05 in
Runoff Volume (Pervious)	0.705 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.705 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1019 hours
Computational Time Increment	0.0136 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	15.55 ft³/s
Unit peak time, Tp	0.0679 hours
Unit receding limb, Tr	0.2717 hours
Total unit time, Tb	0.3397 hours

SCS Unit Hydrograph Parameters

Macro Existing Conditions

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

Storm Event	2-Yr (TP-40)
Return Event	2 years
Duration	72.0000 hours
Depth	3.50 in
Time of Concentration (Composite)	0.2652 hours
Area (User Defined)	2,319,189.150 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
5.5500	0.00	0.00	0.00	0.00	0.00
5.6000	0.00	0.00	0.01	0.01	0.01
5.6500	0.01	0.01	0.01	0.02	0.02
5.7000	0.02	0.02	0.02	0.03	0.03
5.7500	0.03	0.03	0.04	0.04	0.04
5.8000	0.04	0.05	0.05	0.05	0.05
5.8500	0.06	0.06	0.06	0.07	0.07
5.9000	0.07	0.08	0.08	0.08	0.08
5.9500	0.09	0.09	0.09	0.10	0.10
6.0000	0.10	0.11	0.11	0.11	0.12
6.0500	0.12	0.12	0.13	0.13	0.13
6.1000	0.14	0.14	0.14	0.15	0.15
6.1500	0.15	0.16	0.16	0.16	0.17
6.2000	0.17	0.17	0.18	0.18	0.18
6.2500	0.19	0.19	0.19	0.20	0.20
6.3000	0.20	0.21	0.21	0.21	0.22
6.3500	0.22	0.22	0.23	0.23	0.23
6.4000	0.24	0.24	0.25	0.25	0.25
6.4500	0.26	0.26	0.26	0.27	0.27
6.5000	0.27	0.28	0.28	0.28	0.29
6.5500	0.29	0.29	0.30	0.30	0.31
6.6000	0.31	0.31	0.32	0.32	0.32
6.6500	0.33	0.33	0.33	0.34	0.34
6.7000	0.35	0.35	0.35	0.36	0.36
6.7500	0.36	0.37	0.37	0.37	0.38
6.8000	0.38	0.39	0.39	0.39	0.40
6.8500	0.40	0.40	0.41	0.41	0.42
6.9000	0.42	0.42	0.43	0.43	0.43
6.9500	0.44	0.44	0.45	0.45	0.45
7.0000	0.46	0.46	0.46	0.47	0.47
7.0500	0.48	0.48	0.48	0.49	0.49
7.1000	0.50	0.50	0.50	0.51	0.51
7.1500	0.52	0.52	0.52	0.53	0.53
7.2000	0.53	0.54	0.54	0.55	0.55
7.2500	0.55	0.56	0.56	0.57	0.57
7.3000	0.57	0.58	0.58	0.59	0.59
7.3500	0.59	0.60	0.60	0.61	0.61

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.4000	0.61	0.62	0.62	0.63	0.63
7.4500	0.63	0.64	0.64	0.65	0.65
7.5000	0.65	0.66	0.66	0.67	0.67
7.5500	0.67	0.68	0.68	0.69	0.69
7.6000	0.69	0.70	0.70	0.71	0.71
7.6500	0.72	0.72	0.72	0.73	0.73
7.7000	0.74	0.74	0.74	0.75	0.75
7.7500	0.76	0.76	0.76	0.77	0.77
7.8000	0.78	0.78	0.79	0.79	0.79
7.8500	0.80	0.80	0.81	0.81	0.82
7.9000	0.82	0.82	0.83	0.83	0.84
7.9500	0.84	0.84	0.85	0.85	0.86
8.0000	0.86	0.87	0.87	0.87	0.88
8.0500	0.88	0.89	0.89	0.90	0.90
8.1000	0.91	0.91	0.92	0.92	0.93
8.1500	0.93	0.94	0.94	0.95	0.96
8.2000	0.96	0.97	0.98	0.98	0.99
8.2500	1.00	1.00	1.01	1.02	1.03
8.3000	1.03	1.04	1.05	1.06	1.06
8.3500	1.07	1.08	1.09	1.10	1.10
8.4000	1.11	1.12	1.13	1.14	1.15
8.4500	1.16	1.16	1.17	1.18	1.19
8.5000	1.20	1.21	1.22	1.23	1.24
8.5500	1.25	1.25	1.26	1.27	1.28
8.6000	1.29	1.30	1.31	1.32	1.33
8.6500	1.34	1.35	1.36	1.37	1.38
8.7000	1.39	1.40	1.41	1.42	1.43
8.7500	1.44	1.45	1.46	1.47	1.48
8.8000	1.49	1.50	1.51	1.52	1.53
8.8500	1.54	1.55	1.56	1.57	1.58
8.9000	1.60	1.61	1.62	1.63	1.64
8.9500	1.65	1.66	1.67	1.68	1.69
9.0000	1.71	1.72	1.73	1.74	1.75
9.0500	1.76	1.77	1.78	1.79	1.80
9.1000	1.81	1.83	1.84	1.85	1.86
9.1500	1.87	1.88	1.88	1.89	1.90
9.2000	1.91	1.92	1.93	1.94	1.94
9.2500	1.95	1.96	1.97	1.98	1.98
9.3000	1.99	2.00	2.00	2.01	2.02
9.3500	2.02	2.03	2.04	2.04	2.05
9.4000	2.06	2.06	2.07	2.07	2.08
9.4500	2.09	2.09	2.10	2.10	2.11
9.5000	2.12	2.12	2.13	2.13	2.14
9.5500	2.15	2.15	2.16	2.17	2.17
9.6000	2.18	2.19	2.20	2.21	2.22
9.6500	2.22	2.23	2.24	2.25	2.27

Macro Existing Conditions

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.7000	2.28	2.29	2.30	2.31	2.33
9.7500	2.34	2.35	2.37	2.38	2.40
9.8000	2.41	2.43	2.44	2.46	2.48
9.8500	2.49	2.51	2.52	2.54	2.56
9.9000	2.57	2.59	2.61	2.63	2.64
9.9500	2.66	2.68	2.70	2.72	2.73
10.0000	2.75	2.77	2.79	2.81	2.83
10.0500	2.85	2.87	2.89	2.91	2.93
10.1000	2.95	2.97	2.99	3.01	3.03
10.1500	3.05	3.07	3.10	3.12	3.14
10.2000	3.17	3.19	3.21	3.24	3.26
10.2500	3.29	3.31	3.34	3.36	3.39
10.3000	3.42	3.44	3.47	3.50	3.52
10.3500	3.55	3.58	3.60	3.63	3.66
10.4000	3.69	3.72	3.75	3.77	3.80
10.4500	3.83	3.86	3.89	3.92	3.95
10.5000	3.98	4.01	4.04	4.07	4.10
10.5500	4.13	4.16	4.19	4.23	4.26
10.6000	4.29	4.33	4.36	4.40	4.43
10.6500	4.47	4.51	4.54	4.58	4.62
10.7000	4.66	4.70	4.74	4.78	4.83
10.7500	4.87	4.91	4.96	5.00	5.05
10.8000	5.09	5.14	5.18	5.23	5.28
10.8500	5.33	5.38	5.42	5.47	5.52
10.9000	5.57	5.62	5.67	5.72	5.77
10.9500	5.82	5.88	5.93	5.98	6.03
11.0000	6.08	6.14	6.19	6.25	6.30
11.0500	6.36	6.42	6.48	6.54	6.60
11.1000	6.66	6.73	6.80	6.87	6.94
11.1500	7.02	7.10	7.17	7.26	7.34
11.2000	7.43	7.52	7.61	7.71	7.81
11.2500	7.91	8.01	8.11	8.21	8.32
11.3000	8.43	8.54	8.65	8.77	8.88
11.3500	9.00	9.12	9.24	9.35	9.47
11.4000	9.60	9.72	9.84	9.97	10.10
11.4500	10.22	10.35	10.48	10.61	10.73
11.5000	10.90	11.08	11.25	11.46	11.74
11.5500	12.02	12.31	12.72	13.19	13.66
11.6000	14.18	14.93	15.68	16.44	17.41
11.6500	18.48	19.56	20.70	22.21	23.72
11.7000	25.24	27.04	29.03	31.03	33.04
11.7500	35.44	37.84	40.24	42.93	45.88
11.8000	48.83	51.78	55.46	59.15	62.84
11.8500	66.90	71.42	75.95	80.47	85.78
11.9000	91.17	96.56	102.00	107.51	113.02
11.9500	118.53	123.23	127.76	132.30	136.28

Macro Existing Conditions

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
12.0000	138.97	141.66	144.34	145.30	145.72
12.0500	146.13	145.96	143.77	141.58	139.39
12.1000	135.73	131.42	127.11	122.66	117.45
12.1500	112.24	107.04	101.91	96.83	91.75
12.2000	86.72	82.23	77.75	73.27	69.30
12.2500	65.78	62.25	58.74	56.13	53.53
12.3000	50.93	48.64	46.69	44.74	42.78
12.3500	41.24	39.72	38.20	36.81	35.61
12.4000	34.41	33.21	32.21	31.24	30.27
12.4500	29.35	28.55	27.75	26.95	26.25
12.5000	25.57	24.89	24.24	23.65	23.07
12.5500	22.48	21.96	21.45	20.95	20.46
12.6000	20.02	19.58	19.15	18.75	18.37
12.6500	18.00	17.63	17.31	17.00	16.68
12.7000	16.40	16.14	15.88	15.63	15.42
12.7500	15.21	14.99	14.80	14.63	14.46
12.8000	14.29	14.14	13.99	13.85	13.72
12.8500	13.60	13.47	13.35	13.24	13.14
12.9000	13.03	12.92	12.82	12.72	12.61
12.9500	12.51	12.42	12.32	12.23	12.13
13.0000	12.04	11.95	11.86	11.77	11.67
13.0500	11.59	11.50	11.42	11.33	11.25
13.1000	11.17	11.09	11.01	10.93	10.86
13.1500	10.78	10.71	10.64	10.57	10.50
13.2000	10.44	10.37	10.31	10.25	10.19
13.2500	10.13	10.07	10.02	9.96	9.91
13.3000	9.85	9.80	9.75	9.69	9.64
13.3500	9.59	9.54	9.49	9.44	9.40
13.4000	9.35	9.30	9.25	9.20	9.15
13.4500	9.11	9.06	9.01	8.96	8.92
13.5000	8.87	8.82	8.78	8.73	8.68
13.5500	8.64	8.59	8.55	8.50	8.46
13.6000	8.41	8.37	8.32	8.28	8.24
13.6500	8.19	8.15	8.11	8.07	8.03
13.7000	7.99	7.95	7.92	7.88	7.84
13.7500	7.80	7.77	7.73	7.69	7.66
13.8000	7.62	7.59	7.55	7.52	7.48
13.8500	7.45	7.41	7.38	7.35	7.31
13.9000	7.28	7.24	7.21	7.18	7.14
13.9500	7.11	7.08	7.04	7.01	6.97
14.0000	6.94	6.91	6.88	6.84	6.81
14.0500	6.78	6.75	6.71	6.68	6.65
14.1000	6.62	6.60	6.57	6.54	6.51
14.1500	6.49	6.46	6.44	6.41	6.39
14.2000	6.37	6.35	6.32	6.31	6.29
14.2500	6.27	6.25	6.23	6.21	6.20

Macro Existing Conditions

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
14.3000	6.18	6.17	6.15	6.14	6.12
14.3500	6.11	6.09	6.08	6.07	6.05
14.4000	6.04	6.03	6.02	6.00	5.99
14.4500	5.98	5.96	5.95	5.94	5.93
14.5000	5.92	5.90	5.89	5.88	5.87
14.5500	5.86	5.85	5.83	5.82	5.81
14.6000	5.80	5.79	5.77	5.76	5.75
14.6500	5.74	5.73	5.72	5.70	5.69
14.7000	5.68	5.67	5.66	5.65	5.63
14.7500	5.62	5.61	5.60	5.59	5.58
14.8000	5.57	5.55	5.54	5.53	5.52
14.8500	5.51	5.50	5.48	5.47	5.46
14.9000	5.45	5.44	5.43	5.42	5.40
14.9500	5.39	5.38	5.37	5.36	5.35
15.0000	5.34	5.32	5.31	5.30	5.29
15.0500	5.28	5.27	5.25	5.24	5.23
15.1000	5.22	5.21	5.20	5.19	5.17
15.1500	5.16	5.15	5.14	5.13	5.12
15.2000	5.11	5.09	5.08	5.07	5.06
15.2500	5.05	5.03	5.02	5.01	5.00
15.3000	4.99	4.98	4.96	4.95	4.94
15.3500	4.93	4.92	4.91	4.90	4.88
15.4000	4.87	4.86	4.85	4.84	4.82
15.4500	4.81	4.80	4.79	4.78	4.77
15.5000	4.76	4.74	4.73	4.72	4.71
15.5500	4.70	4.69	4.67	4.66	4.65
15.6000	4.64	4.63	4.62	4.60	4.59
15.6500	4.58	4.57	4.56	4.55	4.53
15.7000	4.52	4.51	4.50	4.49	4.48
15.7500	4.46	4.45	4.44	4.43	4.42
15.8000	4.41	4.39	4.38	4.37	4.36
15.8500	4.35	4.33	4.32	4.31	4.30
15.9000	4.29	4.28	4.26	4.25	4.24
15.9500	4.23	4.22	4.21	4.19	4.18
16.0000	4.17	4.16	4.15	4.14	4.12
16.0500	4.11	4.10	4.09	4.08	4.07
16.1000	4.06	4.05	4.04	4.03	4.02
16.1500	4.01	4.00	3.99	3.98	3.98
16.2000	3.97	3.96	3.95	3.94	3.94
16.2500	3.93	3.92	3.92	3.91	3.91
16.3000	3.90	3.89	3.89	3.88	3.88
16.3500	3.87	3.87	3.86	3.86	3.86
16.4000	3.85	3.85	3.84	3.84	3.83
16.4500	3.83	3.82	3.82	3.81	3.81
16.5000	3.81	3.80	3.80	3.79	3.79
16.5500	3.78	3.78	3.78	3.77	3.77

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
16.6000	3.76	3.76	3.75	3.75	3.75
16.6500	3.74	3.74	3.73	3.73	3.73
16.7000	3.72	3.72	3.71	3.71	3.71
16.7500	3.70	3.70	3.69	3.69	3.69
16.8000	3.68	3.68	3.67	3.67	3.66
16.8500	3.66	3.66	3.65	3.65	3.64
16.9000	3.64	3.63	3.63	3.63	3.62
16.9500	3.62	3.61	3.61	3.61	3.60
17.0000	3.60	3.59	3.59	3.59	3.58
17.0500	3.58	3.57	3.57	3.56	3.56
17.1000	3.55	3.55	3.55	3.54	3.54
17.1500	3.53	3.53	3.53	3.52	3.52
17.2000	3.51	3.51	3.50	3.50	3.50
17.2500	3.49	3.49	3.48	3.48	3.48
17.3000	3.47	3.47	3.46	3.46	3.45
17.3500	3.45	3.45	3.44	3.44	3.43
17.4000	3.43	3.43	3.42	3.42	3.41
17.4500	3.41	3.40	3.40	3.40	3.39
17.5000	3.39	3.38	3.38	3.38	3.37
17.5500	3.37	3.37	3.36	3.36	3.35
17.6000	3.35	3.34	3.34	3.34	3.33
17.6500	3.33	3.32	3.32	3.31	3.31
17.7000	3.31	3.30	3.30	3.29	3.29
17.7500	3.28	3.28	3.28	3.27	3.27
17.8000	3.26	3.26	3.25	3.25	3.25
17.8500	3.24	3.24	3.23	3.23	3.22
17.9000	3.22	3.22	3.21	3.21	3.20
17.9500	3.20	3.20	3.19	3.19	3.18
18.0000	3.18	3.17	3.17	3.17	3.16
18.0500	3.16	3.15	3.15	3.15	3.14
18.1000	3.14	3.13	3.13	3.12	3.12
18.1500	3.12	3.11	3.11	3.10	3.10
18.2000	3.10	3.09	3.09	3.08	3.08
18.2500	3.07	3.07	3.07	3.06	3.06
18.3000	3.05	3.05	3.05	3.04	3.04
18.3500	3.03	3.03	3.03	3.02	3.02
18.4000	3.01	3.01	3.00	3.00	3.00
18.4500	2.99	2.99	2.98	2.98	2.97
18.5000	2.97	2.97	2.96	2.96	2.95
18.5500	2.95	2.94	2.94	2.94	2.93
18.6000	2.93	2.92	2.92	2.91	2.91
18.6500	2.91	2.90	2.90	2.89	2.89
18.7000	2.88	2.88	2.87	2.87	2.87
18.7500	2.86	2.86	2.85	2.85	2.85
18.8000	2.84	2.84	2.83	2.83	2.83
18.8500	2.82	2.82	2.81	2.81	2.80

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
18.9000	2.80	2.80	2.79	2.79	2.78
18.9500	2.78	2.77	2.77	2.77	2.76
19.0000	2.76	2.75	2.75	2.74	2.74
19.0500	2.74	2.73	2.73	2.72	2.72
19.1000	2.72	2.71	2.71	2.70	2.70
19.1500	2.70	2.69	2.69	2.68	2.68
19.2000	2.67	2.67	2.67	2.66	2.66
19.2500	2.65	2.65	2.64	2.64	2.64
19.3000	2.63	2.63	2.62	2.62	2.61
19.3500	2.61	2.61	2.60	2.60	2.59
19.4000	2.59	2.58	2.58	2.57	2.57
19.4500	2.57	2.56	2.56	2.55	2.55
19.5000	2.54	2.54	2.54	2.53	2.53
19.5500	2.52	2.52	2.51	2.51	2.51
19.6000	2.50	2.50	2.49	2.49	2.49
19.6500	2.48	2.48	2.47	2.47	2.46
19.7000	2.46	2.46	2.45	2.45	2.44
19.7500	2.44	2.44	2.43	2.43	2.42
19.8000	2.42	2.41	2.41	2.40	2.40
19.8500	2.40	2.39	2.39	2.38	2.38
19.9000	2.38	2.37	2.37	2.36	2.36
19.9500	2.36	2.35	2.35	2.34	2.34
20.0000	2.33	2.33	2.33	2.32	2.32
20.0500	2.31	2.31	2.30	2.30	2.30
20.1000	2.29	2.29	2.29	2.28	2.28
20.1500	2.28	2.27	2.27	2.27	2.26
20.2000	2.26	2.26	2.26	2.26	2.25
20.2500	2.25	2.25	2.25	2.25	2.24
20.3000	2.24	2.24	2.24	2.24	2.24
20.3500	2.24	2.23	2.23	2.23	2.23
20.4000	2.23	2.23	2.23	2.23	2.23
20.4500	2.22	2.22	2.22	2.22	2.22
20.5000	2.22	2.22	2.22	2.22	2.22
20.5500	2.22	2.21	2.21	2.21	2.21
20.6000	2.21	2.21	2.21	2.21	2.21
20.6500	2.21	2.21	2.20	2.20	2.20
20.7000	2.20	2.20	2.20	2.20	2.20
20.7500	2.20	2.20	2.20	2.20	2.20
20.8000	2.19	2.19	2.19	2.19	2.19
20.8500	2.19	2.19	2.19	2.19	2.19
20.9000	2.19	2.19	2.18	2.18	2.18
20.9500	2.18	2.18	2.18	2.18	2.18
21.0000	2.18	2.18	2.18	2.17	2.17
21.0500	2.17	2.17	2.17	2.17	2.17
21.1000	2.17	2.17	2.17	2.17	2.17
21.1500	2.17	2.16	2.16	2.16	2.16

Macro Existing Conditions

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
21.2000	2.16	2.16	2.16	2.16	2.16
21.2500	2.16	2.16	2.16	2.15	2.15
21.3000	2.15	2.15	2.15	2.15	2.15
21.3500	2.15	2.15	2.15	2.15	2.15
21.4000	2.14	2.14	2.14	2.14	2.14
21.4500	2.14	2.14	2.14	2.14	2.14
21.5000	2.14	2.14	2.13	2.13	2.13
21.5500	2.13	2.13	2.13	2.13	2.13
21.6000	2.13	2.13	2.13	2.13	2.13
21.6500	2.12	2.12	2.12	2.12	2.12
21.7000	2.12	2.12	2.12	2.12	2.12
21.7500	2.12	2.12	2.11	2.11	2.11
21.8000	2.11	2.11	2.11	2.11	2.11
21.8500	2.11	2.11	2.11	2.10	2.10
21.9000	2.10	2.10	2.10	2.10	2.10
21.9500	2.10	2.10	2.10	2.10	2.10
22.0000	2.10	2.09	2.09	2.09	2.09
22.0500	2.09	2.09	2.09	2.09	2.09
22.1000	2.09	2.09	2.09	2.08	2.08
22.1500	2.08	2.08	2.08	2.08	2.08
22.2000	2.08	2.08	2.08	2.08	2.07
22.2500	2.07	2.07	2.07	2.07	2.07
22.3000	2.07	2.07	2.07	2.07	2.07
22.3500	2.07	2.07	2.06	2.06	2.06
22.4000	2.06	2.06	2.06	2.06	2.06
22.4500	2.06	2.06	2.06	2.06	2.05
22.5000	2.05	2.05	2.05	2.05	2.05
22.5500	2.05	2.05	2.05	2.05	2.05
22.6000	2.05	2.04	2.04	2.04	2.04
22.6500	2.04	2.04	2.04	2.04	2.04
22.7000	2.04	2.04	2.03	2.03	2.03
22.7500	2.03	2.03	2.03	2.03	2.03
22.8000	2.03	2.03	2.03	2.03	2.03
22.8500	2.02	2.02	2.02	2.02	2.02
22.9000	2.02	2.02	2.02	2.02	2.02
22.9500	2.02	2.02	2.01	2.01	2.01
23.0000	2.01	2.01	2.01	2.01	2.01
23.0500	2.01	2.01	2.01	2.00	2.00
23.1000	2.00	2.00	2.00	2.00	2.00
23.1500	2.00	2.00	2.00	2.00	2.00
23.2000	2.00	1.99	1.99	1.99	1.99
23.2500	1.99	1.99	1.99	1.99	1.99
23.3000	1.99	1.99	1.99	1.98	1.98
23.3500	1.98	1.98	1.98	1.98	1.98
23.4000	1.98	1.98	1.98	1.98	1.97
23.4500	1.97	1.97	1.97	1.97	1.97

Macro Existing Conditions

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: D-5 Storm Event: 2-Yr (TP-40)
Scenario: 2-Yr (TP-40)

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.0100 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.5000	1.97	1.97	1.97	1.97	1.97
23.5500	1.97	1.96	1.96	1.96	1.96
23.6000	1.96	1.96	1.96	1.96	1.96
23.6500	1.96	1.96	1.96	1.95	1.95
23.7000	1.95	1.95	1.95	1.95	1.95
23.7500	1.95	1.95	1.95	1.95	1.95
23.8000	1.94	1.94	1.94	1.94	1.94
23.8500	1.94	1.94	1.94	1.94	1.94
23.9000	1.94	1.93	1.93	1.93	1.93
23.9500	1.93	1.93	1.93	1.93	1.93
24.0000	1.92	1.92	1.91	1.89	1.88
24.0500	1.85	1.82	1.79	1.75	1.69
24.1000	1.63	1.57	1.51	1.43	1.35
24.1500	1.27	1.19	1.11	1.03	0.96
24.2000	0.88	0.81	0.74	0.68	0.62
24.2500	0.56	0.51	0.47	0.42	0.38
24.3000	0.35	0.32	0.29	0.26	0.24
24.3500	0.22	0.20	0.18	0.17	0.15
24.4000	0.14	0.13	0.11	0.10	0.09
24.4500	0.09	0.08	0.07	0.06	0.06
24.5000	0.05	0.05	0.04	0.04	0.04
24.5500	0.03	0.03	0.03	0.02	0.02
24.6000	0.02	0.02	0.02	0.01	0.01
24.6500	0.01	0.01	0.01	0.01	0.01
24.7000	0.01	0.01	0.00	0.00	0.00
24.7500	0.00	0.00	0.00	0.00	0.00
24.8000	0.00	0.00	(N/A)	(N/A)	(N/A)

Macro Existing Conditions

Project Summary	
Title	
Engineer	
Company	
Date	11/20/2014

Notes

Requested Pond Water Surface Elevations	
Minimum (Headwater)	992.0000 ft
Increment (Headwater)	0.1000 ft
Maximum (Headwater)	998.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Area	Orifice - 1	Forward	Culvert - 1	992.0000	998.0001
Culvert-Circular	Culvert - 1	Forward	TW	981.0000	998.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Area	
Number of Openings	1
Elevation	992.0000 ft
Orifice Area	4.2 ft²
Top Elevation	992.8300 ft
Datum Elevation	992.0000 ft
Orifice Coefficient	0.600

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	36.0 in
Length	280.00 ft
Length (Computed Barrel)	280.04 ft
Slope (Computed)	0.018 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.500
Kb	0.007
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0098
M	2.0000
C	0.0398
Y	0.6700
T1 ratio (HW/D)	1.151
T2 ratio (HW/D)	1.298
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	984.4539 ft	T1 Flow	42.85 ft³/s
T2 Elevation	984.8936 ft	T2 Flow	48.97 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Macro Existing Conditions

Subsection: Outlet Input Data
Label: E1 Overflow to D2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	927.1000 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	935.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	931.0000	935.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
-43.42	935.00
-23.24	934.00
-18.95	933.00
-14.67	932.00
0.00	931.00
8.60	932.00
16.78	933.00
26.27	934.00
29.55	935.00

Lowest Elevation	931.0000 ft
Weir Coefficient	2.80 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: Highway Crossing D4
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	952.0000 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	964.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	Culvert - 1	Forward	TW	952.0000	966.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Highway Crossing D4
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: Culvert - 1 Structure Type: Culvert-Box	
Number of Barrels	1
Width	8.00 ft
Height	5.00 ft
Length	323.00 ft
Length (Computed Barrel)	323.02 ft
Slope (Computed)	0.012 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.003
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.136
T2 ratio (HW/D)	1.191
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	957.6806 ft	T1 Flow	313.05 ft³/s
T2 Elevation	957.9550 ft	T2 Flow	357.77 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	956.8500 ft
Increment (Headwater)	0.1000 ft
Maximum (Headwater)	972.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Area	Grate Inlet	Forward	66" RCP	956.8500	972.0001
Culvert-Circular	66" RCP	Forward	TW	945.7000	972.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Inlet C2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: Grate Inlet Structure Type: Orifice-Area	
Number of Openings	1
Elevation	956.8500 ft
Orifice Area	27.2 ft²
Top Elevation	0.0000 ft
Datum Elevation	0.0000 ft
Orifice Coefficient	0.600

