

PROJECT ROCKETSHIP PRELIMINARY DRAINAGE STUDY

SMITHVILLE, CLAY COUNTY, MO

Prepared for:

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1. GENERAL INFORMATION

Project Rocketship is a proposed warehouse development on a 155.23 acre lot. The project is located on the North side of NW 136 ST and West of HWY 169. The site is generally located North of SWADE Dispensary Smithville and Southwest of NW 140th ST and HWY 169 intersection. The project lies in the northwest $\frac{1}{4}$ of Section 3, Township 52N, Range 33W, in Clay County, Smithville MO.

1.1. Project Location

The proposed Project Rocketship development is located in the city of Smithville, Missouri. The area to be developed is bounded by HWY 169 to the East, single family homes to the East, commercial buildings to the South, and undeveloped land to the North. The site discharges primarily to the West, into an existing creek that directs flows to the North into the Bell Lake.

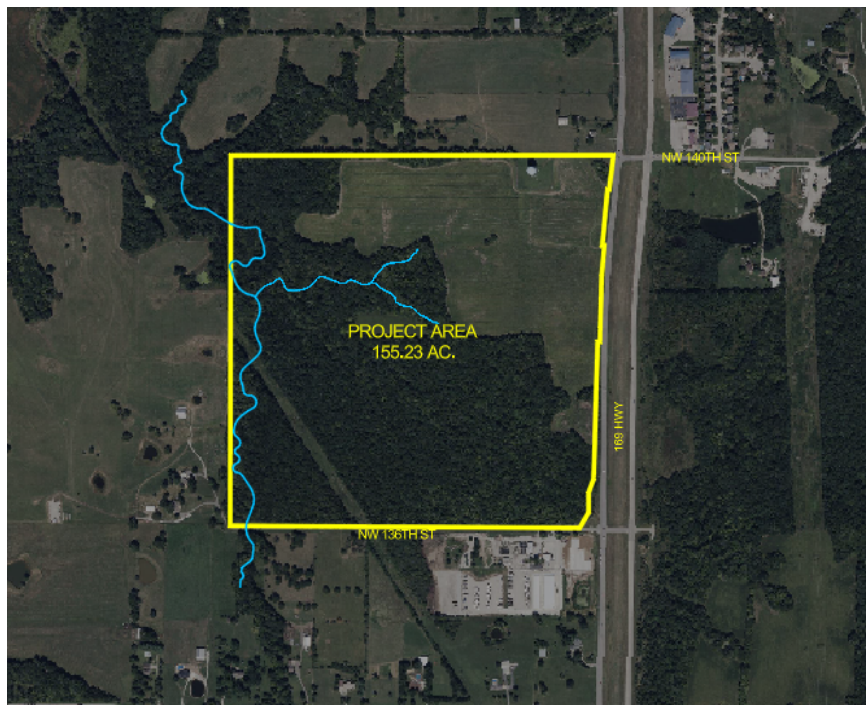


Figure 1. Rocketship Location Map.

1.2. Federal Emergency Management Agency Floodplain Classification

FEMA Flood Boundary and Floodway Map Community Panel Number 29047C0102E and 29047C0104E classifies the Rocketship property as a mostly in a unshaded Zone X area. This is the FEMA flood insurance rate zone that corresponds to areas of minimal flood hazard. Refer to Appendix F for the FIRM Map.

1.3. Soil Classifications

Soil maps published on the Natural Resources Conservation Service (NRCS) Web Soil Survey categorize soils on the Project Rocketship property as shown in Table 1. Refer to Appendix E for a map of soils on the property.

Table 1. Soil Classifications

HSG	Symbol	Name	Slope
C	10120	Sharpsburg Silt Loam	2-5%
C	10122	Sharpsburg Silt Loam	5-9%
D	10071	Ladoga Silt Loam	5-9%
D	10142	Snead-Rock Outcrop Complex	5-14%
C	30024	Armster Loam	9-14%
C/D	10081	Macksburg Silt Loam	5-9%

2. METHODOLOGY

The storm drainage study will be analyzed in accordance with the February 15, 2006 edition of the Kansas City Metropolitan Chapter, American Public Works Association, (KCAPWA) Construction and Material Specifications, Section 5601.5.A.4.

The Existing Conditions hydrology will be evaluated in Section 3 and Proposed Conditions hydrology will be computed in Section 4. The Proposed Conditions discharge data for each stage of development will be compared to the Existing Conditions results; variations in quantity and rate of stormwater discharge between these models will represent the hydrologic impact generated by the proposed development. The overall stormwater management plan will be designed utilizing this information. Section 3 assumes current land use within the tributary sub-watersheds, and pre-development conditions within the project boundary. Section 4 assumes fully developed conditions.

Runoff rates and detention hydraulics were analyzed using Autodesk Storm and Sanitary Analysis 2024 (SSA). SSA utilizes the following approved methods to model Existing and Proposed Conditions for stormwater runoff.

- NRCS TR-55 Unit Hydrograph Method
- 2, 10-, and 100-year Return Frequency, 24-hr. Storm Precip. Depths (NOAA Atlas 14)
- ARC Type II Soil Moisture Conditions
- 24-Hour NRCS Type II Rainfall Distribution
- Runoff Curve Numbers per NRCS TR-55 (Tables 2-2a - 2-2c) and KCAPWA Section 5602.3
- NRCS TR-55 Methods for determination of Time of Concentration and Travel Time.

NOTE: SSA models use "Time of Concentration" rather than "Lag Time" for computing subarea hydrology.

Stormwater runoff models were created for the 1%, 10%, and 100% design storm events. The precipitation depths used in the analyses have been interpolated from the NOAA Atlas 14 Maps. The following Table 2 summarizes the rainfall depths used in this analysis:

Table 2. Precipitation Depths.

Return Period	24-Hour Precipitation Depth (in.)
2-Year	5.07
10-Year	7.49
100-Year	11.8

3. EXISTING CONDITIONS

To quantify the effects of development of this project, the following areas and points of interest have been used for Existing and Proposed Conditions analyses. See Exhibit 01 in Appendix A, Existing Macro Conditions Drainage Area Map.

Table 3-1. Project Rocketship– Existing Conditions Cover Types

Cover Type	Soil Type	CN Value
Pasture	C	79
Pasture	D	84
Pasture	C/D	82
Woods	C	73
Woods	D	79

Subarea 1 consists of 11 acres which discharge to the east into an existing culverts underneath HWY 169. This area is primarily pastureland. **Subarea 2** consist of 16 acres which are discharged to the east into an existing culvert underneath Hwy 169. Subarea 2 contains a mix of pastureland and woods. **Subarea 3** consists of 7 acres discharge to existing culvert to the east, with a mix of pastureland and woods. **Subarea 4** consists of 121 acres that discharge to the west into an existing creek and ultimately into Bell Lake. This area consists of a mix of pastureland and woods.

The following tables summarize the results of the Existing Conditions analysis. The Proposed Conditions data will be compared to these results in Section 4 of this report. Refer to Appendix D for output from and a schematic of the Existing Conditions model.

Table 3-2. Project Rocketship – Existing Conditions Subarea Data

Area	Area (acres)	T _c (minutes)	Weighted Curve Number
1	11.11	15.89	81.02
2	16.05	11.09	76.51
3	7.05	13.72	76.30
4	120.94	28.40	77.87

Table 3-3. Project Rocketship– Existing Conditions Subarea Results

Area	Q ₂ (cfs)	V _{R-1} (ac-ft)	Q ₁₀ (cfs)	V _{R-10} (ac-ft)	Q ₁₀₀ (cfs)	V _{R-100} (ac-ft)
1	21.06	1.61	38.82	3.00	71.35	5.73
2	29.22	1.91	57.83	3.78	112.14	7.56
3	11.50	0.83	22.91	1.65	44.78	3.31
4	146.55	15.29	288.03	29.67	555.85	58.55

4. PROPOSED CONDITIONS

The Proposed Conditions section of analysis assumes completion of the Project Rocketship development. The site includes construction of 3 warehouses, parking lots, and commercial development areas. The proposed developments will result in approximately 137 acres being discharged to the west, as the ridgeline moves eastward. CN values are minorly altered, as pastureland and woods areas will be removed, while impervious surfaces increase. Time of concentration is slightly reduced, as a portion of the site traverses through a stormwater pipe system. Several areas have been altered and are described below:

Drainage area 4 is broken into two drainage areas, **4 Detained** and **4 Undetained**. With the increase in drainage area and CN value increase, a drainage basin will be installed. All areas which discharge into the basin are treated as **4 Detained**, while all areas that bypass the basin are considered **4 Undetained**. All areas that discharge to the west have not been fully designed. The future intent is for the sites to be commercial lots, therefore a CN value of 95 was assigned to all areas to the east that are bounded by the proposed street. See Exhibit 02 for a visual representation of the assumed cover types on the site.

The following tables summarize the results of the Proposed Conditions analysis for the revised area. Refer to Appendix D for outputs from the Proposed Conditions SSA model.

Table 4-1. Project Rocketship – Proposed Conditions Subarea Data

Area	Area (acres)	T _c (minutes)	Weighted Curve Number
1	2.33	5.00	95.05
1-1	6.01	5.00	95.24
2	5.94	5.00	95.06
3	4.4	5.00	95.13
4 Detained	105.00	11.10	93.74
4 Undetained	32.81	32.28	79.92

Table 4-2. Project Rocketship – Proposed Conditions Subarea Results

Area	Q ₂ (cfs)	V _{R-1} (ac-ft)	Q ₁₀ (cfs)	V _{R-10} (ac-ft)	Q ₁₀₀ (cfs)	V _{R-100} (ac-ft)
1	27.34	1.49	41.46	1.857	66.36	3.93
1-1	10.63	0.58	16.08	0.91	25.72	1.52
2	26.99	1.47	40.93	2.32	65.50	3.87
3	20.04	1.09	30.37	1.72	48.59	2.88
4 Detained	363.20	24.92	560.27	39.93	905.70	67.54
4 Undetained	40.21	4.54	76.530	8.58	32.81	16.56

Table 4-3. Project Rocketship – Proposed (No Detention) Conditions Points of Interest Results

Outfalls	Q ₂ (cfs)	V _{R-1} (ac-ft)	Q ₁₀ (cfs)	V _{R-10} (ac-ft)	Q ₁₀₀ (cfs)	V _{R-100} (ac-ft)
1	37.40	2.07	56.70	3.26	90.76	5.45
2	26.54	1.47	40.26	2.32	64.53	3.87
3	19.73	1.09	29.97	1.72	47.79	2.88
4	374.86	29.48	588.30	48.53	971.01	84.13

The following table compares the results of the Proposed Conditions analysis to the Existing Conditions from Section 3 at points of interest on the site. Positive values indicate an increase from Existing to Proposed conditions, while negative values indicate a decrease.

Table 4-4. Project Rocketship – Proposed (No Detention) vs. Existing Conditions Point of Interest Comparison

Outfall	Condition	Q ₁ (cfs)	V _{R-1} (ac-ft)	Q ₁₀ (cfs)	V _{R-10} (ac-ft)	Q ₁₀₀ (cfs)	V _{R-100} (ac-ft)
1	Existing	21.06	1.61	38.82	3.00	71.35	5.73
	Proposed	37.40	2.07	56.70	3.26	90.76	5.45
	Difference	+16.34	+0.46	+17.88	+0.26	+19.41	-0.28
2	Existing	29.22	1.91	57.83	3.78	112.14	7.56
	Proposed	26.54	1.47	40.26	2.32	64.53	3.87
	Difference	-2.68	-0.44	-17.57	-1.46	-47.61	-3.69
3	Existing	11.50	0.83	22.91	1.65	44.78	3.31
	Proposed	19.73	1.09	29.97	1.72	47.79	2.88
	Difference	+8.23	+0.26	+7.06	+0.70	+3.01	+0.43
4	Existing	146.55	15.29	288.03	29.67	555.85	58.55
	Proposed	374.86	29.48	588.30	48.53	971.01	84.13
	Difference	+228.31	+14.19	+300.27	+18.86	+415.16	+25.58

To mitigate for the increases shown in the previous table at Outfall 4, a detention basin will be required. A basin is proposed on the west side of the property that will receive all flows from the proposed warehouse buildings. Details for the proposed basin can be found below:

Basin Bottom Elevation: 927.50
 Top of Basin Elevation = 937.00
 60" HDPE pipe as outfall, FL = 927.50
 Emergency Spillway Elevation = 935.50

For outfalls Outfalls 1, 2 and 3, assumptions made show that there will be an increase in Outfall 1 and 3, with a decrease in Outfall 2. Due to the unknown nature of the future sites, The exact CN values and Tc's will be determined in future designs on site. To account for the increases, a preliminary basin design has been added, with approximately 37,500 cf of storage used in Area 1, and approximately 17,500 cf of storage used in Area 3.

The below table shows results for the proposed basin.

Table 4-5. Project Rocketship – Proposed Conditions Detention Basin Flow and Volume Results

Subarea	Peak Q In (cfs)	TP In (hr)	Peak Q Out (cfs)	TP Out (hr)	Peak W.S.E. (ft)	Stored Volume (ac-ft)
1-Year	363.20	12.17	75.92	12.52	930.63	11.800
10-Year	560.27	12.16	139.34	12.50	932.20	18.108
100-Year	905.70	12.16	212.41	12.52	934.82	29.292

The below table shows the results of the model using the assumed basins and storage.

Table 4-6. Project Rocketship – Proposed (With Detention) Conditions Point of Interest Results

Outfalls	Q ₂ (cfs)	V _{R-1} (ac-ft)	Q ₁₀ (cfs)	V _{R-10} (ac-ft)	Q ₁₀₀ (cfs)	V _{R-100} (ac-ft)
1	19.34	2.07	33.17	3.26	62.51	5.45
2	26.54	1.47	40.26	2.32	64.53	3.87
3	9.07	1.09	19.02	1.72	36.61	2.88
4	114.15	29.41	213.41	48.45	352.30	84.04

5. RESULTS

Table 5-1 below, summarizes the Proposed Conditions results and compares them with Existing conditions.

Table 5-1. Project Rocketship –Points of Interest Discharge Comparison

Outfall	Condition	Q ₁ (cfs)	V _{R-1} (ac-ft)	Q ₁₀ (cfs)	V _{R-10} (ac-ft)	Q ₁₀₀ (cfs)	V _{R-100} (ac-ft)
1	Existing	21.06	1.61	38.82	3.00	71.35	5.73
	Proposed	19.34	2.07	33.17	3.26	62.51	5.45
	Difference	-1.72	+0.46	-5.65	+0.26	-8.84	-0.28
2	Existing	29.22	1.91	57.83	3.78	112.14	7.56
	Proposed	26.54	1.47	40.26	2.32	64.53	3.87
	Difference	-2.68	-0.44	-17.57	-1.46	-47.61	-3.69
3	Existing	11.50	0.83	22.91	1.65	44.78	3.31
	Proposed	9.07	1.09	19.02	1.72	36.61	2.88
	Difference	-2.43	+0.26	-3.89	+0.70	-8.71	+0.43
4	Existing	146.55	15.29	288.03	29.67	555.85	58.55
	Proposed	114.15	29.41	213.41	48.45	352.30	84.04
	Difference	-32.40	+14.12	-74.62	+18.78	-203.55	+25.49

As can be seen in the above table, flows are reduced in all storm events at all Outfalls. Future developments in Areas 1, 2 and 3 will submit micro studies ensuring conformance with city regulations and this stormwater study.

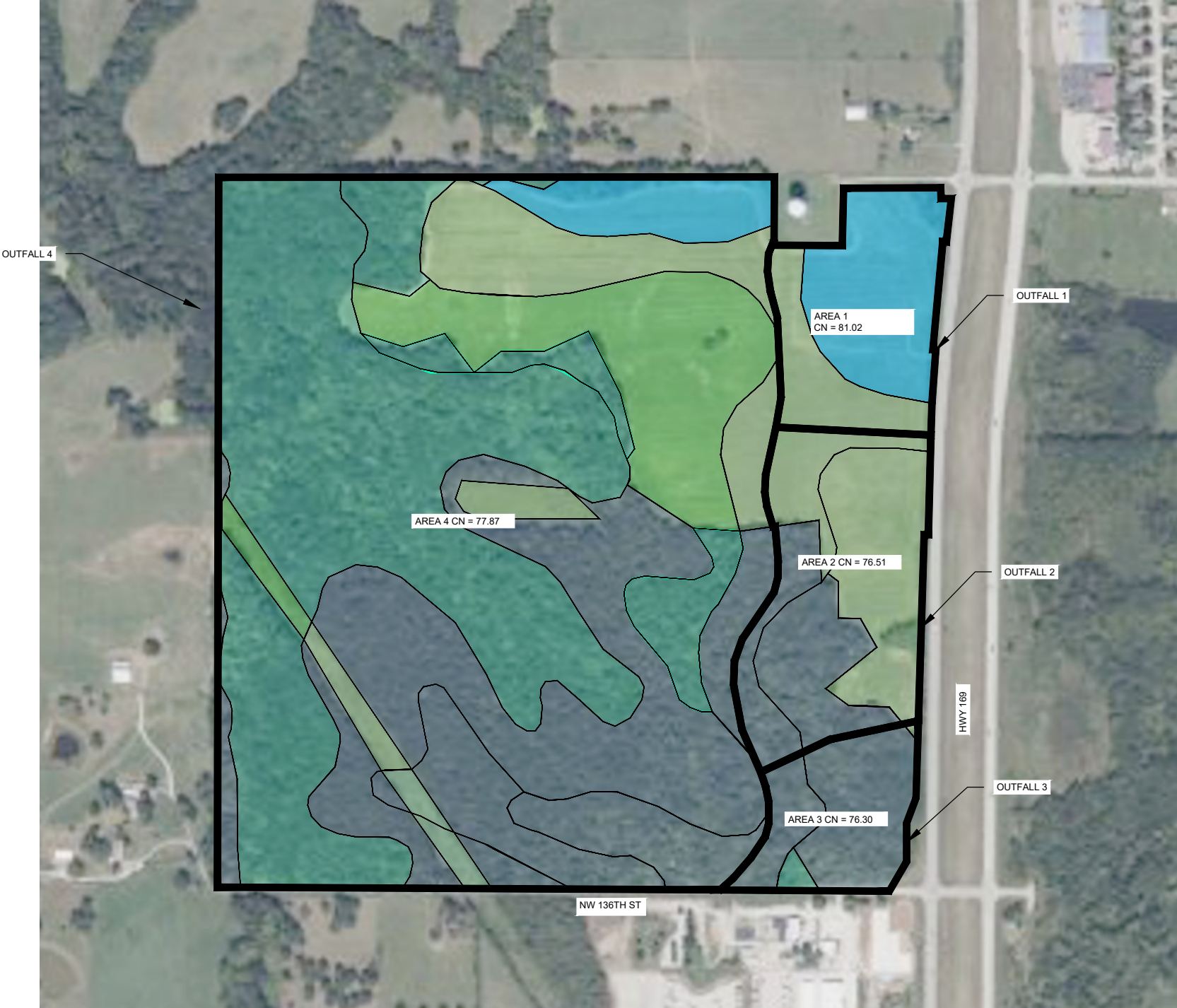
6. CONCLUSION

This Stormwater Drainage Study has been prepared for the proposed project to establish a comprehensive stormwater management plan for the site. The results of this analysis demonstrate that the proposed stormwater management plan for the project achieves compliance with current City of Smithville, Missouri design criteria.

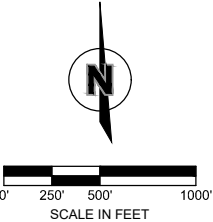
APPENDIX A

Exhibits

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PASTURE SOIL TYPE D	
PASTURE SOIL TYPE C/D	
WOODS C	
WOODS D	



PROJECT NO: 026-02142

DRAWN BY: AV

DATE: 05/20/2026

EXISTING CONDITIONS

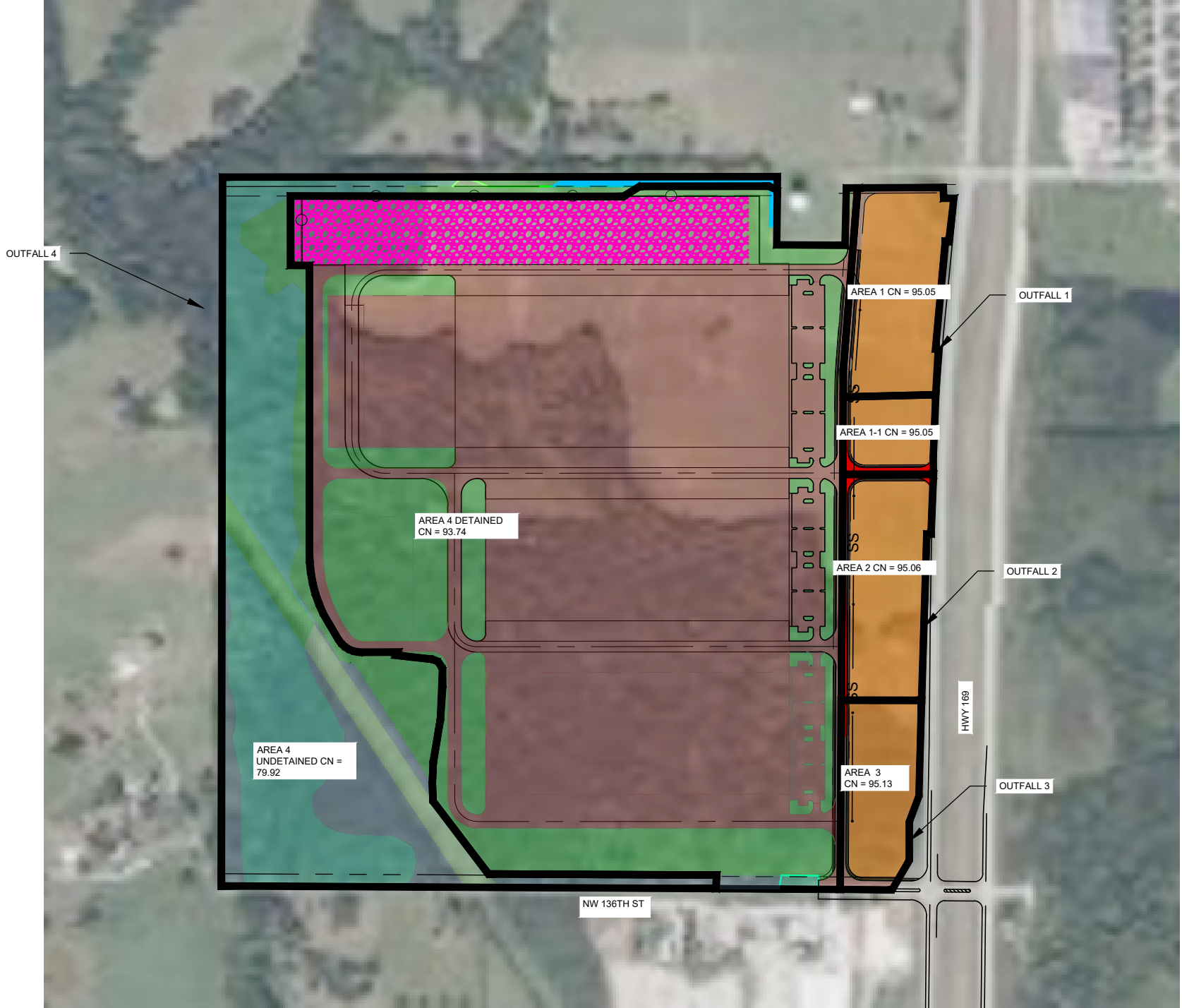
olsson

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Kansas COA #E-516

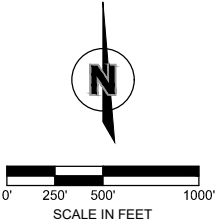
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TURF TYPE D	
PASTURE SOIL TYPE C/D	
WOODS C	
WOODS D	
IMPERVIOUS	
COMMERICAL	
GRAVEL	



PROJECT NO: 026-02142

DRAWN BY: AV

DATE: 05/20/2026

PROPOSED CONDITIONS

olsson

1301 Burlington Street
North Kansas City, MO 64116
olsson.com
TEL 816.361.1177
Olsson - Engineering
Kansas COA #E-516

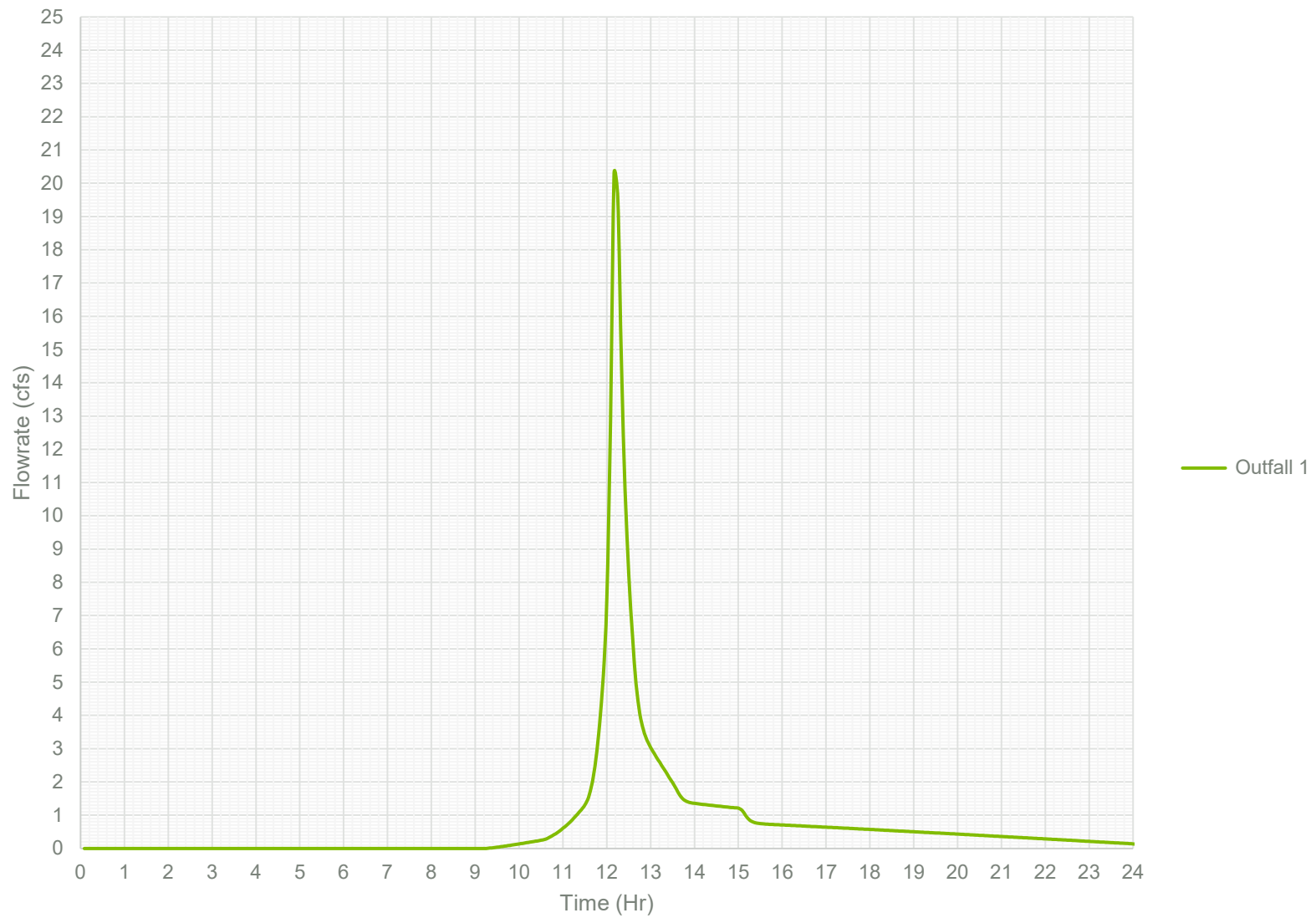
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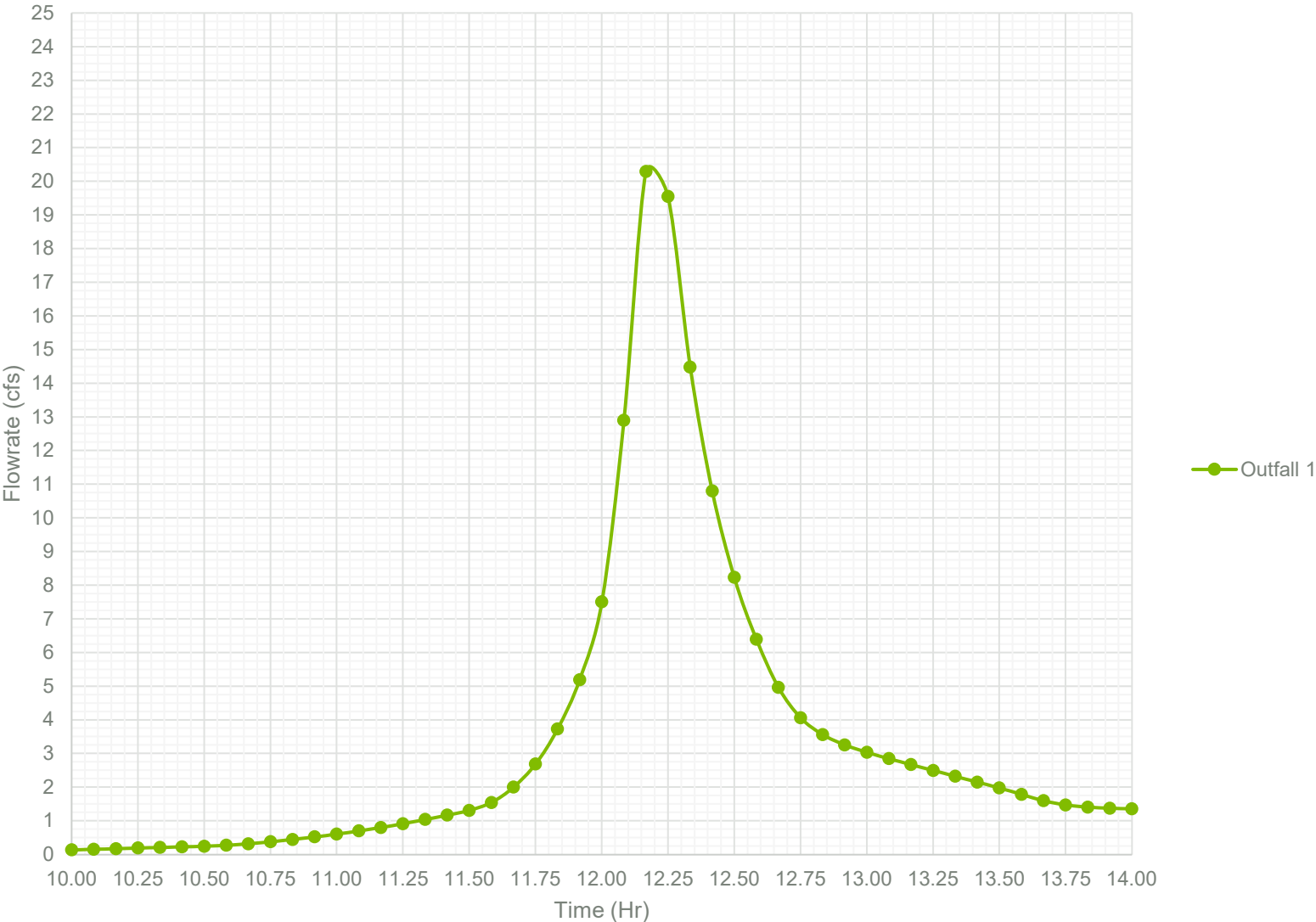
APPENDIX B

