



Final Drainage Report

Madera Canyon Road, Florida Canyon Wash and Medium Wash Bridges

Florida Canyon Wash

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Federal Project No.: PPM-0(273)D

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Medium Wash

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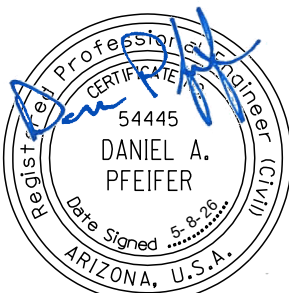
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Contents

1	Introduction	3
2	Data Collection	5
2.1	Geographic Information System Data	5
2.2	Record Drawing Documentation	5
2.3	Review of Previous Studies.....	5
2.4	Field Review	5
3	Federal Emergency Management Agency	7
4	Hydrology and Hydraulics	7
4.1	Design Criteria.....	7
4.2	Offsite Hydrology	7
4.3	Existing Conditions Hydraulics.....	11
4.4	Florida Canyon Wash Bridge – Proposed Conditions.....	15
4.5	Medium Wash Bridge – Proposed Conditions	18
4.6	Bridge Deck Drainage	19
4.7	Proposed Culvert and Riprap Layout	20
5	Summary	20

Tables

Table 1.	Rainfall Depths.....	9
Table 2.	Peak Discharge Results.....	10
Table 3.	Watershed Drainage Areas.....	11
Table 4.	Manning’s n-values for hydraulic models.....	11
Table 5.	Florida Canyon Wash Bridge 100-year Hydraulic Results.....	15
Table 6.	Florida Canyon Wash Bridge 500-year Hydraulic Results.....	15
Table 7.	Florida Canyon Wash Bridge Scour Analysis Results	17
Table 8.	Medium Wash Bridge Hydraulic Results	18
Table 9.	Medium Wash Bridge 500-year Hydraulic Results	18
Table 10.	Medium Wash Bridge Scour Analysis Results.....	19
Table 11.	Bridge Deck Drainage Analysis Results	20

Figures

Figure 1.	Location Map	4
Figure 2.	Florida Canyon Wash Bridge northeastern wingwall.....	6
Figure 3.	Main channel upstream of Florida Canyon Wash Bridge	6
Figure 4.	Florida Canyon Wash 2D Model Domain	12
Figure 5.	100-year Florida Canyon Wash Flow Depth (Existing Conditions)	13
Figure 6.	100-year Medium Wash Flow Depth (Existing Condition).....	14
Figure 7.	100-year Florida Canyon Overtopping Flow Depths >1' (Alt. 2).....	16



Appendices

- Appendix A. Exhibits
- Appendix B. Reference Information
- Appendix C. Hydrology
- Appendix D. Hydraulics

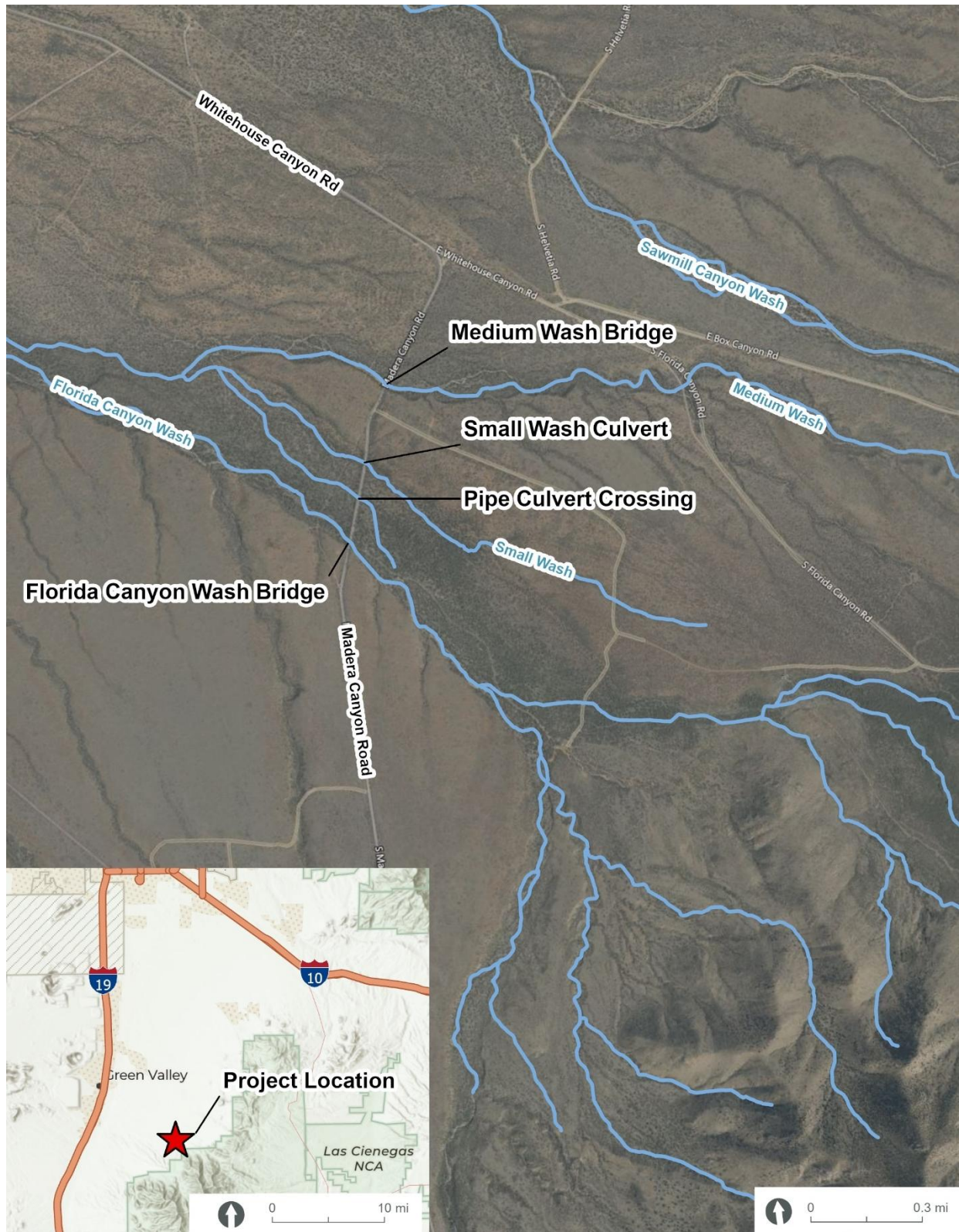
1 Introduction

The Madera Canyon Road, Florida Canyon Wash and Medium Wash Bridges are approximately seven miles southeast of the town of Green Valley in Pima County, Arizona. Figure 1 shows the project area location and nearby watercourses. This drainage report documents professional services completed as part of the project, including data collection, field investigation, desktop review, hydrologic and hydraulic analyses, and scour and erosion analyses.

Pima County plans to replace the two single-lane bridge crossings on Madera Canyon Road over Florida Canyon Wash and Medium Wash. The existing roadway section outside the project limits consists of two travel lanes, one in each direction, with variable-size shoulders. Within the project limits, the road narrows to approximately 14 feet wide to match the clear roadway width at the existing single-lane bridges. The bridges are cast-in-place reinforced concrete slab bridges that were constructed in 1935 by the Civilian Conservation Corps. The Florida Canyon Wash bridge is approximately 49'-7" long with two 24'-9 1/2" spans. The existing bridge is skewed 45° and has a 14-foot clear roadway width. The Medium Wash bridge is approximately 82'-2" long with three 26' +/- clear spans. The Medium Wash bridge is not skewed and has a 14'-2" clear roadway width. Because of the narrow clear roadway widths, traffic is forced to alternating one way traffic operations on the bridge. About 140 feet north of Medium Wash, there is a 36-inch CMP culvert that is 62 feet long. In addition, there is also a single lane reinforced concrete box culvert (RCBC) on Madera Canyon Road which conveys flow from Small Wash. This culvert is located about halfway between the two bridges and has a clear roadway width of approximately 15 feet and has a waterway opening of 15'-8" wide by 6'-2" tall measured between the bottom of the top slab and the ground line in the channel. It is unknown if there is a bottom slab on the culvert as it is not visible and may be obscured by the soil in the channel bottom.

Roadway runoff is allowed to sheet flow off the pavement and into roadside ditches or the surrounding terrain. This drainage report assesses the hydrology and hydraulics of the proposed improvements within the project area. It is intended to supplement the final design efforts for construction.

Figure 1. Location Map



2 Data Collection

Information for the project area was obtained from a variety of sources, including (but not limited to) Pima County, online services, topographic survey, and field observations conducted as part of this project. The information collected includes record documents for existing infrastructure, meteorological data, soils surveys, topographic mapping, meetings with staff, and site photographs. See Appendix B for excerpts of survey data, previous studies, and record drawings containing documentation of existing drainage features, analysis, and design intent.

2.1 Geographic Information System Data

Geographic Information System (GIS) data were collected to assist in generating hydrologic and hydraulic models used for the evaluation of the watershed flow path, soil properties, precipitation statistics, and natural and human-made features. U.S. Geological Survey (USGS) 1-meter National Elevation Data in GeoTIFF format were collected from the USGS database on November 19, 2024. Project Coordinate System is AZ State Plane, Central Zone NAD 1983 (1992)/HARN, North American Vertical Datum of 1988, International Feet. Digital terrain model data were compiled at 1- and 2-foot contour interval data-vertical accuracy.

2.2 Record Drawing Documentation

Record drawings were obtained through Pima County for past projects along Madera Canyon Road. Record drawing information provided details used to support the development of existing and proposed conditions analysis. Record drawings were not requested for private utilities.

2.3 Review of Previous Studies

Designs for this project were originally completed for Pima County in August 2003. This original design, which will be referred to as the 2003 design, included a new single-span AASHTO I-Girder Bridge over Medium Wash, a new two-span AASHTO I-Girder Bridge over Florida Canyon Wash, a new two-barrel 10-foot by 5-foot RCBC at Small Wash, and reconstruction of approximately 4,750 feet of Madera Canyon Road. The project was put on hold and was never constructed. The 2003 design concept report was reviewed as part of this study.

2.4 Field Review

HDR staff visited the project location multiple times in 2023 and 2024. Site visit photos and aerial mapping helped document existing conditions of the bridges for implementation of the structures in hydraulic models. Additionally, photos from site visits aided in parameterizing Manning's roughness n -values for modeling.

Figure 2. Florida Canyon Wash Bridge northeastern wingwall



The northeastern wingwall at Florida Canyon Bridge has been damaged, potentially by flows contracting into the bridge from the overbanks. Existing conditions hydraulics model indicates this same behavior.

Figure 3. Main channel upstream of Florida Canyon Wash Bridge



Stone sizes present in the main channel are composed of sand and cobbles, with similar conditions at Medium Wash Bridge.

3 Federal Emergency Management Agency

The project is located within Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel 04019C3970L. All panels have an effective date of June 16, 2011.

All mapped floodplains are designated as Zone D flood hazard areas. Zone D is described by FEMA as areas where flood risk exists, but the probability of that risk has not been determined. As a Zone D, detailed analyses were not performed for this area by FEMA and no depths or base flood elevations are shown within these zones on the FIRM.

4 Hydrology and Hydraulics

4.1 Design Criteria

The hydrologic and hydraulic analyses were completed using the criteria presented by the Pima County Regional Flood Control District and the Pima County Department of Transportation. The criteria used were acquired from the guidelines below:

- Pima County Roadway Design Manual, 2013
- Guidelines for Establishing Scour and Freeboard for Bridges in Pima County, 2012
- TECH-010 Rainfall Input for Hydrological Modeling, 2024
- TECH-015 Acceptable Methods for Determining Peak Discharges, 2021
- TECH-018 Acceptable Model Parameterization for Determining Peak Discharges, 2021
- TECH-114 Requirements for Content of Hydrologic and Hydraulic Reports, 2015

4.2 Offsite Hydrology

A hydrologic analysis of the project area was conducted to provide an understanding of the existing runoff conditions for the entire study area. The hydrologic results were used within the hydraulic analysis to confirm existing capacities and support the development of proposed drainage features.

Generation of the hydrology for the existing condition was completed by employing spreadsheets and methodologies provided by Pima County Regional Flood Control District to calculate the required hydrologic parameters. Specifically, the hydrologic model components consist of a “basin model” to describe the physical characteristics of the watershed, a “meteorological model” to describe the characteristics of the selected rainfall data, and “control specifications” to define the temporal (duration and time step) elements of the model. The sections below describe the data collection, analysis, and assumptions associated with the development of each of these model components.

4.2.1 Basin Model and Watershed Delineation

The basin model generated for this study consisted of the contributing drainage areas above the existing bridge crossings. Watershed delineation was completed using the built-in GIS tools available in the Hydraulic Engineering Center's Hydrologic Modeling System (HEC-HMS) Version 4.12, with additional processing done in ArcGIS Pro software as required.

A watershed map showing the delineated watersheds is provided in Appendix A. The watersheds contributing to the project were found to be representative of a typical sky island ecosystem in southern Arizona. The watershed headwaters are characterized by highly incised canyons with extremely steep channel slopes where the flow is fully contained within the channel. At the lower watershed elevations, the slopes begin to flatten and flowpaths become more braided and distributary leading up to the existing Madera Canyon Road bridges.

4.2.2 Rainfall Loss

For all subbasins, the Soil Conservation Service (SCS) curve number (CN) method was used as the rainfall loss method. Subbasin losses were calculated by generating representative values for CN using the combination of land use and soils data. The land use dataset available on Pima County's Geospatial Data Portal was used as the basis for the land use classes with modifications made using another land use product after aerial desktop review via Google Earth. The dataset known as LANDFIRE from the United States Department of Agriculture (USDA) was manually reclassified to the same set of land use classes present in the Pima County dataset. Additionally, LANDFIRE provides the vegetation cover density which was averaged across each of the subbasins for determination of the CN values. A map showing the land use classification is available in Appendix A. In addition, data describing the study area soils was obtained from the Pima County Geospatial Portal. Soils within the study area were found to consist of Hydrologic Soil Groups B, C, and D as shown in Appendix A.

Subbasin averaged CN values were determined using the "Curve Number (CN) (XLS)" spreadsheet available on the County's website. The dominant land cover types for the study area are desert brush and juniper-grass.

4.2.3 Hydrograph Transformation

Calculations for time of concentration were completed using spreadsheet titled "Time of Concentration (Tc) (XLS)" available on the County's website which employs separate methods for sheet, shallow concentrated, and channel flow. These methods coincide with the methods for use as specified in Technical Policy, TECH-018.

Flow paths extending from the most downstream point of the subbasin to the most hydraulically remote upstream point were developed through review of the available topographic data. Determination of the flow type within each flow path was based on the overall length, changes in gradient, and aerial imagery.

Sheet flow was generally limited to a maximum length of 300 feet. Due to their size, most subbasins included all three flow types, with channel being the longest.

Sheet and shallow channel flow calculations were completed using the supplied spreadsheet with no deviations. For channel flow, Bentley FlowMaster software was used to apply Manning's equation for determination of flow velocity. Due to the extremely steep slopes present in many of the subbasins, the Manning's equation showed supercritical flow and extremely fast velocities, at over 20 feet per second. These velocities resulted in unreasonably short time of concentrations for natural flow paths. An iterative process was used by applying Jarrett's (1984) equation to determine the Manning's n-values in high gradient streams from the HEC-RAS manual. Jarrett's equation is the result of regression analysis of data from high gradient mountainous streams.

Studies conducted by the SCS have found that, for most cases, the subbasin lag time can be approximated as 60 percent of the calculated time of concentration. Thus, for this analysis, values have been calculated under that assumption. Reference Appendix A for exhibits of the watershed delineations and flow paths for time of concentration.

4.2.4 Meteorological Data

Rainfall intensity and depth was provided by National Oceanic and Atmospheric Administration Atlas 14 (NOAA14) partial duration point precipitation frequency estimate values for partial storm durations between 5 minutes and 24 hours. In accordance with TECH-010, the upper 90% confidence interval value from NOAA14 was used for the 100-year storm, rather than the mean value. In addition, the NOAA14 precipitation depths were increased by 15% to account for possible future changes to rainfall due to climate change. The NOAA14 mean value with no percentage increase was used for the 500-year value. A summary of the rainfall depths is provided in Table 1.

Table 1. Rainfall Depths

Scenario	Rainfall Depth (in)	
	Florida Canyon Wash	Medium Wash
100-yr, 3-hr Upper 90%	3.72	4.03
100-yr, 3-hr Upper 90% + 15%	4.27	4.64
500-yr, 3-hr Mean	4.23	4.59
100-yr, 24-hr Upper 90%	5.27	5.72
100-yr, 24-hr Upper 90% + 15%	6.06	6.57
500-yr, 24-hr Mean	5.90	6.40

Note: Rainfall depths presented here account for the area reduction factor.

These values were used for 100- and 500-year recurrence interval storm events. Within the HEC-HMS model, simulations were set up for the 3-hour and 24-hour storm events. The 3-hour event used the SCS Type II rainfall distribution, and the 24-hour event used the SCS Type I.

4.2.5 Hydrological Results

As noted in Section 4.2.4 the hydrologic model was run for both the 3- and 24-hour storm events. The 3-hour storm event had the dominating discharge, thus only results from the

3-hour event will be used in the hydraulics analysis. Table 2 provides the discharge values at the existing structure crossings under Madera Canyon Road and Figure 4 includes the subbasin peak discharges compared to the regional regression equations. Note that in Figure 4, the majority of the basins are near the upper standard limit for the regression equations. This difference is likely because the regression equations are based on historical streamflow data from gage data, while the modeling presented here represents possible future conditions of increased rainfall depths as a result of climate change. Table 3 shows the drainage areas for all project watersheds.

Table 2. Peak Discharge Results

Scenario	Peak Discharge (cubic feet per second, cfs)		
	Florida Canyon Wash	Medium Wash	Small Wash
100-yr, 3-hr Upper 90%	7,249	1,325	237
100-yr, 3-hr Upper 90% + 15%	9,083	1,608	290
100-yr, 24-hr Upper 90%	6,802	1,230	217
100-yr, 24-hr Upper 90% + 15%	8,400	1,474	262
100-yr Regression Lower 90% Prediction	2,100	655	111
100-yr Regression Upper 90% Prediction	8,290	2,780	799
500-yr, 3-hr Mean	8,928	1,424	285
500-yr, 24-hr Mean	8,067	1,584	253
500-yr Regression Lower 90% Prediction	3,660	1,130	180
500-yr Regression Upper 90% Prediction	14,500	4,460	1,300

Figure 4. Subbasin regional regression analysis

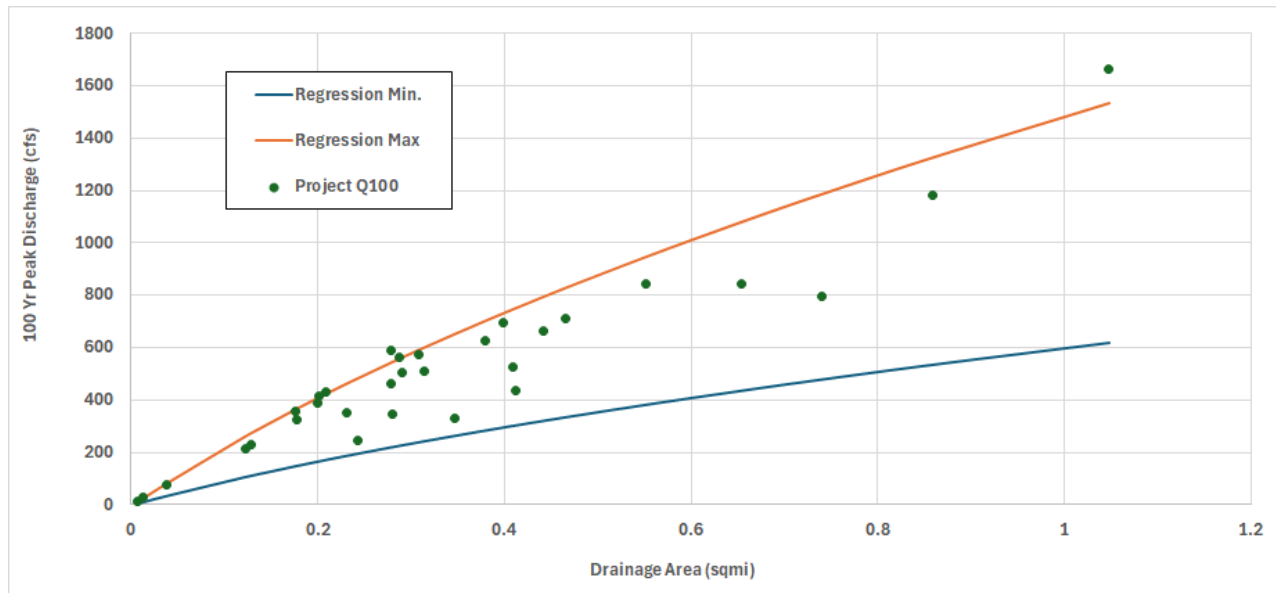


Table 3. Watershed Drainage Areas

Watershed	Drainage Area (mi ²)
Florida Canyon Wash	8.9
Medium Wash	1.4
Small Wash	0.2

4.3 Existing Conditions Hydraulics

A hydraulic assessment of the existing features within the project area was conducted to gain an understanding of the system's current hydraulic constraints and deficiencies. Specifically, the analysis was developed to evaluate the conveyance features for their ability to convey the 100-year recurrence interval storm event. All analyses were conducted using the Hydraulic Engineering Center's River Analysis System (HEC-RAS) software, version 6.6.

4.3.1 Evaluation Criteria

According to the 2012 "Guidelines for Establishing Scour and Freeboard for Bridges in Pima County" the design freeboard is dependent on the magnitude of the peak discharge. Florida Canyon Bridge shall have a minimum of 2 feet of freeboard above the 100-year water surface elevation (WSE), while Medium Wash Bridge shall have a minimum of 1 foot.

4.3.2 Manning's n-Values

Using aerial imagery, Manning's n-value land cover maps were hand drawn with the detail required to distinguish between the main channel, overbanks with different levels of vegetative cover density, and pavement. The Manning's n-value for these land cover classes were determined from photos collected during a field visit by HDR staff. Table 4 below lists the land cover classes and their associated Manning's n-value.

Table 4. Manning's n-values for hydraulic models

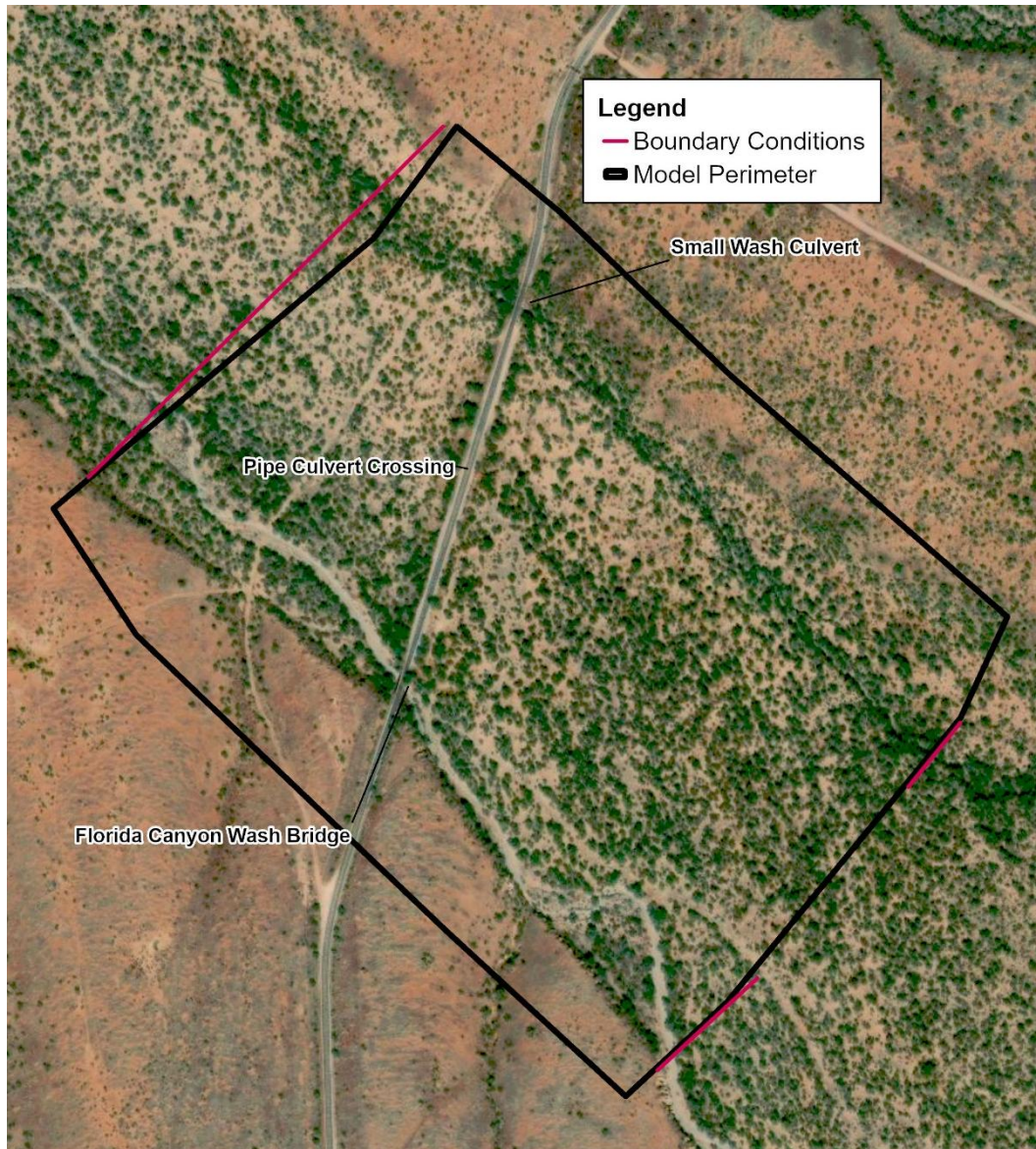
Land Cover	Manning's n
Channel	0.045
Pavement	0.020
Vegetation, Low	0.055
Vegetation, High	0.070

4.3.3 Florida Canyon Wash Bridge – Existing Conditions

Results of the two-dimensional (2D) HEC-RAS model for the Florida Canyon Wash Bridge indicate that both the bridge and the existing box culvert at Small Wash operate in

tandem to convey flows beneath the roadway. This is due to the low elevation of the right overbank (looking downstream) of the approach channel to the bridge which results in a flow split upstream. Additionally, the alignment of the roadway contains a vertical sump between the two structures which results in overtopping of the roadway during large storm events (50-year). The model includes inflows from both Florida Canyon Wash and Small Wash. An overview of the 2D model domain is shown in Figure 4.

Figure 4. Florida Canyon Wash 2D Model Domain



The existing bridge and culvert geometry were modeled based on record drawings and other available data. All structures were modeled as clear and free of debris. The bulking factor of 15% applied to the 100-year rainfall is conservative and accounts for debris and other flow anomalies. The hydraulics analysis resulted in pressurization of the Florida Canyon Wash Bridge with a large portion of flow splitting off upstream of the bridge and into the left overbanks, indicating 4,676 cfs drains through the bridge with the remainder either overtopping the alignment or draining through the existing Small Wash RCBC.

These results agree with the past analysis of the crossing conducted in 2003. The previous analysis indicates only a small amount of flow (<100cfs) bifurcates into the Small Wash RCBC crossing due to the sump in the roadway elevation between the two crossings conveying the majority of the flow as roadway overtopping. A map of the flow depth from the 2D model is presented in Figure 5. Additional full-size maps of model results are available in Appendix A.

Figure 5. 100-year Florida Canyon Wash Flow Depth (Existing Conditions)

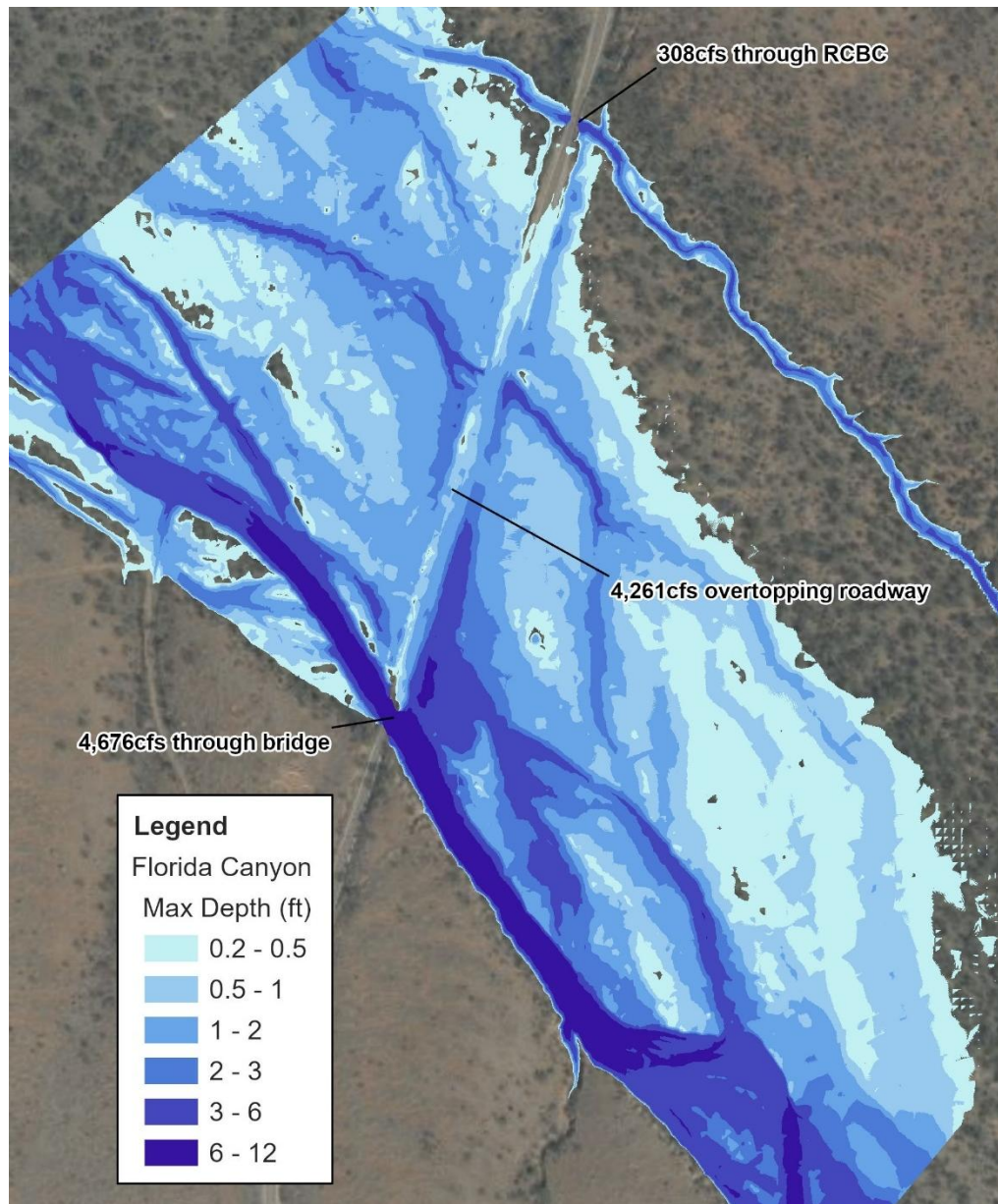


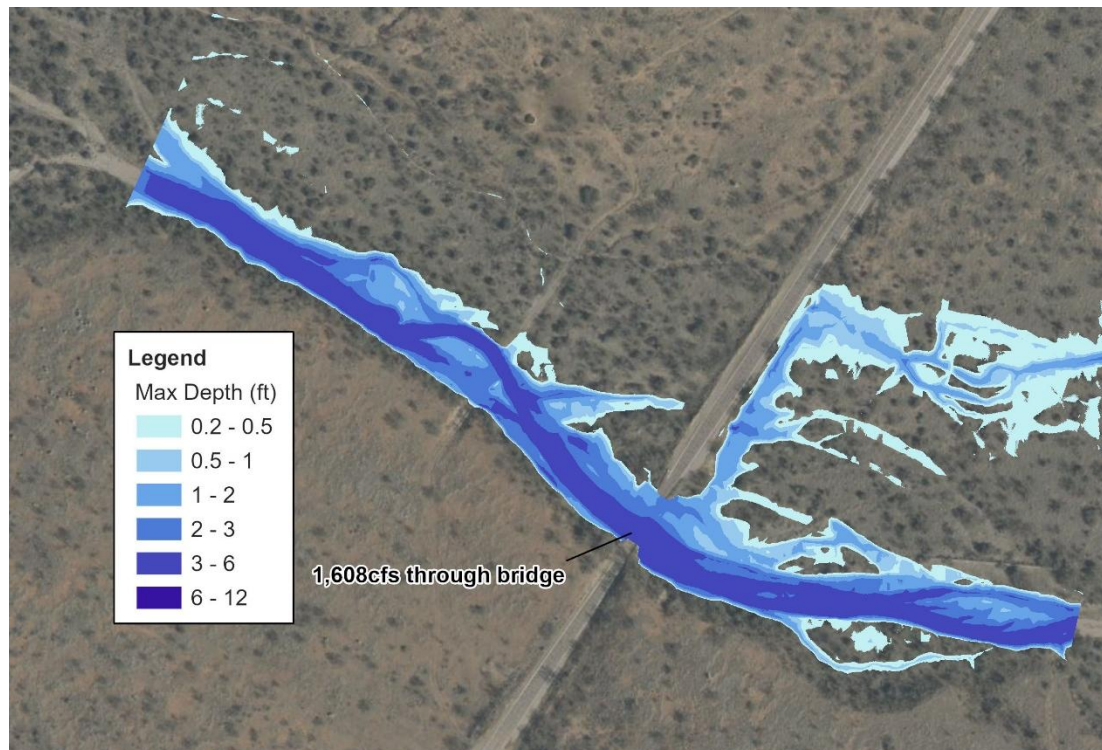
Figure 5 highlights the necessary designation of this model as multiple opening analysis. The model indicates that in existing conditions 4,676 cfs of flow is conveyed through the existing Florida Canyon Wash Bridge, 308 cfs passes through the Small Wash RCBC, and 4,261 cfs overtops the roadway between the two crossings. The length of overtopping over the roadway is approximately 800 feet at an average depth of 0.9 feet.

The total distance along Madera Canyon Road between the existing Florida Canyon Wash Bridge and the small wash RCBC is approximately 1100 feet.

4.3.4 Medium Wash Bridge – Existing Conditions

Preliminary results for the Medium Wash Bridge indicate the bridge has adequate capacity for the design flows. For the 100-year event, the existing bridge conveys the full peak discharge with approximately 4 feet of freeboard with a flow velocity of 10.5 feet per second within the bridge opening. Figure 6 provides a flow depth map from the 2D model. Additional full-size maps of model results are available in Appendix A.

Figure 6. 100-year Medium Wash Flow Depth (Existing Condition)



4.4 Florida Canyon Wash Bridge – Proposed Conditions

HDR modeled two bridge alternatives for the Florida Canyon Wash Bridge during the Initial Project Assessment phase of the project. Alternative 1 is a single-span Utah Bulb Tee (UBT) girder bridge with a single 100'-0" span between centerlines of bearing at each abutment, which produces a total bridge length of 109'-11" back-to-back of abutments. Alternative 1 has a superstructure depth of 5'-2". Alternative 2 is a three-span superbox bridge that consists of two 31'-3" end spans and one 37'-6" interior span. This produces a total bridge length of 102'-10" back-to-back of abutments and a superstructure depth of 1'-6". To mitigate scour, cutoff walls would extend along the upstream and downstream edges of the bottom slab. The modeling of these alternatives was accomplished using the terrain modification tools within HEC-RAS. The modification tools allow the placement of piers, roadway, and abutments into the terrain with a high level of detail. Both alternatives were modeled with a 45-degree skew to match the angle of the wash to Madera Canyon Road.

Tables 5 and 6 highlight the hydraulic modeling results for the existing and proposed bridges. Note that the 100-year flows are based on the 90th percentile rainfall plus 15 percent, while the 500-year flows are based on mean rainfall values. This causes the 100-year flows to be of a similar magnitude to the 500-year flows. Alternative 2 has higher capacity compared to Alternative 1. The reduction in capacity in Alternative 1 is due to the sloping abutment protection that extends partially into the main channel on the northern abutment.

Table 5. Florida Canyon Wash Bridge 100-year Hydraulic Results

100-Year Design Storm Hydraulics					
Bridge Types	Design Discharge	Flow through Bridge	High Water Elevation	Bridge Velocity	Freeboard
Existing Bridge	9,083 cfs	4,676 cfs	3,675.5 ft	17.0 fps	0 ft
Alt 1 - Single-Span UBT Girder	9,083 cfs	6,178 cfs	3,674.7 ft	14.2 fps	1.8 ft ±
Alt 2 – Three-Span Concrete Superbox	9,083 cfs	6,253 cfs	3675.6 ft	14.9 fps	3.5 ft ±

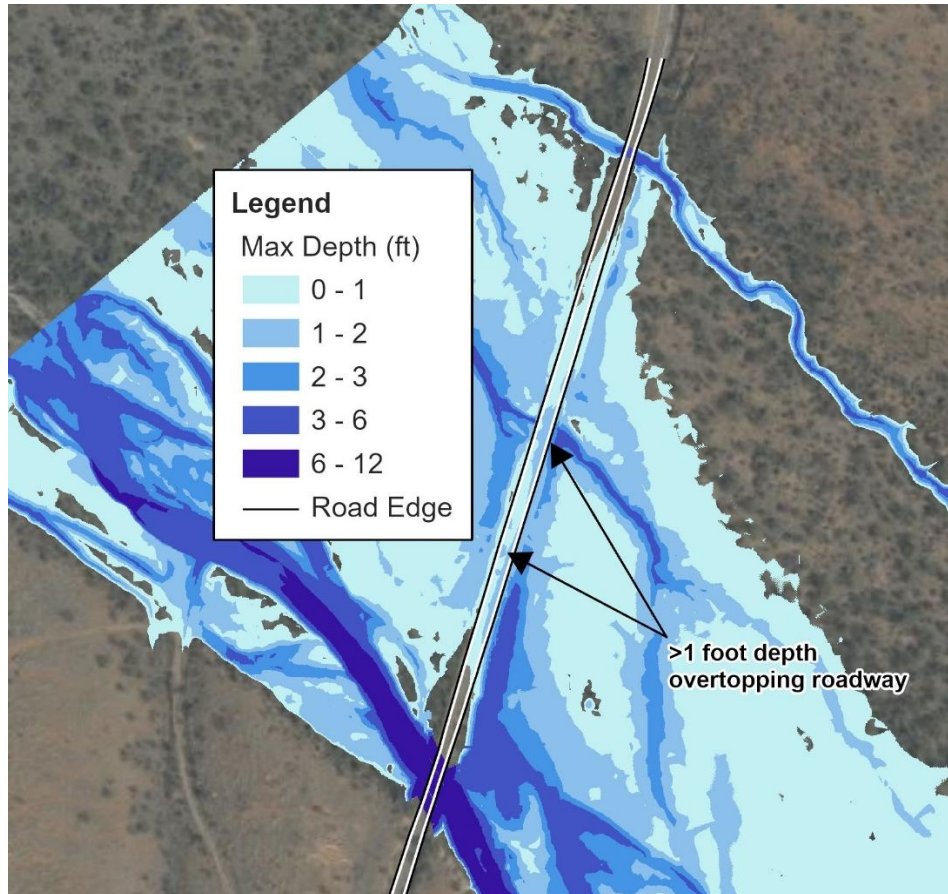
Table 6. Florida Canyon Wash Bridge 500-year Hydraulic Results

500-Year Design Storm Hydraulics					
Bridge Types	Design Discharge	Flow through Bridge	High Water Elevation	Bridge Velocity	Freeboard
Existing Bridge	8,928 cfs	4,693 cfs	3,675.6 ft	17.1 fps	0 ft
Alt 1 - Single-Span UBT Girder	8,928 cfs	6,215 cfs	3,674.7 ft	14.1 fps	1.8 ft ±
Alt 2 – Three-Span Concrete Superbox	8,928 cfs	6,290 cfs	3,675.6 ft	14.9 fps	3.5 ft ±

As discussed in Section 4.3.3, the roadway overtopping north along Madera Canyon Road is present in all modeled bridge alternatives. The extent and maximum depth of

overtopping for the two alternatives is similar. The overtopping occurs over approximately 700 feet with an average depth of 0.8 feet and a maximum depth of 1.3 feet. The average depth of overtopping for Alternative 2 is slightly deeper. Figure 7 shows the locations of flow depths greater than one foot for Alternative 2. Full size maps of the hydraulic modeling results of flow depth and velocities are available in Appendix A.

Figure 7. 100-year Florida Canyon Overtopping Flow Depths >1' (Alt. 2)



Options to completely prevent overtopping of the roadway were examined. Extending the bridge further north did not divert significant flow away from overtopping the roadway. The existing terrain slopes to the north, away from the bridge opening and does not provide a channeling effect that would force more water through a wider bridge opening. Therefore, extending the bridge is not a cost-effective solution.

Additionally, HDR evaluated raising the entire roadway from Florida Canyon to the Small Wash crossing. However, this option would extend the project limits beyond their current boundaries and would increase project cost significantly. Additional right-of-way would likely be required to accommodate the raised roadway. Raising the roadway would also force a large amount of flow towards Small Wash. In the existing condition, the Small Wash RCBC has adequate capacity to convey flows. If the roadway were raised, the size of the Small Wash RCBC would need to be increased, and/or multiple culverts between the Florida Canyon Wash Bridge and the Small Wash crossing would need to be installed to pass flows underneath the raised roadway.

Scour analysis of Alternative 1 was completed using the Federal Highway Administration's Hydraulic Toolbox version 5.4 which utilizes Hydraulic Engineering Circular (HEC) 18 and HEC 23 methodologies and equations. The data required for the analysis was extracted using profile lines within HEC-RAS and then averaged in a spreadsheet. See Table 7 for preliminary estimate of the contraction and abutment scour for the 100- and 500-year storm events.

Table 7. Florida Canyon Wash Bridge Scour Analysis Results

Alternative 1: Single-span UBT Girder		
Return Interval	Contraction Scour Depth (ft)	Abutment Scour Depth (ft)
100-year	0	1.4
500-year	0	3.3

The implementation of the HEC-23 scour analysis for Alternative 1 is inherently subjective due to the manual placement of profile lines used to extract input data. Multiple locations of the cross-sections were tested but none resulted in any non-zero contraction scour depths. The mapped results from the hydraulic model agree with this, as much of the flow in the overbanks is conveyed northward, overtopping the roadway rather than contracting into the bridge opening. The portion of flow that is contracted into the bridge opening from the right overbank is what causes the abutment scour depths shown. The abutments will require protection that is outlined by the FHWA for abutment protection with deep foundations. The protection is composed of riprap along the abutment slope that extends beneath the surface at a 2:1 slope until the design scour depth is reached, then extends horizontally outwards at a length equal to the design flow depth. Design Guideline 14 from HEC-23 was applied to determine the required riprap size for the abutment protection. This method is based on the average velocity and depth inside the bridge. The analysis found that the median stone size of 3 feet is required due to high velocities within the bridge.

Scour analysis for Alternative 2 does not follow the same procedure as outlined above due to the concrete slab below the bridge that limits the maximum amount of scour within the bridge. The scour analysis for the structure considers potential scour which could form on the downstream side of the superbox if the soil cover atop the concrete slab within the bridge has been eroded and a perched flow condition formed at the superbox outlet. This analysis supports the design of the cutoff wall depth required at the end of the concrete slab. The analysis was conducted using the Veronese equation for scour at grade-control structures as described in SSCAFCA Sediment and Erosion Design Guide (2008). Although the site does not currently exhibit a perched condition, multiple potential outlet drops for the superbox were analyzed to assess their impact on downstream scour. Results indicate that if a half foot drop in head formed at the outlet of the superbox, there would be potential for 3 feet of scour and at a 2-foot drop, the potential scour depth reaches 7 feet. In Arizona, superbox installations typically incorporate cutoff walls with a maximum height of 6 feet. It is recommended that 6-feet-deep cutoff walls be constructed along the upstream and downstream edges of the structure with the top surface of the bottom slab of the superbox placed 2 to 3 feet below the existing thalweg elevation. This will place the cutoff walls 8 to 9 feet below the existing thalweg elevation. In addition, it is recommended that a 6-inch-thick by 10-foot-wide concrete apron be

constructed along the downstream (outlet) side of the superbox bridge to further protect against scour.

4.5 Medium Wash Bridge – Proposed Conditions

As noted in section 4.3.4, the existing bridge is capable of conveying the full flow of Medium Wash. This hydraulics analysis follows the same procedure outlined in the previous section for the Florida Canyon Wash Bridge. Two alternatives were evaluated that matched the Florida Canyon alternatives but without the bridge being skewed to the flow. Table 8 and Table 9 highlight the hydraulics results for the existing and proposed bridges modeled.

Table 8. Medium Wash Bridge Hydraulic Results

100-Year Design Storm Hydraulics				
Bridge Types	Design Discharge	High Water Elevation	Bridge Velocity	Freeboard
Existing Bridge	1,608 cfs	3,660.3 ft	9.6 fps	4.7 ft ±
Alt 1 - Single-Span UBT Girder	1,608 cfs	3,659.8 ft	10.6 fps	2.5 ft ±
Alt 2 – Three-Span Concrete Superbox	1,608 cfs	3,659.9 ft	10.4 fps	6.7 ft ±

Table 9. Medium Wash Bridge 500-year Hydraulic Results

500-Year Design Storm Hydraulics				
Bridge Types	Design Discharge	High Water Elevation	Bridge Velocity	Freeboard
Existing Bridge	1,424 cfs	3,660.3 ft	8.2 fps	4.7 ft ±
Alt 1 - Single-Span UBT Girder	1,424 cfs	3,659.6 ft	10.5 fps	2.7 ft ±
Alt 2 – Three-Span Concrete Superbox	1,424 cfs	3,659.6 ft	9.7 fps	7.0 ft ±

The same procedure for scour was also followed for the Medium Wash Bridge with the results for Alternative 1 shown in Table 110.

Table 10. Medium Wash Bridge Scour Analysis Results

Alternative 1: Single-span UBT Girder		
Return Interval	Contraction Scour Depth (ft)	Abutment Scour Depth (ft)
100-year	1.7	3.3
500-year	1.7	3.7

The southern abutment in Alternative 1 extends into the main channel and occupies a portion of the existing condition main channel flow path which causes a restriction of flow within the main channel that is transporting sediment. This results in a non-zero value for contraction scour in Alternative 1 at Medium Wash, unlike Alternative 1 for Florida Canyon Wash, which had no contraction scour. Alternative 1 will require the same abutment riprap protection on the north and south abutments that was outlined for Florida Canyon. The required median riprap size for this alternative was found to be 1.3 feet, or 16 inches.

Scour analysis for Alternative 2 found that if a perched flow condition forms at the superbox outlet, the scour depths range from 1.5 feet of scour if the outlet is perched 0.5 feet above the downstream channel, and up to 3.5 feet if the outlet is perched 2 feet above. Similar to Florida Canyon, if a superbox is selected, the top surface of the bottom slab should be placed 2 to 3 feet below the existing thalweg elevation and 6-foot-deep cutoff walls 8 to 9 feet below the existing thalweg elevation. In addition, it is recommended that a 6-inch-thick by 10-foot-wide concrete apron be constructed along the downstream (outlet) side of the superbox bridge to further protect against scour.

4.6 Bridge Deck Drainage

The Pima County Roadway Design Manual, Fourth Edition, requires all traffic lanes on the bridge deck to be free of ponding or flowing water during the 10-year storm event. The proposed roadway section for Florida Canyon Wash and Medium Wash consists of two 11-foot lanes, each with a 6-foot shoulder. The proposed longitudinal slopes along the proposed bridges are 5.3 percent and 2.8 percent, for Florida Canyon Wash and Medium Wash, respectively.

Onsite peak discharges were calculated for the 10-year storm using the Pima County Flood Control District's web interface for determining peak flows, PC-Hydro, and roadway spread was calculated using Bentley Flowmaster, version 10.03. Calculations were performed assuming no deck drainage. See Appendix C and Appendix D for PC-Hydro and Flowmaster calculations. Table 11 shows the results from the analysis, including the calculated onsite flows from PC-Hydro and the expected spread, as measured from the edge of roadway. The spread values for both bridges are less than the width of the 6-foot shoulder. Therefore, it is not necessary to include deck drainage with the proposed bridges to meet allowable spread requirements.

Table 11. Bridge Deck Drainage Analysis Results

Location	10-year Roadway Peak Discharge (cfs)	Roadway Spread (ft)
Florida Canyon Wash Crossing	0.6	4.4
Medium Wash Crossing	0.5	4.6

4.7 Proposed Culvert and Riprap Layout

Due to the roadway fill and grading, the 3 span superbox Alternative 2 will include wingwalls at all four corners for both Florida Canyon Wash and Medium Wash. The high-shear differential between concrete and soil can cause erosion over time. Riprap should be included at the soil-concrete interface at the bridge wingwalls for Alternative 2. A D_{50} of 6 inches is adequate to protect the slopes behind the wingwalls, and a D_{50} of 12 inches should be used in front of the wingwalls. Additionally, the toe of the northeastern roadway fill at Florida Canyon Wash should be protected from flows in the ditch parallel to the roadway with six-inch riprap. Calculations for sizing the Florida Canyon Wash ditch riprap can be found in the appendix.

In both existing and proposed conditions at Medium Wash, flow originating from a small basin north of the Medium Wash bridge accumulates along the northeast edge of the roadway fill. A portion of the flow is drained by the existing 36-inch culvert north of Medium Wash. Due to the wider roadway in the proposed condition, the existing 62-foot CMP culvert will be replaced with a longer 84-foot, 36-inch culvert. 100- and 500-year hydrographs for the basin were determined using PC-Hydro. Both the basin boundary and longest flow path were delineated using the watershed tools in HEC-HMS. Lengths, slopes, and elevations were determined in ArcGIS Pro. The printouts from PC-Hydro can be found in Appendix C. The output hydrographs were added as a boundary condition in the Medium Wash HEC-RAS model to analyze the hydraulic performance of the 36-inch culvert. The capacity of the culvert ranges from 27 to 40 cfs, depending on the headwater elevation. An outlet riprap apron for the culvert was designed using Equation 10.4 from the Federal Highway Administration's HEC-14 to dissipate energy at the outlet of the culvert. A minimum of a 12-foot-long apron with a 6-inch D_{50} is required to dissipate the highest velocities expected.

The flow not drained by the 36-inch culvert is drained by a ditch along the northeast edge of the roadway fill. This flow risks scouring and undermining the toe of the fill. It is recommended that the proposed design includes a continuous seven-foot-wide riprap apron to protect the fill from being undermined.

5 Summary

Based on the results presented in this Draft Final PS&E Phase Drainage Report, the Medium Wash bridge conveys the full 100-year flow and meets freeboard requirements in proposed conditions for Alternatives 1 and 2. The sloping abutment protection of the single-span Alternative 1 protrudes partially into the main flow path (thalweg) within the bridge opening, exposing it to increased risk of scour along the toe. The 3-span superbox Alternative 2 has improved performance compared to Alternative 1 since there would be

no abutment protection required within the bridge opening. The pier walls of the superbox are located within the existing channel and therefore have the potential for debris accumulation, which could reduce the flow capacity within the bridge. Debris accumulation on the pier walls was not included in the model at this time, as the rainfall factor of 15% accounts for debris.