Structure ID: 66" RCP Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	66.0 in
Length	177.00 ft
Length (Computed Barrel)	177.00 ft
Slope (Computed)	0.003 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.003
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.094
T2 ratio (HW/D)	1.196
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	951.7149 ft	T1 Flow	195.01 ft³/s
T2 Elevation	952.2753 ft	T2 Flow	222.87 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: Pt. A3 Drive Culverts
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	900.8100 ft
Increment (Headwater)	0.1000 ft
Maximum (Headwater)	912.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward	TW	900.8100	912.0001
Irregular Weir	Weir - 1	Forward	TW	907.2400	912.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	84.0 in
Length	66.60 ft
Length (Computed Barrel)	66.60 ft
Slope (Computed)	0.006 ft/ft

Outlet Control Data	
Manning's n	0.026
Ke	0.200
Kb	0.009
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.092
T2 ratio (HW/D)	1.194
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	908.4573 ft	T1 Flow	356.37 ft³/s
T2 Elevation	909.1704 ft	T2 Flow	407.28 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	912.00
22.00	910.00
43.10	908.52
76.73	907.24
124.40	907.44
157.13	908.16
223.83	908.35
251.00	908.60
265.18	909.00
270.32	910.00
277.43	912.00

Lowest Elevation	907.2400 ft
Weir Coefficient	2.80 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Pt. A5 Former Pond
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	929.0000 ft
Increment (Headwater)	0.1000 ft
Maximum (Headwater)	940.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	929.0000	940.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	940.00
23.88	938.00
64.85	936.00
167.91	934.00
238.10	932.00
246.58	930.00
251.38	929.00
253.10	929.00
257.52	930.00
263.49	932.00
268.12	934.00
273.30	936.00
297.08	938.00
333.50	940.00

Lowest Elevation	929.0000 ft
Weir Coefficient	2.80 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: RCB Sta,. 25+65
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	945.3000 ft
Increment (Headwater)	0.1000 ft
Maximum (Headwater)	958.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	RCB: 13 x 7 x 125.8'	Forward	TW	945.3000	958.0001
Irregular Weir	Roadway Weir	Forward	TW	955.6500	958.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: RCB Sta,. 25+65
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: RCB: 13 x 7 x 125.8' Structure Type: Culvert-Box	
Number of Barrels	1
Width	13.00 ft
Height	7.00 ft
Length	125.80 ft
Length (Computed Barrel)	126.04 ft
Slope (Computed)	0.062 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.002
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 2
K	0.4860
M	0.6670
C	0.0249
Y	0.8300
T1 ratio (HW/D)	1.121
T2 ratio (HW/D)	1.197
Slope Correction Factor	-0.500

Use unsubmerged inlet control 1 equation below T1 elevation.
Use submerged inlet control 1 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	953.1456 ft	T1 Flow	842.67 ft³/s
T2 Elevation	953.6818 ft	T2 Flow	963.05 ft³/s

Structure ID: Roadway Weir
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	958.00
46.50	957.00
118.20	956.00
206.10	955.65
276.80	956.00
345.40	957.00
392.40	958.00

Lowest Elevation	955.6500 ft
Weir Coefficient	2.60 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Macro Existing Conditions

Subsection: Outlet Input Data
Label: RCB Sta. 45+15
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	916.2200 ft
Increment (Headwater)	0.1000 ft
Maximum (Headwater)	930.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	RCB: 2x 10 x 7 x 174.4'	Forward	TW	916.2200	930.0001
Irregular Weir	Roadway Weir	Forward	TW	928.6800	930.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: RCB Sta. 45+15
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: RCB: 2x 10 x 7 x 174.4' Structure Type: Culvert-Box	
Number of Barrels	2
Width	10.00 ft
Height	7.00 ft
Length	174.40 ft
Length (Computed Barrel)	174.46 ft
Slope (Computed)	0.027 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.400
Kb	0.002
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 2
K	0.5450
M	0.6670
C	0.0451
Y	0.7300
T1 ratio (HW/D)	1.257
T2 ratio (HW/D)	1.437
Slope Correction Factor	-0.500

Use unsubmerged inlet control 1 equation below T1 elevation.
Use submerged inlet control 1 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	925.0181 ft	T1 Flow	648.21 ft³/s
T2 Elevation	926.2817 ft	T2 Flow	740.81 ft³/s

Structure ID: Roadway Weir
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	930.00
64.20	929.00
155.00	928.68
244.30	929.00
309.00	930.00

Lowest Elevation	928.6800 ft
Weir Coefficient	2.60 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: Road Crossing D2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	926.0400 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	935.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	Culvert - 1	Forward	TW	926.0400	935.0001
Irregular Weir	Weir - 1	Forward	TW	931.0000	935.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Road Crossing D2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: Culvert - 1 Structure Type: Culvert-Box	
Number of Barrels	1
Width	10.00 ft
Height	6.00 ft
Length	40.51 ft
Length (Computed Barrel)	40.51 ft
Slope (Computed)	0.010 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.002
Kr	0.000
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.137
T2 ratio (HW/D)	1.192
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	932.8650 ft	T1 Flow	514.39 ft³/s
T2 Elevation	933.1943 ft	T2 Flow	587.88 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
-43.42	935.00
-23.24	934.00
-18.95	933.00
-14.67	932.00
0.00	931.00
8.66	932.00
16.78	933.00
26.27	934.00
29.55	935.00

Lowest Elevation	931.0000 ft
Weir Coefficient	2.80 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	974.0000 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	986.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	Culvert - 1	Forward	TW	974.0000	986.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Road Crossing D5
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: Culvert - 1 Structure Type: Culvert-Box	
Number of Barrels	1
Width	5.00 ft
Height	6.00 ft
Length	265.00 ft
Length (Computed Barrel)	265.07 ft
Slope (Computed)	0.023 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.003
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.131
T2 ratio (HW/D)	1.186
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	980.7859 ft	T1 Flow	257.20 ft³/s
T2 Elevation	981.1153 ft	T2 Flow	293.94 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: Road Crossing E1
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	927.1000 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	935.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	Culvert - 1	Forward	TW	927.1000	935.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Road Crossing E1
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: Culvert - 1 Structure Type: Culvert-Box	
Number of Barrels	1
Width	3.00 ft
Height	4.00 ft
Length	48.89 ft
Length (Computed Barrel)	48.94 ft
Slope (Computed)	0.043 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.006
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.121
T2 ratio (HW/D)	1.176
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	931.5833 ft	T1 Flow	84.00 ft³/s
T2 Elevation	931.8029 ft	T2 Flow	96.00 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: Road Crossing F2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	940.6600 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	950.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	Culvert - 1	Forward	TW	940.6600	950.0001
Irregular Weir	Weir - 1	Forward	TW	947.3600	950.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Road Crossing F2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: Culvert - 1 Structure Type: Culvert-Box	
Number of Barrels	1
Width	2.00 ft
Height	2.00 ft
Length	47.85 ft
Length (Computed Barrel)	47.90 ft
Slope (Computed)	0.044 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.120
T2 ratio (HW/D)	1.175
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	942.9007 ft	T1 Flow	19.80 ft³/s
T2 Elevation	943.0105 ft	T2 Flow	22.63 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
-121.53	950.00
-91.57	949.00
-55.98	948.00
0.00	947.36
75.05	948.00
116.63	949.00
160.45	950.00

Lowest Elevation	947.3600 ft
Weir Coefficient	2.80 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: Road Crossing G2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	944.5000 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	952.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Box	Culvert - 1	Forward	TW	944.5000	952.0001
Irregular Weir	Weir - 1	Forward	TW	949.0000	952.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Macro Existing Conditions

Subsection: Outlet Input Data
Label: Road Crossing G2
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Structure ID: Culvert - 1 Structure Type: Culvert-Box	
Number of Barrels	1
Width	2.00 ft
Height	2.00 ft
Length	39.34 ft
Length (Computed Barrel)	39.34 ft
Slope (Computed)	0.008 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.138
T2 ratio (HW/D)	1.193
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	946.7767 ft	T1 Flow	19.80 ft³/s
T2 Elevation	946.8865 ft	T2 Flow	22.63 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
-150.53	952.00
-119.12	951.00
-78.68	950.00
0.00	949.00
72.91	950.00
113.04	951.00
141.59	952.00

Lowest Elevation	949.0000 ft
Weir Coefficient	2.80 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Outlet Input Data
Label: Road Crossing H1
Scenario: 100-Yr (TP-40)

Return Event: 100 years
Storm Event: 100-Yr (TP-40)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	908.3100 ft
Increment (Headwater)	0.5000 ft
Maximum (Headwater)	915.0000 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward	TW	908.3100	915.0001
Irregular Weir	Weir - 1	Forward	TW	912.0000	915.0001
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	36.0 in
Length	37.87 ft
Length (Computed Barrel)	38.07 ft
Slope (Computed)	0.103 ft/ft

Outlet Control Data	
Manning's n	0.026
Ke	0.200
Kb	0.029
Kr	0.500
Convergence Tolerance	0.0010 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.044
T2 ratio (HW/D)	1.146
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	911.4411 ft	T1 Flow	42.85 ft³/s
T2 Elevation	911.7467 ft	T2 Flow	48.97 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
-298.66	915.00
-208.00	914.00
-151.01	913.00
0.00	912.00
172.98	913.00
228.85	914.00
278.27	915.00

Lowest Elevation	912.0000 ft
Weir Coefficient	2.80 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.0100 ft
Tailwater Tolerance (Maximum)	0.5000 ft
Headwater Tolerance (Minimum)	0.0100 ft
Headwater Tolerance (Maximum)	0.5000 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Macro Existing Conditions

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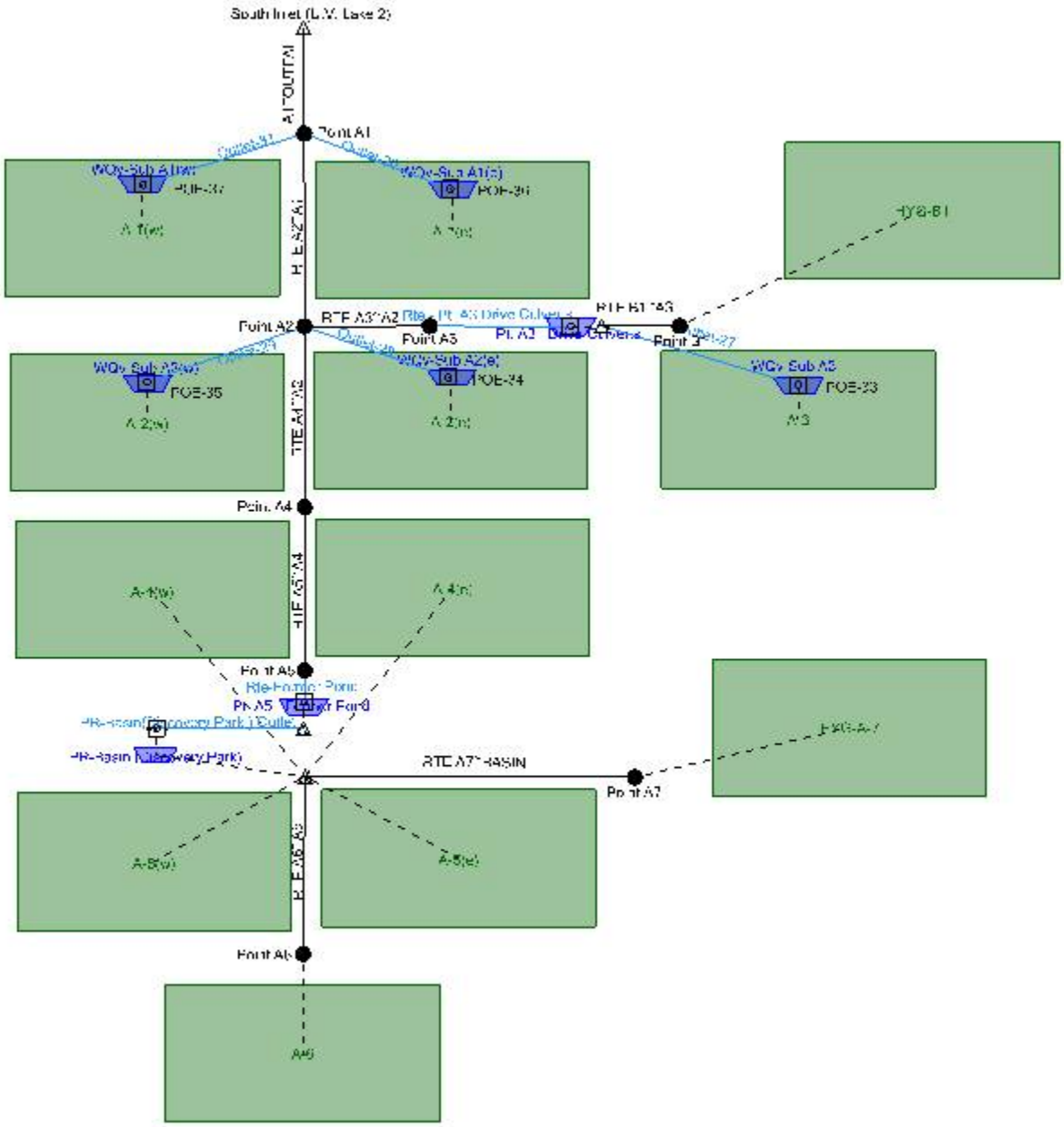
Macro Existing Conditions



Proposed Conditions

Project Summary	
Title	
Engineer	DFG
Company	Olsson
Date	3/21/2023

Notes

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Proposed Conditions

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
A-1(e)	2-Year	2	3.334	12.0100	53.90
A-1(e)	10-Year	10	6.782	11.9900	110.31
A-1(e)	100-Year	100	11.674	11.9900	187.81
A-1(w)	2-Year	2	4.908	12.0500	70.15
A-1(w)	10-Year	10	10.132	12.0500	146.86
A-1(w)	100-Year	100	17.597	12.0500	252.55
A-2(e)	2-Year	2	0.420	11.9400	7.64
A-2(e)	10-Year	10	0.819	11.9300	14.90
A-2(e)	100-Year	100	1.374	11.9300	24.63
A-2(w)	2-Year	2	2.301	12.0300	34.59
A-2(w)	10-Year	10	4.975	12.0300	76.77
A-2(w)	100-Year	100	8.884	12.0300	136.28
A-3	2-Year	2	3.574	11.9300	65.13
A-3	10-Year	10	6.787	11.9300	122.96
A-3	100-Year	100	11.198	11.9300	199.22
A-4(e)	2-Year	2	0.279	11.9300	5.05
A-4(e)	10-Year	10	0.491	11.9300	8.68
A-4(e)	100-Year	100	0.773	11.9300	13.33
A-4(w)	2-Year	2	0.817	11.9600	14.08
A-4(w)	10-Year	10	1.796	11.9400	32.12
A-4(w)	100-Year	100	3.239	11.9400	58.07
A-5(e)	2-Year	2	3.344	11.9300	60.82
A-5(e)	10-Year	10	6.033	11.9300	107.76
A-5(e)	100-Year	100	9.642	11.9300	168.25
A-5(w)	2-Year	2	8.184	11.9200	139.52
A-5(w)	10-Year	10	13.246	11.9200	219.80
A-5(w)	100-Year	100	19.806	11.9200	322.03
A-6	2-Year	2	2.077	11.9300	37.88
A-6	10-Year	10	3.893	11.9300	70.35
A-6	100-Year	100	6.372	11.9300	112.88
HYG-A-7	2-Year	2	14.580	12.0500	229.52
HYG-A-7	10-Year	10	27.333	12.0700	397.43
HYG-A-7	100-Year	100	44.871	12.0800	603.64
HYG-B1	2-Year	2	49.667	12.1100	615.17
HYG-B1	10-Year	10	91.457	12.1100	1,077.54
HYG-B1	100-Year	100	148.401	12.1400	1,553.02

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Point A1	2-Year	2	91.367	12.2500	822.31
Point A1	10-Year	10	171.623	12.2400	1,511.28
Point A1	100-Year	100	281.712	12.2400	2,280.25
Point A2	2-Year	2	83.974	12.1800	782.43
Point A2	10-Year	10	155.560	12.1700	1,425.45
Point A2	100-Year	100	253.290	12.1900	2,141.89

Proposed Conditions

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Point A3	2-Year	2	52.191	12.1600	625.11
Point A3	10-Year	10	97.194	12.1500	1,100.39
Point A3	100-Year	100	158.549	12.1700	1,586.54
Point A4	2-Year	2	29.282	12.2500	149.63
Point A4	10-Year	10	52.792	12.2600	308.87
Point A4	100-Year	100	84.703	12.2700	517.84
Point A5	2-Year	2	29.282	12.2300	149.69
Point A5	10-Year	10	52.792	12.2400	309.02
Point A5	100-Year	100	84.703	12.2500	518.01
Point A6	2-Year	2	2.077	11.9300	37.88
Point A6	10-Year	10	3.893	11.9300	70.35
Point A6	100-Year	100	6.372	11.9300	112.88
Point A7	2-Year	2	14.580	12.0500	229.52
Point A7	10-Year	10	27.333	12.0700	397.43
Point A7	100-Year	100	44.871	12.0800	603.64
Point B1	2-Year	2	49.667	12.1100	615.17
Point B1	10-Year	10	91.457	12.1100	1,077.54
Point B1	100-Year	100	148.401	12.1400	1,553.02

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pt. A3 - Drive-Culverts (IN)	2-Year	2	52.191	12.1400	629.47	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	2-Year	2	52.191	12.1600	625.11	908.4986	1.741
Pt. A3 - Drive-Culverts (IN)	10-Year	10	97.194	12.1400	1,103.01	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	10-Year	10	97.194	12.1500	1,100.39	909.0613	2.333
Pt. A3 - Drive-Culverts (IN)	100-Year	100	158.549	12.1600	1,588.34	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	100-Year	100	158.549	12.1700	1,586.54	909.4948	2.839
Pt. A5 - Former Pond (IN)	2-Year	2	29.282	12.2300	149.69	(N/A)	(N/A)

Proposed Conditions

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pt. A5 - Former Pond (OUT)	2-Year	2	29.282	12.2300	149.69	0.0000	0.000
Pt. A5 - Former Pond (IN)	10-Year	10	52.792	12.2400	309.02	(N/A)	(N/A)
Pt. A5 - Former Pond (OUT)	10-Year	10	52.792	12.2400	309.02	0.0000	0.000
Pt. A5 - Former Pond (IN)	100-Year	100	84.703	12.2500	518.01	(N/A)	(N/A)
Pt. A5 - Former Pond (OUT)	100-Year	100	84.703	12.2500	518.01	0.0000	0.000
PR-Basin (Discovery Park) (IN)	2-Year	2	29.282	12.0100	415.53	(N/A)	(N/A)
PR-Basin (Discovery Park) (OUT)	2-Year	2	29.282	12.2300	149.69	932.3414	11.012
PR-Basin (Discovery Park) (IN)	10-Year	10	52.792	12.0200	699.01	(N/A)	(N/A)
PR-Basin (Discovery Park) (OUT)	10-Year	10	52.792	12.2400	309.02	934.4178	18.514
PR-Basin (Discovery Park) (IN)	100-Year	100	84.703	12.0100	1,049.30	(N/A)	(N/A)
PR-Basin (Discovery Park) (OUT)	100-Year	100	84.703	12.2500	518.01	936.6462	27.201
WQv-Sub A3 (IN)	2-Year	2	3.574	11.9300	65.13	(N/A)	(N/A)
WQv-Sub A3 (OUT)	2-Year	2	2.524	11.9500	91.87	2.2850	1.064
WQv-Sub A3 (IN)	10-Year	10	6.787	11.9300	122.96	(N/A)	(N/A)
WQv-Sub A3 (OUT)	10-Year	10	5.737	11.9300	123.00	2.3459	1.067
WQv-Sub A3 (IN)	100-Year	100	11.198	11.9300	199.22	(N/A)	(N/A)
WQv-Sub A3 (OUT)	100-Year	100	10.148	11.9300	199.33	2.4788	1.074
WQv-Sub A2(w) (IN)	2-Year	2	2.301	12.0300	34.59	(N/A)	(N/A)
WQv-Sub A2(w) (OUT)	2-Year	2	2.111	12.0300	34.59	2.1450	0.194

Proposed Conditions

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
WQv-Sub A2(w) (IN)	10-Year	10	4.975	12.0300	76.77	(N/A)	(N/A)
WQv-Sub A2(w) (OUT)	10-Year	10	4.785	12.0300	76.76	2.2514	0.198
WQv-Sub A2(w) (IN)	100-Year	100	8.884	12.0300	136.28	(N/A)	(N/A)
WQv-Sub A2(w) (OUT)	100-Year	100	8.694	12.0300	136.29	2.3709	0.201
WQv-Sub A2(e) (IN)	2-Year	2	0.420	11.9400	7.64	(N/A)	(N/A)
WQv-Sub A2(e) (OUT)	2-Year	2	0.390	11.9400	7.64	2.0403	0.030
WQv-Sub A2(e) (IN)	10-Year	10	0.819	11.9300	14.90	(N/A)	(N/A)
WQv-Sub A2(e) (OUT)	10-Year	10	0.789	11.9300	14.90	2.0785	0.031
WQv-Sub A2(e) (IN)	100-Year	100	1.374	11.9300	24.63	(N/A)	(N/A)
WQv-Sub A2(e) (OUT)	100-Year	100	1.344	11.9300	24.63	2.1163	0.031
WQv-Sub A1(w) (IN)	2-Year	2	4.908	12.0500	70.15	(N/A)	(N/A)
WQv-Sub A1(w) (OUT)	2-Year	2	4.548	12.0500	70.11	2.2366	0.369
WQv-Sub A1(w) (IN)	10-Year	10	10.132	12.0500	146.86	(N/A)	(N/A)
WQv-Sub A1(w) (OUT)	10-Year	10	9.772	12.0500	146.85	2.3907	0.376
WQv-Sub A1(w) (IN)	100-Year	100	17.597	12.0500	252.55	(N/A)	(N/A)
WQv-Sub A1(w) (OUT)	100-Year	100	17.237	12.0500	252.61	2.5607	0.382
WQv-Sub A1(e) (IN)	2-Year	2	3.334	12.0100	53.90	(N/A)	(N/A)
WQv-Sub A1(e) (OUT)	2-Year	2	2.844	12.0100	53.84	2.2004	0.502
WQv-Sub A1(e) (IN)	10-Year	10	6.782	11.9900	110.31	(N/A)	(N/A)
WQv-Sub A1(e) (OUT)	10-Year	10	6.292	11.9900	110.15	2.3217	0.509
WQv-Sub A1(e) (IN)	100-Year	100	11.674	11.9900	187.81	(N/A)	(N/A)
WQv-Sub A1(e) (OUT)	100-Year	100	11.184	11.9900	187.63	2.4594	0.518

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1736 hours
Area (User Defined)	1,218,273.200 ft²

Computational Time Increment	0.0231 hours
Time to Peak (Computed)	11.9900 hours
Flow (Peak, Computed)	187.81 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9900 hours
Flow (Peak Interpolated Output)	187.81 ft³/s

Drainage Area	
SCS CN (Composite)	77.000
Area (User Defined)	1,218,273.200 ft²
Maximum Retention (Pervious)	2.99 in
Maximum Retention (Pervious, 20 percent)	0.60 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.01 in
Runoff Volume (Pervious)	11.674 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	11.674 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1736 hours
Computational Time Increment	0.0231 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	182.54 ft³/s
Unit peak time, Tp	0.1157 hours
Unit receding limb, Tr	0.4629 hours
Total unit time, Tb	0.5787 hours

Subsection: Unit Hydrograph Summary
Label: A-1(e)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2511 hours
Area (User Defined)	1,879,178.401 ft²

Computational Time Increment	0.0335 hours
Time to Peak (Computed)	12.0528 hours
Flow (Peak, Computed)	252.68 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0500 hours
Flow (Peak Interpolated Output)	252.55 ft³/s

Drainage Area	
SCS CN (Composite)	76.000
Area (User Defined)	1,879,178.401 ft²
Maximum Retention (Pervious)	3.16 in
Maximum Retention (Pervious, 20 percent)	0.63 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.89 in
Runoff Volume (Pervious)	17.597 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	17.597 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2511 hours
Computational Time Increment	0.0335 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	194.66 ft³/s
Unit peak time, Tp	0.1674 hours
Unit receding limb, Tr	0.6696 hours
Total unit time, Tb	0.8370 hours

Subsection: Unit Hydrograph Summary
Label: A-1(w)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	134,164.800 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	24.66 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	24.63 ft³/s

Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	134,164.800 ft²
Maximum Retention (Pervious)	2.50 in
Maximum Retention (Pervious, 20 percent)	0.50 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.35 in
Runoff Volume (Pervious)	1.374 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.374 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	34.90 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2133 hours
Area (User Defined)	1,019,739.600 ft²

Computational Time Increment	0.0284 hours
Time to Peak (Computed)	12.0301 hours
Flow (Peak, Computed)	136.29 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0300 hours
Flow (Peak Interpolated Output)	136.28 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	1,019,739.600 ft²
Maximum Retention (Pervious)	3.70 in
Maximum Retention (Pervious, 20 percent)	0.74 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.55 in
Runoff Volume (Pervious)	8.884 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	8.884 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2133 hours
Computational Time Increment	0.0284 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	124.35 ft³/s
Unit peak time, Tp	0.1422 hours
Unit receding limb, Tr	0.5688 hours
Total unit time, Tb	0.7110 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	1,048,038.590 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	199.41 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	199.22 ft³/s

Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	1,048,038.590 ft²
Maximum Retention (Pervious)	2.20 in
Maximum Retention (Pervious, 20 percent)	0.44 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.58 in
Runoff Volume (Pervious)	11.198 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	11.198 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	272.61 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Subsection: Unit Hydrograph Summary
Label: A-3
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	64,316.530 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	13.33 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	13.33 ft³/s

Drainage Area	
SCS CN (Composite)	88.000
Area (User Defined)	64,316.530 ft²
Maximum Retention (Pervious)	1.36 in
Maximum Retention (Pervious, 20 percent)	0.27 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.28 in
Runoff Volume (Pervious)	0.773 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.773 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	16.73 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1095 hours
Area (User Defined)	381,204.740 ft²

Computational Time Increment	0.0146 hours
Time to Peak (Computed)	11.9428 hours
Flow (Peak, Computed)	58.13 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9400 hours
Flow (Peak Interpolated Output)	58.07 ft³/s

Drainage Area	
SCS CN (Composite)	72.000
Area (User Defined)	381,204.740 ft²
Maximum Retention (Pervious)	3.89 in
Maximum Retention (Pervious, 20 percent)	0.78 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.44 in
Runoff Volume (Pervious)	3.239 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.239 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1095 hours
Computational Time Increment	0.0146 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	90.55 ft³/s
Unit peak time, Tp	0.0730 hours
Unit receding limb, Tr	0.2920 hours
Total unit time, Tb	0.3650 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	833,009.080 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	168.32 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	168.25 ft³/s