Hydrographs

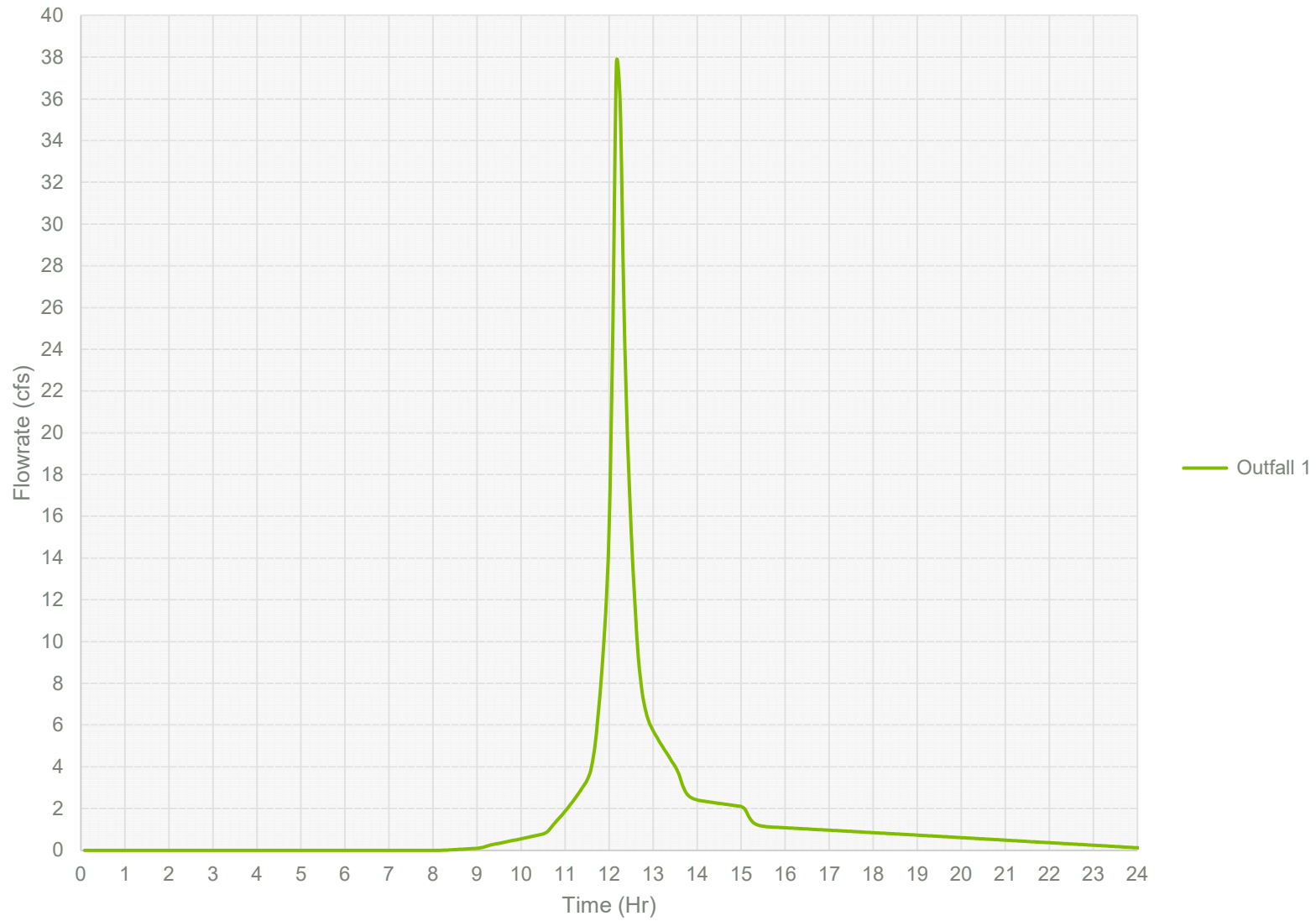
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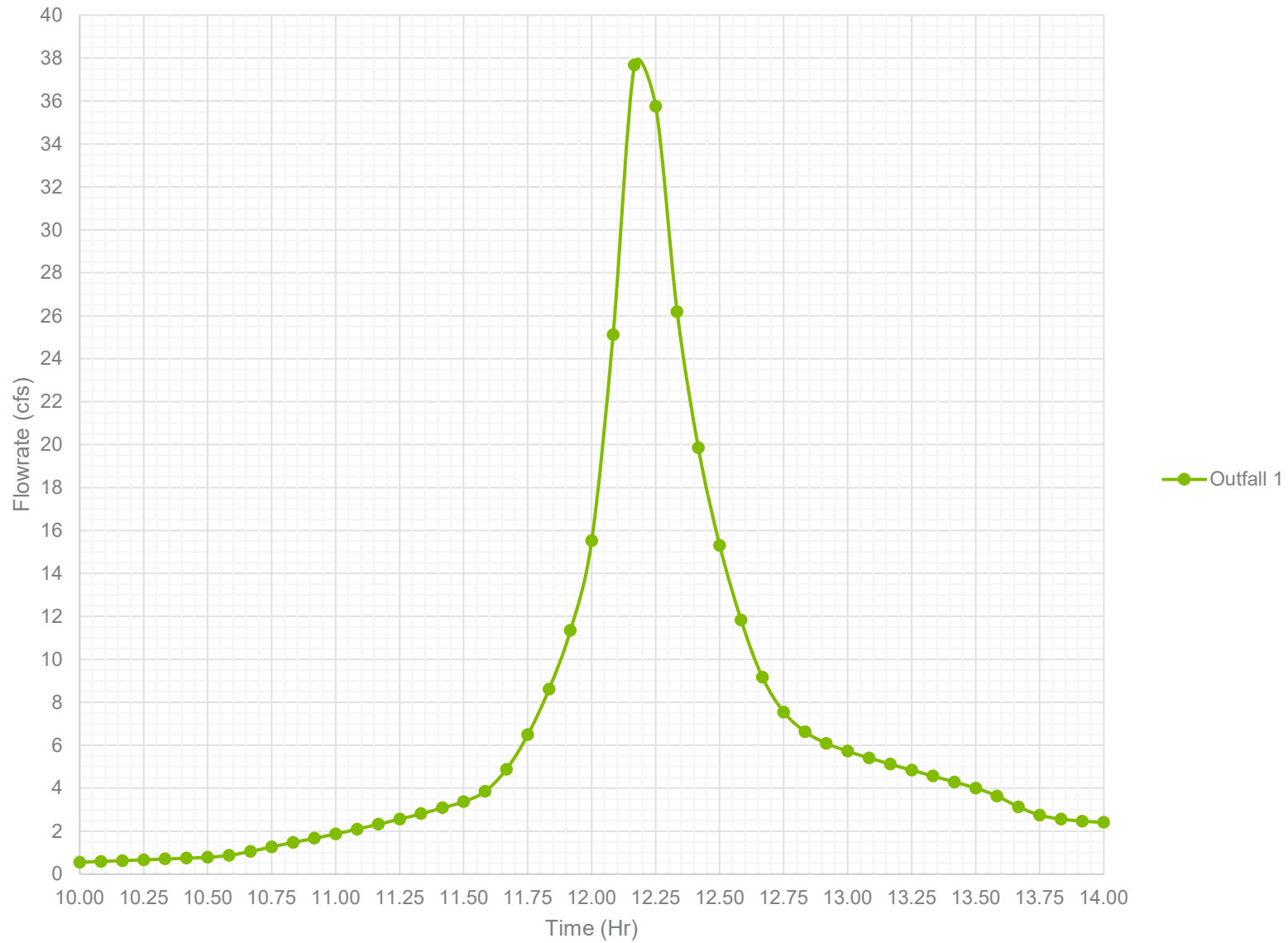
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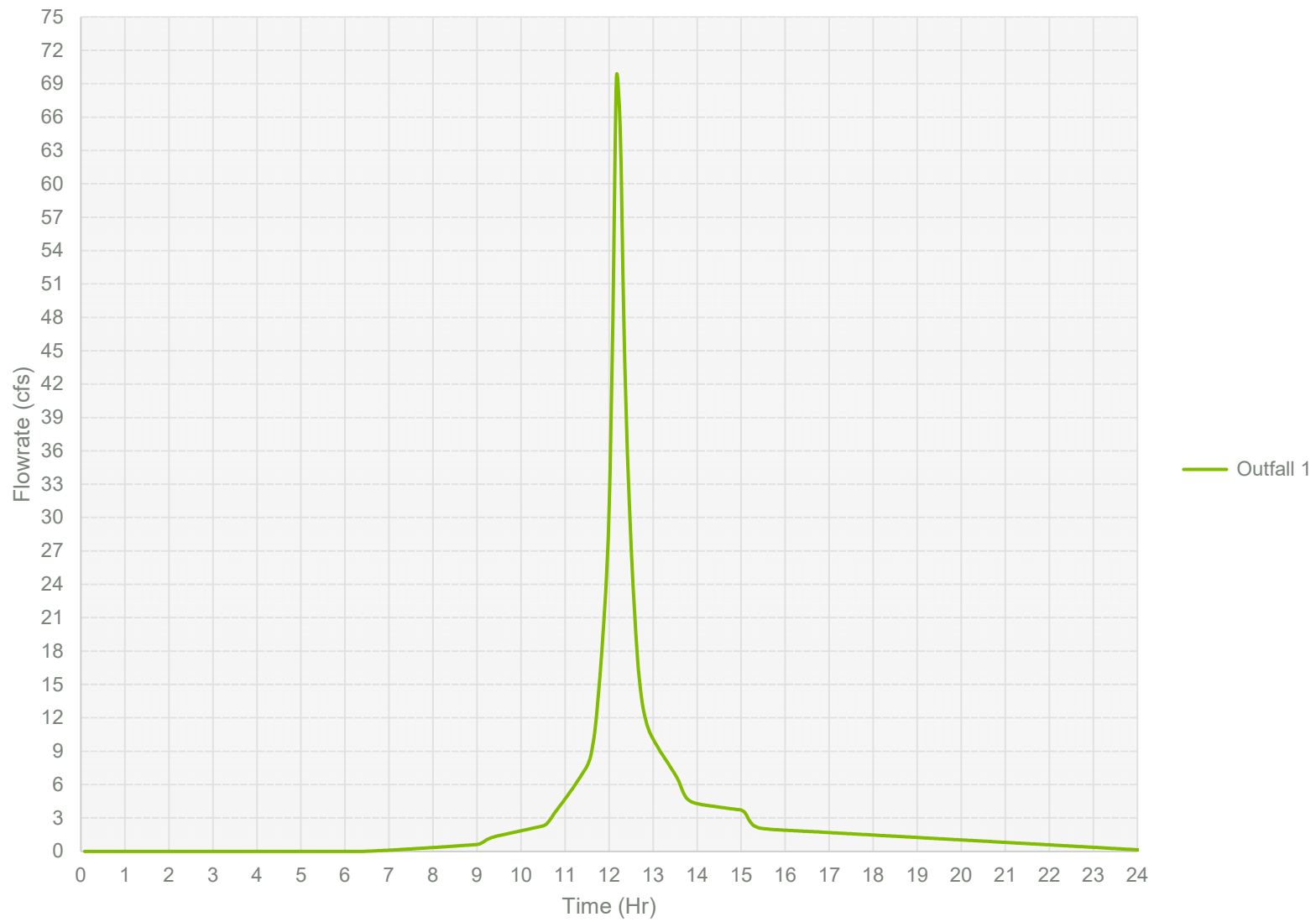
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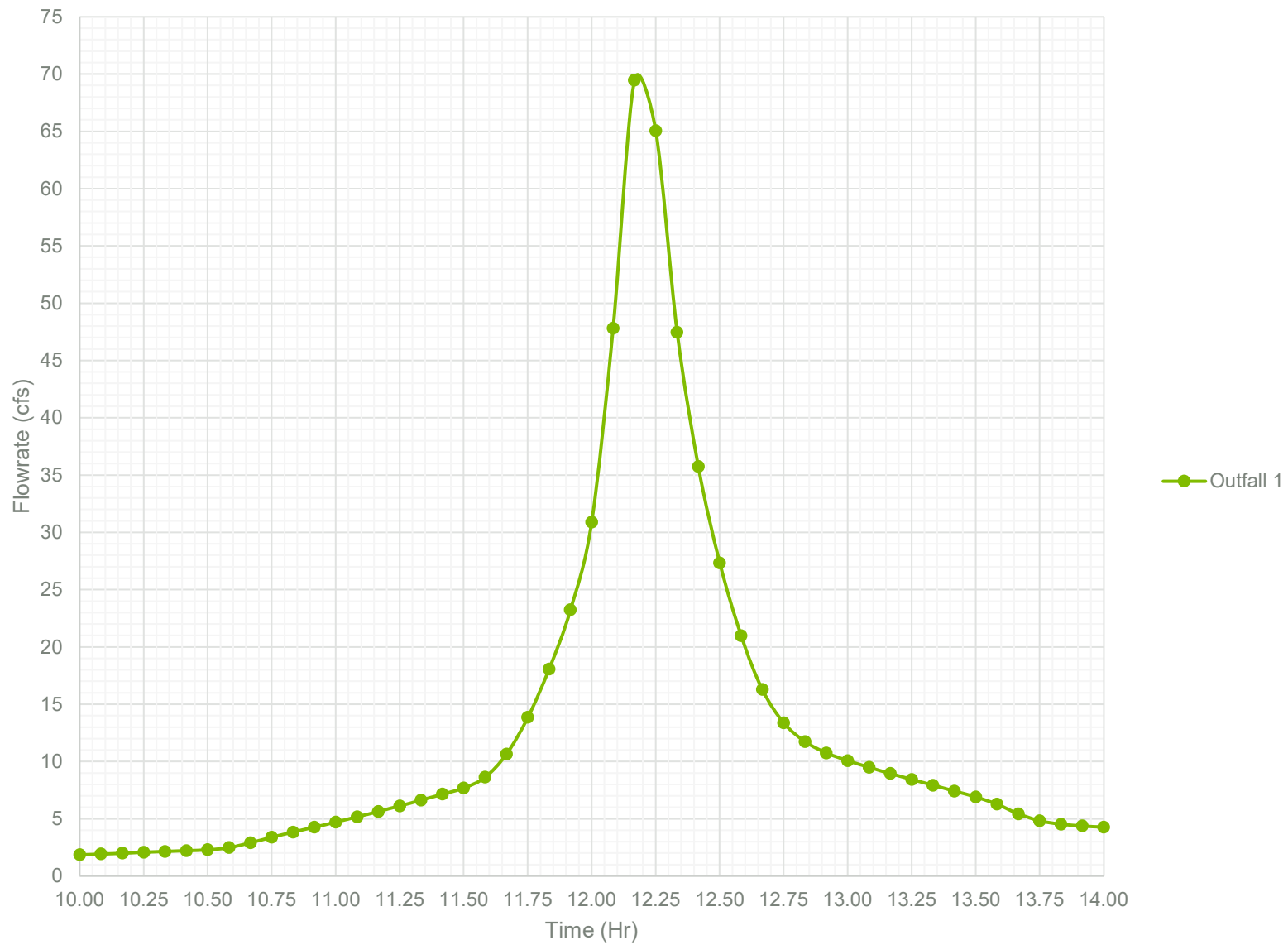
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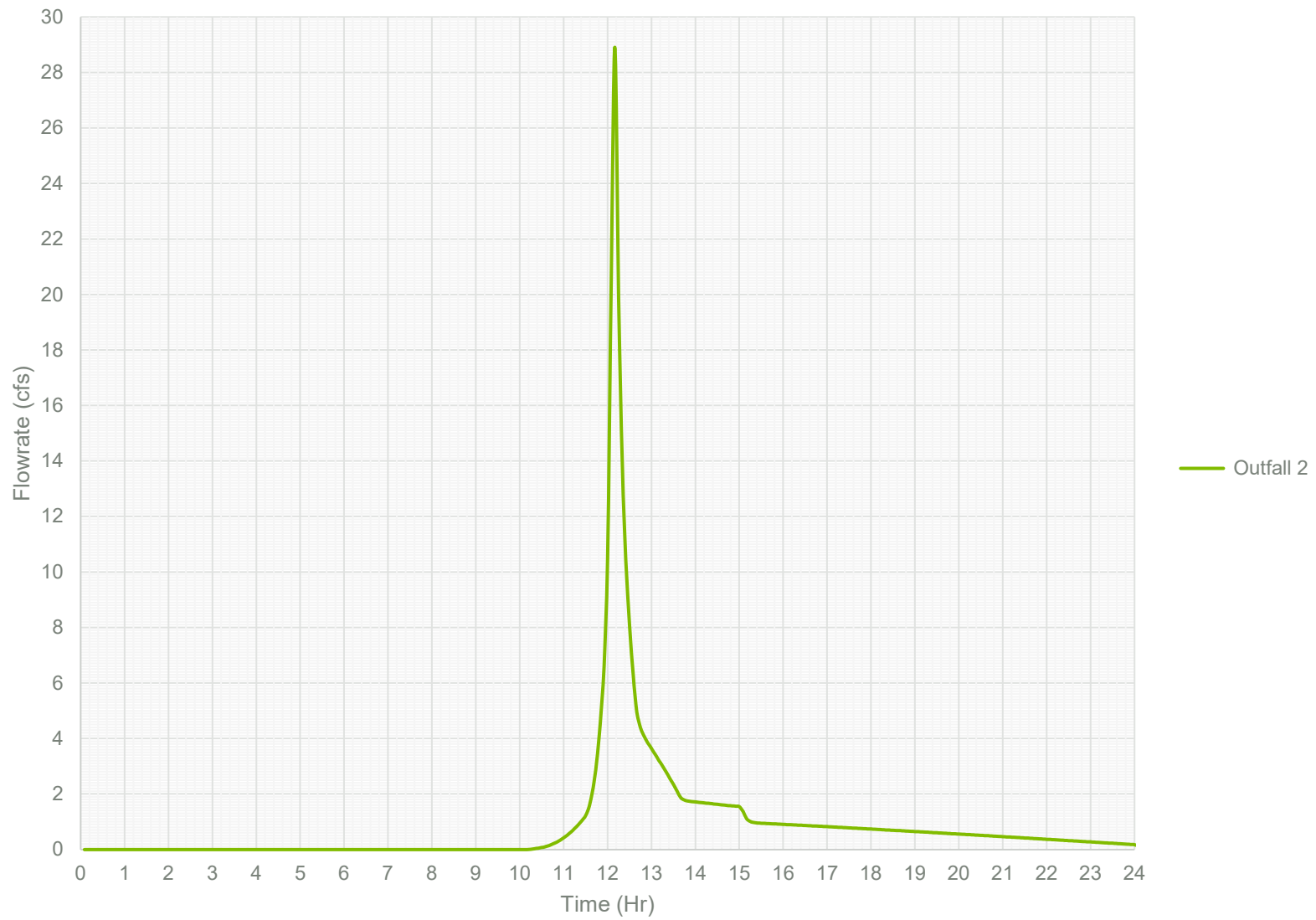
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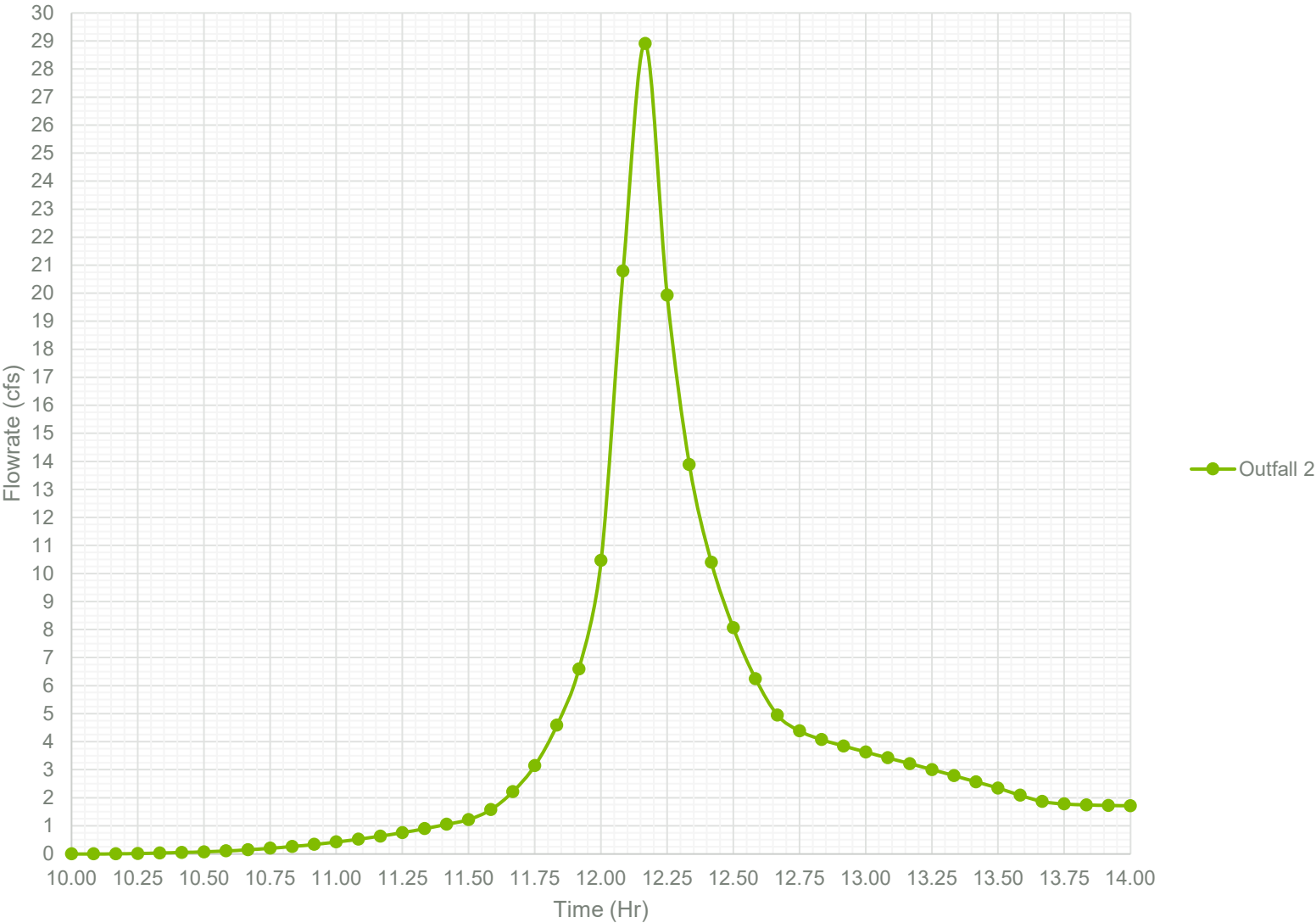
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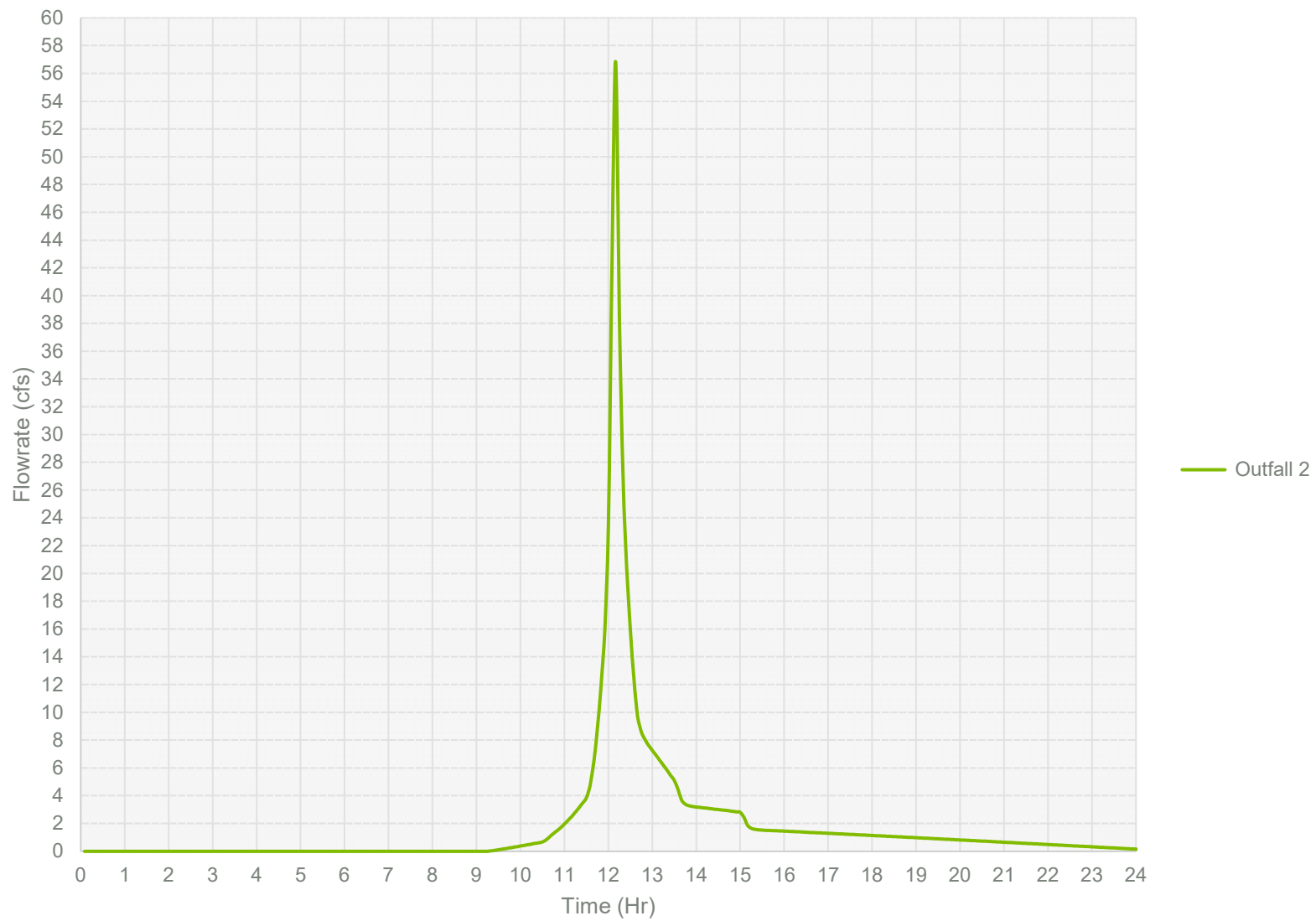
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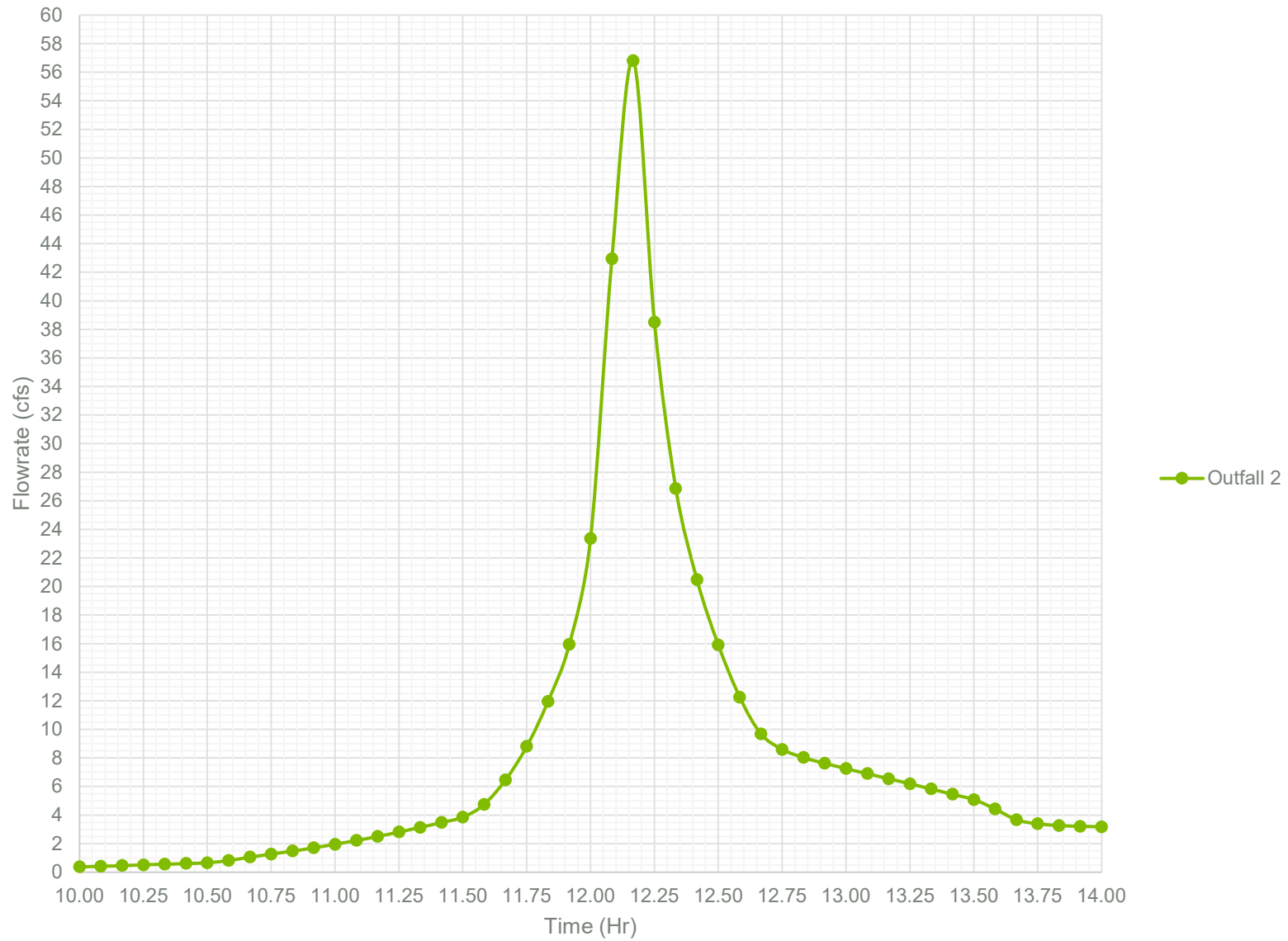
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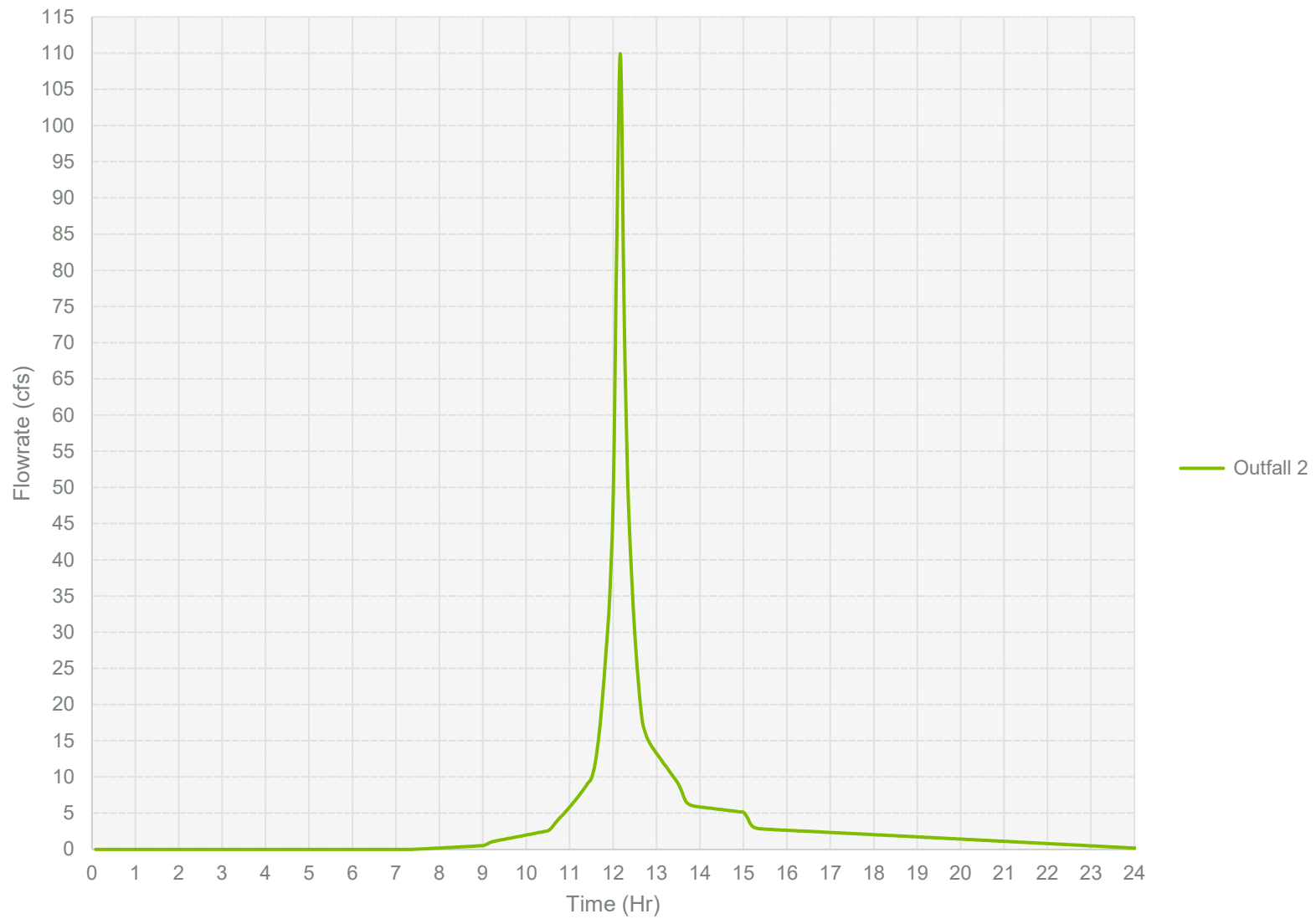
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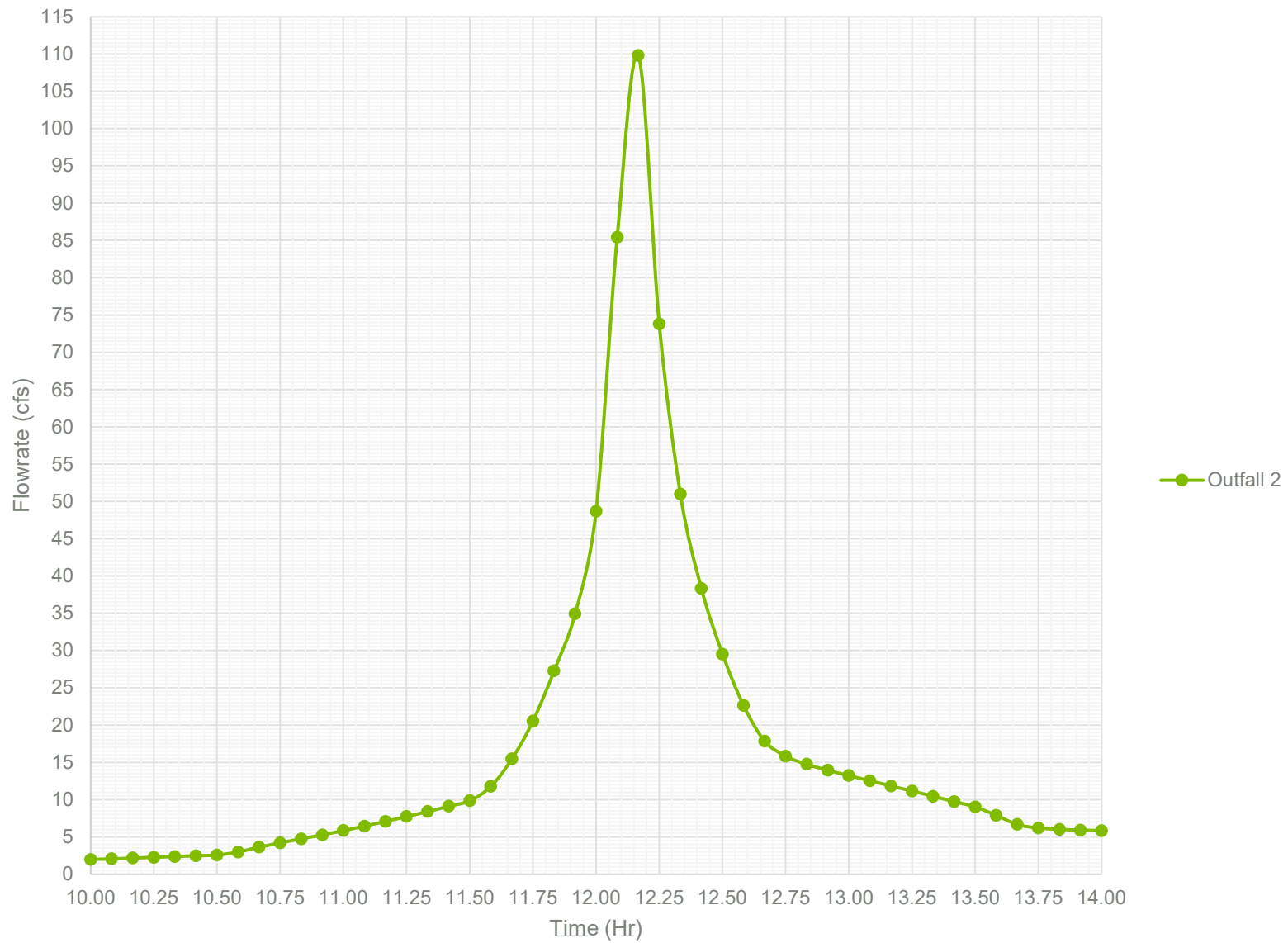
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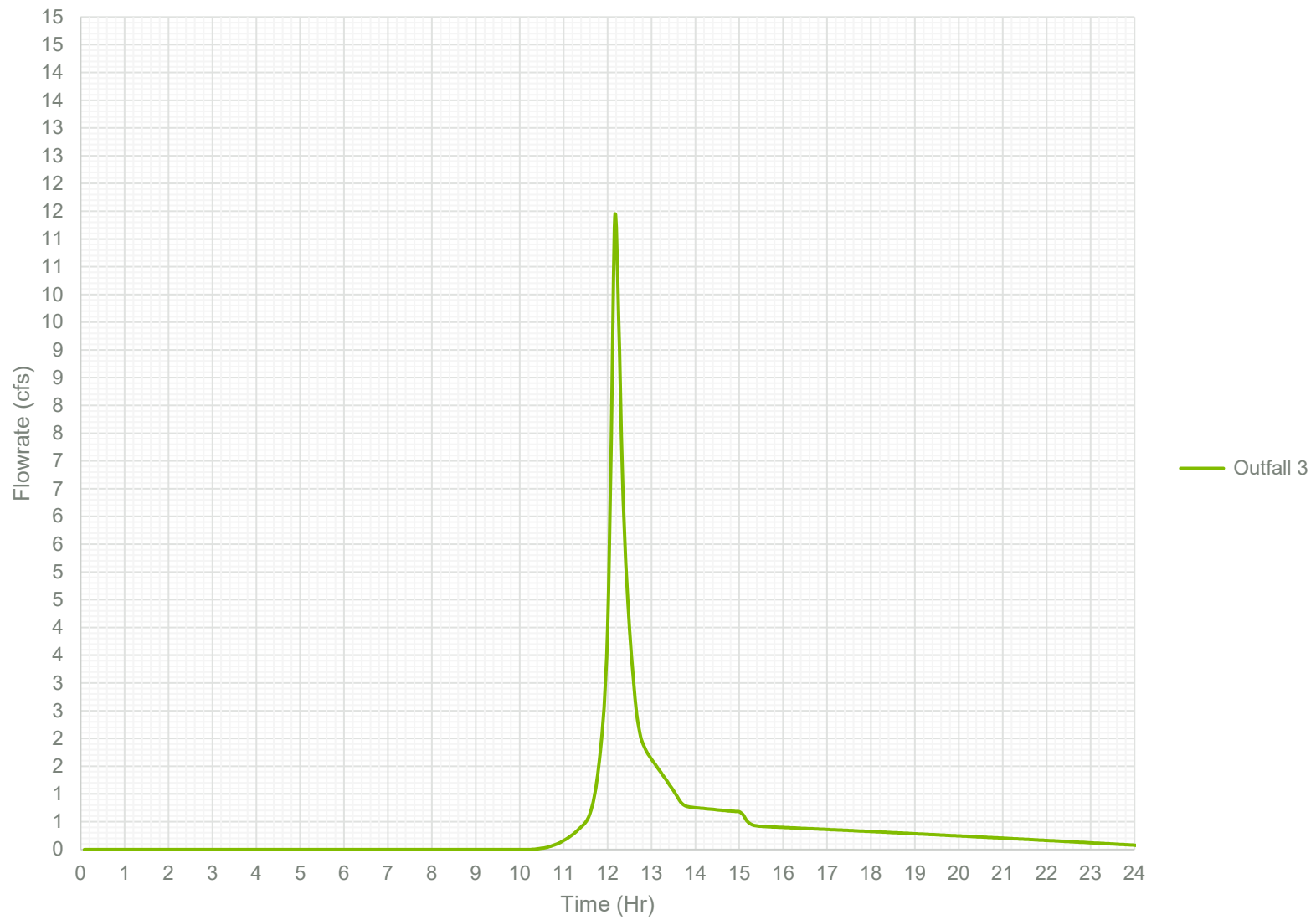