The Florida Canyon Wash Bridge has complex flow paths upstream of the crossing that result in nearly a 50% flow split through the bridge and overtopping of the roadway north of the bridge crossing. Multiple bridge opening lengths were examined to determine if a single opening could prevent flow overtopping the roadway. Results indicated a significant bridge and/or roadway re-configuration would be required, which was determined to not be economically feasible. The two alternatives for Florida Canyon presented in this report have improved capacity compared to existing but still allow a large portion of flow to overtop the roadway. The maximum depth of overtopping is greater than 1 foot at the location of the lowest elevation of the roadway, but the average depth of overtopping is less than 1 foot. Alternative 1 has a reduced hydraulic performance due to the sloping abutment protection protruding into the channel. Due to the reduction in hydraulic capacity and the deeper superstructure, Alternative 1 for Florida Canyon Wash does not meet freeboard requirements.

The chosen recommendation to move forward with is Alternative 2 for both Florida Canyon and Medium Wash, as the 3-span superbox meets the freeboard requirements for all design storms and has improved hydraulic performance compared to Alternative 1. It is recommended to protect all superbox wingwalls with riprap to avoid erosion arising from the shear differential between soil and concrete. The northeast toe of roadway fill at Florida Canyon should be protected from flows overtopping the road. At Medium Wash, the toe of the roadway fill should be protected from backwater flows with riprap.

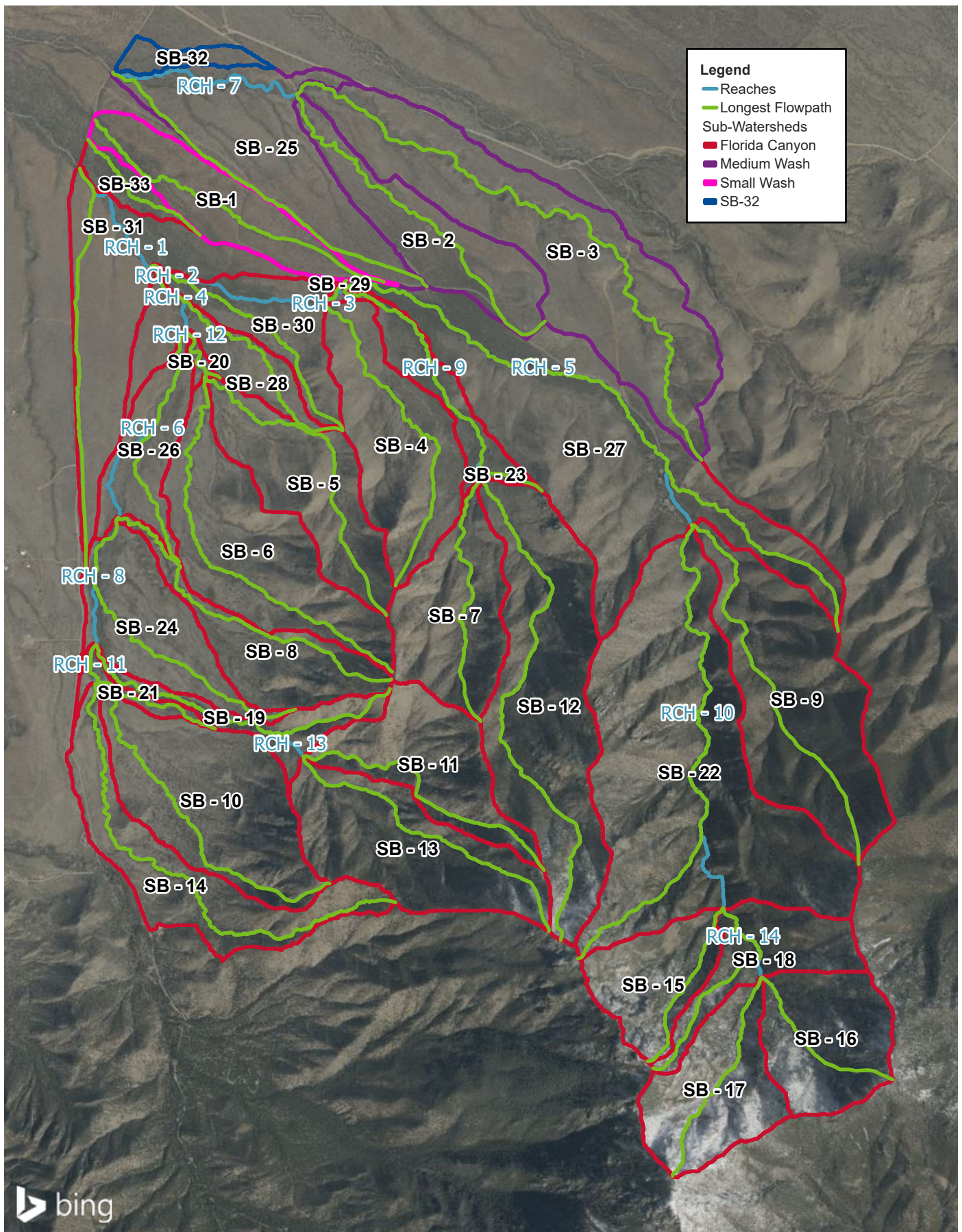


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Appendix A. Exhibits

Sub-Watershed Figures



bing

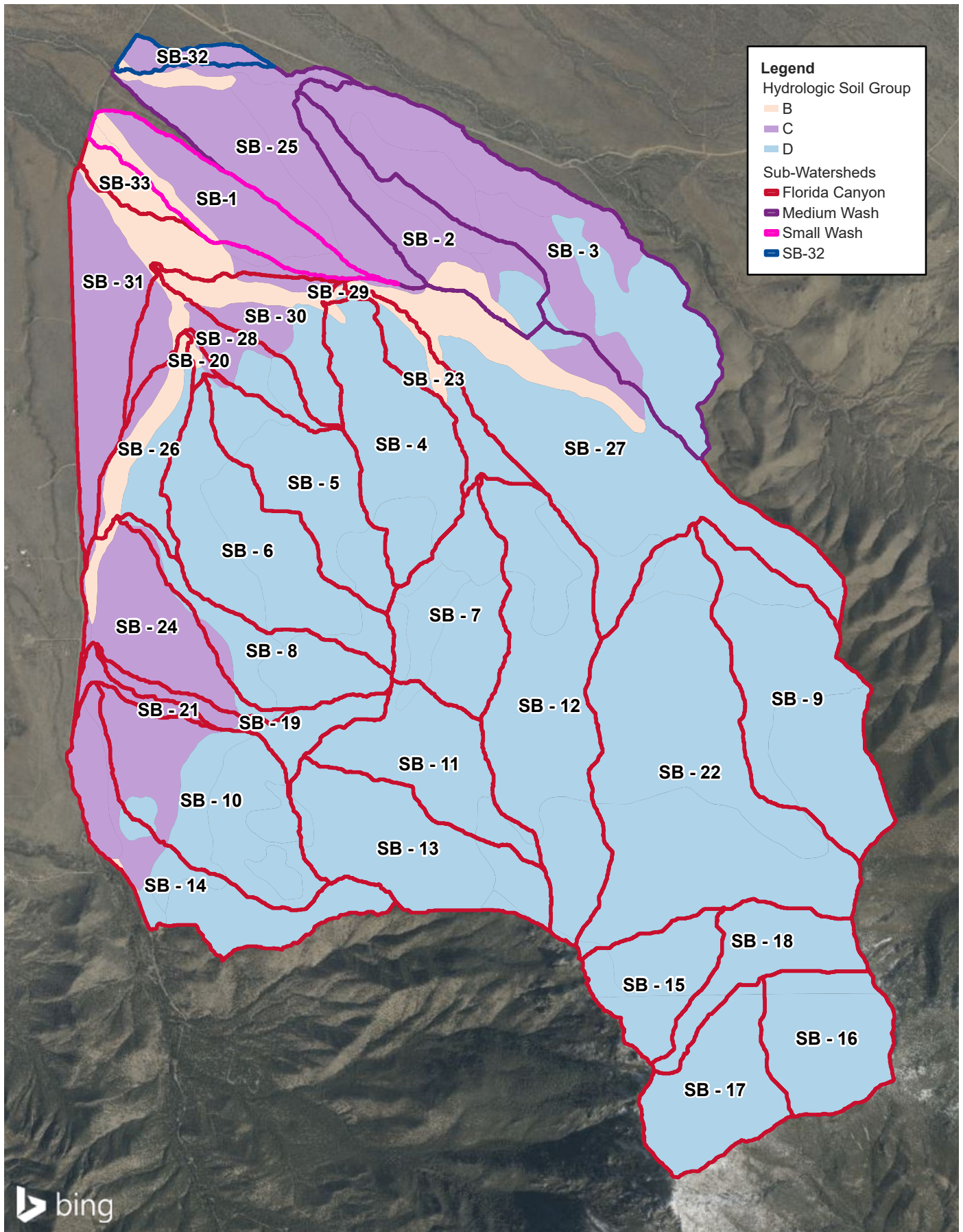
HR

0 0.4 mi



WATERSHED MAP

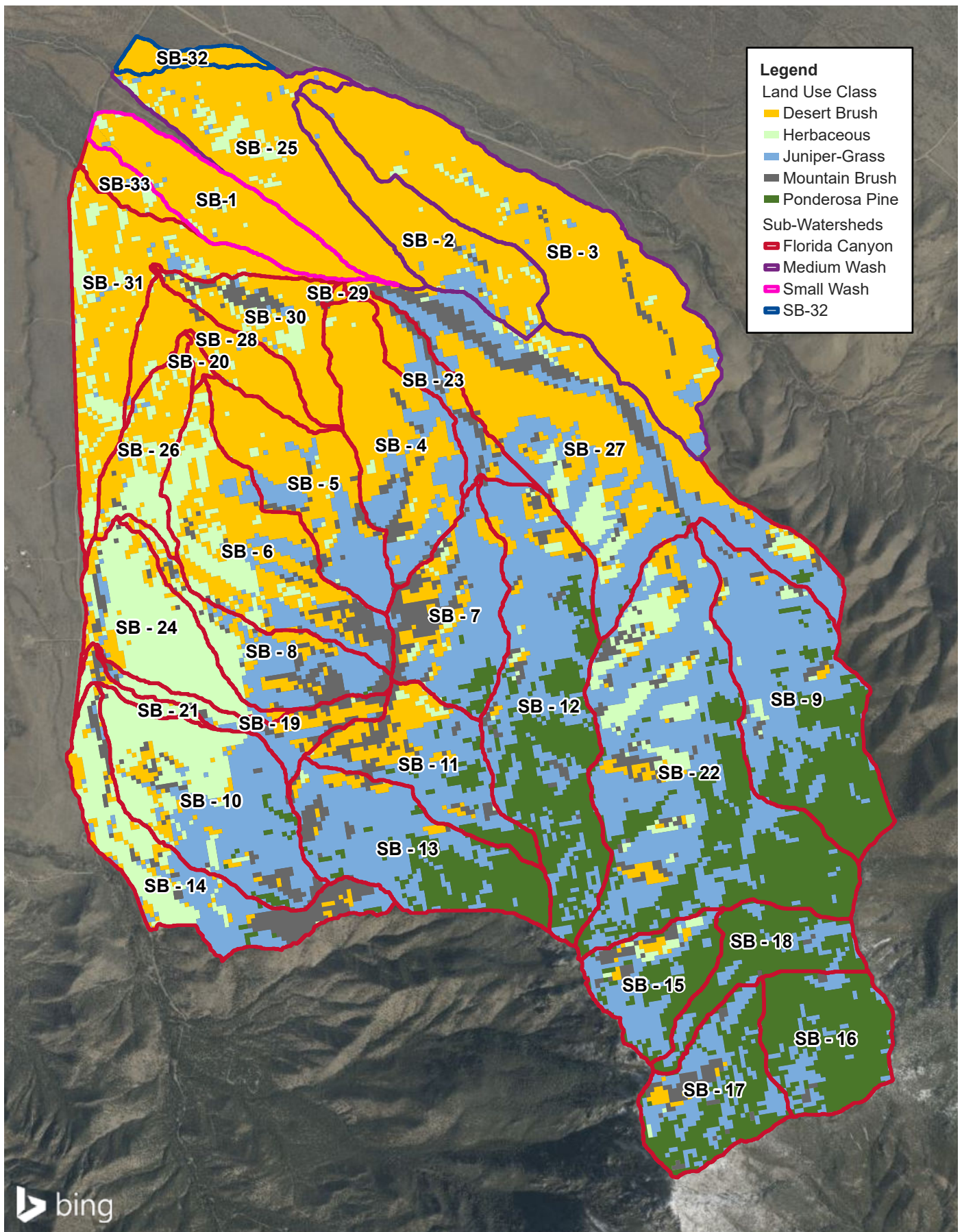
MADERA CANYON ROAD BRIDGE REPLACEMENT



0 0.4 mi



SOILS MAP

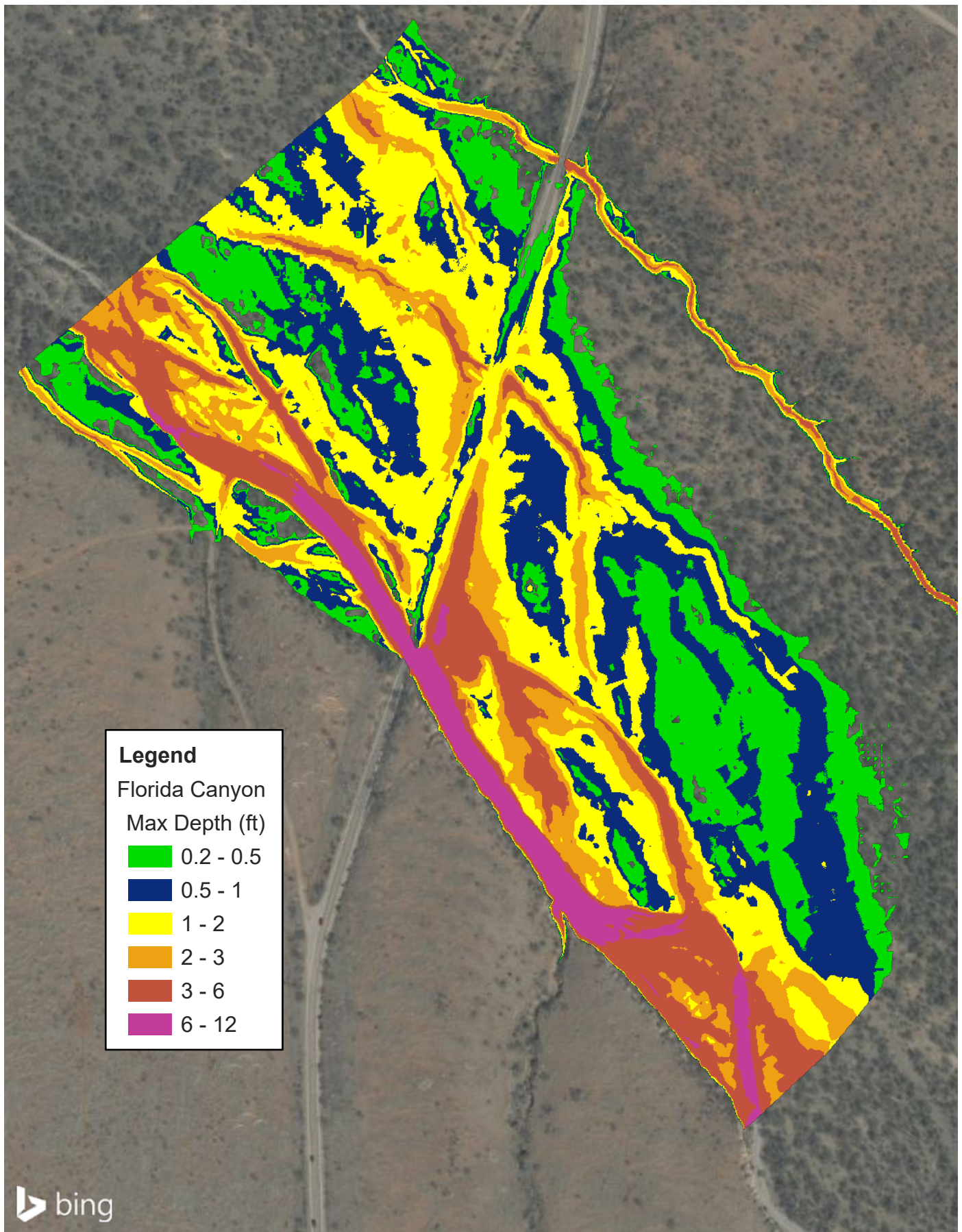


0 0.4 mi



LAND USE MAP

HEC-RAS Results Figures



Legend

Florida Canyon
Max Depth (ft)

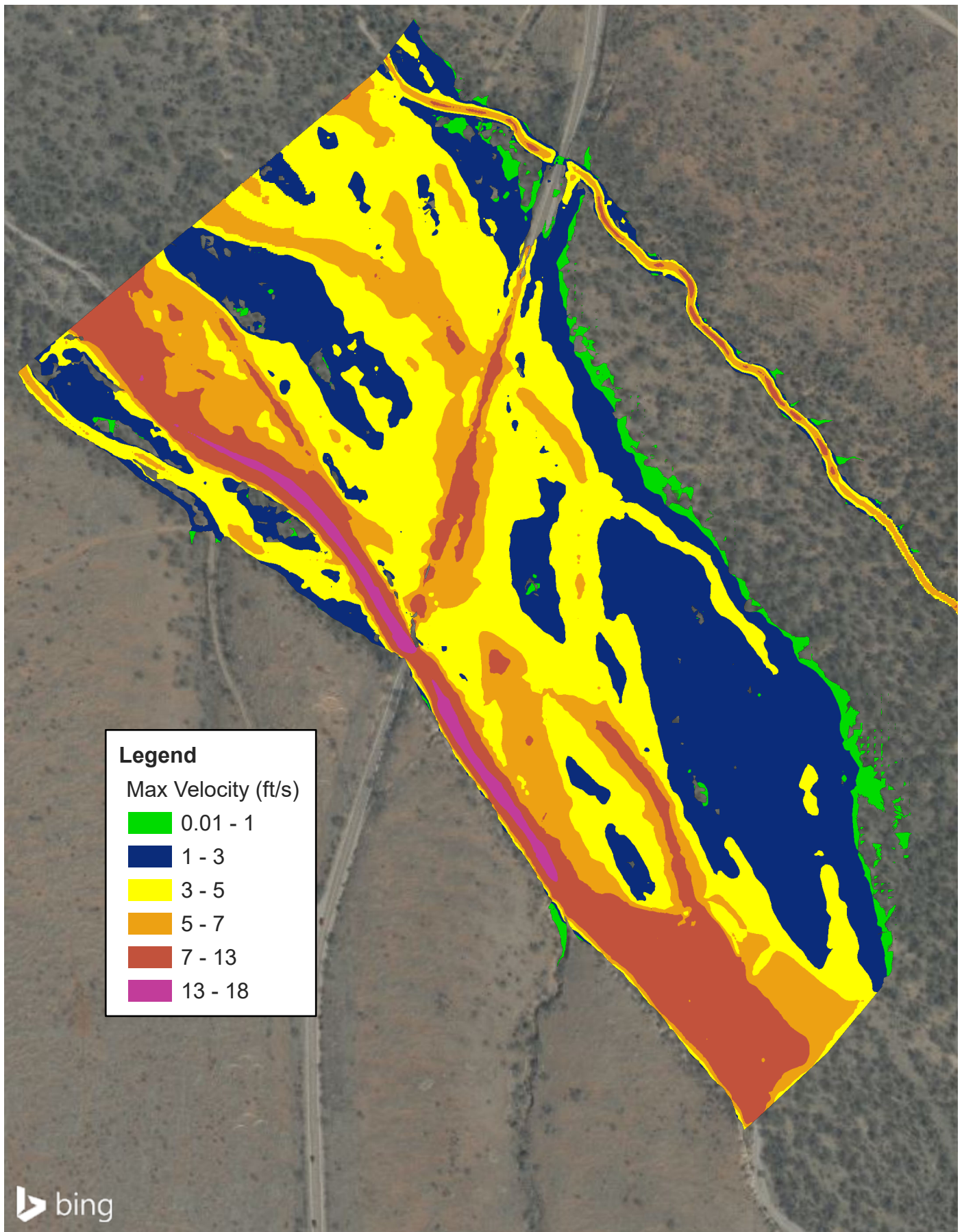
- 0.2 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 6
- 6 - 12



0 0.1 mi

**FLORIDA CANYON
EXISTING 100-YR DEPTH MAP**

MADERA CANYON ROAD BRIDGE REPLACEMENT



Legend

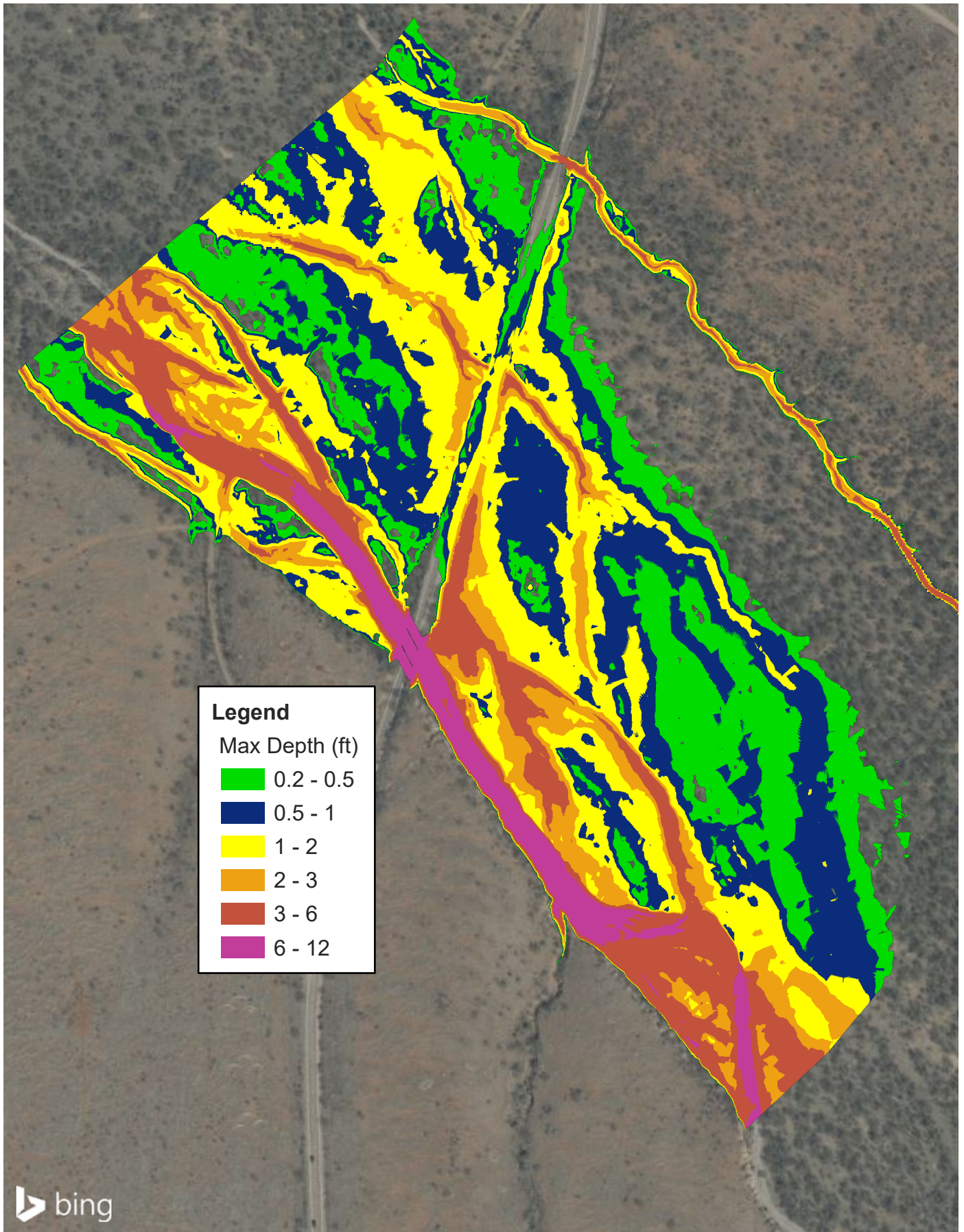
Max Velocity (ft/s)

0.01 - 1
1 - 3
3 - 5
5 - 7
7 - 13
13 - 18



**FLORIDA CANYON
EXISTING 100-YR VELOCITY MAP**

MADERA CANYON ROAD BRIDGE REPLACEMENT

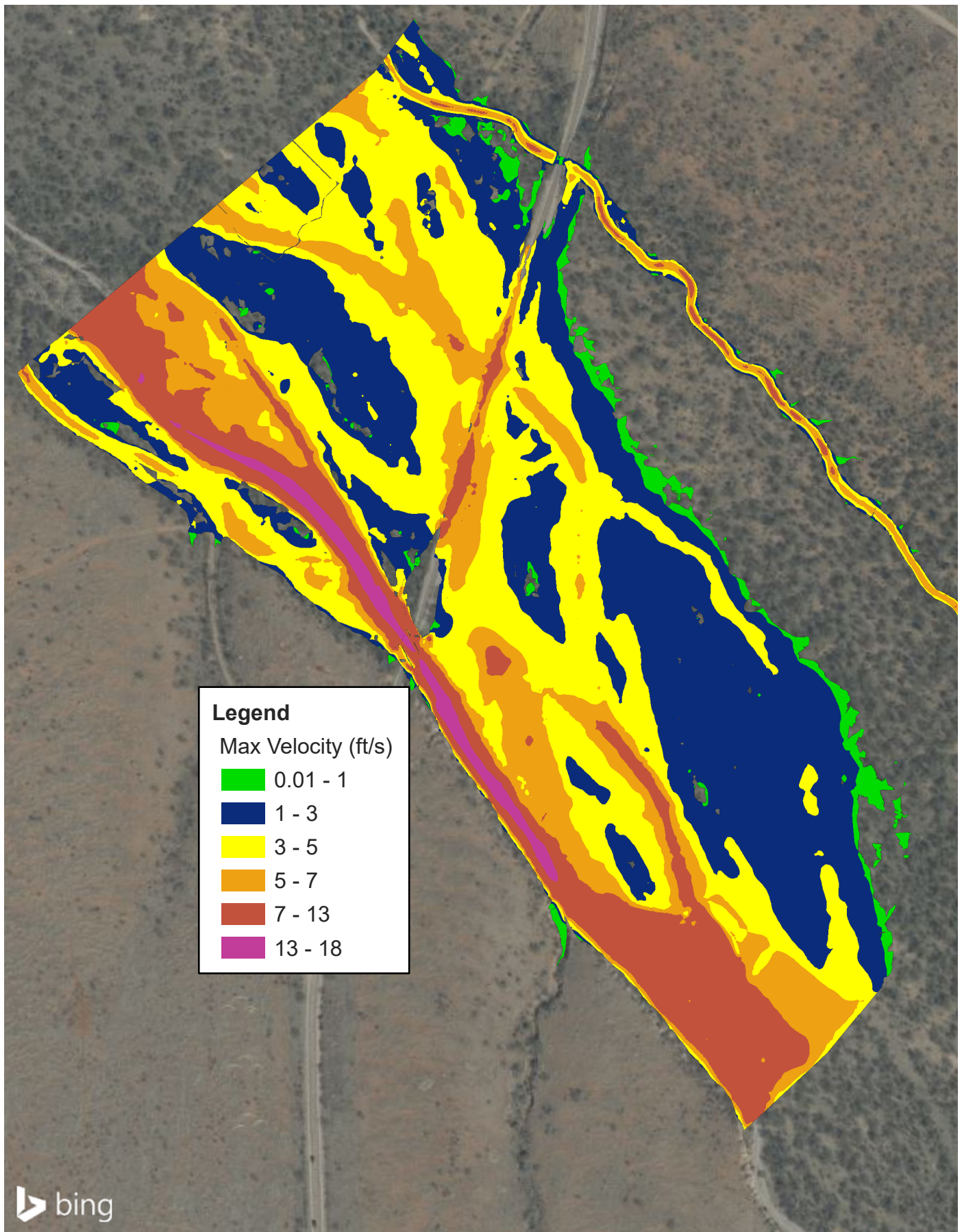


0 0.1 mi



FLORIDA CANYON
ALT: 2 SUPERBOX 100-YR DEPTH MAP

MADERA CANYON ROAD BRIDGE REPLACEMENT

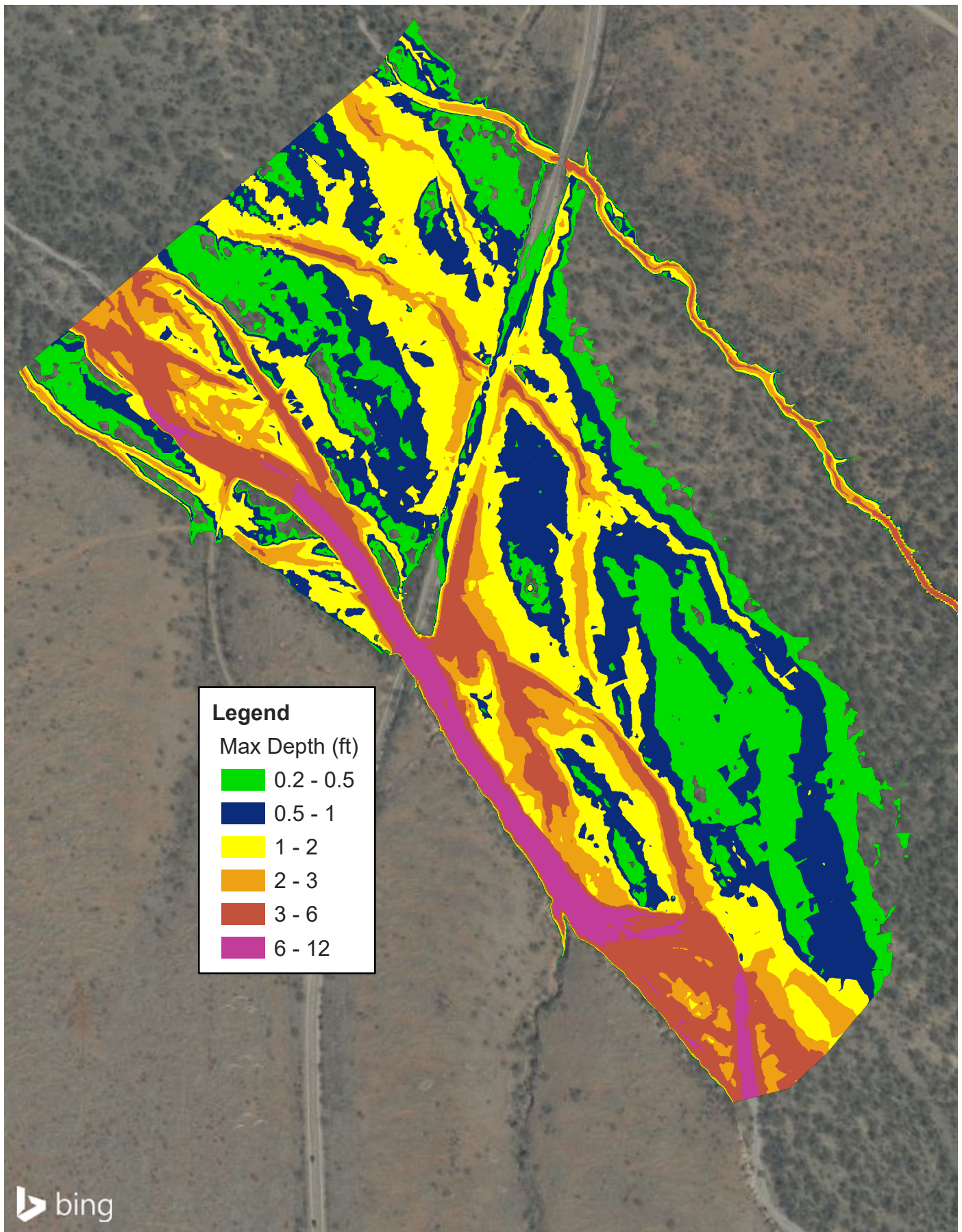


0 0.1 mi



FLORIDA CANYON
ALT: 2 SUPERBOX 100-YR VELOCITY MAP

MADERA CANYON ROAD BRIDGE REPLACEMENT

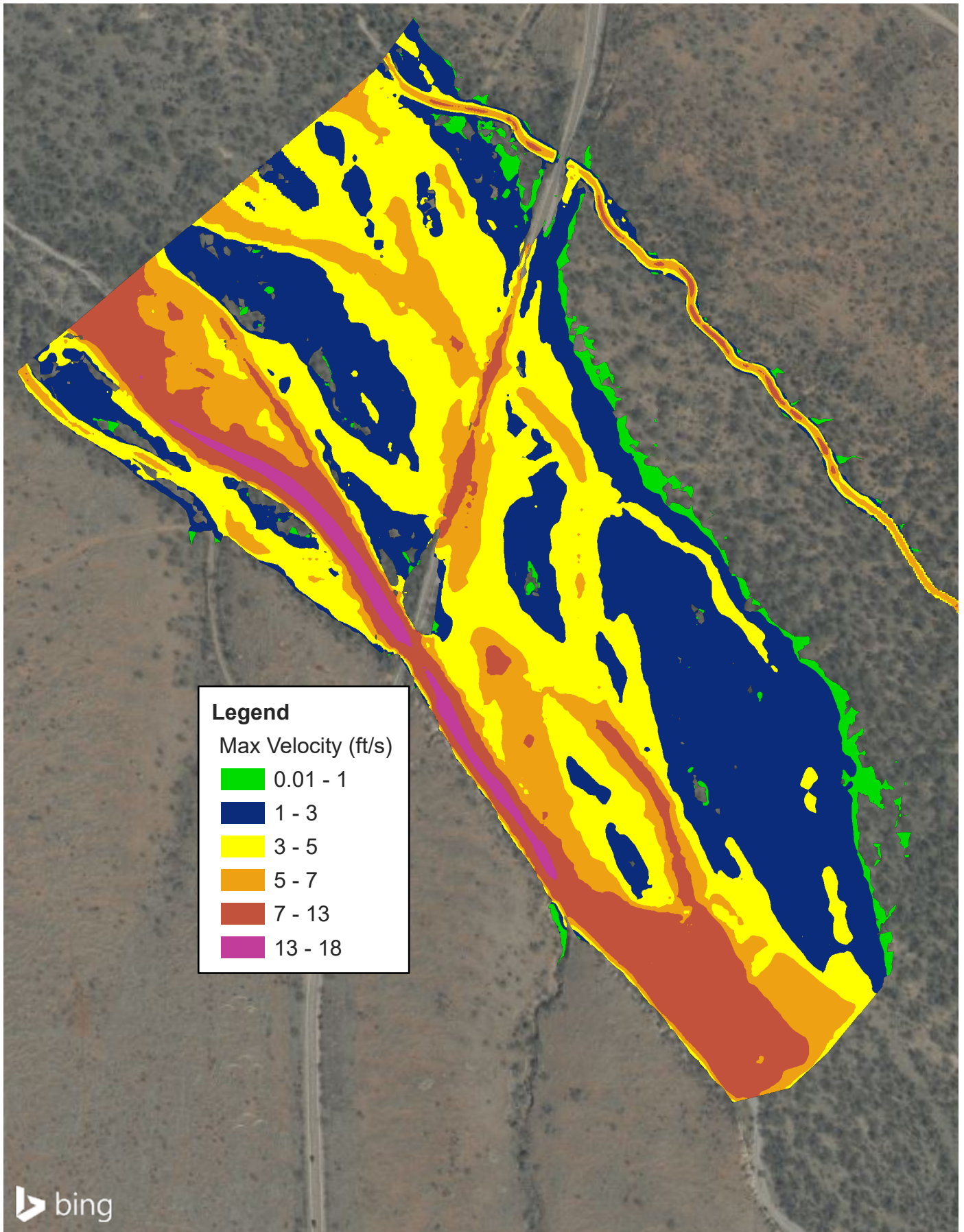


0 0.1 mi



FLORIDA CANYON
ALT: 1 UBT GIRDER 100-YR DEPTH MAP

MADERA CANYON ROAD BRIDGE REPLACEMENT

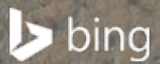
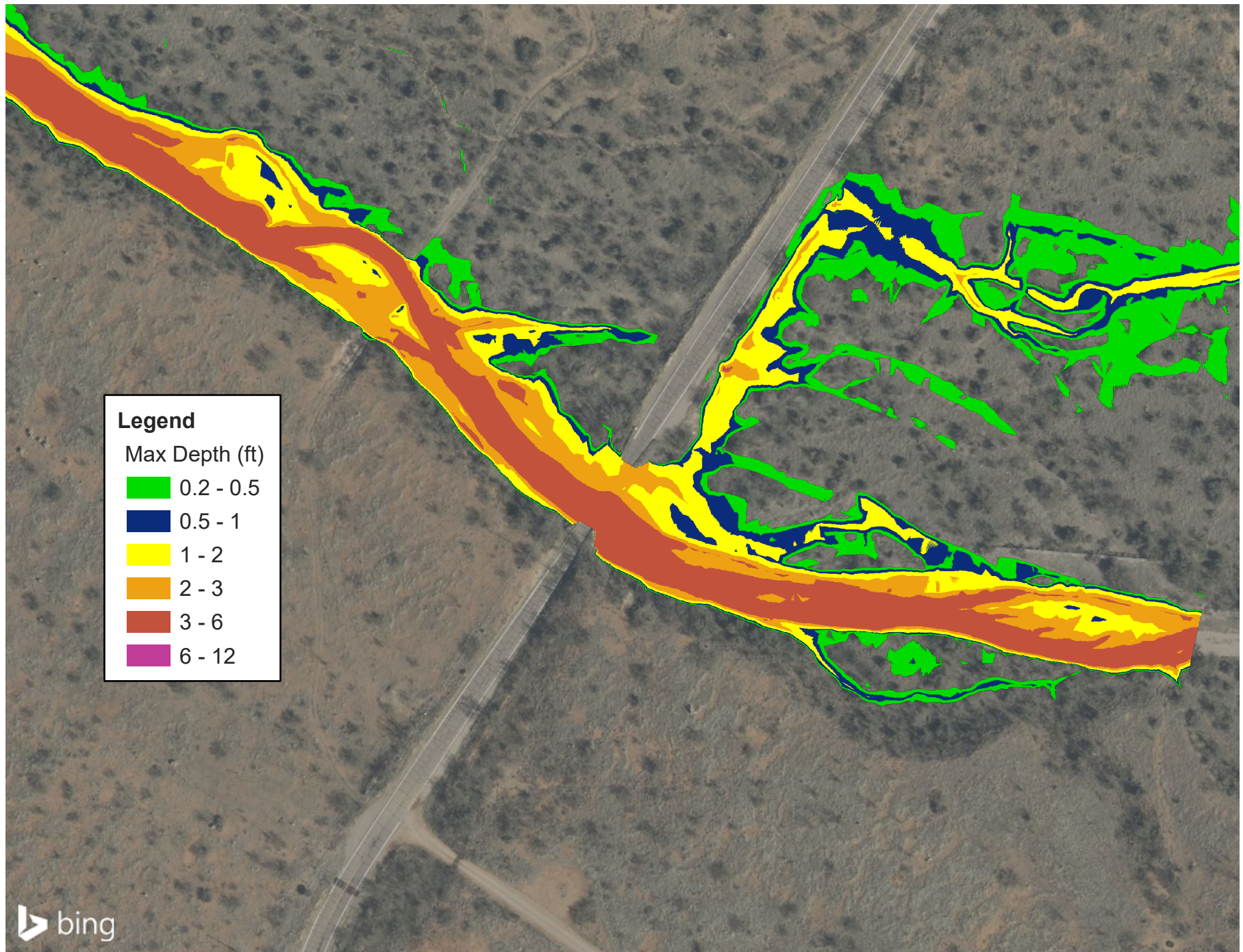


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FLORIDA CANYON
ALT: 1 UBT GIRDER 100-YR VELOCITY MAP

MADERA CANYON ROAD BRIDGE REPLACEMENT

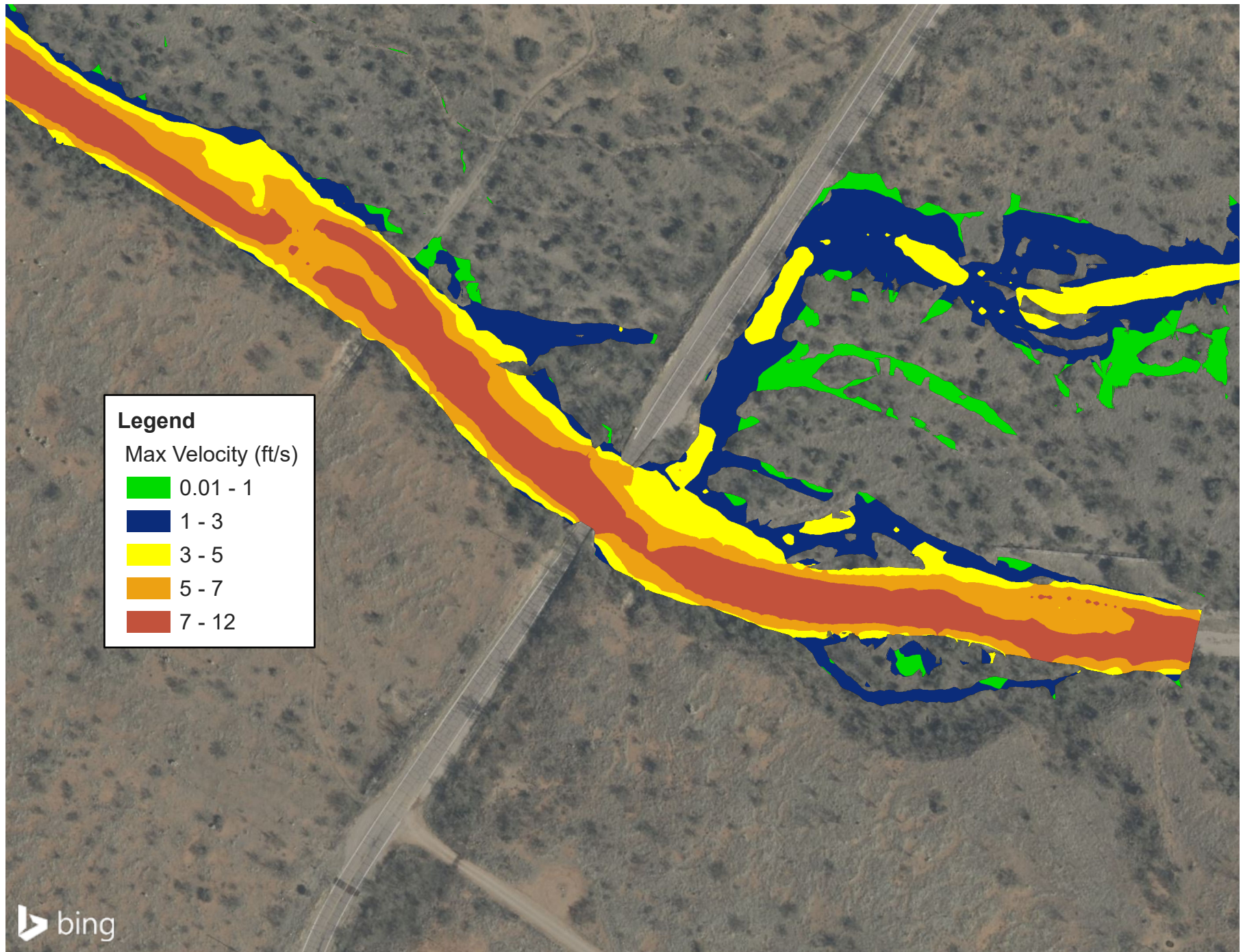


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MEDIUM WASH
EXISTING 100-YR DEPTH MAP

MADERA CANYON ROAD BRIDGE REPLACEMENT

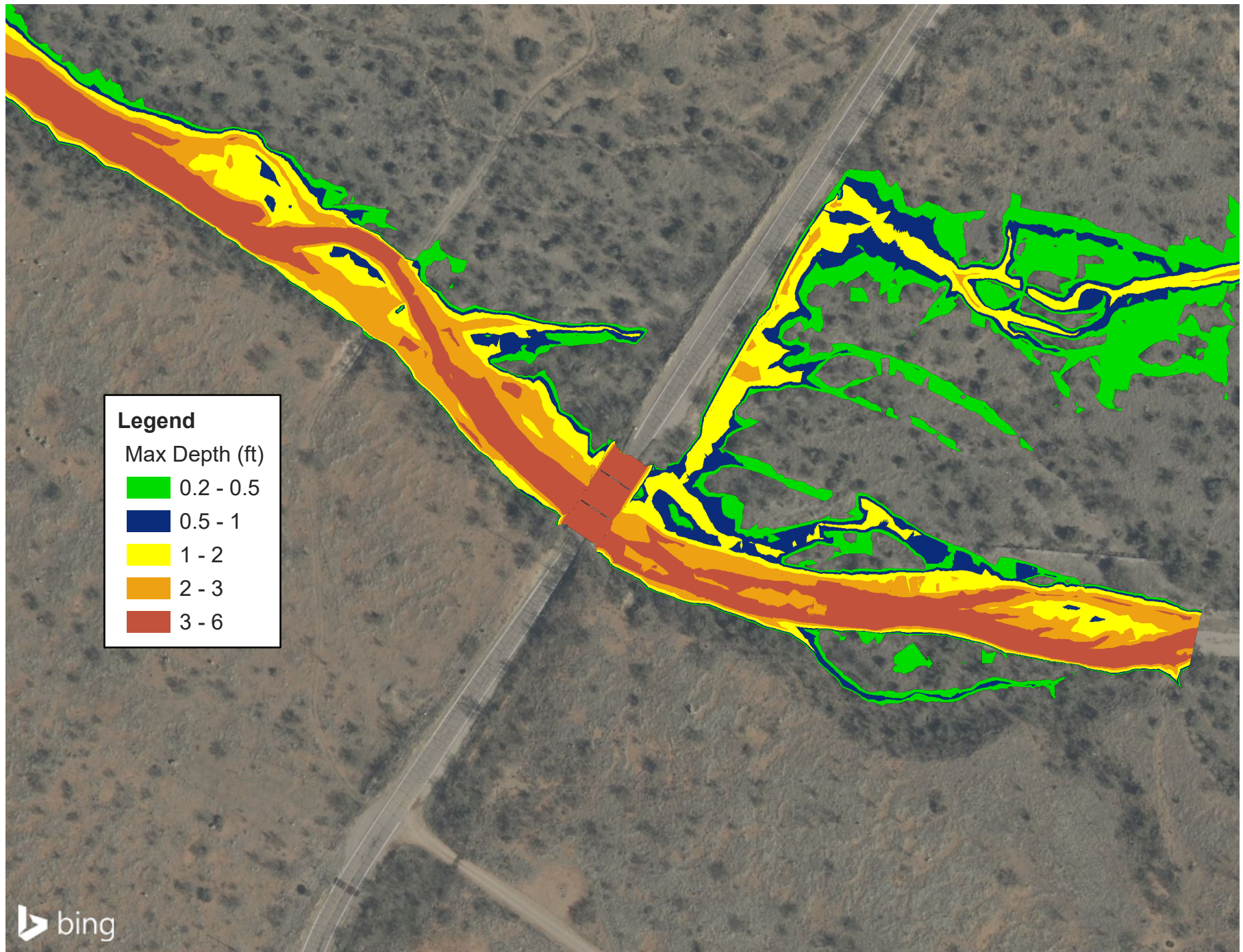


0 0 mi



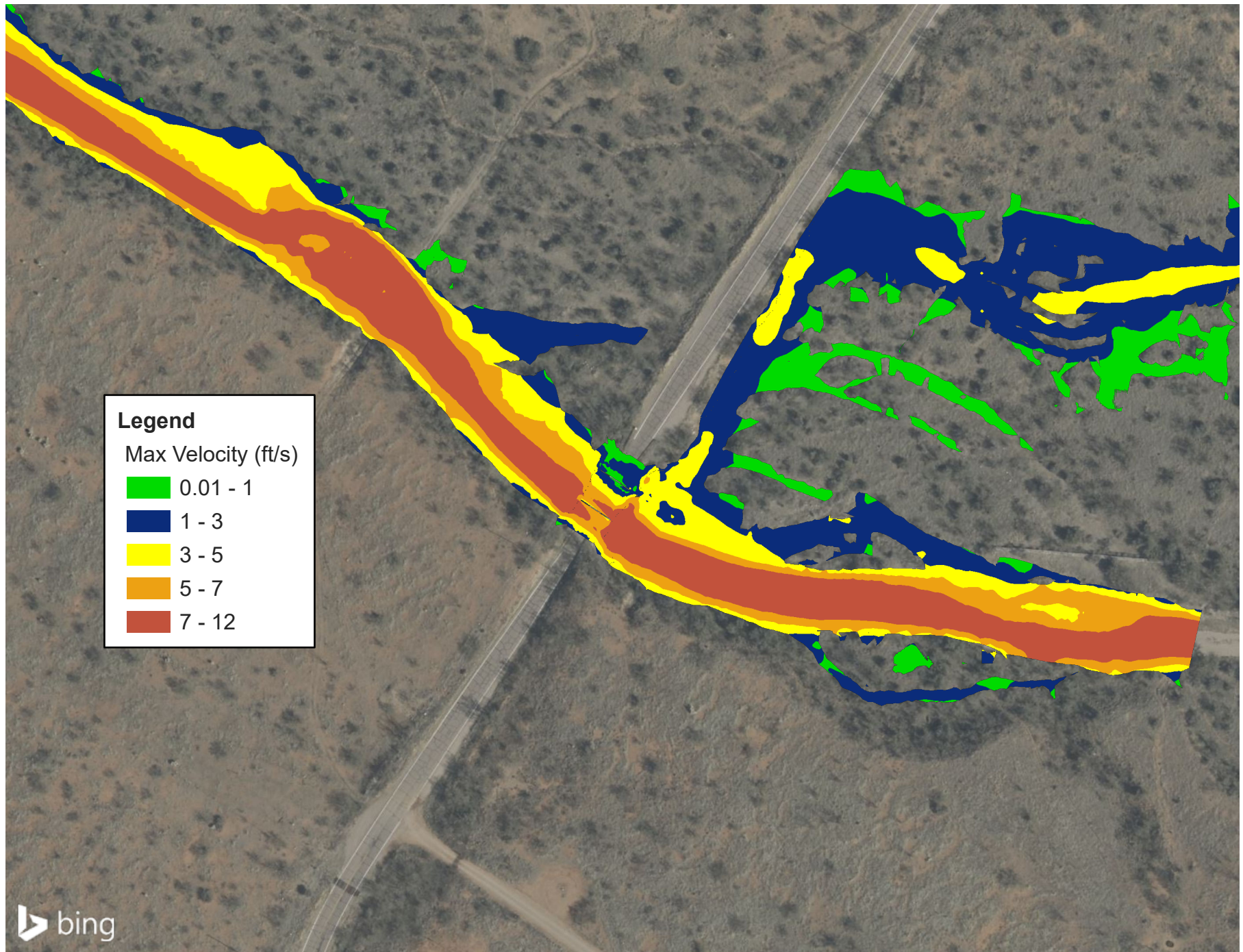
MEDIUM WASH
EXISTING 100-YR VELOCITY MAP