Drainage Area	
SCS CN (Composite)	86.000
Area (User Defined)	833,009.080 ft²
Maximum Retention (Pervious)	1.63 in
Maximum Retention (Pervious, 20 percent)	0.33 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.05 in
Runoff Volume (Pervious)	9.642 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9.642 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	216.67 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	1,455,610.630 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9200 hours
Flow (Peak, Computed)	322.03 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9200 hours
Flow (Peak Interpolated Output)	322.03 ft³/s

Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	1,455,610.630 ft²
Maximum Retention (Pervious)	0.53 in
Maximum Retention (Pervious, 20 percent)	0.11 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.11 in
Runoff Volume (Pervious)	19.806 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	19.806 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	378.62 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	584,231.800 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	112.97 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	112.88 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	584,231.800 ft²
Maximum Retention (Pervious)	2.05 in
Maximum Retention (Pervious, 20 percent)	0.41 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.70 in
Runoff Volume (Pervious)	6.372 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6.372 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	151.97 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Proposed Conditions

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Project Summary	
Title	Fully Developed Proposed Conditions
Engineer	DFG
Company	Olsson
Date	3/21/2023

Notes

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Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
A-1(e)	2-Year	2	5.137	11.9600	87.32
A-1(e)	10-Year	10	9.384	11.9600	157.07
A-1(e)	100-Year	100	15.116	11.9600	247.45
A-1(w)	2-Year	2	4.908	12.0500	70.15
A-1(w)	10-Year	10	10.132	12.0500	146.86
A-1(w)	100-Year	100	17.597	12.0500	252.55
A-2(e)	2-Year	2	0.420	11.9400	7.64
A-2(e)	10-Year	10	0.819	11.9300	14.90
A-2(e)	100-Year	100	1.374	11.9300	24.63
A-2(w)	2-Year	2	2.301	12.0300	34.59
A-2(w)	10-Year	10	4.975	12.0300	76.77
A-2(w)	100-Year	100	8.884	12.0300	136.28
A-3	2-Year	2	4.376	11.9300	79.39
A-3	10-Year	10	7.797	11.9300	138.56
A-3	100-Year	100	12.366	11.9300	214.51
A-4(e)	2-Year	2	0.290	11.9300	5.22
A-4(e)	10-Year	10	0.504	11.9300	8.85
A-4(e)	100-Year	100	0.788	11.9200	13.49
A-4(w)	2-Year	2	0.817	11.9600	14.08
A-4(w)	10-Year	10	1.796	11.9400	32.12
A-4(w)	100-Year	100	3.239	11.9400	58.07
A-5(e)	2-Year	2	4.202	11.9300	74.12
A-5(e)	10-Year	10	7.047	11.9300	120.76
A-5(e)	100-Year	100	10.767	11.9200	180.16
A-5(w)	2-Year	2	8.184	11.9200	139.52
A-5(w)	10-Year	10	13.245	11.9200	219.79
A-5(w)	100-Year	100	19.806	11.9200	322.02
A-6	2-Year	2	3.169	11.9300	54.75
A-6	10-Year	10	5.190	11.9200	87.16
A-6	100-Year	100	7.817	11.9200	128.41
HYG-A-7	2-Year	2	14.580	12.0500	229.52
HYG-A-7	10-Year	10	27.333	12.0700	397.43
HYG-A-7	100-Year	100	44.871	12.0800	603.64
HYG-B1	2-Year	2	49.667	12.1100	615.17
HYG-B1	10-Year	10	91.457	12.1100	1,077.54
HYG-B1	100-Year	100	148.401	12.1400	1,553.02

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Point A1	2-Year	2	95.932	12.2500	846.59
Point A1	10-Year	10	177.559	12.2400	1,539.67
Point A1	100-Year	100	288.906	12.2400	2,309.68
Point A2	2-Year	2	86.736	12.1800	803.35
Point A2	10-Year	10	158.893	12.1700	1,451.96
Point A2	100-Year	100	257.043	12.1900	2,169.95

Fully Developed Proposed Conditions

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Point A3	2-Year	2	52.992	12.1500	627.78
Point A3	10-Year	10	98.204	12.1500	1,103.02
Point A3	100-Year	100	159.717	12.1700	1,588.55
Point A4	2-Year	2	31.243	12.2300	163.90
Point A4	10-Year	10	55.115	12.2400	325.28
Point A4	100-Year	100	87.287	12.2500	534.89
Point A5	2-Year	2	31.243	12.2100	163.97
Point A5	10-Year	10	55.115	12.2200	325.43
Point A5	100-Year	100	87.287	12.2300	535.06
Point A6	2-Year	2	3.169	11.9300	54.75
Point A6	10-Year	10	5.190	11.9200	87.16
Point A6	100-Year	100	7.817	11.9200	128.41
Point A7	2-Year	2	14.580	12.0500	229.52
Point A7	10-Year	10	27.333	12.0700	397.43
Point A7	100-Year	100	44.871	12.0800	603.64
Point B1	2-Year	2	49.667	12.1100	615.17
Point B1	10-Year	10	91.457	12.1100	1,077.54
Point B1	100-Year	100	148.401	12.1400	1,553.02

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pt. A3 - Drive-Culverts (IN)	2-Year	2	52.992	12.1400	631.90	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	2-Year	2	52.992	12.1500	627.78	908.5030	1.746
Pt. A3 - Drive-Culverts (IN)	10-Year	10	98.204	12.1400	1,105.53	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	10-Year	10	98.204	12.1500	1,103.02	909.0639	2.336
Pt. A3 - Drive-Culverts (IN)	100-Year	100	159.717	12.1600	1,590.30	(N/A)	(N/A)
Pt. A3 - Drive-Culverts (OUT)	100-Year	100	159.717	12.1700	1,588.55	909.4965	2.842
Pt. A5 - Former Pond (IN)	2-Year	2	31.243	12.2100	163.97	(N/A)	(N/A)

Fully Developed Proposed Conditions

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pt. A5 - Former Pond (OUT)	2-Year	2	31.243	12.2100	163.97	0.0000	0.000
Pt. A5 - Former Pond (IN)	10-Year	10	55.115	12.2200	325.43	(N/A)	(N/A)
Pt. A5 - Former Pond (OUT)	10-Year	10	55.115	12.2200	325.43	0.0000	0.000
Pt. A5 - Former Pond (IN)	100-Year	100	87.287	12.2300	535.06	(N/A)	(N/A)
Pt. A5 - Former Pond (OUT)	100-Year	100	87.287	12.2300	535.06	0.0000	0.000
PR-Basin (Discovery Park) (IN)	2-Year	2	31.243	12.0100	447.89	(N/A)	(N/A)
PR-Basin (Discovery Park) (OUT)	2-Year	2	31.243	12.2100	163.97	932.5513	11.748
PR-Basin (Discovery Park) (IN)	10-Year	10	55.115	12.0100	738.58	(N/A)	(N/A)
PR-Basin (Discovery Park) (OUT)	10-Year	10	55.115	12.2200	325.43	934.6085	19.231
PR-Basin (Discovery Park) (IN)	100-Year	100	87.287	12.0100	1,095.79	(N/A)	(N/A)
PR-Basin (Discovery Park) (OUT)	100-Year	100	87.287	12.2300	535.06	936.8119	27.902
WQv-Sub A3 (IN)	2-Year	2	4.376	11.9300	79.39	(N/A)	(N/A)
WQv-Sub A3 (OUT)	2-Year	2	3.326	11.9300	79.73	2.2580	1.063
WQv-Sub A3 (IN)	10-Year	10	7.797	11.9300	138.56	(N/A)	(N/A)
WQv-Sub A3 (OUT)	10-Year	10	6.747	11.9300	138.65	2.3753	1.069
WQv-Sub A3 (IN)	100-Year	100	12.366	11.9300	214.51	(N/A)	(N/A)
WQv-Sub A3 (OUT)	100-Year	100	11.316	11.9300	214.67	2.5038	1.075
WQv-Sub A2(w) (IN)	2-Year	2	2.301	12.0300	34.59	(N/A)	(N/A)
WQv-Sub A2(w) (OUT)	2-Year	2	2.111	12.0300	34.59	2.1450	0.194

Fully Developed Proposed Conditions

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
WQv-Sub A2(w) (IN)	10-Year	10	4.975	12.0300	76.77	(N/A)	(N/A)
WQv-Sub A2(w) (OUT)	10-Year	10	4.785	12.0300	76.76	2.2514	0.198
WQv-Sub A2(w) (IN)	100-Year	100	8.884	12.0300	136.28	(N/A)	(N/A)
WQv-Sub A2(w) (OUT)	100-Year	100	8.694	12.0300	136.29	2.3709	0.201
WQv-Sub A2(e) (IN)	2-Year	2	0.420	11.9400	7.64	(N/A)	(N/A)
WQv-Sub A2(e) (OUT)	2-Year	2	0.390	11.9400	7.64	2.0403	0.030
WQv-Sub A2(e) (IN)	10-Year	10	0.819	11.9300	14.90	(N/A)	(N/A)
WQv-Sub A2(e) (OUT)	10-Year	10	0.789	11.9300	14.90	2.0785	0.031
WQv-Sub A2(e) (IN)	100-Year	100	1.374	11.9300	24.63	(N/A)	(N/A)
WQv-Sub A2(e) (OUT)	100-Year	100	1.344	11.9300	24.63	2.1163	0.031
WQv-Sub A1(w) (IN)	2-Year	2	4.908	12.0500	70.15	(N/A)	(N/A)
WQv-Sub A1(w) (OUT)	2-Year	2	4.548	12.0500	70.11	2.2366	0.369
WQv-Sub A1(w) (IN)	10-Year	10	10.132	12.0500	146.86	(N/A)	(N/A)
WQv-Sub A1(w) (OUT)	10-Year	10	9.772	12.0500	146.85	2.3907	0.376
WQv-Sub A1(w) (IN)	100-Year	100	17.597	12.0500	252.55	(N/A)	(N/A)
WQv-Sub A1(w) (OUT)	100-Year	100	17.237	12.0500	252.61	2.5607	0.382
WQv-Sub A1(e) (IN)	2-Year	2	5.137	11.9600	87.32	(N/A)	(N/A)
WQv-Sub A1(e) (OUT)	2-Year	2	4.647	11.9700	87.28	2.2748	0.506
WQv-Sub A1(e) (IN)	10-Year	10	9.384	11.9600	157.07	(N/A)	(N/A)
WQv-Sub A1(e) (OUT)	10-Year	10	8.894	11.9600	157.01	2.4087	0.515
WQv-Sub A1(e) (IN)	100-Year	100	15.116	11.9600	247.45	(N/A)	(N/A)
WQv-Sub A1(e) (OUT)	100-Year	100	14.626	11.9600	247.40	2.5529	0.523

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1401 hours
Area (User Defined)	1,331,597.560 ft²

Computational Time Increment	0.0187 hours
Time to Peak (Computed)	11.9552 hours
Flow (Peak, Computed)	248.26 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9600 hours
Flow (Peak Interpolated Output)	247.45 ft³/s

Drainage Area	
SCS CN (Composite)	85.000
Area (User Defined)	1,331,597.560 ft²
Maximum Retention (Pervious)	1.76 in
Maximum Retention (Pervious, 20 percent)	0.35 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.93 in
Runoff Volume (Pervious)	15.116 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	15.116 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1401 hours
Computational Time Increment	0.0187 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	247.23 ft³/s
Unit peak time, Tp	0.0934 hours
Unit receding limb, Tr	0.3736 hours
Total unit time, Tb	0.4670 hours

Fully Developed Proposed Conditions

Subsection: Unit Hydrograph Summary
Label: A-1(e)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2511 hours
Area (User Defined)	1,879,178.401 ft²

Computational Time Increment	0.0335 hours
Time to Peak (Computed)	12.0528 hours
Flow (Peak, Computed)	252.68 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0500 hours
Flow (Peak Interpolated Output)	252.55 ft³/s

Drainage Area	
SCS CN (Composite)	76.000
Area (User Defined)	1,879,178.401 ft²
Maximum Retention (Pervious)	3.16 in
Maximum Retention (Pervious, 20 percent)	0.63 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.89 in
Runoff Volume (Pervious)	17.597 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	17.597 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2511 hours
Computational Time Increment	0.0335 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	194.66 ft³/s
Unit peak time, Tp	0.1674 hours
Unit receding limb, Tr	0.6696 hours
Total unit time, Tb	0.8370 hours

Fully Developed Proposed Conditions

Subsection: Unit Hydrograph Summary
Label: A-1(w)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	134,164.800 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	24.66 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	24.63 ft³/s

Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	134,164.800 ft²
Maximum Retention (Pervious)	2.50 in
Maximum Retention (Pervious, 20 percent)	0.50 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.35 in
Runoff Volume (Pervious)	1.374 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.374 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	34.90 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Fully Developed Proposed Conditions

Subsection: Unit Hydrograph Summary
Label: A-2(e)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.2133 hours
Area (User Defined)	1,019,739.600 ft²

Computational Time Increment	0.0284 hours
Time to Peak (Computed)	12.0301 hours
Flow (Peak, Computed)	136.29 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	12.0300 hours
Flow (Peak Interpolated Output)	136.28 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	1,019,739.600 ft²
Maximum Retention (Pervious)	3.70 in
Maximum Retention (Pervious, 20 percent)	0.74 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.55 in
Runoff Volume (Pervious)	8.884 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	8.884 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.2133 hours
Computational Time Increment	0.0284 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	124.35 ft³/s
Unit peak time, Tp	0.1422 hours
Unit receding limb, Tr	0.5688 hours
Total unit time, Tb	0.7110 hours

Subsection: Unit Hydrograph Summary
Label: A-2(w)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	1,048,038.590 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9333 hours
Flow (Peak, Computed)	214.57 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9300 hours
Flow (Peak Interpolated Output)	214.51 ft³/s

Drainage Area	
SCS CN (Composite)	87.000
Area (User Defined)	1,048,038.590 ft²
Maximum Retention (Pervious)	1.49 in
Maximum Retention (Pervious, 20 percent)	0.30 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.17 in
Runoff Volume (Pervious)	12.366 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	12.366 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	272.61 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Subsection: Unit Hydrograph Summary
Label: A-3
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	64,316.530 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9200 hours
Flow (Peak, Computed)	13.49 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9200 hours
Flow (Peak Interpolated Output)	13.49 ft³/s

Drainage Area	
SCS CN (Composite)	89.000
Area (User Defined)	64,316.530 ft²
Maximum Retention (Pervious)	1.24 in
Maximum Retention (Pervious, 20 percent)	0.25 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.40 in
Runoff Volume (Pervious)	0.788 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.788 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	16.73 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Fully Developed Proposed Conditions

Subsection: Unit Hydrograph Summary
Label: A-4(e)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1095 hours
Area (User Defined)	381,204.740 ft²

Computational Time Increment	0.0146 hours
Time to Peak (Computed)	11.9428 hours
Flow (Peak, Computed)	58.13 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9400 hours
Flow (Peak Interpolated Output)	58.07 ft³/s

Drainage Area	
SCS CN (Composite)	72.000
Area (User Defined)	381,204.740 ft²
Maximum Retention (Pervious)	3.89 in
Maximum Retention (Pervious, 20 percent)	0.78 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.44 in
Runoff Volume (Pervious)	3.239 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.239 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1095 hours
Computational Time Increment	0.0146 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	90.55 ft³/s
Unit peak time, Tp	0.0730 hours
Unit receding limb, Tr	0.2920 hours
Total unit time, Tb	0.3650 hours

Fully Developed Proposed Conditions

Subsection: Unit Hydrograph Summary
Label: A-4(w)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	833,009.030 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9200 hours
Flow (Peak, Computed)	180.16 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9200 hours
Flow (Peak Interpolated Output)	180.16 ft³/s

Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	833,009.030 ft²
Maximum Retention (Pervious)	0.87 in
Maximum Retention (Pervious, 20 percent)	0.17 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.76 in
Runoff Volume (Pervious)	10.767 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	10.767 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	216.67 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	1,455,578.170 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9200 hours
Flow (Peak, Computed)	322.02 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9200 hours
Flow (Peak Interpolated Output)	322.02 ft³/s

Drainage Area	
SCS CN (Composite)	95.000
Area (User Defined)	1,455,578.170 ft²
Maximum Retention (Pervious)	0.53 in
Maximum Retention (Pervious, 20 percent)	0.11 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.11 in
Runoff Volume (Pervious)	19.806 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	19.806 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	378.61 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

SCS Unit Hydrograph Parameters

Storm Event	100-Year
Return Event	100 years
Duration	72.0000 hours
Depth	7.71 in
Time of Concentration (Composite)	0.1000 hours
Area (User Defined)	584,231.800 ft²

Computational Time Increment	0.0133 hours
Time to Peak (Computed)	11.9200 hours
Flow (Peak, Computed)	128.41 ft³/s
Output Increment	0.0100 hours
Time to Flow (Peak Interpolated Output)	11.9200 hours
Flow (Peak Interpolated Output)	128.41 ft³/s

Drainage Area	
SCS CN (Composite)	94.000
Area (User Defined)	584,231.800 ft²
Maximum Retention (Pervious)	0.64 in
Maximum Retention (Pervious, 20 percent)	0.13 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.99 in
Runoff Volume (Pervious)	7.817 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	7.817 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.1000 hours
Computational Time Increment	0.0133 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	151.97 ft³/s
Unit peak time, Tp	0.0667 hours
Unit receding limb, Tr	0.2667 hours
Total unit time, Tb	0.3333 hours

Fully Developed Proposed Conditions

Subsection: Unit Hydrograph Summary
Label: A-6
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters

Fully Developed Proposed Conditions

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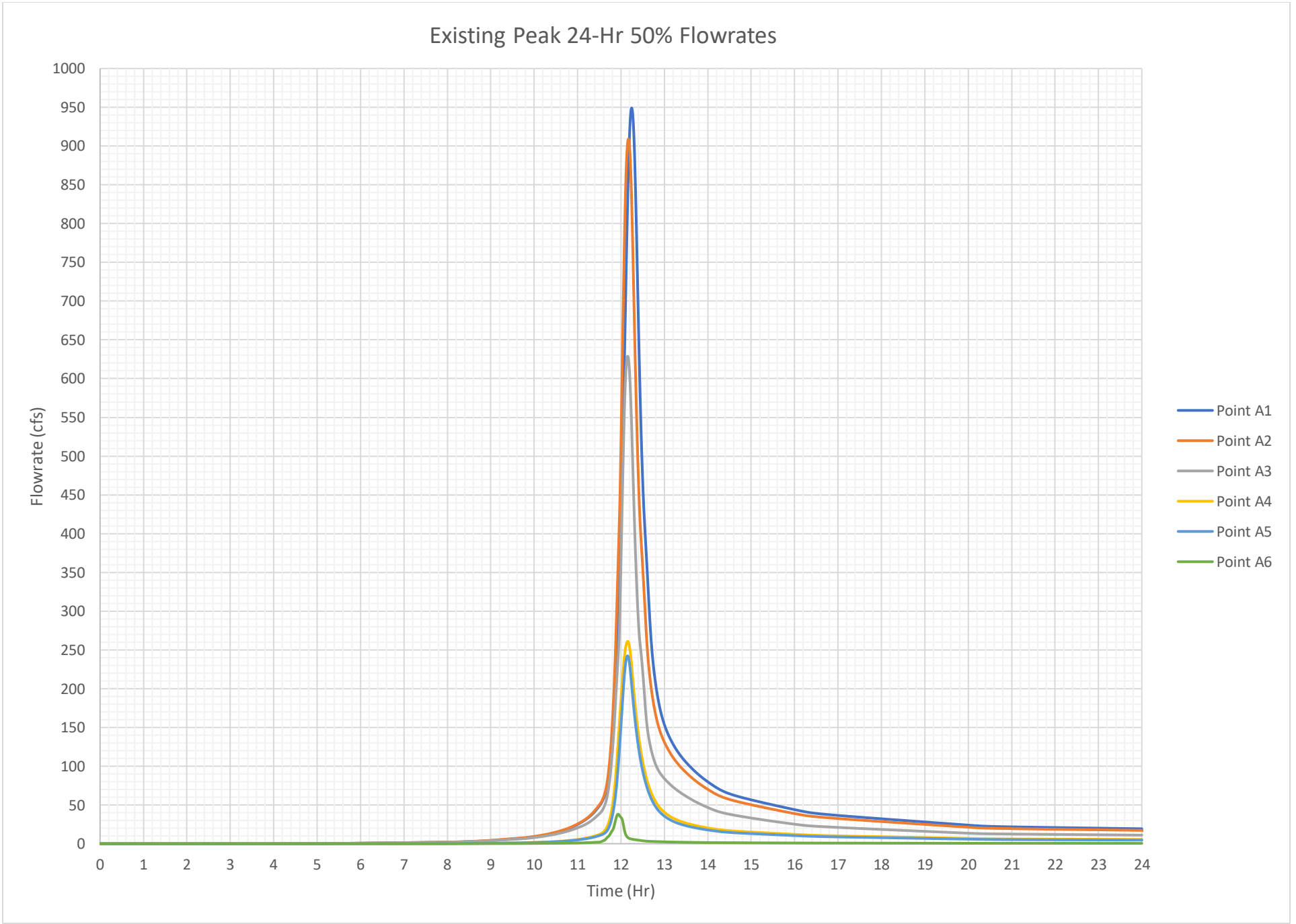
8. EXHIBITS AND HYDROGRAPHS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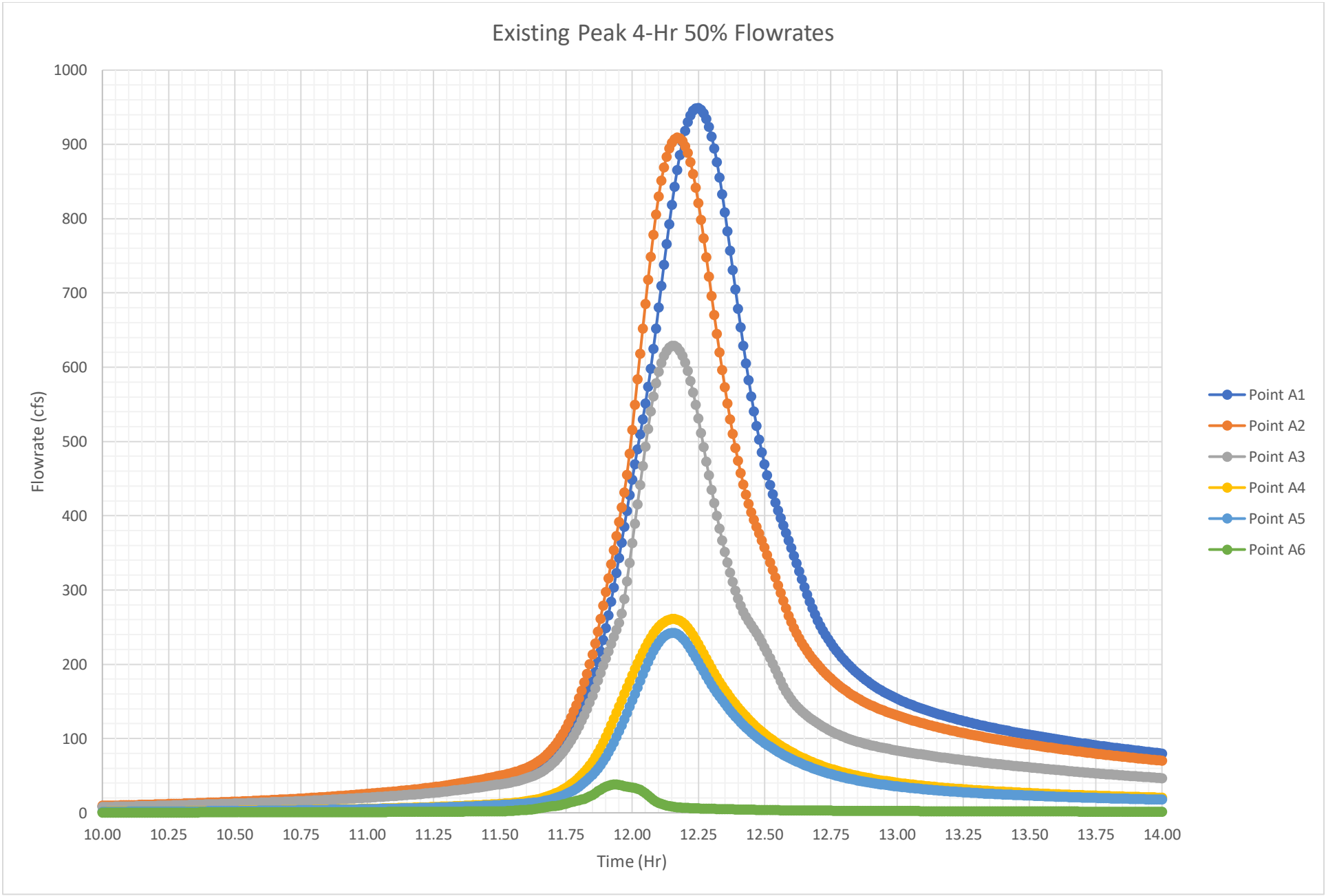
Point A2
Point A3
Point A4
Point A5
Point A6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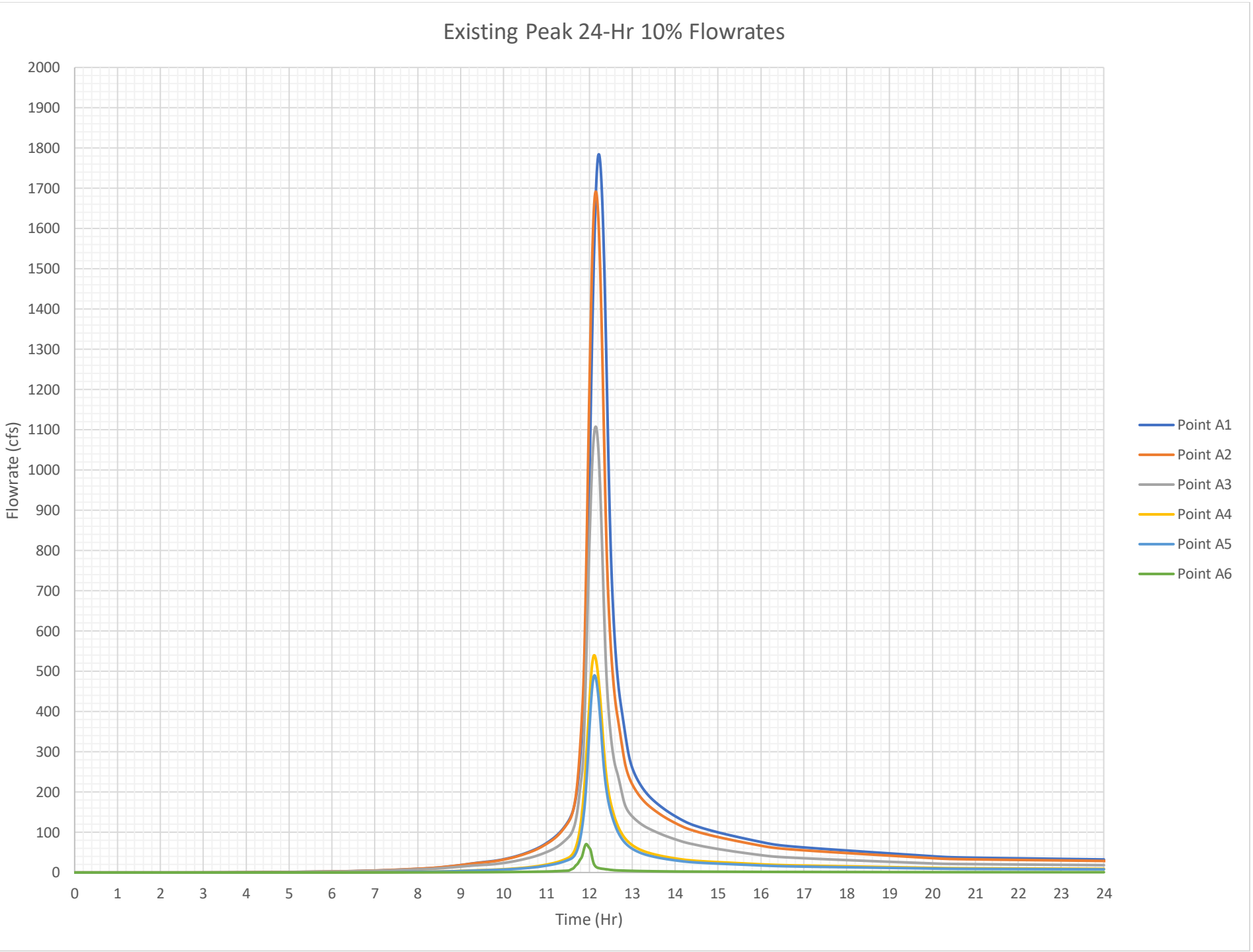
Point A3
Point A4
Point A5
Point A6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700
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500
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200
100
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (Hr)
Point A1
Point A2
Point A3
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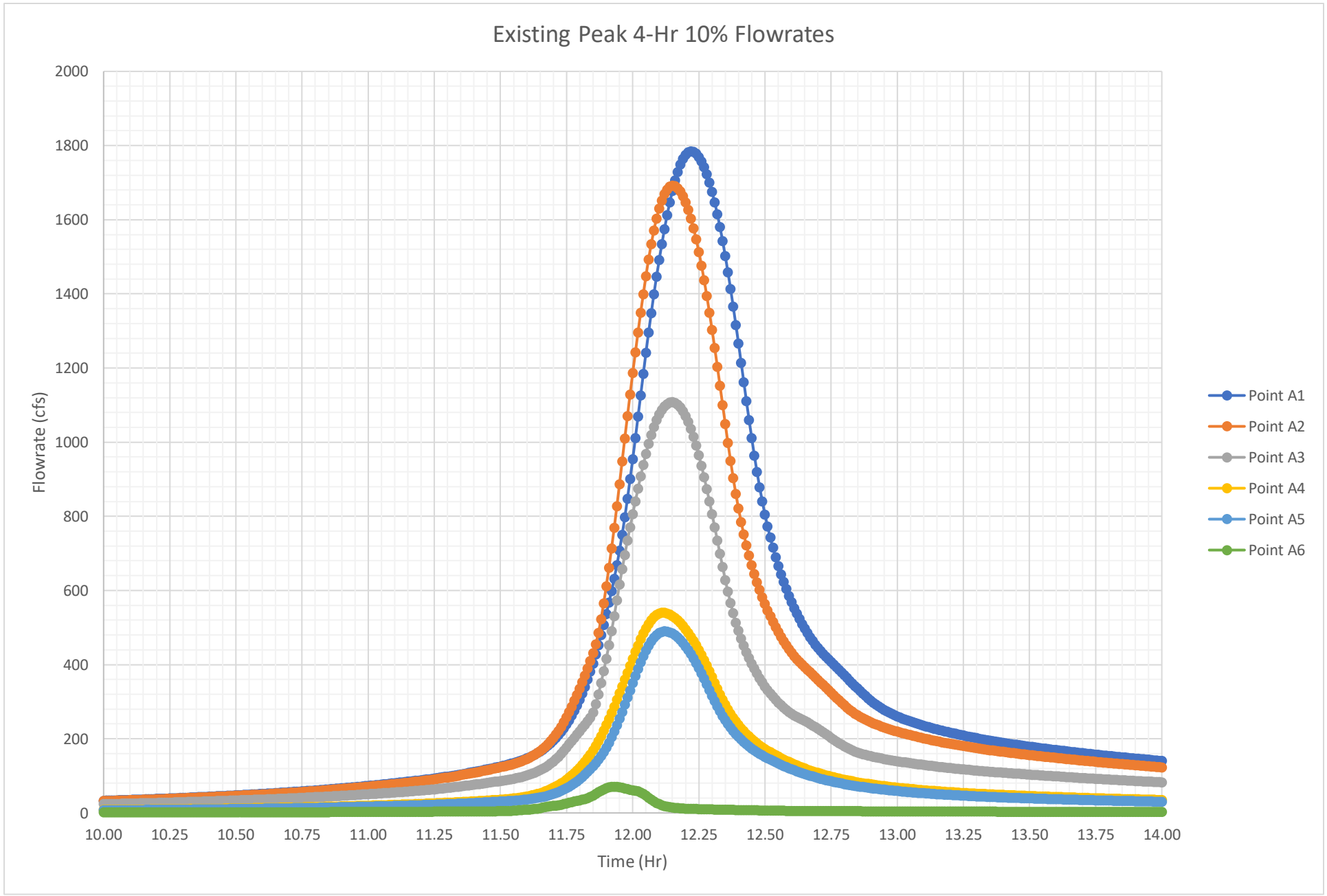
Point A6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Flowrate (cfs)
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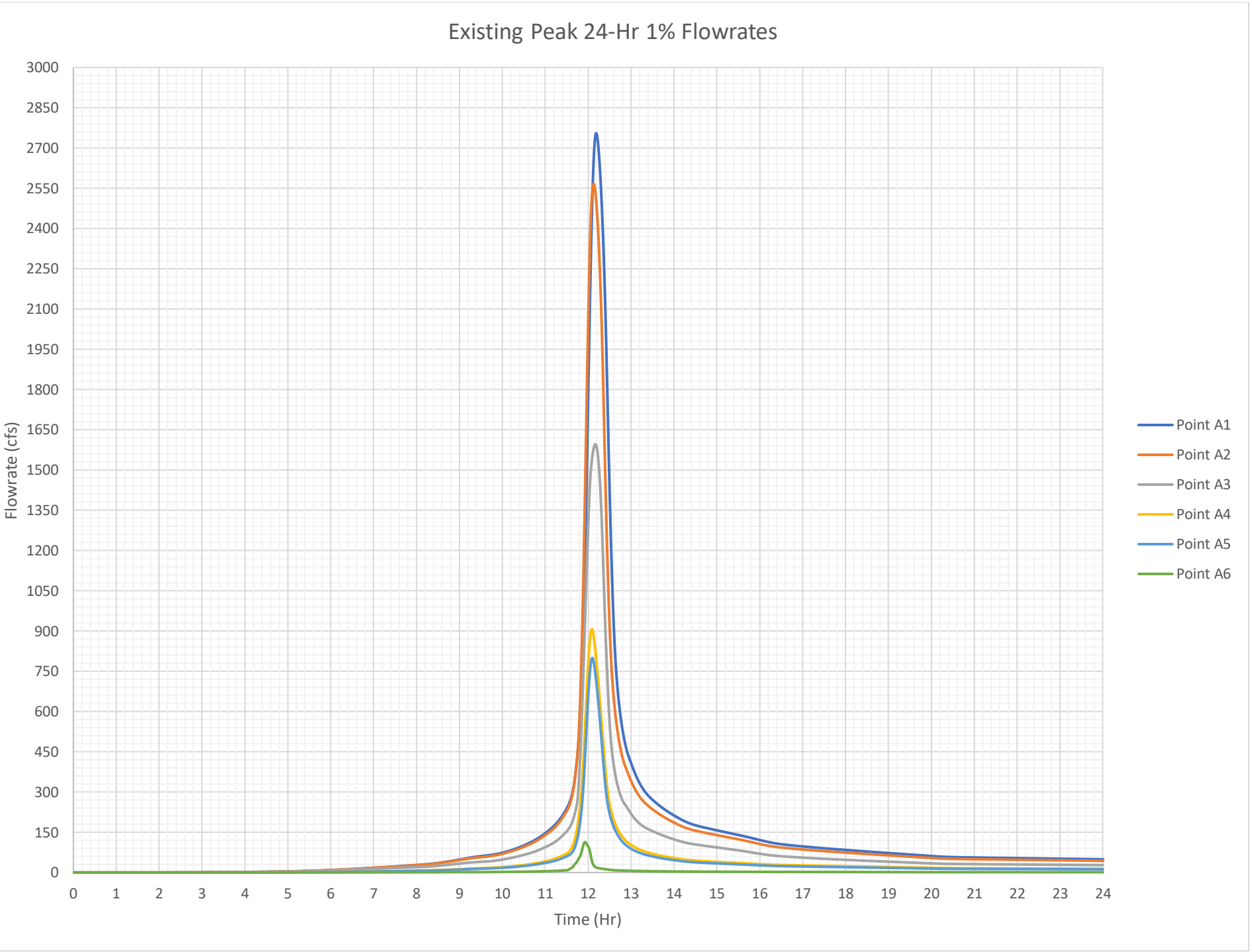
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0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
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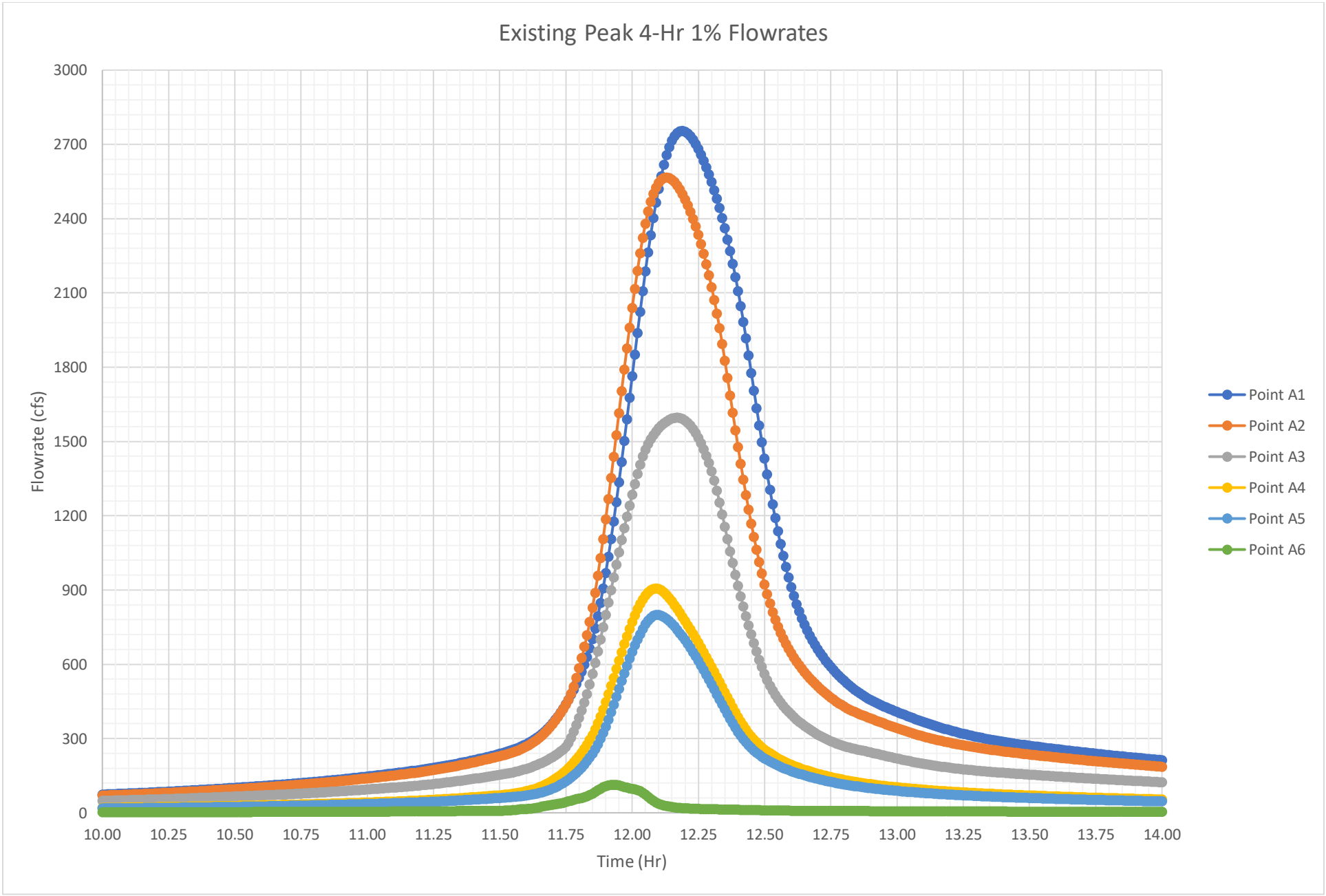
Point A5
Point A6


Existing Peak 4-Hr 1% Flowrates
Flowrate (cfs)
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Point A4
Point A5
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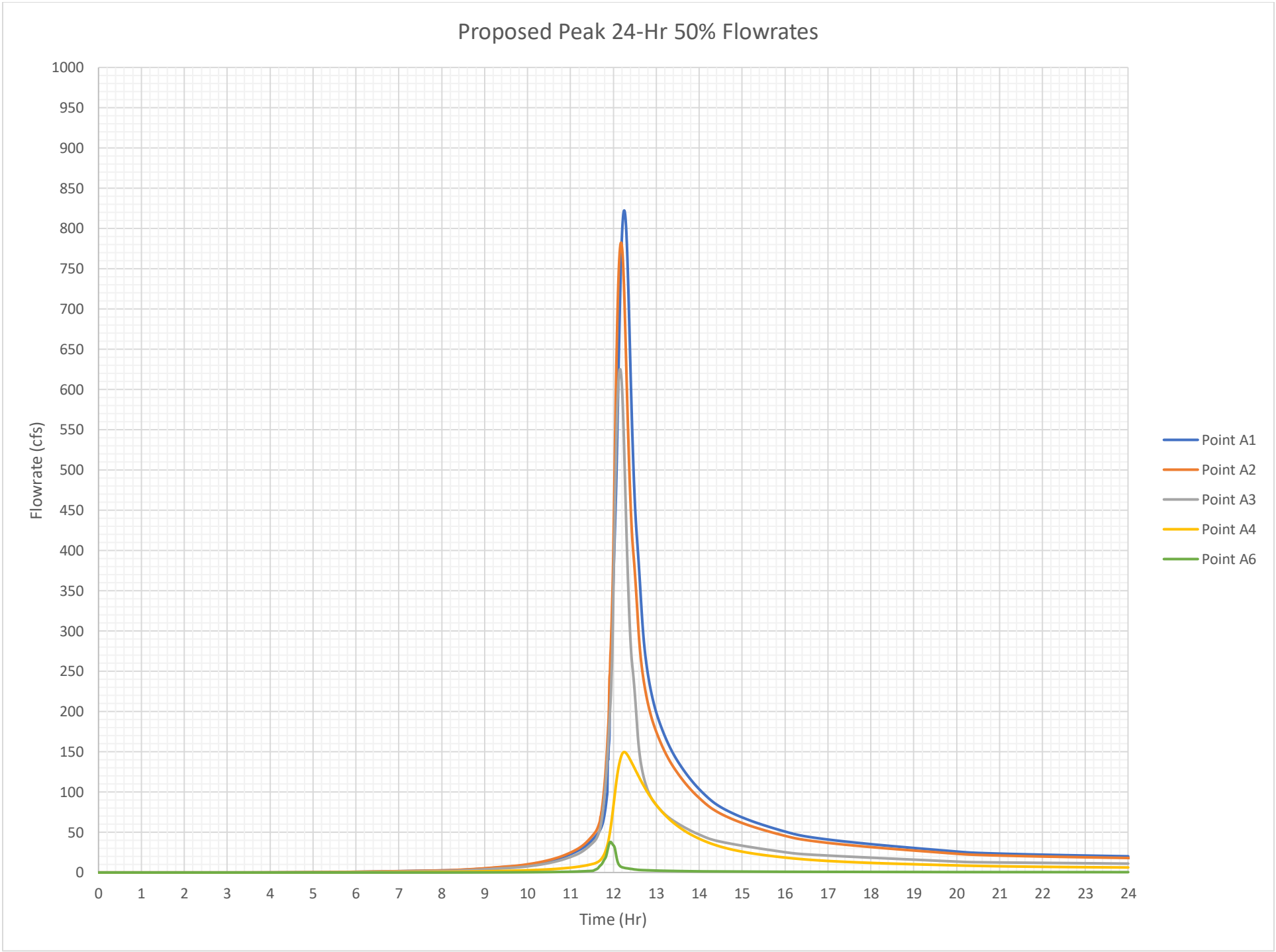
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100
50
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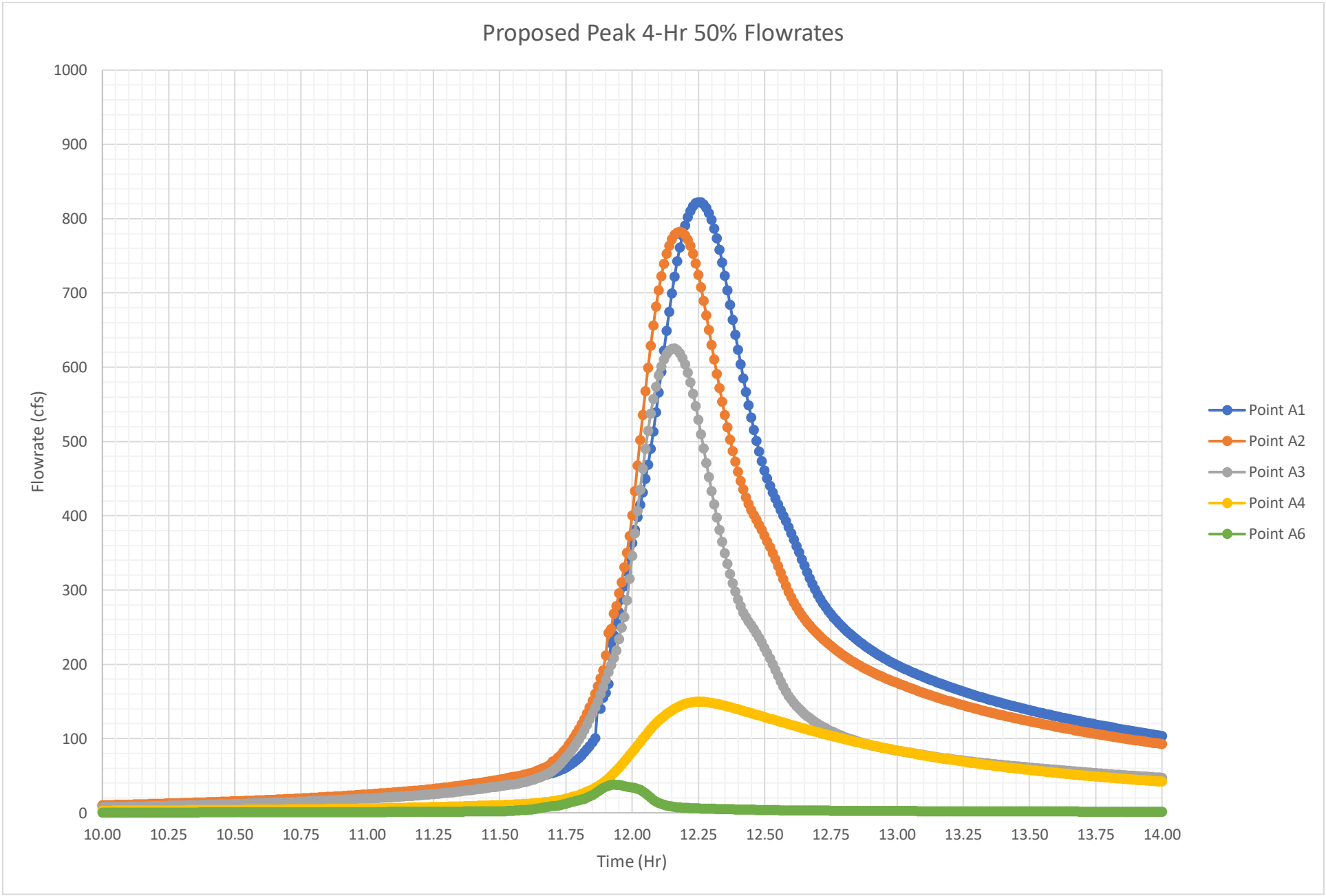
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6