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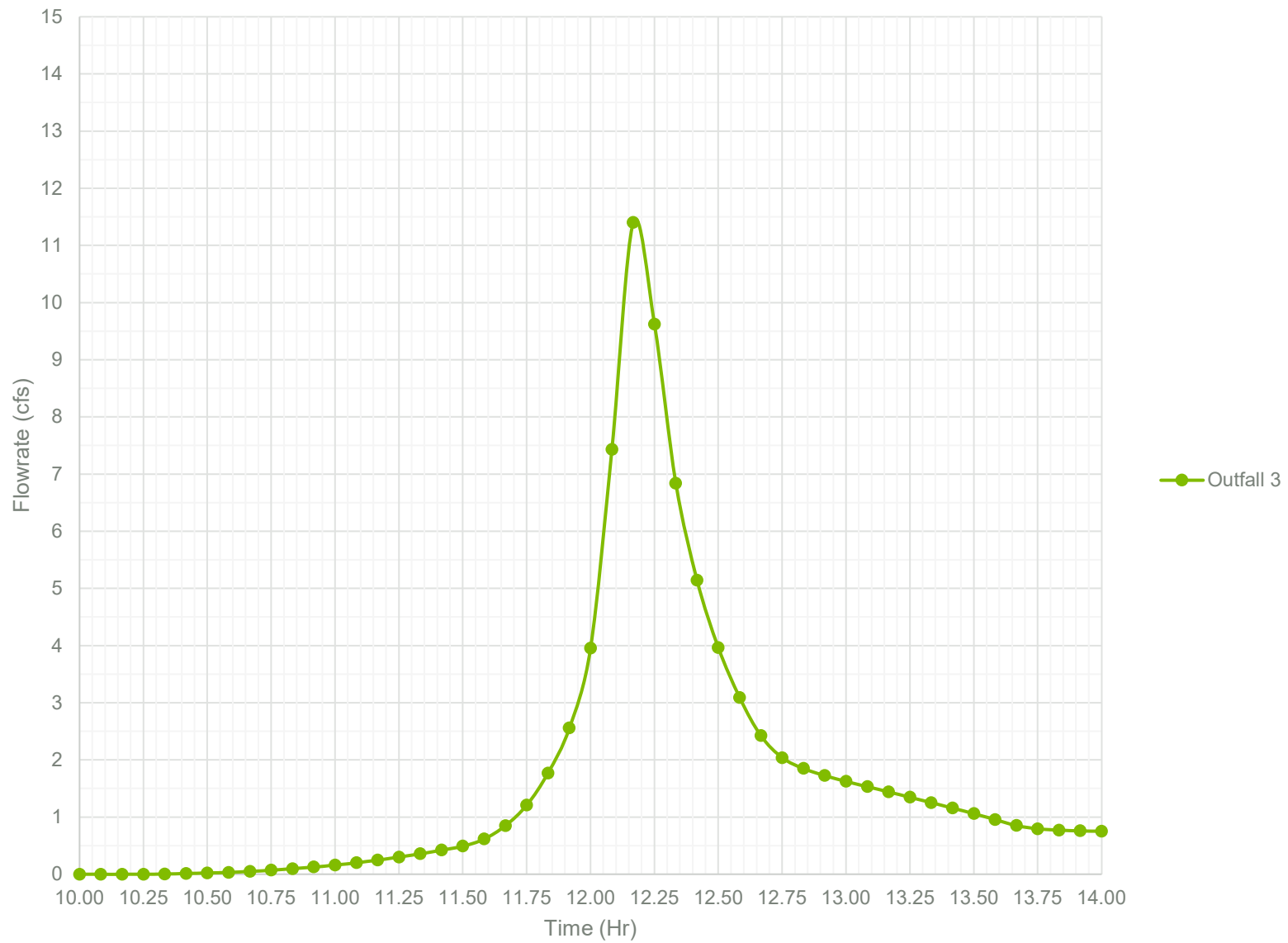
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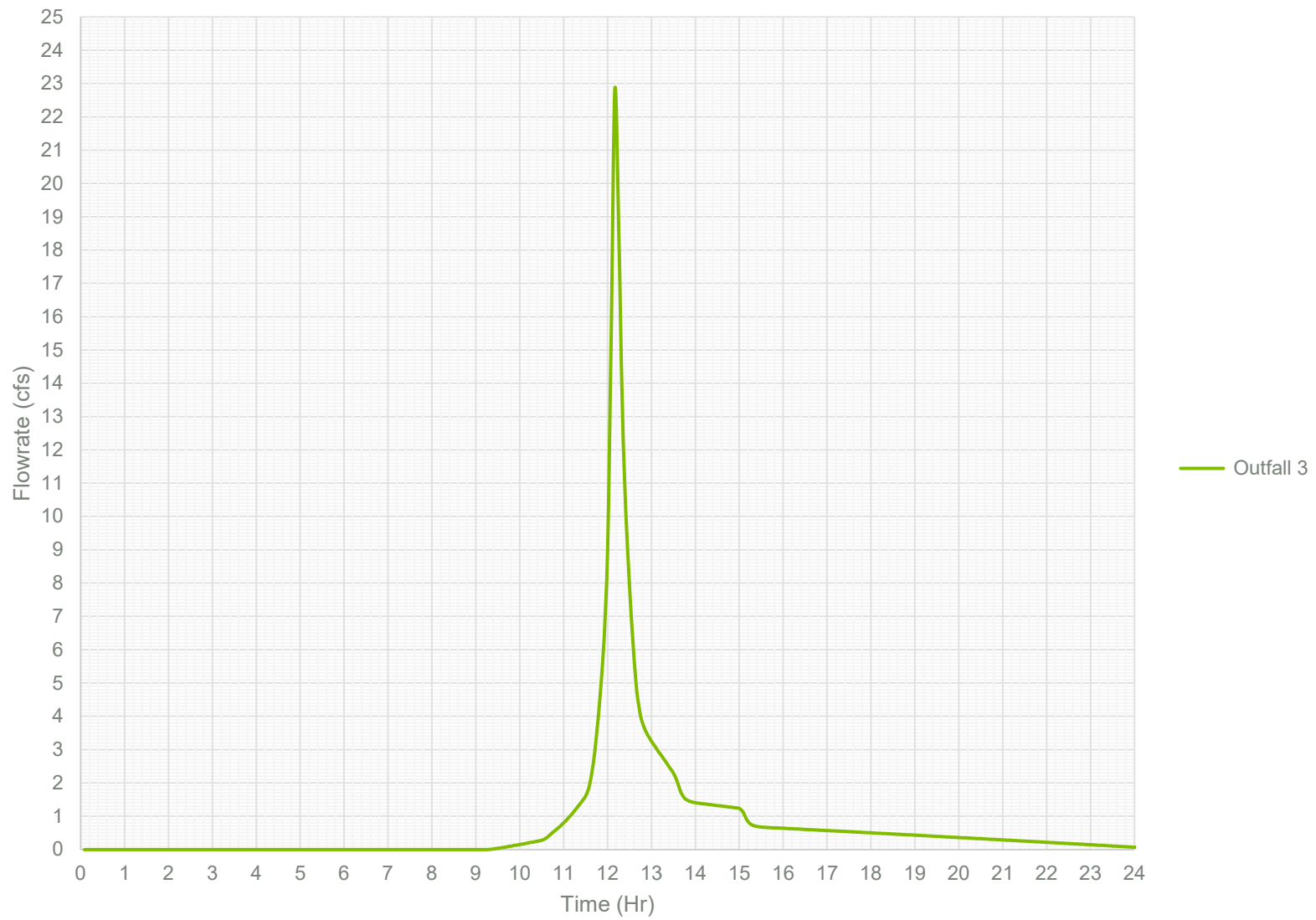
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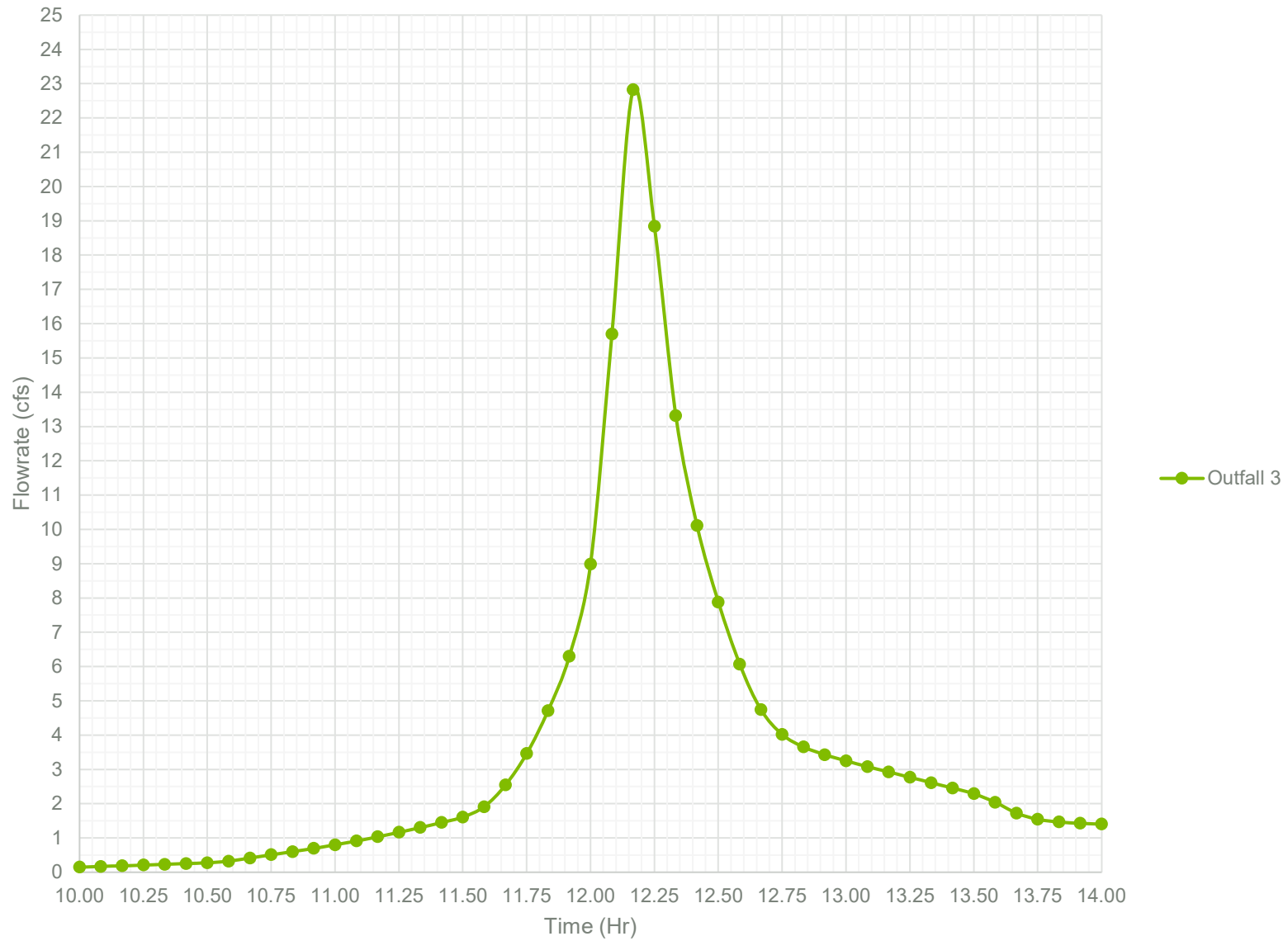
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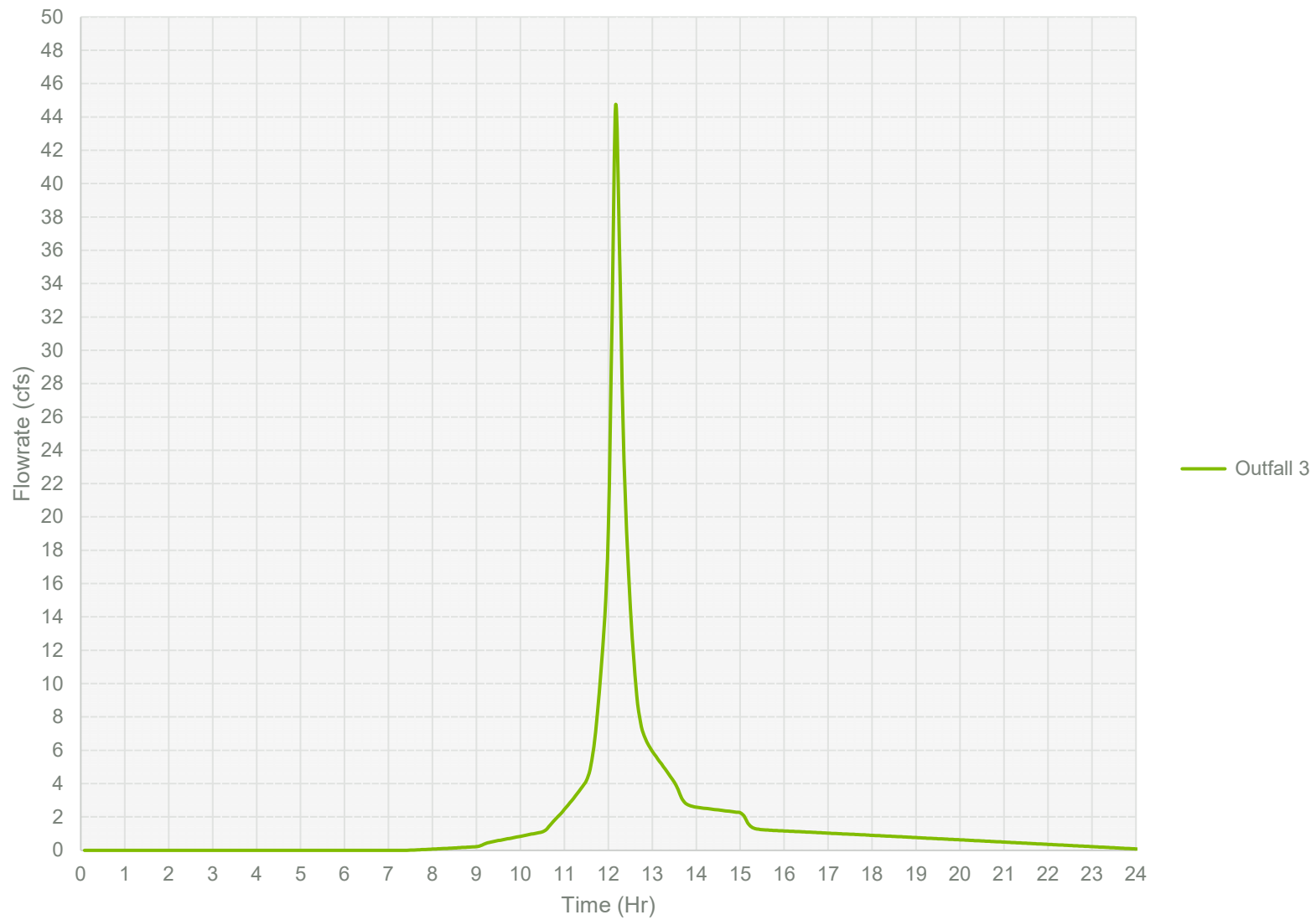
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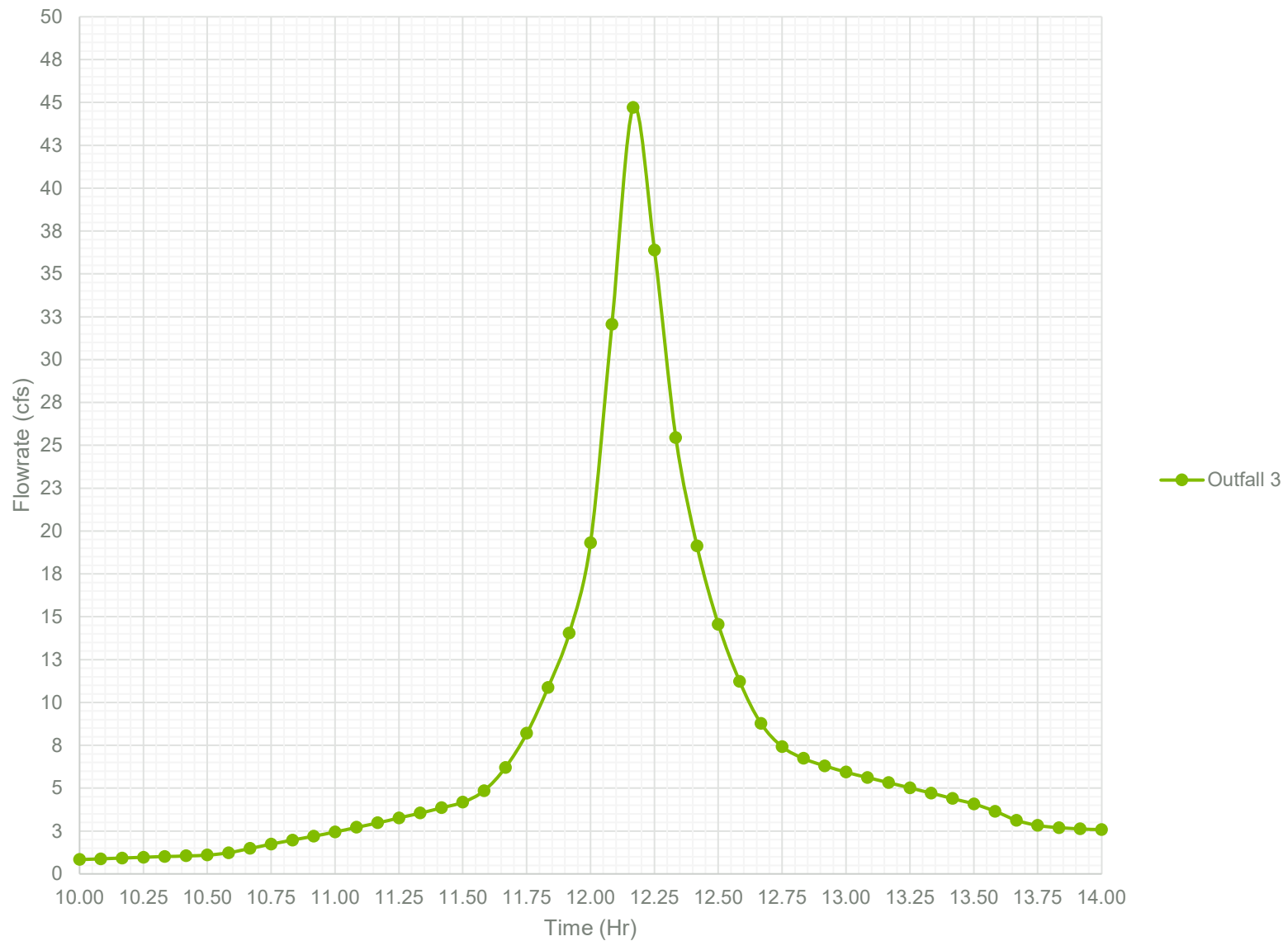
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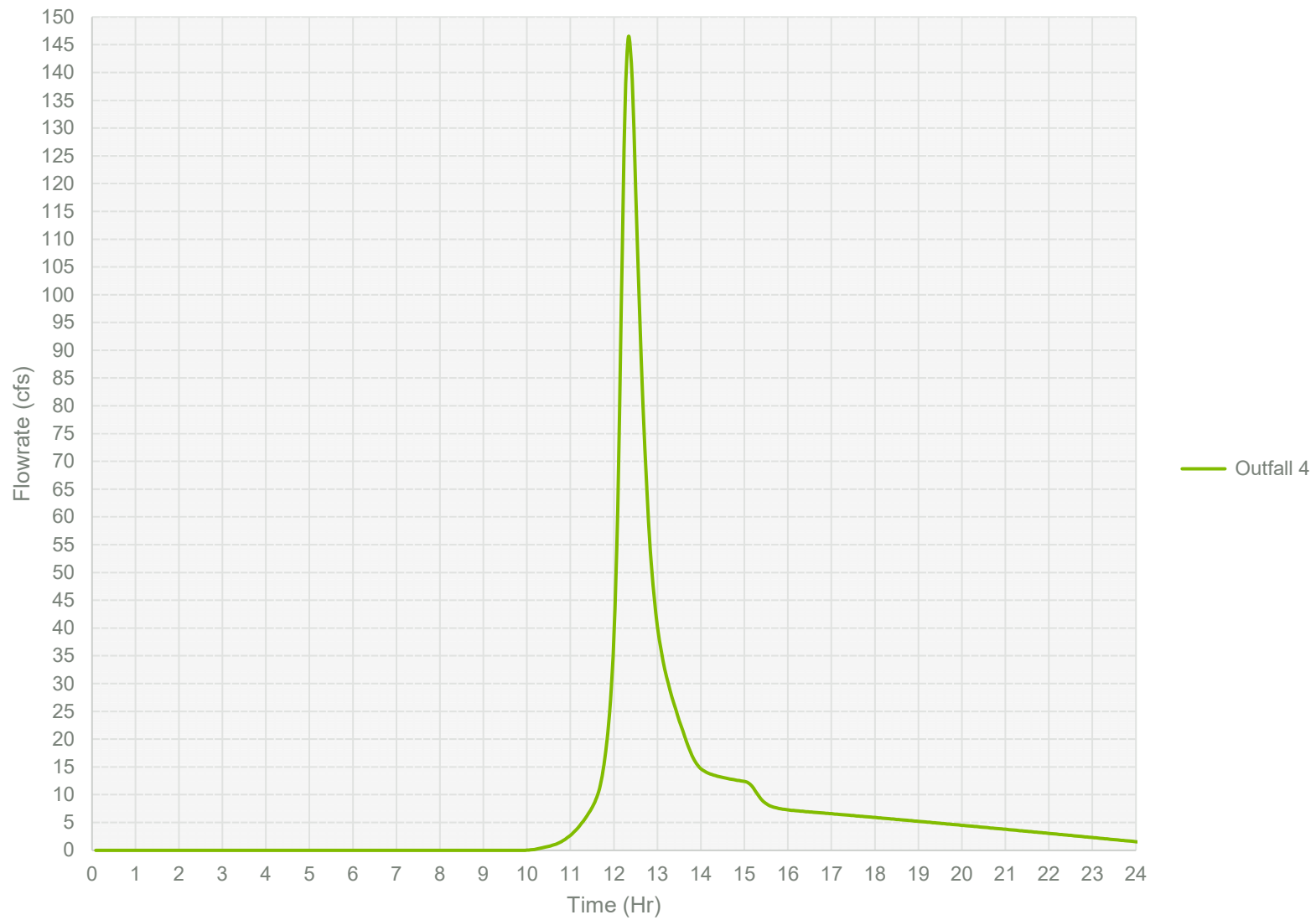
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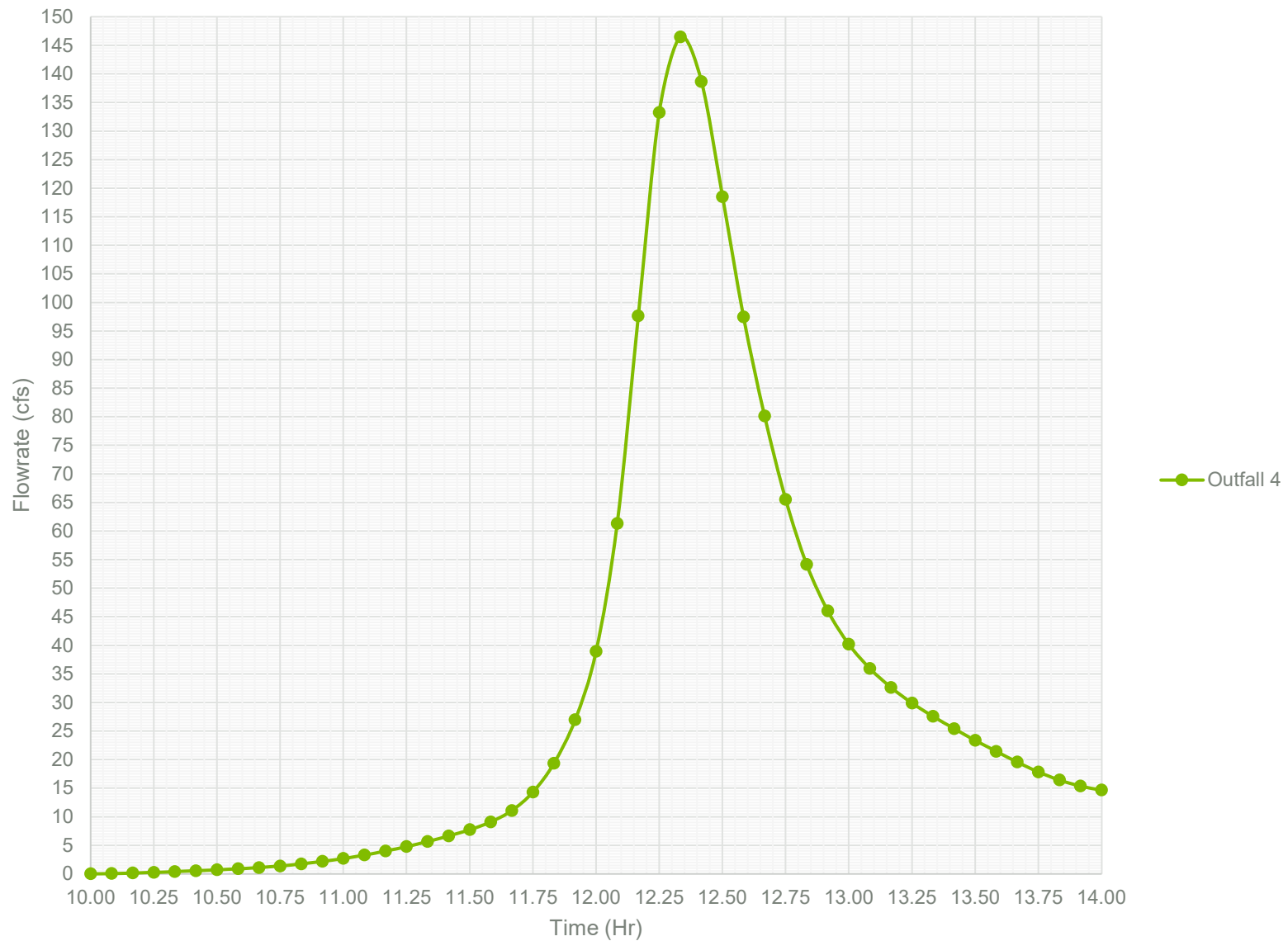
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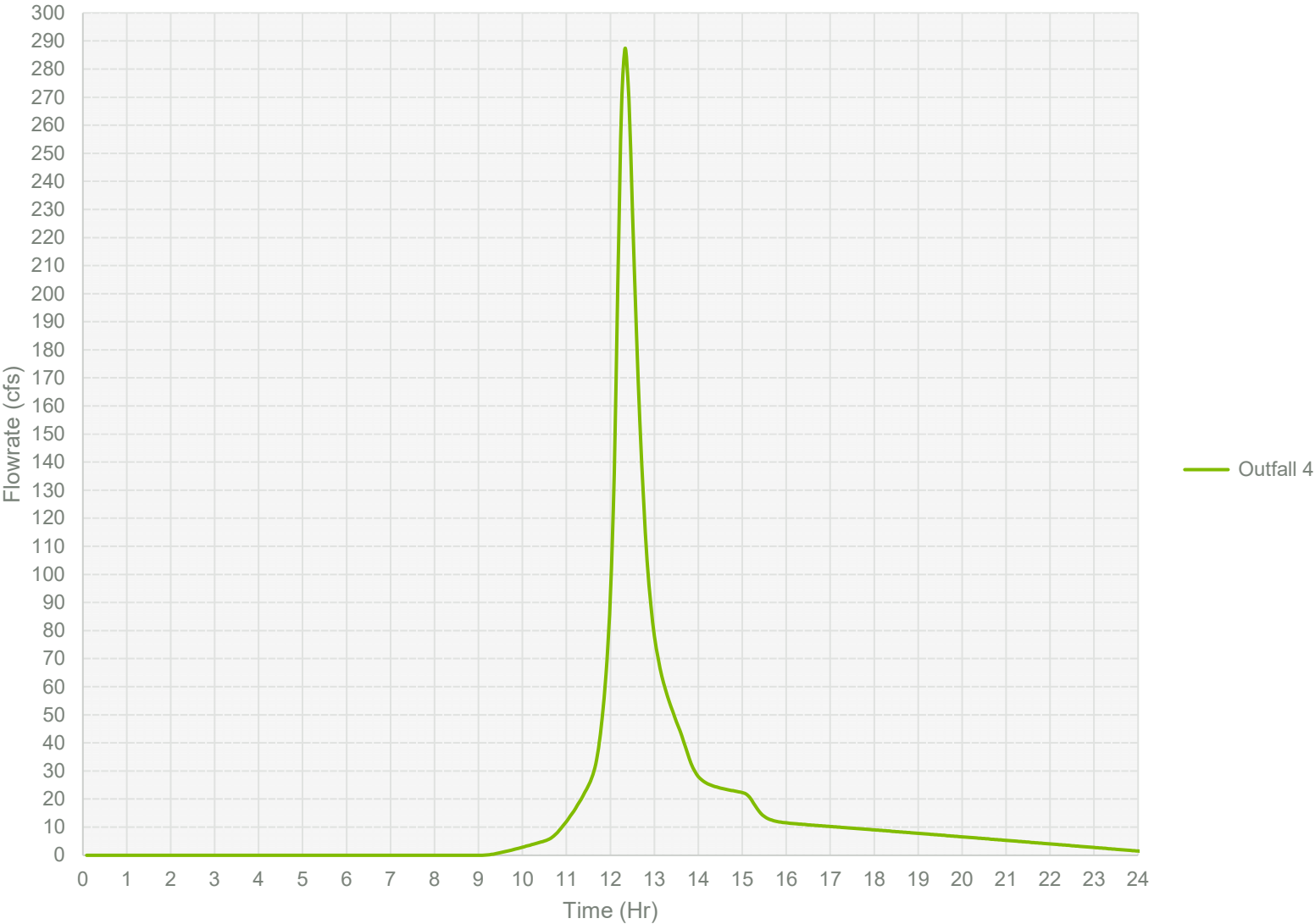
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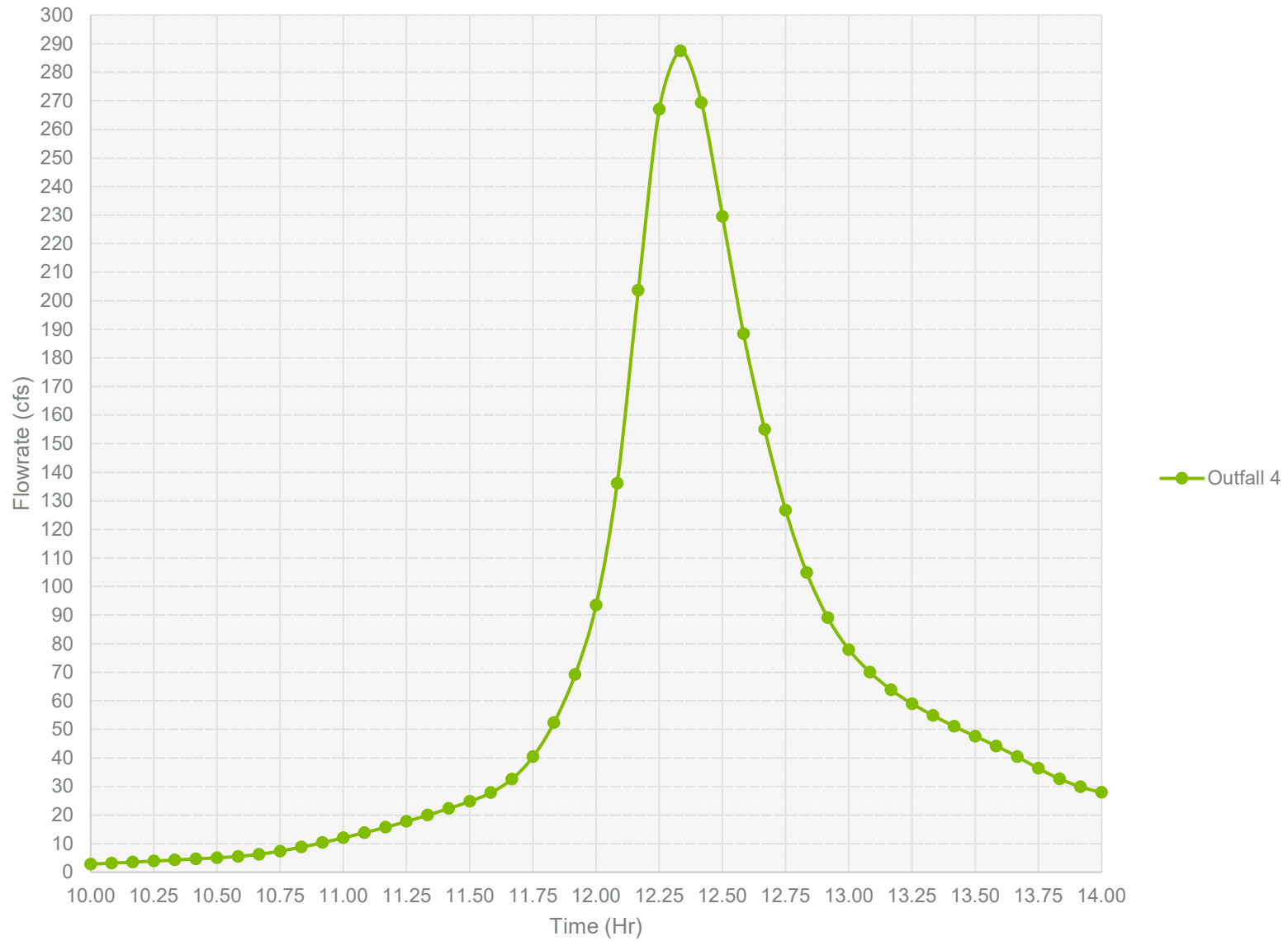
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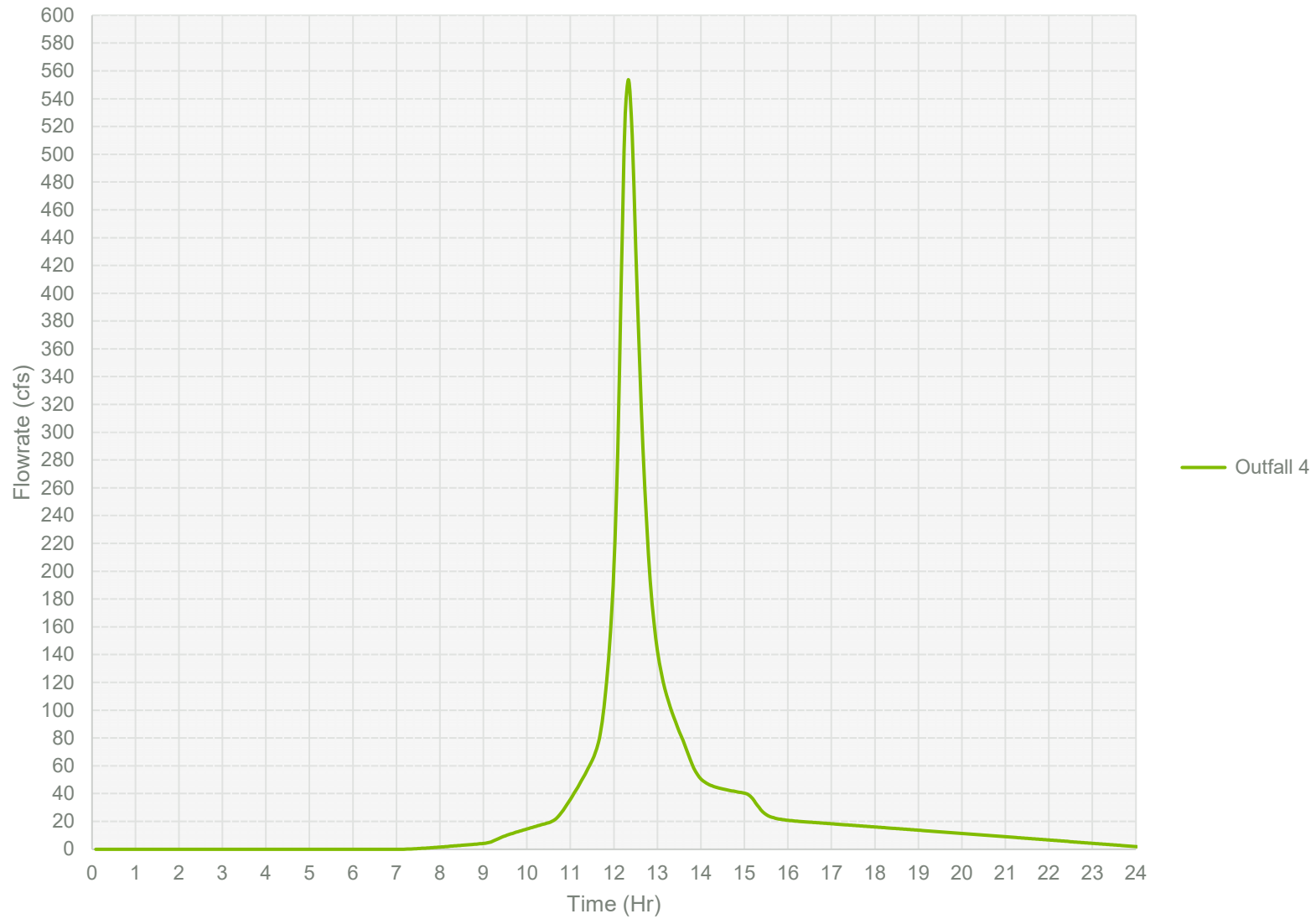
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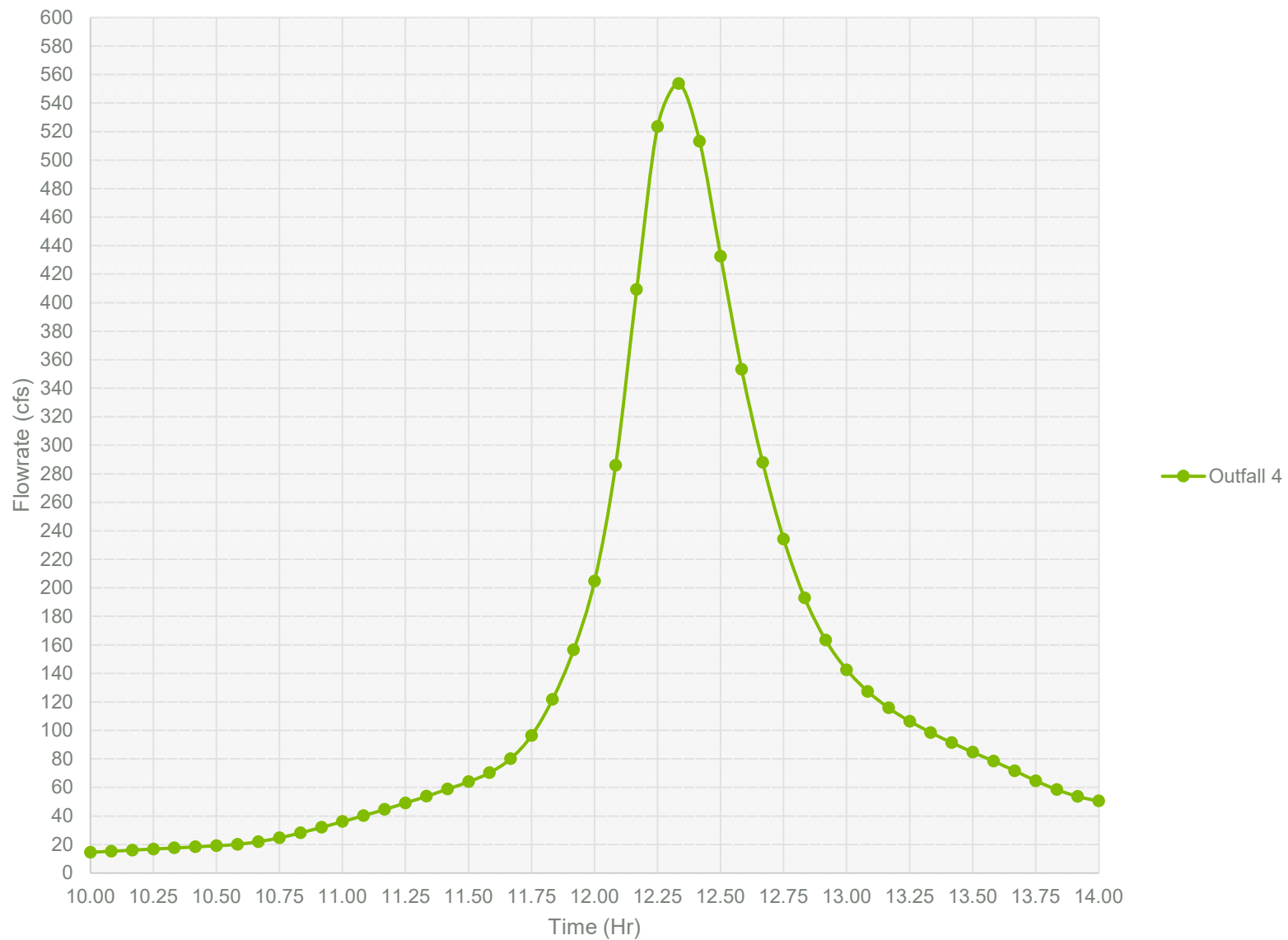
Existing Peak 4-Hr 10-YR Storm Flowrates Outfall 4