MADERA CANYON ROAD BRIDGE REPLACEMENT



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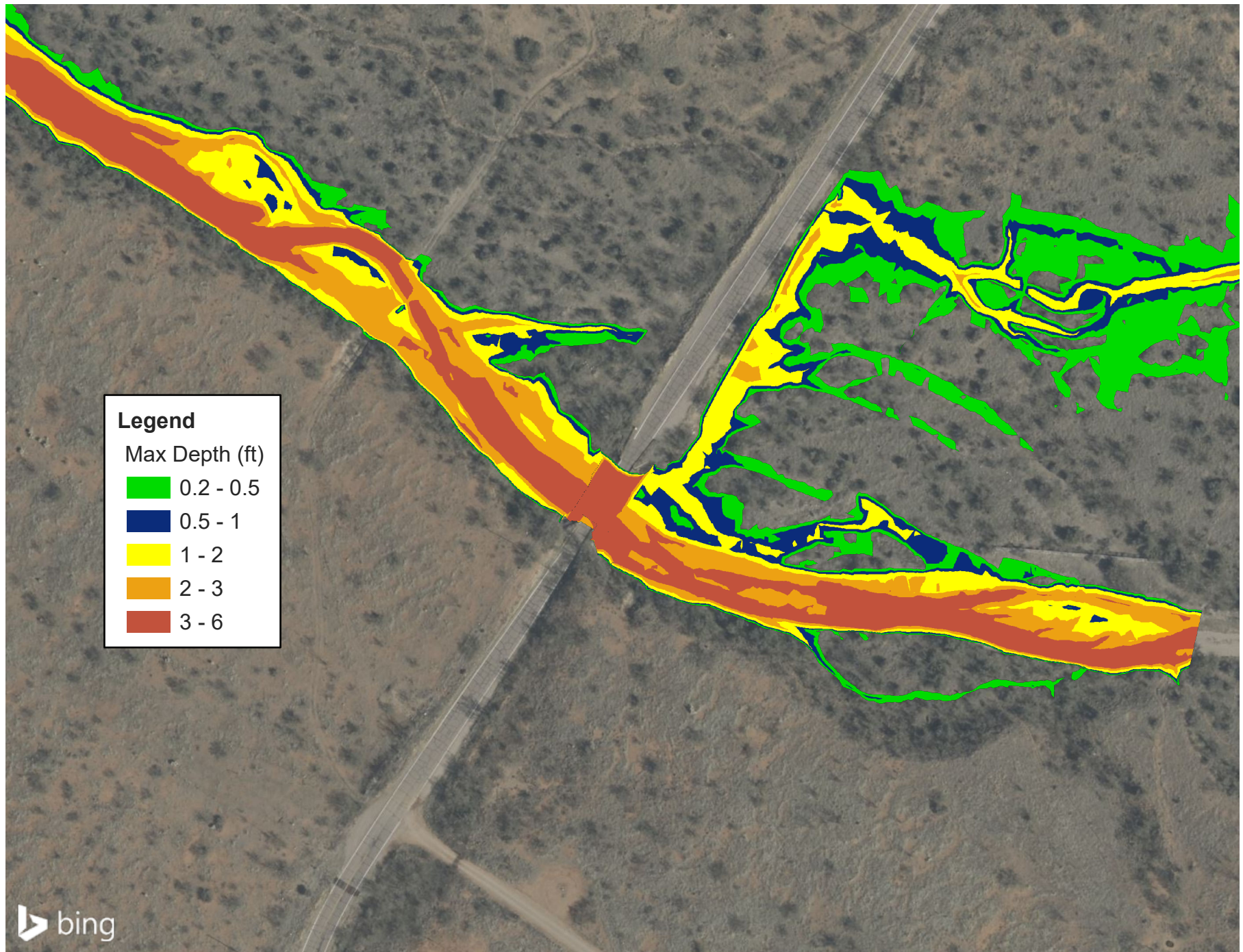


0 0 mi



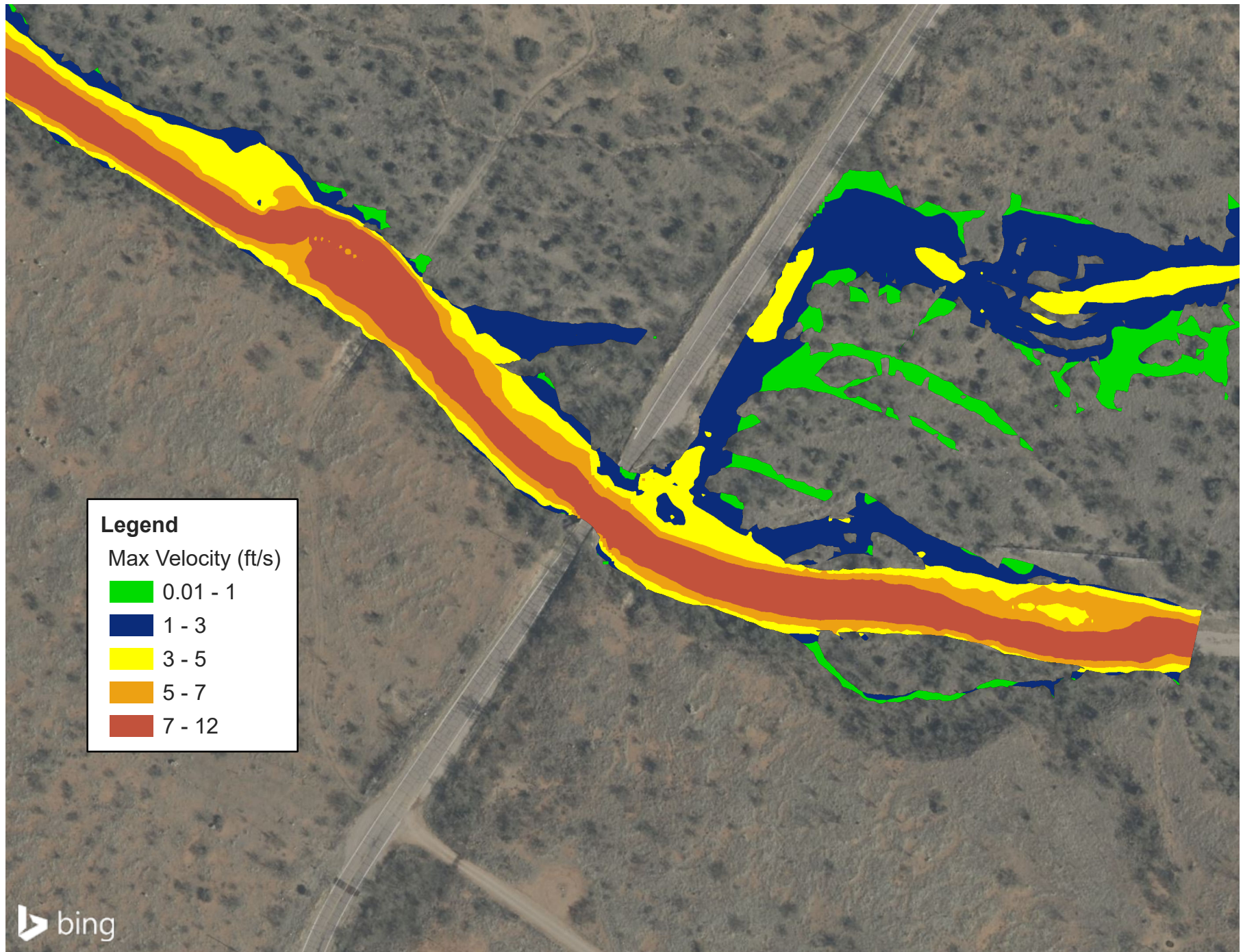
MEDIUM WASH
ALT 2: SUPERBOX 100-YR VELOCITY MAP

MADERA CANYON ROAD BRIDGE REPLACEMENT



0 0 mi





0 0.1 mi



MEDIUM WASH
ALT 1: UBT GIRDER 100-YR VELOCITY MAP

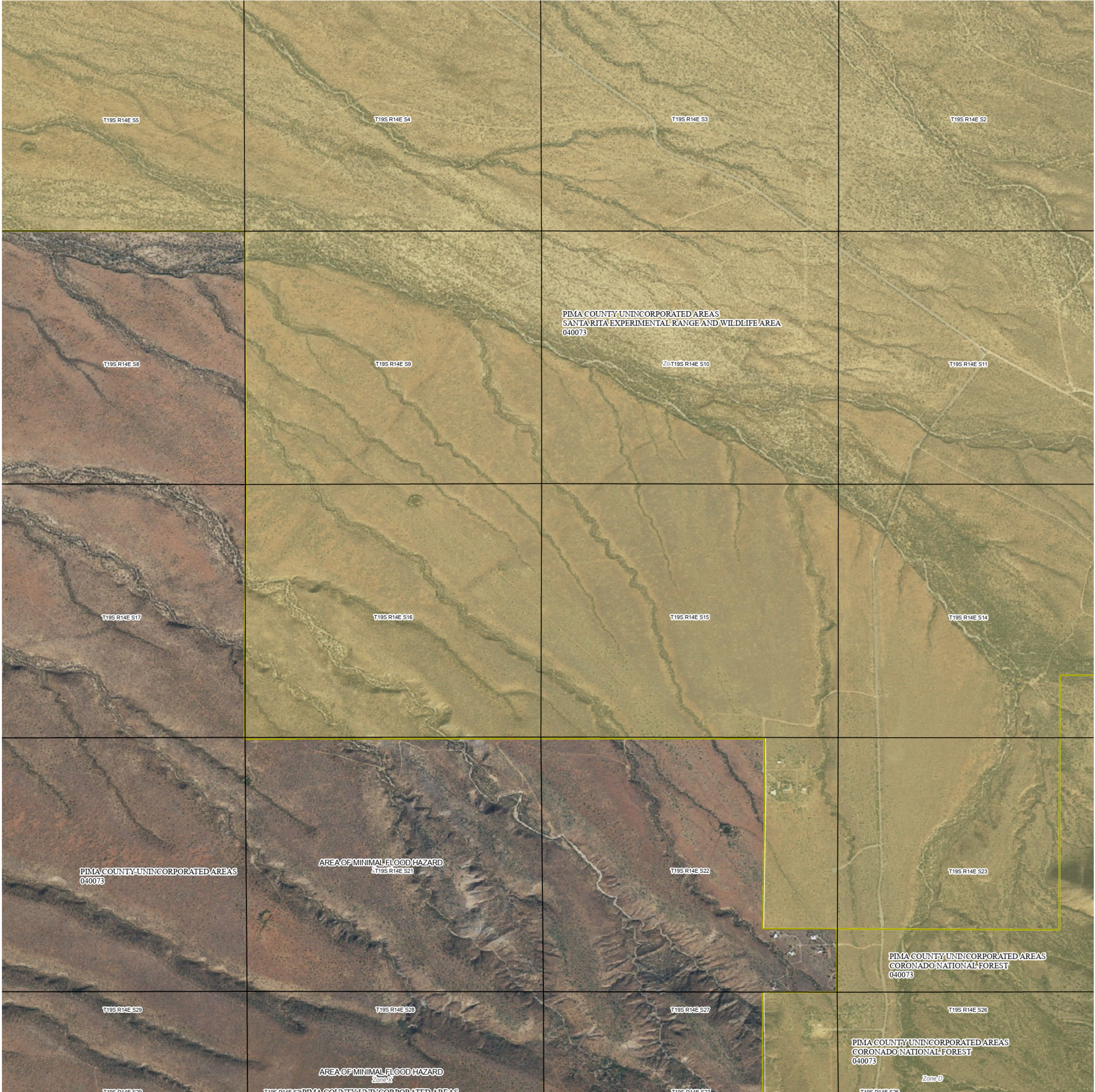
MADERA CANYON ROAD BRIDGE REPLACEMENT



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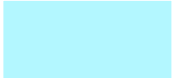
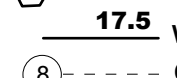
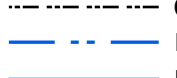
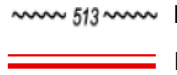
Appendix B. Reference Information

FEMA FIRM



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR DRAFT FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		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
OTHER AREAS		Area with Flood Risk due to Levee Zone D
		NO SCREEN Area of Minimal Flood Hazard Zone X
OTHER AREAS		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance
		Water Surface Elevation
OTHER FEATURES		Coastal Transect
		Coastal Transect Baseline
OTHER FEATURES		Profile Baseline
		Hydrographic Feature
OTHER FEATURES		Base Flood Elevation Line (BFE)
		Limit of Study
OTHER FEATURES		Jurisdiction Boundary
		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 (1-877-336-6627) 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.

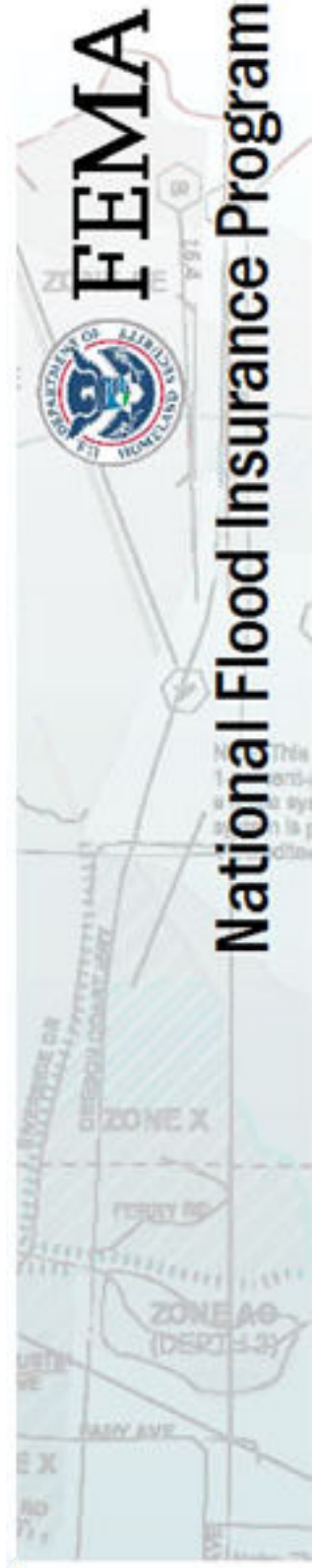
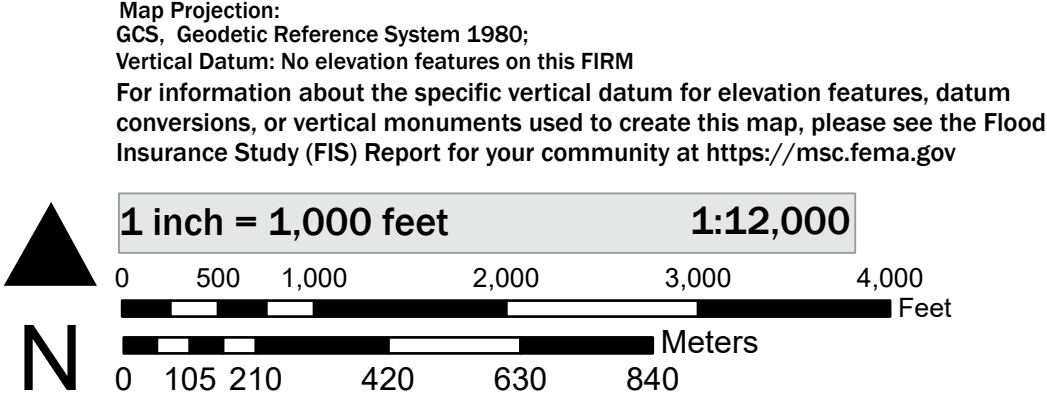
To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

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 2/18/2025 8:21 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. 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



NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

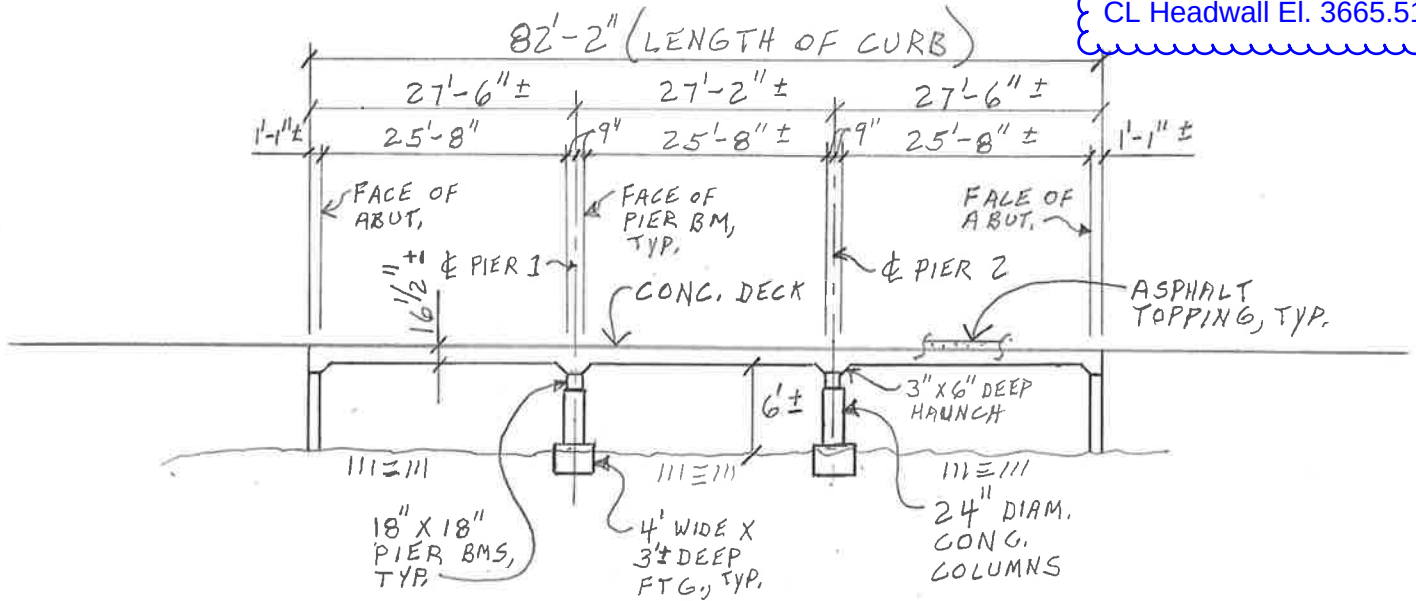
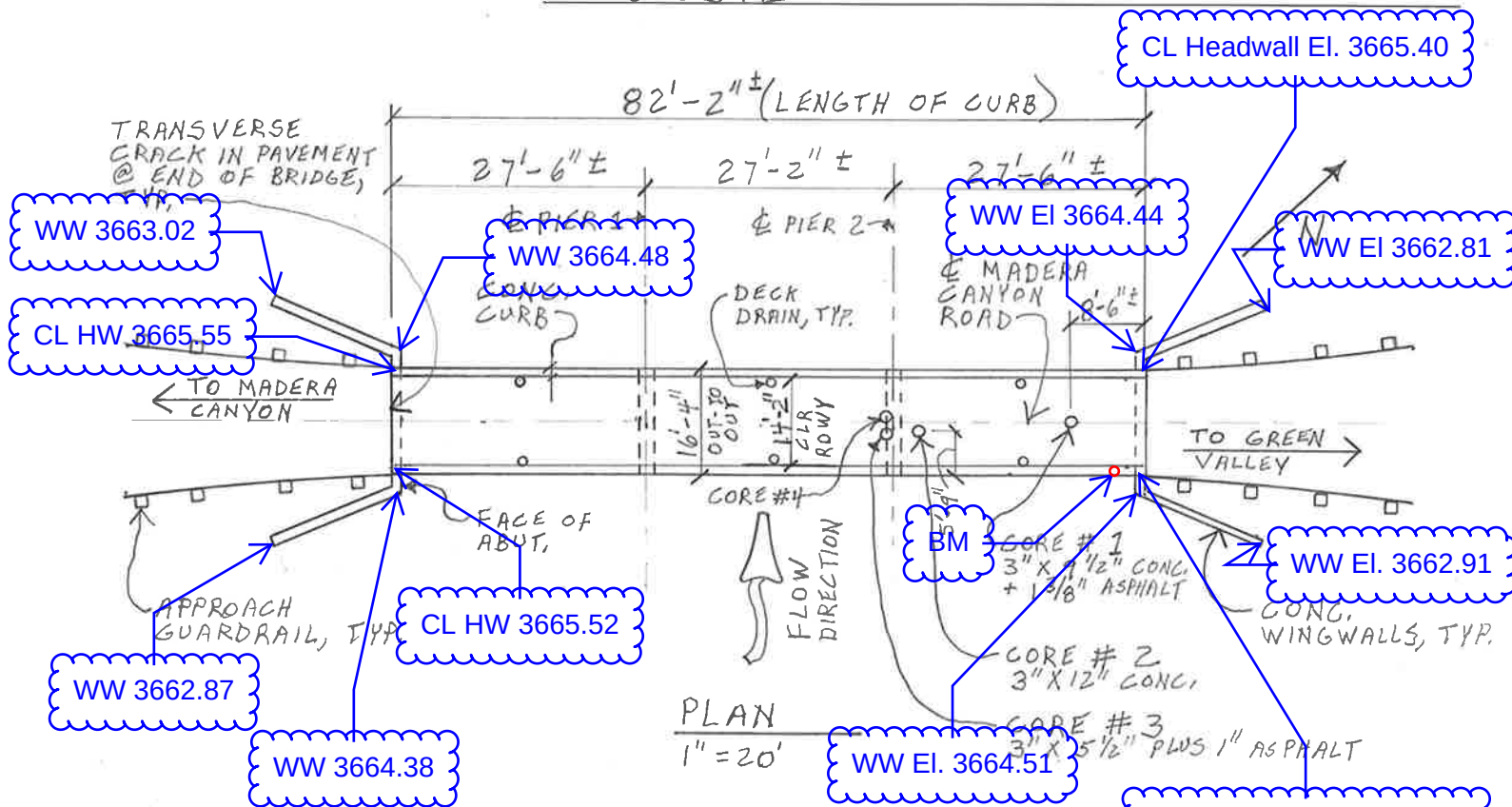
PANEL 3970 of 4725

Panel Contains:		
COMMUNITY	NUMBER	PANEL
PIMA COUNTY UNINCORPORATED AREAS	040073	3970

HDR Existing Bridge Sketches

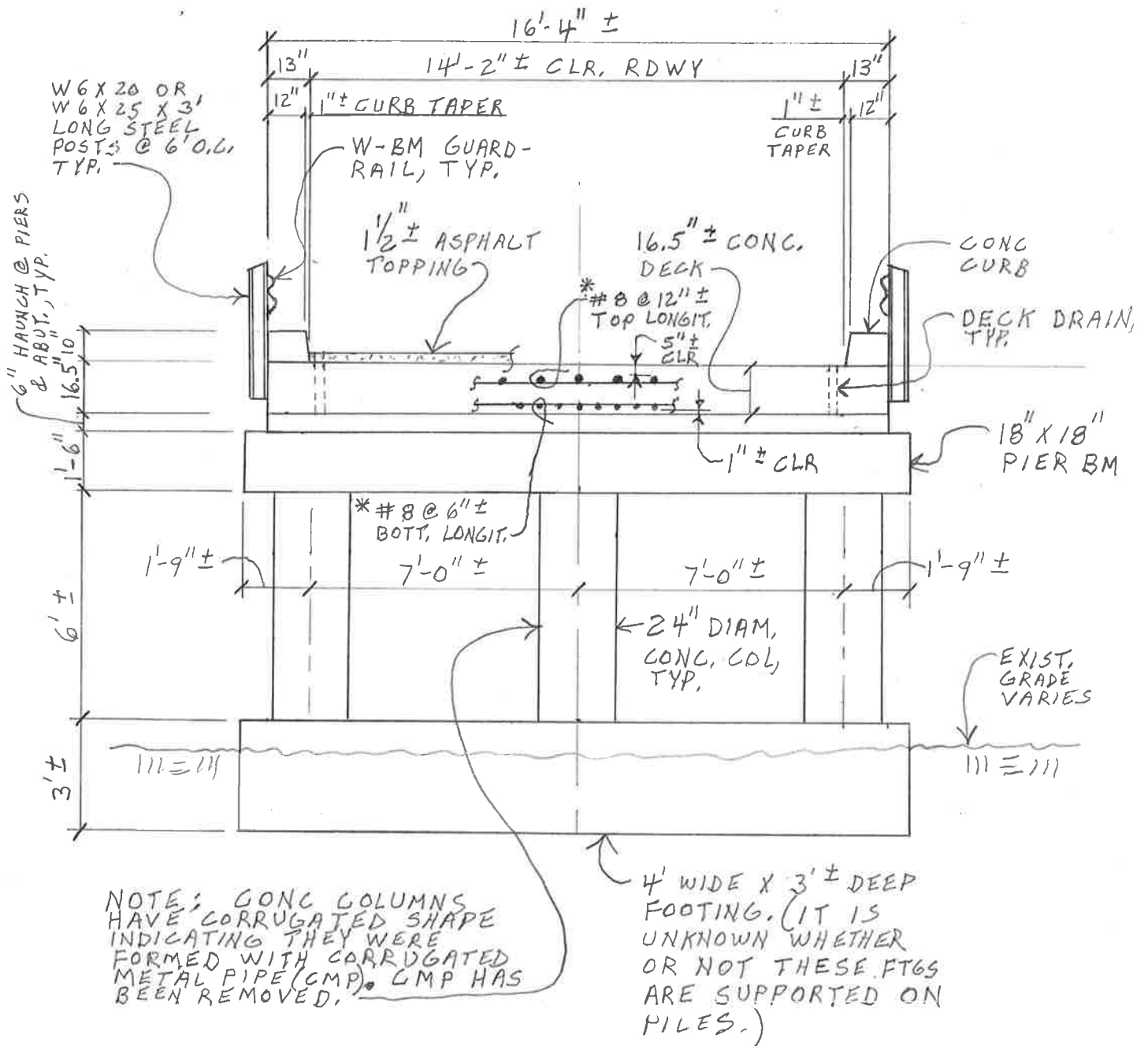


Project: PCDOT BRIDGE LOAD RATINGS Computed: TWB Date: 6-18-13
Subject: STRUCTURE NO. 8301 Checked: JPH Date: 11-18-13
Task: PLAN & LONGIT. SECTION Page: 1 of: 2
Job #: 202512 No: _____





Project: PCDOT BRIDGE LOAD RATINGS Computed: TWB Date: 6-18-13
Subject: STRUCTURE NO. 8301 Checked: JPH Date: 11-18-13
Task: TYP. SECTION @ PIER Page: 2 of: 2
Job #: 202512 No: _____



TYP. SECTION @ PIER
1/4" = 1'-0"

* DECK REINFORCING DETERMINED THROUGH NON-DESTRUCTIVE &
LIMITED DESTRUCTIVE TESTING ON JUNE 18, 2013.





Project: PC DOT BRIDGE LOAD RATING Computed: TWB Date: 6-18-13
Subject: STRUCTURE NO. 8302 Checked: JPH Date: 11-19-13
Task: PLAN & LONGIT. SECTION Page: 1 of: 2
Job #: 202512 No:

CL HW 3678.18

CRACK IN PAVEMENT
PARALLEL TO ABUT.
WALL @ EACH END
OF BRIDGE

CL HW 3676.10

EXPOSED TOP REINF. IN THIS
LOCATION FROM TOP WITH CHIPPING
HAMMER. 1 1/2" THICK ASPHALT
AT THIS LOCATION



49'-7" ± BACK TO BACK ABUTS.

24'-9 1/2" ±

24'-9 1/2" ±

DECK DRAIN, TYP.

PIER

TO MADERA
CANYON

CONC.
CURB

FACE OF
ABUT.

FLORIDA
CANYON WASH
FLOW
DIRECTION

CORE 2' 3" X 12"
PLUS 1.5" ASPHALT
CONC
WINDWALL,
TYP.

TO GREEN
VALLEY

APPROACH
GUARD RAIL
TYP.

CORE 1' 3" X 13"
PLUS 2 1/4"
ASPHALT ON TOP

CL HW 3678.85

PLAN

1" = 10'-0"

WW 3675.67

CL HW 3676.68

49'-7" ± BACK-TO-BACK ABUTMENTS

24'-9 1/2" ±

PIER 24'-9 1/2" ±

1.40' ±

22'-4" ±

22'-4" ±

FACE OF
ABUT

FACE OF
PIER BM

9" / cos 43° = 12 3/4" ±

ASPHALT
TOPPING, TYP.

III III

III III

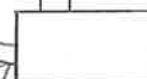
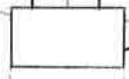
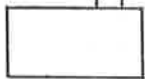
9' ±

18" WIDE X
26" DEEP
PIER BM

6" ± DEEP
HAUNCH

24" DIAM.
CONC. COLUMNS

WW Rock 3670.36

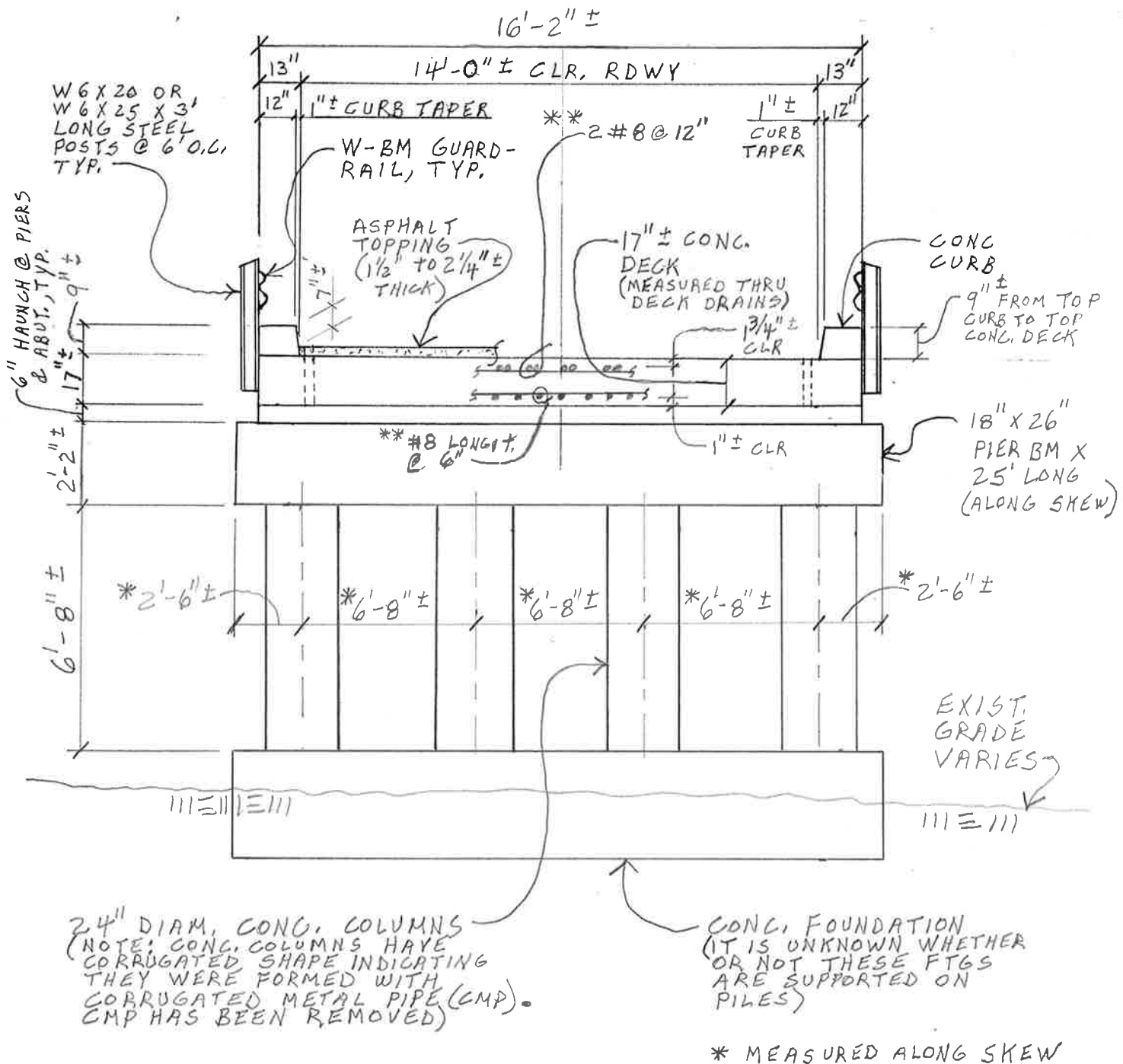


CONC. FTG
TYP.

LONGITUDINAL SECTION ALONG CONSTR. CENTERLINE
1" = 10'-0"



Project: PCDOT BRIDGE LOAD RATING Computed: TWB Date: 6-18-13
Subject: STRUCTURE NO. 8302 Checked: JPH Date: 11-19-13
Task: TYP. SECTION @ PIER Page: 2 of: 2
Job #: 202512 No: _____



TYP. SECTION @ PIER

1/4" = 1'-0"

** DECK REINFORCING DETERMINED THROUGH NON-DESTRUCTIVE AND LIMITED DESTRUCTIVE TESTING ON JUNE 18, 2013



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Appendix C. Hydrology

Regression Analysis



Project:	Madera Canyon
Subject:	Hydrology - Existing Conditions - Offsite
Task:	USGS Regional Regression
Job #:	

Computed: CJC
Checked:

Date: 12/4/2024
Date:

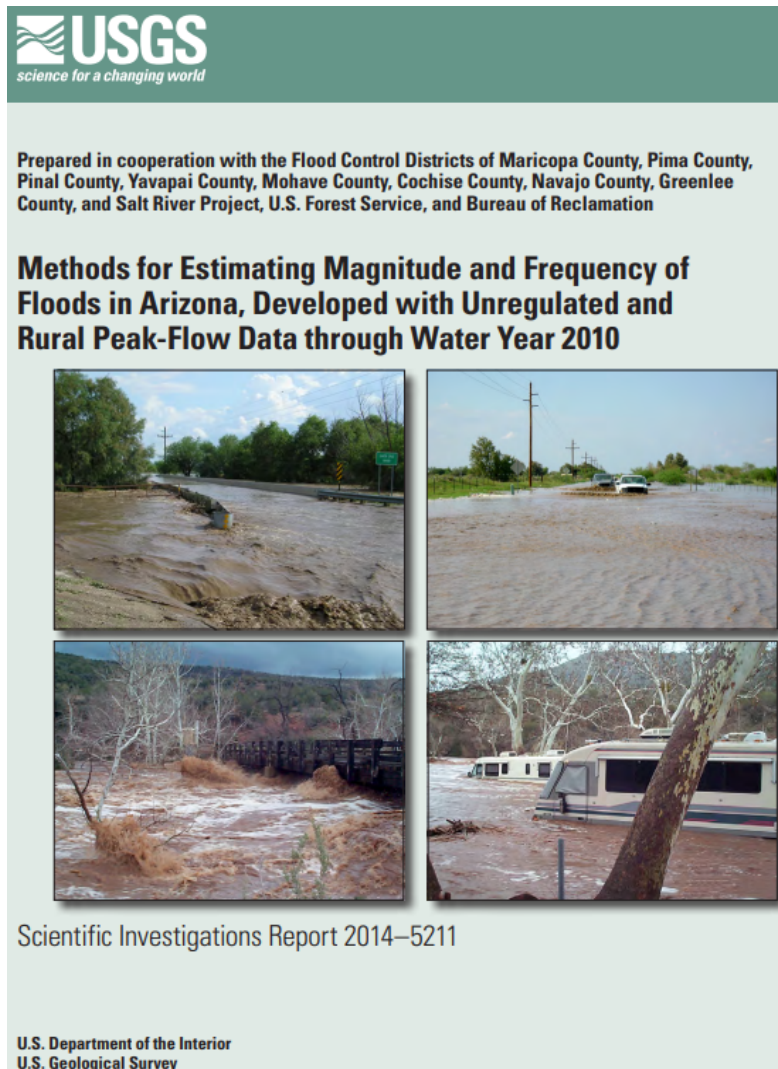
Reference: USGS Scientific Investigations Report 2014-5211

Methodology: USGS Regional Regression Equations using generalized least-squares regression

Equations: Table 9, Page 29

Using USGS Regression equations for Pima County should be limited to:

D. Comparison of peak discharge: Peak discharges shall be compared with the peak discharges obtained from USGS regression equations obtained from **Table 9** of *Methods for Estimating Magnitude and Frequency of Floods in Arizona, Developed with Unregulated and Rural Peak-Flow Data through Water Year 2010*, (USGS, 2014). Eastern Pima County is represented by "Region 5" and western Pima County is represented by "Region 3".





Project: **Madera Canyon**
 Subject: **Hydrology - Existing Conditions - Offsite**
 Task: **USGS Regional Regression**
 Job #:

Computed: CJC
 Checked:

Date: 12/4/2024
 Date:

Pima County Technical Policy, TECH-018 states that eastern Pima County falls into Region 5. A closer look at the Region 5 Regression Equations are shown below:

Table 9. Regional regression equations for predicting the 50-, 20-, 10-, 4-, 2-, 1-, 0.5-, and 0.2-percent annual exceedance probability flows in 5 flood regions of Arizona.—Continued

[*DRNAREA*, drainage area in square miles; *PRECIP*, mean annual precipitation in inches; *ELEV*, mean basin elevation in feet]

Flood region 5 (Southeastern Basin and Range) regression equation	
50	$10^{(6.363-4.386 \text{ DRNAREA}+0.060)}$
20	$10^{(5.868-3.506 \text{ DRNAREA}+0.080)}$
10	$10^{(5.778-3.218 \text{ DRNAREA}+0.090)}$
4	$10^{(5.757-2.988 \text{ DRNAREA}+0.100)}$
2	$10^{(5.696-2.795 \text{ DRNAREA}+0.110)}$
1	$10^{(5.651-2.634 \text{ DRNAREA}+0.120)}$
0.5	$10^{(5.761-2.638 \text{ DRNAREA}+0.120)}$
0.2	$10^{(5.750-2.502 \text{ DRNAREA}+0.130)}$

Reviewing the overall analysis study area:

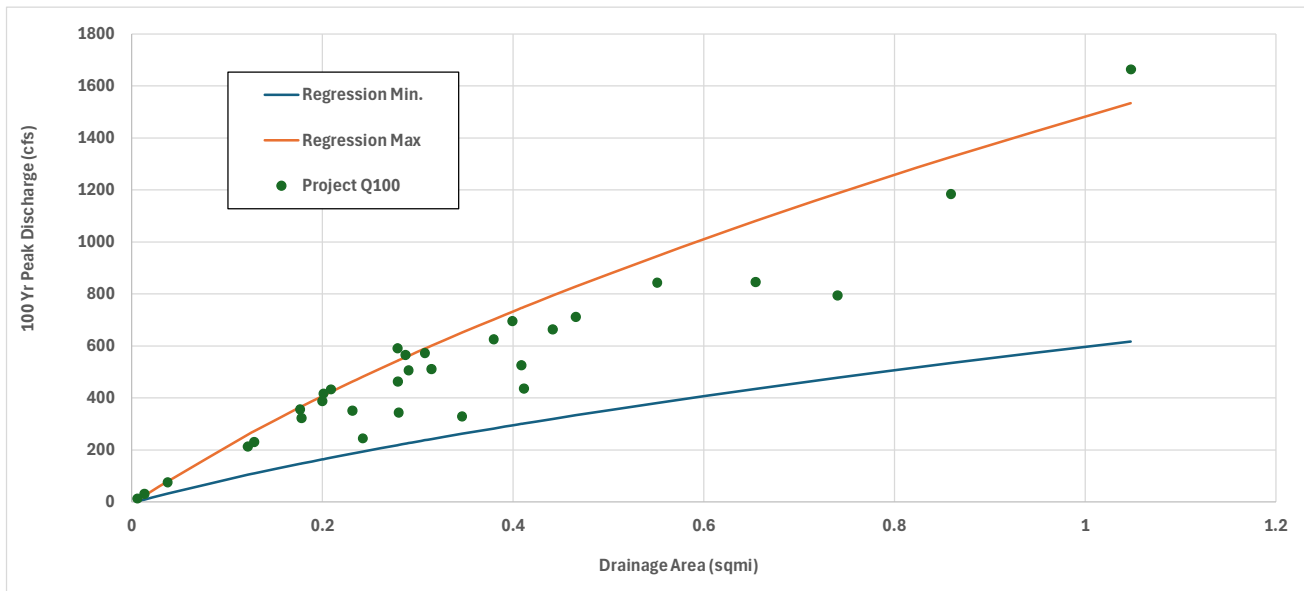
Study Area 100 Yr Peak Discharge Min and Max Review						
Subbasin	Area	Area	Peak Discharge	Discharge to Area (acre) Ratio	Regression % Peak Min	Regression % Peak Max
	acre	sq. mi.	cfs	cfs/acre	cfs	cfs
SB - 1	155	0.24	338	2.178	194	482
SB - 10	298	0.47	581	1.949	333	828
SB - 11	186	0.29	394	2.121	226	562
SB - 12	419	0.65	758	1.809	435	1080
SB - 13	255	0.40	513	2.008	294	732
SB - 14	222	0.35	457	2.060	262	651
SB - 15	134	0.21	297	2.220	170	423
SB - 16	178	0.28	381	2.134	219	543
SB - 17	184	0.29	390	2.125	224	557
SB - 18	129	0.20	287	2.230	165	409
SB - 19	78	0.12	182	2.334	104	259
SB - 2	179	0.28	382	2.133	219	545
SB - 20	8	0.01	17	1.982	10	24
SB - 21	24	0.04	56	2.317	32	80
SB - 22	671	1.05	1076	1.604	618	1534
SB - 23	82	0.13	191	2.326	110	273
SB - 24	179	0.28	381	2.134	219	543
SB - 25	262	0.41	523	1.999	300	746
SB - 26	114	0.18	258	2.261	148	367
SB - 27	550	0.86	930	1.692	534	1327
SB - 28	113	0.18	256	2.263	147	365
SB - 29	4	0.01	6	1.582	3	9
SB - 3	474	0.74	832	1.756	478	1187
SB - 30	128	0.20	285	2.232	164	407
SB - 31	263	0.41	526	1.997	302	750
SB - 4	243	0.38	492	2.027	283	702
SB - 5	201	0.31	421	2.094	242	601
SB - 6	283	0.44	557	1.970	319	794
SB - 7	197	0.31	413	2.102	237	590
SB - 8	148	0.23	324	2.191	186	463
SB - 9	353	0.55	663	1.881	381	946



Project: **Madera Canyon**
Subject: **Hydrology - Existing Conditions - Offsite**
Task: **USGS Regional Regression**
Job #:

Computed: CJC
Checked:

Date: 12/4/2024
Date:



The values determined from the regression equations will be used to check against the approved hydrologic peak discharge analysis methodology used for the study area. This methodology is listed in the Summary tab of this workbook. The final values used for design will be supported by the exercise of judgement.

HEC-HMS Model Parameter Calculations

Pima County Regional Flood Control District "CURVE NUMBER (CN) (XLS)" Spreadsheet

Sub-Basin Name	Impervious Cover (%)	Vegetation Cover (%)	Fraction of Area			Fraction of Area			Fraction of Area			Fraction of Area			Fraction of Area		
			Hydrologic Soil Group			Hydrologic Soil Group			Hydrologic Soil Group			Hydrologic Soil Group			Hydrologic Soil Group		
			B	C	D	B	C	D	B	C	D	B	C	D	B	C	D
SB - 1	0	35	0.147	0.803	0.000	0.021	0.018	0.000	0.000	0.001	0.000	0.006	0.004	0.000	0.000	0.000	0.000
SB - 2	0	35	0.051	0.706	0.110	0.006	0.014	0.013	0.001	0.015	0.000	0.065	0.013	0.007	0.000	0.000	0.000
SB - 3	0	30	0.000	0.599	0.335	0.000	0.014	0.005	0.000	0.005	0.010	0.000	0.008	0.023	0.000	0.000	0.000
SB - 4	0	30	0.010	0.000	0.625	0.001	0.000	0.017	0.001	0.000	0.063	0.001	0.000	0.282	0.000	0.000	0.000
SB - 5	0	30	0.000	0.006	0.590	0.000	0.000	0.021	0.000	0.000	0.052	0.000	0.000	0.330	0.000	0.000	0.000
SB - 6	0	35	0.000	0.000	0.467	0.000	0.000	0.254	0.000	0.000	0.098	0.000	0.000	0.181	0.000	0.000	0.000
SB - 7	0	30	0.000	0.000	0.161	0.000	0.000	0.035	0.000	0.000	0.182	0.000	0.000	0.567	0.000	0.000	0.055
SB - 8	0	35	0.000	0.014	0.185	0.000	0.073	0.136	0.000	0.001	0.184	0.000	0.000	0.403	0.000	0.000	0.003
SB - 9	0	35	0.000	0.000	0.011	0.000	0.000	0.020	0.000	0.000	0.026	0.000	0.000	0.561	0.000	0.000	0.382
SB - 10	0	35	0.000	0.044	0.028	0.000	0.230	0.142	0.000	0.021	0.044	0.000	0.013	0.450	0.000	0.000	0.027
SB - 11	0	30	0.000	0.000	0.236	0.000	0.000	0.025	0.000	0.000	0.138	0.000	0.000	0.449	0.000	0.000	0.153
SB - 12	0	30	0.000	0.000	0.051	0.000	0.000	0.012	0.000	0.000	0.039	0.000	0.000	0.496	0.000	0.000	0.402
SB - 13	0	30	0.000	0.000	0.042	0.000	0.000	0.004	0.000	0.000	0.056	0.000	0.000	0.543	0.000	0.000	0.354
SB - 14	0	35	0.003	0.066	0.044	0.002	0.239	0.135	0.000	0.038	0.158	0.003	0.018	0.279	0.000	0.000	0.015
SB - 15	0	35	0.000	0.000	0.047	0.000	0.000	0.053	0.000	0.000	0.081	0.000	0.000	0.423	0.000	0.000	0.396
SB - 16	0	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.183	0.000	0.000	0.803
SB - 17	0	30	0.000	0.000	0.034	0.000	0.000	0.005	0.000	0.000	0.092	0.000	0.000	0.366	0.000	0.000	0.503
SB - 18	0	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.235	0.000	0.000	0.756
SB - 19	0	35	0.000	0.011	0.238	0.000	0.225	0.024	0.000	0.041	0.195	0.000	0.035	0.232	0.000	0.000	0.000
SB - 20	0	35	0.362	0.318	0.204	0.027	0.034	0.051	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000
SB - 21	0	40	0.000	0.113	0.000	0.000	0.730	0.000	0.000	0.127	0.000	0.000	0.030	0.000	0.000	0.000	0.000
SB - 22	0	35	0.000	0.000	0.045	0.000	0.000	0.104	0.000	0.000	0.049	0.000	0.000	0.478	0.000	0.000	0.323
SB - 23	0	30	0.031	0.000	0.343	0.000	0.000	0.000	0.091	0.000	0.081	0.059	0.000	0.394	0.000	0.000	0.000
SB - 24	0	40	0.020	0.104	0.012	0.036	0.728	0.024	0.008	0.025	0.001	0.002	0.027	0.013	0.000	0.000	0.000
SB - 25	0	35	0.060	0.836	0.000	0.001	0.090	0.000	0.000	0.000	0.000	0.002	0.011	0.000	0.000	0.000	0.000
SB - 26	0	40	0.298	0.098	0.166	0.075	0.041	0.292	0.008	0.000	0.002	0.008	0.010	0.001	0.000	0.000	0.000
SB - 27	0	30	0.021	0.044	0.333	0.006	0.004	0.079	0.069	0.008	0.034	0.084	0.003	0.306	0.000	0.000	0.009
SB - 28	0	35	0.092	0.505	0.327	0.002	0.047	0.003	0.000	0.010	0.000	0.000	0.014	0.000	0.000	0.000	0.000
SB - 29	0	35	0.524	0.136	0.156	0.000	0.000	0.000	0.184	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SB - 30	0	35	0.155	0.229	0.328	0.037	0.069	0.038	0.105	0.015	0.000	0.010	0.014	0.000	0.000	0.000	0.000
SB - 31	0	35	0.178	0.564	0.000	0.033	0.198	0.000	0.002	0.000	0.000	0.016	0.009	0.000	0.000	0.000	0.000
SB - 33	0	35	0.862	0.000	0.000	0.108	0.000	0.000	0.000	0.000	0.000	0.030	0.000	0.000	0.000	0.000	0.000

Desert Brush			Herbaceous			Mountain Brush			Juniper-Grass			Ponderosa Pine			CN-Pervious Area	Composite CN	Potential Max Soil Moisture Rentention, S	Initial Abstraction, Ia
CN			CN			CN			CN			CN						
Hydrologic Soil Group			Hydrologic Soil Group			Hydrologic Soil Group			Hydrologic Soil Group			Hydrologic Soil Group						
B	C	D	B	C	D	B	C	D	B	C	D	B	C	D				
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	85.3	85.3	1.7	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	85.0	85.0	1.8	0.4
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	88.0	88.0	1.4	0.3
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	89.7	89.7	1.1	0.2
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	89.8	89.8	1.1	0.2
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	89.3	89.3	1.2	0.2
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	89.6	89.6	1.2	0.2
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	88.5	88.5	1.3	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	88.2	88.2	1.3	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	87.3	87.3	1.5	0.3
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	89.5	89.5	1.2	0.2
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	88.9	88.9	1.2	0.2
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	89.0	89.0	1.2	0.2
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	86.7	86.7	1.5	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	88.2	88.2	1.3	0.3
81	86	89	74	83	89	65	76	86	63	77	88	61	73	86	86.4	86.4	1.6	0.3
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	88.8	88.8	1.3	0.3
81	86	89	74	83	89	65	76	86	63	77	88	61	73	86	86.5	86.5	1.6	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	86.9	86.9	1.5	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	85.0	85.0	1.8	0.4
81	86	89	74	83	89	65	76	86	63	77	88	61	73	86	82.3	82.3	2.2	0.4
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	88.4	88.4	1.3	0.3
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	86.6	86.6	1.5	0.3
81	86	89	74	83	89	65	76	86	63	77	88	61	73	86	82.7	82.7	2.1	0.4
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	85.8	85.8	1.7	0.3
81	86	89	74	83	89	65	76	86	63	77	88	61	73	86	84.4	84.4	1.8	0.4
82	87	90	76	84	90	72	81	90	68.5	80	89.5	64	75	88	86.3	86.3	1.6	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	86.7	86.7	1.5	0.3
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	81.1	81.1	2.3	0.5
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	83.9	83.9	1.9	0.4
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	84.2	84.2	1.9	0.4
81.5	86.5	89.5	75	83.5	89.5	69	79	88	66	78	89	63	74	87	80.3	80.3	2.4	0.5

Pima County Regional Flood Control District "Time of Concentration (Tc) (XLS)" Spreadsheet