Proposed Peak 4-Hr 50% Flowrates
Flowrate (cfs)
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12.25
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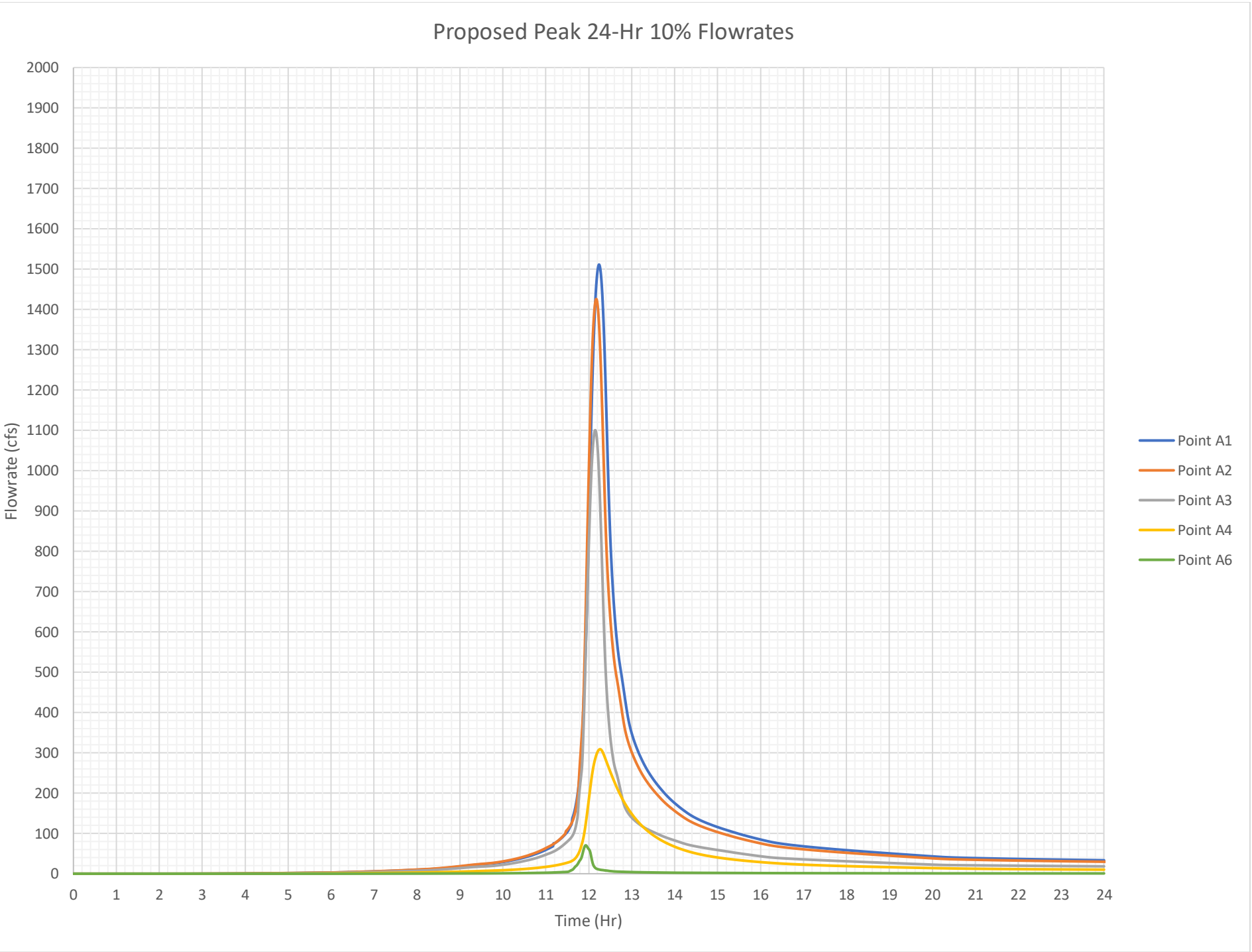
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6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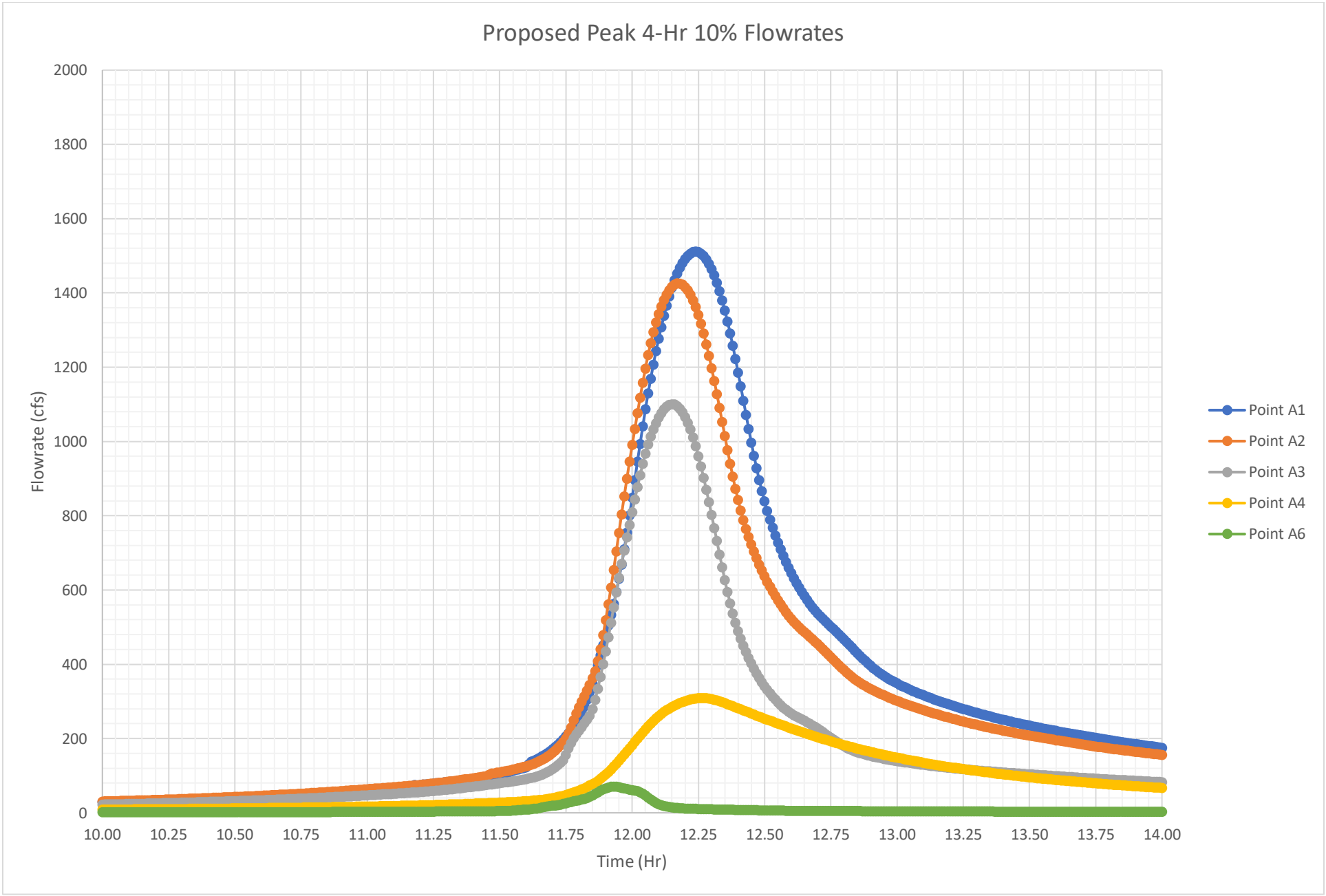
Point A2
Point A3
Point A4
Point A6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10.75
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12.50
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14.00
Time (Hr)
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Point A2
Point A3
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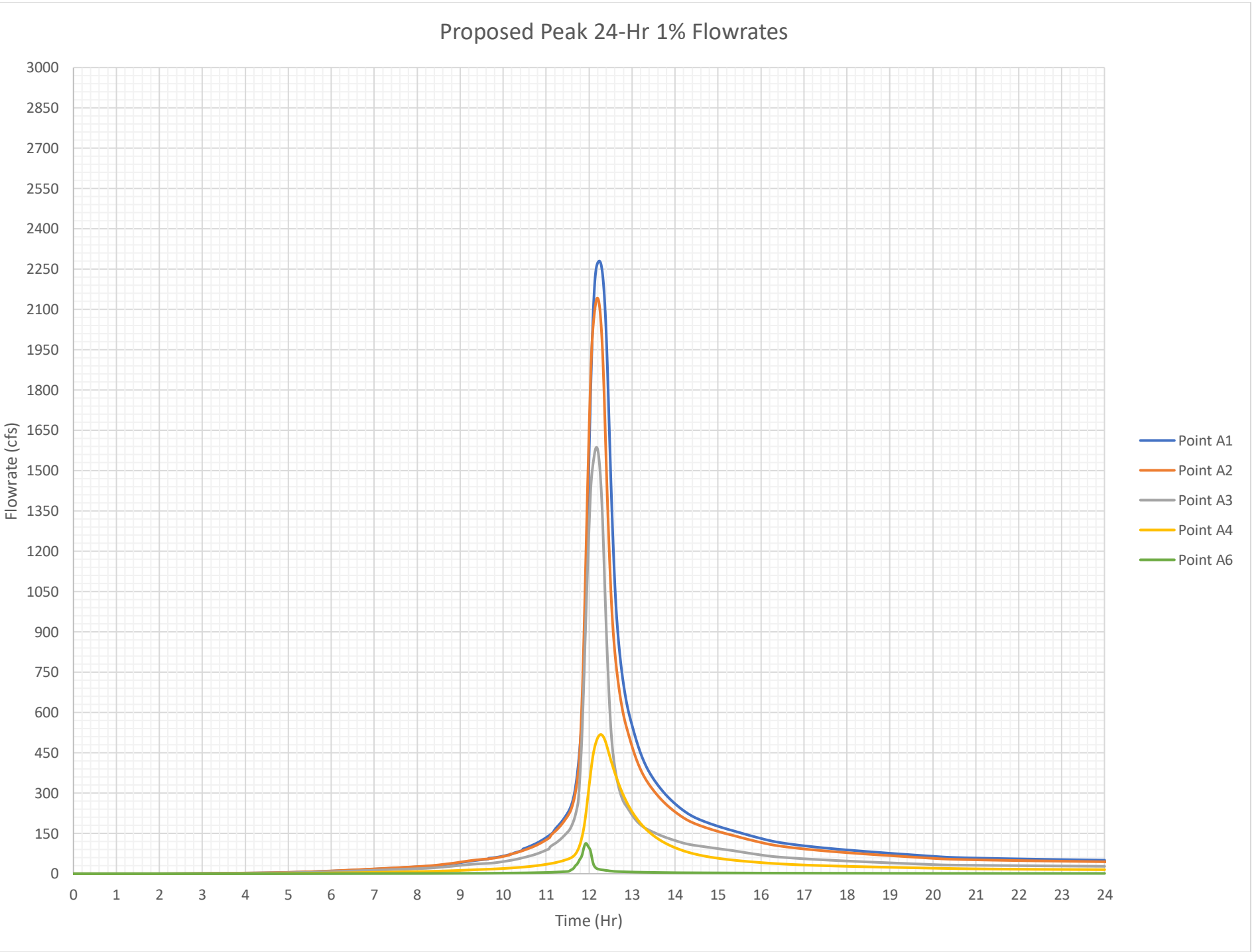
Point A6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1800
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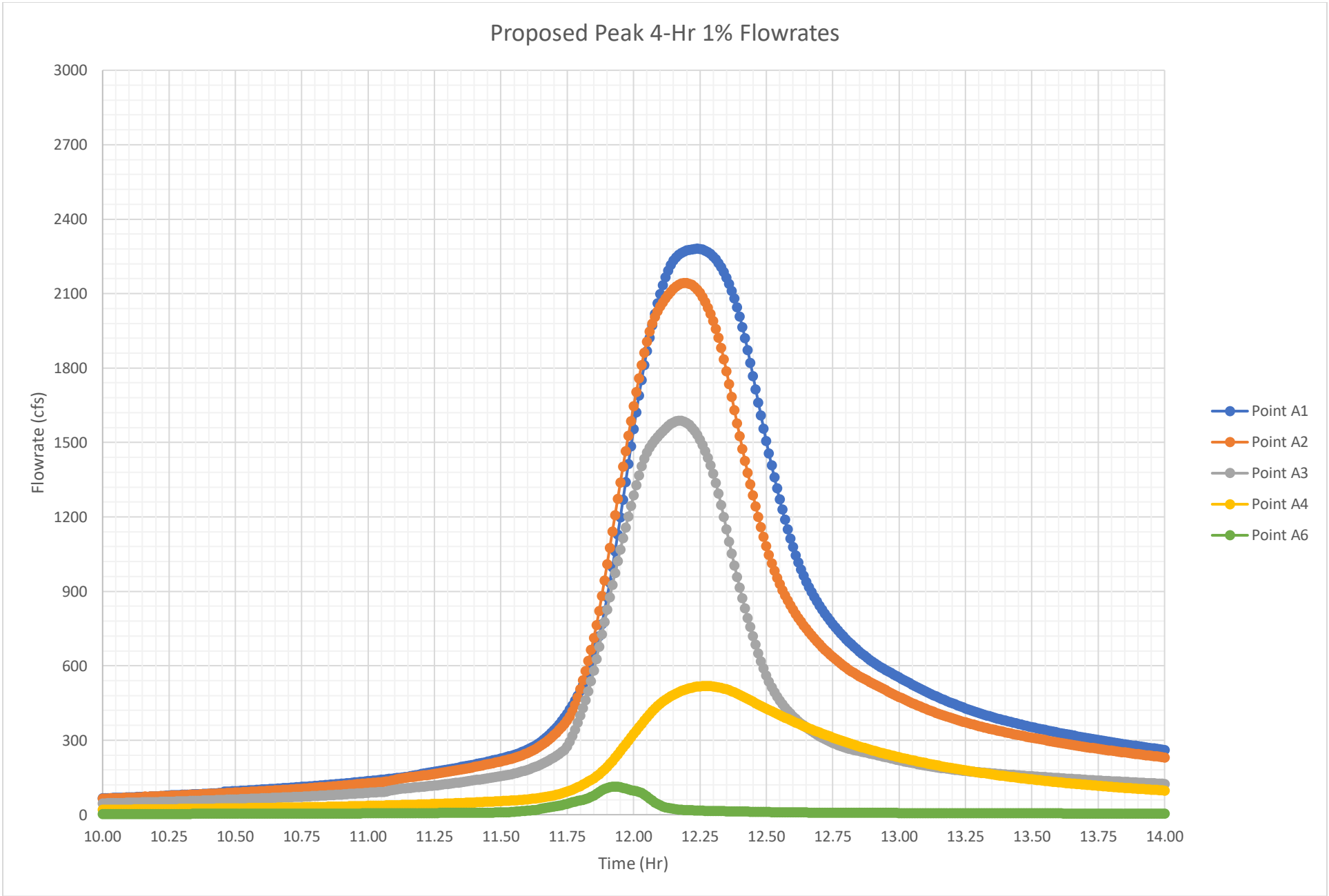
1500
1350
1200
1050
900
750
600
450
300
150
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6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11.00
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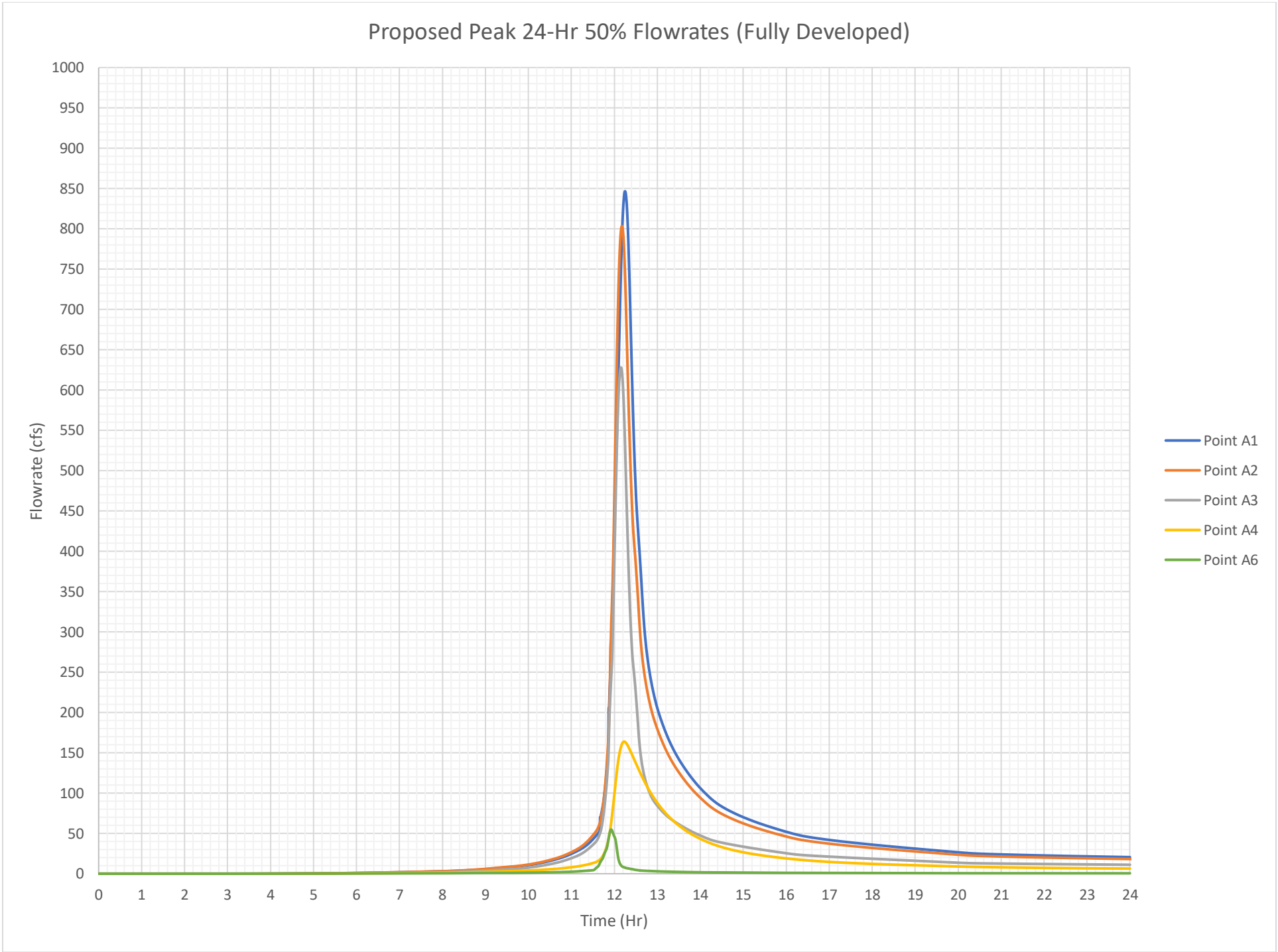
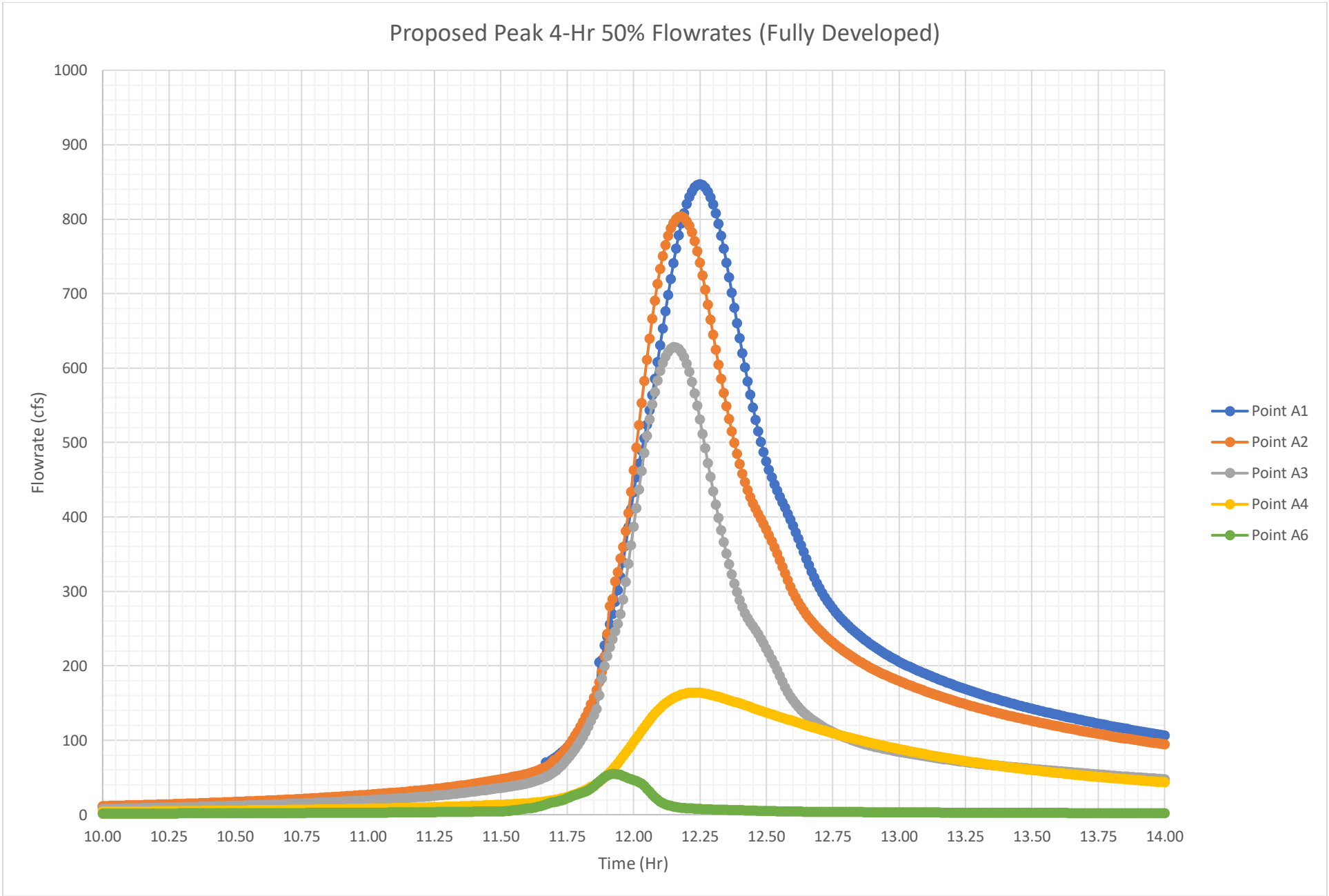
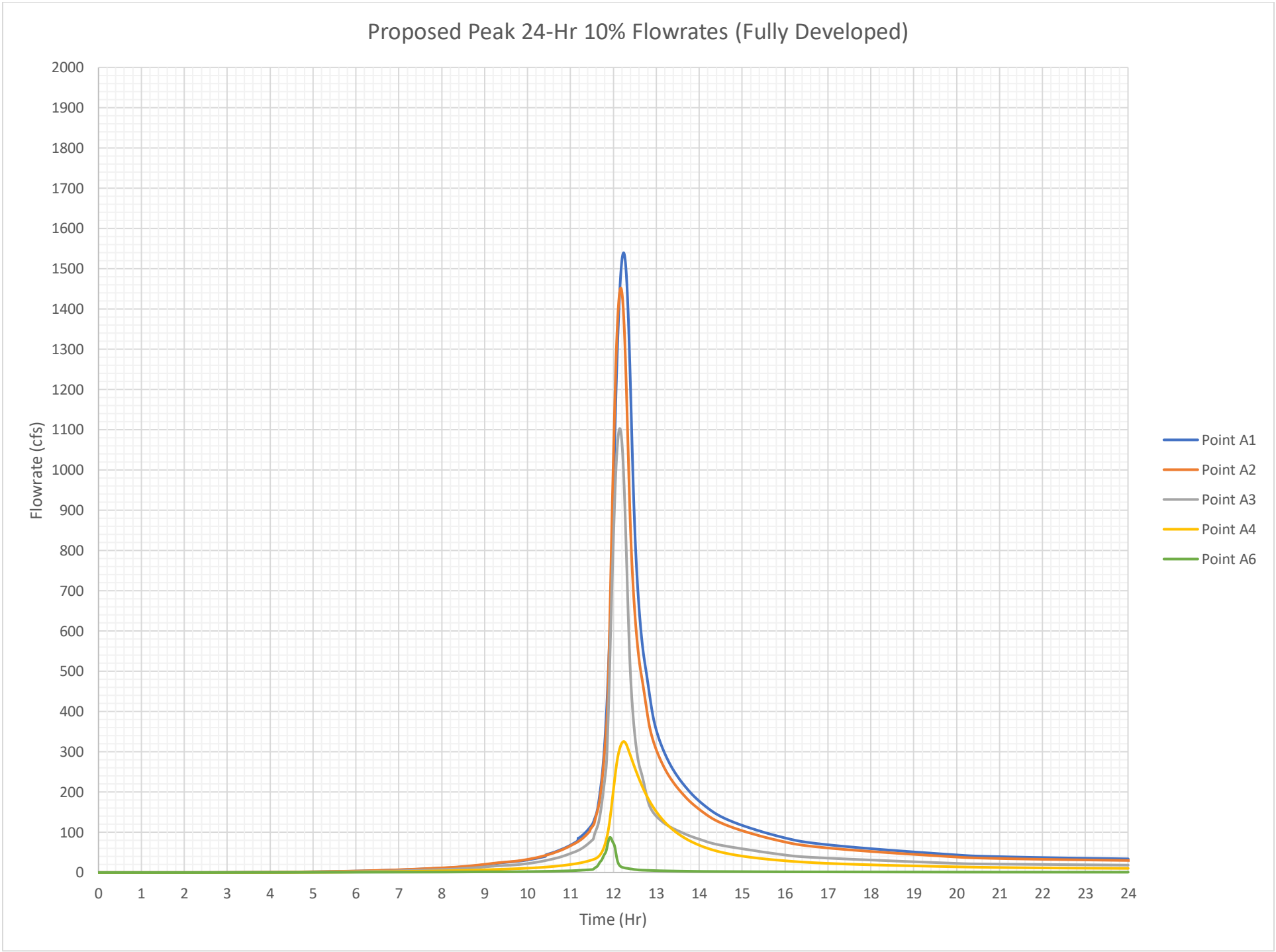
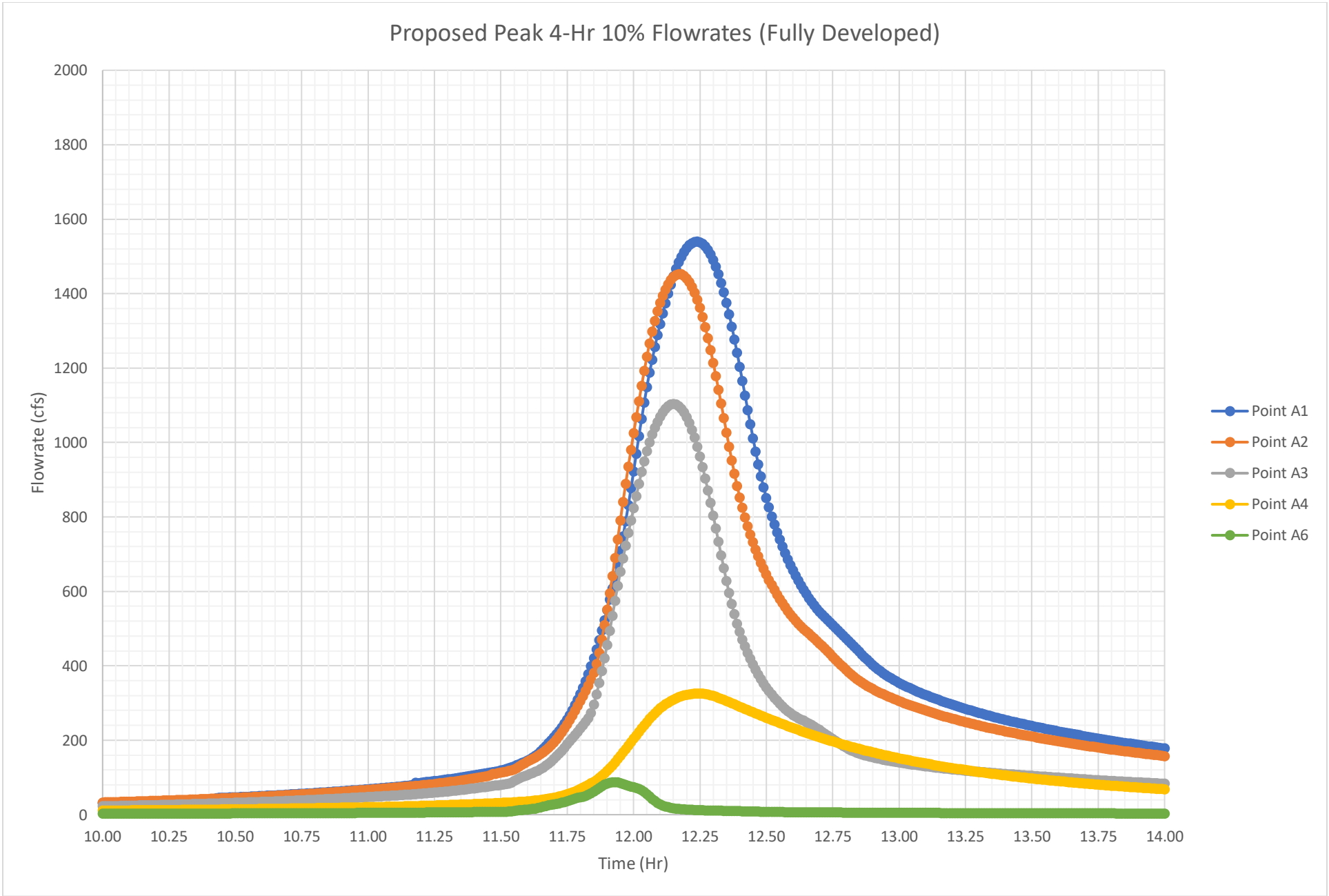
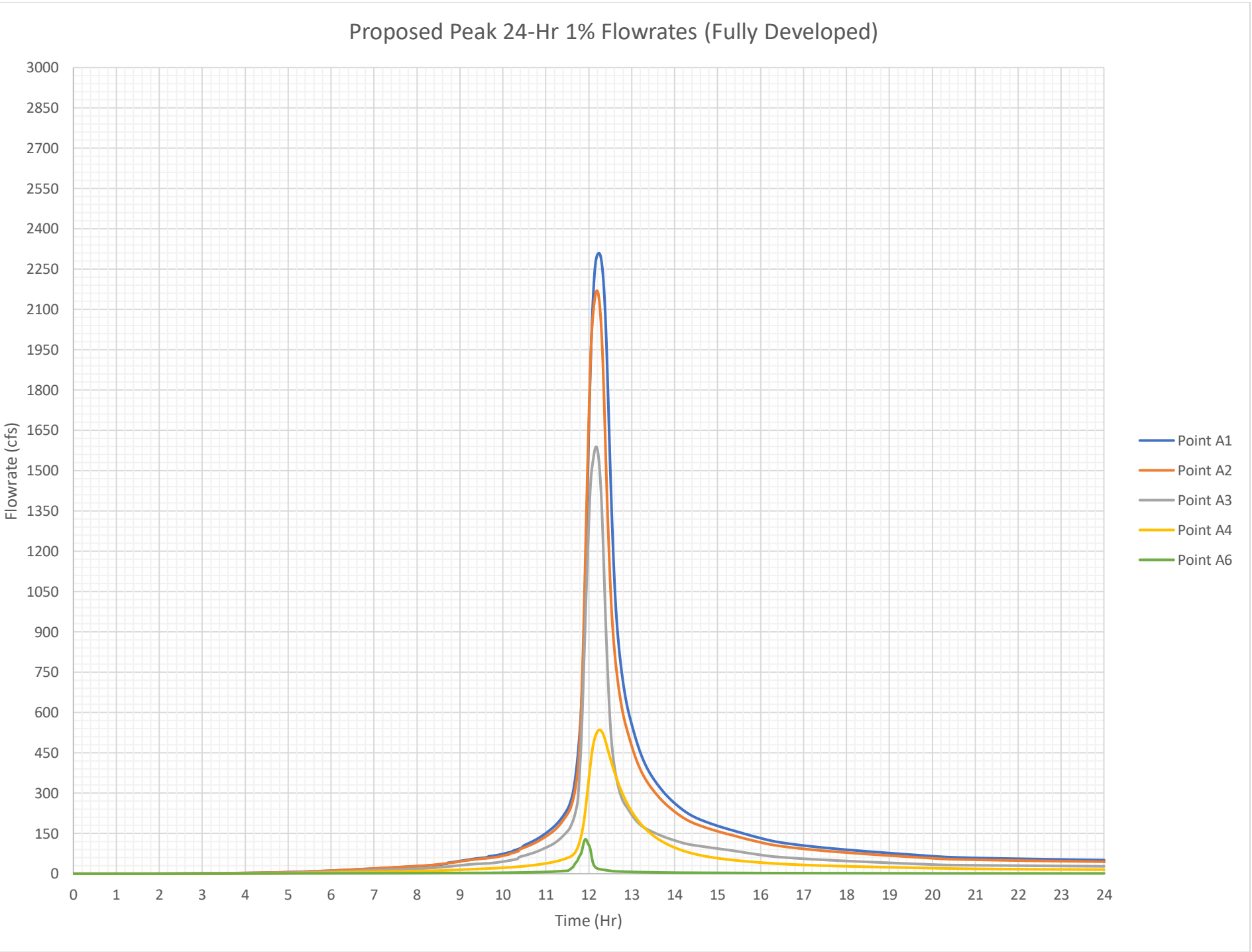
11.50
11.75
12.00
12.25
12.50
12.75
13.00
13.25
13.50
13.75
14.00
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6