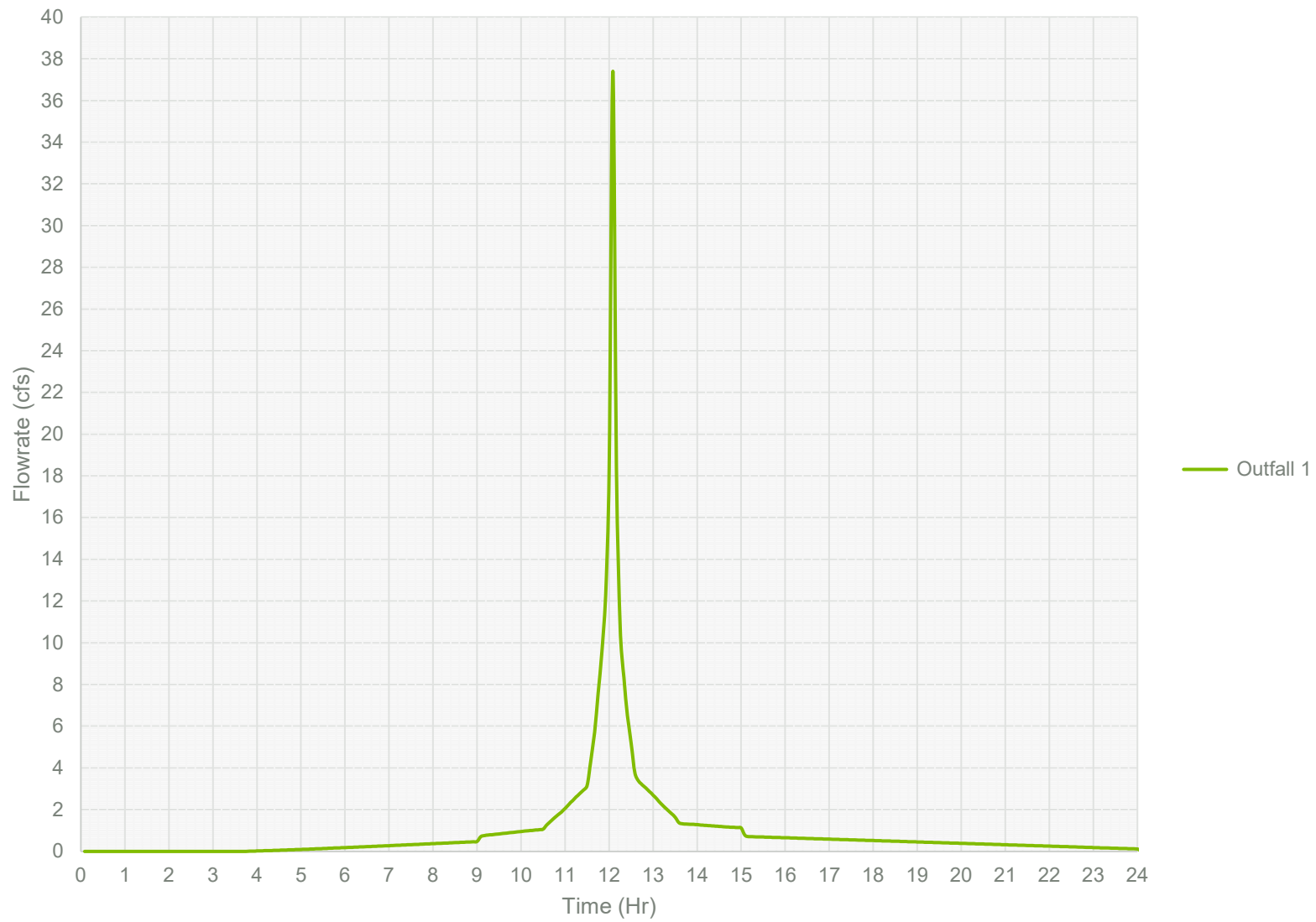
Existing Peak 24-Hr 100-YR Storm Flowrates Outfall 4



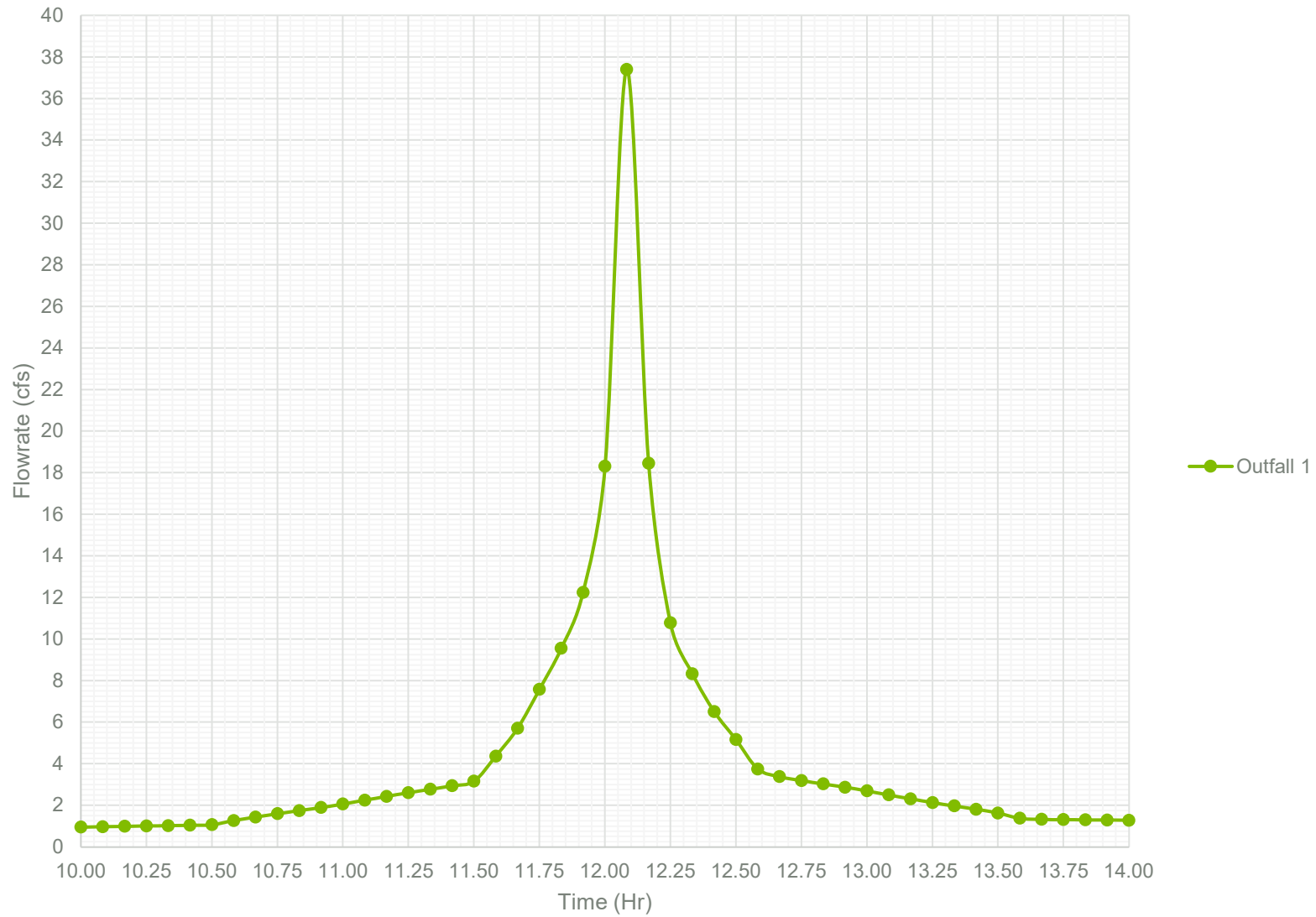
Existing Peak 4-Hr 100-YR Storm Flowrates Outfall 4



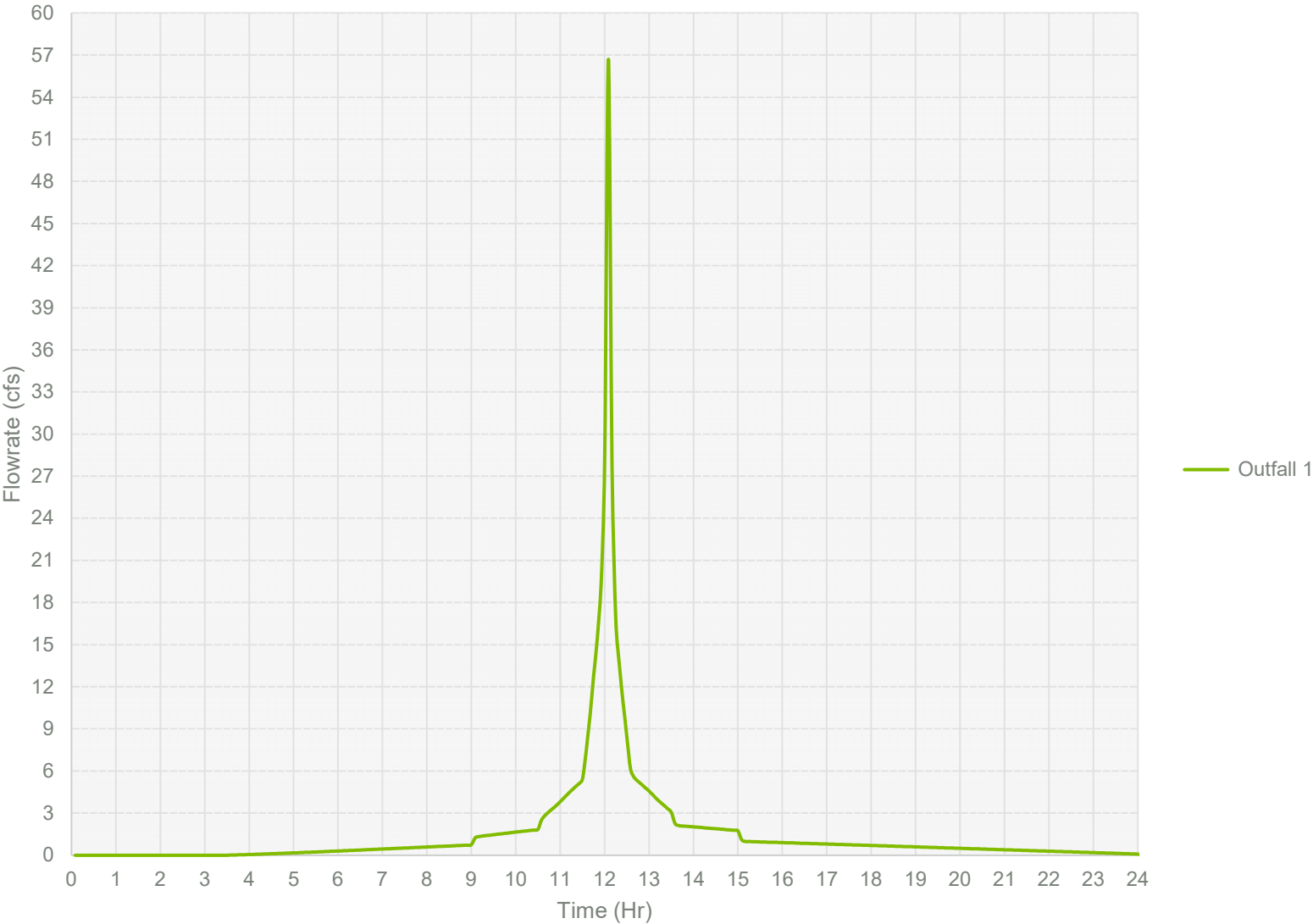
Proposed Peak 24-Hr 2-YR Storm Flowrates Outfall 1