		Sheet Flow (Kinematic Wave)	Shallow Concentrated Flow					Channel					
Basin	Sub-basin	Travel time (min)	Length (ft)	Slope	Paved/Unpaved	Average V (ft/s)	Travel Time (min)	Length (ft)	RAS V ft/s	Travel time (min)	Time of Concentration (min)	(hr)	Lag Time (min)
Watershed Name	SB - 1	14.54	3206	0.037	Unpaved	3.086	17.31	4330	4.090	17.64	49.50	0.824952	29.70
	SB - 10	1.54	431	0.465	Unpaved	11.000	0.65	8332	5.430	25.58	27.76	0.462719	16.66
	SB - 11	1.99	727	0.749	Unpaved	13.964	0.87	6362	4.990	21.25	24.10	0.401705	14.46
	SB - 12	1.79	379	0.660	Unpaved	13.103	0.48	12740	5.790	36.67	38.94	0.649004	23.36
	SB - 13	1.52	704	0.614	Unpaved	12.640	0.93	7011	5.540	21.09	23.54	0.392297	14.12
	SB - 14	2.38	471	0.386	Unpaved	10.023	0.78	12248	3.840	53.16	56.32	0.938688	33.79
	SB - 15	1.20	160	0.823	Unpaved	14.641	0.18	3992	4.780	13.92	15.30	0.254987	9.18
	SB - 16	1.20	1094	0.635	Unpaved	12.862	1.42	3010	5.040	9.95	12.57	0.209457	7.54
	SB - 17	0.76	263	0.730	Unpaved	13.782	0.32	5184	5.110	16.91	17.99	0.299855	10.79
	SB - 18	1.42	454	0.758	Unpaved	14.052	0.54	5014	7.220	11.57	13.53	0.225494	8.12
	SB - 19	1.58	510	0.430	Unpaved	10.579	0.80	7914	7.060	18.68	21.06	0.351071	12.64
	SB - 2	2.08	1607	0.108	Unpaved	5.308	5.04	7592	4.370	28.95	36.08	0.601403	21.65
	SB - 20	2.01	240	0.123	Unpaved	5.662	0.71	1445	6.130	3.93	6.65	0.110785	3.99
	SB - 21	1.26	482	0.991	Unpaved	16.058	0.50	3479	6.760	8.58	10.34	0.172303	6.20
	SB - 22	1.80	719	0.674	Unpaved	13.250	0.90	12398	8.440	24.48	27.18	0.453038	16.31
	SB - 23	2.87	1338	0.404	Unpaved	10.256	2.17	5979	6.800	14.65	19.69	0.328238	11.82
	SB - 24	2.40	866	0.421	Unpaved	10.468	1.38	7007	7.750	15.07	18.85	0.314192	11.31
	SB - 25	5.27	8027	0.090	Unpaved	4.840	27.64	876	8.450	1.73	34.64	0.577376	20.79
	SB - 26	3.40	471	0.116	Unpaved	5.499	1.43	5596	7.670	12.16	16.98	0.283075	10.19
	SB - 27	1.72	887	0.469	Unpaved	11.046	1.34	15310	8.930	28.57	31.63	0.527239	18.98
	SB - 28	1.77	962	0.301	Unpaved	8.850	1.81	5541	8.100	11.40	14.99	0.249775	8.99
	SB - 29	3.41	261	0.072	Unpaved	4.330	1.00	530	8.560	1.03	5.44	0.090737	3.27
	SB - 3	2.23	384	0.463	Unpaved	10.978	0.58	15870	5.650	46.82	49.62	0.827071	29.77
	SB - 30	1.89	694	0.434	Unpaved	10.626	1.09	5705	8.930	10.65	13.63	0.227151	8.18
	SB - 31	4.27	7485	0.045	Unpaved	3.409	36.60	1682	9.710	2.89	43.75	0.729208	26.25
	SB - 4	1.67	1025	0.674	Unpaved	13.244	1.29	7258	5.050	23.95	26.91	0.448536	16.15
	SB - 5	1.72	1107	0.609	Unpaved	12.592	1.46	7078	4.800	24.58	27.76	0.462748	16.66
	SB - 6	1.31	608	0.719	Unpaved	13.685	0.74	9483	5.450	29.00	31.05	0.517466	18.63
	SB - 7	1.78	1161	0.655	Unpaved	13.061	1.48	5284	4.910	17.94	21.20	0.353304	12.72
	SB - 8	1.58	1190	0.536	Unpaved	11.811	1.68	7264	4.610	26.26	29.52	0.492038	17.71
	SB - 9	3.38	1922	0.547	Unpaved	11.936	2.68	7623	5.610	22.65	28.71	0.478544	17.23
	SB - 33	7.81	1028	0.034	Unpaved	2.977	5.76	2464	6.300	6.52	20.08	0.334738	12.05

Computed: **CJC**

Checked:

Date: 12/4/2024

Date:

Point precipitation frequency estimates (inches)

NOAA Atlas 14 Volume 1 Version 5

Data type: Precipitation depth

Time series type: Partial duration

Project area: Southwest

Location n: Arizona USA

Station Name: -

Latitude: 31.7494 Degree

Longitude: -110.8735 Degree

Elevation (USGS): 4767 ft

PRECIPITATION FREQUENCY ESTIMATES AT UPPER BOUND OF 90% CONFIDENCE INTERVAL

by duration	1	2	5	10	25	50	100	200	500	1000
5-min:	0.4	0.513	0.662	0.771	0.919	1.03	1.15	1.27	1.43	1.56
10-min:	0.609	0.781	1.01	1.17	1.4	1.57	1.75	1.93	2.17	2.37
15-min:	0.755	0.968	1.25	1.46	1.73	1.95	2.17	2.39	2.69	2.94
30-min:	1.02	1.3	1.68	1.96	2.33	2.62	2.92	3.22	3.62	3.95
60-min:	1.26	1.61	2.08	2.42	2.89	3.25	3.61	3.98	4.49	4.89
2-hr:	1.38	1.75	2.23	2.6	3.13	3.55	4	4.46	5.1	5.64
3-hr:	1.44	1.82	2.29	2.68	3.21	3.65	4.12	4.63	5.34	5.94
6-hr:	1.67	2.09	2.62	3.06	3.7	4.21	4.78	5.38	6.25	6.98
12-hr:	1.95	2.43	3.04	3.52	4.21	4.78	5.41	6.07	7	7.76
24-hr:	2.2	2.76	3.43	3.96	4.69	5.25	5.84	6.44	7.26	7.92
2-day:	2.38	2.97	3.69	4.27	5.09	5.76	6.46	7.18	8.22	9.06
3-day:	2.59	3.22	4.01	4.65	5.56	6.3	7.08	7.89	9.06	10
4-day:	2.79	3.48	4.34	5.04	6.03	6.84	7.7	8.6	9.89	10.9
7-day:	3.43	4.29	5.37	6.24	7.45	8.39	9.41	10.5	11.9	13.1
10-day:	3.95	4.94	6.14	7.08	8.36	9.36	10.4	11.4	12.9	14
20-day:	5.39	6.74	8.28	9.44	11	12.1	13.3	14.4	15.9	17
30-day:	6.84	8.54	10.4	11.8	13.6	14.9	16.1	17.4	18.9	20.1
45-day:	8.39	10.5	12.6	14.2	16.2	17.6	18.9	20.2	21.8	23
60-day:	9.86	12.3	14.8	16.6	18.8	20.3	21.8	23.2	24.9	26.2

Date/time (GMT): Tue Dec 3 23:22:05 2024

pyRunTime: 0.016876220703125

HEC-HMS Simulation Reports

Project: Madera_Canyon

Simulation Run: FC 100y3h +15%P

Simulation Start: 30 December 2024, 24:00

Simulation End: 31 December 2024, 24:00

HMS Version: 4.12

Executed: 06 March 2026, 19:20

Global Parameter Summary - Subbasin

Element Name	Location	
	Longitude Degrees	Latitude Degrees
SB - 17	-110.84	31.73
SB - 16	-110.83	31.73
SB - 15	-110.85	31.73
SB - 18	-110.84	31.73
SB - 22	-110.84	31.75
SB - 9	-110.84	31.75
SB - 12	-110.85	31.75
SB - 7	-110.86	31.75
SB - 27	-110.85	31.76
SB - 23	-110.86	31.77
SB - 4	-110.86	31.77
SB - 29	-110.87	31.77
SB - 10	-110.88	31.74
SB - 14	-110.88	31.74
SB - 13	-110.86	31.74
SB - 11	-110.86	31.75
SB - 19	-110.87	31.75
SB - 21	-110.88	31.75
SB - 24	-110.88	31.75
SB - 8	-110.87	31.75
SB - 6	-110.87	31.76
SB - 5	-110.87	31.76
SB - 26	-110.88	31.76
SB - 20	-110.88	31.77
SB - 30	-110.87	31.77
SB - 28	-110.88	31.77
SB - 31	-110.88	31.77
SB - 33	-110.88	31.78
SB - 3	-110.85	31.78
SB - 2	-110.86	31.78
SB - 25	-110.87	31.78
SB - 1	-110.88	31.78

Area (M12)	
Element Name	Area (M12)
SB - 17	0.29
SB - 16	0.28
SB - 15	0.21
SB - 18	0.2
SB - 22	1.05
SB - 9	0.55
SB - 12	0.65
SB - 7	0.31
SB - 27	0.86
SB - 23	0.13
SB - 4	0.38
SB - 29	0.01
SB - 10	0.47
SB - 14	0.35
SB - 13	0.4
SB - 11	0.29
SB - 19	0.12
SB - 21	0.04
SB - 24	0.28
SB - 8	0.23
SB - 6	0.44
SB - 5	0.31
SB - 26	0.18
SB - 20	0.01
SB - 30	0.2
SB - 28	0.18
SB - 31	0.41
SB - 33	0.06
SB - 3	0.74
SB - 2	0.28
SB - 25	0.41
SB - 1	0.25

Downstream

Element Name	Downstream
SB - 17	J - 14
SB - 16	J - 14
SB - 15	J - 10
SB - 18	J - 10
SB - 22	J - 5
SB - 9	J - 5
SB - 12	J - 9
SB - 7	J - 9
SB - 27	J - 3
SB - 23	J - 3
SB - 4	J - 2
SB - 29	J - 2
SB - 10	J - 11
SB - 14	J - 11
SB - 13	J - 13
SB - 11	J - 13
SB - 19	J - 8
SB - 21	J - 8
SB - 24	J - 6
SB - 8	J - 6
SB - 6	J - 12
SB - 5	J - 12
SB - 26	J - 4
SB - 20	J - 4
SB - 30	J - 1
SB - 28	J - 1
SB - 31	Florida Canyon Wash
SB - 33	Florida Canyon Wash
SB - 3	J - 7
SB - 2	J - 7
SB - 25	Medium Wash
SB - 1	Small Wash

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number	Initial Abstraction
SB - 17	0	88.8	Not Specified
SB - 16	0	86.4	Not Specified
SB - 15	0	88.2	Not Specified
SB - 18	0	86.5	Not Specified
SB - 22	0	88.4	Not Specified
SB - 9	0	88.2	Not Specified
SB - 12	0	88.9	Not Specified
SB - 7	0	89.6	Not Specified
SB - 27	0	86.3	Not Specified
SB - 23	0	86.6	Not Specified
SB - 4	0	89.7	Not Specified
SB - 29	0	81.1	Not Specified
SB - 10	0	87.3	Not Specified
SB - 14	0	86.7	Not Specified
SB - 13	0	89	Not Specified
SB - 11	0	89.5	Not Specified
SB - 19	0	86.9	Not Specified
SB - 21	0	82.3	Not Specified
SB - 24	0	82.7	Not Specified
SB - 8	0	88.5	Not Specified
SB - 6	0	89.3	Not Specified
SB - 5	0	89.8	Not Specified
SB - 26	0	84.4	Not Specified
SB - 20	0	85	Not Specified
SB - 30	0	83.9	Not Specified
SB - 28	0	86.7	Not Specified
SB - 31	0	84.2	Not Specified
SB - 33	0	80.3	0.5
SB - 3	0	88	Not Specified
SB - 2	0	85	Not Specified
SB - 25	0	85.8	Not Specified
SB - 1	0	85.3	0.3

Transform: Scs		
Element Name	Lag	Unitgraph Type
SB - 17	10.79	Standard
SB - 16	7.54	Standard
SB - 15	9.18	Standard
SB - 18	8.12	Standard
SB - 22	16.31	Standard
SB - 9	17.23	Standard
SB - 12	23.36	Standard
SB - 7	12.72	Standard
SB - 27	18.98	Standard
SB - 23	11.82	Standard
SB - 4	16.15	Standard
SB - 29	3.27	Standard
SB - 10	16.66	Standard
SB - 14	33.79	Standard
SB - 13	14.12	Standard
SB - 11	14.46	Standard
SB - 19	12.64	Standard
SB - 21	6.2	Standard
SB - 24	11.31	Standard
SB - 8	17.71	Standard
SB - 6	18.63	Standard
SB - 5	16.66	Standard
SB - 26	10.19	Standard
SB - 20	3.99	Standard
SB - 30	8.18	Standard
SB - 28	8.99	Standard
SB - 31	26.25	Standard
SB - 33	12.05	Standard
SB - 3	29.77	Standard
SB - 2	21.65	Standard
SB - 25	20.79	Standard
SB - 1	29.7	Standard

Global Parameter Summary - Reach

Downstream	
Element Name	Downstream
RCH - 14	J - 10
RCH - 10	J - 5
RCH - 5	J - 3
RCH - 9	J - 3
RCH - 3	J - 2
RCH - 2	J - 1
RCH - 11	J - 8
RCH - 13	J - 8
RCH - 8	J - 6
RCH - 6	J - 4
RCH - 12	J - 4
RCH - 4	J - 1
RCH - 1	Florida Canyon Wash
RCH - 7	Medium Wash

Route: Kinematic Wave												
Element Name	Method	Channel	Length (FT)	Energy Slope (FT/FT)	Mannings n	Shape	Number of Subreaches	Width (FT)	Side Slope (FT/FT)	Initial Variable	Index Parameter Type	Ir F
RCH - 14	Kinematic Wave	Kinematic Wave	2187.23	0.15	0.22	Trapezoid	5	8	4	Combined Inflow	Index Flow	1
RCH - 10	Kinematic Wave	Kinematic Wave	11173.72	0.15	0.19	Trapezoid	5	10	4	Combined Inflow	Index Flow	1
RCH - 5	Kinematic Wave	Kinematic Wave	11542.83	0.05	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	3
RCH - 9	Kinematic Wave	Kinematic Wave	6275.53	0.06	0.11	Trapezoid	5	15	4	Combined Inflow	Index Flow	1
RCH - 3	Kinematic Wave	Kinematic Wave	727.7	0.03	0.08	Trapezoid	5	200	4	Combined Inflow	Index Flow	4
RCH - 2	Kinematic Wave	Kinematic Wave	4383.33	0.03	0.11	Trapezoid	5	400	4	Combined Inflow	Index Flow	4
RCH - 11	Kinematic Wave	Kinematic Wave	1004.26	0.05	0.13	Trapezoid	5	80	4	Combined Inflow	Index Flow	8
RCH - 13	Kinematic Wave	Kinematic Wave	6298.97	0.1	0.17	Trapezoid	5	90	4	Combined Inflow	Index Flow	1
RCH - 8	Kinematic Wave	Kinematic Wave	3385.93	0.04	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	2
RCH - 6	Kinematic Wave	Kinematic Wave	5289.14	0.03	0.1	Trapezoid	5	250	4	Combined Inflow	Index Flow	2
RCH - 12	Kinematic Wave	Kinematic Wave	1501.96	0.03	0.09	Trapezoid	5	80	4	Combined Inflow	Index Flow	1
RCH - 4	Kinematic Wave	Kinematic Wave	1941.67	0.03	0.11	Trapezoid	5	300	4	Combined Inflow	Index Flow	2
RCH - 1	Kinematic Wave	Kinematic Wave	3145.34	0.02	0.1	Trapezoid	5	400	4	Combined Inflow	Index Flow	6
RCH - 7	Kinematic Wave	Kinematic Wave	5200.73	0.02	0.22	Trapezoid	5	300	4	Combined Inflow	Index Flow	10

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SB - 17	0.29	662.33	31Dec2024, 12:04	3.04
SB - 16	0.28	686.73	31Dec2024, 12:01	2.82
J - 14	0.57	1325.79	31Dec2024, 12:02	2.93
RCH - 14	0.57	1319.79	31Dec2024, 12:06	2.91
SB - 15	0.21	505.83	31Dec2024, 12:02	2.99
SB - 18	0.2	484.59	31Dec2024, 12:01	2.83
J - 10	0.98	2211.68	31Dec2024, 12:04	2.91
RCH - 10	0.98	2193.43	31Dec2024, 12:21	2.84
SB - 22	1.05	1943.59	31Dec2024, 12:09	3
SB - 9	0.55	984.48	31Dec2024, 12:10	2.98
J - 5	2.57	4157.12	31Dec2024, 12:19	2.94
RCH - 5	2.57	4117.13	31Dec2024, 12:38	2.83
SB - 12	0.65	987.51	31Dec2024, 12:15	3.04
SB - 7	0.31	671.43	31Dec2024, 12:05	3.12
J - 9	0.96	1508.25	31Dec2024, 12:10	3.06
RCH - 9	0.96	1507.07	31Dec2024, 12:19	3.03
SB - 27	0.86	1369.4	31Dec2024, 12:11	2.8
SB - 23	0.13	267.53	31Dec2024, 12:05	2.83
J - 3	4.52	5556.22	31Dec2024, 12:38	2.86
RCH - 3	4.52	5556.22	31Dec2024, 12:39	2.86
SB - 4	0.38	733.08	31Dec2024, 12:09	3.12
SB - 29	0.01	14.8	31Dec2024, 11:57	2.35

J - 2	4.91	5726.47	31Dec2024, 12:38	2.88
RCH - 2	4.91	5687.72	31Dec2024, 12:48	2.83
SB - 10	0.47	827.17	31Dec2024, 12:09	2.89
SB - 14	0.35	380.35	31Dec2024, 12:26	2.82
J - 11	0.81	1083.65	31Dec2024, 12:11	2.86
RCH - 11	0.81	1082.33	31Dec2024, 12:14	2.85
SB - 13	0.4	814.53	31Dec2024, 12:07	3.06
SB - 11	0.29	593.43	31Dec2024, 12:07	3.11
J - 13	0.69	1407.95	31Dec2024, 12:07	3.08
RCH - 13	0.69	1403.42	31Dec2024, 12:20	3
SB - 19	0.12	247.64	31Dec2024, 12:05	2.86
SB - 21	0.04	86.36	31Dec2024, 12:00	2.45
J - 8	1.66	2527.4	31Dec2024, 12:19	2.9
RCH - 8	1.66	2525.65	31Dec2024, 12:25	2.87
SB - 24	0.28	523.88	31Dec2024, 12:04	2.48
SB - 8	0.23	410.26	31Dec2024, 12:10	3.01
J - 6	2.17	2889	31Dec2024, 12:25	2.83
RCH - 6	2.17	2874.21	31Dec2024, 12:36	2.77
SB - 6	0.44	776.64	31Dec2024, 12:11	3.08
SB - 5	0.31	598.6	31Dec2024, 12:09	3.13
J - 12	0.76	1370.84	31Dec2024, 12:10	3.1
RCH - 12	0.76	1368.64	31Dec2024, 12:13	3.09
SB - 26	0.18	370.3	31Dec2024, 12:03	2.63
SB - 20	0.01	35.93	31Dec2024, 11:57	2.69
J - 4	3.12	3460.08	31Dec2024, 12:36	2.84
RCH - 4	3.12	3453.45	31Dec2024, 12:41	2.81
SB - 30	0.2	443.81	31Dec2024, 12:02	2.59
SB - 28	0.18	413.45	31Dec2024, 12:02	2.84
J - 1	8.4	8849.32	31Dec2024, 12:40	2.82
RCH - 1	8.4	8847	31Dec2024, 12:46	2.78
SB - 31	0.41	496.01	31Dec2024, 12:19	2.6
SB - 33	0.06	96.46	31Dec2024, 12:05	2.27
Florida Canyon Wash	8.87	9082.86	31Dec2024, 12:46	2.77
SB - 3	0.74	924.66	31Dec2024, 12:22	2.95
SB - 2	0.28	394.21	31Dec2024, 12:14	2.68
J - 7	1.02	1283.67	31Dec2024, 12:19	2.87
RCH - 7	1.02	1279.15	31Dec2024, 12:51	2.7
SB - 25	0.41	605.81	31Dec2024, 12:13	2.75
Medium Wash	1.43	1428.41	31Dec2024, 12:50	2.71
SB - 1	0.25	289.58	31Dec2024, 12:22	2.74
Small Wash	0.25	289.58	31Dec2024, 12:22	2.74

Subbasin: SB - 17

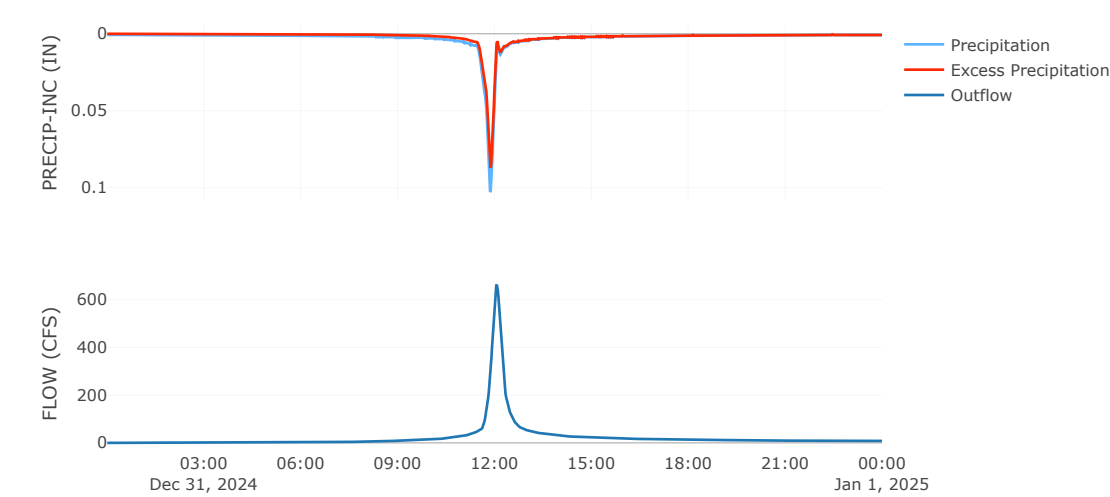
Area (MI2) : 0.29
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 14

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.8

Transform: Scs	
Lag	10.79
Unitgraph Type	Standard

Results: SB - 17	
Peak Discharge (CFS)	662.33
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	3.04
Precipitation Volume (AC - FT)	65.27
Loss Volume (AC - FT)	18.55
Excess Volume (AC - FT)	46.72
Direct Runoff Volume (AC - FT)	46.56
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 16

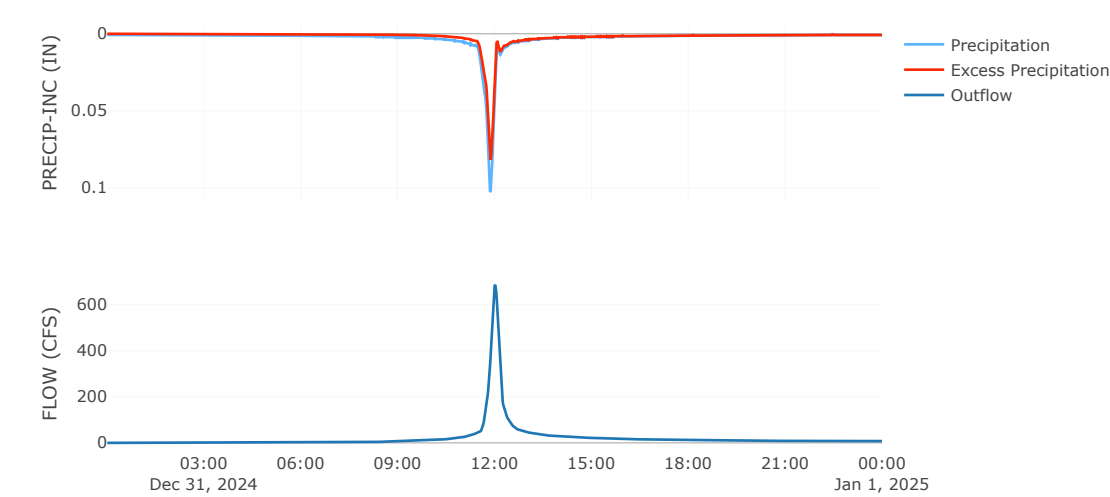
Area (MI2) : 0.28
Latitude Degrees : 31.73
Longitude Degrees : -110.83
Downstream : J - 14

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	86.4

Transform: SCS	
Lag	7.54
Unitgraph Type	Standard

Results: SB - 16	
Peak Discharge (CFS)	686.73
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	2.82
Precipitation Volume (AC - FT)	63.4
Loss Volume (AC - FT)	21.42
Excess Volume (AC - FT)	41.99
Direct Runoff Volume (AC - FT)	41.88
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



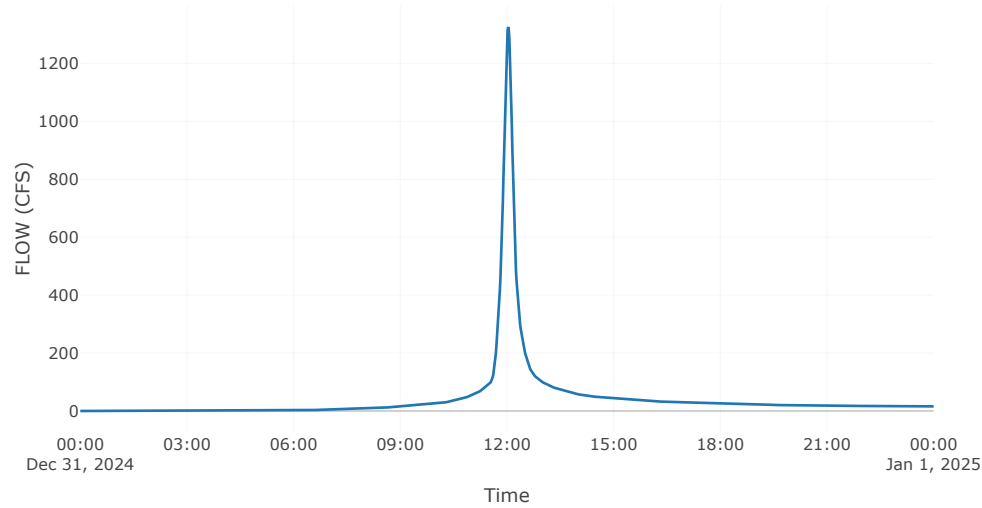
Junction: J - 14

Downstream : RCH - 14

Results: J - 14

Peak Discharge (CFS)	1325.79
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.93

Outflow

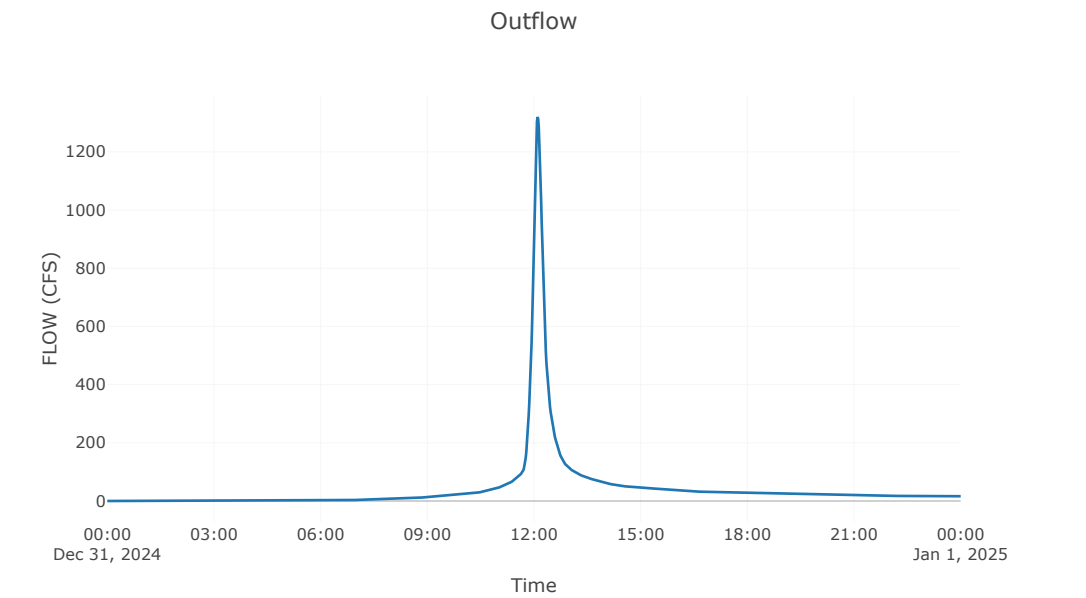


Reach: RCH - 14

Downstream : J - 10

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	2187.23
Energy Slope (FT/FT)	0.15
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	8
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1081

Results: RCH - 14	
Peak Discharge (CFS)	1319.79
Time of Peak Discharge	31Dec2024, 12:06
Volume (IN)	2.91
Peak Inflow (CFS)	1325.79
Inflow Volume (AC - FT)	88.44



Subbasin: SB - 15

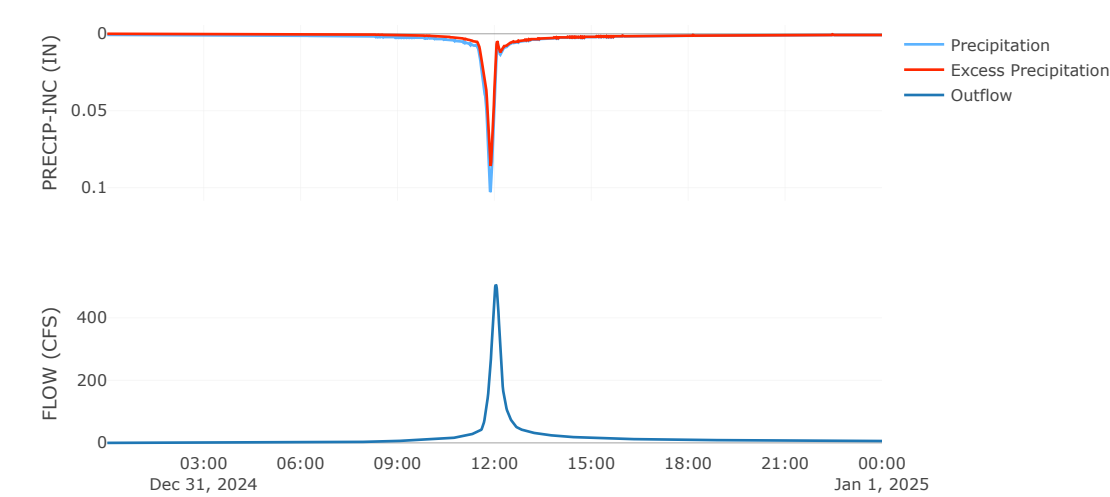
Area (MI2) : 0.21
Latitude Degrees : 31.73
Longitude Degrees : -110.85
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	9.18
Unitgraph Type	Standard

Results: SB - 15	
Peak Discharge (CFS)	505.83
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.99
Precipitation Volume (AC - FT)	47.49
Loss Volume (AC - FT)	14.14
Excess Volume (AC - FT)	33.34
Direct Runoff Volume (AC - FT)	33.25
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 18

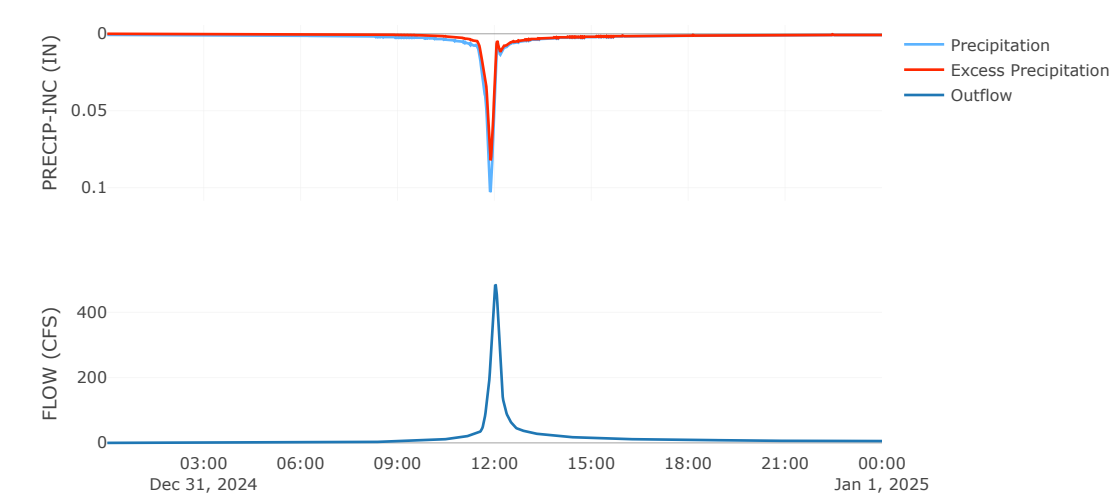
Area (MI2) : 0.2
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.5

Transform: Scs	
Lag	8.12
Unitgraph Type	Standard

Results: SB - 18	
Peak Discharge (CFS)	484.59
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	2.83
Precipitation Volume (AC - FT)	45.71
Loss Volume (AC - FT)	15.34
Excess Volume (AC - FT)	30.37
Direct Runoff Volume (AC - FT)	30.29
Baseflow Volume (AC - FT)	0

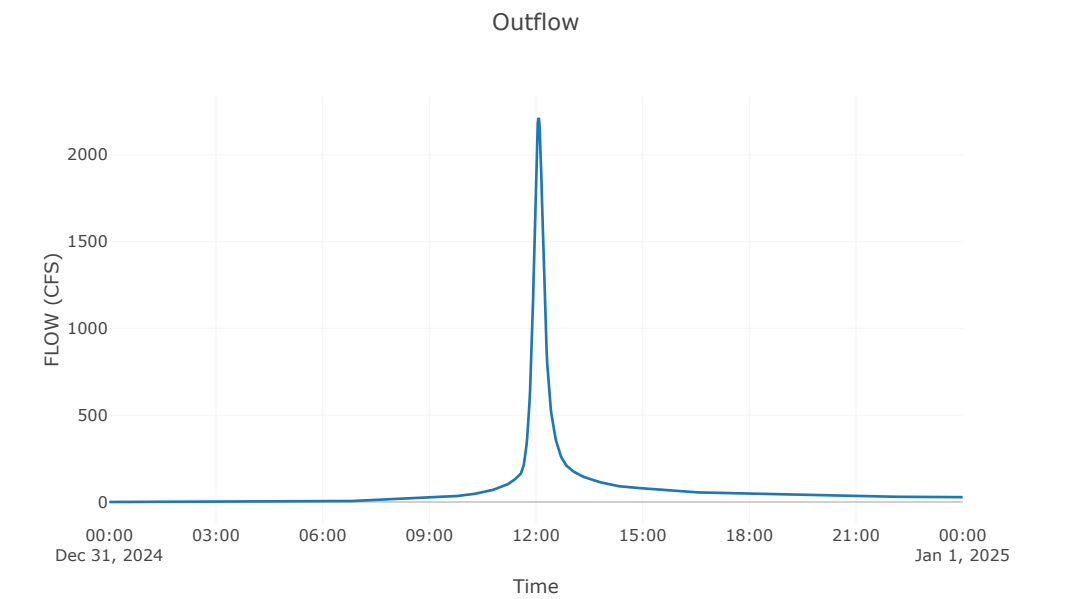
Precipitation and Outflow



Junction: J - 10

Downstream : RCH - 10

Results: J - 10	
Peak Discharge (CFS)	2211.68
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	2.91

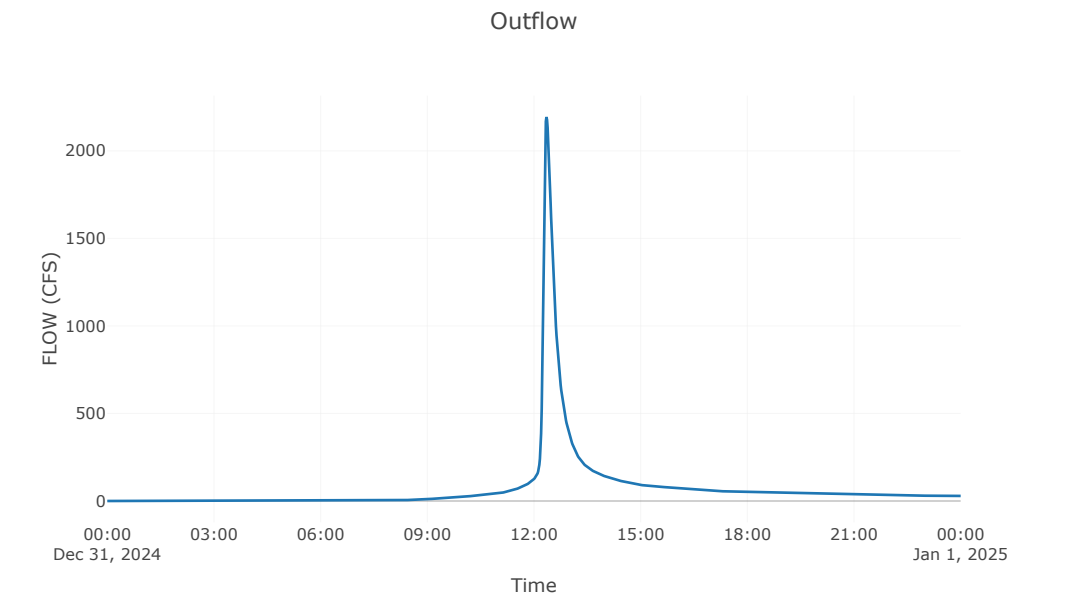


Reach: RCH - 10

Downstream : J - 5

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11173.72
Energy Slope (FT/FT)	0.15
Mannings n	0.19
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	10
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1793

Results: RCH - 10	
Peak Discharge (CFS)	2193.43
Time of Peak Discharge	31Dec2024, 12:21
Volume (IN)	2.84
Peak Inflow (CFS)	2211.68
Inflow Volume (AC - FT)	151.43



Subbasin: SB - 22

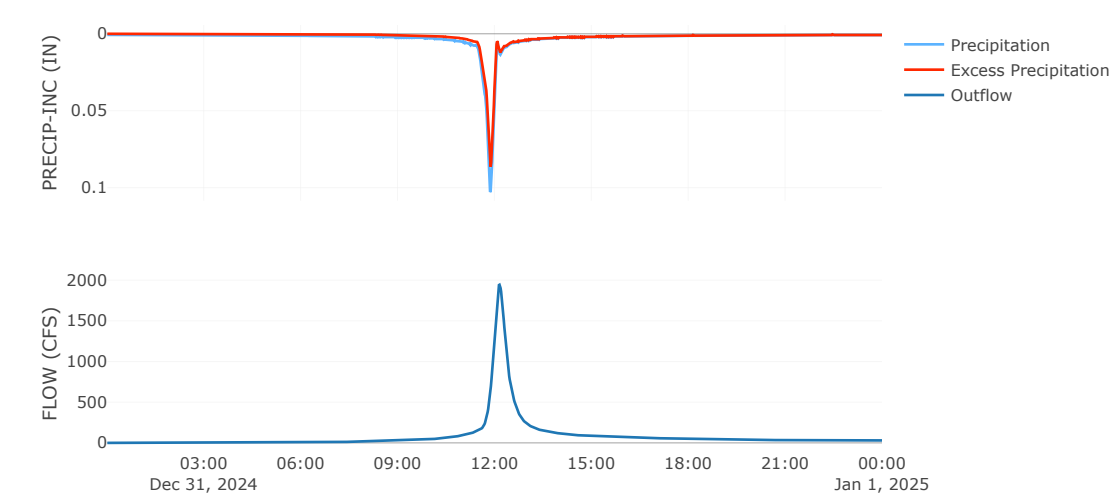
Area (MI2) : 1.05
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.4

Transform: Scs	
Lag	16.31
Unitgraph Type	Standard

Results: SB - 22	
Peak Discharge (CFS)	1943.59
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3
Precipitation Volume (AC - FT)	238.31
Loss Volume (AC - FT)	69.89
Excess Volume (AC - FT)	168.42
Direct Runoff Volume (AC - FT)	167.54
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 9

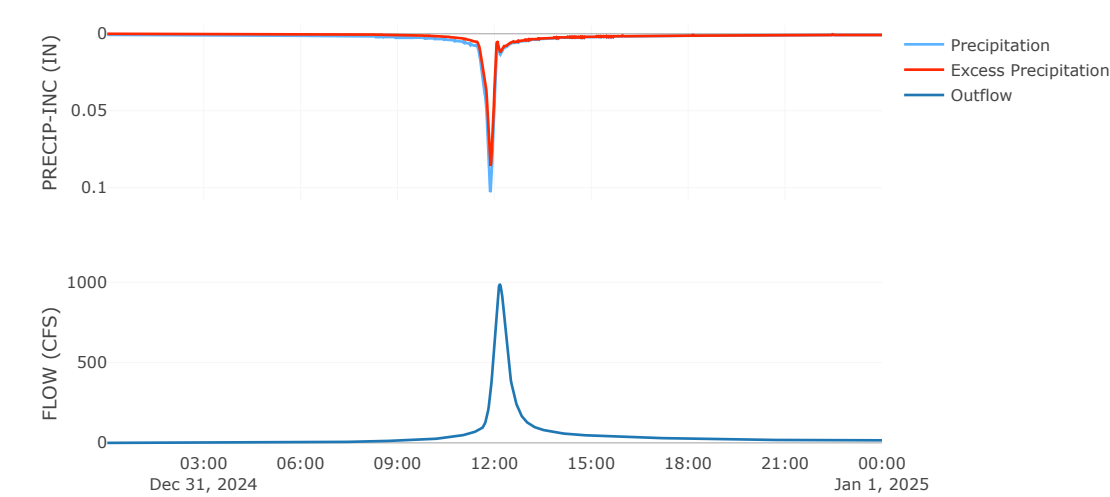
Area (MI2) : 0.55
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	17.23
Unitgraph Type	Standard

Results: SB - 9	
Peak Discharge (CFS)	984.48
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	2.98
Precipitation Volume (AC - FT)	125.35
Loss Volume (AC - FT)	37.33
Excess Volume (AC - FT)	88.02
Direct Runoff Volume (AC - FT)	87.54
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



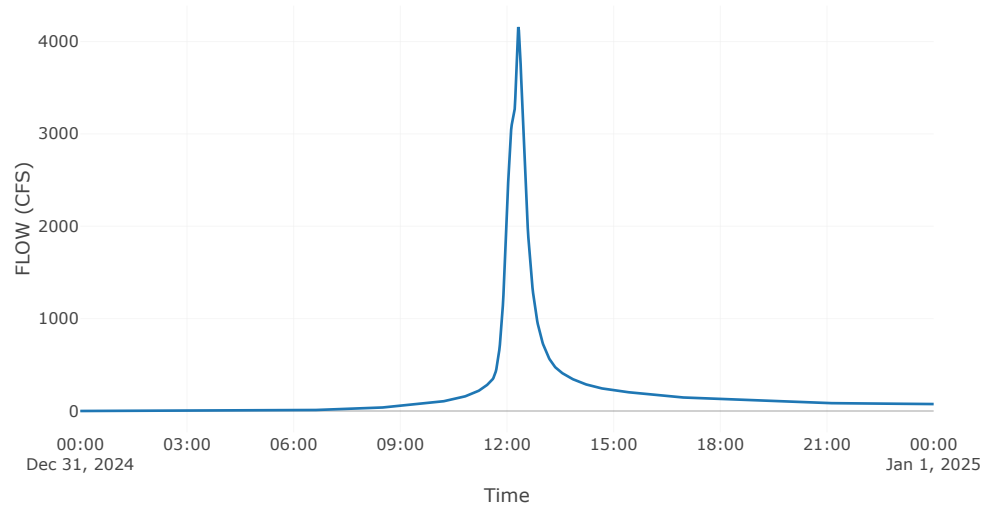
Junction: J - 5

Downstream : RCH - 5

Results: J - 5

Peak Discharge (CFS)	4157.12
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.94

Outflow

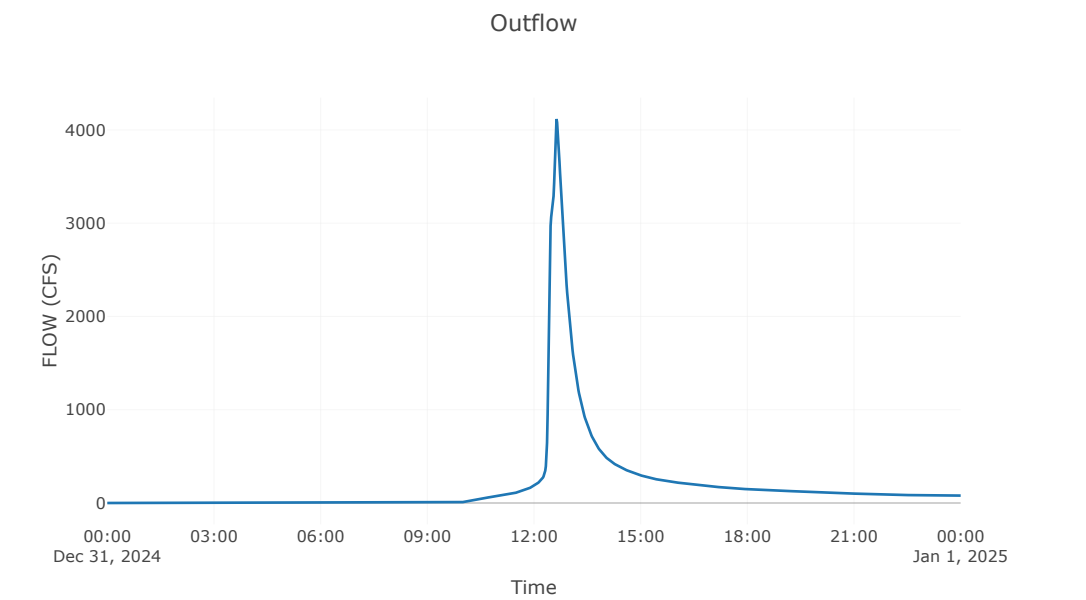


Reach: RCH - 5

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11542.83
Energy Slope (FT/FT)	0.05
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	3272

Results: RCH - 5	
Peak Discharge (CFS)	4117.13
Time of Peak Discharge	31Dec2024, 12:38
Volume (IN)	2.83
Peak Inflow (CFS)	4157.12
Inflow Volume (AC - FT)	403.03



Subbasin: SB - 12

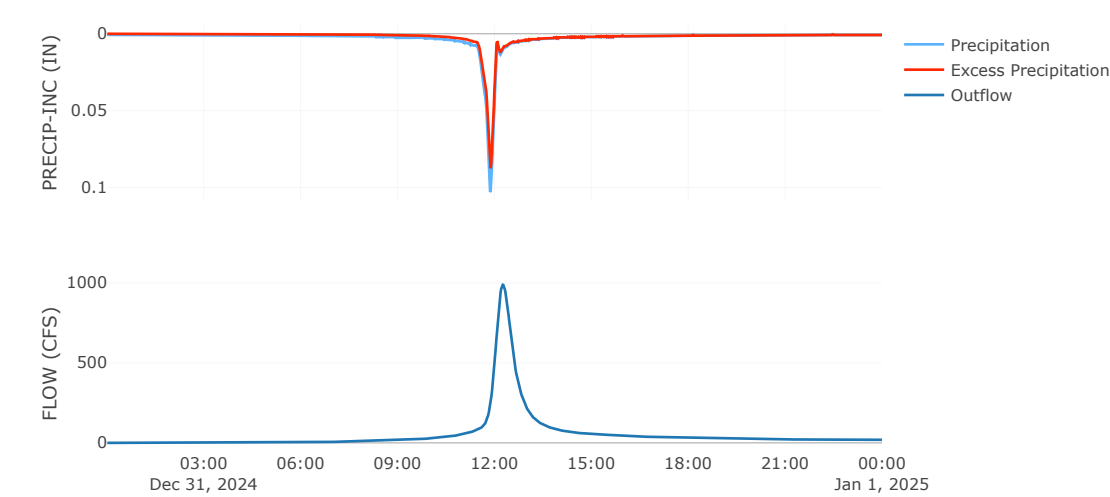
Area (MI2) : 0.65
Latitude Degrees : 31.75
Longitude Degrees : -110.85
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.9

Transform: Scs	
Lag	23.36
Unitgraph Type	Standard

Results: SB - 12	
Peak Discharge (CFS)	987.51
Time of Peak Discharge	31Dec2024, 12:15
Volume (IN)	3.04
Precipitation Volume (AC - FT)	148.78
Loss Volume (AC - FT)	41.94
Excess Volume (AC - FT)	106.84
Direct Runoff Volume (AC - FT)	106.05
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 7

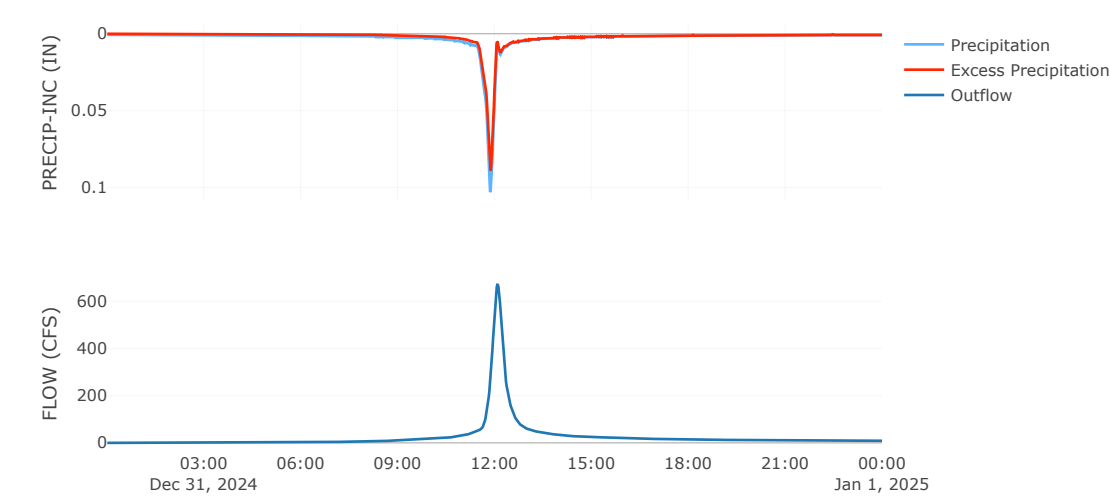
Area (MI2) : 0.31
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.6

Transform: Scs	
Lag	12.72
Unitgraph Type	Standard

Results: SB - 7	
Peak Discharge (CFS)	671.43
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	3.12
Precipitation Volume (AC - FT)	69.91
Loss Volume (AC - FT)	18.58
Excess Volume (AC - FT)	51.33
Direct Runoff Volume (AC - FT)	51.12
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



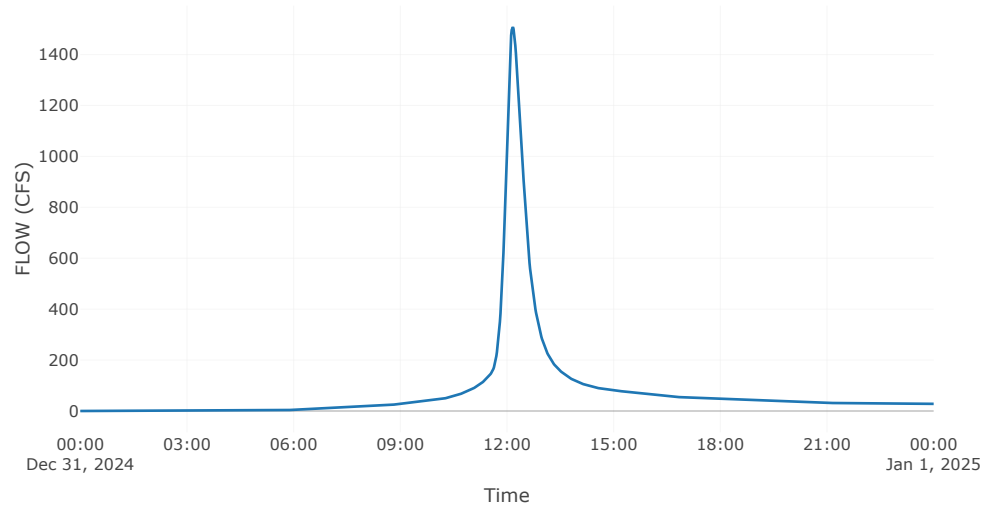
Junction: J - 9

Downstream : RCH - 9

Results: J - 9

Peak Discharge (CFS)	1508.25
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.06