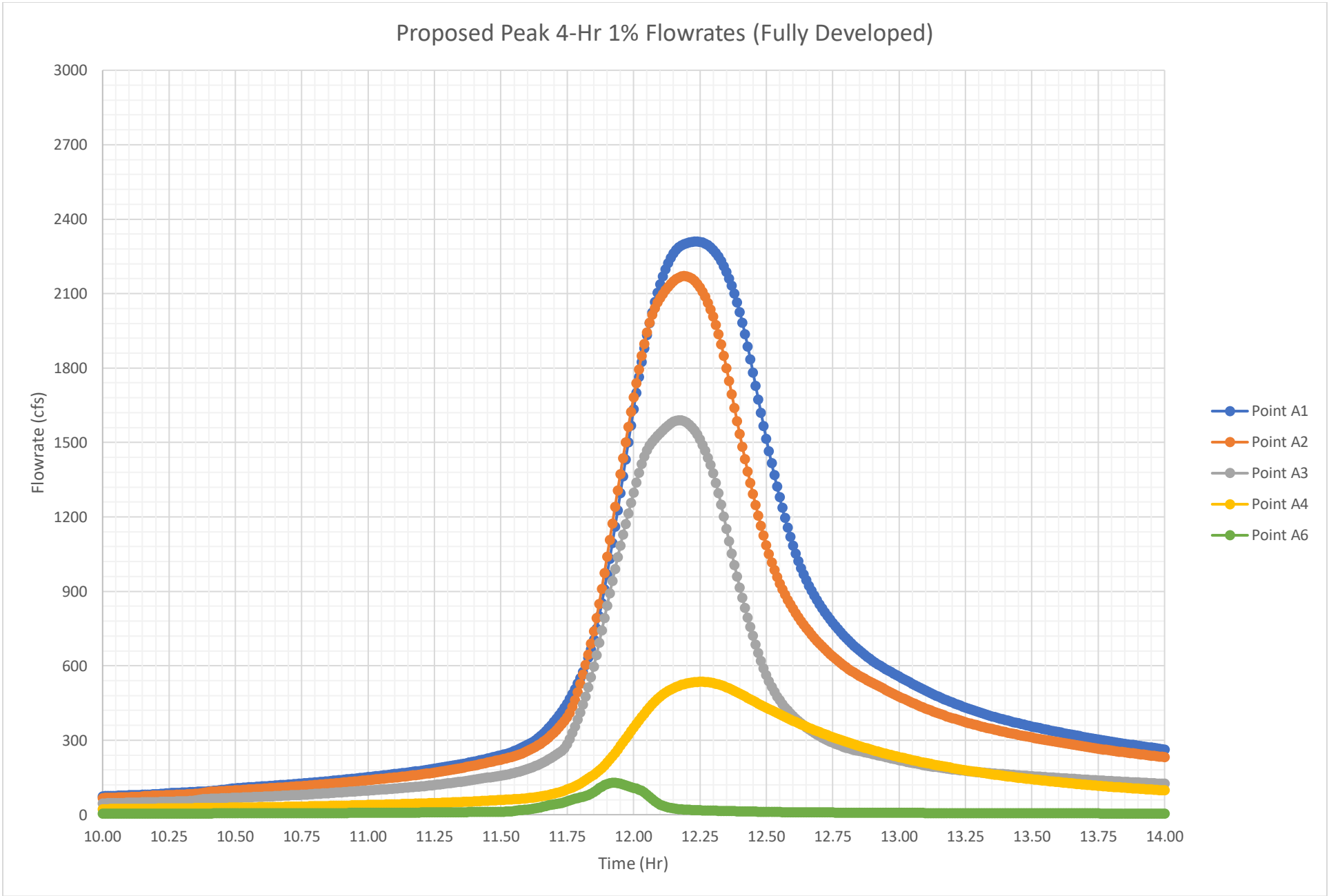

Proposed Peak 24-Hr 50% Flowrates (Fully Developed)
Flowrate (cfs)
1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6

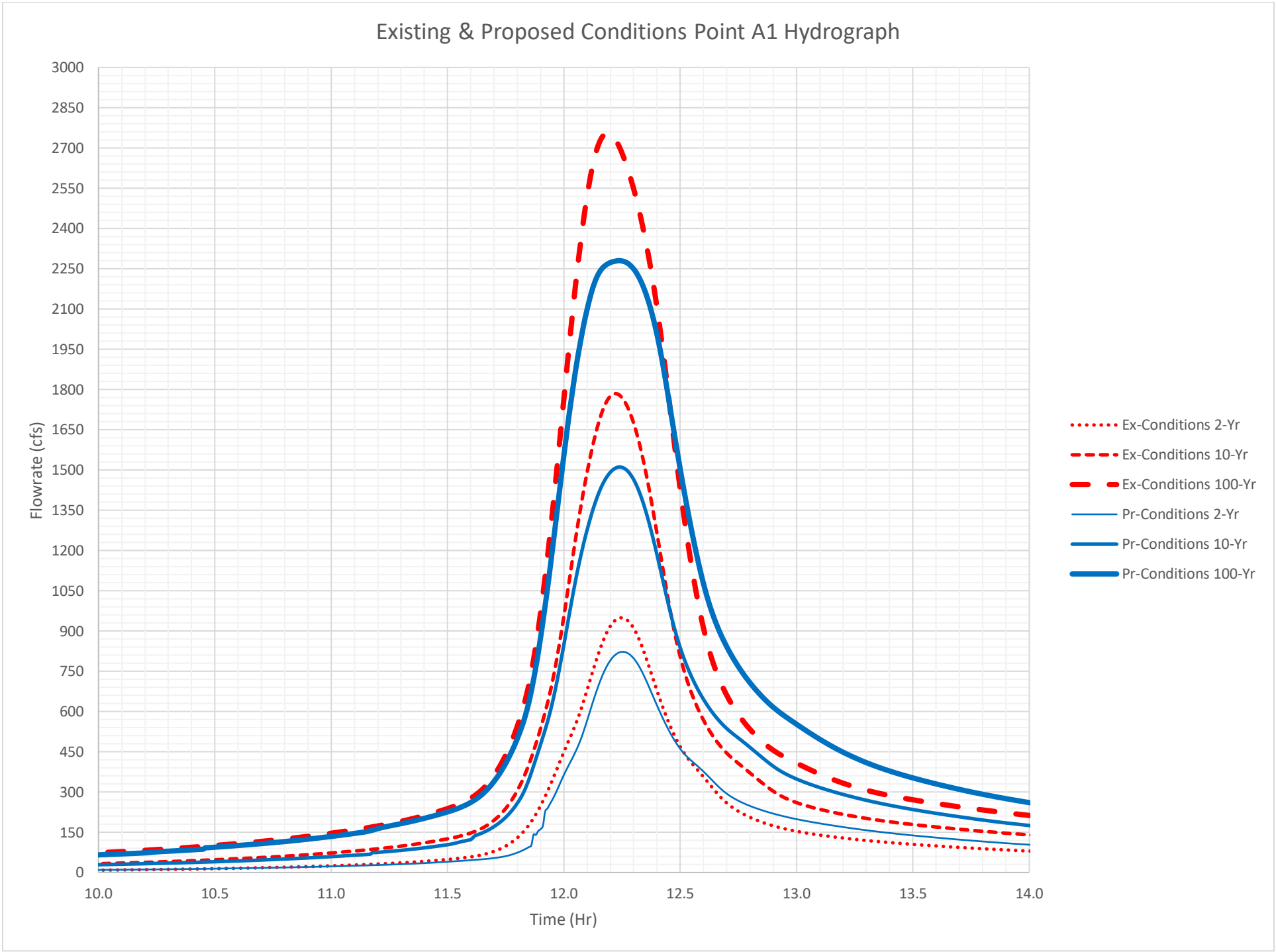

Proposed Peak 4-Hr 50% Flowrates (Fully Developed)
Flowrate (cfs)
1000
900
800
700
600
500
400
300
200
100
0
10.00
10.25
10.50
10.75
11.00
11.25
11.50
11.75
12.00
12.25
12.50
12.75
13.00
13.25
13.50
13.75
14.00
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6

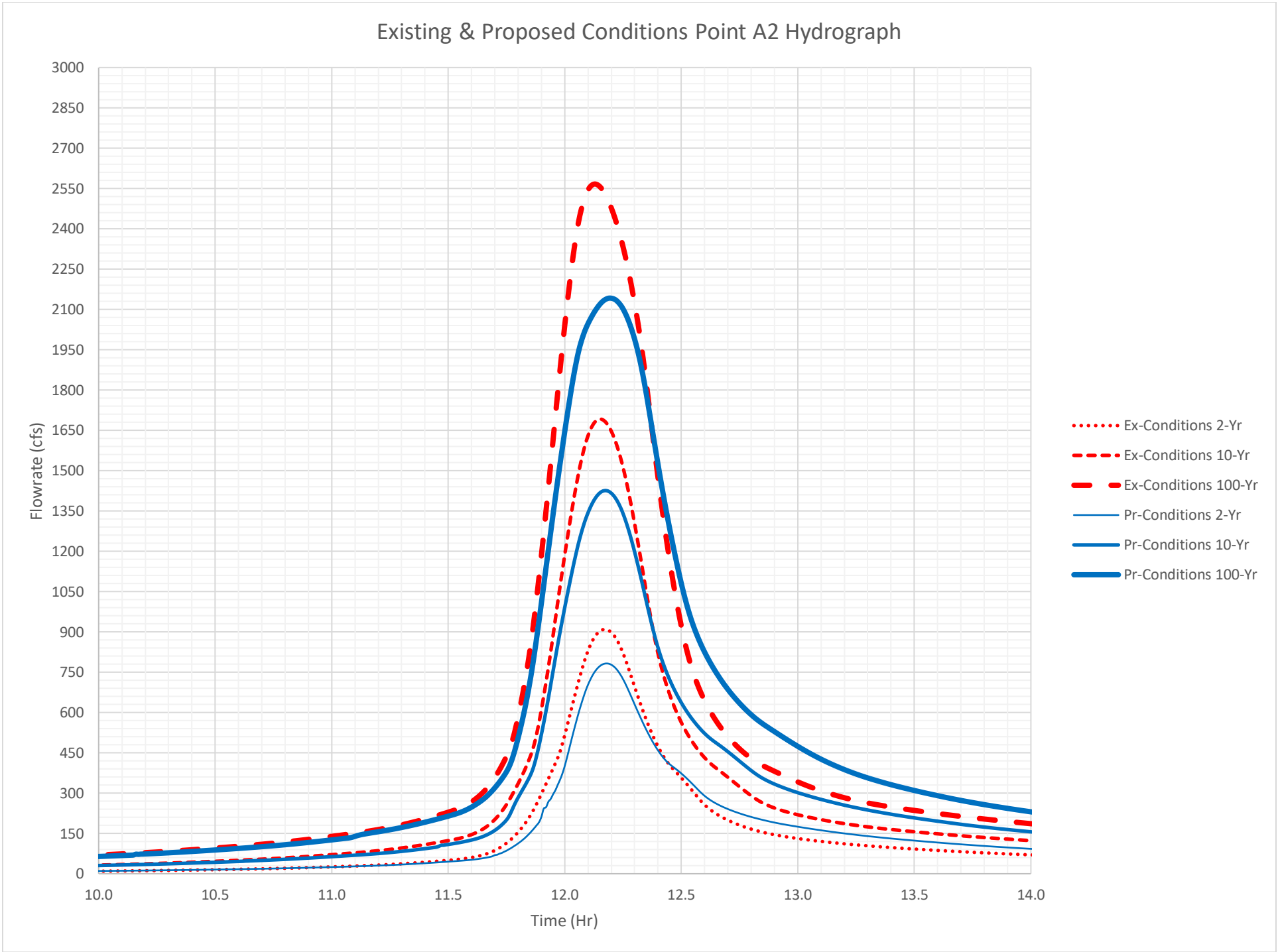

Proposed Peak 24-Hr 10% Flowrates (Fully Developed)
Flowrate (cfs)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6

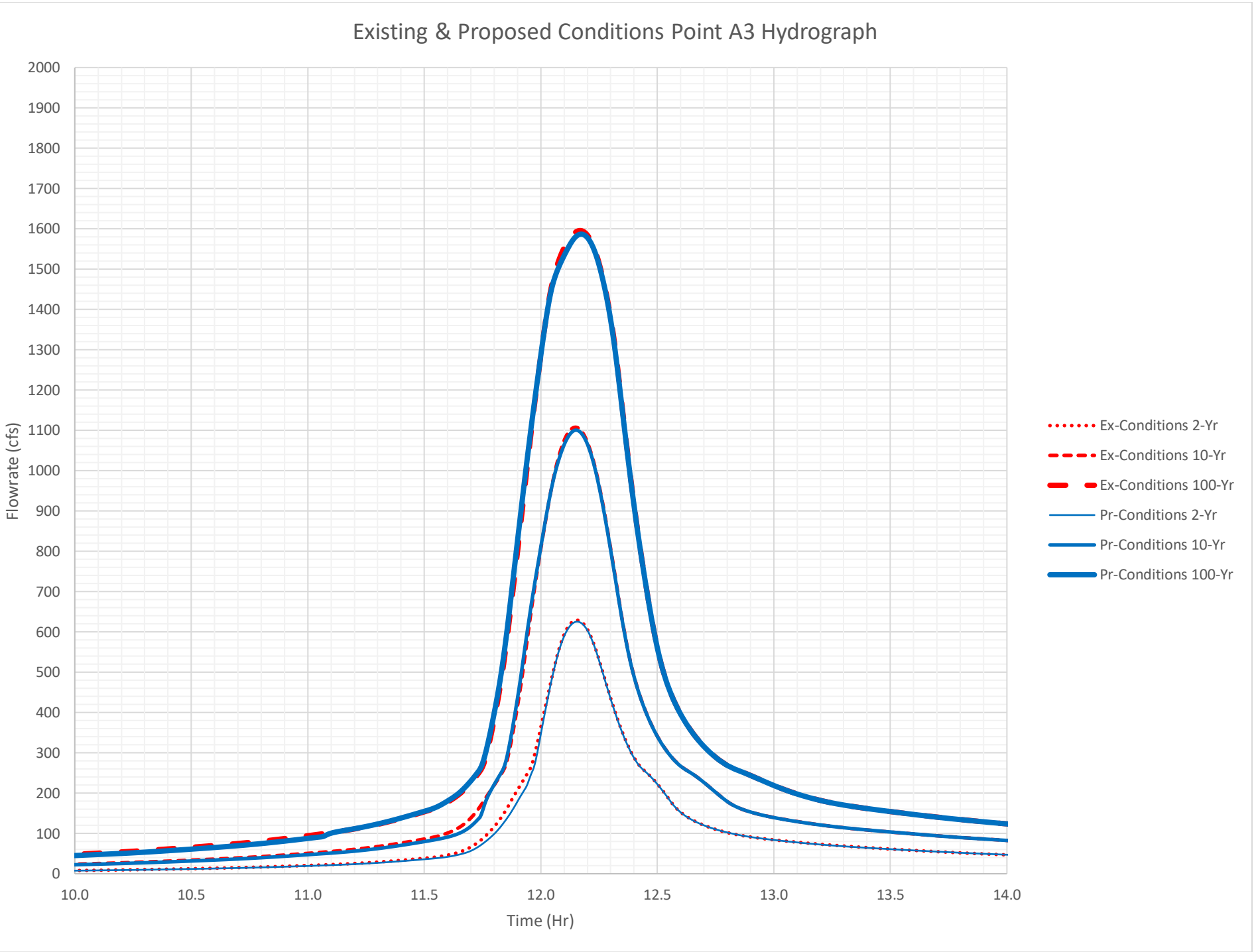

Proposed Peak 4-Hr 10% Flowrates (Fully Developed)
Flowrate (cfs)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
10.00
10.25
10.50
10.75
11.00
11.25
11.50
11.75
12.00
12.25
12.50
12.75
13.00
13.25
13.50
13.75
14.00
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6

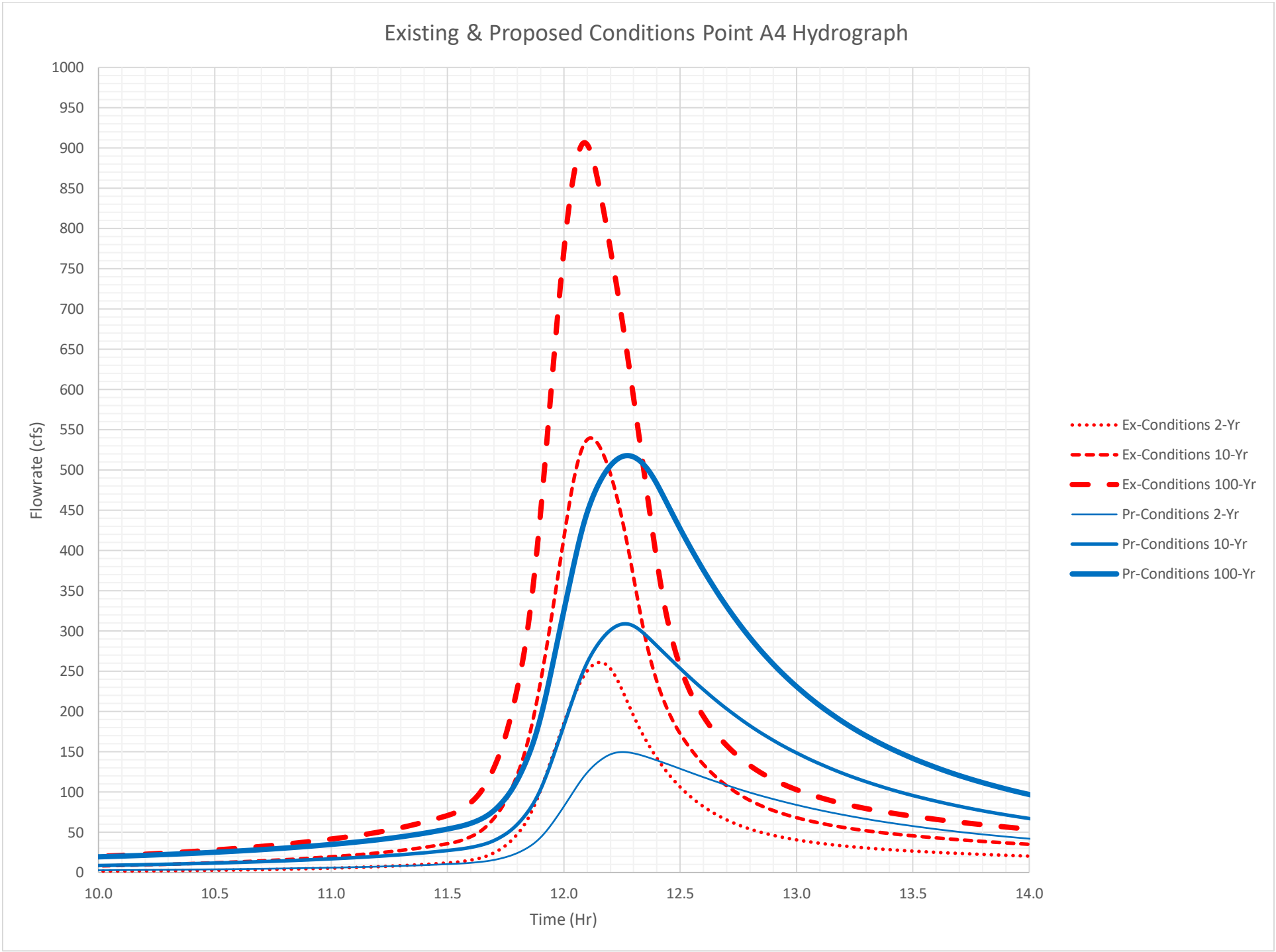

Proposed Peak 24-Hr 1% Flowrates (Fully Developed)
Flowrate (cfs)
3000
2850
2700
2550
2400
2250
2100
1950
1800
1650
1500
1350
1200
1050
900
750
600
450
300
150
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6

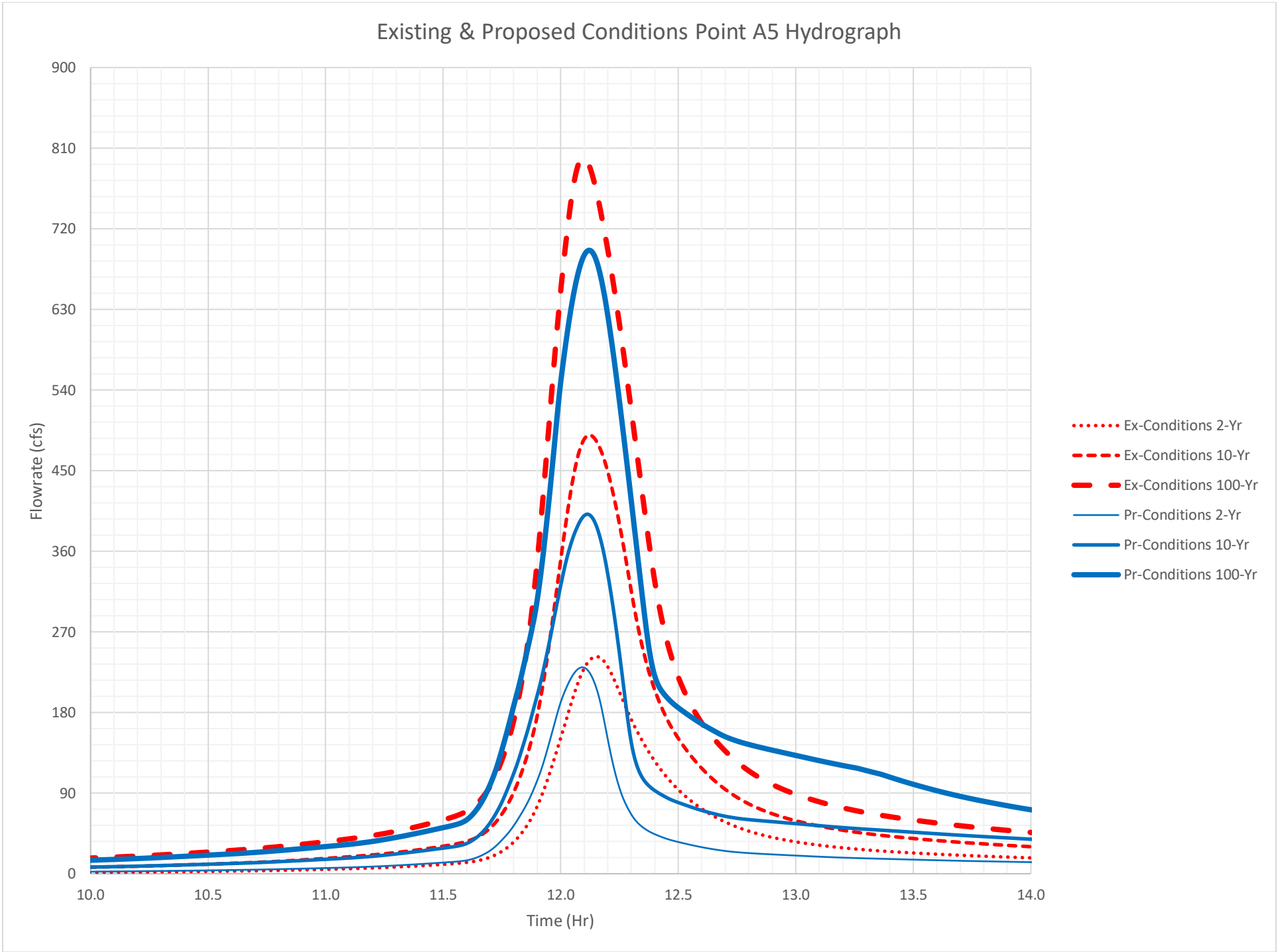

Proposed Peak 4-Hr 1% Flowrates (Fully Developed)
Flowrate (cfs)
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
10.00
10.25
10.50
10.75
11.00
11.25
11.50
11.75
12.00
12.25
12.50
12.75
13.00
13.25
13.50
13.75
14.00
Time (Hr)
Point A1
Point A2
Point A3
Point A4
Point A6