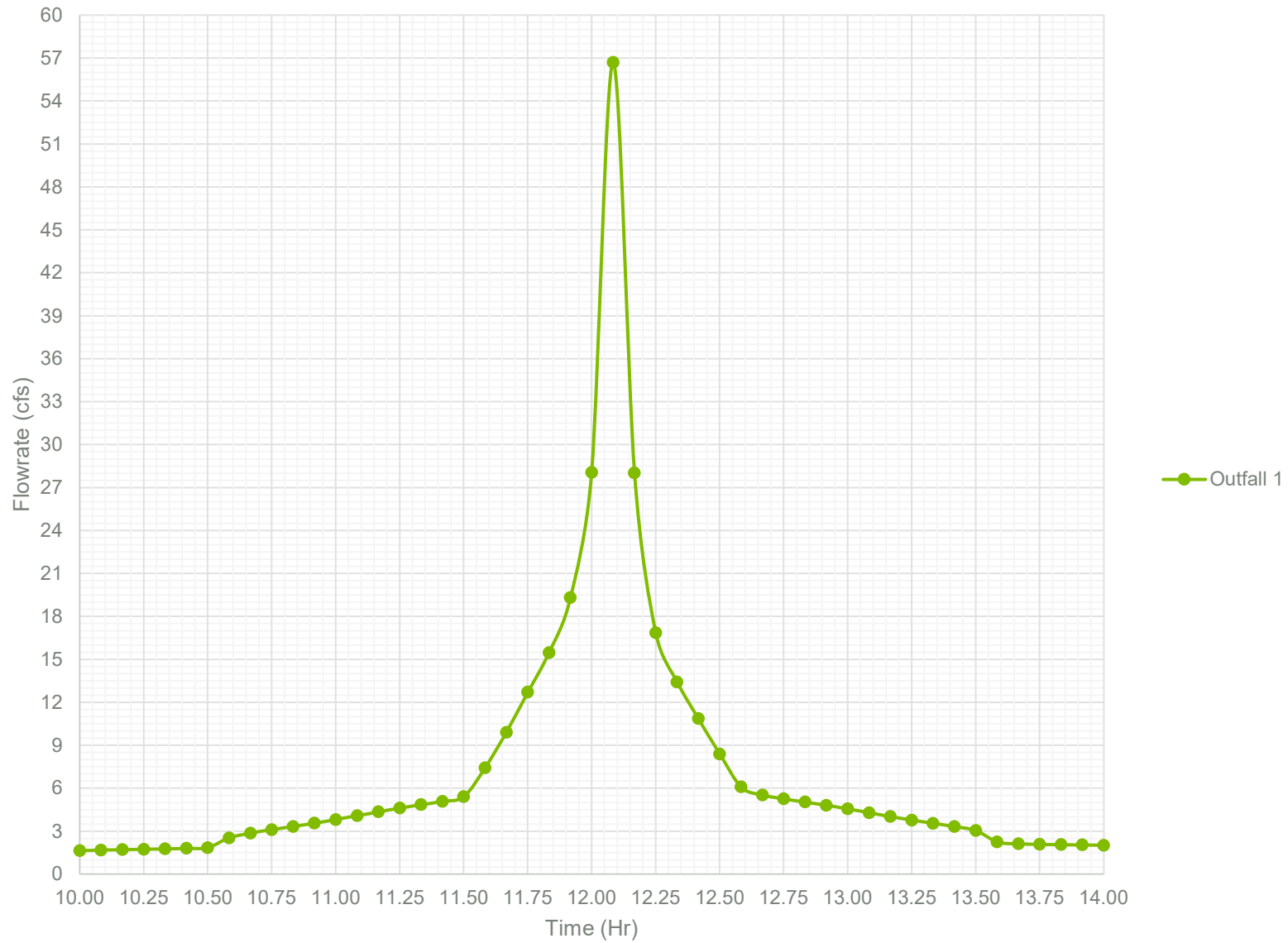
Proposed Peak 4-Hr 2-YR Storm Flowrates Outfall 2



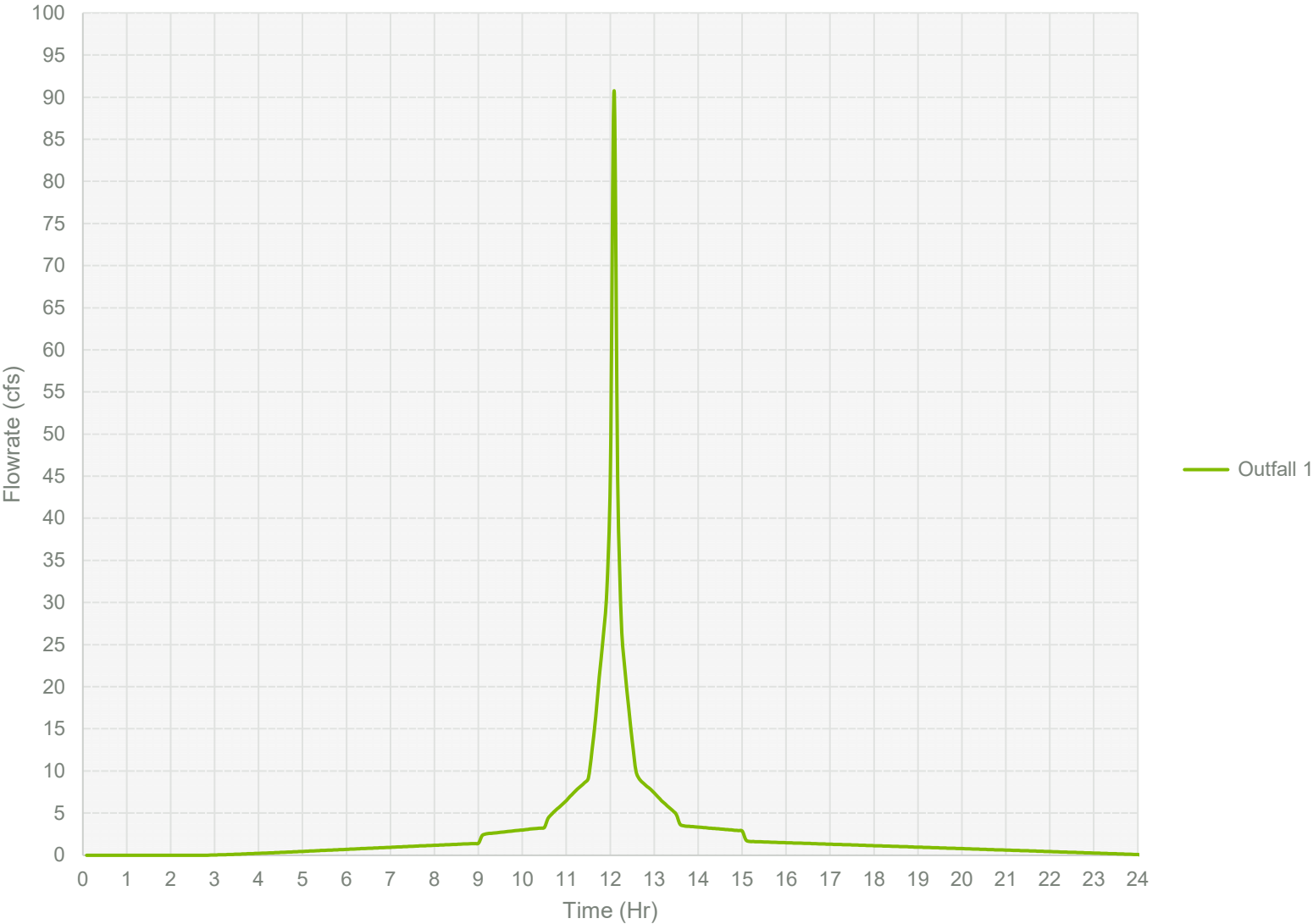
Proposed Peak 24-Hr 10-YR Storm Flowrates Outfall 1



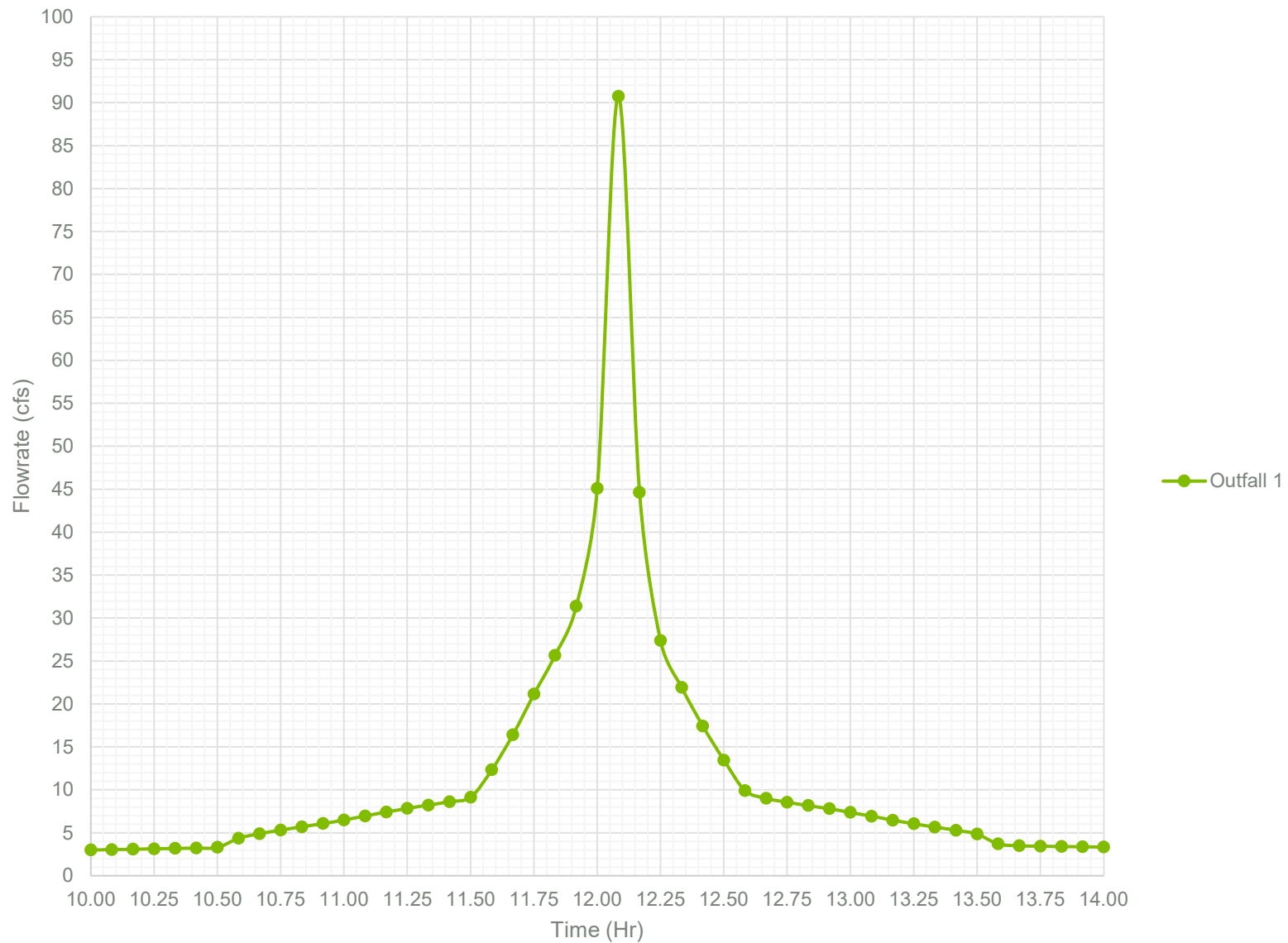
Proposed Peak 4-Hr 10-YR Storm Flowrates Outfall 1



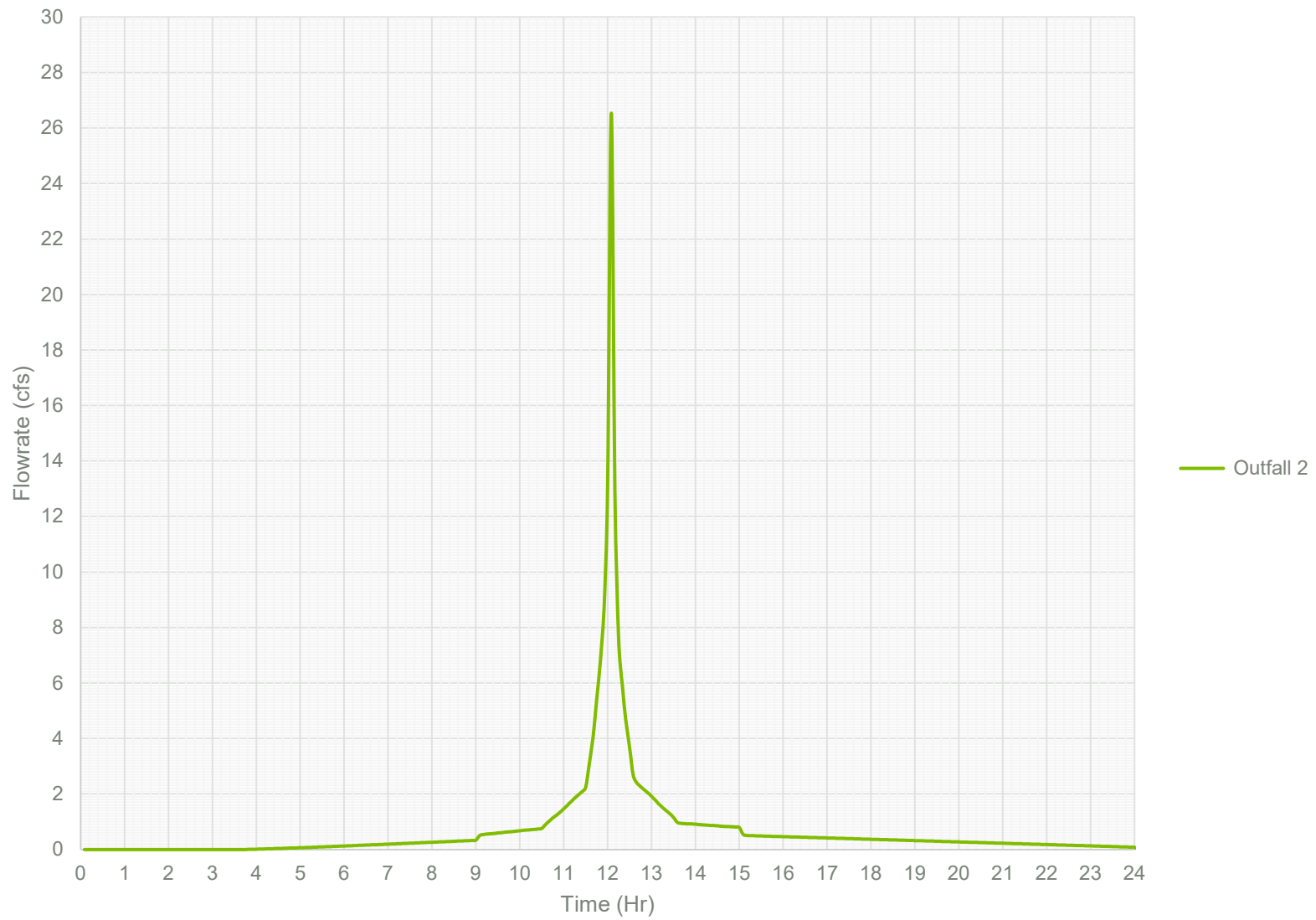
Proposed Peak 24-Hr 100-YR Storm Flowrates Outfall 1



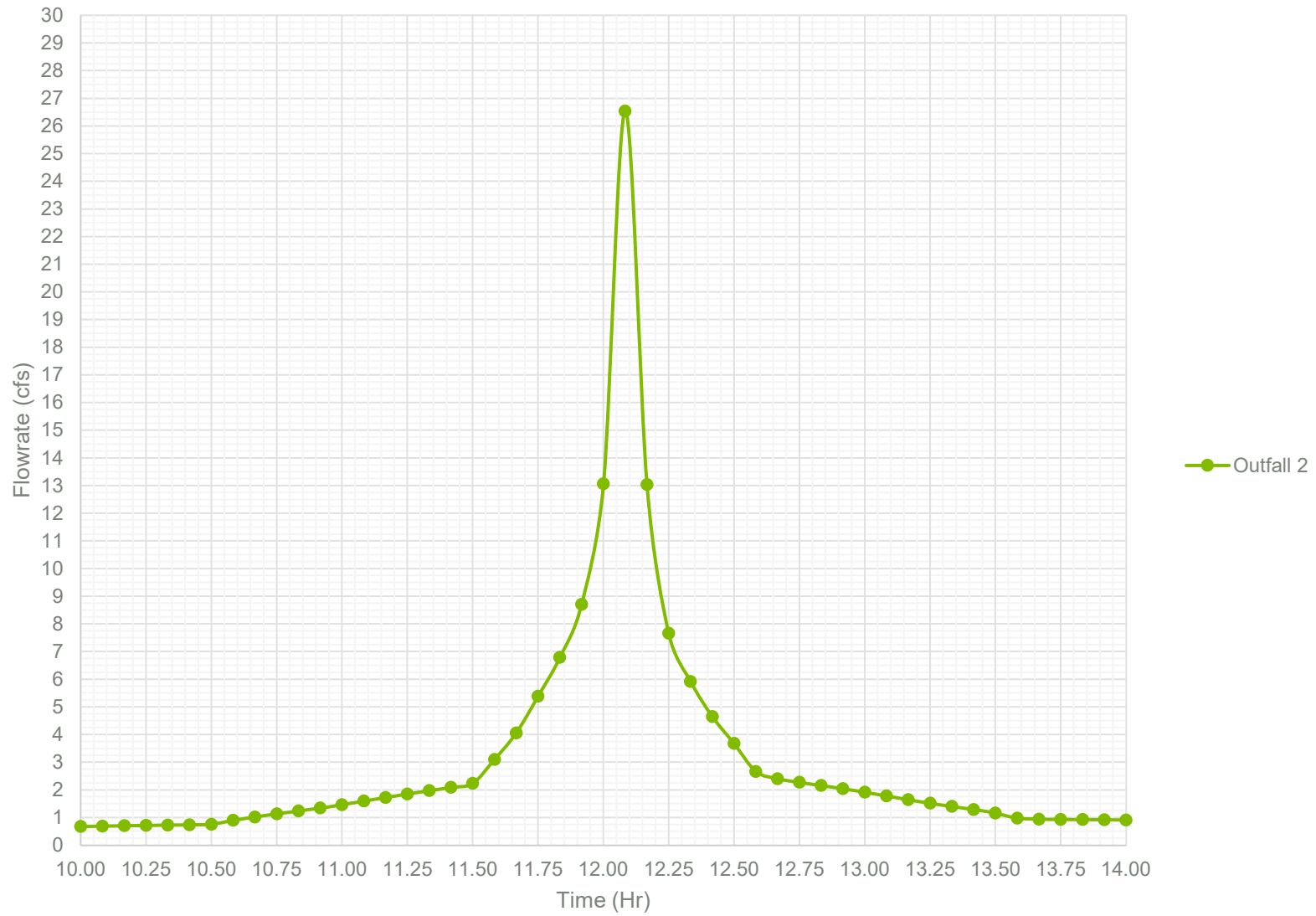
Proposed Peak 4-Hr 100-YR Storm Flowrates Outfall 1



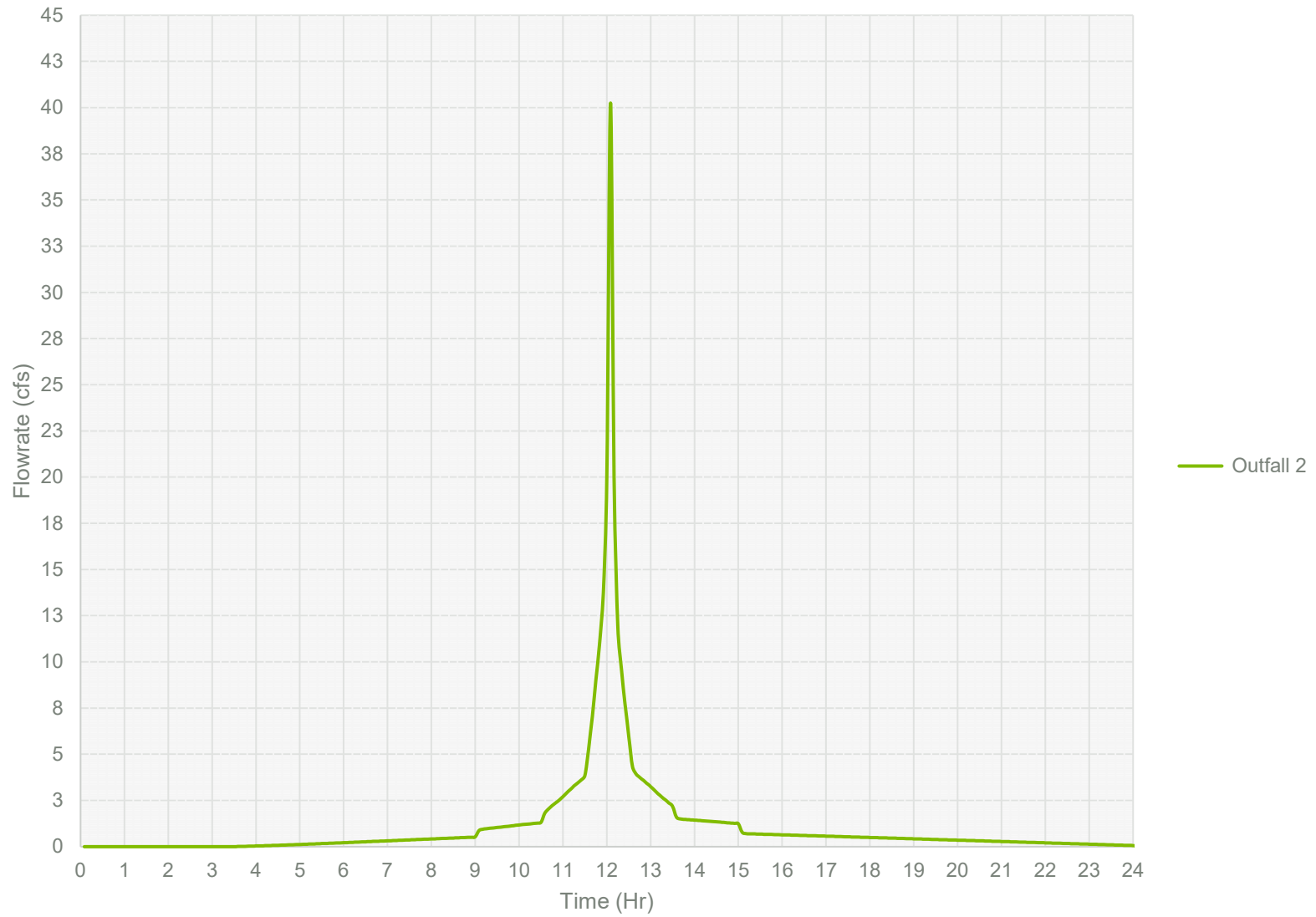
Proposed Peak 24-Hr 2-YR Storm Flowrates Outfall 2



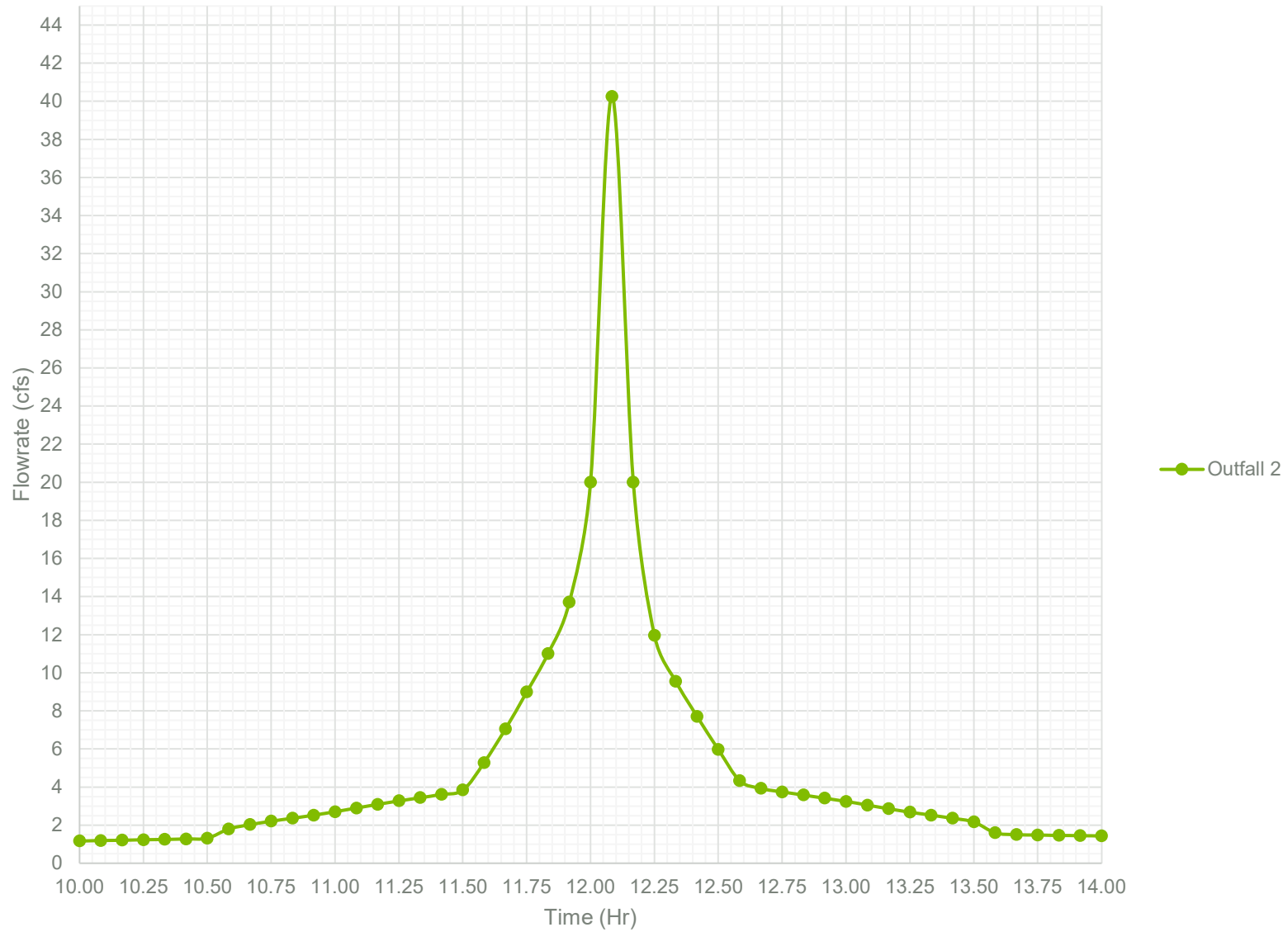
Proposed Peak 4-Hr 2-YR Storm Flowrates Outfall 2



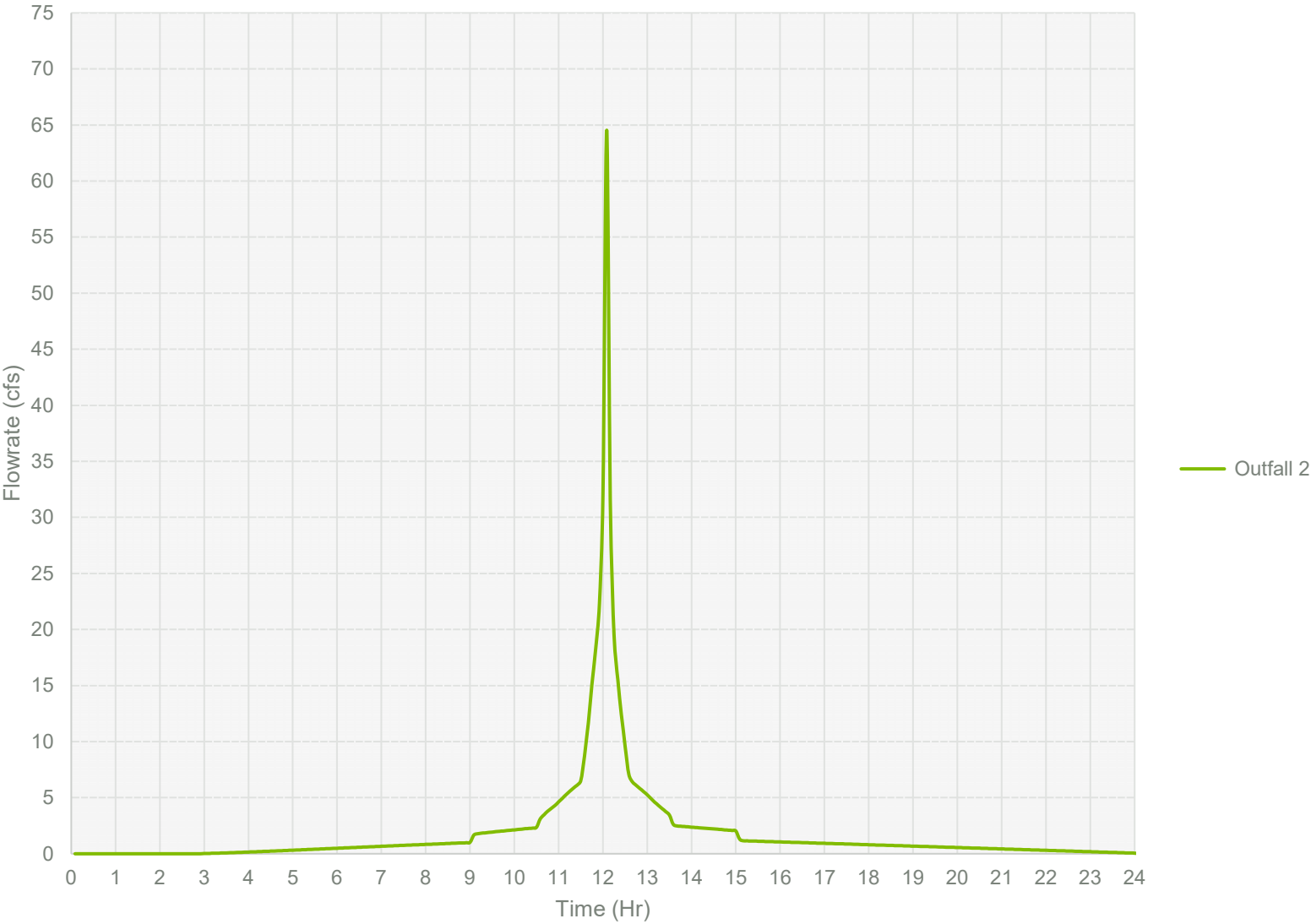
Proposed Peak 24-Hr 10-YR Storm Flowrates Outfall 2



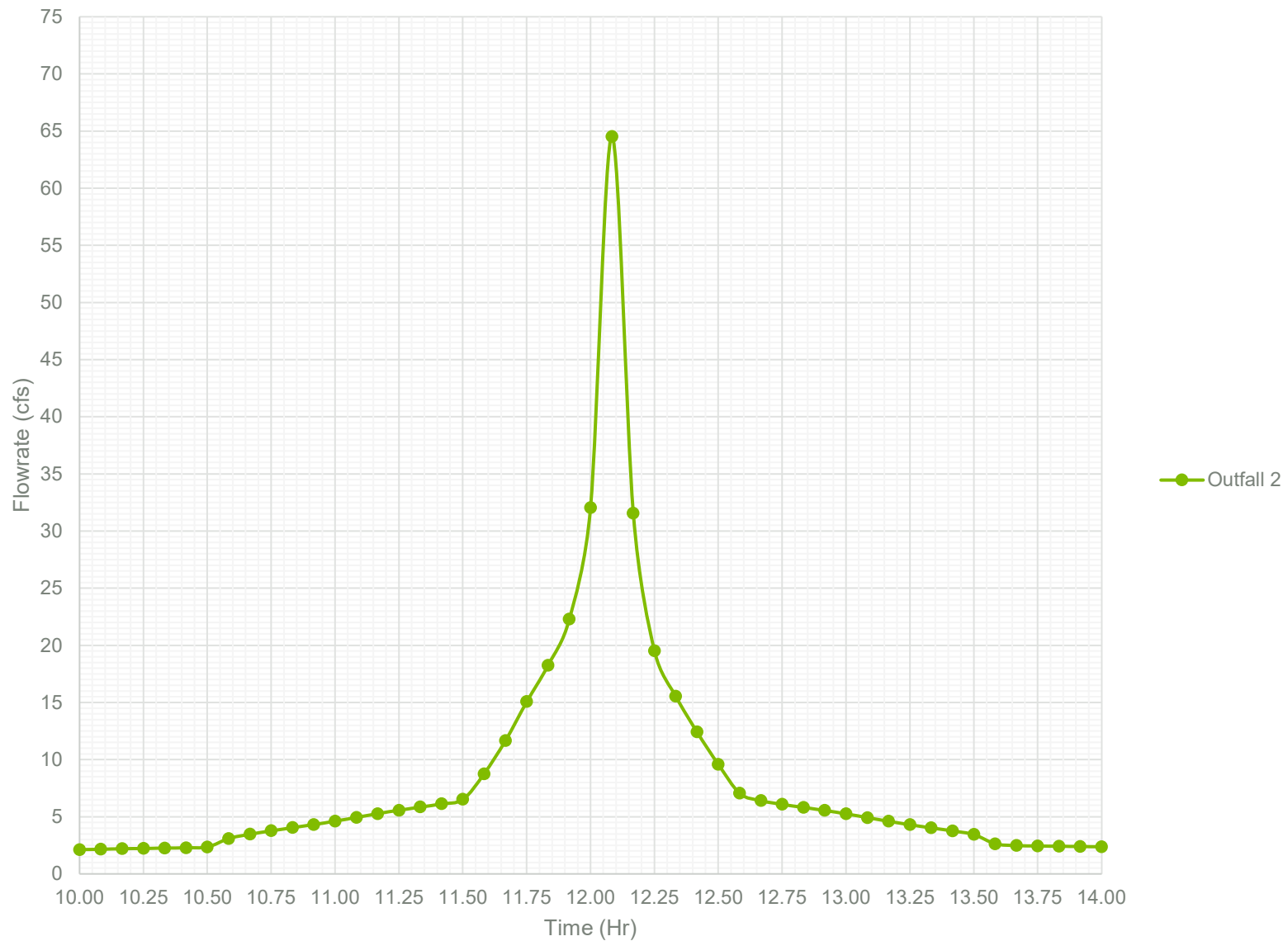
Proposed Peak 4-Hr 10-YR Storm Flowrates Outfall 2