Outflow

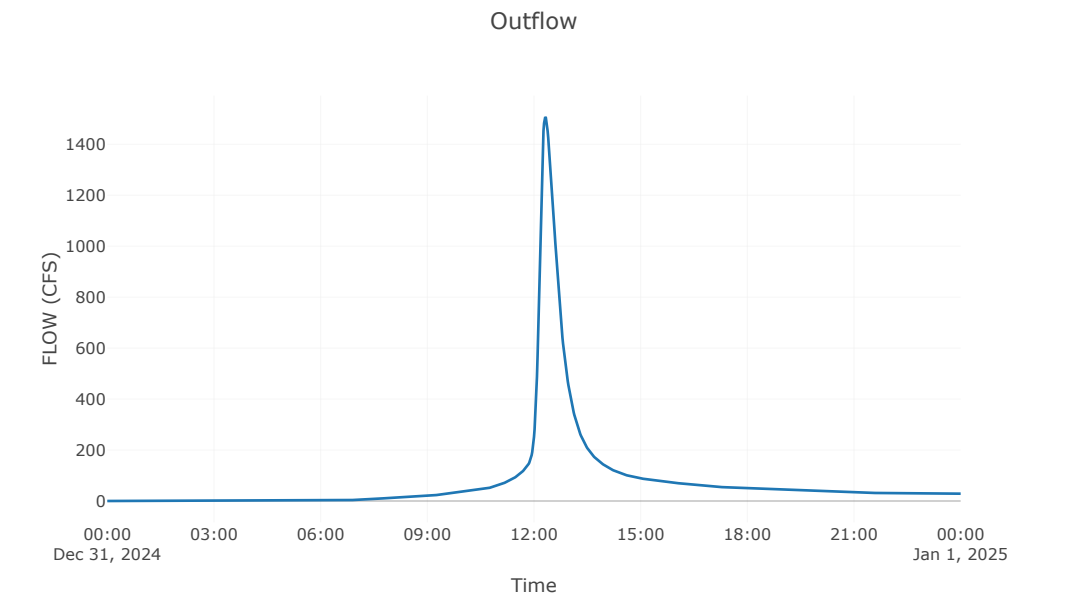


Reach: RCH - 9

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6275.53
Energy Slope (FT/FT)	0.06
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	15
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1237

Results: RCH - 9	
Peak Discharge (CFS)	1507.07
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	3.03
Peak Inflow (CFS)	1508.25
Inflow Volume (AC - FT)	157.17



Subbasin: SB - 27

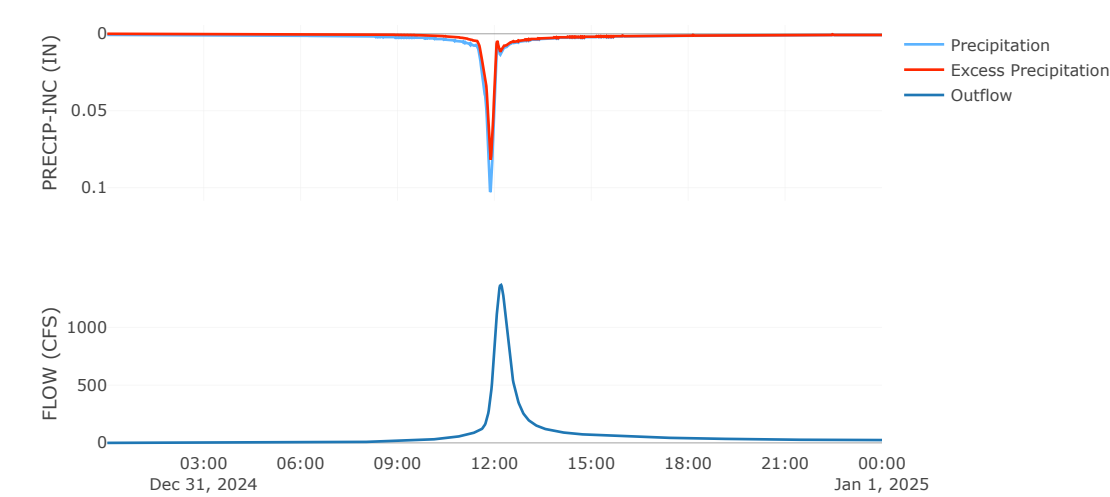
Area (MI2) : 0.86
Latitude Degrees : 31.76
Longitude Degrees : -110.85
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.3

Transform: Scs	
Lag	18.98
Unitgraph Type	Standard

Results: SB - 27	
Peak Discharge (CFS)	1369.4
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	2.8
Precipitation Volume (AC - FT)	195.42
Loss Volume (AC - FT)	66.43
Excess Volume (AC - FT)	128.99
Direct Runoff Volume (AC - FT)	128.17
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 23

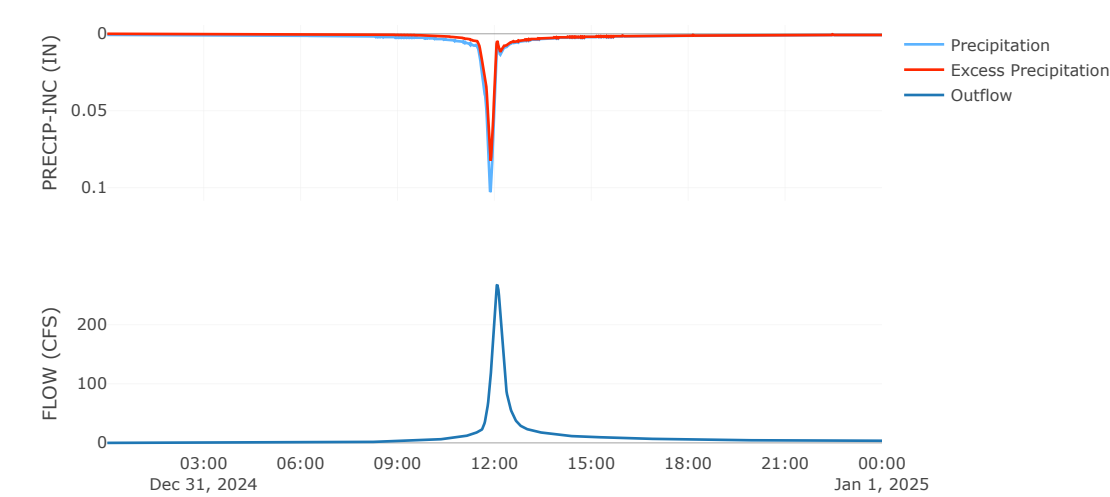
Area (MI2) : 0.13
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.6

Transform: Scs	
Lag	11.82
Unitgraph Type	Standard

Results: SB - 23	
Peak Discharge (CFS)	267.53
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	2.83
Precipitation Volume (AC - FT)	29.2
Loss Volume (AC - FT)	9.74
Excess Volume (AC - FT)	19.47
Direct Runoff Volume (AC - FT)	19.39
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



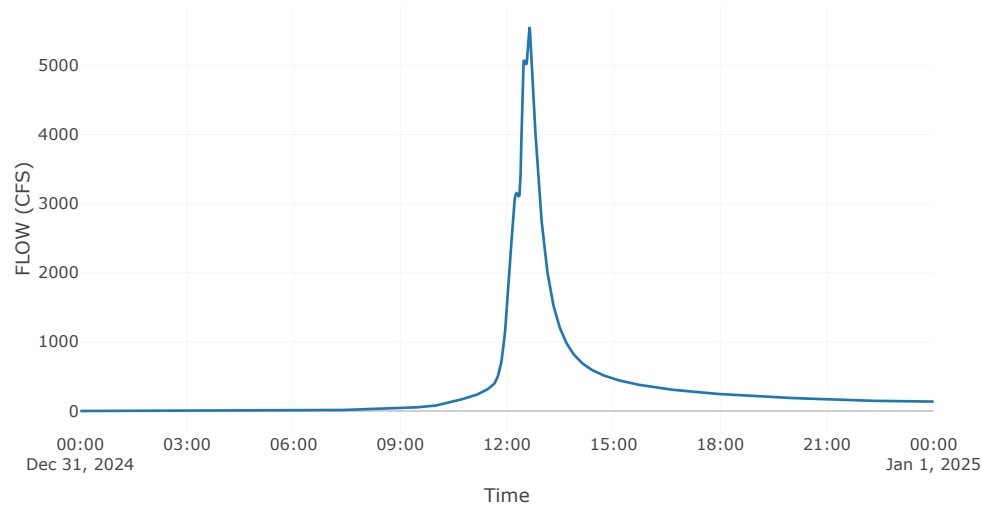
Junction: J - 3

Downstream : RCH - 3

Results: J - 3

Peak Discharge (CFS)	5556.22
Time of Peak Discharge	31Dec2024, 12:38
Volume (IN)	2.86

Outflow

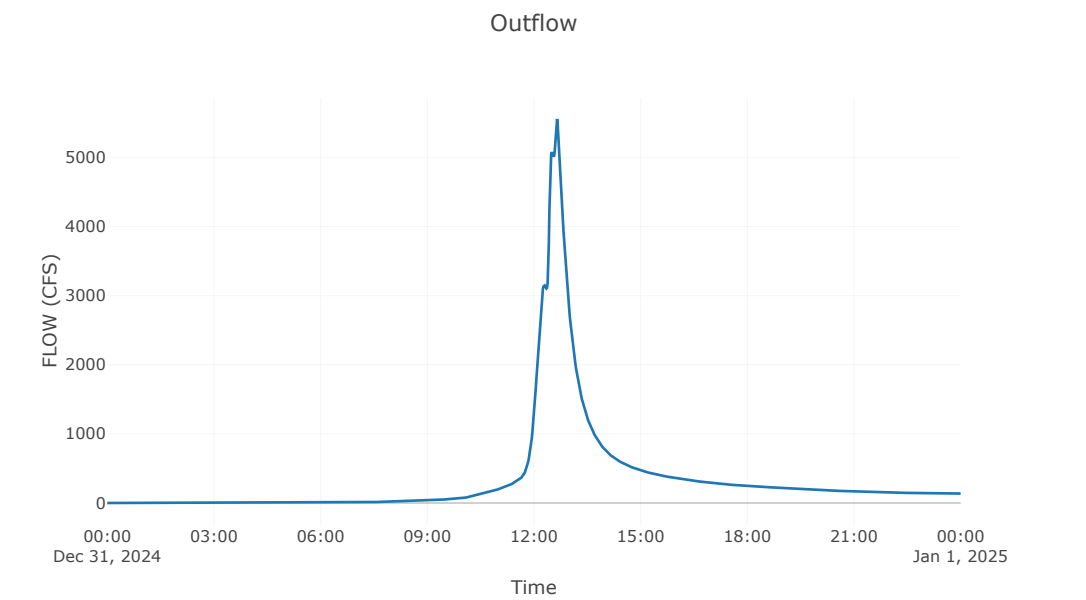


Reach: RCH - 3

Downstream : J - 2

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	727.7
Energy Slope (FT/FT)	0.03
Mannings n	0.08
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	200
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4227

Results: RCH - 3	
Peak Discharge (CFS)	5556.22
Time of Peak Discharge	31Dec2024, 12:39
Volume (IN)	2.86
Peak Inflow (CFS)	5556.22
Inflow Volume (AC - FT)	691.25



Subbasin: SB - 4

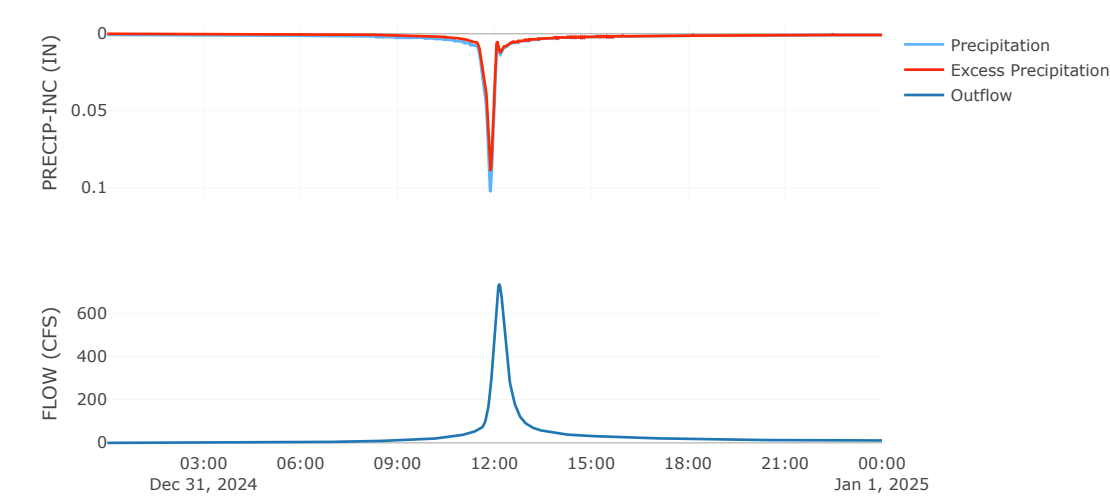
Area (MI2) : 0.38
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.7

Transform: Scs	
Lag	16.15
Unitgraph Type	Standard

Results: SB - 4	
Peak Discharge (CFS)	733.08
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.12
Precipitation Volume (AC - FT)	86.35
Loss Volume (AC - FT)	22.75
Excess Volume (AC - FT)	63.6
Direct Runoff Volume (AC - FT)	63.28
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 29

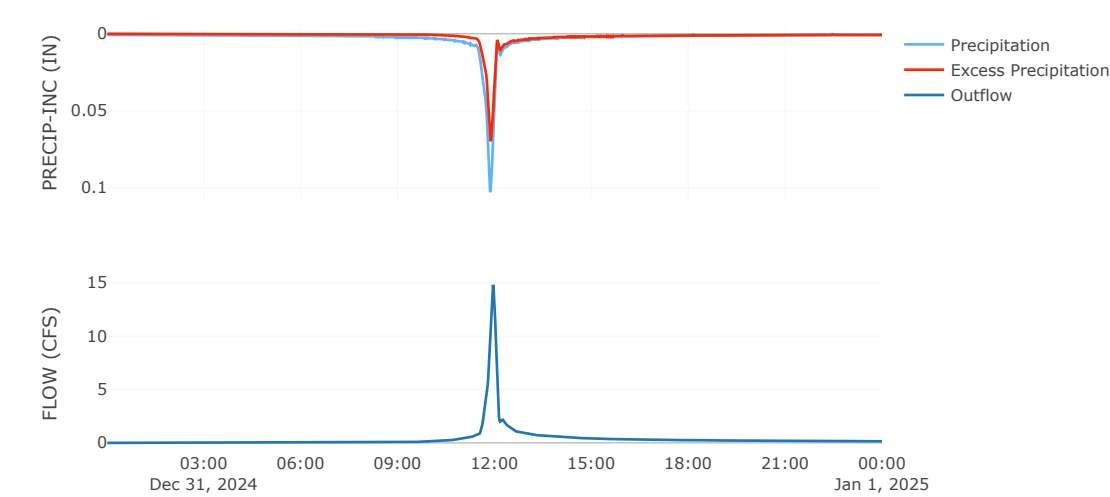
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	81.1

Transform: Scs	
Lag	3.27
Unitgraph Type	Standard

Results: SB - 29	
Peak Discharge (CFS)	14.8
Time of Peak Discharge	31Dec2024, 11:57
Volume (IN)	2.35
Precipitation Volume (AC - FT)	1.36
Loss Volume (AC - FT)	0.61
Excess Volume (AC - FT)	0.75
Direct Runoff Volume (AC - FT)	0.75
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



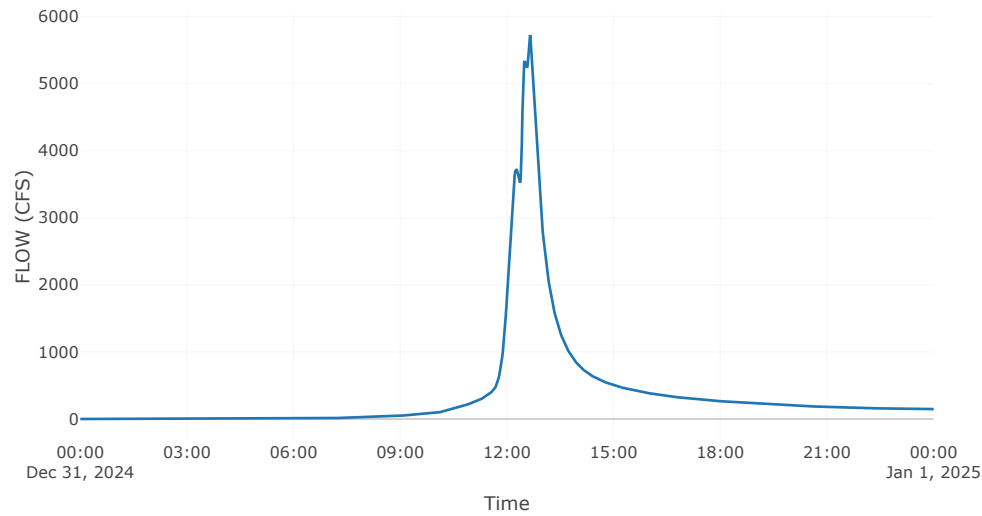
Junction: J - 2

Downstream : RCH - 2

Results: J - 2

Peak Discharge (CFS)	5726.47
Time of Peak Discharge	31Dec2024, 12:38
Volume (IN)	2.88

Outflow

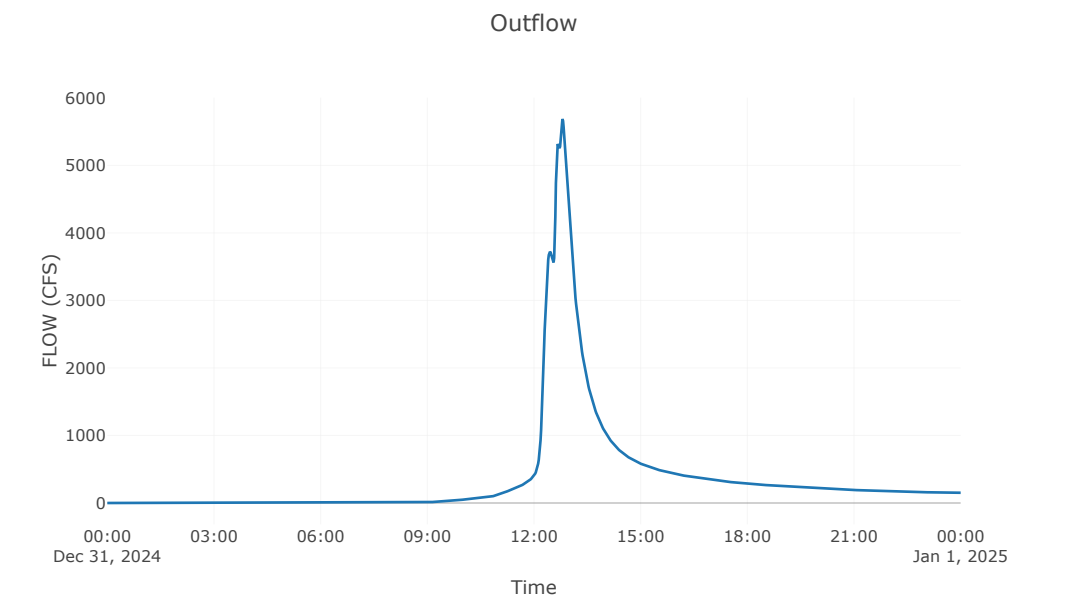


Reach: RCH - 2

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	4383.33
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4346

Results: RCH - 2	
Peak Discharge (CFS)	5687.72
Time of Peak Discharge	31Dec2024, 12:48
Volume (IN)	2.83
Peak Inflow (CFS)	5726.47
Inflow Volume (AC - FT)	753.98



Subbasin: SB - 10

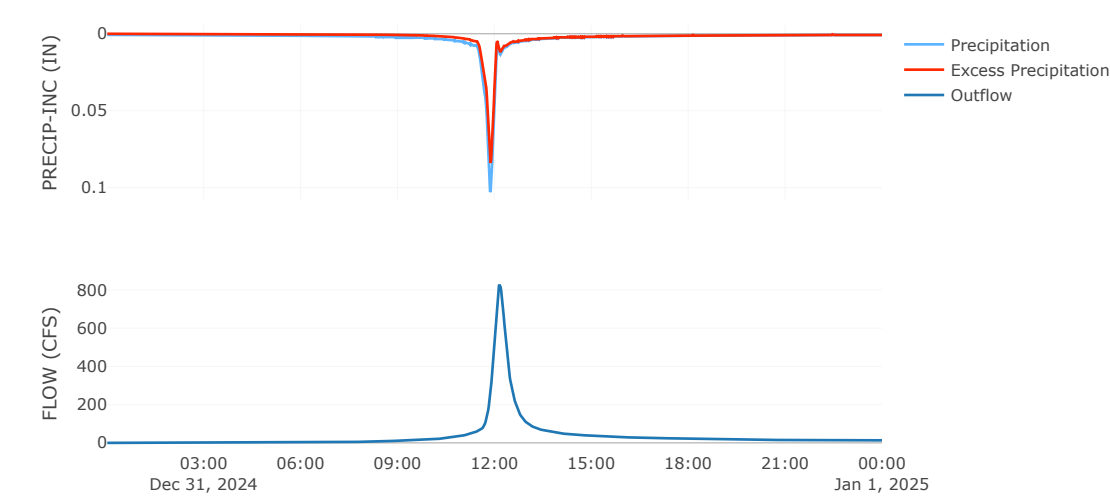
Area (MI2) : 0.47
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	87.3

Transform: SCS	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 10	
Peak Discharge (CFS)	827.17
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	2.89
Precipitation Volume (AC - FT)	105.93
Loss Volume (AC - FT)	33.68
Excess Volume (AC - FT)	72.25
Direct Runoff Volume (AC - FT)	71.86
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 14

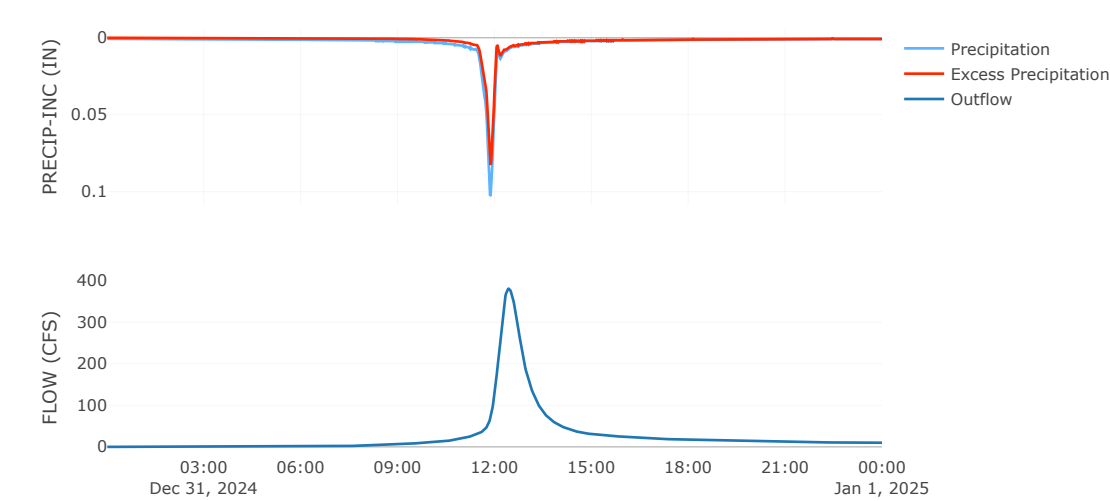
Area (MI2) : 0.35
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	33.79
Unitgraph Type	Standard

Results: SB - 14	
Peak Discharge (CFS)	380.35
Time of Peak Discharge	31Dec2024, 12:26
Volume (IN)	2.82
Precipitation Volume (AC - FT)	78.76
Loss Volume (AC - FT)	26.08
Excess Volume (AC - FT)	52.67
Direct Runoff Volume (AC - FT)	52.08
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



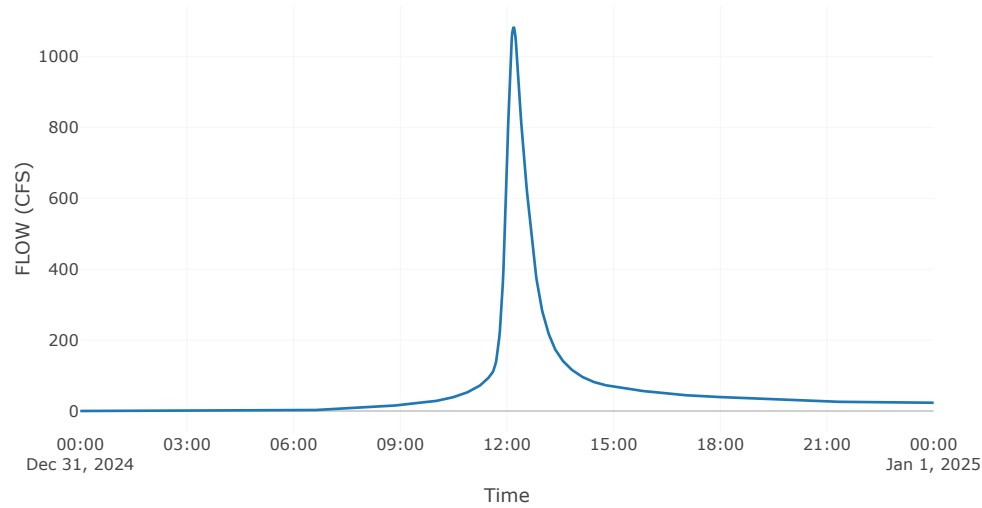
Junction: J - 11

Downstream : RCH - 11

Results: J - 11

Peak Discharge (CFS)	1083.65
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	2.86

Outflow

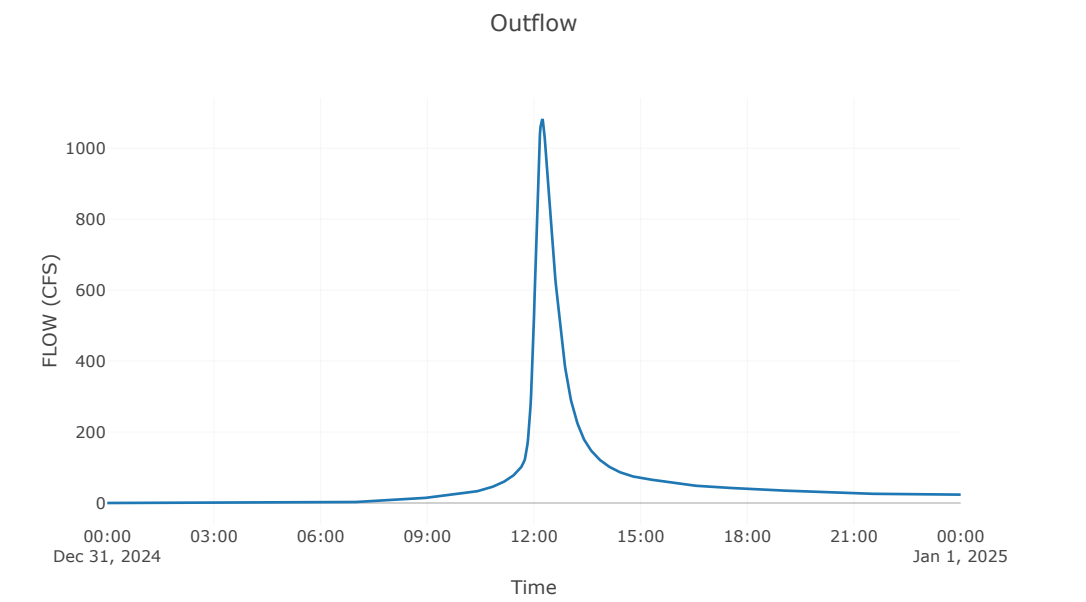


Reach: RCH - II

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1004.26
Energy Slope (FT/FT)	0.05
Mannings n	0.13
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	877

Results: RCH - II	
Peak Discharge (CFS)	1082.33
Time of Peak Discharge	31Dec2024, 12:14
Volume (IN)	2.85
Peak Inflow (CFS)	1083.65
Inflow Volume (AC - FT)	123.93



Subbasin: SB - 13

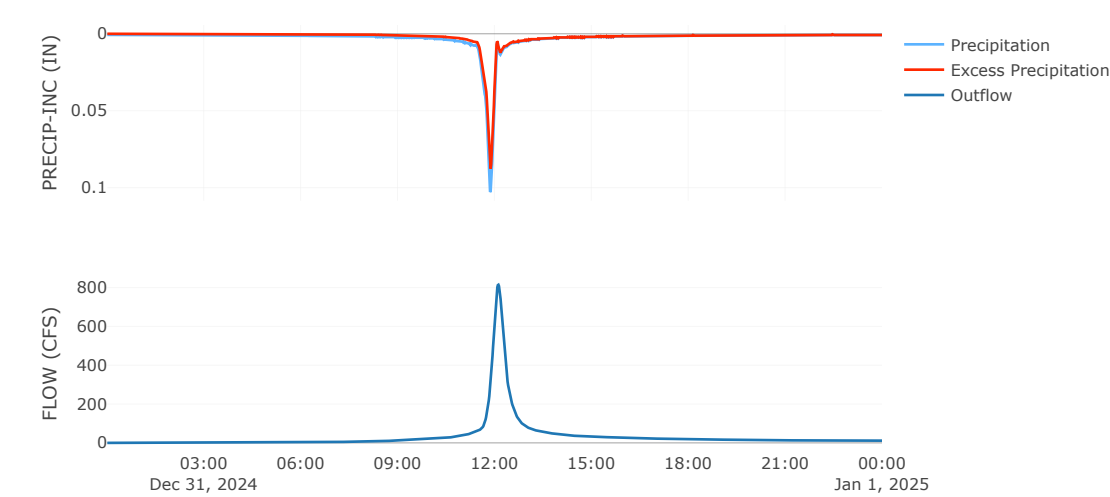
Area (MI2) : 0.4
Latitude Degrees : 31.74
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	89

Transform: SCS	
Lag	14.12
Unitgraph Type	Standard

Results: SB - 13	
Peak Discharge (CFS)	814.53
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.06
Precipitation Volume (AC - FT)	90.79
Loss Volume (AC - FT)	25.39
Excess Volume (AC - FT)	65.4
Direct Runoff Volume (AC - FT)	65.11
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 11

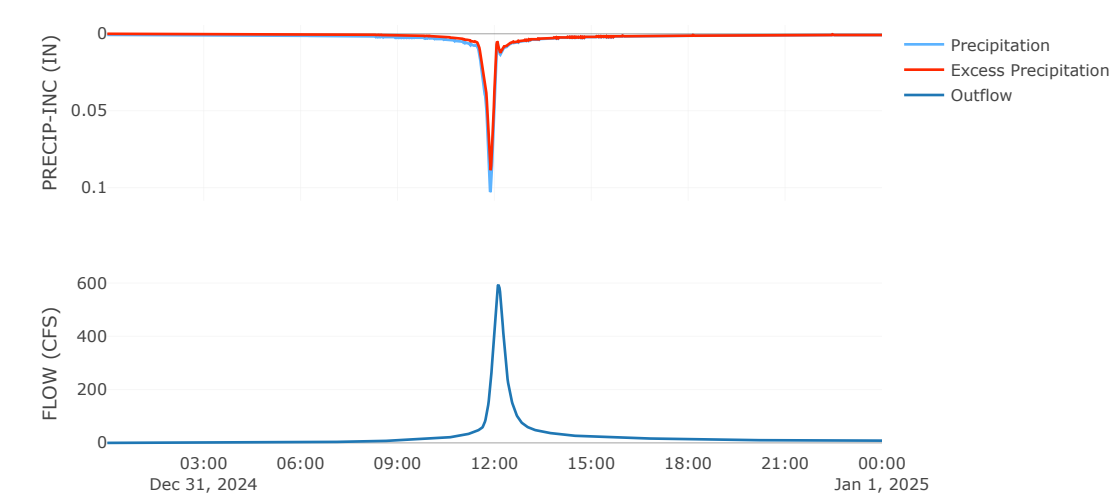
Area (MI2) : 0.29
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	89.5

Transform: SCS	
Lag	14.46
Unitgraph Type	Standard

Results: SB - 11	
Peak Discharge (CFS)	593.43
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.11
Precipitation Volume (AC - FT)	66.07
Loss Volume (AC - FT)	17.71
Excess Volume (AC - FT)	48.35
Direct Runoff Volume (AC - FT)	48.13
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



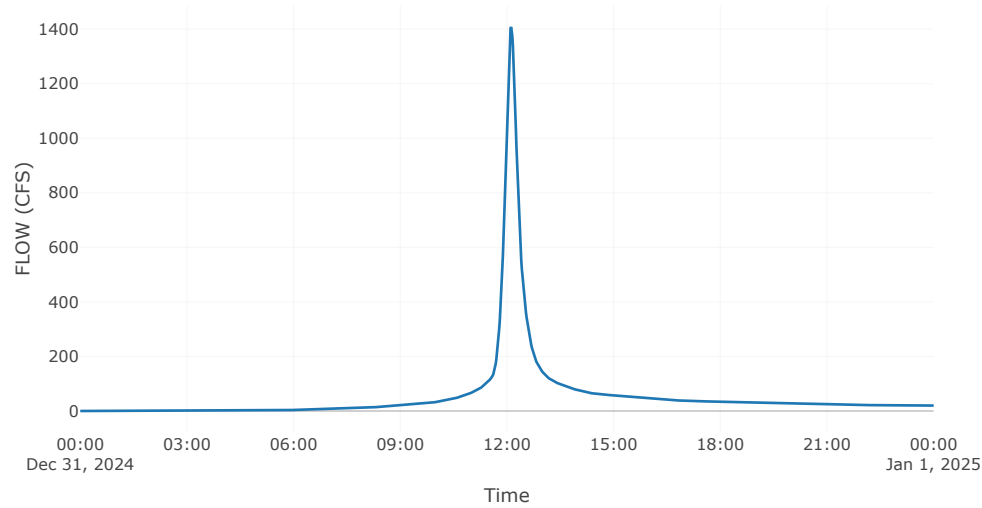
Junction: J - 13

Downstream : RCH - 13

Results: J - 13

Peak Discharge (CFS)	1407.95
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.08

Outflow

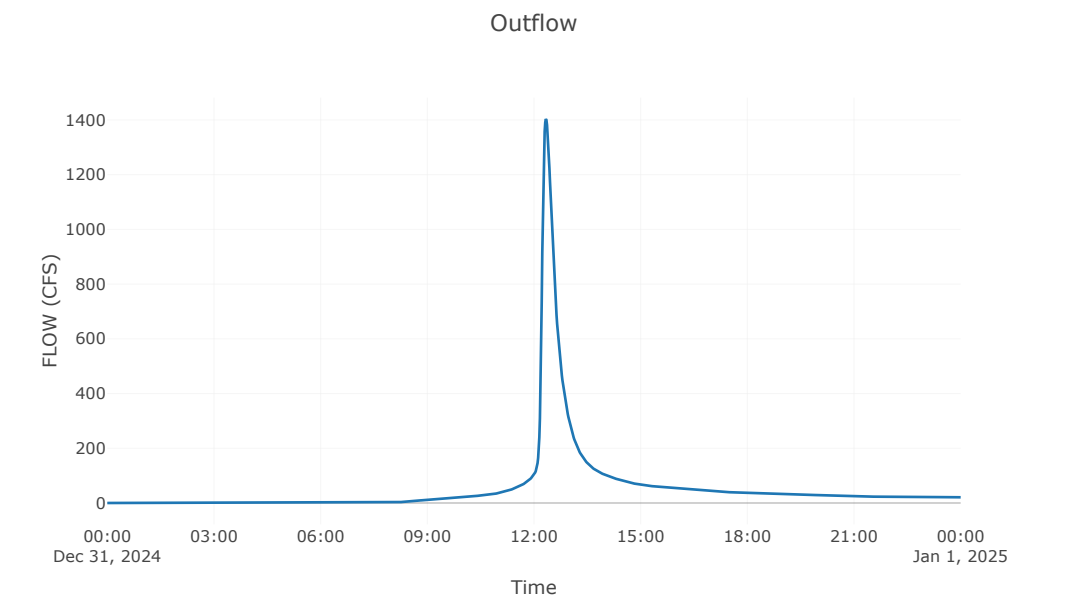


Reach: RCH - 13

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6298.97
Energy Slope (FT/FT)	0.1
Mannings n	0.17
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	90
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1157

Results: RCH - 13	
Peak Discharge (CFS)	1403.42
Time of Peak Discharge	31Dec2024, 12:20
Volume (IN)	3
Peak Inflow (CFS)	1407.95
Inflow Volume (AC - FT)	113.24



Subbasin: SB - 19

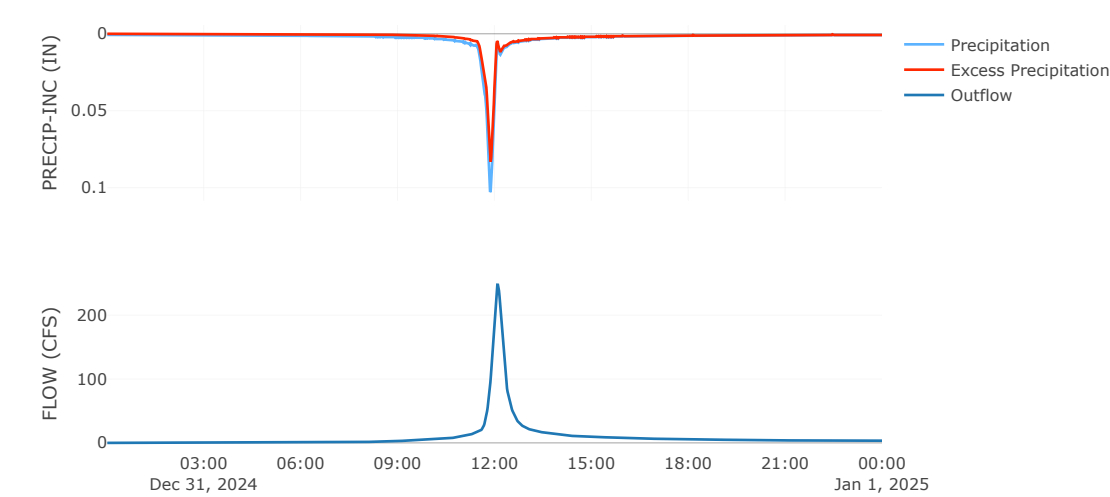
Area (MI2) : 0.12
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 8

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.9

Transform: Scs	
Lag	12.64
Unitgraph Type	Standard

Results: SB - 19	
Peak Discharge (CFS)	247.64
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	2.86
Precipitation Volume (AC - FT)	27.7
Loss Volume (AC - FT)	9.05
Excess Volume (AC - FT)	18.65
Direct Runoff Volume (AC - FT)	18.57
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 21

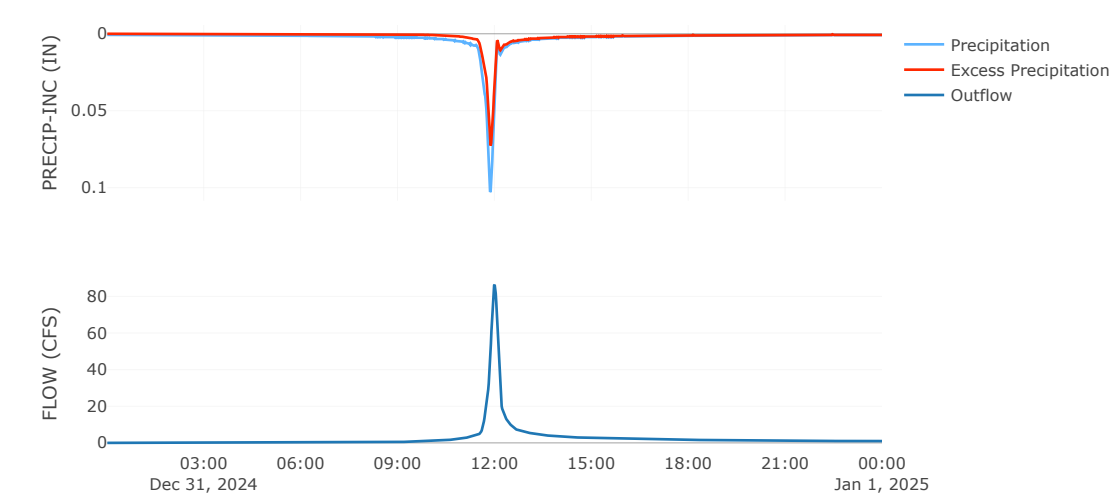
Area (MI2) : 0.04
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 8

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	82.3

Transform: Scs	
Lag	6.2
Unitgraph Type	Standard

Results: SB - 21	
Peak Discharge (CFS)	86.36
Time of Peak Discharge	31Dec2024, 12:00
Volume (IN)	2.45
Precipitation Volume (AC - FT)	8.57
Loss Volume (AC - FT)	3.64
Excess Volume (AC - FT)	4.94
Direct Runoff Volume (AC - FT)	4.93
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

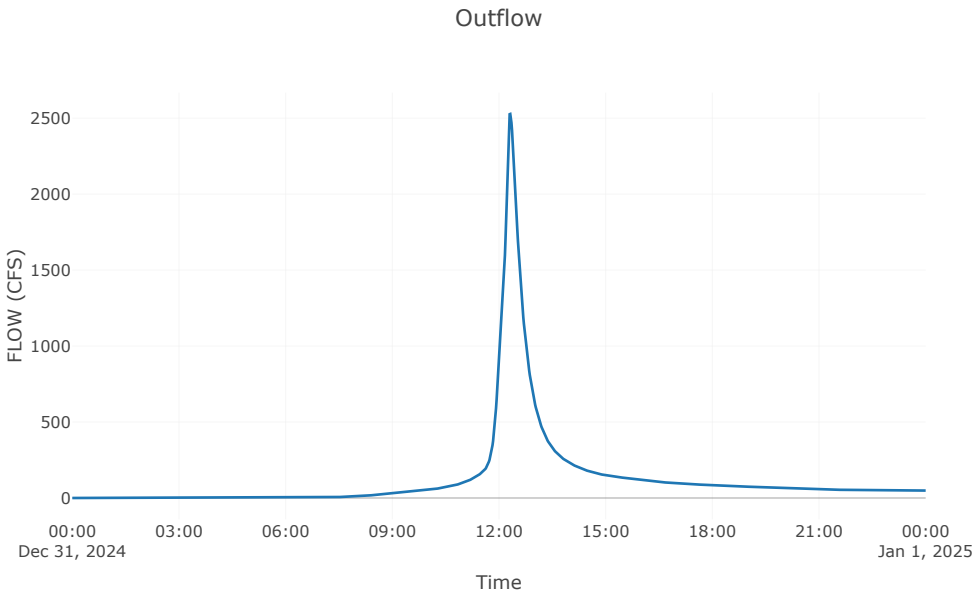


Junction: J - 8

Downstream : RCH - 8

Results: J - 8

Peak Discharge (CFS)	2527.4
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.9

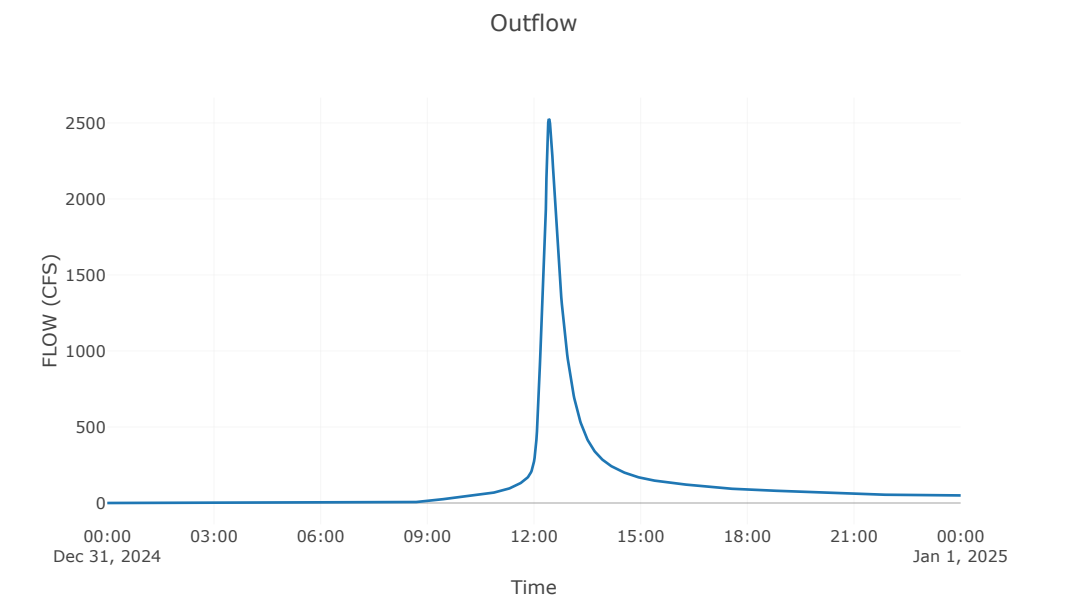


Reach: RCH - 8

Downstream : J - 6

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3385.93
Energy Slope (FT/FT)	0.04
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2043

Results: RCH - 8	
Peak Discharge (CFS)	2525.65
Time of Peak Discharge	31Dec2024, 12:25
Volume (IN)	2.87
Peak Inflow (CFS)	2527.4
Inflow Volume (AC - FT)	257.22



Subbasin: SB - 24

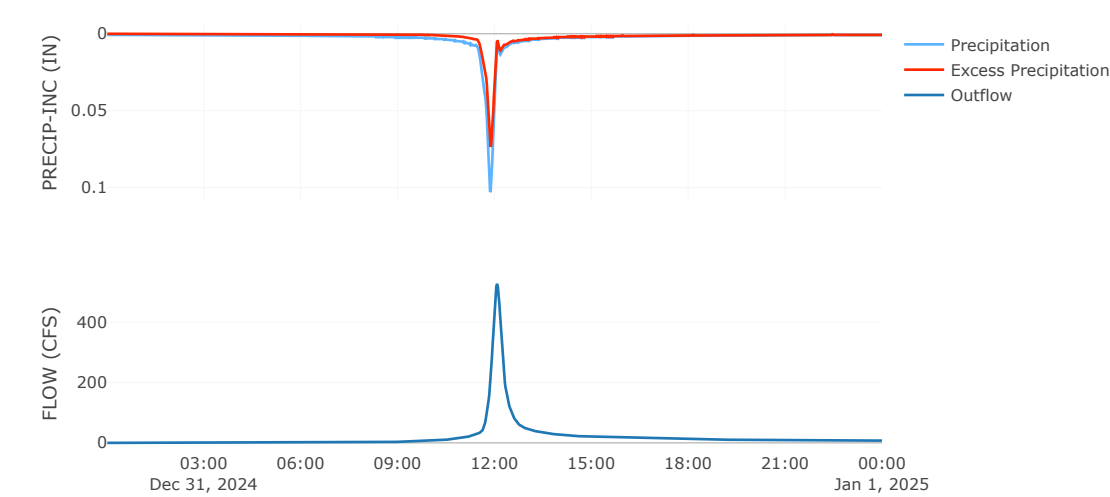
Area (MI2) : 0.28
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 6

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	82.7

Transform: SCS	
Lag	11.31
Unitgraph Type	Standard

Results: SB - 24	
Peak Discharge (CFS)	523.88
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	2.48
Precipitation Volume (AC - FT)	63.45
Loss Volume (AC - FT)	26.39
Excess Volume (AC - FT)	37.06
Direct Runoff Volume (AC - FT)	36.91
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 8

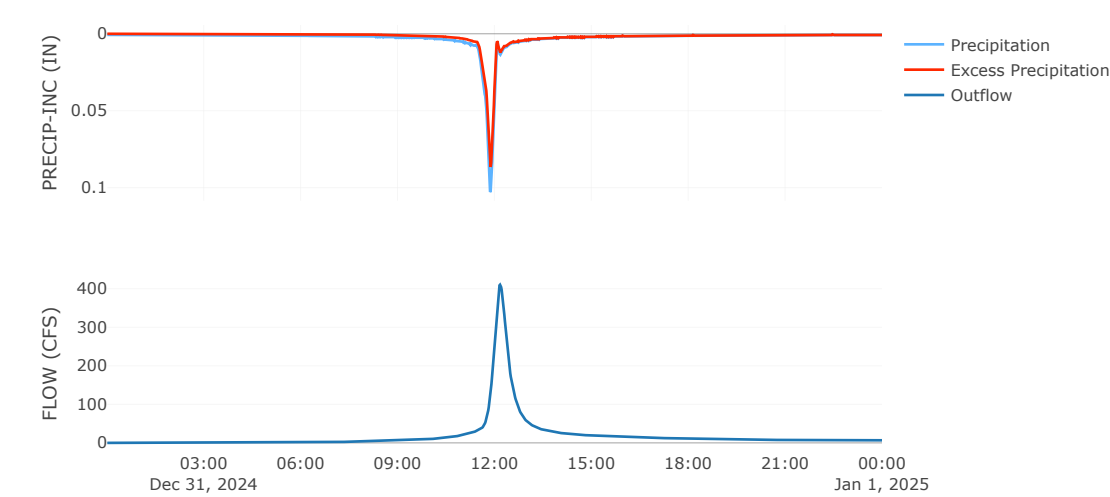
Area (MI2) : 0.23
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 6

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.5

Transform: Scs	
Lag	17.71
Unitgraph Type	Standard

Results: SB - 8	
Peak Discharge (CFS)	410.26
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.01
Precipitation Volume (AC - FT)	52.6
Loss Volume (AC - FT)	15.31
Excess Volume (AC - FT)	37.29
Direct Runoff Volume (AC - FT)	37.08
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



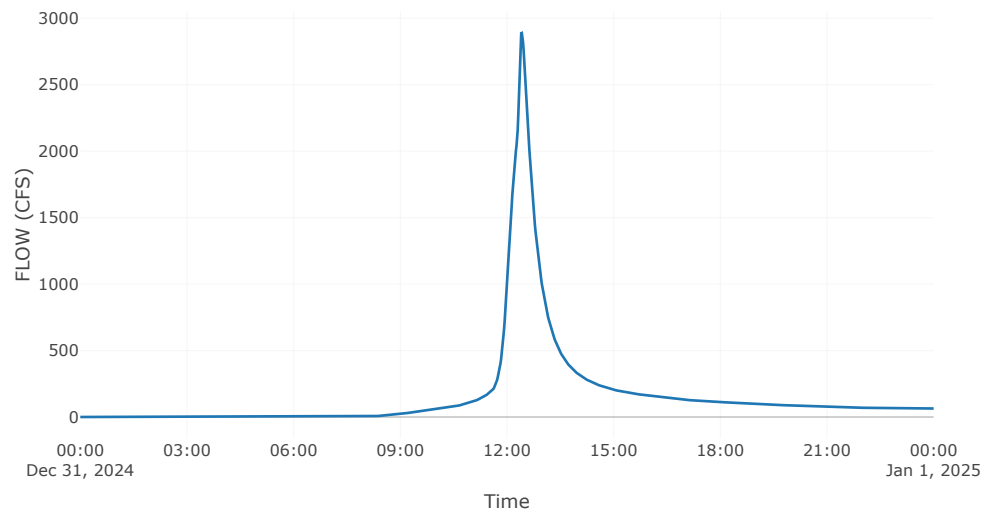
Junction: J - 6

Downstream : RCH - 6

Results: J - 6

Peak Discharge (CFS)	2889
Time of Peak Discharge	31Dec2024, 12:25
Volume (IN)	2.83