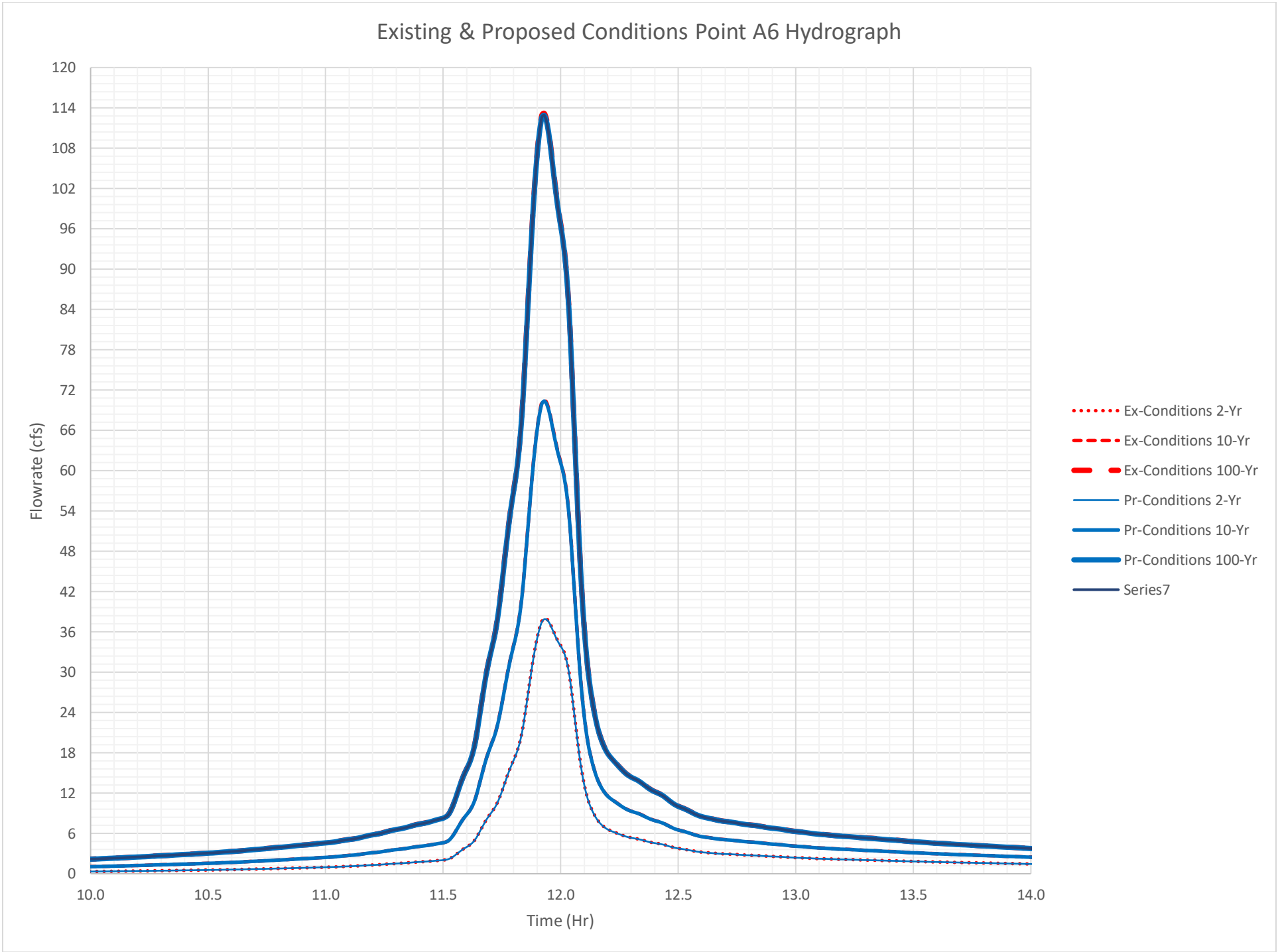

Existing & Proposed Conditions Point A1 Hydrograph
Flowrate (cfs)
3000
2850
2700
2550
2400
2250
2100
1950
1800
1650
1500
1350
1200
1050
900
750
600
450
300
150
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr

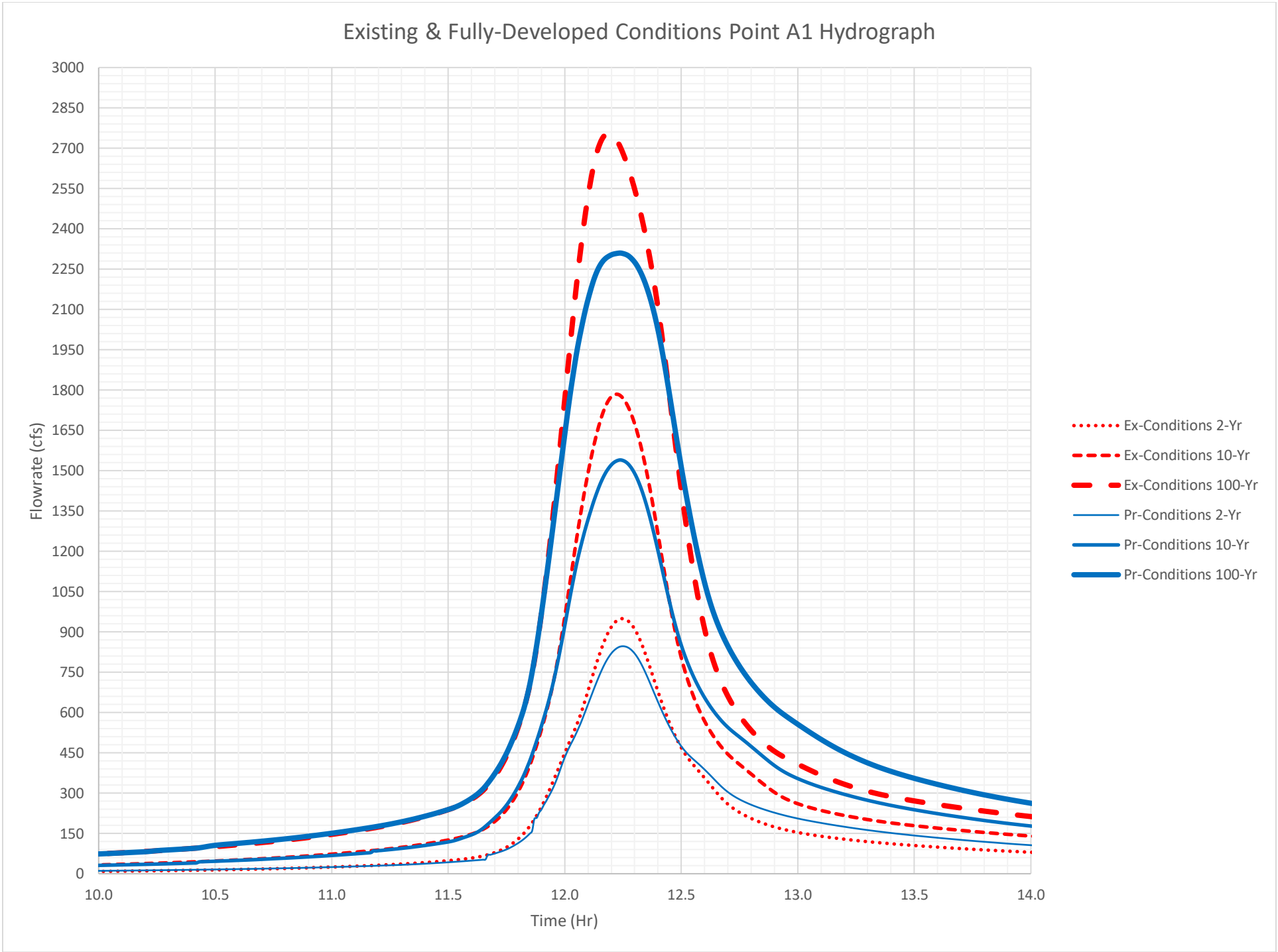

Existing & Proposed Conditions Point A2 Hydrograph
Flowrate (cfs)
3000
2850
2700
2550
2400
2250
2100
1950
1800
1650
1500
1350
1200
1050
900
750
600
450
300
150
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr

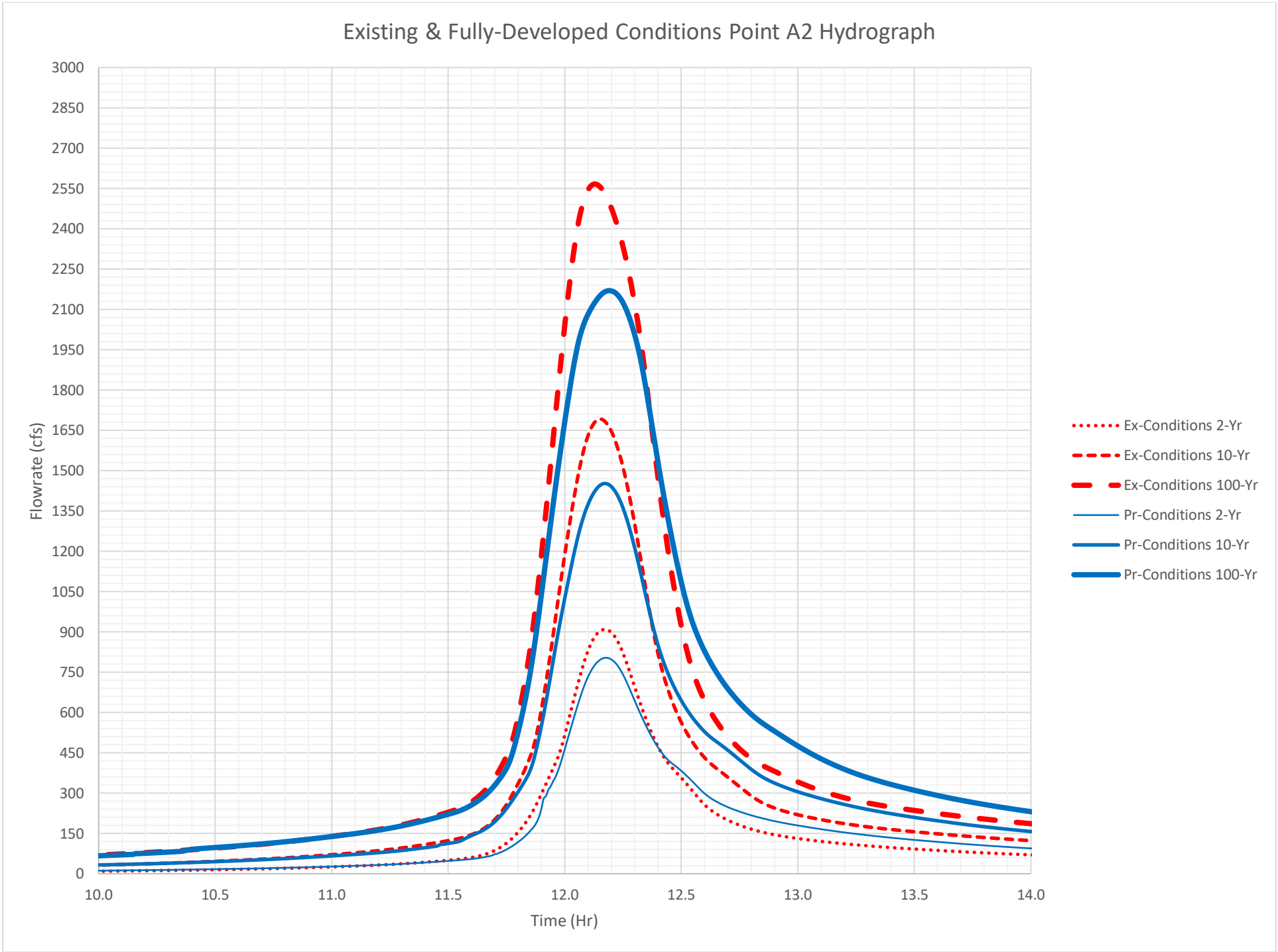

Existing & Proposed Conditions Point A3 Hydrograph
Flowrate (cfs)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr

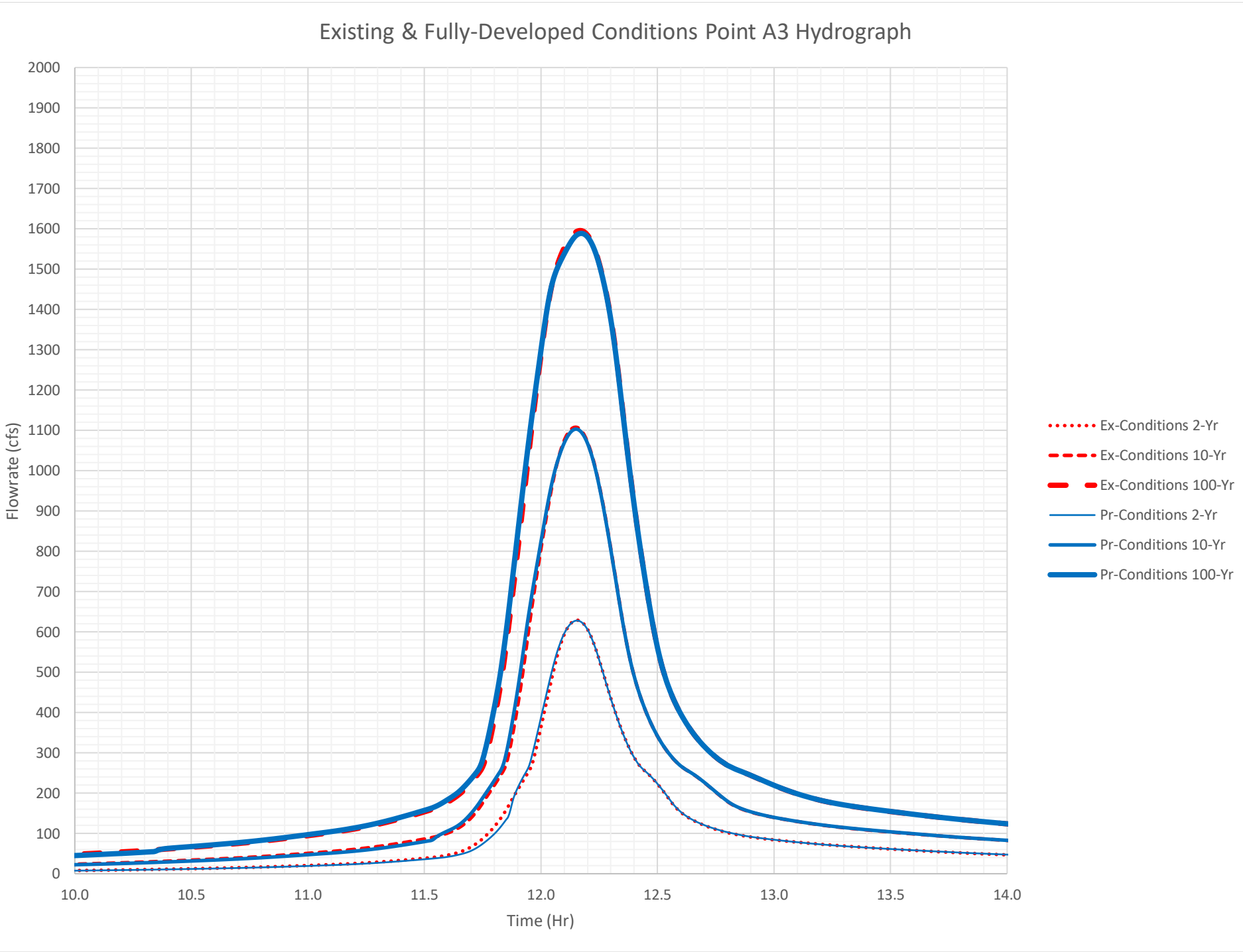

Existing & Proposed Conditions Point A4 Hydrograph
Flowrate (cfs)
1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr

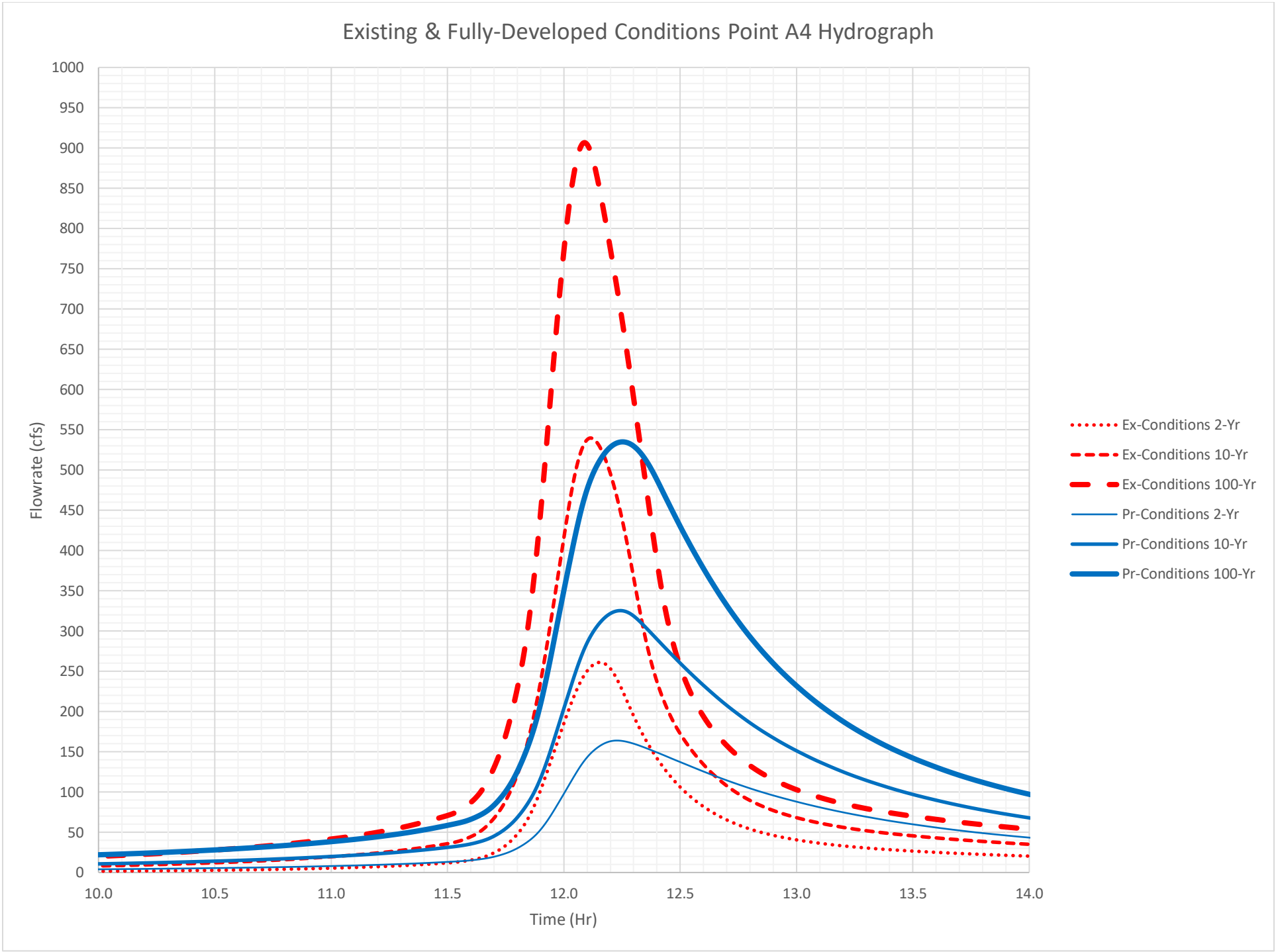

Existing & Proposed Conditions Point A5 Hydrograph
Flowrate (cfs)
900
810
720
630
540
450
360
270
180
90
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr

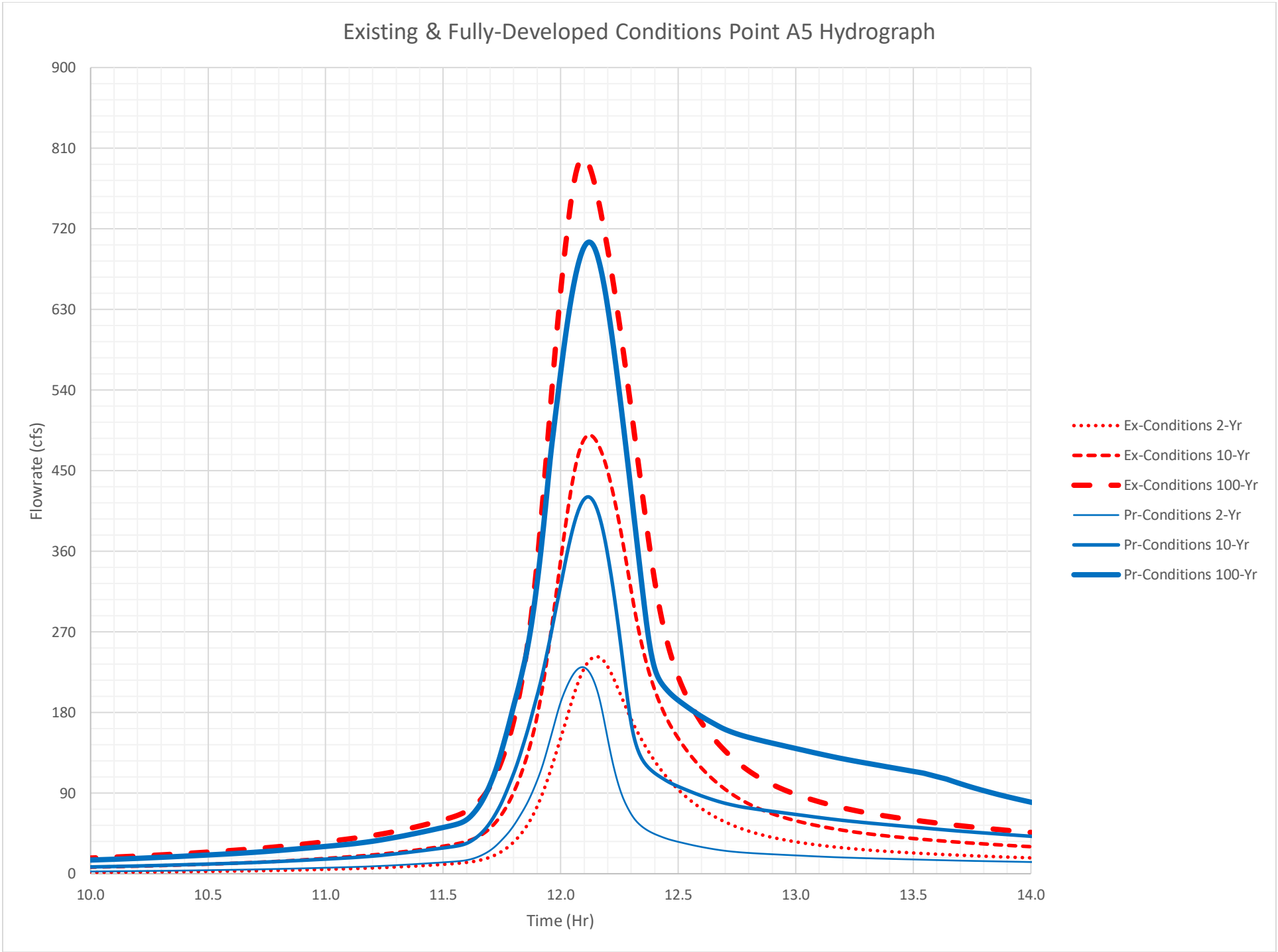

Existing & Proposed Conditions Point A6 Hydrograph
Flowrate (cfs)
120
114
108
102
96
90
84
78
72
66
60
54
48
42
36
30
24
18
12
6
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr
Series7

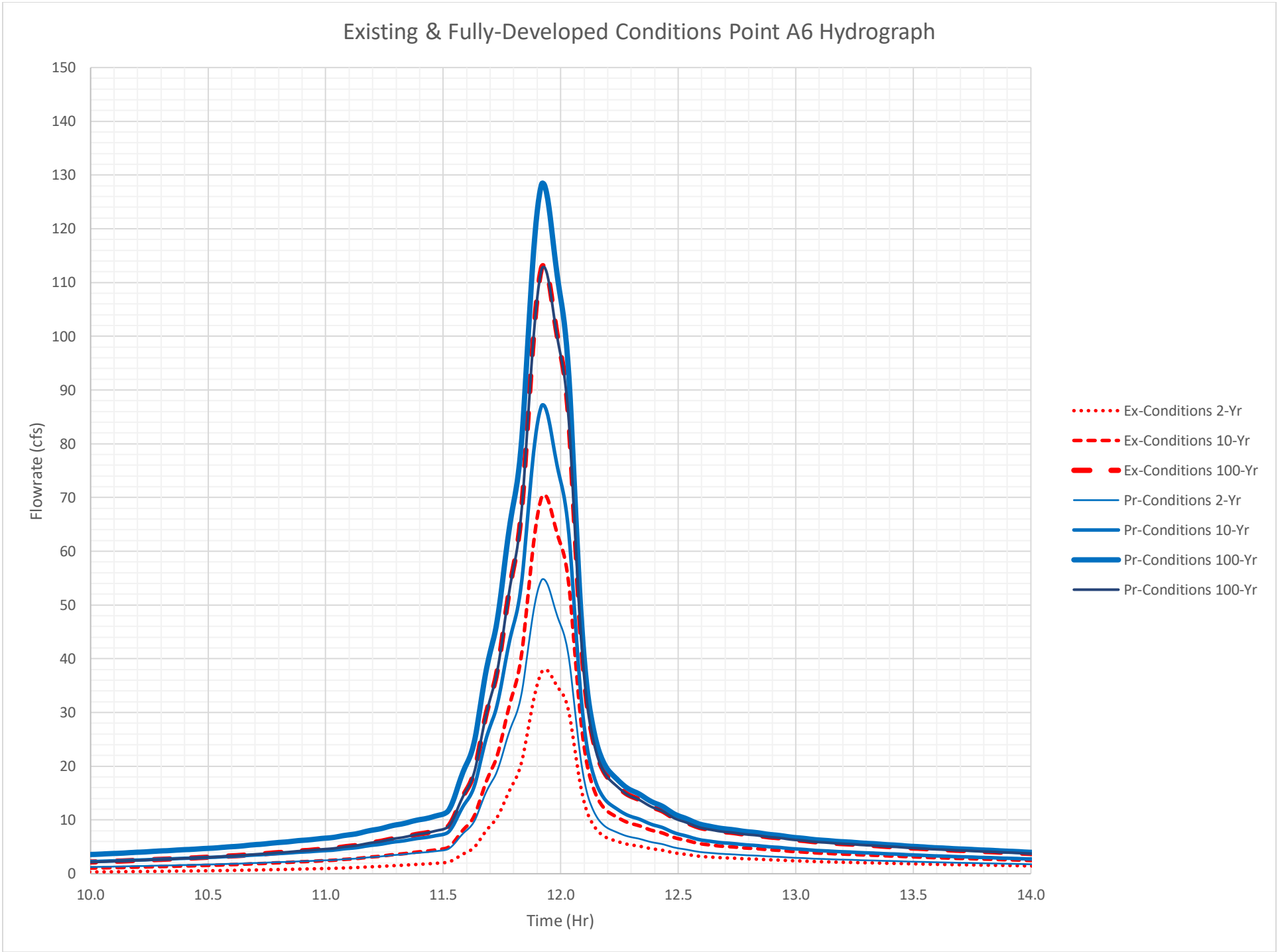

Existing & Fully-Developed Conditions Point A1 Hydrograph
Flowrate (cfs)
3000
2850
2700
2550
2400
2250
2100
1950
1800
1650
1500
1350
1200
1050
900
750
600
450
300
150
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr


Existing & Fully-Developed Conditions Point A2 Hydrograph
Flowrate (cfs)
3000
2850
2700
2550
2400
2250
2100
1950
1800
1650
1500
1350
1200
1050
900
750
600
450
300
150
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr

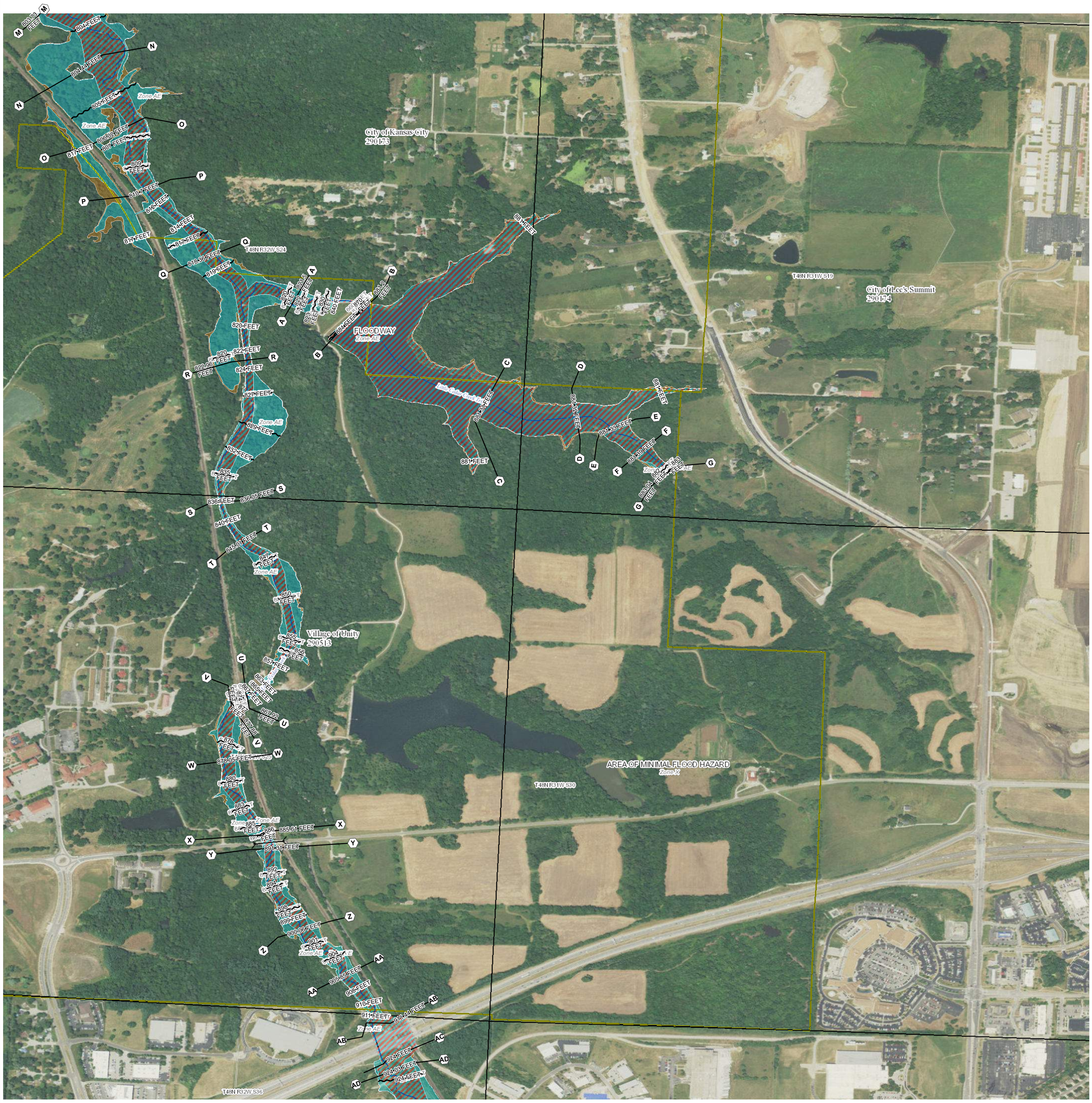

Existing & Fully-Developed Conditions Point A3 Hydrograph
Flowrate (cfs)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr


Existing & Fully-Developed Conditions Point A4 Hydrograph
Flowrate (cfs)
1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr


Existing & Fully-Developed Conditions Point A5 Hydrograph
Flowrate (cfs)
900
810
720
630
540
450
360
270
180
90
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr


Existing & Fully-Developed Conditions Point A6 Hydrograph
Flowrate (cfs)
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Time (Hr)
Ex-Conditions 2-Yr
Ex-Conditions 10-Yr
Ex-Conditions 100-Yr
Pr-Conditions 2-Yr
Pr-Conditions 10-Yr
Pr-Conditions 100-Yr
Pr-Conditions 100-Yr

94°24'22.95"W 38°58'14.11"N



USGS The National Map: Orthoimagery. Data refreshed April 2020

94°22'29.6"W 38°56'8.44"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **8/26/2020 8:37 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88

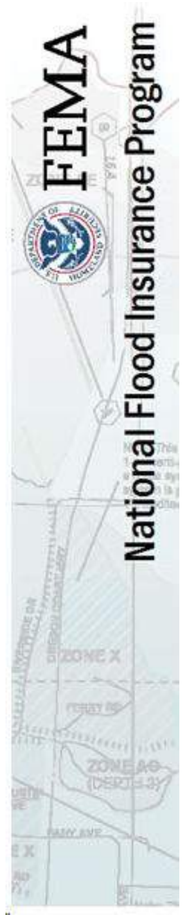
For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 500 feet 1:6,000

0 250 500 1,000 1,500 2,000 Feet

0 50 100 200 300 400 Meters



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

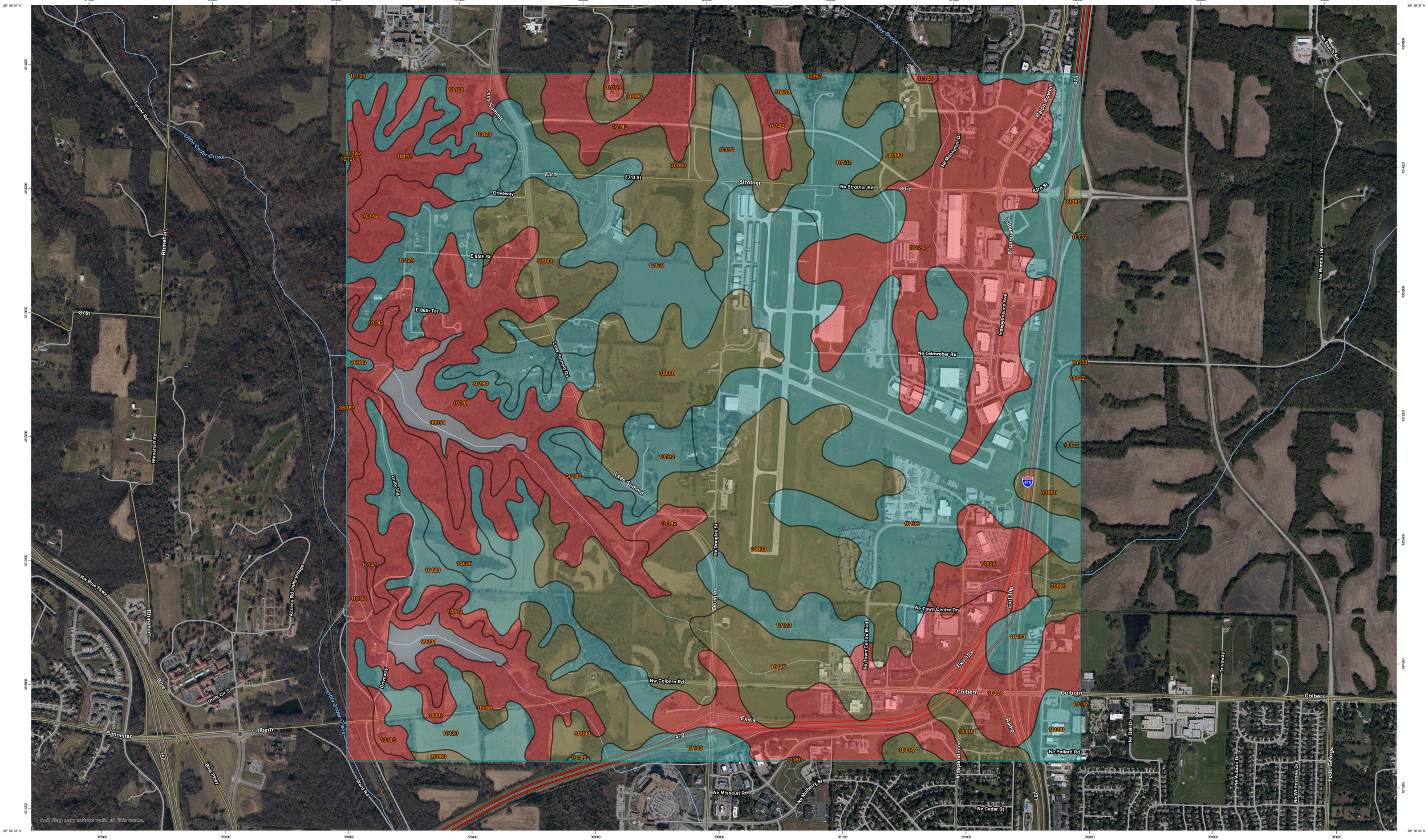
JACKSON COUNTY, MISSOURI AND INCORPORATED AREAS

PANEL 409 OF 605

Panel Contains:

COMMUNITY	NUMBER	PANEL
CITY OF KANSAS CITY	290173	0409
VILLAGE OF UNITY	290513	0409
CITY OF LEE'S SUMMIT	290174	0409

MAP NUMBER
29095C0409G
EFFECTIVE DATE
January 20, 2017



Map Scale: 1:8,260 if printed on D landscape (34" x 22") sheet.

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 20, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 6, 2019—Nov 16, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10000	Arisburg silt loam, 1 to 5 percent slopes	C	19.2	0.7%
10024	Greenton-Urban land complex, 5 to 9 percent slopes	D	294.2	10.0%
10026	Higginsville silt loam, 5 to 9 percent slopes	C	64.2	2.2%
10113	Oska silty clay loam, 5 to 9 percent slopes, eroded	D	26.5	0.9%
10116	Sampsel silty clay loam, 2 to 5 percent slopes	C/D	22.2	0.8%
10117	Sampsel silty clay loam, 5 to 9 percent slopes	C/D	61.8	2.1%
10120	Sharpsburg silt loam, 2 to 5 percent slopes	C	232.0	7.9%
10122	Sharpsburg silt loam, 5 to 9 percent slopes, eroded	C	5.2	0.2%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	D	206.3	7.0%
10132	Sibley silt loam, 2 to 5 percent slopes	C	253.0	8.6%
10136	Sibley-Urban land complex, 2 to 5 percent slopes	C	458.4	15.6%
10141	Snead-Rock outcrop complex, 14 to 30 percent slopes	D	194.8	6.6%
10142	Snead-Rock outcrop complex, 5 to 14 percent slopes	D	287.3	9.8%
10143	Snead-Urban land complex, 9 to 30 percent slopes	D	1.6	0.1%
10180	Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	C	40.4	1.4%
30080	Greenton silty clay loam, 5 to 9 percent slopes	C/D	684.9	23.3%
30180	Polo silt loam, 5 to 9 percent slopes, eroded	C	43.7	1.5%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
36083	Kennebec silt loam, 1 to 4 percent slopes, occasionally flooded	C	2.1	0.1%
99001	Water		39.4	1.3%
Totals for Area of Interest			**2,937.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

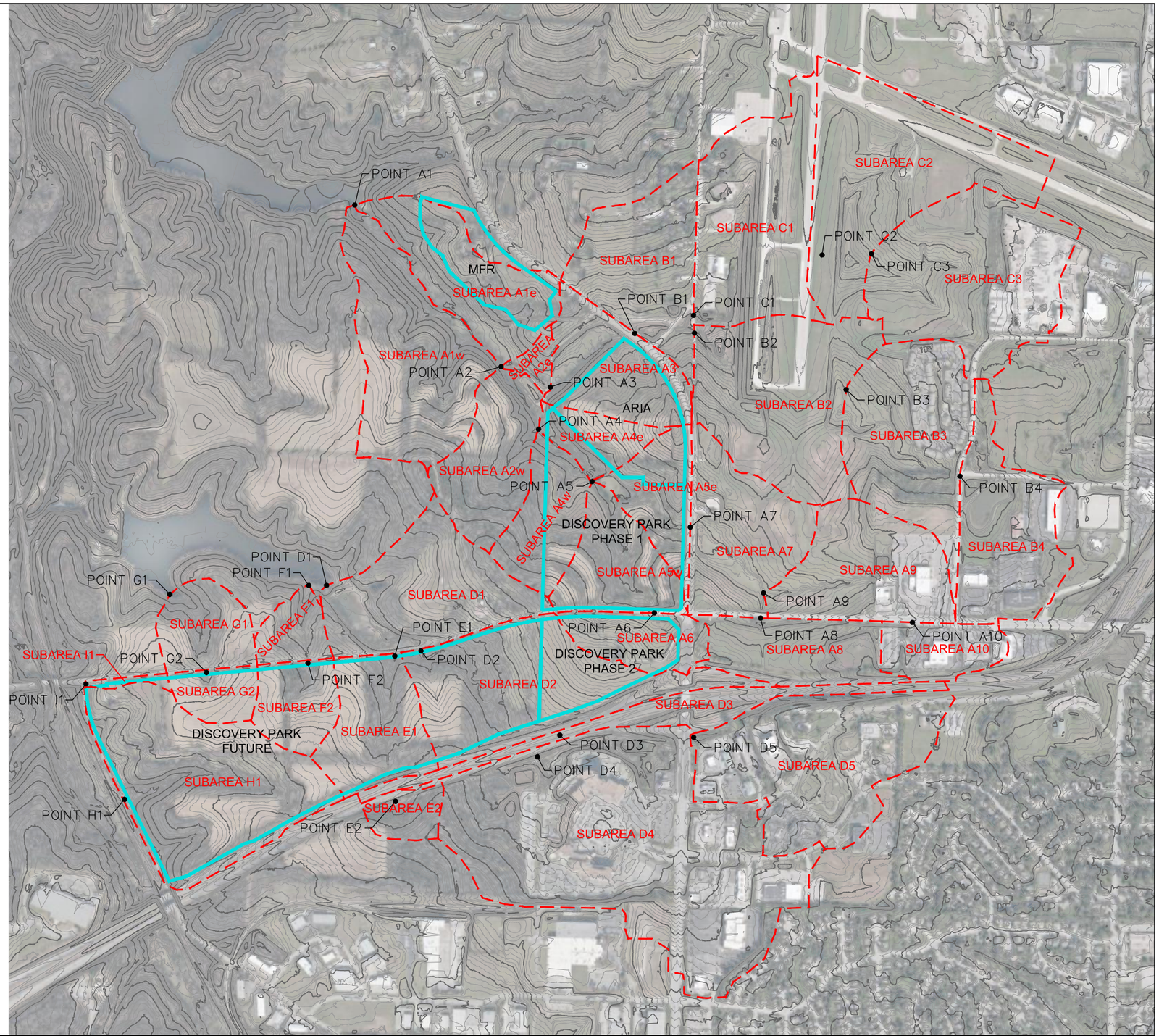
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Location ID:	Total Area (sf):	Aria Onsite Area (sf):	Discovery Park Phase 1 Onsite Area (sf):	Discovery Park Phase 2 Onsite Area (sf):	Discovery Park Future Onsite Area (sf):	Weighted NRCS CN:
Subarea A1(e):	27.97				12.36	77
Subarea A1(w):	43.14					76
Subarea A2(e):	3.08					80
Subarea A2(w):	23.41					73
Subarea A3:	24.42	11.62				80
Subarea A4(e):	9.85	5.99	3.35			81
Subarea A4(w):	17.41		9.19			73
Subarea A5(e):	15.16	4.88	8.00			80
Subarea A5(w):	19.77		18.66			76
Subarea A6:	13.45			9.21		83
Subarea A7:	30.60					76
Subarea A8:	21.56					81
Subarea A9:	31.84					84
Subarea A10:	12.23					94
Subtotal:	*293.88*	*22.50*	*39.20*	*9.21*	*12.36*	
Subarea B1:	31.94					79
Subarea B2:	48.54					78
Subarea B3:	40.69					83
Subarea B4-DET:	25.05					94
Subarea B4-BYP:	7.42					94
Subtotal:	*153.64*					
Subarea C1:	45.21					90
Subarea C2:	57.13					81
Subarea C3:	52.36					83
Subtotal:	154.70					
Subarea D1:	36.91		0.22			77
Subarea D2:	47.00			10.62	24.74	79
Subarea D3:	16.84					88
Subarea D4:	112.38					88
Subarea D5:	53.24					89
Subtotal:	*266.37*		*0.22*	*10.62*	*24.74*	
Subarea E1:	22.59				20.68	80
Subarea E2:	6.56					73
Subtotal:	*29.15*				*20.68*	
Subarea F1:	7.85					77
Subarea F2:	12.76				12.06	81
Subtotal:	*20.60*				*12.06*	
Subarea G1:	14.04					81
Subarea G2:	7.93				7.11	85
Subtotal:	*21.96*				*7.11*	
Subarea H1:	56.17				51.06	78
Subtotal:	*56.17*				*51.06*	
Subarea I1:	1.40				0.61	86
Subtotal:	*1.40*				*0.61*	

Sub-W'Shed A Subtotal:	293.88	22.50	39.20	9.21	12.36
Sub-W'Shed B Subtotal:	153.64				
Sub-W'Shed C Subtotal:	154.70				
Sub-W'Shed D Subtotal:	266.37		0.22	10.62	24.74
Sub-W'Shed E Subtotal:	29.15				20.68
Sub-W'Shed F Subtotal:	20.60				12.06
Sub-W'Shed G Subtotal:	21.96				7.11
Sub-W'Shed H Subtotal:	56.17				51.06
Sub-W'Shed I Subtotal:	1.40				0.61
Modeled Total:	997.89	22.50	39.42	19.83	128.62



BOUNDARY LEGEND

SITE BOUNDARY

TRIBUTARY DRAINAGE BOUNDARY

DWG: F:\2021\04501-05000\021-04643-A\40-Design\Reports\GNCV\Macro_Stormwater_Study_A2104643\Rev_1\Exhibits\EX-300_Existing_Conditions\EX-300_Existing_Conditions_A2104643.dwg

PROJECT NO:	A21-04643
DRAWN BY:	DFG
DATE:	01/18/2023

EXISTING CONDITIONS

olsson
1301 Burlington Street
North Kansas City, MO 64116
TEL 816.361.1177

EXHIBIT

EX-300

Location ID:	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Onsite Area (ac):	Onsite Area Macro-Study (ac):	Weighted NRCS CN:
Subarea A1(e):	*27.97*			*12.36*	*77*
Subarea A1(w):	*43.14*				*76*
Subarea A2(e):	*3.08*				*80*
Subarea A2(w):	*23.41*				*73*
Subarea A3:	24.06	11.07		11.07	82
Subarea A4(e):	1.48	0.14	0.84	0.98	88
Subarea A4(w):	8.75		0.59	0.59	72
Subarea A5(e):	19.12	11.29	6.92	18.20	86
Subarea A5(w):	33.42		31.08	31.08	95
Subarea A6:	13.42			9.88	83
Subarea A7:	*30.60*				*76*
Subarea A8:	*21.56*				*81*
Subarea A9:	*31.84*				*84*
Subarea A10:	*12.23*				*94*
Subtotal:	*294.08*	*22.50*	*39.43*	*84.16*	
Subarea B1:	*31.94*				*79*
Subarea B2:	*48.54*				*78*
Subarea B3:	*40.69*				*83*
Subarea B4-DET:	*25.05*				*94*
Subarea B4-BYP:	*7.42*				*94*
Subtotal:	*153.64*				
Subarea C1:	*45.21*				*90*
Subarea C2:	*57.13*				*81*
Subarea C3:	*52.36*				*83*
Subtotal:	154.70				

Sub-W'Shed A Subtotal:	294.08	22.50	39.43	84.16
Sub-W'Shed B Subtotal:	*153.64*	*0.00*	*0.00*	*0.00*
Sub-W'Shed C Subtotal:	*154.70*	*0.00*	*0.00*	*0.00*
Modeled Total:	602.42	22.50	39.43	84.16

BOUNDARY LEGEND

SITE BOUNDARY

TRIBUTARY DRAINAGE BOUNDARY

N

0' 350' 700' 1400'

SCALE IN FEET

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PROJECT NO: A21-04643	DISCOVERY PARK MACRO PROPOSED CONDITIONS	olsson 1301 Burlington Street North Kansas City, MO 64116 TEL 816.361.1177	EXHIBIT EX-301
DRAWN BY: DFG			
DATE: 01/18/2023			

Location ID:	Total Area (ac):	Aria Onsite Area (ac):	Discovery Park Onsite Area (ac):	Onsite Area Macro-Study (ac):	Weighted NRCS CN:
Subarea A1(e):	30.57			*14.96*	85
Subarea A1(w):	*43.14*				*76*
Subarea A2(e):	*3.08*				*80*
Subarea A2(w):	*23.41*				*73*
Subarea A3:	24.06	11.07		11.07	87
Subarea A4(e):	1.48	0.14	0.84	0.98	89
Subarea A4(w):	8.75		0.59	0.59	72
Subarea A5(e):	19.12	11.29	6.92	18.20	92
Subarea A5(w):	33.42		31.08	31.08	95
Subarea A6:	13.42			9.88	94
Subarea A7:	*30.60*				*76*
Subarea A8:	*21.56*				*81*
Subarea A9:	*31.84*				*84*
Subarea A10:	*12.23*				*94*
Subtotal:	*296.68*	*22.50*	*39.43*	*86.76*	
Subarea B1:	*31.94*				*79*
Subarea B2:	*48.54*				*78*
Subarea B3:	*40.69*				*83*
Subarea B4-DET:	*25.05*				*94*
Subarea B4-BYP:	*7.42*				*94*
Subtotal:	*153.64*				
Subarea C1:	*45.21*				*90*
Subarea C2:	*57.13*				*81*
Subarea C3:	*52.36*				*83*
Subtotal:	154.70				

Sub-W'Shed A Subtotal:	296.68	22.50	39.43	86.76
Sub-W'Shed B Subtotal:	*153.64*	*0.00*	*0.00*	*0.00*
Sub-W'Shed C Subtotal:	*154.70*	*0.00*	*0.00*	*0.00*
Modeled Total:	605.02	22.50	39.43	86.76

BOUNDARY LEGEND

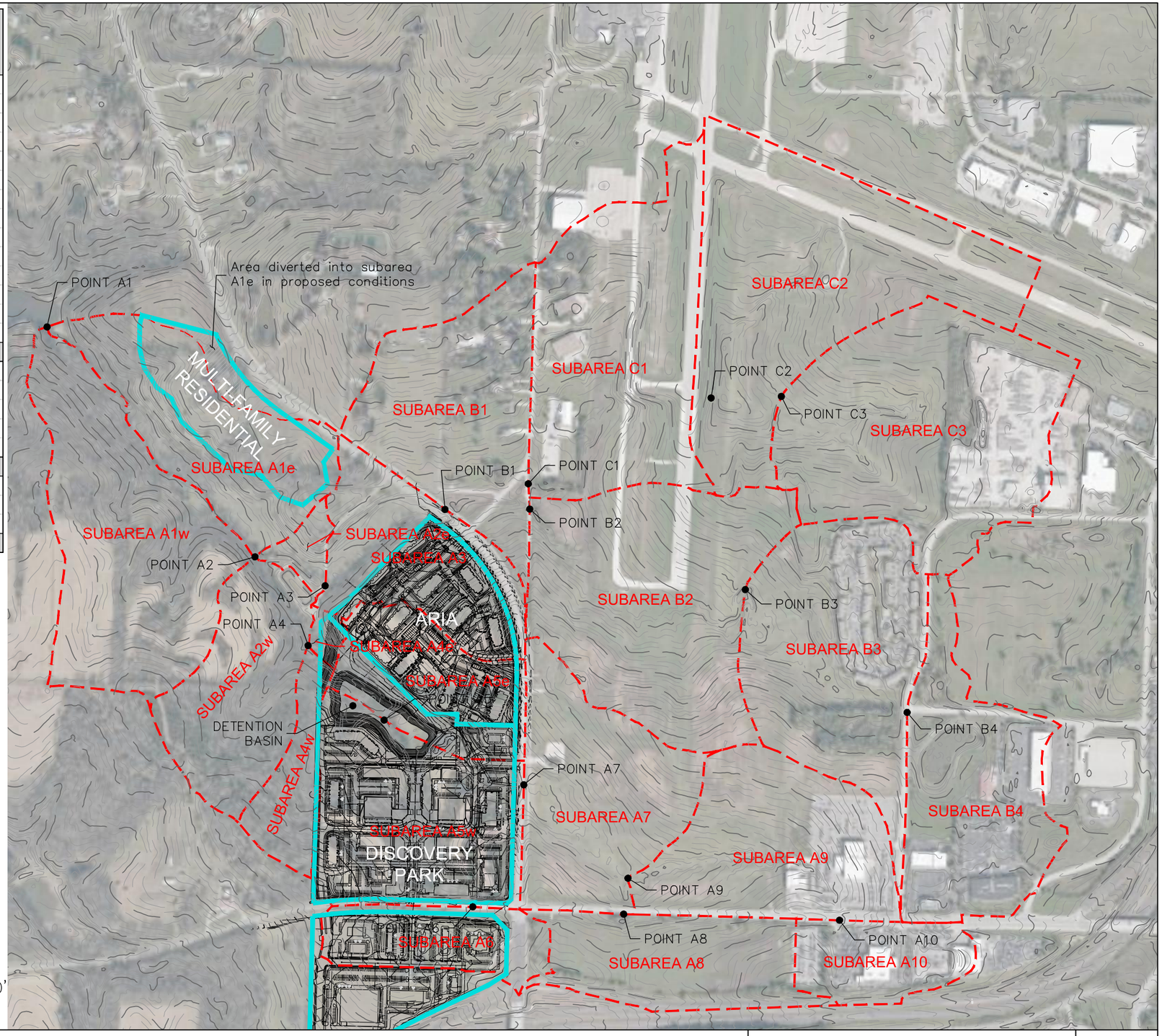
SITE BOUNDARY

TRIBUTARY DRAINAGE BOUNDARY

N

0' 350' 700' 1400'

SCALE IN FEET



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PROJECT NO:	A21-04643
DRAWN BY:	DFG
DATE:	01/18/2023

MACRO FULLY-DEVELOPED CONDITIONS

olsson
1301 Burlington Street
North Kansas City, MO 64116
TEL 816.361.1177

EXHIBIT

EX-302

DISCOVERY PARK
MACRO STORMWATER REPORT

Lee's Summit, MO

January 2023
Revised March 2023
Olsson Project No. A21-04643