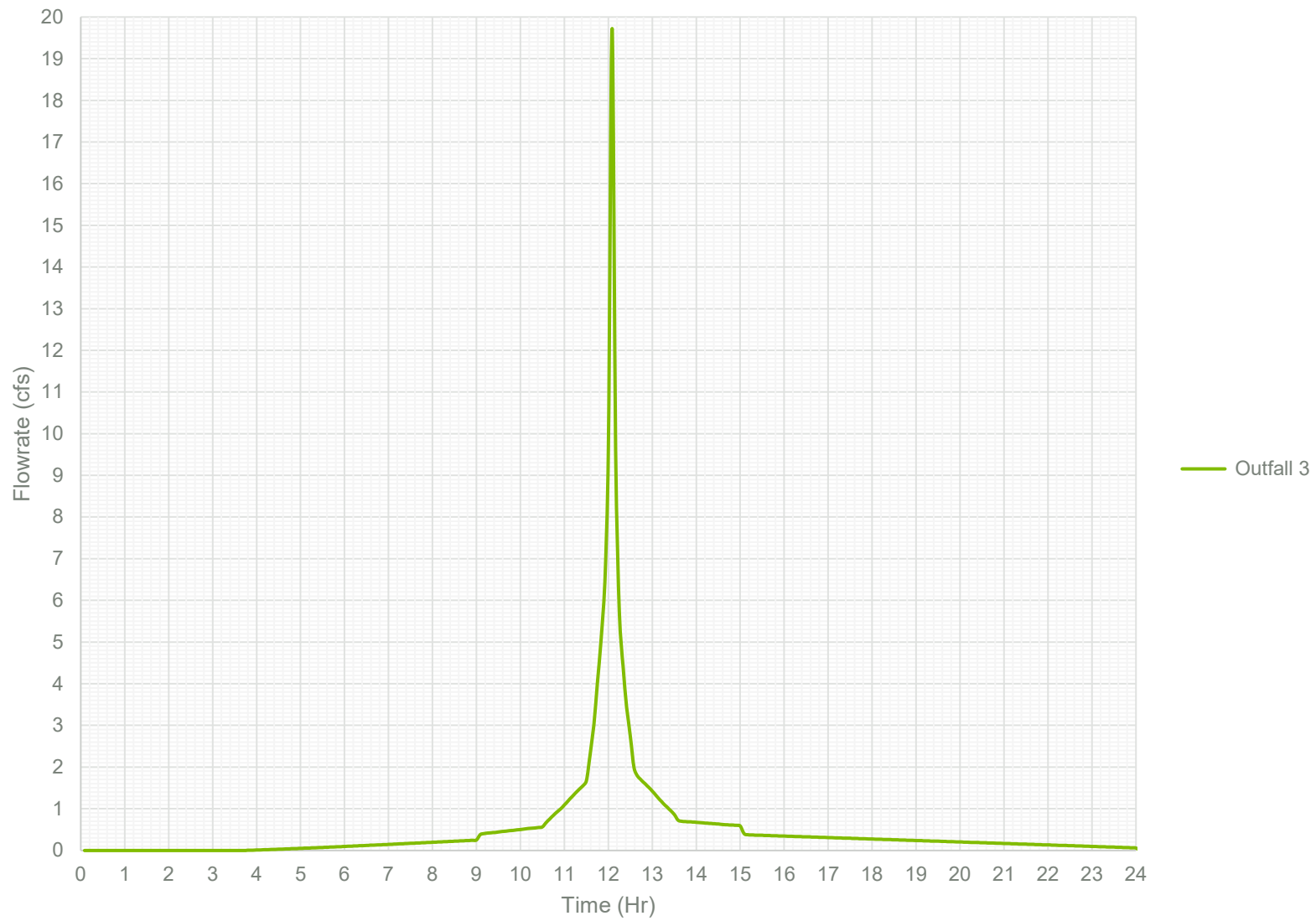
Proposed Peak 24-Hr 100-YR Storm Flowrates Outfall 2



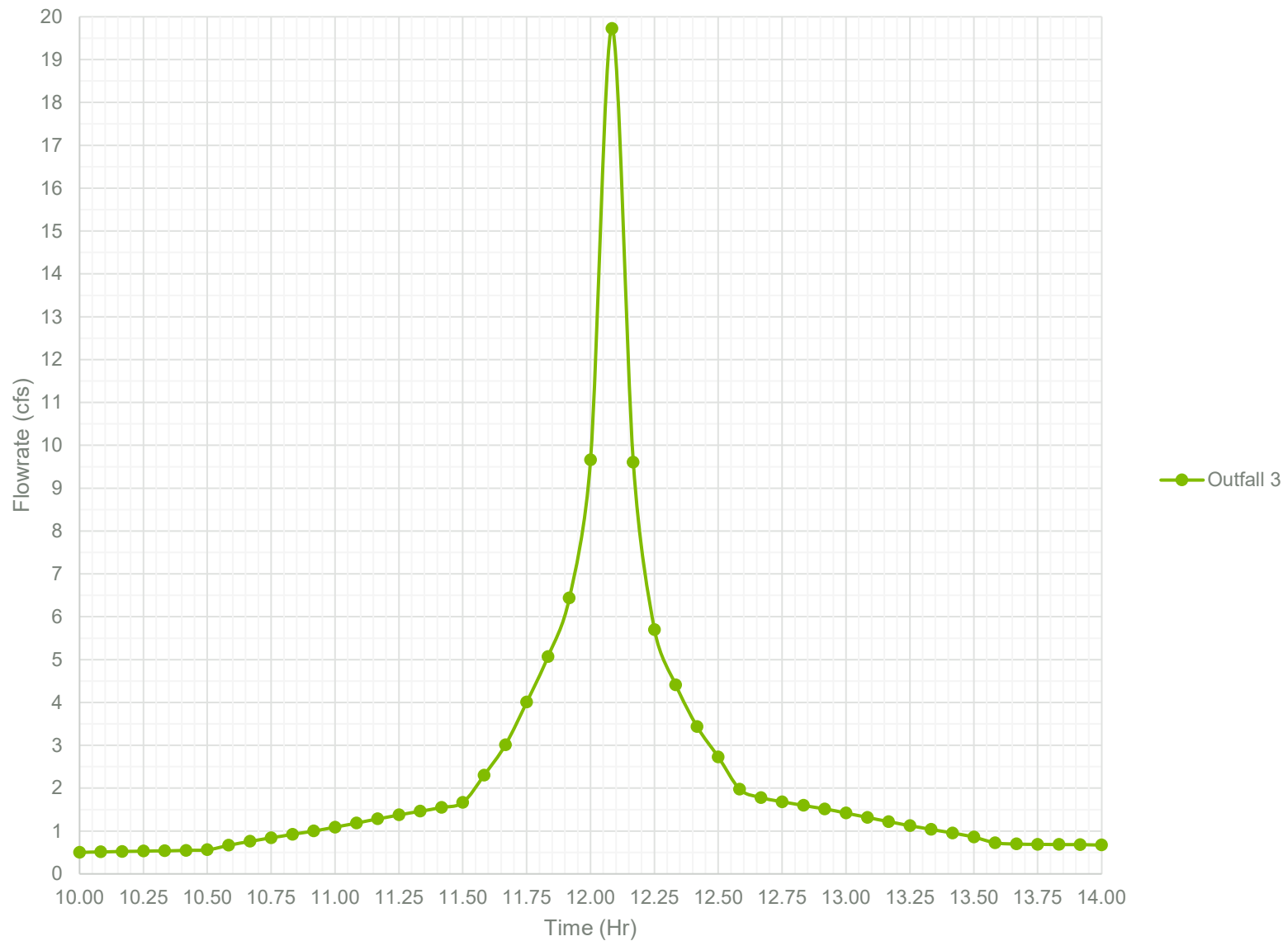
Proposed Peak 4-Hr 100-YR Storm Flowrates Outfall 2



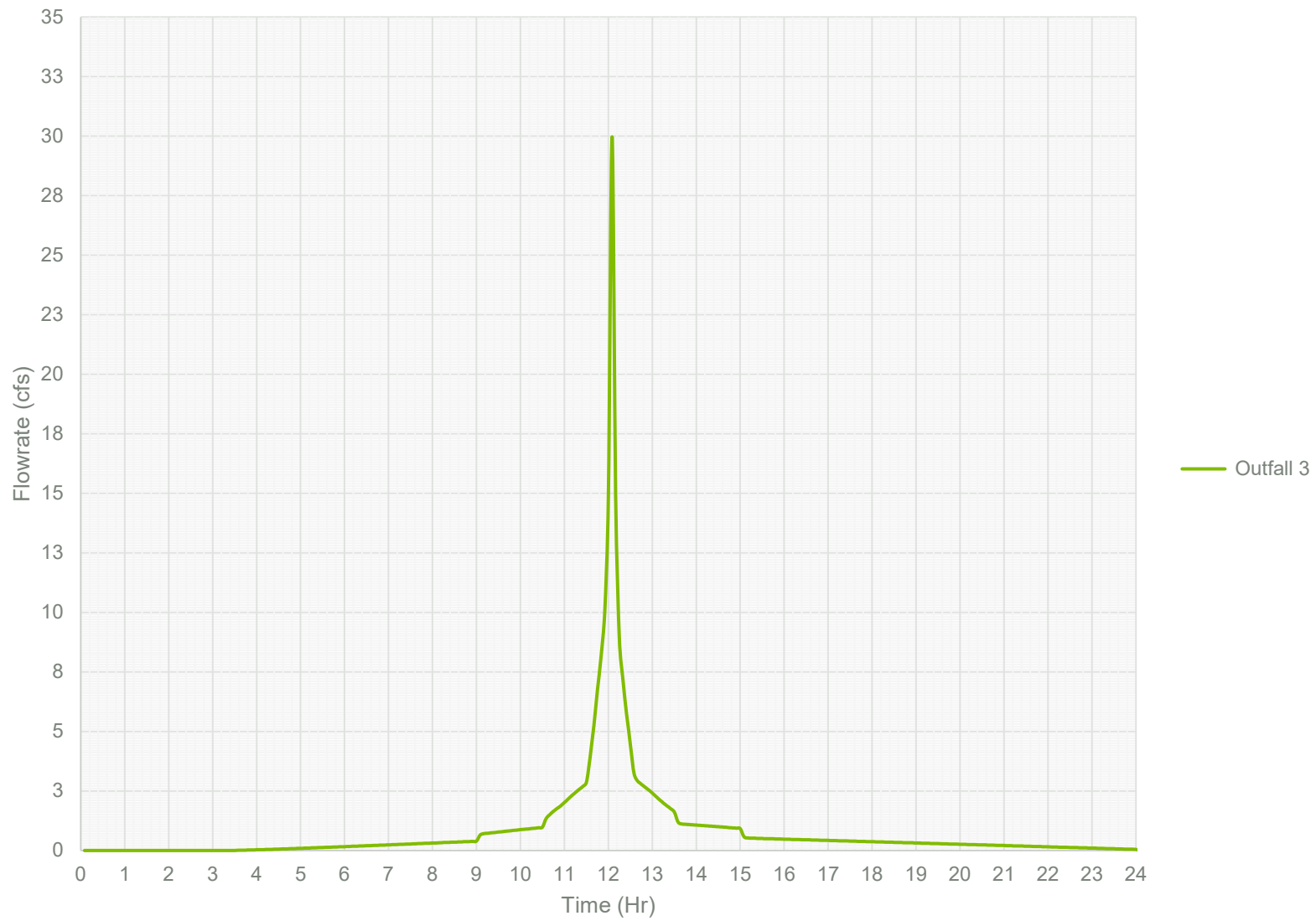
Proposed Peak 24-Hr 2-YR Storm Flowrates Outfall 3



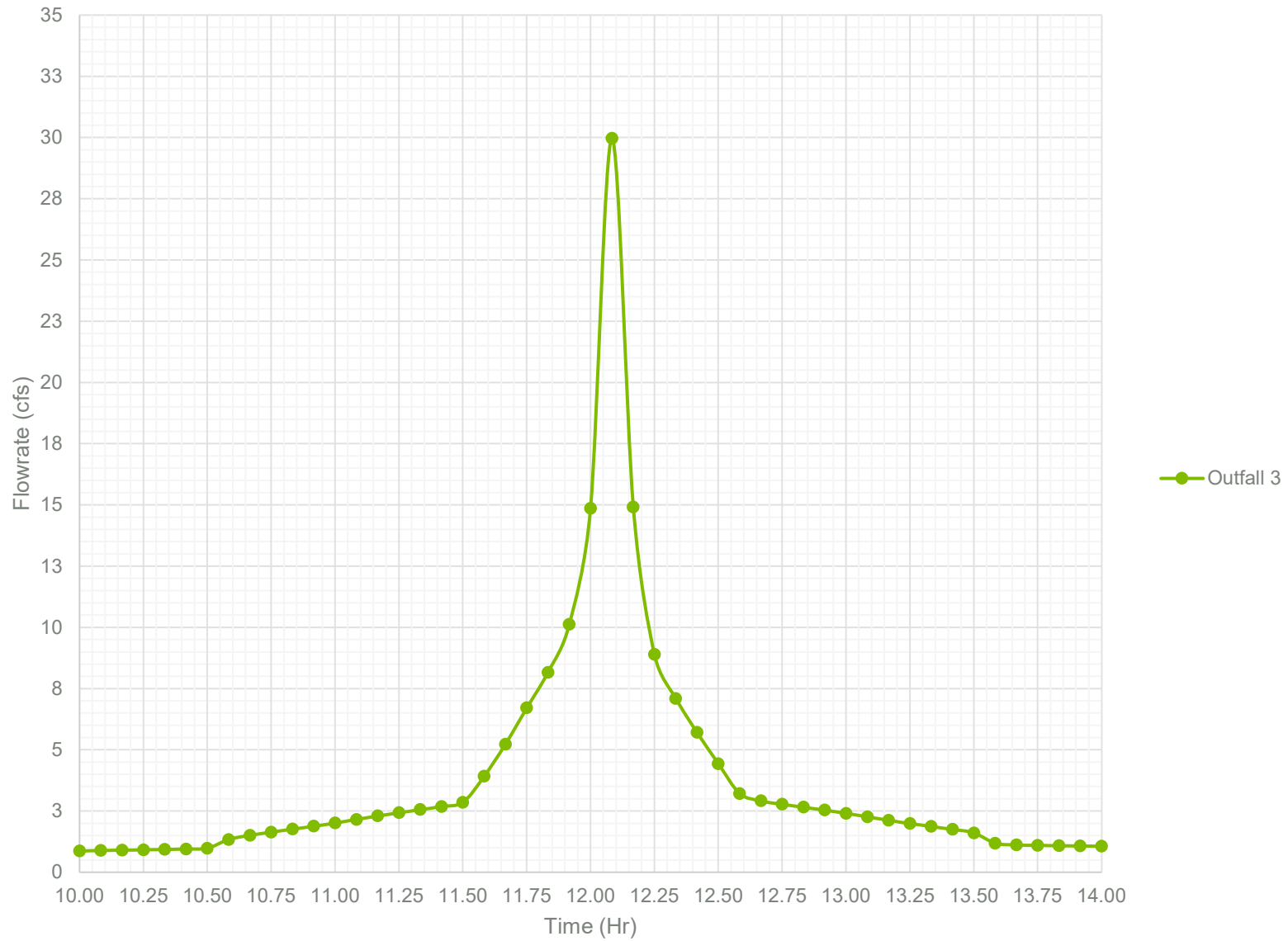
Proposed Peak 4-Hr 2-YR Storm Flowrates Outfall 3



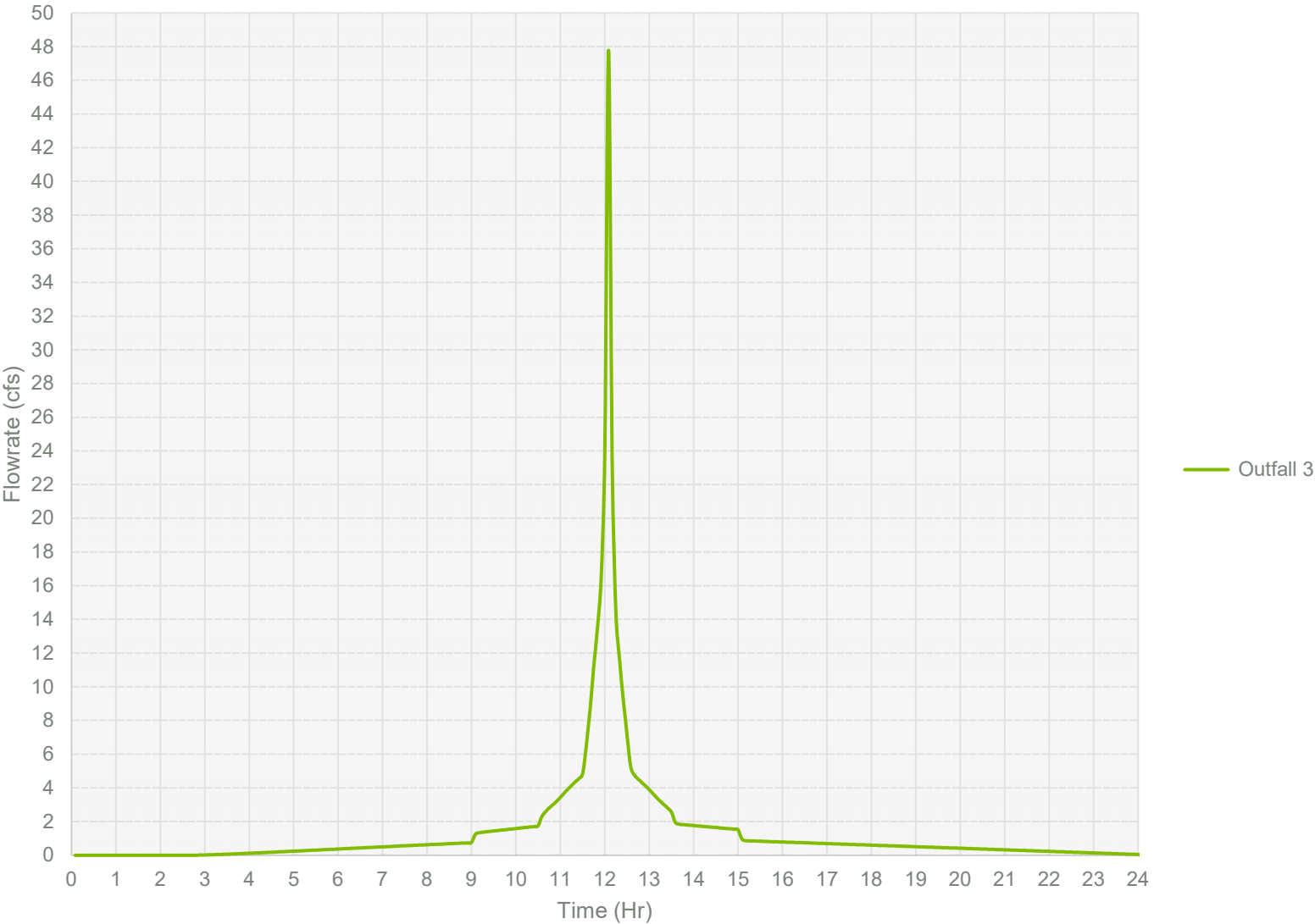
Proposed Peak 24-Hr 10-YR Storm Flowrates Outfall 3



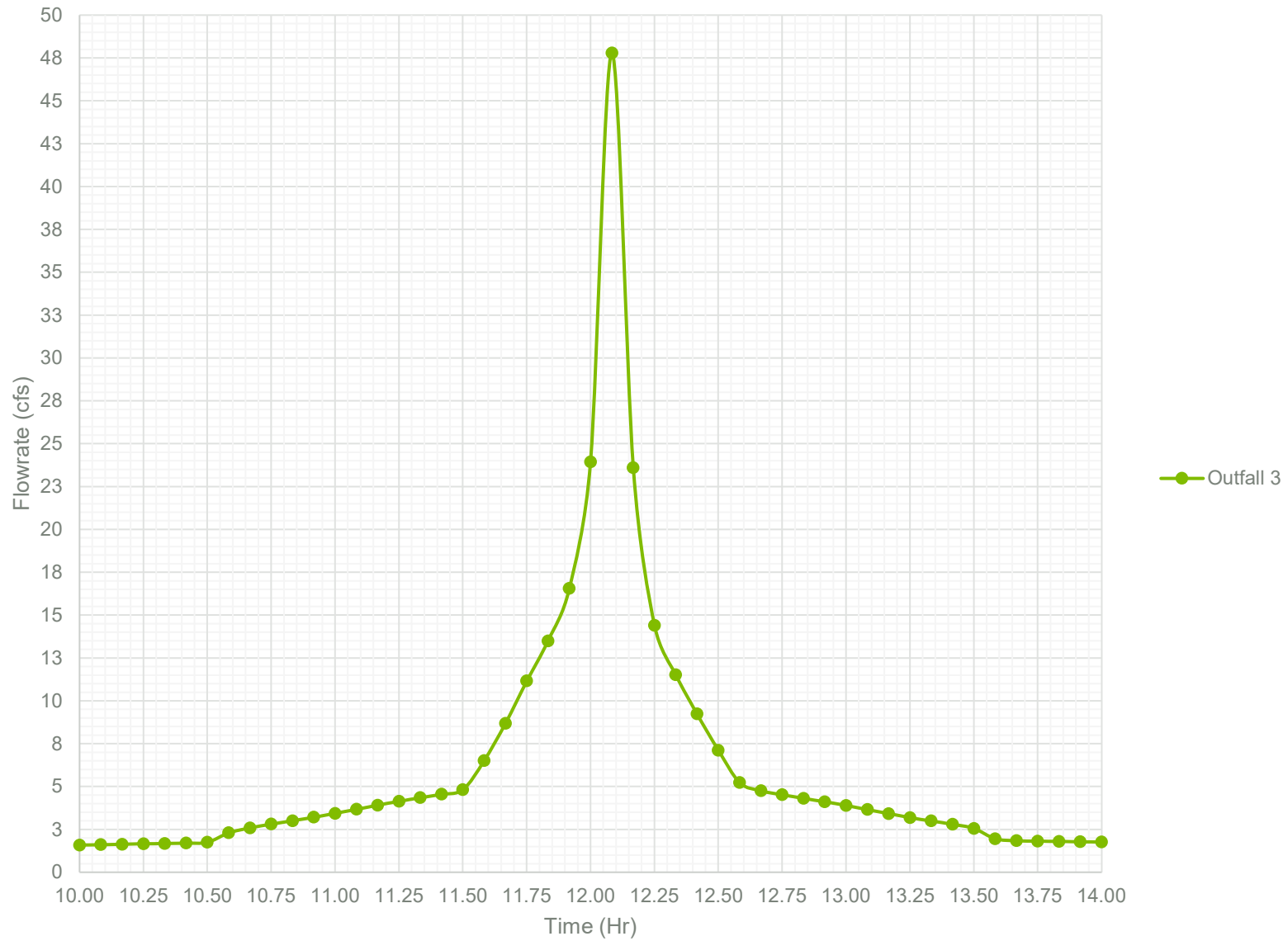
Proposed Peak 4-Hr 10-YR Storm Flowrates Outfall 3



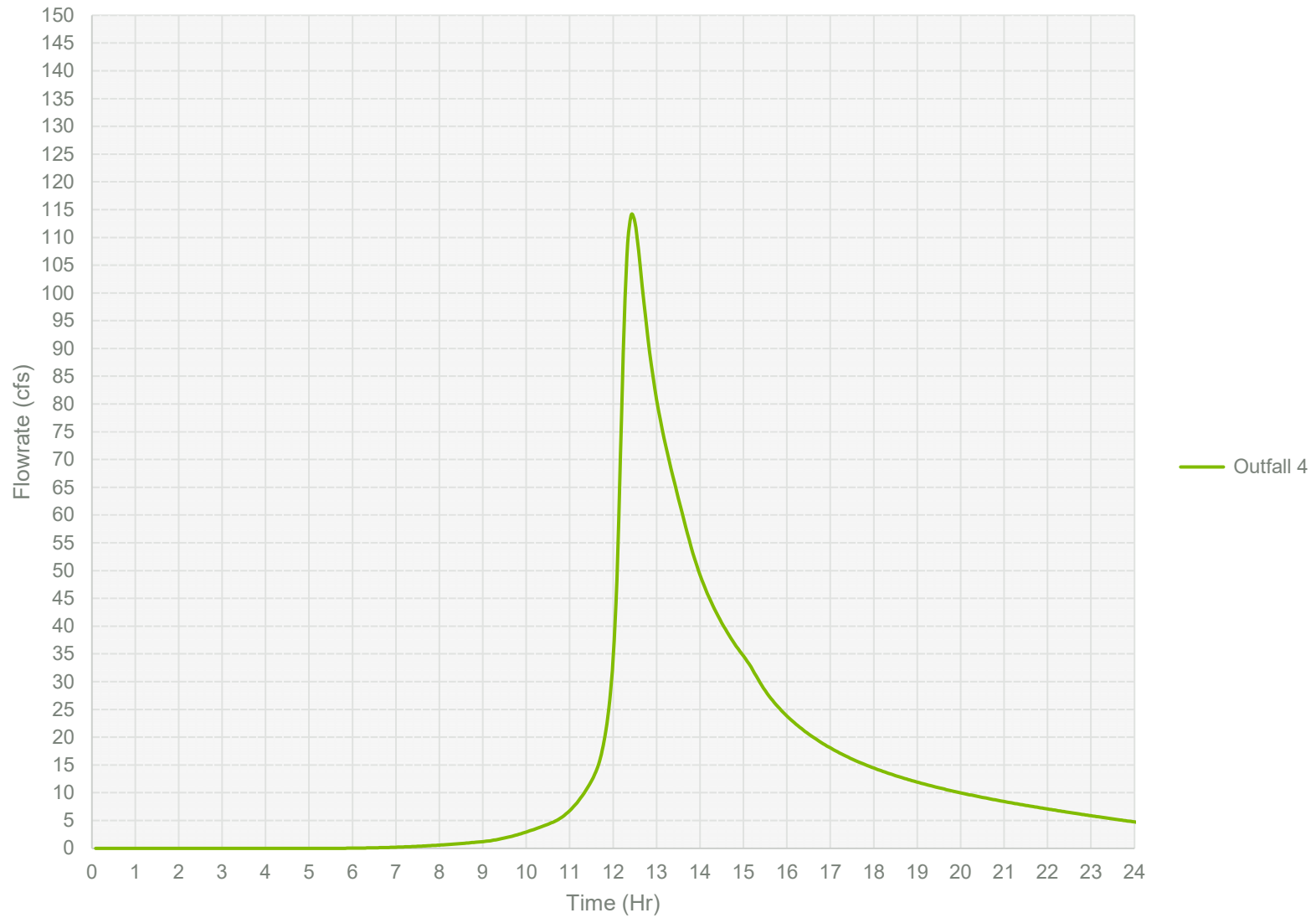
Proposed Peak 24-Hr 100-YR Storm Flowrates Outfall 3



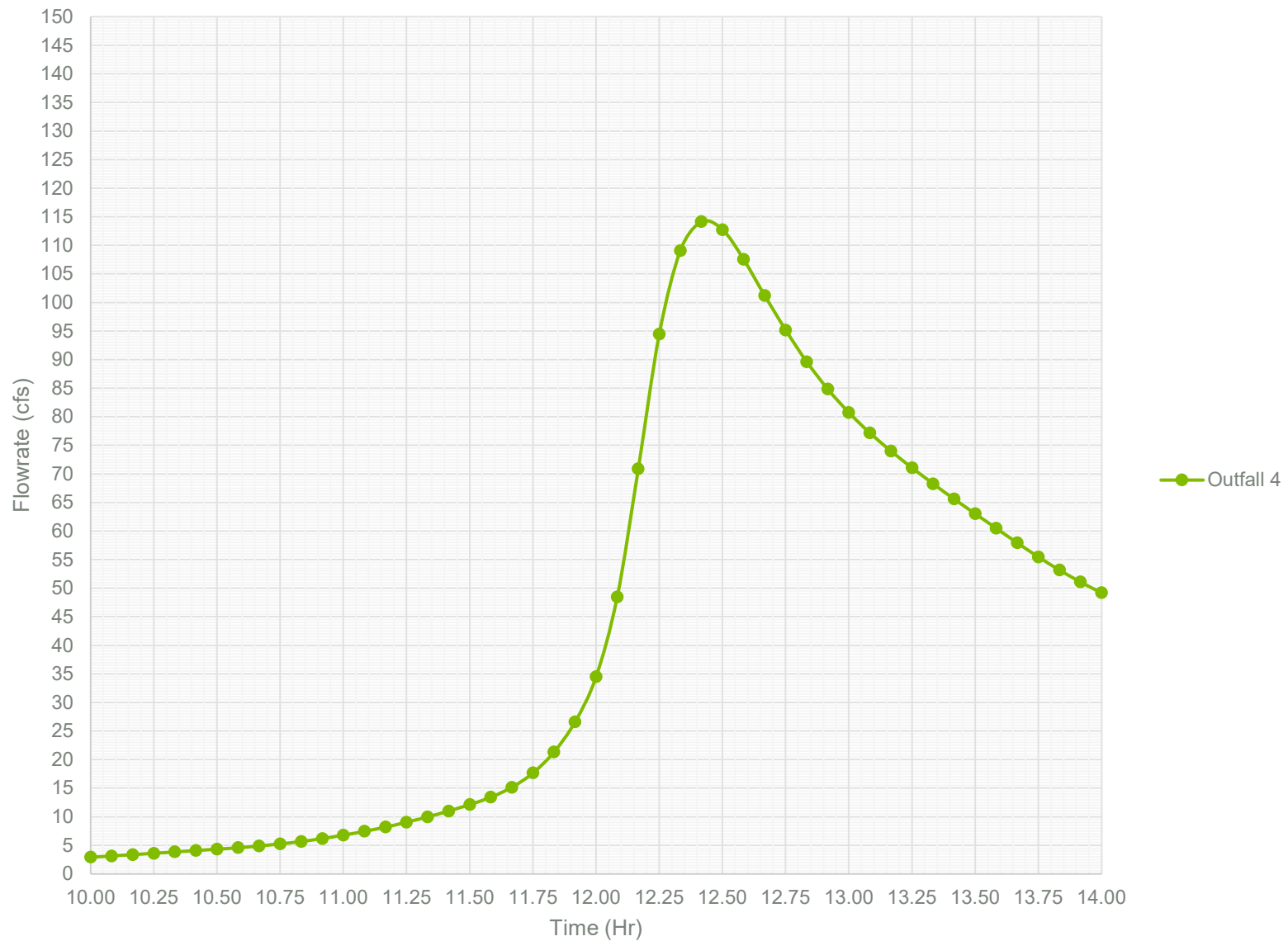
Proposed Peak 4-Hr 100-YR Storm Flowrates Outfall 3