Outflow

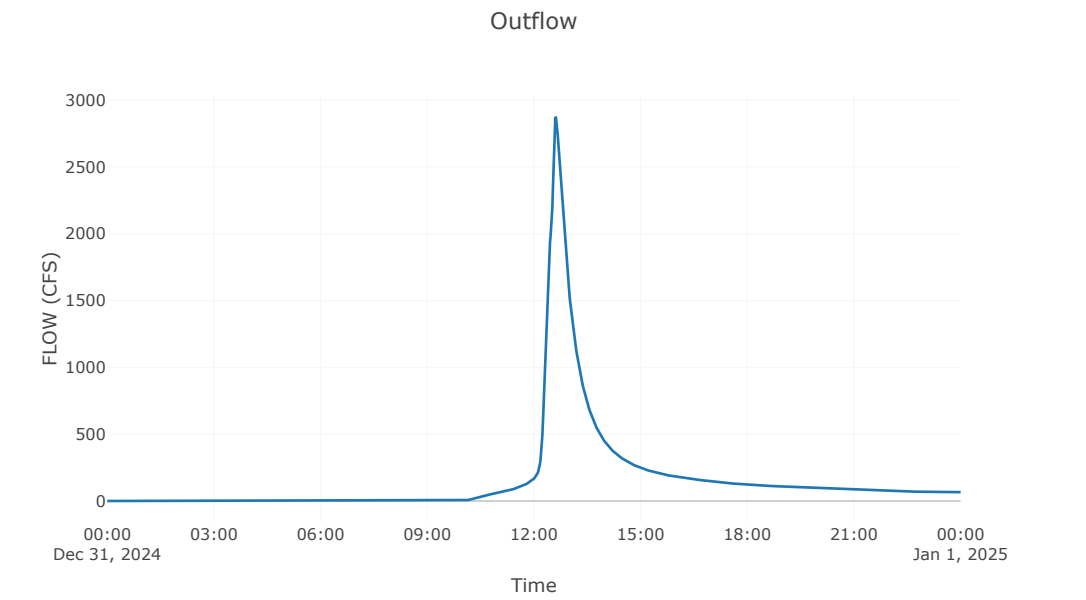


Reach: RCH - 6

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5289.14
Energy Slope (FT/FT)	0.03
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	250
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2306

Results: RCH - 6	
Peak Discharge (CFS)	2874.21
Time of Peak Discharge	31Dec2024, 12:36
Volume (IN)	2.77
Peak Inflow (CFS)	2889
Inflow Volume (AC - FT)	327.95



Subbasin: SB - 6

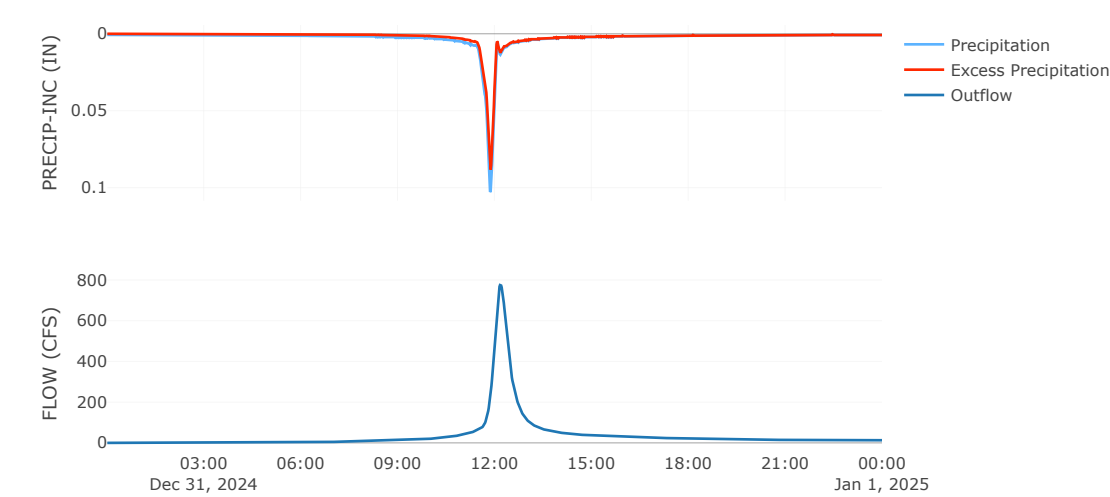
Area (MI2) : 0.44
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.3

Transform: Scs	
Lag	18.63
Unitgraph Type	Standard

Results: SB - 6	
Peak Discharge (CFS)	776.64
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	3.08
Precipitation Volume (AC - FT)	100.41
Loss Volume (AC - FT)	27.38
Excess Volume (AC - FT)	73.02
Direct Runoff Volume (AC - FT)	72.6
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 5

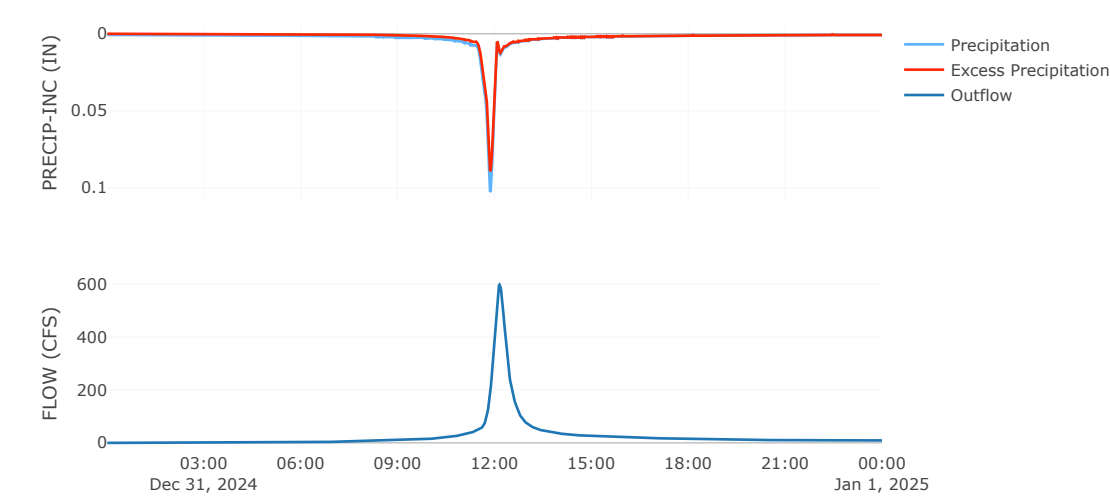
Area (MI2) : 0.31
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.8

Transform: Scs	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 5	
Peak Discharge (CFS)	598.6
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.13
Precipitation Volume (AC - FT)	71.5
Loss Volume (AC - FT)	18.67
Excess Volume (AC - FT)	52.83
Direct Runoff Volume (AC - FT)	52.56
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



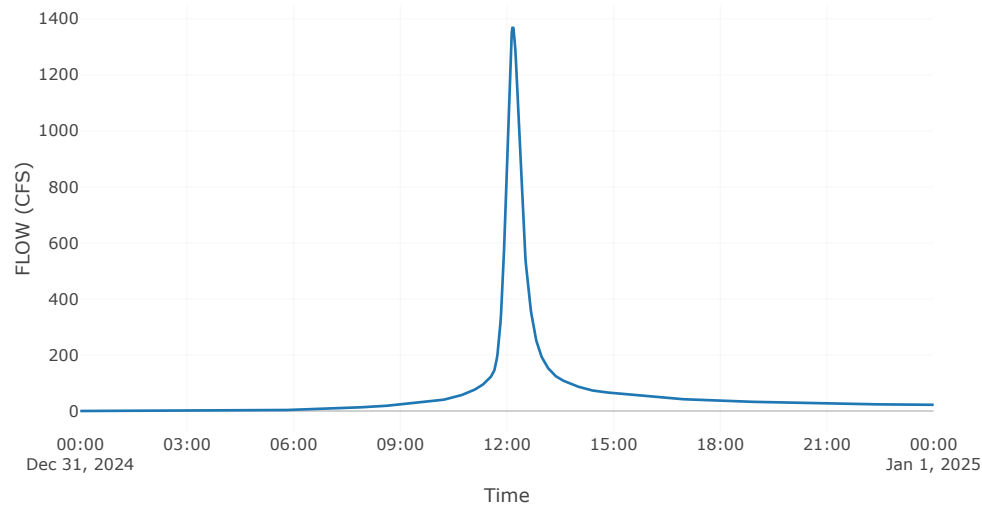
Junction: J - 12

Downstream : RCH - 12

Results: J - 12

Peak Discharge (CFS)	1370.84
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.1

Outflow

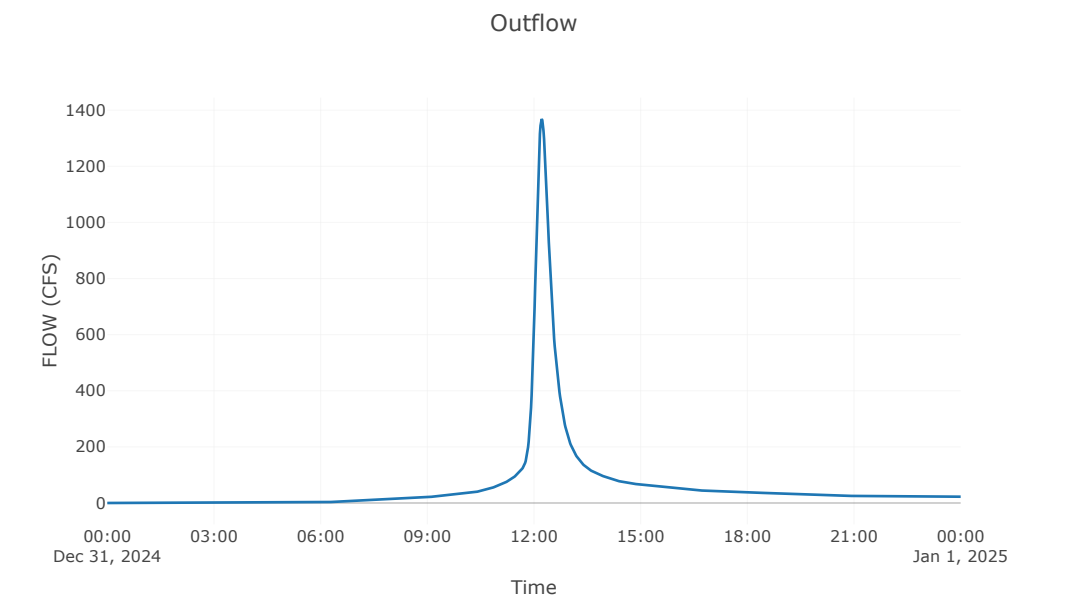


Reach: RCH - 12

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1501.96
Energy Slope (FT/FT)	0.03
Mannings n	0.09
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1127

Results: RCH - 12	
Peak Discharge (CFS)	1368.64
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	3.09
Peak Inflow (CFS)	1370.84
Inflow Volume (AC - FT)	125.15



Subbasin: SB - 26

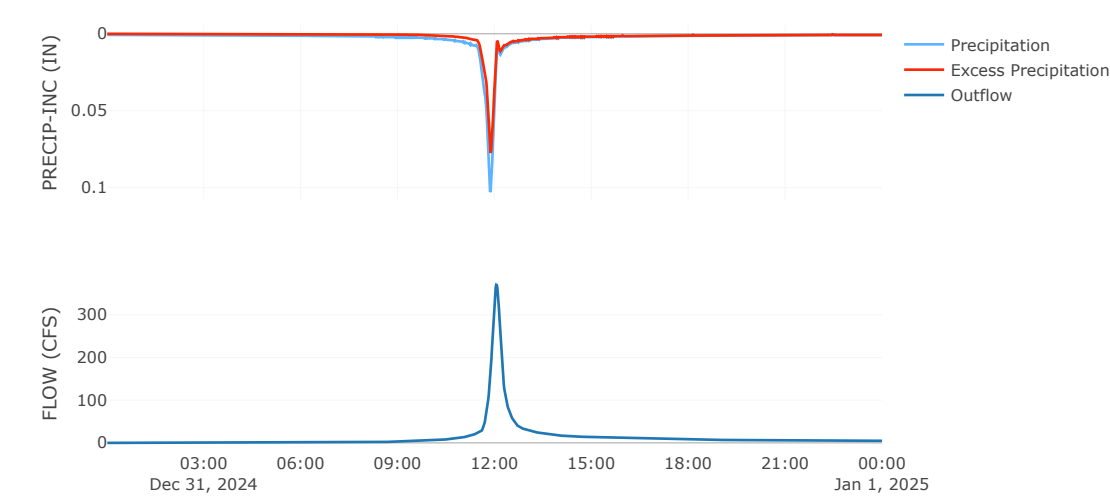
Area (MI2) : 0.18
Latitude Degrees : 31.76
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	84.4

Transform: Scs	
Lag	10.19
Unitgraph Type	Standard

Results: SB - 26	
Peak Discharge (CFS)	370.3
Time of Peak Discharge	31Dec2024, 12:03
Volume (IN)	2.63
Precipitation Volume (AC - FT)	40.5
Loss Volume (AC - FT)	15.42
Excess Volume (AC - FT)	25.09
Direct Runoff Volume (AC - FT)	25
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 20

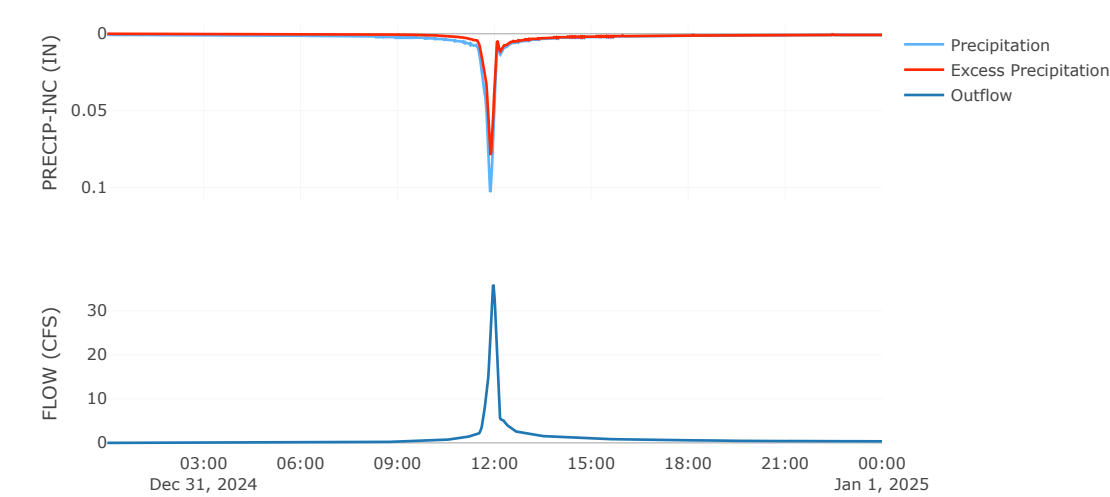
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85

Transform: Scs	
Lag	3.99
Unitgraph Type	Standard

Results: SB - 20	
Peak Discharge (CFS)	35.93
Time of Peak Discharge	31Dec2024, 11:57
Volume (IN)	2.69
Precipitation Volume (AC - FT)	3
Loss Volume (AC - FT)	1.1
Excess Volume (AC - FT)	1.9
Direct Runoff Volume (AC - FT)	1.89
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



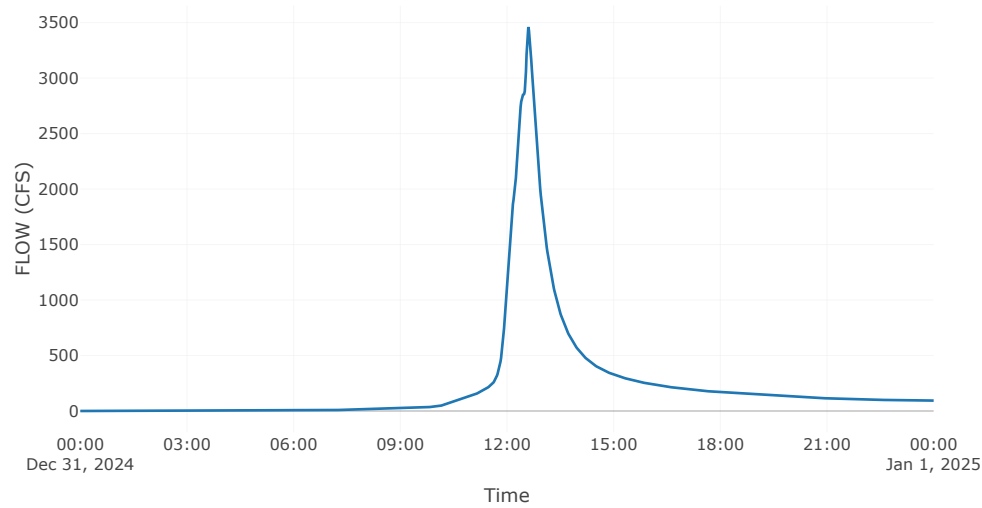
Junction: J - 4

Downstream : RCH - 4

Results: J - 4

Peak Discharge (CFS)	3460.08
Time of Peak Discharge	31Dec2024, 12:36
Volume (IN)	2.84

Outflow

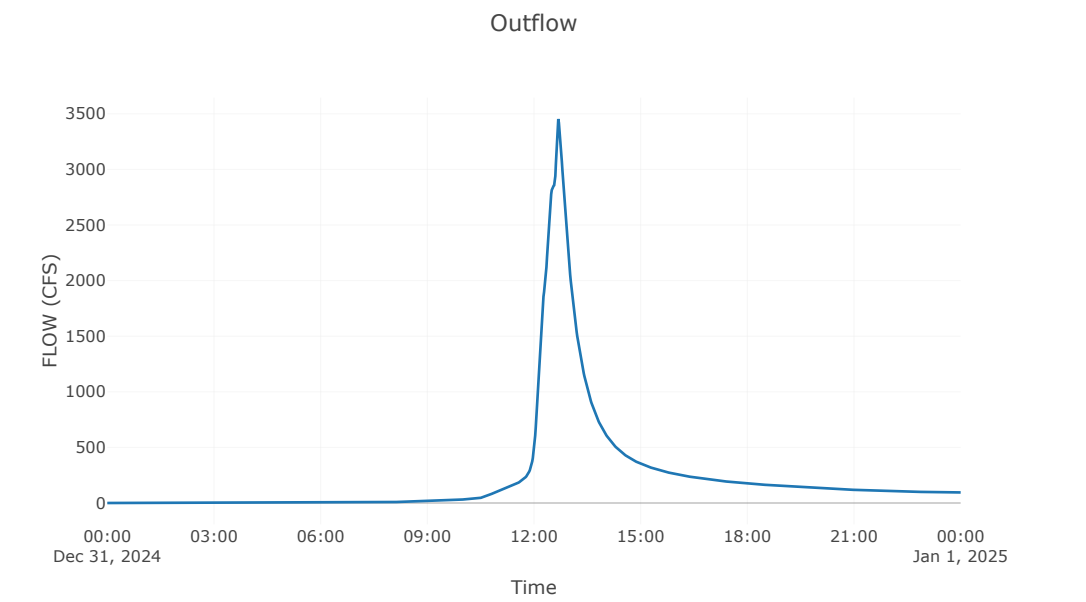


Reach: RCH - 4

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1941.67
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2698

Results: RCH - 4	
Peak Discharge (CFS)	3453.45
Time of Peak Discharge	31Dec2024, 12:41
Volume (IN)	2.81
Peak Inflow (CFS)	3460.08
Inflow Volume (AC - FT)	471.68



Subbasin: SB - 30

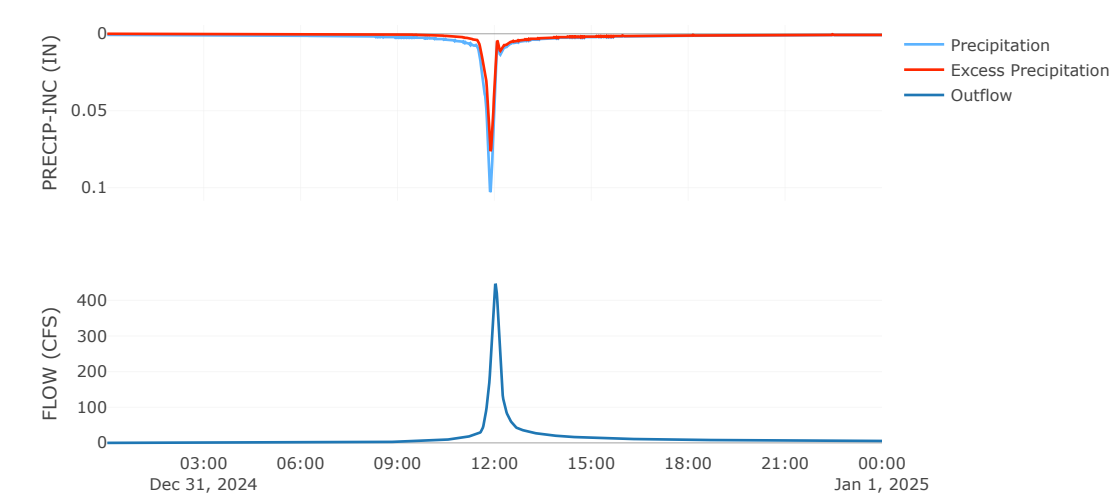
Area (MI2) : 0.2
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	83.9

Transform: Scs	
Lag	8.18
Unitgraph Type	Standard

Results: SB - 30	
Peak Discharge (CFS)	443.81
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.59
Precipitation Volume (AC - FT)	45.44
Loss Volume (AC - FT)	17.77
Excess Volume (AC - FT)	27.67
Direct Runoff Volume (AC - FT)	27.59
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 28

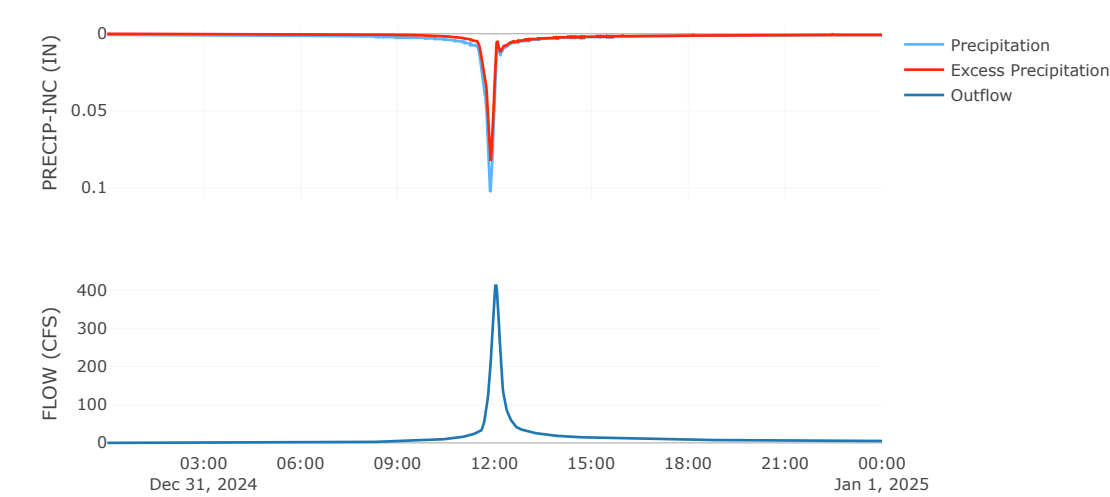
Area (MI2) : 0.18
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	8.99
Unitgraph Type	Standard

Results: SB - 28	
Peak Discharge (CFS)	413.45
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.84
Precipitation Volume (AC - FT)	40.14
Loss Volume (AC - FT)	13.29
Excess Volume (AC - FT)	26.85
Direct Runoff Volume (AC - FT)	26.77
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



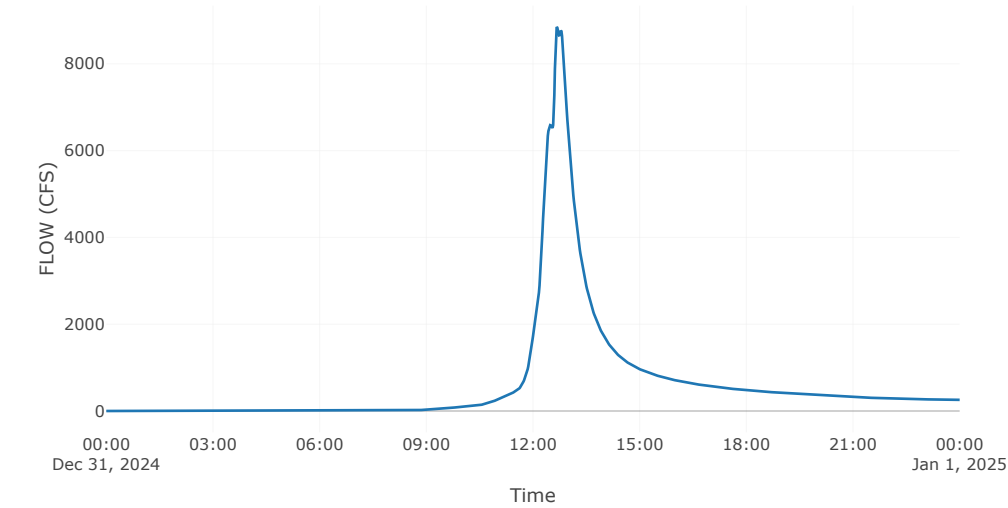
Junction: J - 1

Downstream : RCH - 1

Results: J - 1

Peak Discharge (CFS)	8849.32
Time of Peak Discharge	31Dec2024, 12:40
Volume (IN)	2.82

Outflow

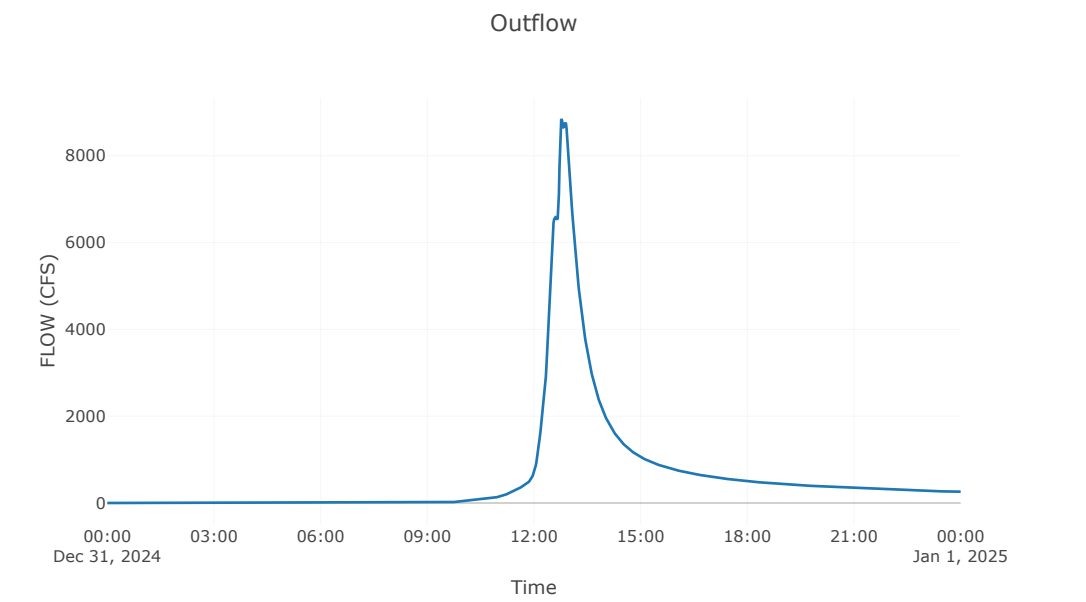


Reach: RCH - 1

Downstream : Florida Canyon Wash

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3145.34
Energy Slope (FT/FT)	0.02
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	6824

Results: RCH - 1	
Peak Discharge (CFS)	8847
Time of Peak Discharge	31Dec2024, 12:46
Volume (IN)	2.78
Peak Inflow (CFS)	8849.32
Inflow Volume (AC - FT)	1262.12



Subbasin: SB - 31

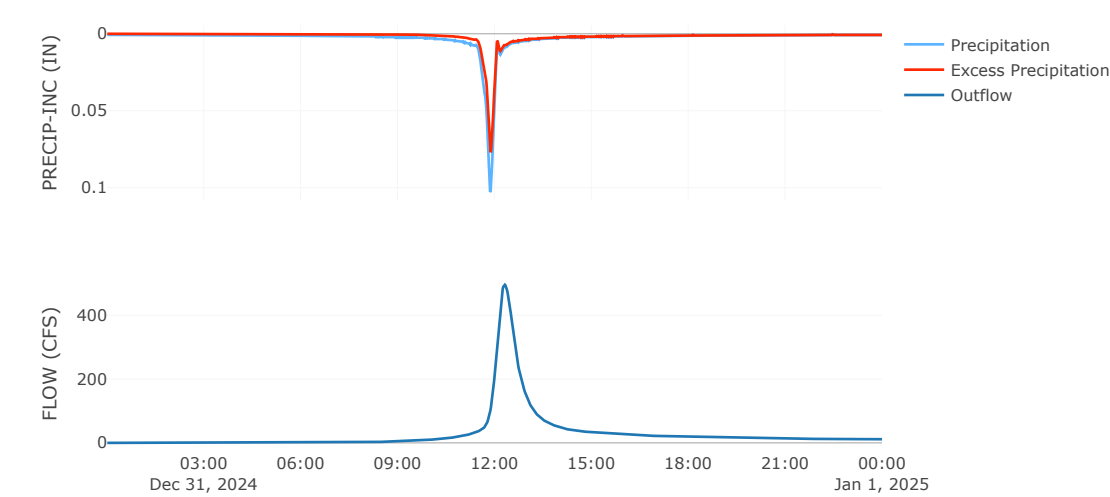
Area (MI2) : 0.41
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : Florida Canyon Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	84.2

Transform: Scs	
Lag	26.25
Unitgraph Type	Standard

Results: SB - 31	
Peak Discharge (CFS)	496.01
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.6
Precipitation Volume (AC - FT)	93.56
Loss Volume (AC - FT)	36.01
Excess Volume (AC - FT)	57.55
Direct Runoff Volume (AC - FT)	57.02
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 33

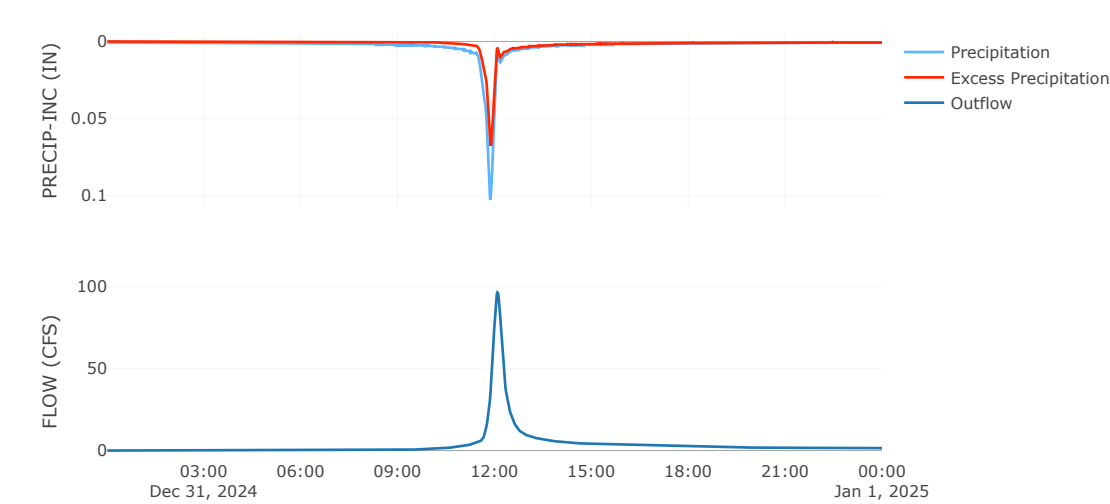
Area (MI2) : 0.06
Latitude Degrees : 31.78
Longitude Degrees : -110.88
Downstream : Florida Canyon Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.3
Initial Abstraction	0.5

Transform: Scs	
Lag	12.05
Unitgraph Type	Standard

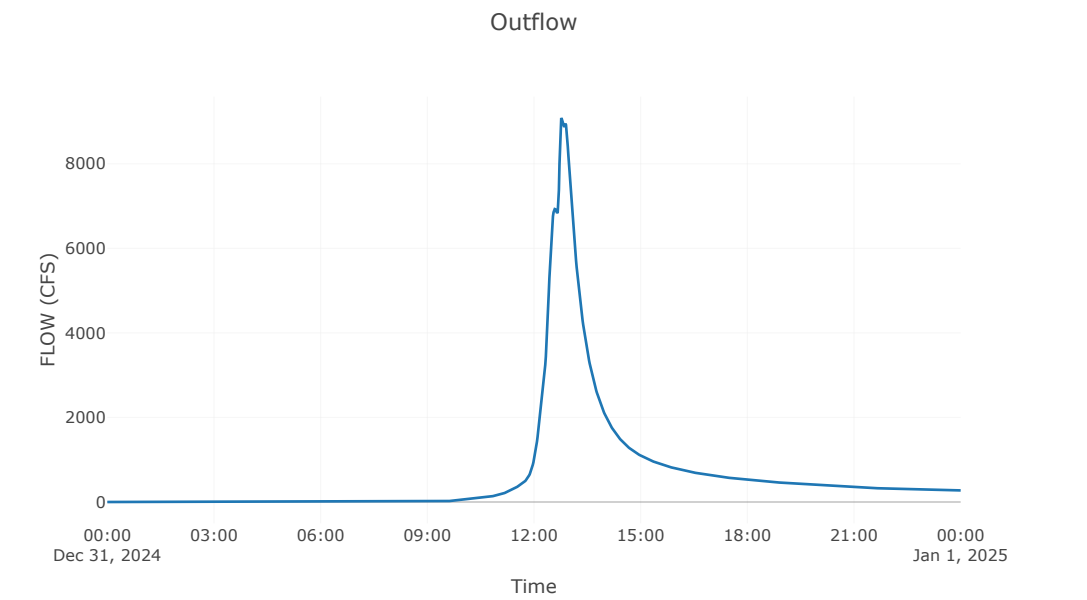
Results: SB - 33	
Peak Discharge (CFS)	96.46
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	2.27
Precipitation Volume (AC - FT)	13.12
Loss Volume (AC - FT)	6.11
Excess Volume (AC - FT)	7.01
Direct Runoff Volume (AC - FT)	6.98
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Sink: Florida Canyon Wash

Results: Florida Canyon Wash	
Peak Discharge (CFS)	9082.86
Time of Peak Discharge	31Dec2024, 12:46
Volume (IN)	2.77



Subbasin: SB - 3

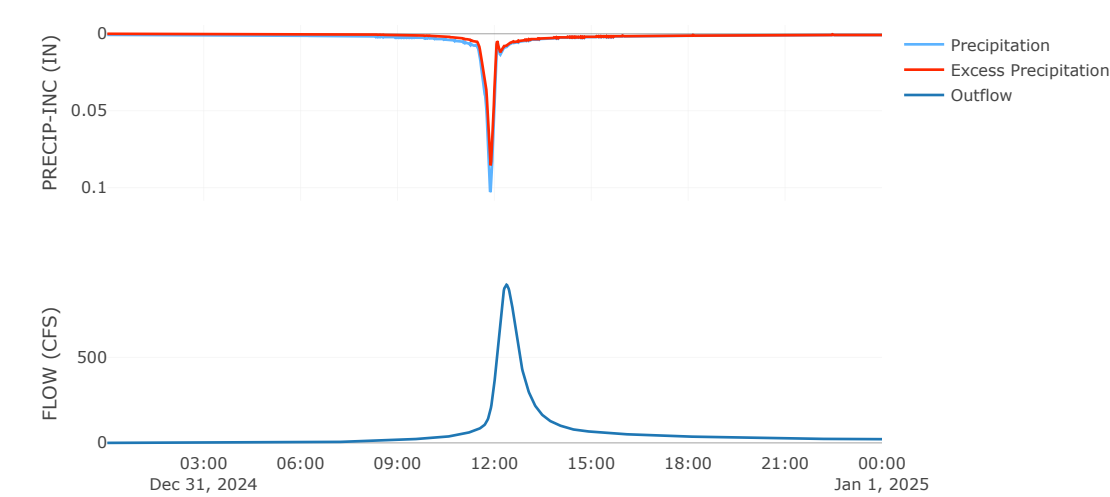
Area (MI2) : 0.74
Latitude Degrees : 31.78
Longitude Degrees : -110.85
Downstream : J - 7

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88

Transform: Scs	
Lag	29.77
Unitgraph Type	Standard

Results: SB - 3	
Peak Discharge (CFS)	924.66
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	2.95
Precipitation Volume (AC - FT)	168.36
Loss Volume (AC - FT)	50.9
Excess Volume (AC - FT)	117.46
Direct Runoff Volume (AC - FT)	116.33
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 2

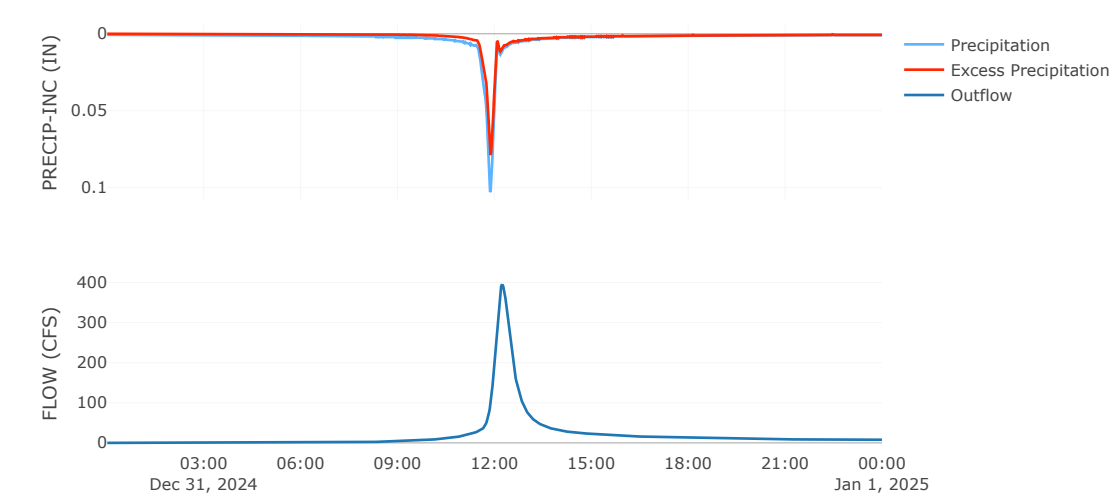
Area (MI2) : 0.28
Latitude Degrees : 31.78
Longitude Degrees : -110.86
Downstream : J - 7

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85

Transform: Scs	
Lag	21.65
Unitgraph Type	Standard

Results: SB - 2	
Peak Discharge (CFS)	394.21
Time of Peak Discharge	31Dec2024, 12:14
Volume (IN)	2.68
Precipitation Volume (AC - FT)	63.68
Loss Volume (AC - FT)	23.43
Excess Volume (AC - FT)	40.25
Direct Runoff Volume (AC - FT)	39.95
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



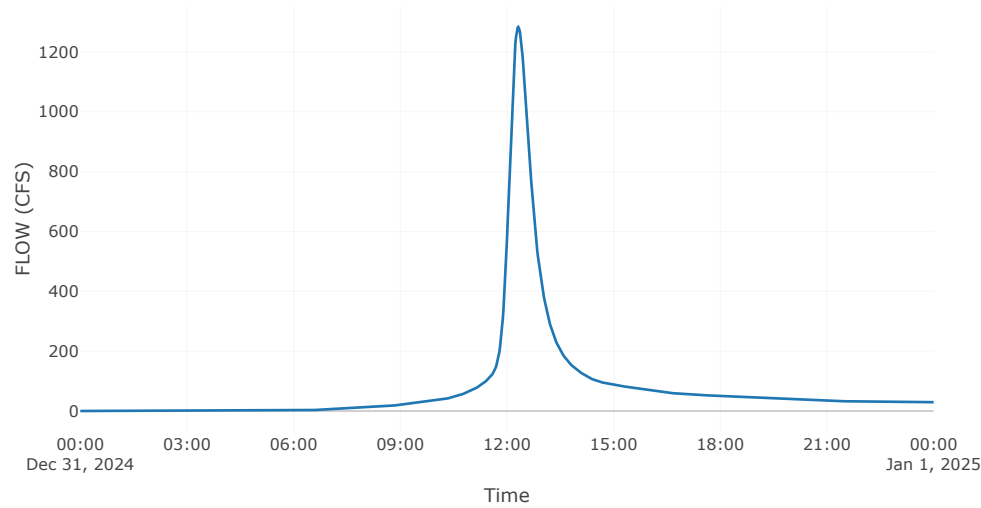
Junction: J - 7

Downstream : RCH - 7

Results: J - 7

Peak Discharge (CFS)	1283.67
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.87

Outflow

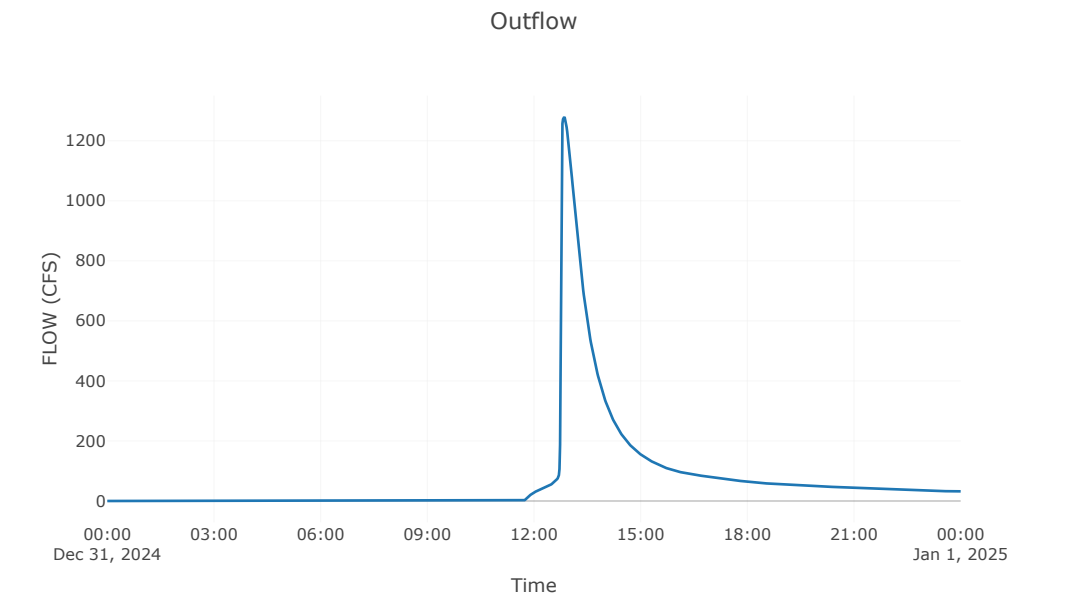


Reach: RCH - 7

Downstream : Medium Wash

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5200.73
Energy Slope (FT/FT)	0.02
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1040

Results: RCH - 7	
Peak Discharge (CFS)	1279.15
Time of Peak Discharge	31Dec2024, 12:51
Volume (IN)	2.7
Peak Inflow (CFS)	1283.67
Inflow Volume (AC - FT)	156.27



Subbasin: SB - 25

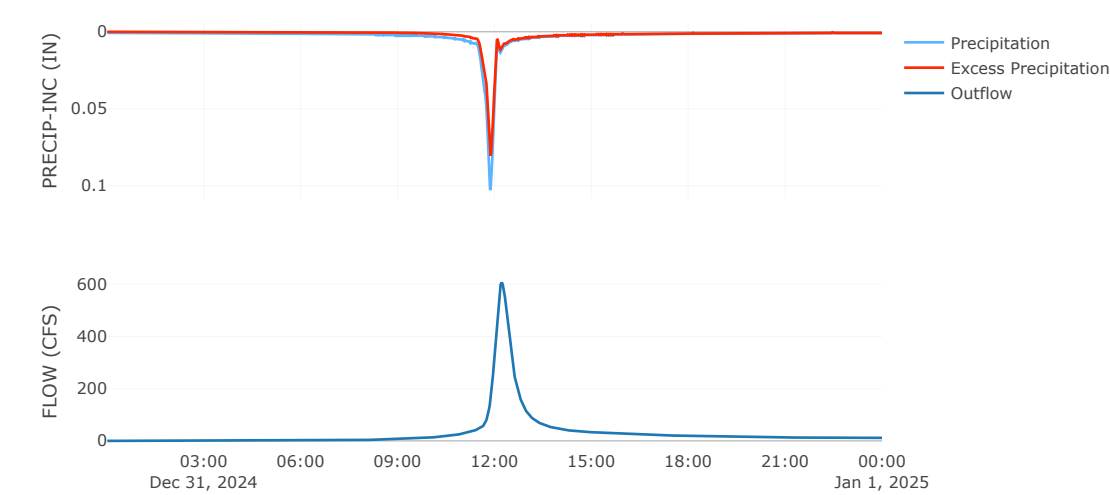
Area (MI2) : 0.41
Latitude Degrees : 31.78
Longitude Degrees : -110.87
Downstream : Medium Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.8

Transform: Scs	
Lag	20.79
Unitgraph Type	Standard

Results: SB - 25	
Peak Discharge (CFS)	605.81
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	2.75
Precipitation Volume (AC - FT)	92.92
Loss Volume (AC - FT)	32.6
Excess Volume (AC - FT)	60.33
Direct Runoff Volume (AC - FT)	59.9
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

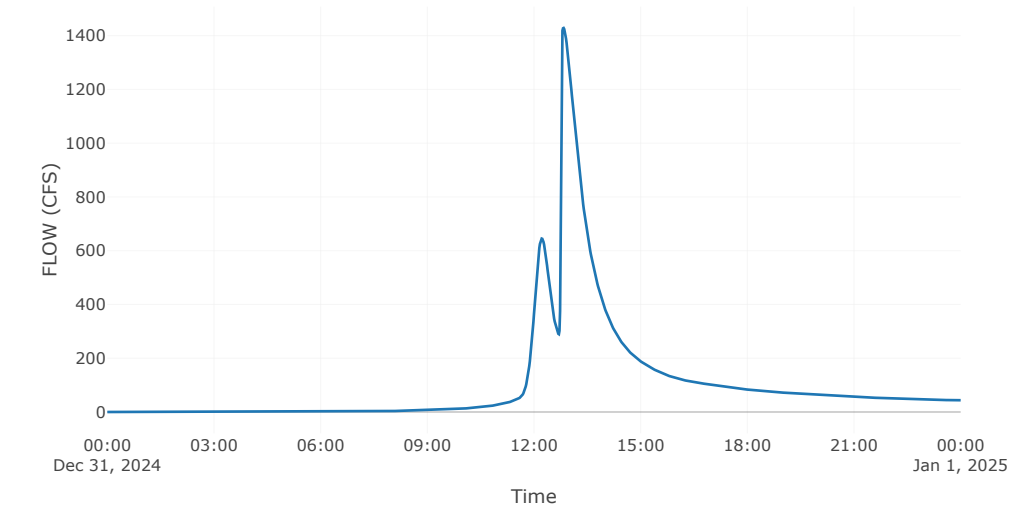


Sink: Medium Wash

Results: Medium Wash

Peak Discharge (CFS)	1428.41
Time of Peak Discharge	31Dec2024, 12:50
Volume (IN)	2.71

Outflow



Subbasin: SB - 1

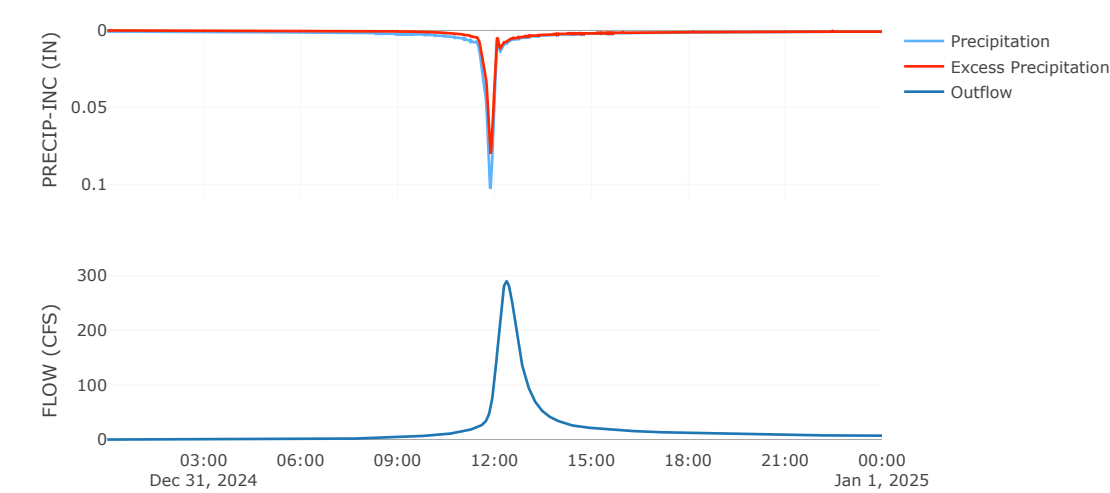
Area (MI2) : 0.25
Latitude Degrees : 31.78
Longitude Degrees : -110.88
Downstream : Small Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.3
Initial Abstraction	0.3