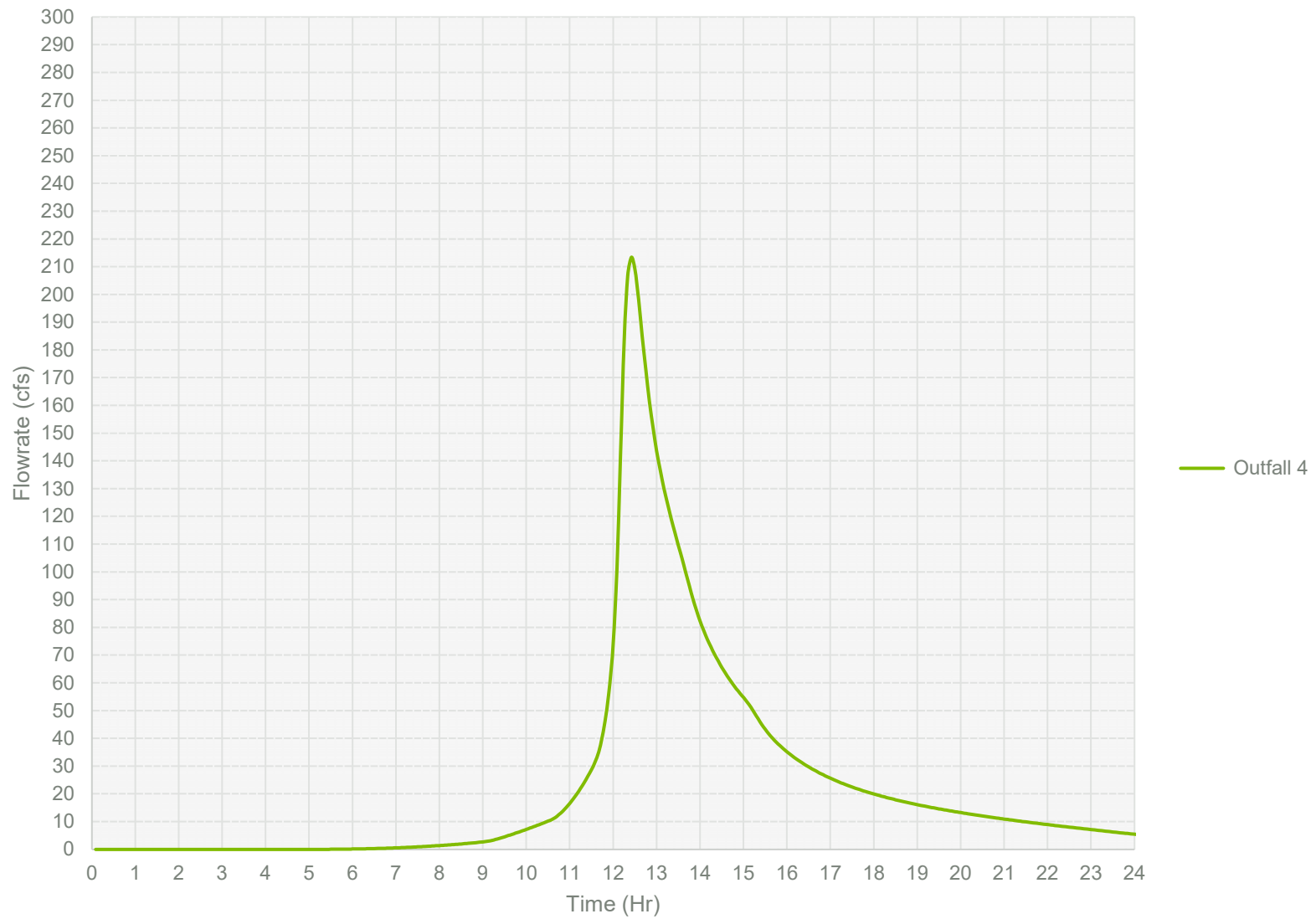
Proposed Peak 24-Hr 2-YR Storm Flowrates Outfall 4



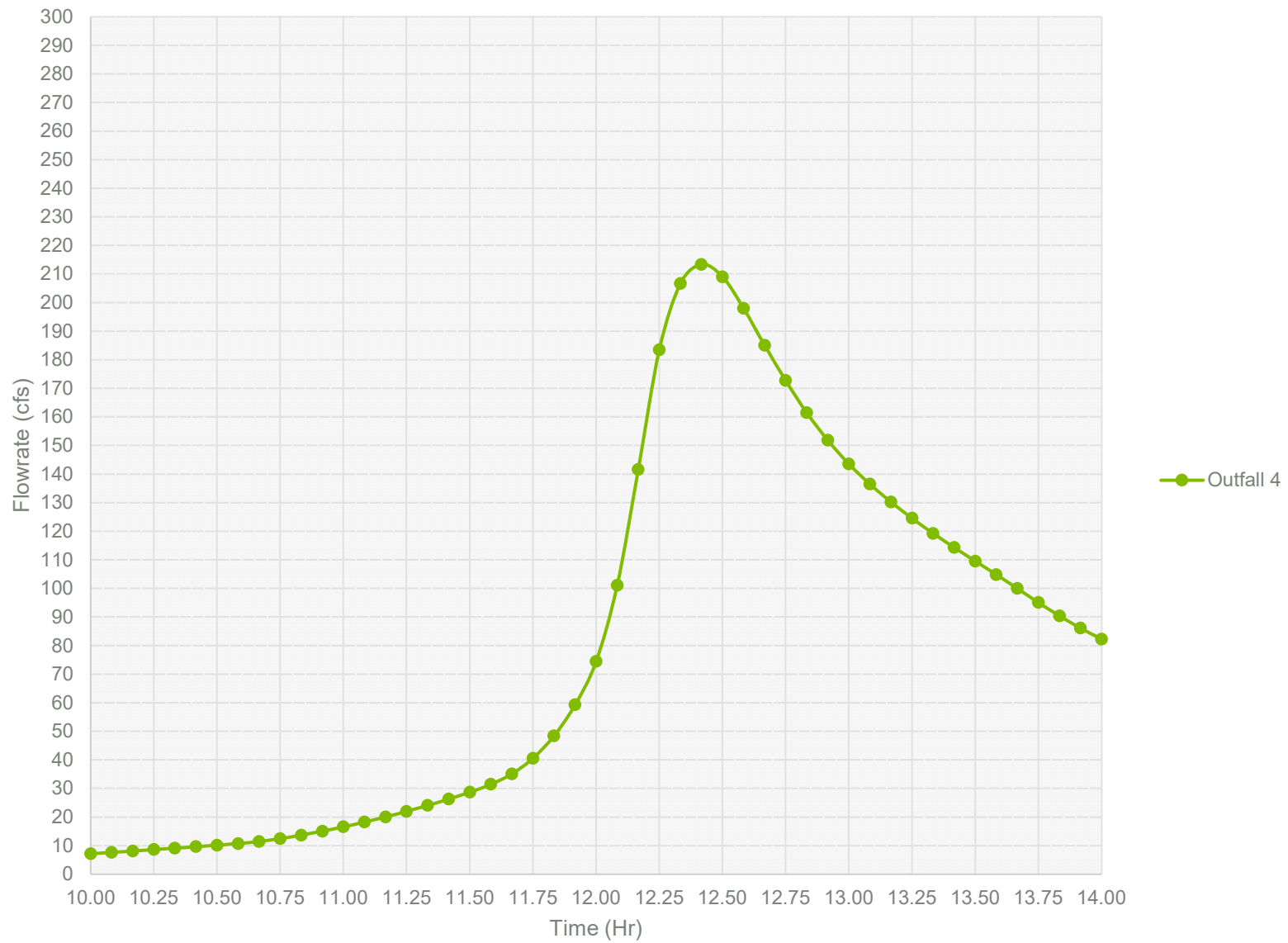
Proposed Peak 4-Hr 2-YR Storm Flowrates Outfall 4



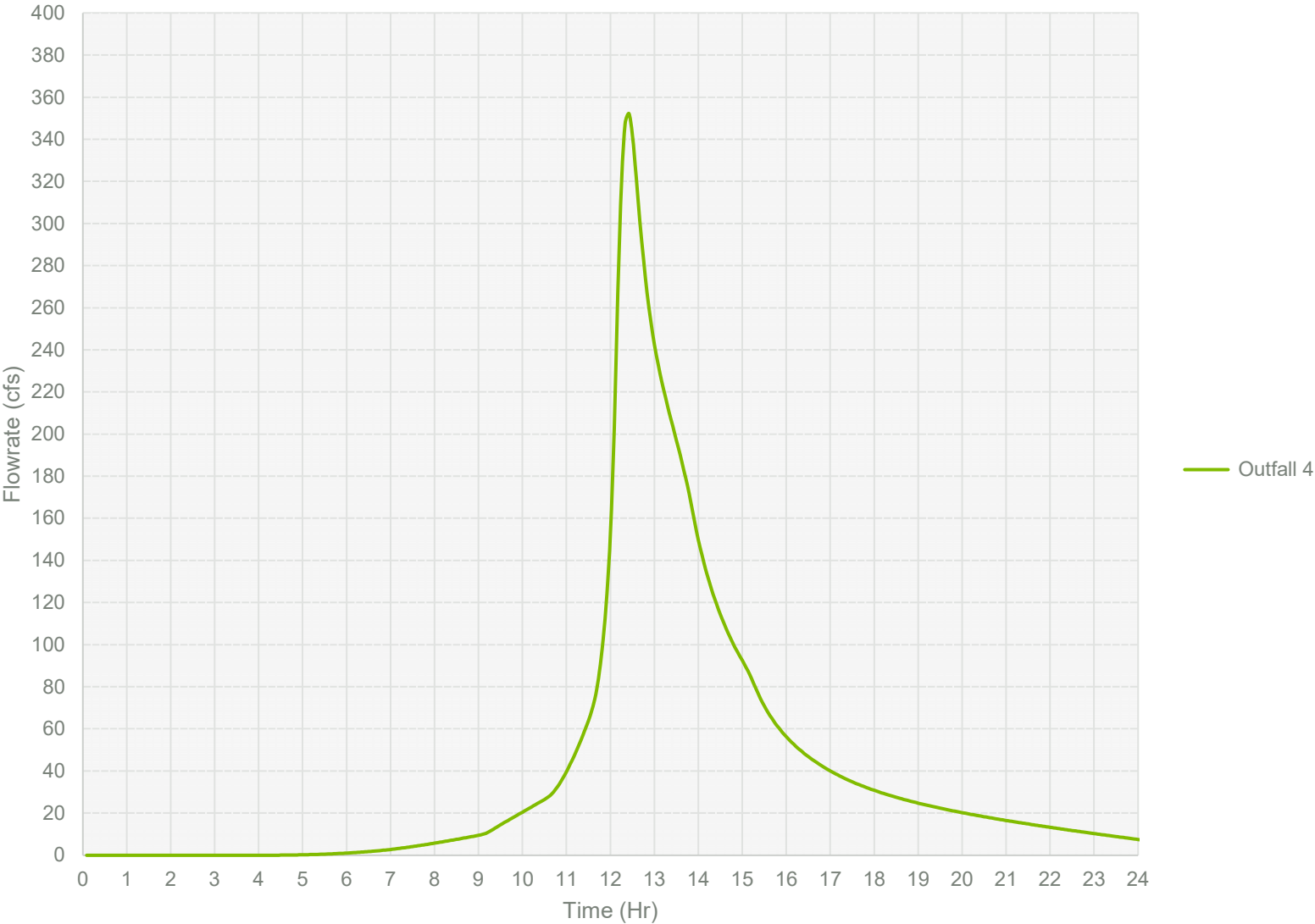
Proposed Peak 24-Hr 10-YR Storm Flowrates Outfall 4



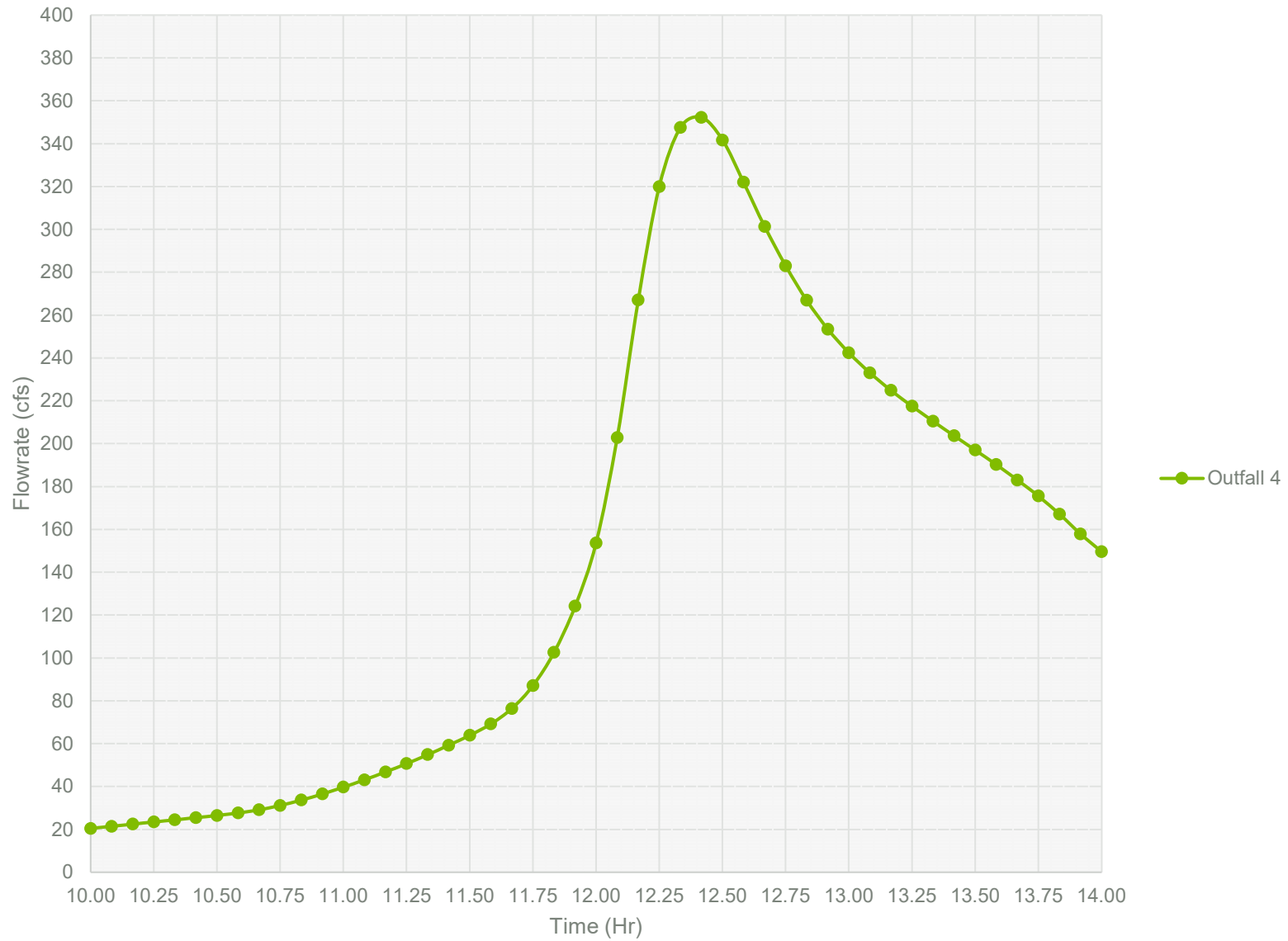
Proposed Peak 4-Hr 10-YR Storm Flowrates Outfall 4



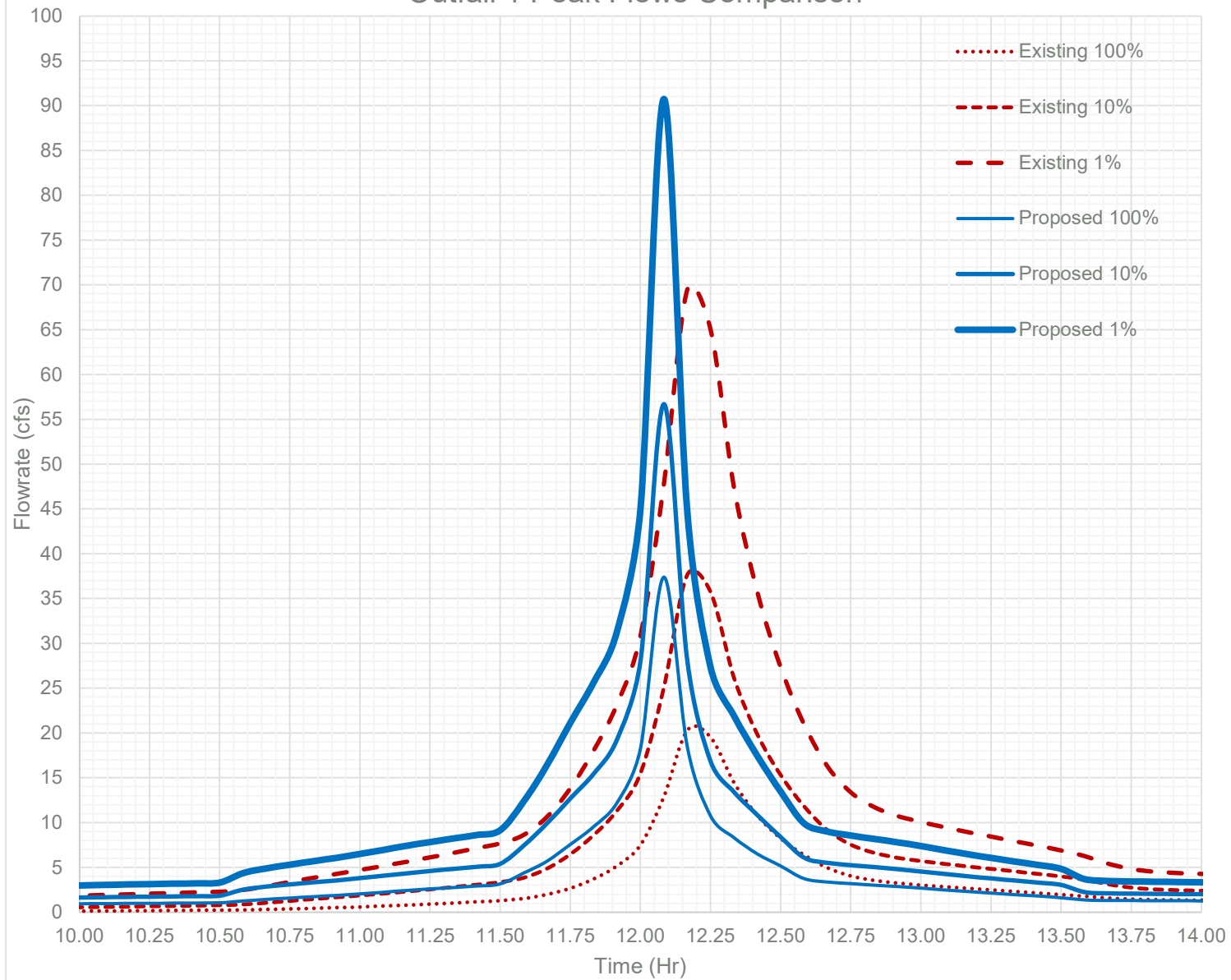
Proposed Peak 24-Hr 100-YR Storm Flowrates Outfall 4



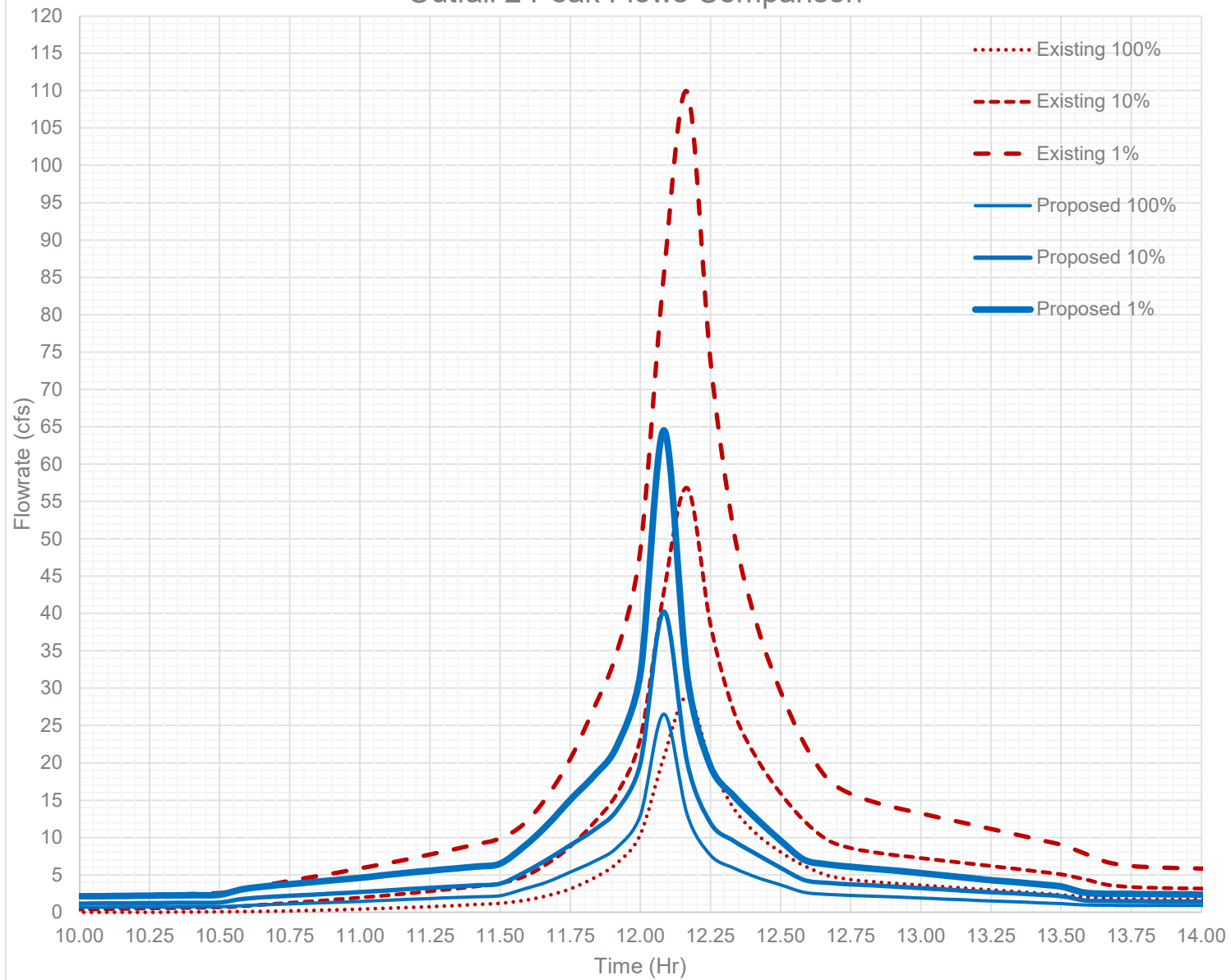
Proposed Peak 4-Hr 100-YR Storm Flowrates Outfall 4



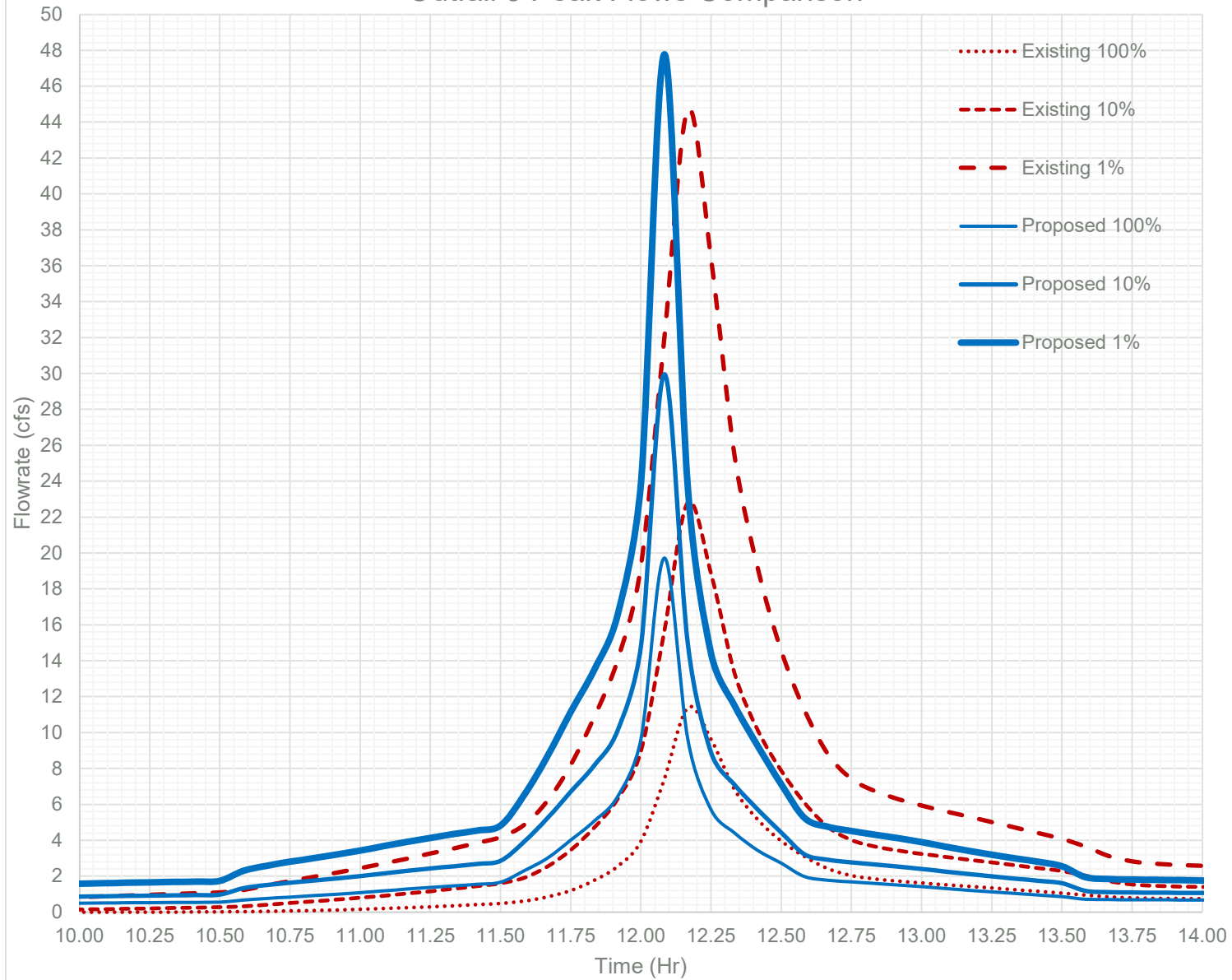
Outfall 1 Peak Flows Comparison



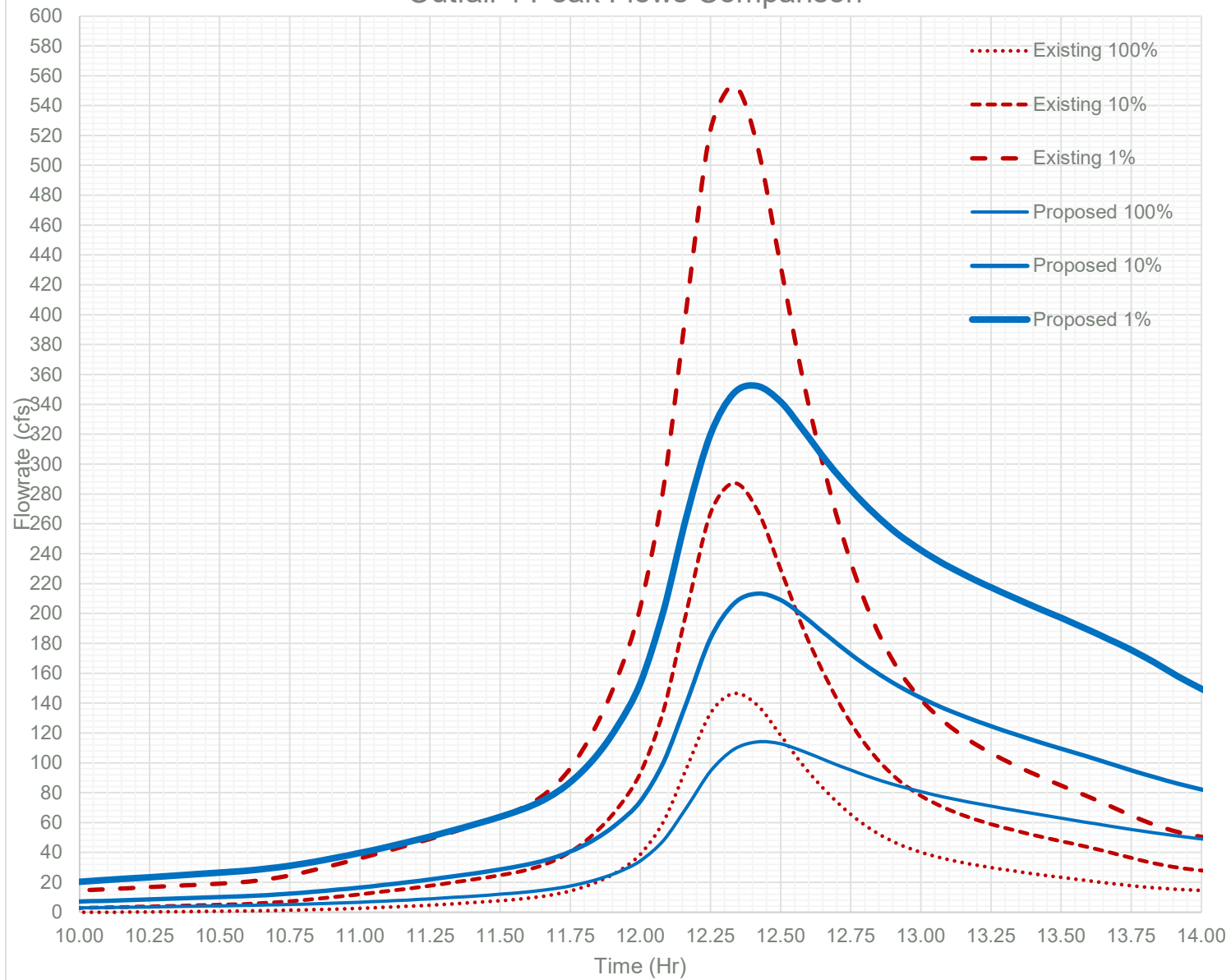
Outfall 2 Peak Flows Comparison



Outfall 3 Peak Flows Comparison



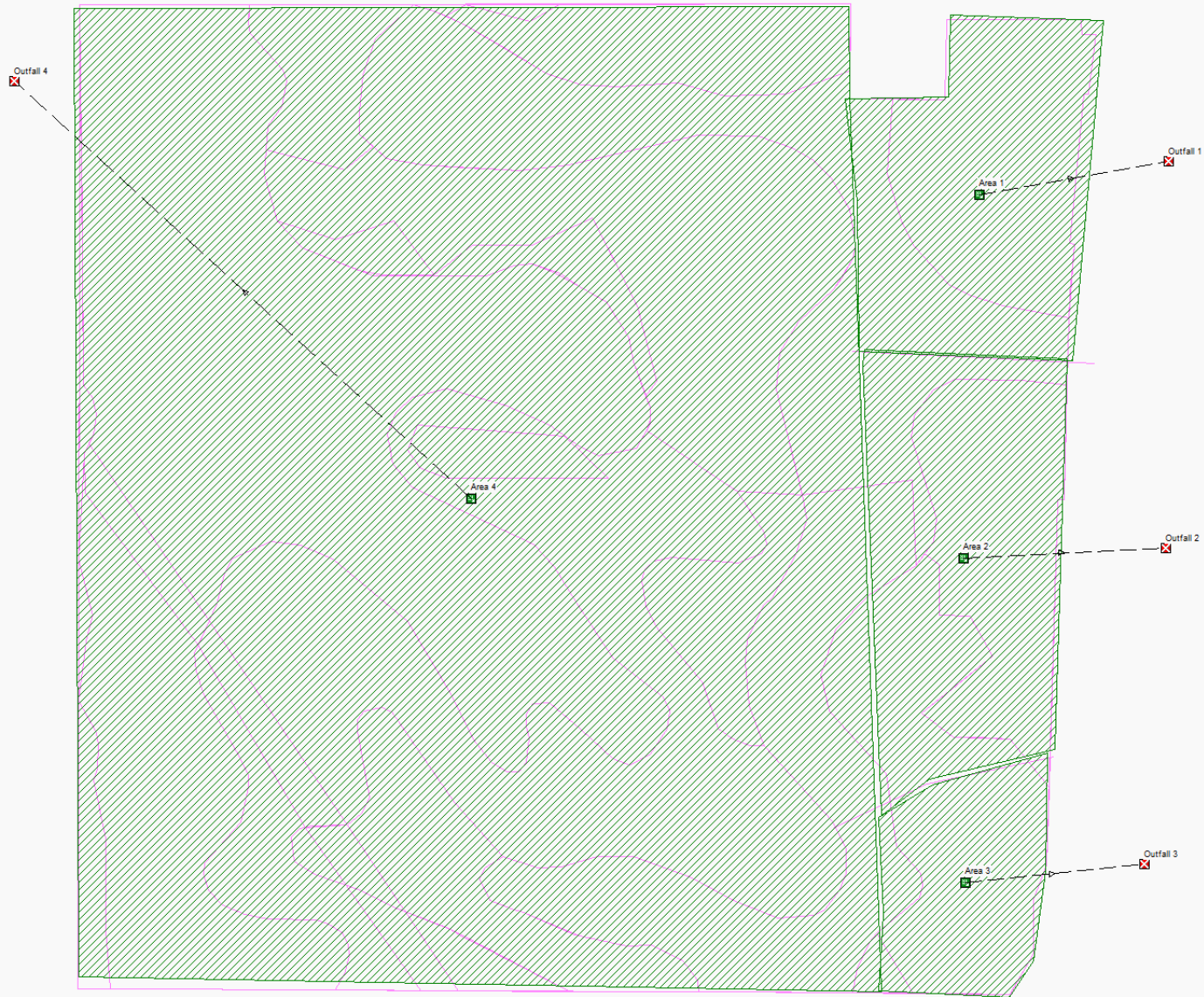
Outfall 4 Peak Flows Comparison



APPENDIX C

Model Results

EXISTING CONDITIONS



2-YEAR RESULTS

Subbasins

×

General

Subbasin ID: Area 1

Connectivity

Rain gage: Rain Gage-01

...