Transform: Scs	
Lag	29.7
Unitgraph Type	Standard

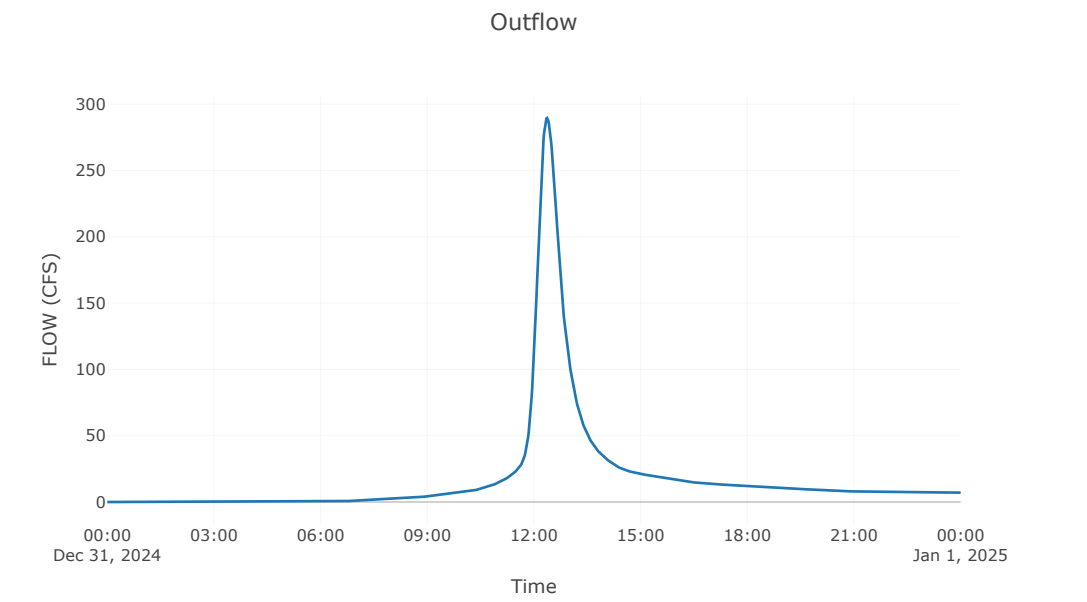
Results: SB - 1	
Peak Discharge (CFS)	289.58
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	2.74
Precipitation Volume (AC - FT)	56.74
Loss Volume (AC - FT)	19.98
Excess Volume (AC - FT)	36.77
Direct Runoff Volume (AC - FT)	36.4
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Sink: Small Wash

Results: Small Wash	
Peak Discharge (CFS)	289.58
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	2.74



Project: Madera_Canyon

Simulation Run: FC 500y3h

Simulation Start: 30 December 2024, 24:00

Simulation End: 31 December 2024, 24:00

HMS Version: 4.12

Executed: 06 March 2026, 19:20

Global Parameter Summary - Subbasin

Element Name	Location	
	Longitude Degrees	Latitude Degrees
SB - 17	-110.84	31.73
SB - 16	-110.83	31.73
SB - 15	-110.85	31.73
SB - 18	-110.84	31.73
SB - 22	-110.84	31.75
SB - 9	-110.84	31.75
SB - 12	-110.85	31.75
SB - 7	-110.86	31.75
SB - 27	-110.85	31.76
SB - 23	-110.86	31.77
SB - 4	-110.86	31.77
SB - 29	-110.87	31.77
SB - 10	-110.88	31.74
SB - 14	-110.88	31.74
SB - 13	-110.86	31.74
SB - 11	-110.86	31.75
SB - 19	-110.87	31.75
SB - 21	-110.88	31.75
SB - 24	-110.88	31.75
SB - 8	-110.87	31.75
SB - 6	-110.87	31.76
SB - 5	-110.87	31.76
SB - 26	-110.88	31.76
SB - 20	-110.88	31.77
SB - 30	-110.87	31.77
SB - 28	-110.88	31.77
SB - 31	-110.88	31.77
SB - 33	-110.88	31.78
SB - 3	-110.85	31.78
SB - 2	-110.86	31.78
SB - 25	-110.87	31.78
SB - 1	-110.88	31.78

Area (M12)	
Element Name	Area (M12)
SB - 17	0.29
SB - 16	0.28
SB - 15	0.21
SB - 18	0.2
SB - 22	1.05
SB - 9	0.55
SB - 12	0.65
SB - 7	0.31
SB - 27	0.86
SB - 23	0.13
SB - 4	0.38
SB - 29	0.01
SB - 10	0.47
SB - 14	0.35
SB - 13	0.4
SB - 11	0.29
SB - 19	0.12
SB - 21	0.04
SB - 24	0.28
SB - 8	0.23
SB - 6	0.44
SB - 5	0.31
SB - 26	0.18
SB - 20	0.01
SB - 30	0.2
SB - 28	0.18
SB - 31	0.41
SB - 33	0.06
SB - 3	0.74
SB - 2	0.28
SB - 25	0.41
SB - 1	0.25

Downstream

Element Name	Downstream
SB - 17	J - 14
SB - 16	J - 14
SB - 15	J - 10
SB - 18	J - 10
SB - 22	J - 5
SB - 9	J - 5
SB - 12	J - 9
SB - 7	J - 9
SB - 27	J - 3
SB - 23	J - 3
SB - 4	J - 2
SB - 29	J - 2
SB - 10	J - 11
SB - 14	J - 11
SB - 13	J - 13
SB - 11	J - 13
SB - 19	J - 8
SB - 21	J - 8
SB - 24	J - 6
SB - 8	J - 6
SB - 6	J - 12
SB - 5	J - 12
SB - 26	J - 4
SB - 20	J - 4
SB - 30	J - 1
SB - 28	J - 1
SB - 31	Florida Canyon Wash
SB - 33	Florida Canyon Wash
SB - 3	J - 7
SB - 2	J - 7
SB - 25	Medium Wash
SB - 1	Small Wash

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number	Initial Abstraction
SB - 17	0	88.8	Not Specified
SB - 16	0	86.4	Not Specified
SB - 15	0	88.2	Not Specified
SB - 18	0	86.5	Not Specified
SB - 22	0	88.4	Not Specified
SB - 9	0	88.2	Not Specified
SB - 12	0	88.9	Not Specified
SB - 7	0	89.6	Not Specified
SB - 27	0	86.3	Not Specified
SB - 23	0	86.6	Not Specified
SB - 4	0	89.7	Not Specified
SB - 29	0	81.1	Not Specified
SB - 10	0	87.3	Not Specified
SB - 14	0	86.7	Not Specified
SB - 13	0	89	Not Specified
SB - 11	0	89.5	Not Specified
SB - 19	0	86.9	Not Specified
SB - 21	0	82.3	Not Specified
SB - 24	0	82.7	Not Specified
SB - 8	0	88.5	Not Specified
SB - 6	0	89.3	Not Specified
SB - 5	0	89.8	Not Specified
SB - 26	0	84.4	Not Specified
SB - 20	0	85	Not Specified
SB - 30	0	83.9	Not Specified
SB - 28	0	86.7	Not Specified
SB - 31	0	84.2	Not Specified
SB - 33	0	80.3	0.5
SB - 3	0	88	Not Specified
SB - 2	0	85	Not Specified
SB - 25	0	85.8	Not Specified
SB - 1	0	85.3	0.3

Transform: Scs		
Element Name	Lag	Unitgraph Type
SB - 17	10.79	Standard
SB - 16	7.54	Standard
SB - 15	9.18	Standard
SB - 18	8.12	Standard
SB - 22	16.31	Standard
SB - 9	17.23	Standard
SB - 12	23.36	Standard
SB - 7	12.72	Standard
SB - 27	18.98	Standard
SB - 23	11.82	Standard
SB - 4	16.15	Standard
SB - 29	3.27	Standard
SB - 10	16.66	Standard
SB - 14	33.79	Standard
SB - 13	14.12	Standard
SB - 11	14.46	Standard
SB - 19	12.64	Standard
SB - 21	6.2	Standard
SB - 24	11.31	Standard
SB - 8	17.71	Standard
SB - 6	18.63	Standard
SB - 5	16.66	Standard
SB - 26	10.19	Standard
SB - 20	3.99	Standard
SB - 30	8.18	Standard
SB - 28	8.99	Standard
SB - 31	26.25	Standard
SB - 33	12.05	Standard
SB - 3	29.77	Standard
SB - 2	21.65	Standard
SB - 25	20.79	Standard
SB - 1	29.7	Standard

Global Parameter Summary - Reach

Downstream	
Element Name	Downstream
RCH - 14	J - 10
RCH - 10	J - 5
RCH - 5	J - 3
RCH - 9	J - 3
RCH - 3	J - 2
RCH - 2	J - 1
RCH - 11	J - 8
RCH - 13	J - 8
RCH - 8	J - 6
RCH - 6	J - 4
RCH - 12	J - 4
RCH - 4	J - 1
RCH - 1	Florida Canyon Wash
RCH - 7	Medium Wash

Route: Kinematic Wave												
Element Name	Method	Channel	Length (FT)	Energy Slope (FT/FT)	Mannings n	Shape	Number of Subreaches	Width (FT)	Side Slope (FT/FT)	Initial Variable	Index Parameter Type	Ir F
RCH - 14	Kinematic Wave	Kinematic Wave	2187.23	0.15	0.22	Trapezoid	5	8	4	Combined Inflow	Index Flow	1
RCH - 10	Kinematic Wave	Kinematic Wave	11173.72	0.15	0.19	Trapezoid	5	10	4	Combined Inflow	Index Flow	1
RCH - 5	Kinematic Wave	Kinematic Wave	11542.83	0.05	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	3
RCH - 9	Kinematic Wave	Kinematic Wave	6275.53	0.06	0.11	Trapezoid	5	15	4	Combined Inflow	Index Flow	1
RCH - 3	Kinematic Wave	Kinematic Wave	727.7	0.03	0.08	Trapezoid	5	200	4	Combined Inflow	Index Flow	4
RCH - 2	Kinematic Wave	Kinematic Wave	4383.33	0.03	0.11	Trapezoid	5	400	4	Combined Inflow	Index Flow	4
RCH - 11	Kinematic Wave	Kinematic Wave	1004.26	0.05	0.13	Trapezoid	5	80	4	Combined Inflow	Index Flow	8
RCH - 13	Kinematic Wave	Kinematic Wave	6298.97	0.1	0.17	Trapezoid	5	90	4	Combined Inflow	Index Flow	1
RCH - 8	Kinematic Wave	Kinematic Wave	3385.93	0.04	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	2
RCH - 6	Kinematic Wave	Kinematic Wave	5289.14	0.03	0.1	Trapezoid	5	250	4	Combined Inflow	Index Flow	2
RCH - 12	Kinematic Wave	Kinematic Wave	1501.96	0.03	0.09	Trapezoid	5	80	4	Combined Inflow	Index Flow	1
RCH - 4	Kinematic Wave	Kinematic Wave	1941.67	0.03	0.11	Trapezoid	5	300	4	Combined Inflow	Index Flow	2
RCH - 1	Kinematic Wave	Kinematic Wave	3145.34	0.02	0.1	Trapezoid	5	400	4	Combined Inflow	Index Flow	6
RCH - 7	Kinematic Wave	Kinematic Wave	5200.73	0.02	0.22	Trapezoid	5	300	4	Combined Inflow	Index Flow	10

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SB - 17	0.29	653.51	31Dec2024, 12:04	3
SB - 16	0.28	677.06	31Dec2024, 12:01	2.78
J - 14	0.57	1307.6	31Dec2024, 12:02	2.89
RCH - 14	0.57	1301.6	31Dec2024, 12:06	2.87
SB - 15	0.21	498.99	31Dec2024, 12:02	2.94
SB - 18	0.2	477.74	31Dec2024, 12:01	2.78
J - 10	0.98	2180.71	31Dec2024, 12:04	2.87
RCH - 10	0.98	2163.31	31Dec2024, 12:21	2.8
SB - 22	1.05	1917.24	31Dec2024, 12:09	2.96
SB - 9	0.55	971.05	31Dec2024, 12:10	2.94
J - 5	2.57	4090.93	31Dec2024, 12:19	2.89
RCH - 5	2.57	4052.4	31Dec2024, 12:38	2.79
SB - 12	0.65	974.19	31Dec2024, 12:15	3
SB - 7	0.31	662.62	31Dec2024, 12:05	3.08
J - 9	0.96	1488.05	31Dec2024, 12:10	3.02
RCH - 9	0.96	1486.93	31Dec2024, 12:19	2.99
SB - 27	0.86	1349.65	31Dec2024, 12:11	2.76
SB - 23	0.13	263.75	31Dec2024, 12:05	2.79
J - 3	4.52	5474.03	31Dec2024, 12:38	2.82
RCH - 3	4.52	5472.33	31Dec2024, 12:39	2.82
SB - 4	0.38	723.48	31Dec2024, 12:09	3.08
SB - 29	0.01	14.57	31Dec2024, 11:57	2.31

J - 2	4.91	5640.23	31Dec2024, 12:39	2.84
RCH - 2	4.91	5581.92	31Dec2024, 12:49	2.79
SB - 10	0.47	815.6	31Dec2024, 12:09	2.85
SB - 14	0.35	374.88	31Dec2024, 12:26	2.78
J - 11	0.81	1068.26	31Dec2024, 12:11	2.82
RCH - 11	0.81	1067.02	31Dec2024, 12:14	2.81
SB - 13	0.4	803.69	31Dec2024, 12:07	3.02
SB - 11	0.29	585.62	31Dec2024, 12:07	3.06
J - 13	0.69	1389.31	31Dec2024, 12:07	3.04
RCH - 13	0.69	1384.91	31Dec2024, 12:20	2.96
SB - 19	0.12	244.15	31Dec2024, 12:05	2.82
SB - 21	0.04	85.01	31Dec2024, 12:00	2.41
J - 8	1.66	2492.17	31Dec2024, 12:19	2.86
RCH - 8	1.66	2489.02	31Dec2024, 12:25	2.83
SB - 24	0.28	515.66	31Dec2024, 12:04	2.44
SB - 8	0.23	404.69	31Dec2024, 12:10	2.96
J - 6	2.17	2847.42	31Dec2024, 12:25	2.79
RCH - 6	2.17	2830.65	31Dec2024, 12:37	2.73
SB - 6	0.44	766.33	31Dec2024, 12:11	3.04
SB - 5	0.31	590.77	31Dec2024, 12:09	3.09
J - 12	0.76	1352.75	31Dec2024, 12:10	3.06
RCH - 12	0.76	1350.53	31Dec2024, 12:13	3.04
SB - 26	0.18	364.76	31Dec2024, 12:03	2.59
SB - 20	0.01	35.41	31Dec2024, 11:57	2.65
J - 4	3.12	3406.98	31Dec2024, 12:36	2.79
RCH - 4	3.12	3402.53	31Dec2024, 12:41	2.77
SB - 30	0.2	437.16	31Dec2024, 12:02	2.55
SB - 28	0.18	407.64	31Dec2024, 12:02	2.8
J - 1	8.4	8701.22	31Dec2024, 12:41	2.77
RCH - 1	8.4	8695.45	31Dec2024, 12:47	2.74
SB - 31	0.41	488.42	31Dec2024, 12:19	2.56
SB - 33	0.06	94.85	31Dec2024, 12:05	2.23
Florida Canyon Wash	8.87	8927.6	31Dec2024, 12:46	2.73
SB - 3	0.74	911.85	31Dec2024, 12:22	2.9
SB - 2	0.28	388.32	31Dec2024, 12:14	2.63
J - 7	1.02	1265.48	31Dec2024, 12:19	2.83
RCH - 7	1.02	1261.46	31Dec2024, 12:51	2.66
SB - 25	0.41	596.95	31Dec2024, 12:13	2.71
Medium Wash	1.43	1407.81	31Dec2024, 12:50	2.67
SB - 1	0.25	285.33	31Dec2024, 12:22	2.69
Small Wash	0.25	285.33	31Dec2024, 12:22	2.69

Subbasin: SB - 17

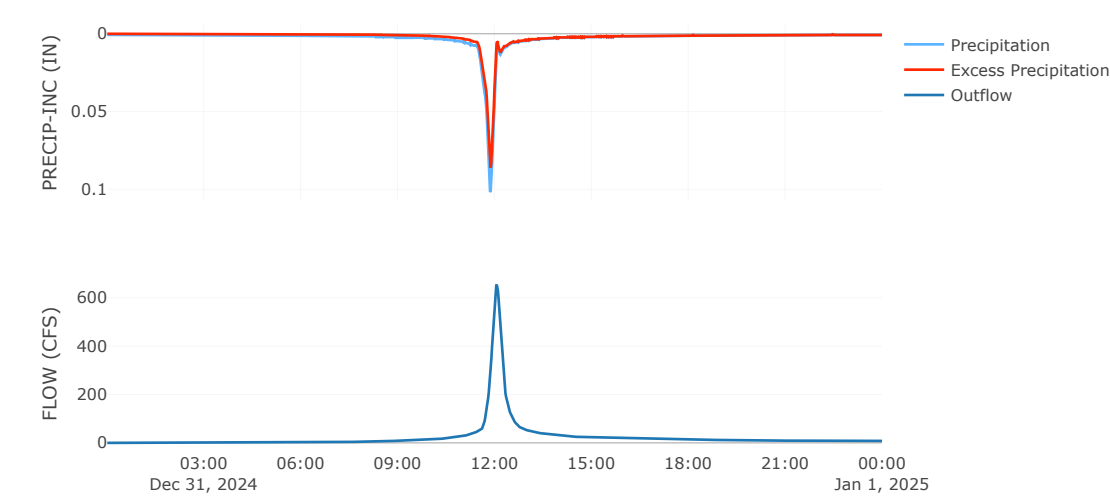
Area (MI2) : 0.29
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 14

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.8

Transform: Scs	
Lag	10.79
Unitgraph Type	Standard

Results: SB - 17	
Peak Discharge (CFS)	653.51
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	3
Precipitation Volume (AC - FT)	64.58
Loss Volume (AC - FT)	18.51
Excess Volume (AC - FT)	46.07
Direct Runoff Volume (AC - FT)	45.91
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 16

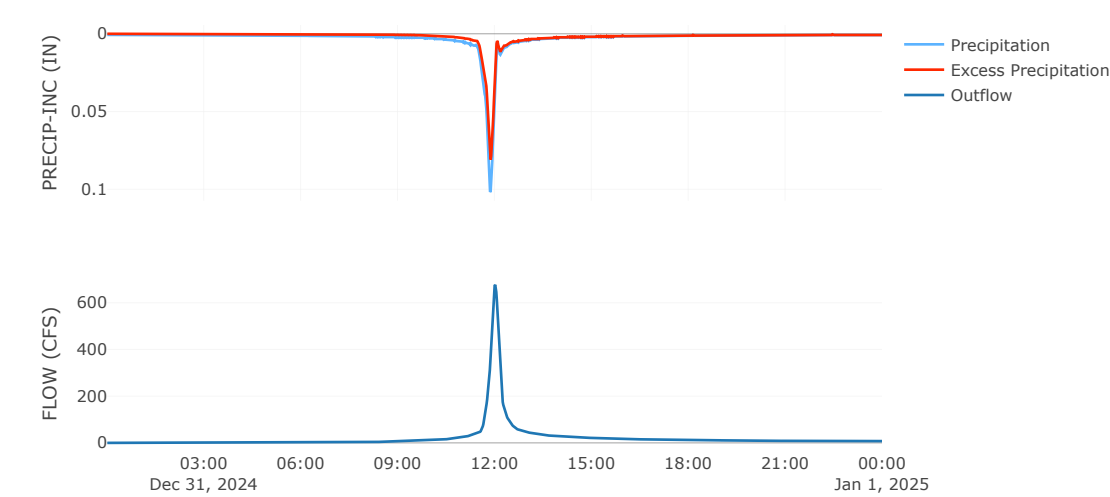
Area (MI2) : 0.28
Latitude Degrees : 31.73
Longitude Degrees : -110.83
Downstream : J - 14

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.4

Transform: Scs	
Lag	7.54
Unitgraph Type	Standard

Results: SB - 16	
Peak Discharge (CFS)	677.06
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	2.78
Precipitation Volume (AC - FT)	62.74
Loss Volume (AC - FT)	21.36
Excess Volume (AC - FT)	41.37
Direct Runoff Volume (AC - FT)	41.27
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



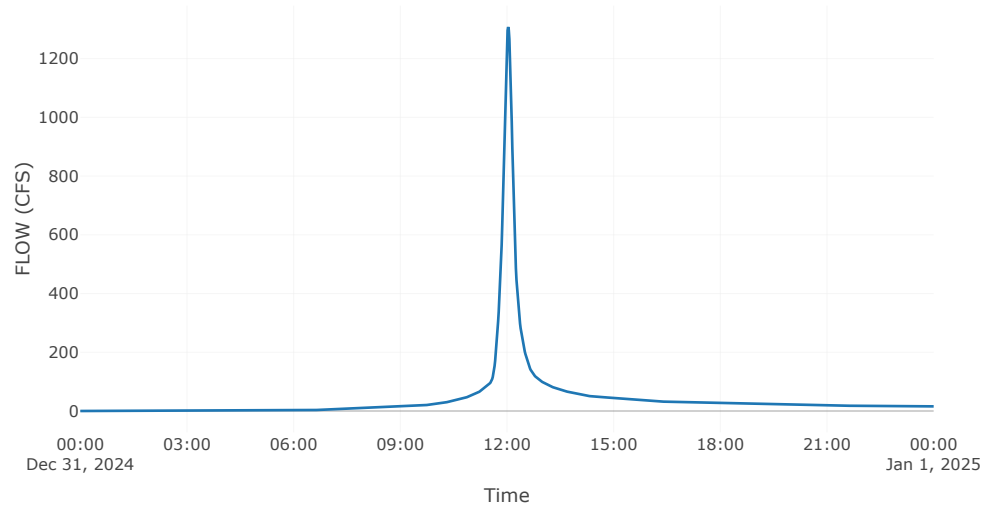
Junction: J - 14

Downstream : RCH - 14

Results: J - 14

Peak Discharge (CFS)	1307.6
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.89

Outflow

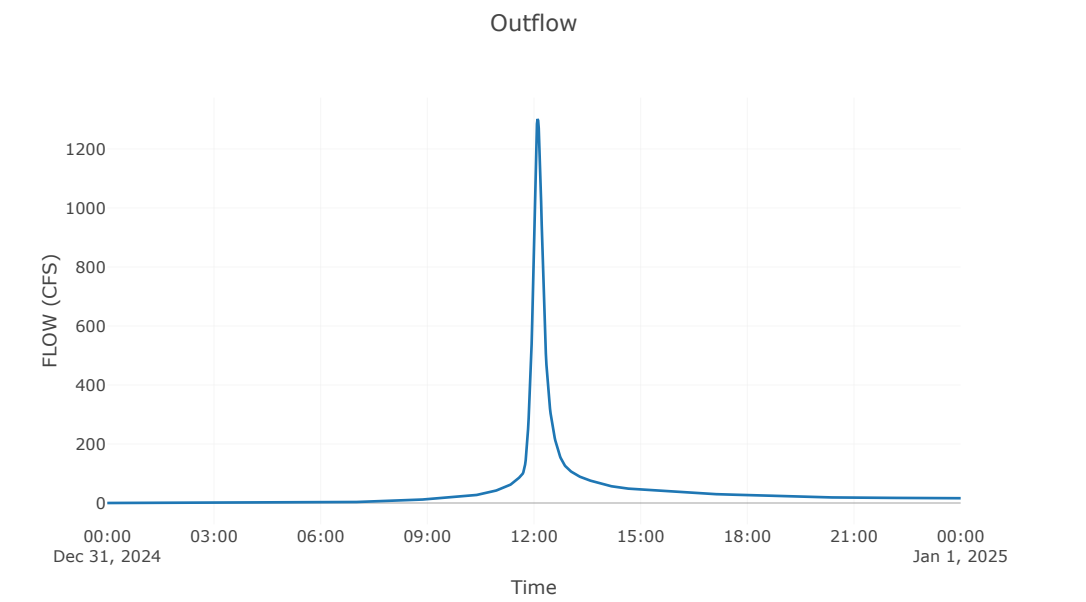


Reach: RCH - 14

Downstream : J - 10

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	2187.23
Energy Slope (FT/FT)	0.15
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	8
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1081

Results: RCH - 14	
Peak Discharge (CFS)	1301.6
Time of Peak Discharge	31Dec2024, 12:06
Volume (IN)	2.87
Peak Inflow (CFS)	1307.6
Inflow Volume (AC - FT)	87.18



Subbasin: SB - 15

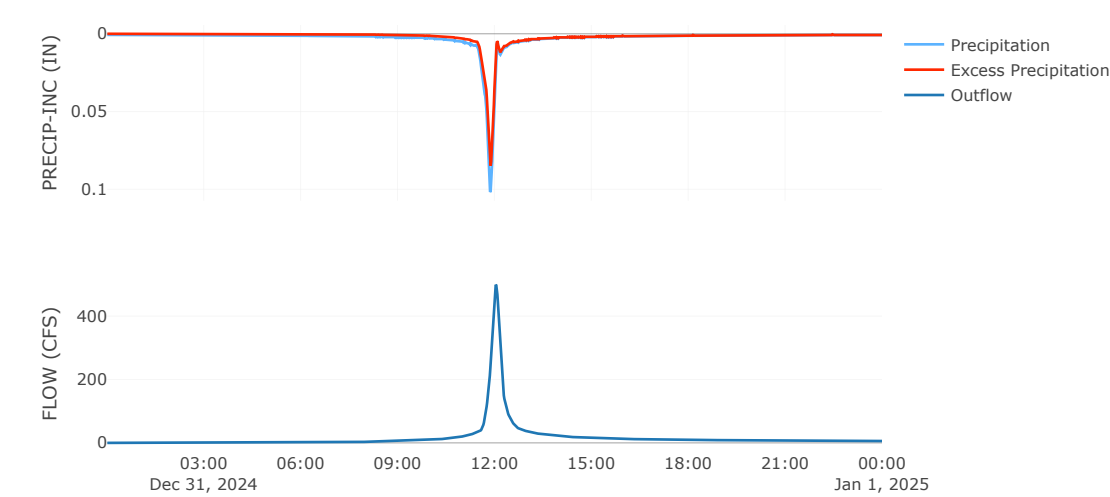
Area (MI2) : 0.21
Latitude Degrees : 31.73
Longitude Degrees : -110.85
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	9.18
Unitgraph Type	Standard

Results: SB - 15	
Peak Discharge (CFS)	498.99
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.94
Precipitation Volume (AC - FT)	46.98
Loss Volume (AC - FT)	14.11
Excess Volume (AC - FT)	32.87
Direct Runoff Volume (AC - FT)	32.78
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 18

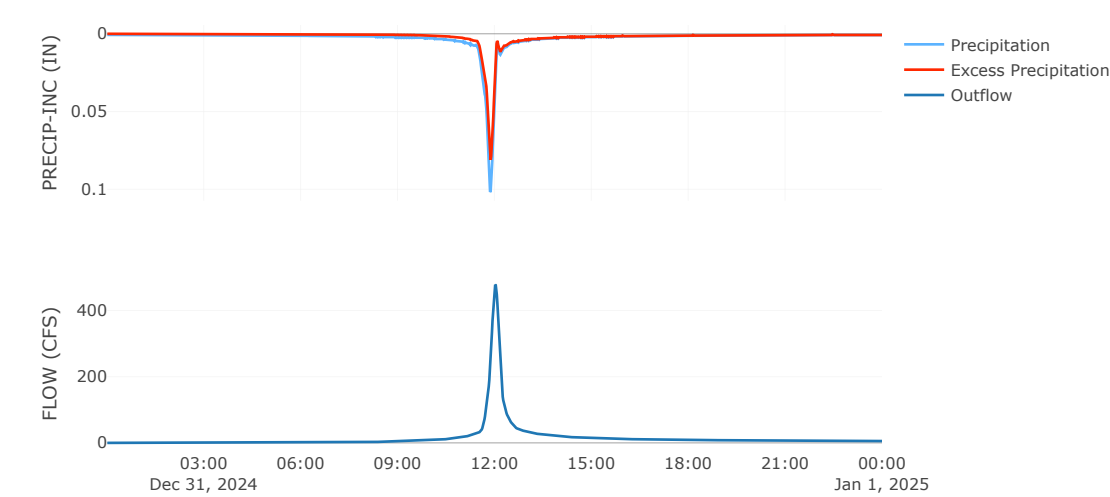
Area (MI2) : 0.2
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.5

Transform: Scs	
Lag	8.12
Unitgraph Type	Standard

Results: SB - 18	
Peak Discharge (CFS)	477.74
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	2.78
Precipitation Volume (AC - FT)	45.23
Loss Volume (AC - FT)	15.3
Excess Volume (AC - FT)	29.93
Direct Runoff Volume (AC - FT)	29.85
Baseflow Volume (AC - FT)	0

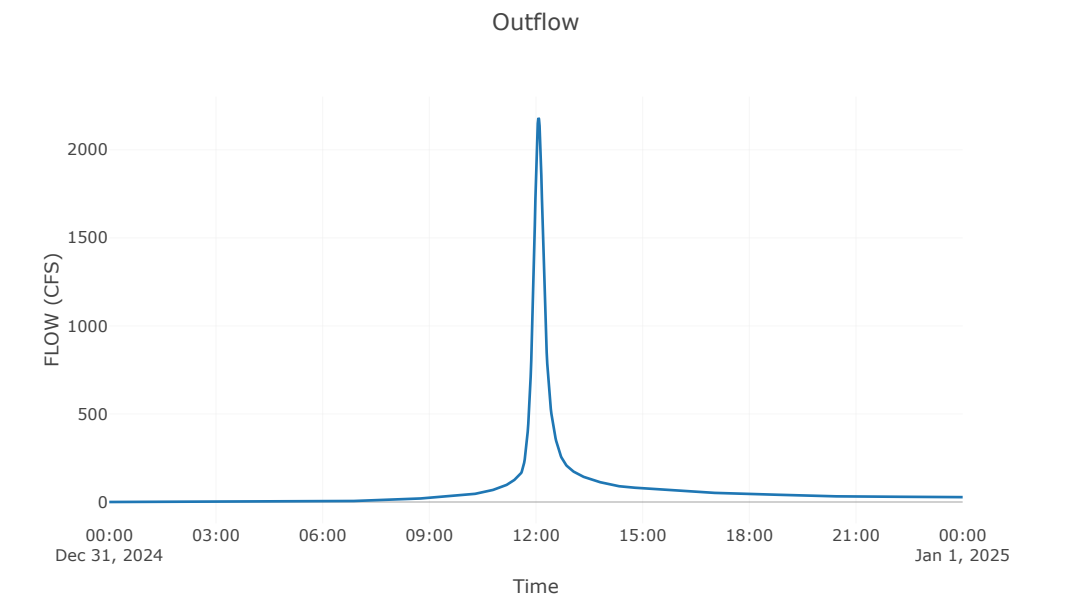
Precipitation and Outflow



Junction: J - 10

Downstream : RCH - 10

Results: J - 10	
Peak Discharge (CFS)	2180.71
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	2.87

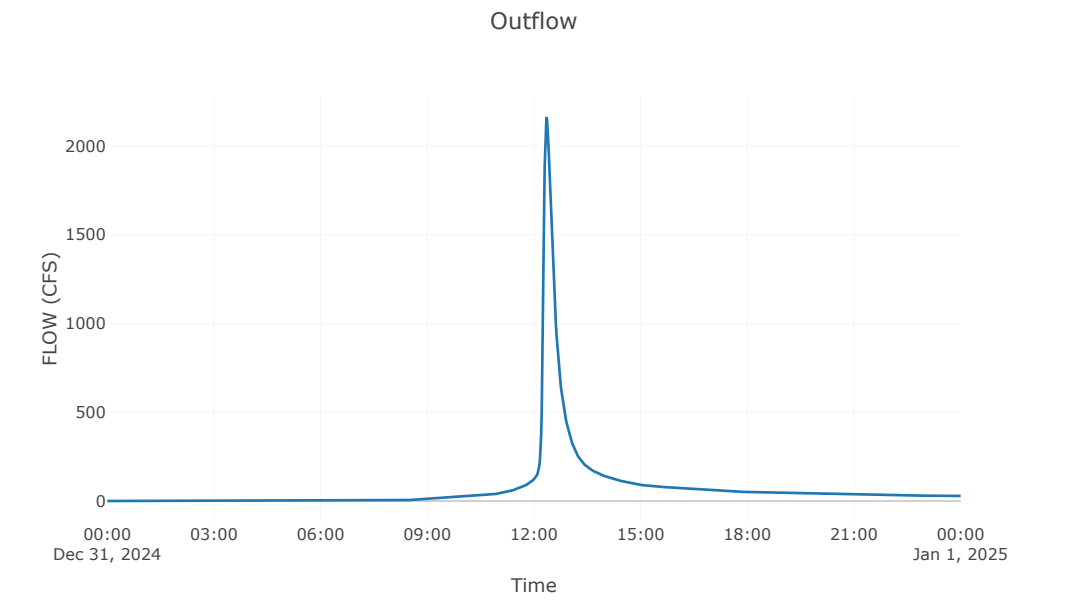


Reach: RCH - 10

Downstream : J - 5

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11173.72
Energy Slope (FT/FT)	0.15
Mannings n	0.19
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	10
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1793

Results: RCH - 10	
Peak Discharge (CFS)	2163.31
Time of Peak Discharge	31Dec2024, 12:21
Volume (IN)	2.8
Peak Inflow (CFS)	2180.71
Inflow Volume (AC - FT)	149.26



Subbasin: SB - 22

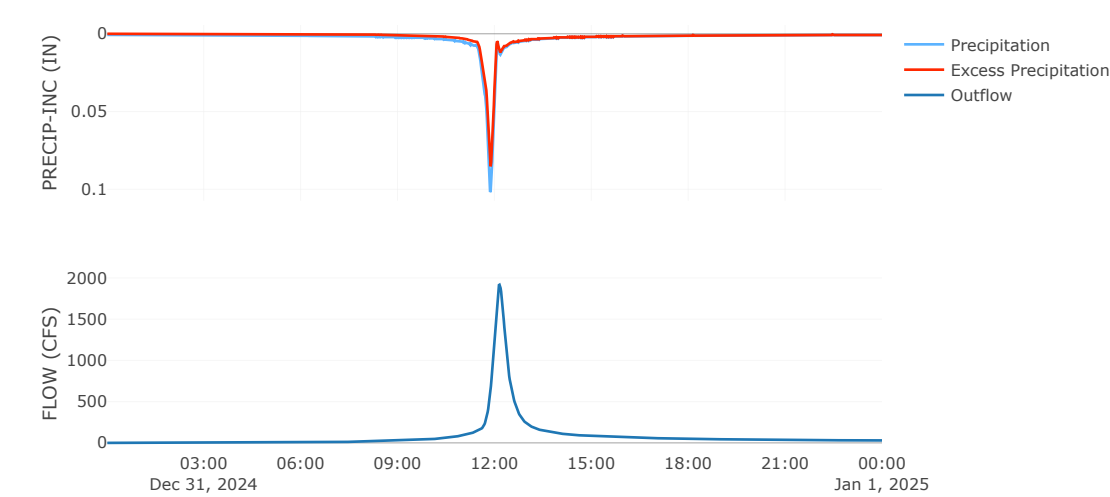
Area (MI2) : 1.05
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.4

Transform: Scs	
Lag	16.31
Unitgraph Type	Standard

Results: SB - 22	
Peak Discharge (CFS)	1917.24
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	2.96
Precipitation Volume (AC - FT)	235.8
Loss Volume (AC - FT)	69.74
Excess Volume (AC - FT)	166.06
Direct Runoff Volume (AC - FT)	165.19
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 9

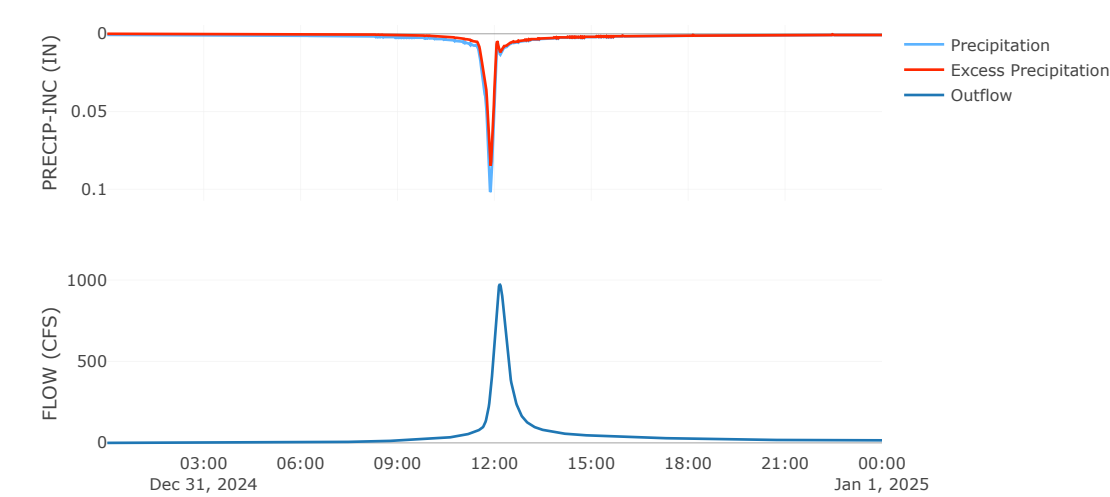
Area (MI2) : 0.55
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	17.23
Unitgraph Type	Standard

Results: SB - 9	
Peak Discharge (CFS)	971.05
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	2.94
Precipitation Volume (AC - FT)	124.03
Loss Volume (AC - FT)	37.25
Excess Volume (AC - FT)	86.78
Direct Runoff Volume (AC - FT)	86.3
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



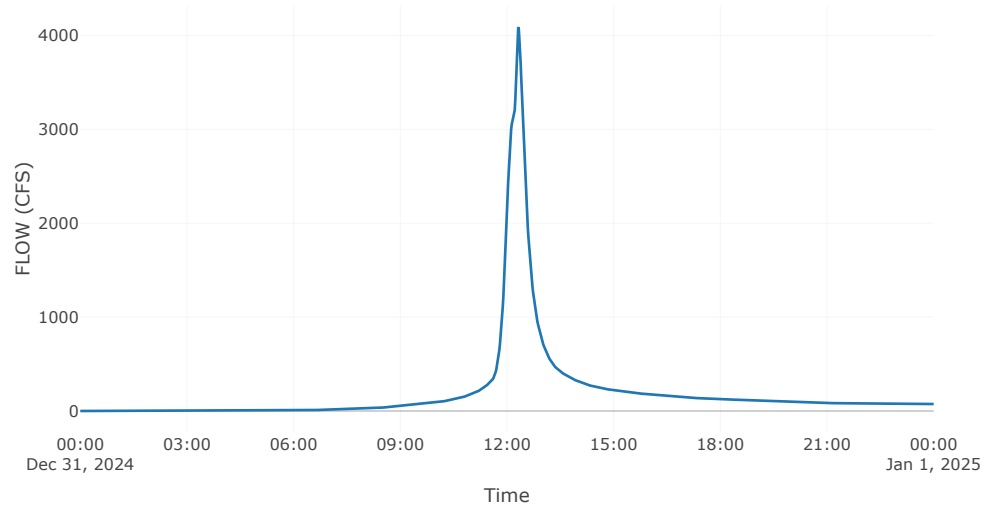
Junction: J - 5

Downstream : RCH - 5

Results: J - 5

Peak Discharge (CFS)	4090.93
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.89

Outflow

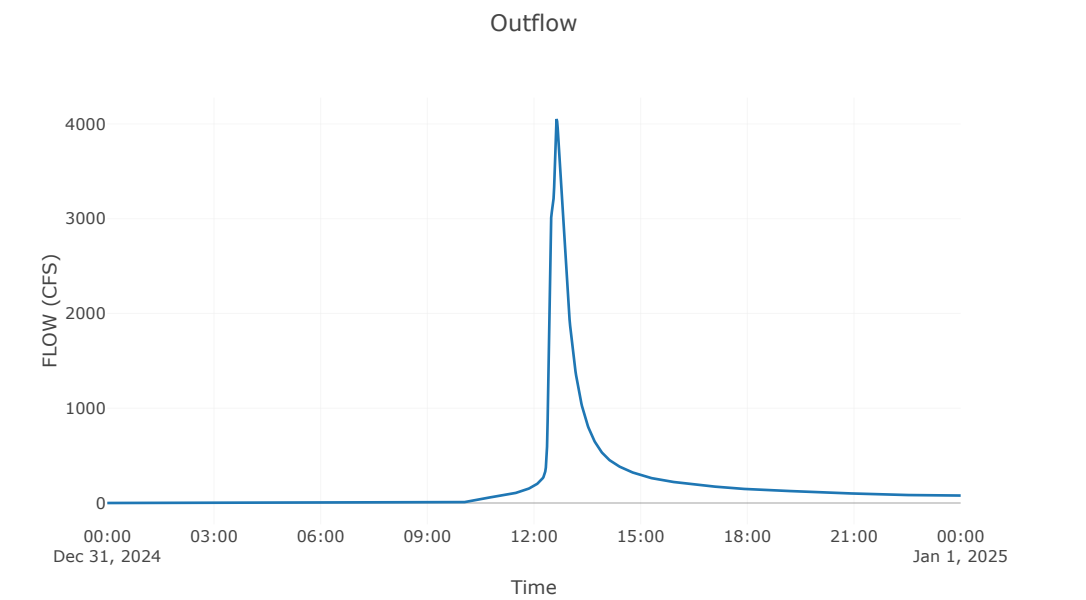


Reach: RCH - 5

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11542.83
Energy Slope (FT/FT)	0.05
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	3272

Results: RCH - 5	
Peak Discharge (CFS)	4052.4
Time of Peak Discharge	31Dec2024, 12:38
Volume (IN)	2.79
Peak Inflow (CFS)	4090.93
Inflow Volume (AC - FT)	397.33



Subbasin: SB - 12

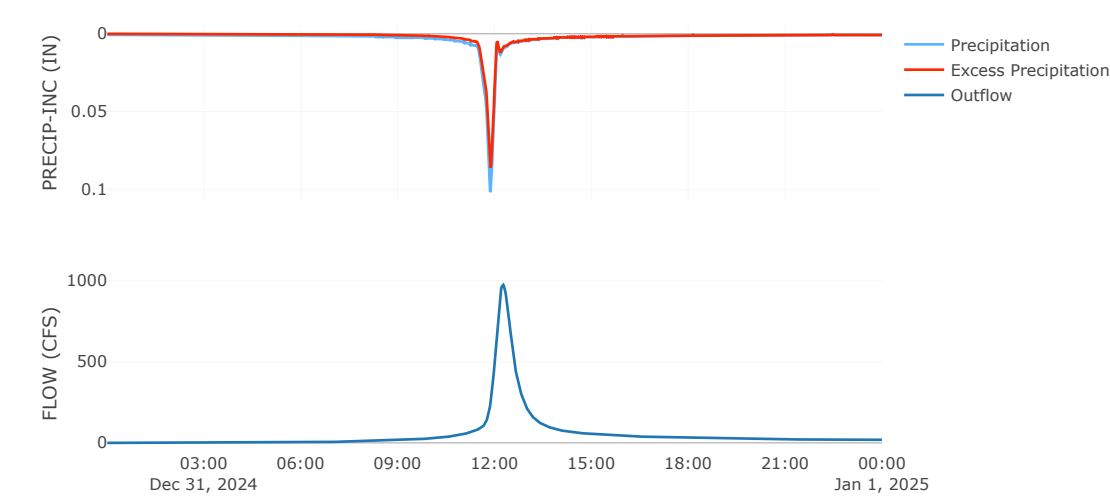
Area (MI2) : 0.65
Latitude Degrees : 31.75
Longitude Degrees : -110.85
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.9

Transform: Scs	
Lag	23.36
Unitgraph Type	Standard

Results: SB - 12	
Peak Discharge (CFS)	974.19
Time of Peak Discharge	31Dec2024, 12:15
Volume (IN)	3
Precipitation Volume (AC - FT)	147.21
Loss Volume (AC - FT)	41.85
Excess Volume (AC - FT)	105.36
Direct Runoff Volume (AC - FT)	104.57
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 7

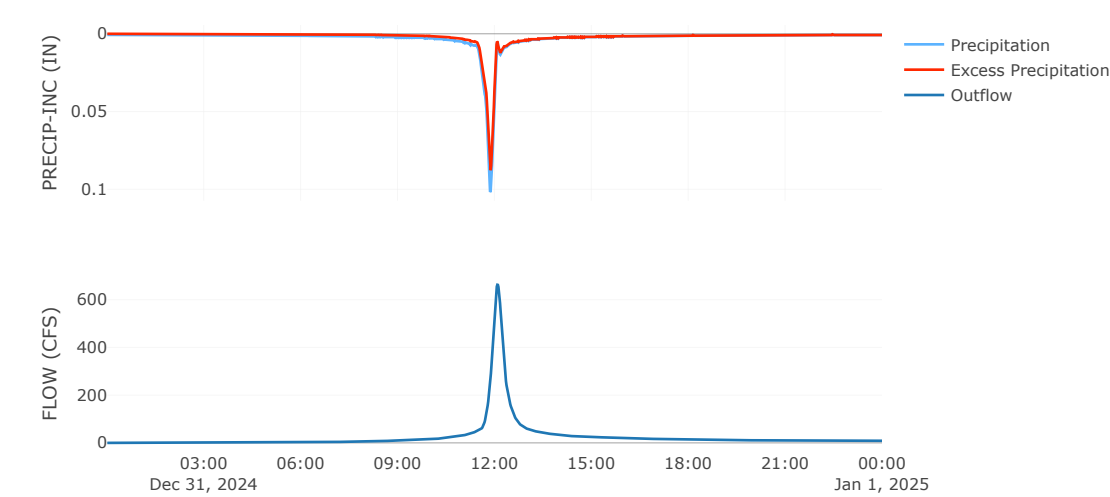
Area (MI2) : 0.31
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.6

Transform: Scs	
Lag	12.72
Unitgraph Type	Standard

Results: SB - 7	
Peak Discharge (CFS)	662.62
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	3.08
Precipitation Volume (AC - FT)	69.17
Loss Volume (AC - FT)	18.54
Excess Volume (AC - FT)	50.63
Direct Runoff Volume (AC - FT)	50.43
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



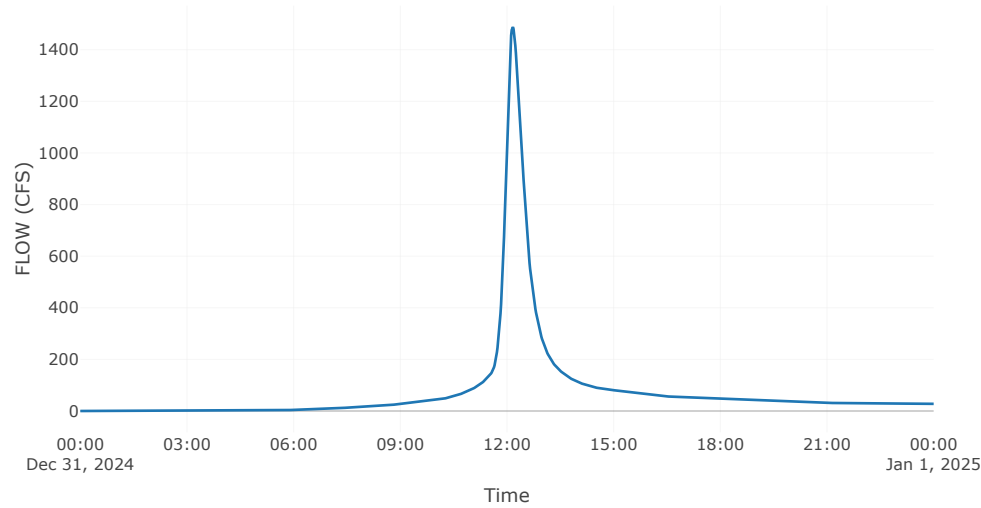
Junction: J - 9

Downstream : RCH - 9

Results: J - 9

Peak Discharge (CFS)	1488.05
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.02

Outflow

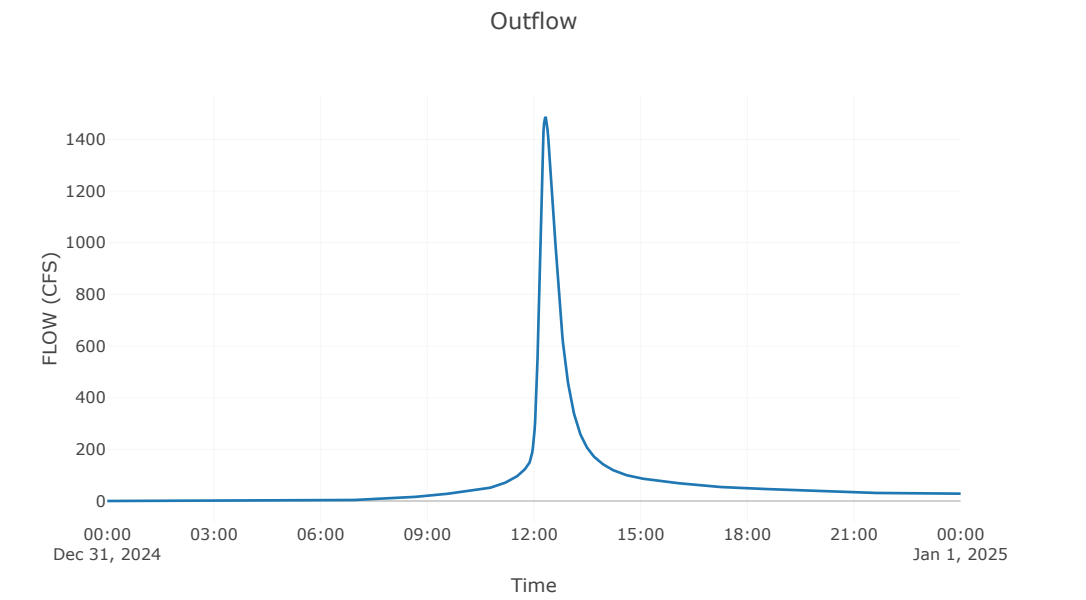


Reach: RCH - 9

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6275.53
Energy Slope (FT/FT)	0.06
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	15
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1237

Results: RCH - 9	
Peak Discharge (CFS)	1486.93
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.99
Peak Inflow (CFS)	1488.05
Inflow Volume (AC - FT)	155



Subbasin: SB - 27

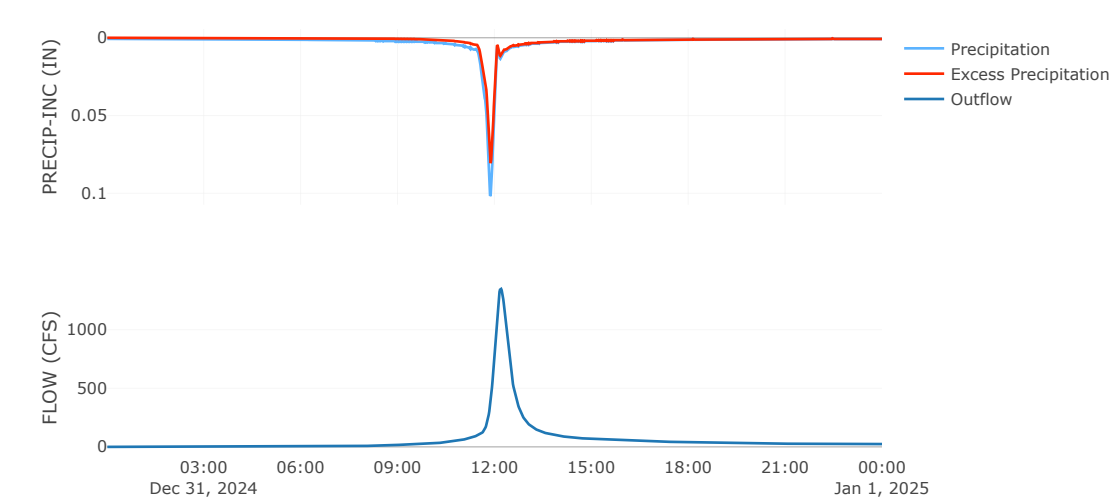
Area (MI2) : 0.86
Latitude Degrees : 31.76
Longitude Degrees : -110.85
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.3

Transform: Scs	
Lag	18.98
Unitgraph Type	Standard

Results: SB - 27	
Peak Discharge (CFS)	1349.65
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	2.76
Precipitation Volume (AC - FT)	193.36
Loss Volume (AC - FT)	66.26
Excess Volume (AC - FT)	127.1
Direct Runoff Volume (AC - FT)	126.29
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 23