Outlet node: Outfall 1

...

Peak rate factor: 484

Delete

Show

Report

Description:

▲

▼

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: 11.117 ac

Equivalent width: 500

...

ft

Average slope: 0.5

...

%

Impervious area

Area: 25

▲

▼

%

No depression: 25

▲

▼

%

Pervious area

Curve number: 0.20

...

Time of concentration: 15.89

...

min

Weighted curve number: 81.02

...

Manning's roughness: 0.015

...

Curve number: 0.08

...

Manning's roughness: 0.1

...

Analysis summary

Peak runoff: 21.060 cfs

Total precipitation: 3.539 in

Total runoff: 1.741 in

Total infiltration: 1.798 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins



General

Subbasin ID:

Connectivity

Rain gage: ...

Outlet node: ...

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac

Equivalent width: ft

Average slope: %

☐ Time of concentration: min

Weighted curve number:

Impervious area

Area: %

No depression: %

Manning's roughness:

Curve number:

Pervious area

Curve number:

Manning's roughness:

Analysis summary

Peak runoff: cfs

Total runoff: in

Total precipitation: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...
Outlet node: ...
Peak rate factor:

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac

Equivalent width: ... ft

Average slope: %

☐ Time of concentration: ... min
Weighted curve number: ...

Impervious area

Area: %

No depression: %

Manning's roughness: ...

Curve number: ...

Pervious area

Curve number: ...

Manning's roughness: ...

Analysis summary

Peak runoff: cfs

Total precipitation: in

Total runoff: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 4

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 4

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: 120.944 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 28.40 min

Weighted curve number: 77.87

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 146.550 cfs

Total runoff: 1.518 in

Total precipitation: 3.539 in

Total infiltration: 2.021 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

10-YEAR RESULTS

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...
Outlet node: ...
Peak rate factor:

Delete
Show
Report

Description:

Physical Properties

SCS TR-55 TOC
Curve Number

Physical properties

Area: ac
Equivalent width: ft
Average slope: %
☐ Time of concentration: min
Weighted curve number:

Impervious area

Area: %
No depression: %
Manning's roughness:
Curve number:

Pervious area

Curve number:
Manning's roughness:

Analysis summary

Peak runoff: cfs
Total runoff: in
Total precipitation: in
Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close
Help

Subbasins



General

Subbasin ID: Area 2

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 2

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 16.050 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 11.09 min

Weighted curve number: 76.51

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 57.830 cfs

Total precipitation: 5.289 in

Total runoff: 2.822 in

Total infiltration: 2.467 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID:

Area 3

Connectivity

Rain gage:

Rain Gage-01

...

Outlet node:

Outfall 3

...

Peak rate factor:

484

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area:

7.057

ac

Equivalent width:

500

...

ft

Average slope:

0.5

%

Time of concentration:

13.72

...

min

Weighted curve number:

76.30

...

Impervious area

Area:

25

...

%

No depression:

25

...

%

Manning's roughness:

0.015

...

Curve number:

0.08

...

Pervious area

Curve number:

0.20

...

Manning's roughness:

0.1

...

Analysis summary

Peak runoff:

22.910

cfs

Total precipitation:

5.289

in

Total runoff:

2.803

in

Total infiltration:

2.486

in

	Subbasin ID	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...
Outlet node: ...
Peak rate factor:

Delete
Show
Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac
Equivalent width: ... ft
Average slope: %

☐ Time of concentration: ... min
Weighted curve number: ...

Impervious area

Area: %
No depression: %

Manning's roughness: ...
Curve number: ...

Pervious area

Curve number: ...
Manning's roughness: ...

Analysis summary

Peak runoff: cfs
Total runoff: in

Total precipitation: in
Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close
Help

100-YEAR RESULTS

Subbasins

×

General

Subbasin ID: Area 1

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 1

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: 11.117 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 15.89 min

Weighted curve number: 81.02

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 71.350 cfs

Total precipitation: 8.469 in

Total runoff: 6.188 in

Total infiltration: 2.281 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 2

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 2

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 16.050 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 11.09 min

Weighted curve number: 76.51

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 112.140 cfs

Total runoff: 5.648 in

Total precipitation: 8.469 in

Total infiltration: 2.821 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 3

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 3

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC Curve Number

Physical properties

Area: 7.057 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 13.72 min

Weighted curve number: 76.30

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 44.780 cfs

Total runoff: 5.622 in

Total precipitation: 8.469 in

Total infiltration: 2.847 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...
Outlet node: ...
Peak rate factor:

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac

Equivalent width: ft

Average slope: %

Impervious area

Area: %

No depression: %

Pervious area

Curve number: ...

Time of concentration: min

Weighted curve number: ...

Manning's roughness: ...

Curve number: ...

Manning's roughness: ...

Analysis summary

Peak runoff: cfs

Total precipitation: in

Total runoff: in

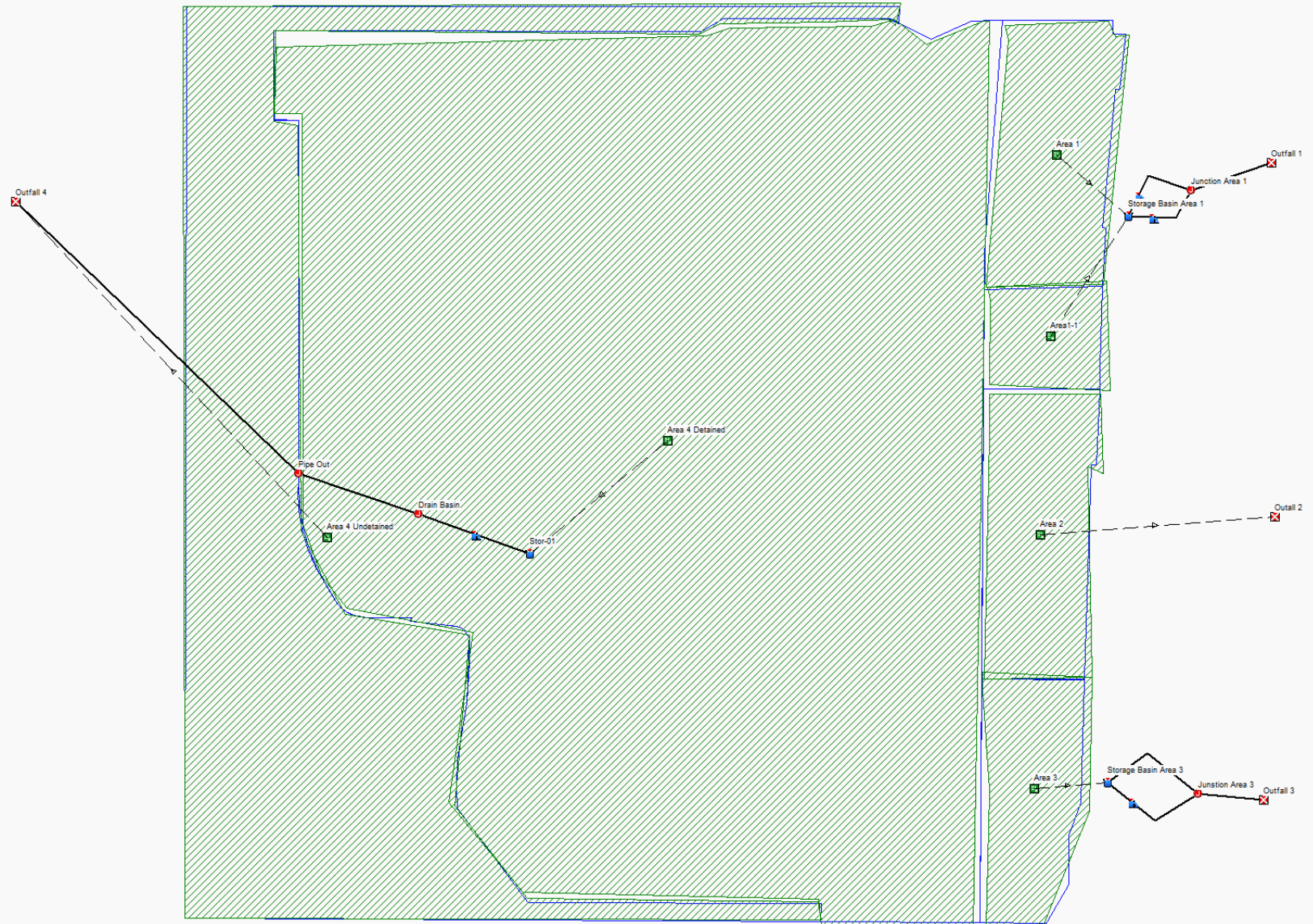
Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1	11.117	484	81.02	15.89	Rain Gage-01
2	Area 2	16.050	484	76.51	11.09	Rain Gage-01
3	Area 3	7.057	484	76.30	13.72	Rain Gage-01
4	Area 4	120.944	484	77.87	28.40	Rain Gage-01

Close

Help

EXISTING CONDITIONS



2-YEAR RESULTS

Subbasins



General

Subbasin ID:

Connectivity

Rain gage:

Outlet node:

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac

Equivalent width: ft

Average slope: %

☒ Time of concentration: min

Weighted curve number:

Impervious area

Area: %

No depression: %

Manning's roughness:

Curve number:

Pervious area

Curve number:

Manning's roughness:

Analysis summary

Peak runoff: cfs

Total runoff: in

Total precipitation: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.24	33.28	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...

Outlet node: ...

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: ac

Equivalent width: ... ft

Average slope: %

☒ Time of concentration: ... min

Weighted curve number: ...

Impervious area

Area: %

No depression: %

Manning's roughness: ...

Curve number: ...

Pervious area

Curve number: ...

Manning's roughness: ...

Analysis summary

Peak runoff: cfs

Total runoff: in

Total precipitation: in

Total infiltration: in

	Subbasin ID	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.24	33.28	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 2

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 2

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 5.9380 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☒ Time of concentration: 5.00 min

Weighted curve number: 95.06

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 26.990 cfs

Total precipitation: 3.539 in

Total runoff: 2.983 in

Total infiltration: 0.556 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins



General

Subbasin ID:

Connectivity

Rain gage: ...

Outlet node: ...

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: ac

Equivalent width: ... ft

Average slope: %

☒ Time of concentration: ... min

Weighted curve number: ...

Impervious area

Area: %

No depression: %

Manning's roughness: ...

Curve number: ...

Pervious area

Curve number: ...

Manning's roughness: ...

Analysis summary

Peak runoff: cfs

Total runoff: in

Total precipitation: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 4 Detained

Connectivity

Rain gage: Rain Gage-01

Outlet node: Stor-01

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 105.0010 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 11.10 min

Weighted curve number: 93.74

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 363.200 cfs

Total precipitation: 3.539 in

Total runoff: 2.847 in

Total infiltration: 0.692 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 4 Undetained

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 4

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 32.8120 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 33.28 min

Weighted curve number: 79.92

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 40.210 cfs

Total runoff: 1.661 in

Total precipitation: 3.539 in

Total infiltration: 1.878 in

	Subbasin ID	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Storage Nodes



General

Storage node ID: Stor-01

Physical properties

Invert elevation: 927.50 ft

Maximum elev.: 937 ft

Delete

Show

Report

Description:

Flow properties

External inflows: NO ...

Treatments: NO ...

WSEL initial: 0 ft

Ponded area: 0 ft²

Evaporation loss: 0

Storage shape

Type: Storage Curve ▾

Constant area: 0 ft²

Coefficient: 1.0

Exponent: 0

Storage curve: Basin 1 ▾ ...

Exfiltration

Type

☒ No exfiltration☐ At all elevations☐ Above elev.: 0 ft

Analysis summary

Max water depth: 3.13 ft Peak inflow: 353.70 cfs

Max water elevation: 930.63 ft Max flooded overflow: 0.00 cfs

Total flooded vol.: 0 ac-in Total time flooded: 0 min

	ID /	Invert Elev.	Max. Elev.	WSEL Initial	Ponded Area	Storage Type	Exfiltration
1	Stor-01	927.50	937	0	0	Storage Curve	

Close

Help

Outfalls

×

General

Outfall ID: Outfall 1

Description:

Inflow sources

External inflows: NO

Treatments: NO

Physical properties

Invert elevation: 895 ft

☐ Flap gate

Boundary condition

Type: Normal

Water elevation:

Tidal curve:

Time series:

Analysis summary

Max water depth: 0.99 ft

Max water elevation: 895.99 ft

Peak inflow: 19.34 cfs

	ID ↗	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	895	No	No	No	Normal
3	Outfall 3	895	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Delete

Show

Report

Close

Help

Outfalls

×

General

Outfall ID: Outfall 3

Description:

Inflow sources

External inflows: NO

Treatments: NO

Physical properties

Invert elevation: 895 ft

☐ Flap gate

Boundary condition

Type: Normal

Water elevation:

Tidal curve:

Time series:

Analysis summary

Max water depth: 0.67 ft

Max water elevation: 895.67 ft

Peak inflow: 9.07 cfs

	ID /	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	895	No	No	No	Normal
3	Outfall 3	895	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Delete

Show

Report

Close

Help

General

Outfall ID:

Outfall 4

Inflow sources

External inflows:

NO

...

Treatments:

NO

...

Delete

Show

Report

Description:

Physical properties

Invert elevation:

0

ft

☐ Flap gate

Boundary condition

Type:

Normal

▼

Water elevation:

ft

Tidal curve:

▼

...

Time series:

▼

...

Analysis summary

Max water depth:

0.51

ft

Peak inflow:

114.15

cfs

Max water elevation:

0.51

ft

	ID /	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	0	No	No	No	Normal
3	Outfall 3	0	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Close

Help

10-YEAR RESULTS

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...
Outlet node: ...
Peak rate factor:

Delete
Show
Report

Description:

Physical Properties

SCS TR-55 TOC
Curve Number

Physical properties

Area: ac
Equivalent width: ... ft
Average slope: %

☒ Time of concentration: ... min
Weighted curve number: ...

Impervious area

Area: %
No depression: %
Manning's roughness: ...
Curve number: ...

Pervious area

Curve number: ...
Manning's roughness: ...

Analysis summary

Peak runoff: cfs
Total runoff: in
Total precipitation: in
Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.24	33.28	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetaine	32.8120	484	79.92	33.28	Rain Gage-01

Close
Help

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...

Outlet node:

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: ac

Equivalent width: ... ft

Average slope: %

☒ Time of concentration: ... min

Weighted curve number: ...

Impervious area

Area: %

No depression: %

Manning's roughness: ...

Curve number: ...

Pervious area

Curve number: ...

Manning's roughness: ...

Analysis summary

Peak runoff: cfs

Total runoff: in

Total precipitation: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.24	33.28	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins



General

Subbasin ID:

Connectivity

Rain gage: ...

Outlet node: ...

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac

Equivalent width: ft

Average slope: %

☒ Time of concentration: min

Weighted curve number:

Impervious area

Area: %

No depression: %

Manning's roughness:

Curve number:

Pervious area

Curve number:

Manning's roughness:

Analysis summary

Peak runoff: cfs

Total runoff: in

Total precipitation: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins



General

Subbasin ID: Area 3

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 3

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 4.4000 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☒ Time of concentration: 5.00 min

Weighted curve number: 95.13

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 30.370 cfs

Total precipitation: 5.289 in

Total runoff: 4.721 in

Total infiltration: 0.568 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 4 Detained

Connectivity

Rain gage: Rain Gage-01

Outlet node: Stor-01

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: 105.0010 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 11.10 min

Weighted curve number: 93.74

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 560.270 cfs

Total runoff: 4.564 in

Total precipitation: 5.289 in

Total infiltration: 0.725 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetaine	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 4 Undetained

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 4

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 32.8120 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 33.28 min

Weighted curve number: 79.92

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 76.530 cfs

Total runoff: 3.139 in

Total precipitation: 5.289 in

Total infiltration: 2.15 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Storage Nodes

×

General

Storage node ID:

Physical properties

Invert elevation: ft

Maximum elev.: ft

Delete

Show

Report

Description:

Flow properties

External inflows: ...

Treatments: ...

WSEL initial: ft

Ponded area: ft²

Evaporation loss:

Storage shape

Type: ▾

Constant area: ft²

Coefficient:

Exponent:

Storage curve: ▾ ...

Exfiltration

Type

☒ No exfiltration
☐ At all elevations
☐ Above elev.: ft

Analysis summary

Max water depth: ft

Peak inflow: cfs

Max water elevation: ft

Max flooded overflow: cfs

Total flooded vol.: ac-in

Total time flooded: min

	ID /	Invert Elev.	Max. Elev.	WSEL Initial	Ponded Area	Storage Type	Exfiltration
1	Stor-01	927.50	937	0	0	Storage Curve	

Close

Help

Outfalls



General

Outfall ID:

Inflow sources

External inflows: ...

Treatments: ...

Delete

Show

Report

Description:

Physical properties

Invert elevation: ft

☐ Flap gate

Boundary condition

Type: ▾

Water elevation: ft

Tidal curve: ▾ ...

Time series: ▾ ...

Analysis summary

Max water depth: ft

Peak inflow: cfs

Max water elevation: ft

	ID /	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	895	No	No	No	Normal
3	Outfall 3	895	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Close

Help

Outfalls



General

Outfall ID:

Inflow sources

External inflows: ...

Treatments: ...

Delete

Show

Report

Description:

Physical properties

Invert elevation: ft

☐ Flap gate

Boundary condition

Type: ▾

Water elevation: ft

Tidal curve: ▾ ...

Time series: ▾ ...

Analysis summary

Max water depth: ft

Peak inflow: cfs

Max water elevation: ft

	ID /	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	895	No	No	No	Normal
3	Outfall 3	895	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Close

Help

Outfalls



General

Outfall ID:

Inflow sources

External inflows: ...

Treatments: ...

Delete

Show

Report

Description:

Physical properties

Invert elevation: ft

☐ Flap gate

Boundary condition

Type: ▼

Water elevation: ft

Tidal curve: ▼ ...

Time series: ▼ ...

Analysis summary

Max water depth: ft

Peak inflow: cfs

Max water elevation: ft

	ID /	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	0	No	No	No	Normal
3	Outfall 3	0	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Close

Help

100-YEAR RESULTS

Subbasins

General

Subbasin ID:

Connectivity

Rain gage: ...
Outlet node: ...
Peak rate factor:

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac

☒ Time of concentration: min
Weighted curve number:

Equivalent width: ft

Average slope: %

Impervious area

Area: %

No depression: %

Manning's roughness:

Curve number:

Pervious area

Curve number:

Manning's roughness:

Analysis summary

Peak runoff: cfs

Total precipitation: in

Total runoff: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.24	33.28	Rain Gage-01
3	Area 2	5.9380	484	95.06	5.00	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins



General

Subbasin ID:

Connectivity

Rain gage: ...

Outlet node: ...

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: ac

Equivalent width: ... ft

Average slope: %

☒ Time of concentration: ... min

Weighted curve number: ...

Impervious area

Area: %

No depression: %

Manning's roughness: ...

Curve number: ...

Pervious area

Curve number: ...

Manning's roughness: ...

Analysis summary

Peak runoff: cfs

Total runoff: in

Total precipitation: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5.00	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins



General

Subbasin ID:

Connectivity

Rain gage: ...

Outlet node: ...

Peak rate factor:

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: ac

Equivalent width: ... ft

Average slope: %

☒ Time of concentration: ... min

Weighted curve number: ...

Impervious area

Area: %

No depression: %

Manning's roughness: ...

Curve number: ...

Pervious area

Curve number: ...

Manning's roughness: ...

Analysis summary

Peak runoff: cfs

Total precipitation: in

Total runoff: in

Total infiltration: in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5.00	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 3

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 3

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 4.4000 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☒ Time of concentration: 5.00 min

Weighted curve number: 95.13

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 48.590 cfs

Total runoff: 7.884 in

Total precipitation: 8.469 in

Total infiltration: 0.585 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins

General

Subbasin ID: Area 4 Detained

Connectivity

Rain gage: Rain Gage-01

Outlet node: Stor-01

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties

SCS TR-55 TOC

Curve Number

Physical properties

Area: 105.0010 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 11.10 min

Weighted curve number: 93.74

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 905.700 cfs

Total runoff: 7.717 in

Total precipitation: 8.469 in

Total infiltration: 0.752 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area 1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Subbasins



General

Subbasin ID: Area 4 Undetained

Connectivity

Rain gage: Rain Gage-01

Outlet node: Outfall 4

Peak rate factor: 484

Delete

Show

Report

Description:

Physical Properties SCS TR-55 TOC Curve Number

Physical properties

Area: 32.8120 ac

Equivalent width: 500 ft

Average slope: 0.5 %

☐ Time of concentration: 33.28 min

Weighted curve number: 79.92

Impervious area

Area: 25 %

No depression: 25 %

Manning's roughness: 0.015

Curve number: 0.08

Pervious area

Curve number: 0.20

Manning's roughness: 0.1

Analysis summary

Peak runoff: 143.810 cfs

Total precipitation: 8.469 in

Total runoff: 6.056 in

Total infiltration: 2.413 in

	Subbasin ID /	Area	Peak Rate Factor	Wt. CN	TOC	Rain Gage ID
1	Area1-1	2.3272	484	95.24	5	Rain Gage-01
2	Area 1	6.0150	484	95.05	5	Rain Gage-01
3	Area 2	5.9380	484	95.06	5	Rain Gage-01
4	Area 3	4.4000	484	95.13	5	Rain Gage-01
5	Area 4 Detained	105.0010	484	93.74	11.10	Rain Gage-01
6	Area 4 Undetained	32.8120	484	79.92	33.28	Rain Gage-01

Close

Help

Storage Nodes



General

Storage node ID: Stor-01

Physical properties

Invert elevation: 927.50 ft

Maximum elev.: 937 ft

Delete

Show

Report

Description:

Flow properties

External inflows: NO ...

Treatments: NO ...

WSEL initial: 0 ft

Ponded area: 0 ft²

Evaporation loss: 0

Storage shape

Type: Storage Curve ▾

Constant area: 0 ft²

Coefficient: 1.0

Exponent: 0

Storage curve: Basin 1 ▾ ...

Exfiltration

Type

☒ No exfiltration☐ At all elevations☐ Above elev.: 0 ft

Analysis summary

Max water depth: 7.32 ft Peak inflow: 882.10 cfs

Max water elevation: 934.82 ft Max flooded overflow: 0.00 cfs

Total flooded vol.: 0 ac-in Total time flooded: 0 min

	ID /	Invert Elev.	Max. Elev.	WSEL Initial	Ponded Area	Storage Type	Exfiltration
1	Stor-01	927.50	937	0	0	Storage Curve	

Close

Help

Outfalls

×

General

Outfall ID: Outfall 1

Description:

Inflow sources

External inflows: NO

Treatments: NO

Physical properties

Invert elevation: 895 ft

☐ Flap gate

Boundary condition

Type: Normal

Water elevation:

Tidal curve:

Time series:

Analysis summary

Max water depth: 1.95 ft

Max water elevation: 896.95 ft

Peak inflow: 62.51 cfs

	ID ↗	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	895	No	No	No	Normal
3	Outfall 3	895	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Delete

Show

Report

Close

Help

Outfalls

×

General

Outfall ID:

Outfall 3

Inflow sources

External inflows:

NO

...

Treatments:

NO

...

Delete

Show

Report

Description:

Physical properties

Invert elevation:

895

ft

☐ Flap gate

Boundary condition

Type:

Normal

▼

Water elevation:

ft

Tidal curve:

▼

...

Time series:

▼

...

Analysis summary

Max water depth:

1.44

ft

Peak inflow:

36.61

cfs

Max water elevation:

896.44

ft

	ID /	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	895	No	No	No	Normal
3	Outfall 3	895	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

Close

Help

Outfalls

×

General

Outfall ID: Outfall 4

Inflow sources

External inflows: NO

...

Treatments: NO

...

Delete

Show

Report

Description:

▲

▼

Physical properties

Invert elevation: 0 ft

☐ Flap gate

Boundary condition

Type: Normal ▼

Water elevation: ft

Tidal curve: ▼

...

Time series: ▼

...

Analysis summary

Max water depth: 0.89 ft

Peak inflow: 352.30 cfs

Max water elevation: 0.89 ft

	ID /	Invert Elev.	Flap Gate	Lateral Inflows	Treatments	Outfall Type
1	Outfall 2	0	No	No	No	Normal
2	Outfall 1	0	No	No	No	Normal
3	Outfall 3	0	No	No	No	Normal
4	Outfall 4	0	No	No	No	Normal

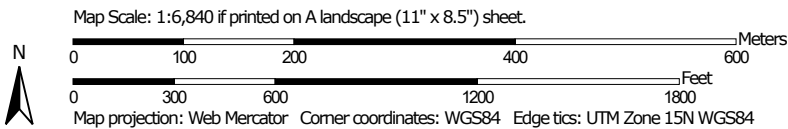
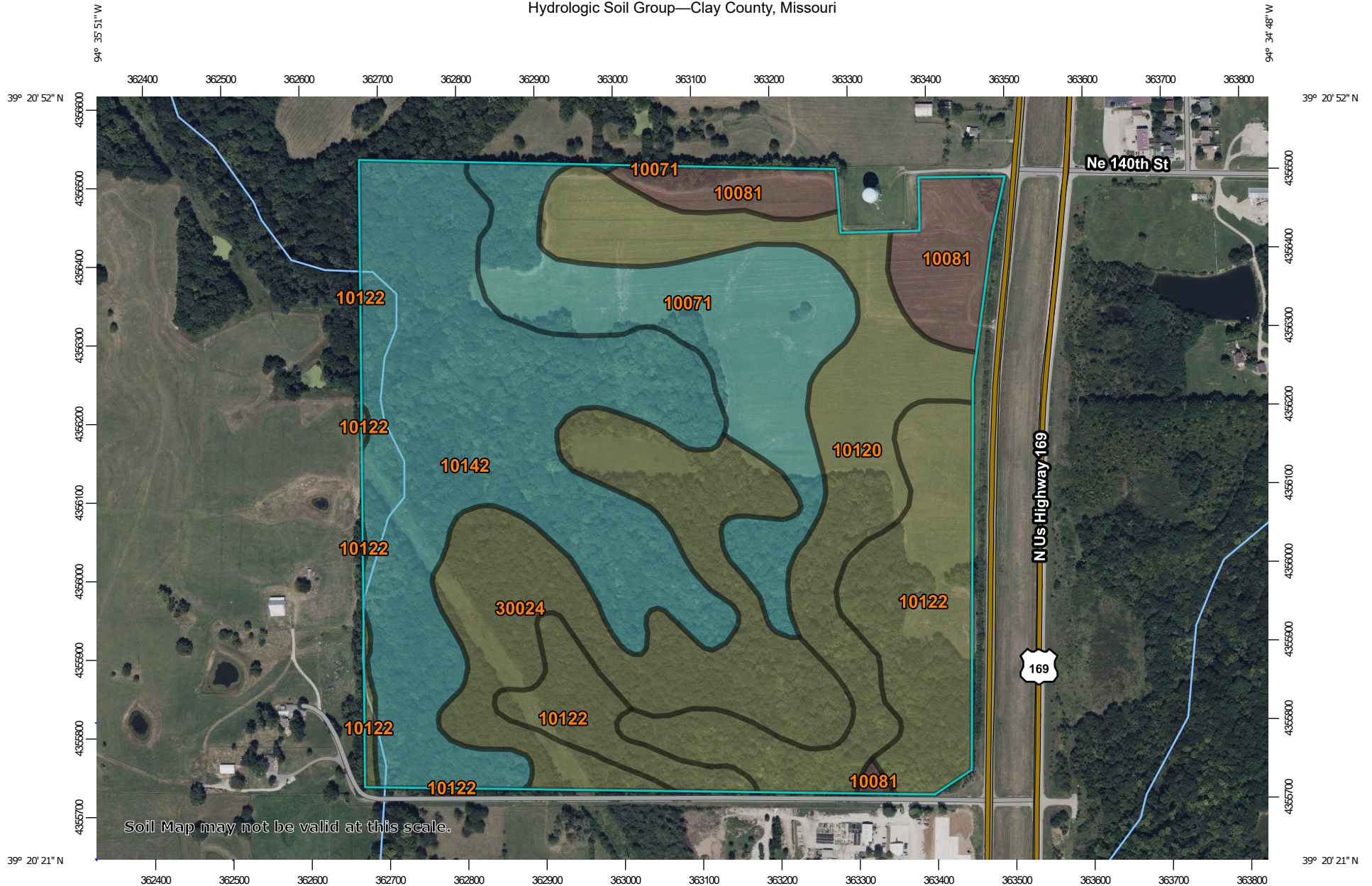
Close

Help

APPENDIX D

Soil Maps

Hydrologic Soil Group—Clay County, Missouri



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: Clay County, Missouri
 Survey Area Data: Version 27, Sep 3, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2022—Sep 16, 2022

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
10071	Ladoga silt loam, 5 to 9 percent slopes, eroded	D	22.1	14.4%
10081	Macksburg silt loam, 5 to 9 percent slopes	C/D	9.7	6.4%
10120	Sharpsburg silt loam, 2 to 5 percent slopes	C	26.3	17.2%
10122	Sharpsburg silt loam, 5 to 9 percent slopes, eroded	C	20.5	13.4%
10142	Snead-Rock outcrop complex, 5 to 14 percent slopes	D	45.9	30.1%
30024	Armster loam, 9 to 14 percent slopes, eroded	C	28.2	18.5%
Totals for Area of Interest			152.7	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



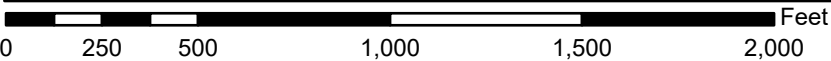
APPENDIX E

FEMA

National Flood Hazard Layer FIRMMette



94°35'35"W 39°20'54"N



1:6,000

94°34'58"W 39°20'26"N

Basemap Imagery Source: USGS National Map 2023

Legend

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 Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **4/9/2026 at 7:56 PM** 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.

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. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

PROJECT ROCKETSHIP

PRELIMINARY DRAINAGE STUDY

Smithville, MO

May 2026

Olsson Project No. 026-02142