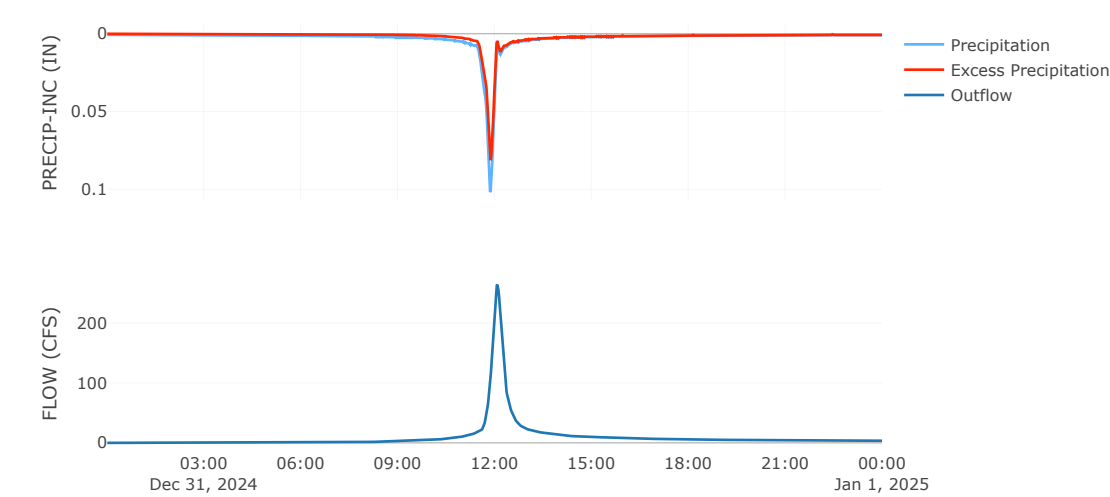
Area (MI2) : 0.13
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.6

Transform: Scs	
Lag	11.82
Unitgraph Type	Standard

Results: SB - 23	
Peak Discharge (CFS)	263.75
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	2.79
Precipitation Volume (AC - FT)	28.89
Loss Volume (AC - FT)	9.71
Excess Volume (AC - FT)	19.18
Direct Runoff Volume (AC - FT)	19.11
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



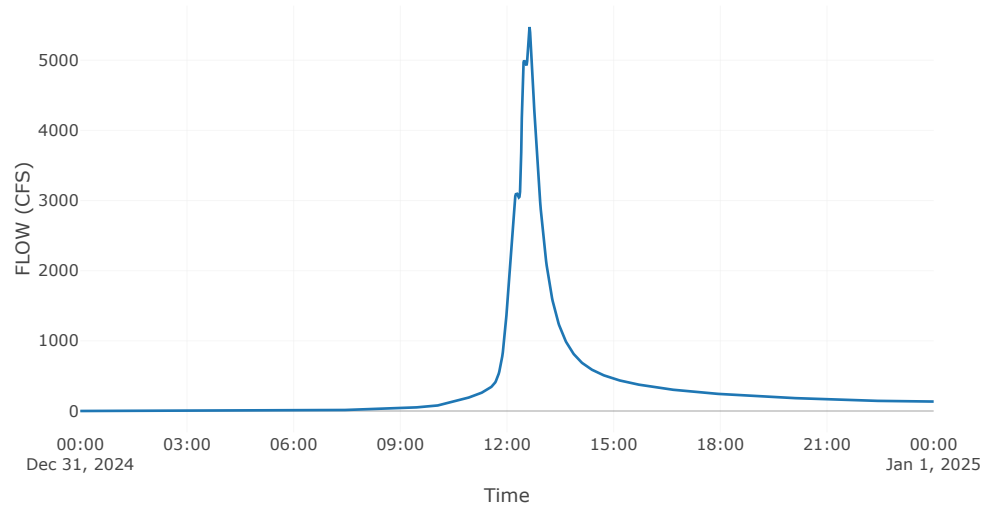
Junction: J - 3

Downstream : RCH - 3

Results: J - 3

Peak Discharge (CFS)	5474.03
Time of Peak Discharge	31Dec2024, 12:38
Volume (IN)	2.82

Outflow

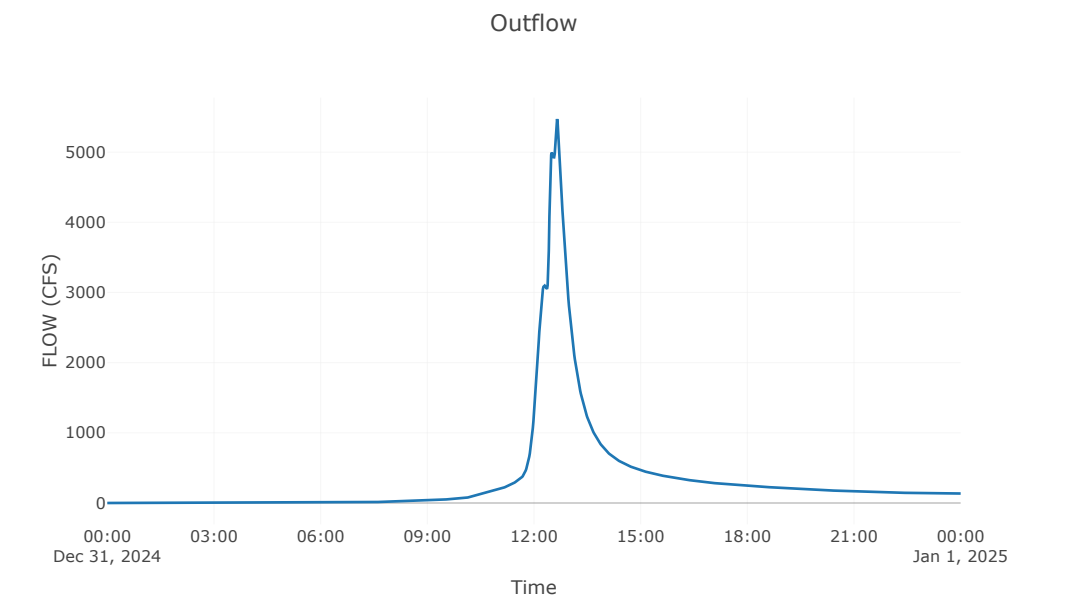


Reach: RCH - 3

Downstream : J - 2

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	727.7
Energy Slope (FT/FT)	0.03
Mannings n	0.08
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	200
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4227

Results: RCH - 3	
Peak Discharge (CFS)	5472.33
Time of Peak Discharge	31Dec2024, 12:39
Volume (IN)	2.82
Peak Inflow (CFS)	5474.03
Inflow Volume (AC - FT)	681.38



Subbasin: SB - 4

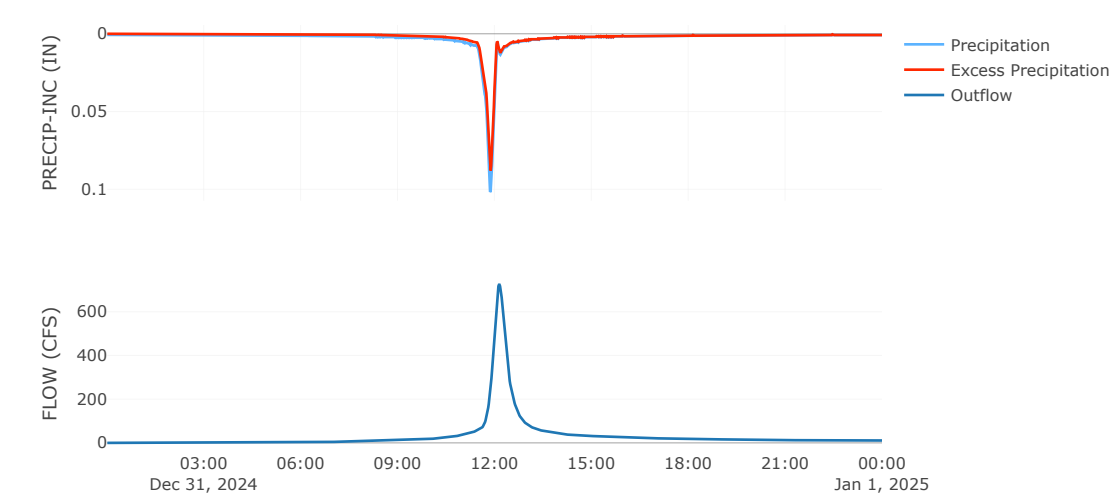
Area (MI2) : 0.38
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.7

Transform: Scs	
Lag	16.15
Unitgraph Type	Standard

Results: SB - 4	
Peak Discharge (CFS)	723.48
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.08
Precipitation Volume (AC - FT)	85.44
Loss Volume (AC - FT)	22.71
Excess Volume (AC - FT)	62.73
Direct Runoff Volume (AC - FT)	62.42
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 29

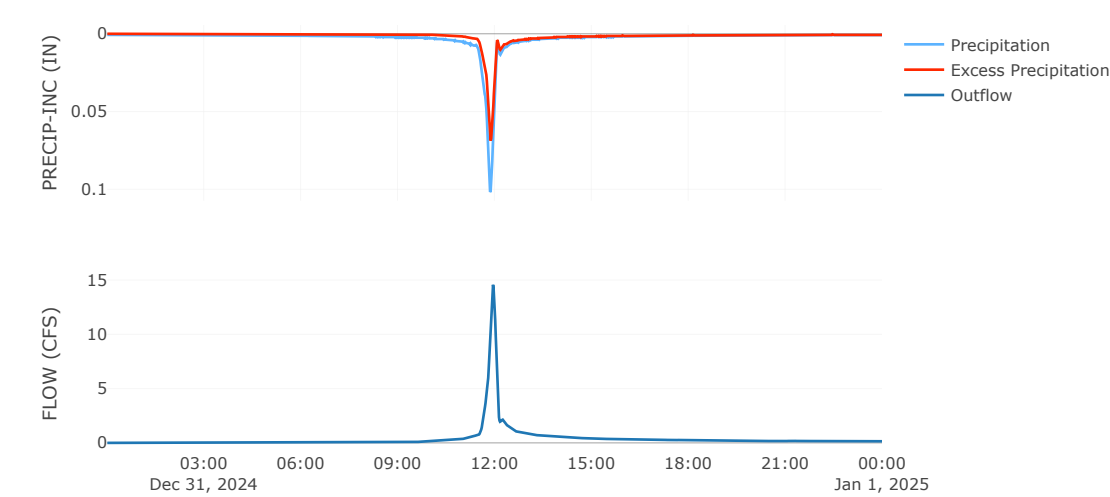
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	81.1

Transform: Scs	
Lag	3.27
Unitgraph Type	Standard

Results: SB - 29	
Peak Discharge (CFS)	14.57
Time of Peak Discharge	31Dec2024, 11:57
Volume (IN)	2.31
Precipitation Volume (AC - FT)	1.35
Loss Volume (AC - FT)	0.61
Excess Volume (AC - FT)	0.74
Direct Runoff Volume (AC - FT)	0.74
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



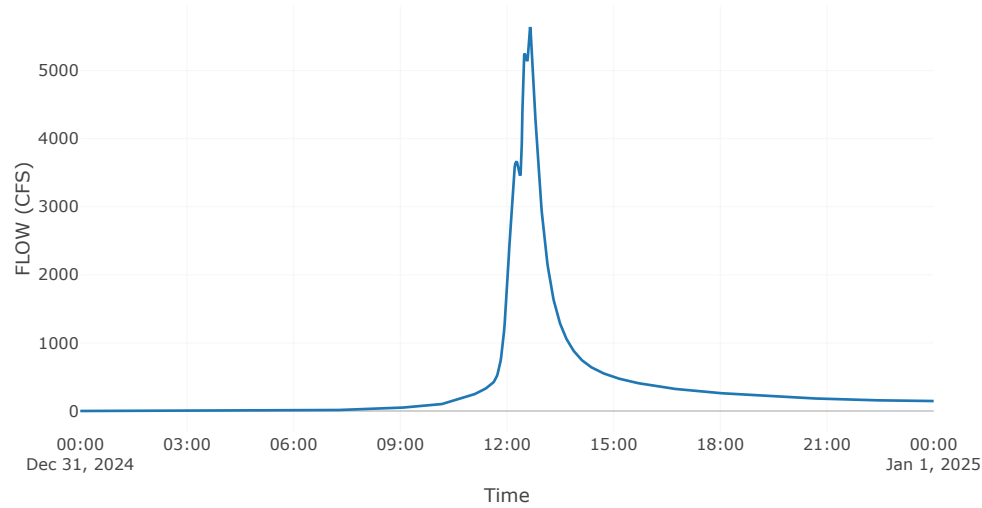
Junction: J - 2

Downstream : RCH - 2

Results: J - 2

Peak Discharge (CFS)	5640.23
Time of Peak Discharge	31Dec2024, 12:39
Volume (IN)	2.84

Outflow

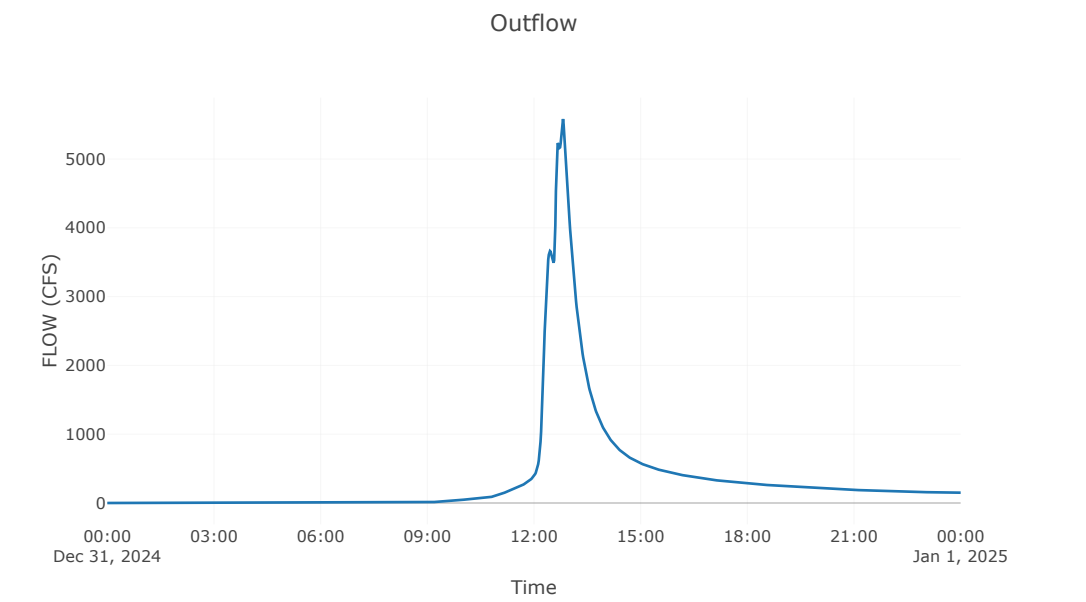


Reach: RCH - 2

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	4383.33
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4346

Results: RCH - 2	
Peak Discharge (CFS)	5581.92
Time of Peak Discharge	31Dec2024, 12:49
Volume (IN)	2.79
Peak Inflow (CFS)	5640.23
Inflow Volume (AC - FT)	743.24



Subbasin: SB - 10

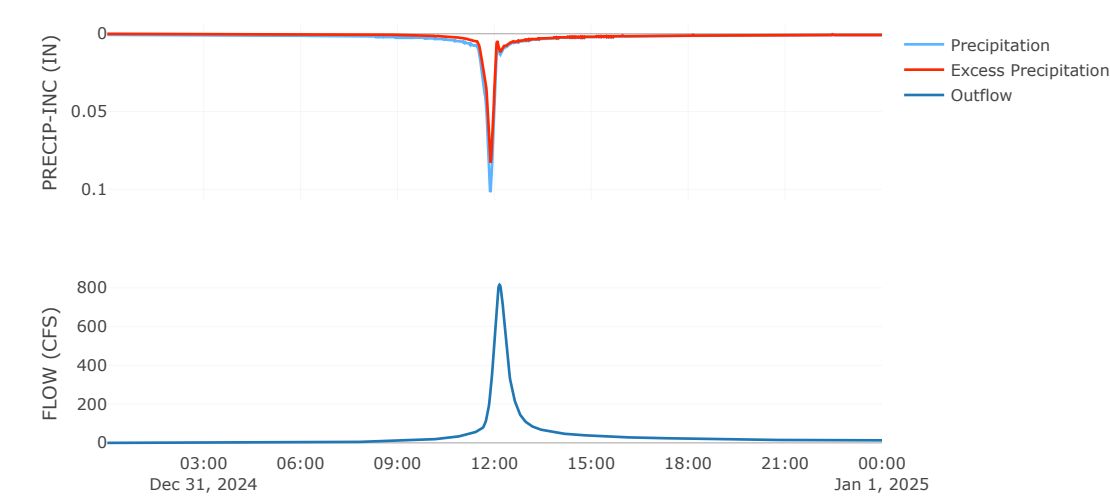
Area (MI2) : 0.47
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	87.3

Transform: SCS	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 10	
Peak Discharge (CFS)	815.6
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	2.85
Precipitation Volume (AC - FT)	104.81
Loss Volume (AC - FT)	33.6
Excess Volume (AC - FT)	71.21
Direct Runoff Volume (AC - FT)	70.82
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 14

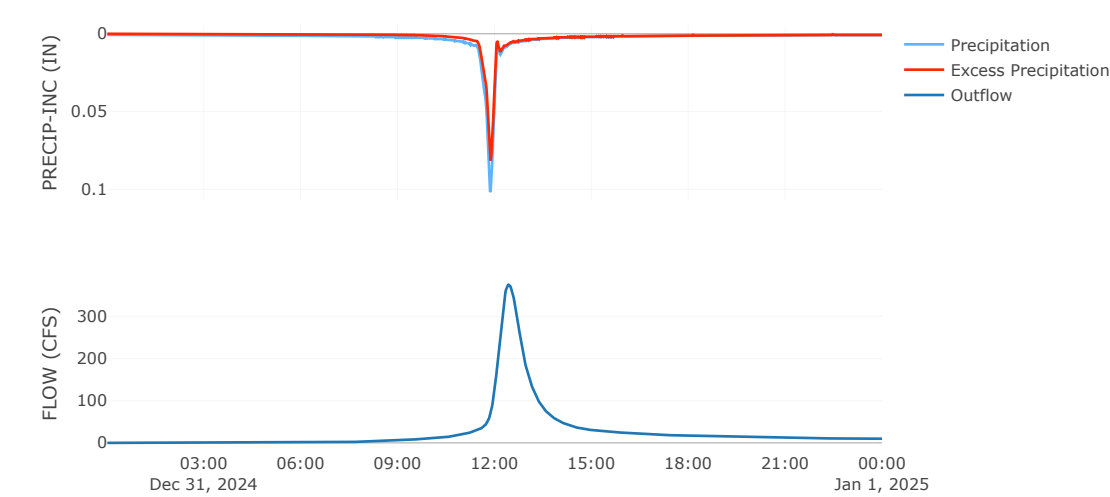
Area (MI2) : 0.35
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	33.79
Unitgraph Type	Standard

Results: SB - 14	
Peak Discharge (CFS)	374.88
Time of Peak Discharge	31Dec2024, 12:26
Volume (IN)	2.78
Precipitation Volume (AC - FT)	77.92
Loss Volume (AC - FT)	26.02
Excess Volume (AC - FT)	51.91
Direct Runoff Volume (AC - FT)	51.32
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



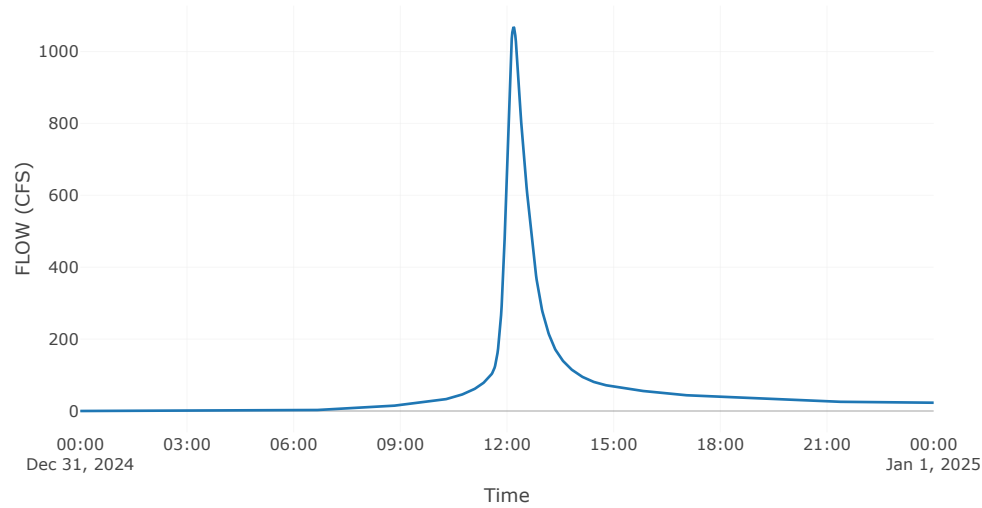
Junction: J - 11

Downstream : RCH - 11

Results: J - 11

Peak Discharge (CFS)	1068.26
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	2.82

Outflow

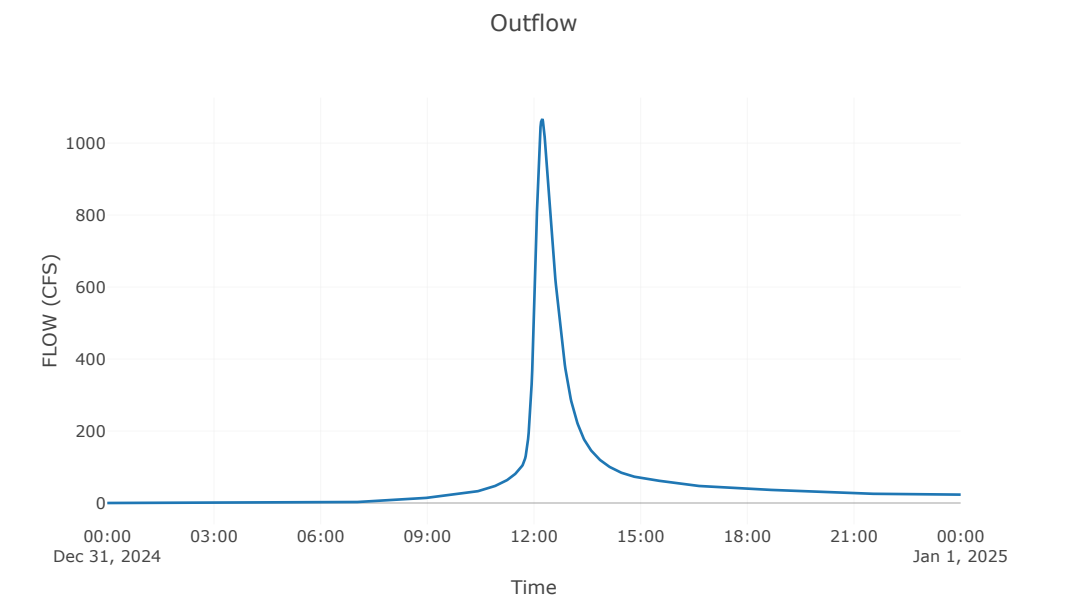


Reach: RCH - II

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1004.26
Energy Slope (FT/FT)	0.05
Mannings n	0.13
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	877

Results: RCH - II	
Peak Discharge (CFS)	1067.02
Time of Peak Discharge	31Dec2024, 12:14
Volume (IN)	2.81
Peak Inflow (CFS)	1068.26
Inflow Volume (AC - FT)	122.14



Subbasin: SB - 13

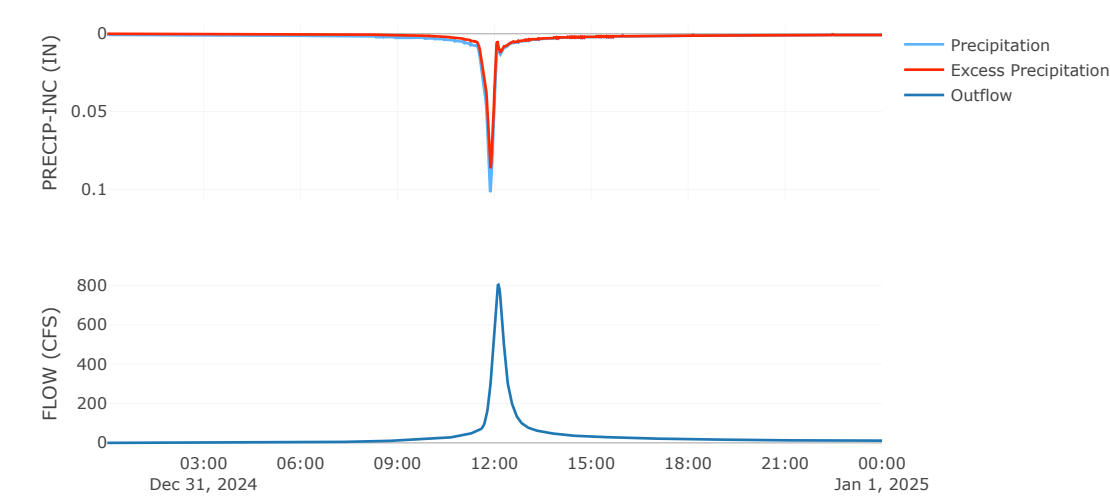
Area (MI2) : 0.4
Latitude Degrees : 31.74
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	89

Transform: SCS	
Lag	14.12
Unitgraph Type	Standard

Results: SB - 13	
Peak Discharge (CFS)	803.69
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.02
Precipitation Volume (AC - FT)	89.83
Loss Volume (AC - FT)	25.33
Excess Volume (AC - FT)	64.5
Direct Runoff Volume (AC - FT)	64.21
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 11

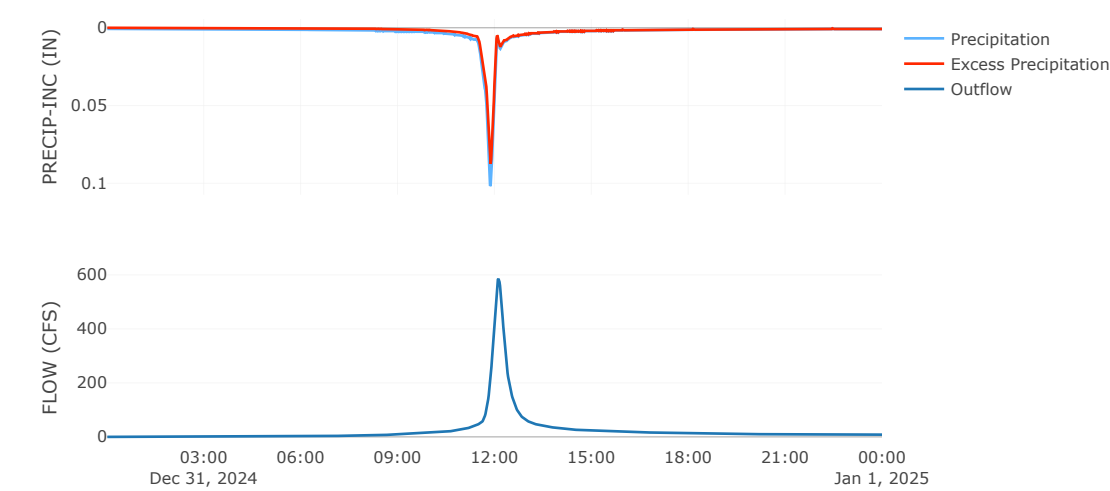
Area (MI2) : 0.29
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.5

Transform: Scs	
Lag	14.46
Unitgraph Type	Standard

Results: SB - 11	
Peak Discharge (CFS)	585.62
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.06
Precipitation Volume (AC - FT)	65.37
Loss Volume (AC - FT)	17.68
Excess Volume (AC - FT)	47.69
Direct Runoff Volume (AC - FT)	47.48
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



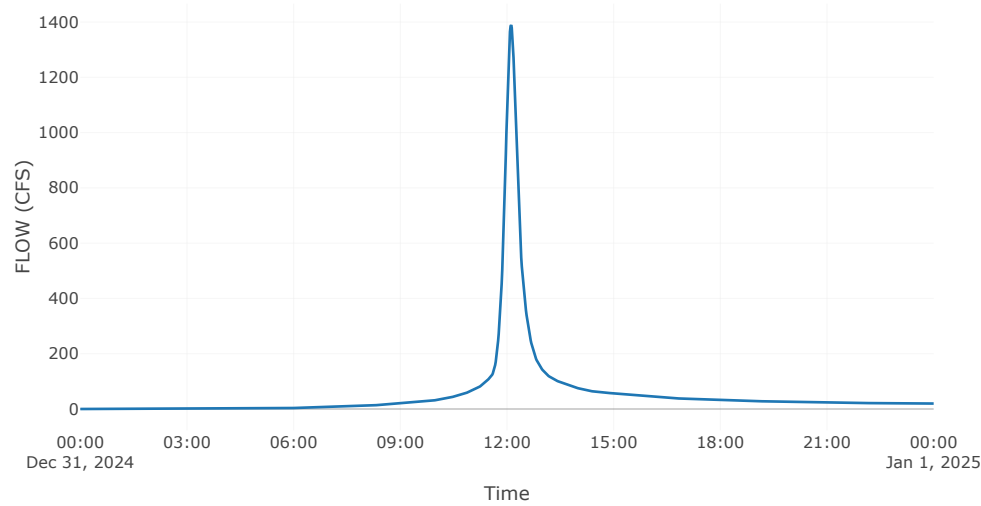
Junction: J - 13

Downstream : RCH - 13

Results: J - 13

Peak Discharge (CFS)	1389.31
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.04

Outflow

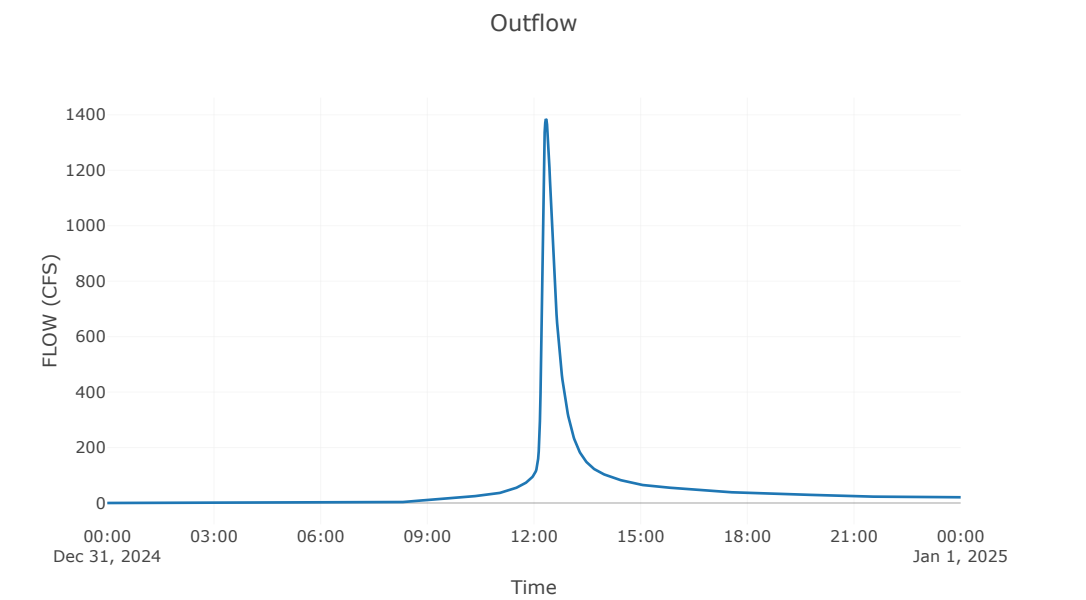


Reach: RCH - 13

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6298.97
Energy Slope (FT/FT)	0.1
Mannings n	0.17
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	90
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1157

Results: RCH - 13	
Peak Discharge (CFS)	1384.91
Time of Peak Discharge	31Dec2024, 12:20
Volume (IN)	2.96
Peak Inflow (CFS)	1389.31
Inflow Volume (AC - FT)	111.68



Subbasin: SB - 19

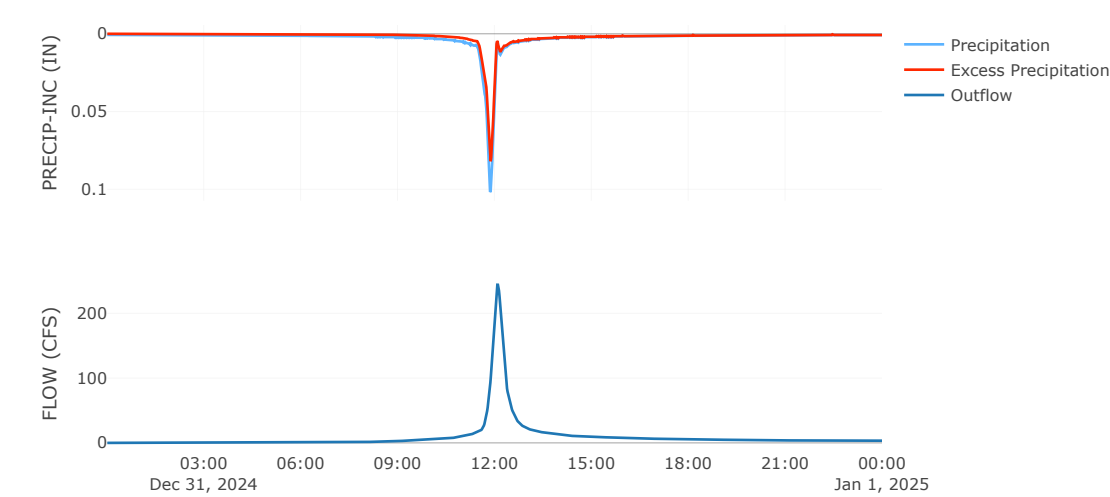
Area (MI2) : 0.12
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 8

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.9

Transform: Scs	
Lag	12.64
Unitgraph Type	Standard

Results: SB - 19	
Peak Discharge (CFS)	244.15
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	2.82
Precipitation Volume (AC - FT)	27.41
Loss Volume (AC - FT)	9.03
Excess Volume (AC - FT)	18.38
Direct Runoff Volume (AC - FT)	18.3
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 21

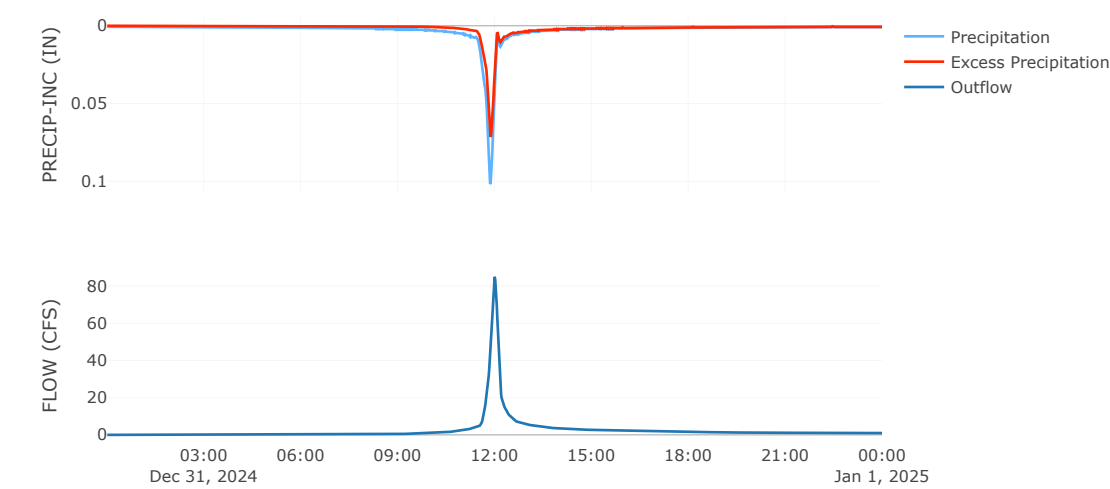
Area (MI2) : 0.04
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 8

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	82.3

Transform: Scs	
Lag	6.2
Unitgraph Type	Standard

Results: SB - 21	
Peak Discharge (CFS)	85.01
Time of Peak Discharge	31Dec2024, 12:00
Volume (IN)	2.41
Precipitation Volume (AC - FT)	8.48
Loss Volume (AC - FT)	3.62
Excess Volume (AC - FT)	4.86
Direct Runoff Volume (AC - FT)	4.85
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



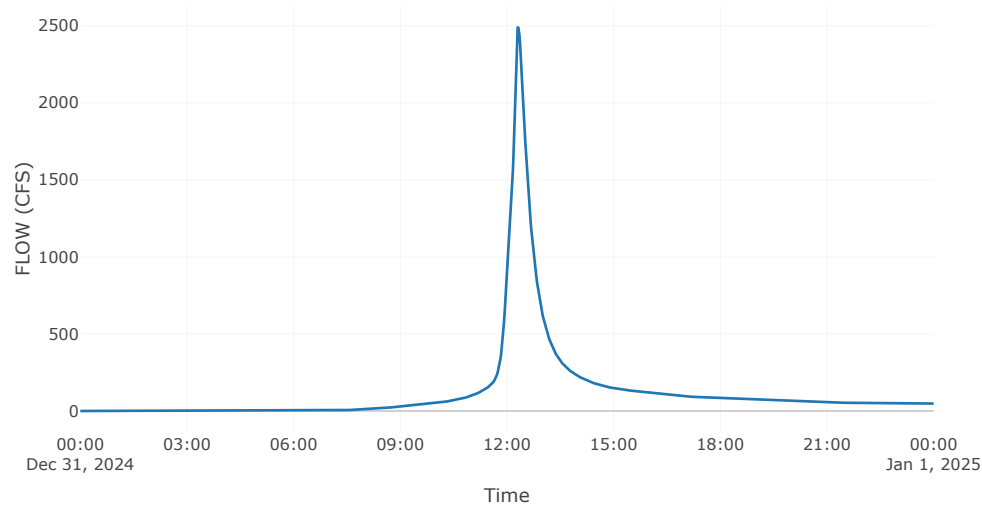
Junction: J - 8

Downstream : RCH - 8

Results: J - 8

Peak Discharge (CFS)	2492.17
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.86

Outflow

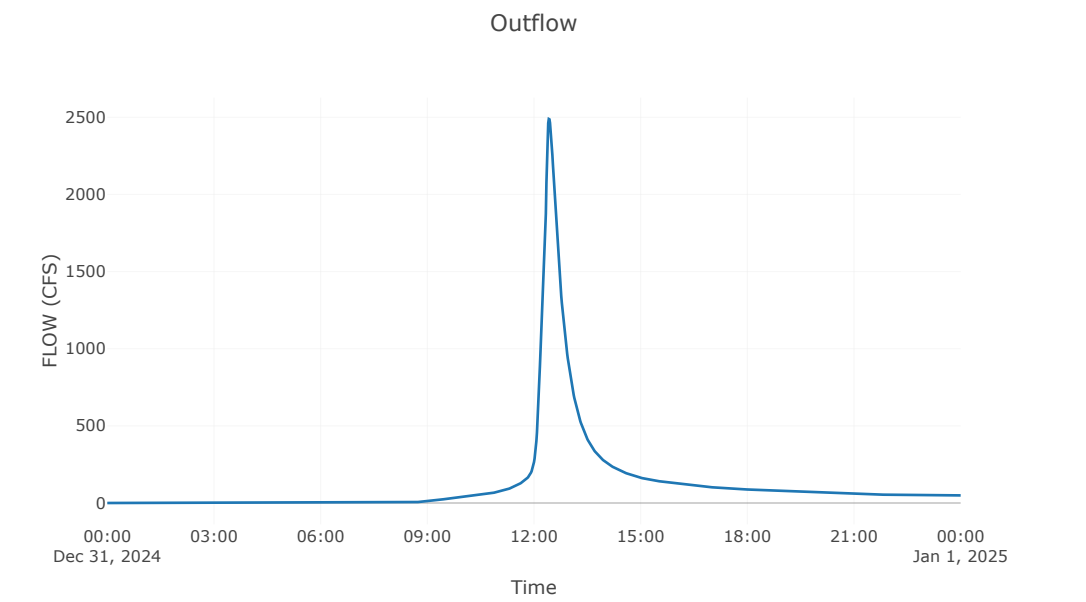


Reach: RCH - 8

Downstream : J - 6

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3385.93
Energy Slope (FT/FT)	0.04
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2043

Results: RCH - 8	
Peak Discharge (CFS)	2489.02
Time of Peak Discharge	31Dec2024, 12:25
Volume (IN)	2.83
Peak Inflow (CFS)	2492.17
Inflow Volume (AC - FT)	253.55



Subbasin: SB - 24

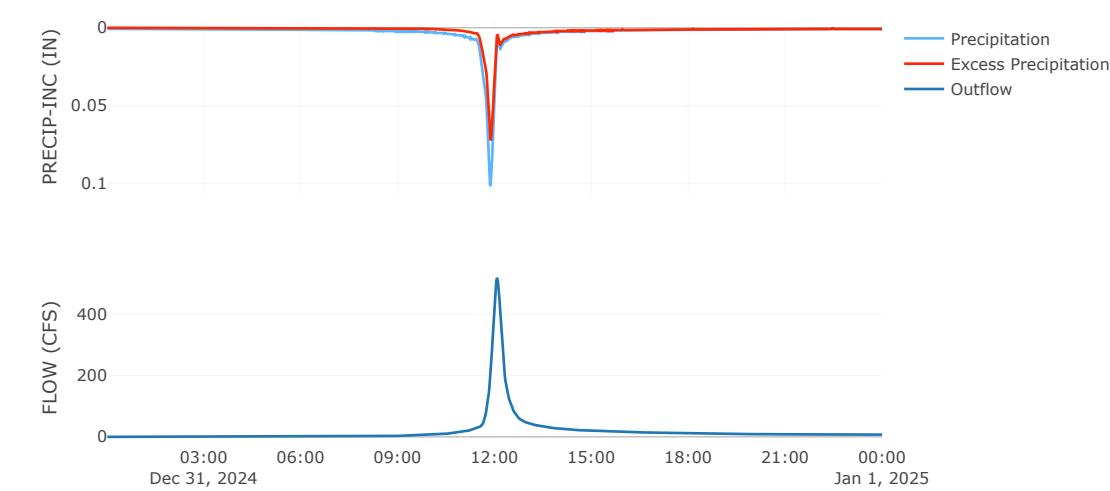
Area (MI2) : 0.28
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 6

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	82.7

Transform: SCS	
Lag	11.31
Unitgraph Type	Standard

Results: SB - 24	
Peak Discharge (CFS)	515.66
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	2.44
Precipitation Volume (AC - FT)	62.78
Loss Volume (AC - FT)	26.3
Excess Volume (AC - FT)	36.48
Direct Runoff Volume (AC - FT)	36.33
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 8

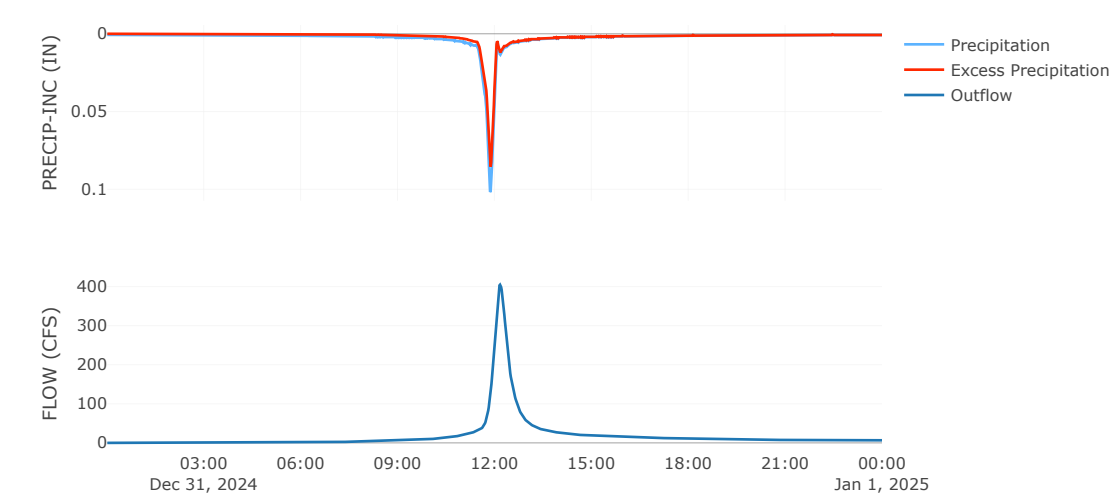
Area (MI2) : 0.23
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 6

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.5

Transform: Scs	
Lag	17.71
Unitgraph Type	Standard

Results: SB - 8	
Peak Discharge (CFS)	404.69
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	2.96
Precipitation Volume (AC - FT)	52.05
Loss Volume (AC - FT)	15.27
Excess Volume (AC - FT)	36.77
Direct Runoff Volume (AC - FT)	36.56
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



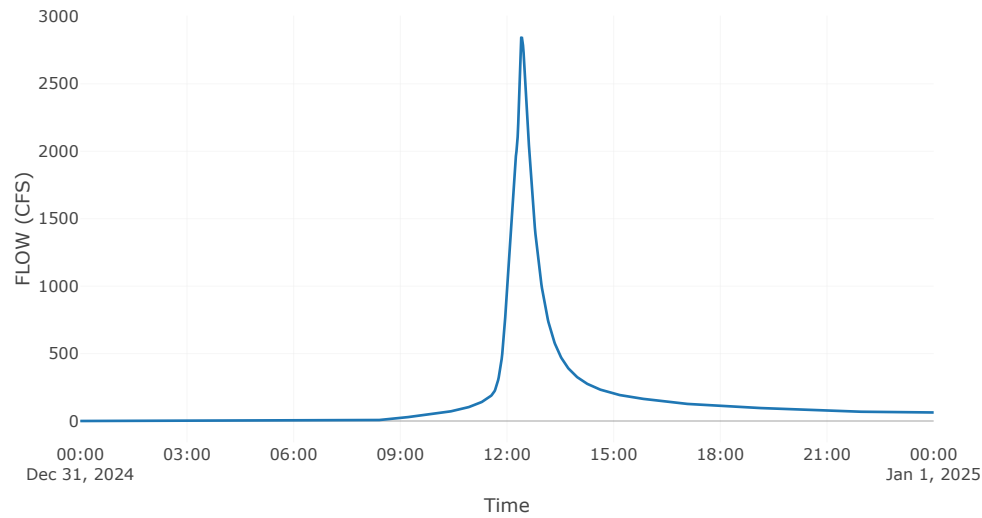
Junction: J - 6

Downstream : RCH - 6

Results: J - 6

Peak Discharge (CFS)	2847.42
Time of Peak Discharge	31Dec2024, 12:25
Volume (IN)	2.79

Outflow

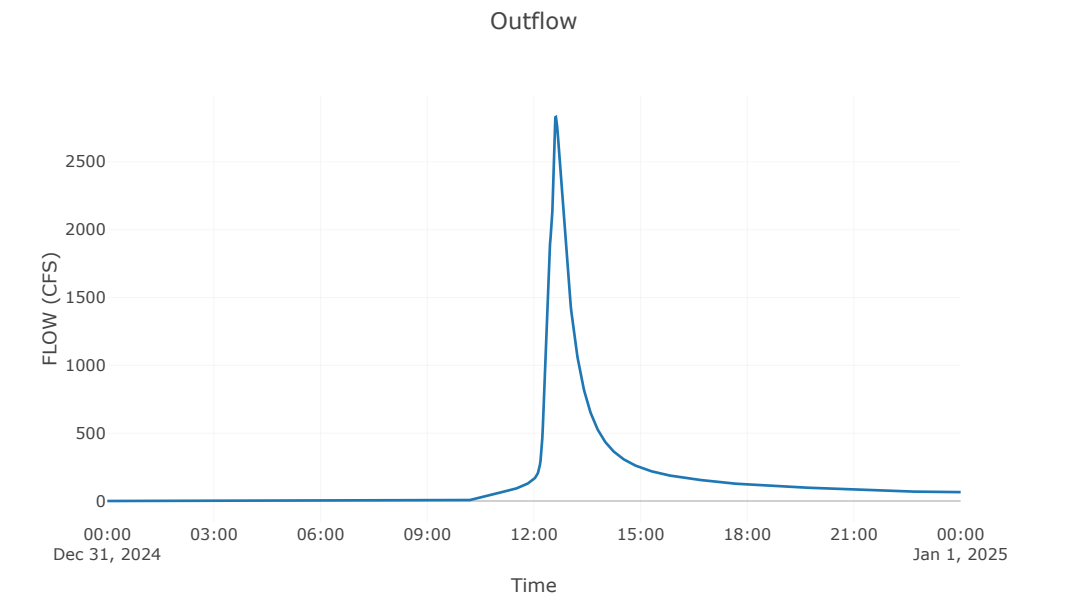


Reach: RCH - 6

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5289.14
Energy Slope (FT/FT)	0.03
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	250
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2306

Results: RCH - 6	
Peak Discharge (CFS)	2830.65
Time of Peak Discharge	31Dec2024, 12:37
Volume (IN)	2.73
Peak Inflow (CFS)	2847.42
Inflow Volume (AC - FT)	323.22



Subbasin: SB - 6

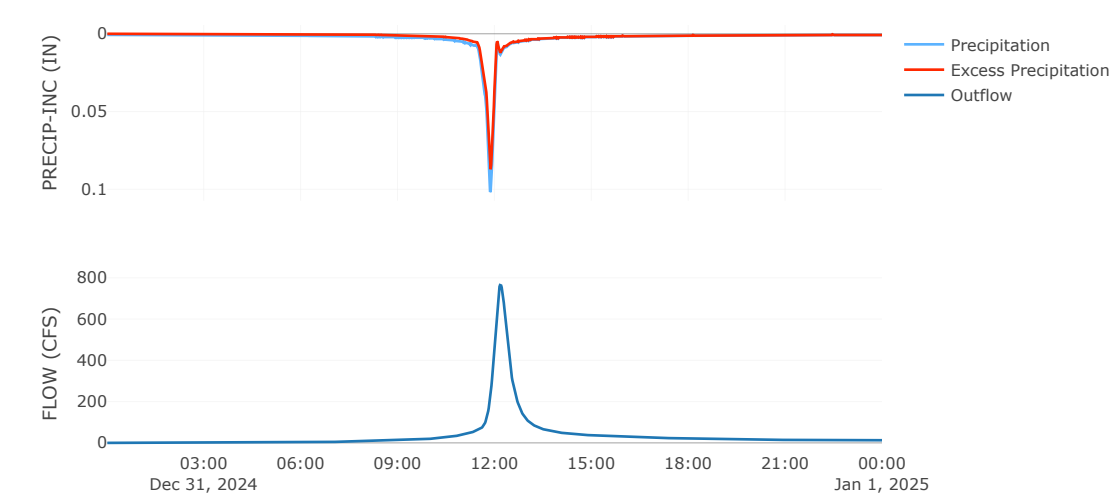
Area (MI2) : 0.44
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.3

Transform: Scs	
Lag	18.63
Unitgraph Type	Standard

Results: SB - 6	
Peak Discharge (CFS)	766.33
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	3.04
Precipitation Volume (AC - FT)	99.35
Loss Volume (AC - FT)	27.33
Excess Volume (AC - FT)	72.02
Direct Runoff Volume (AC - FT)	71.6
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 5

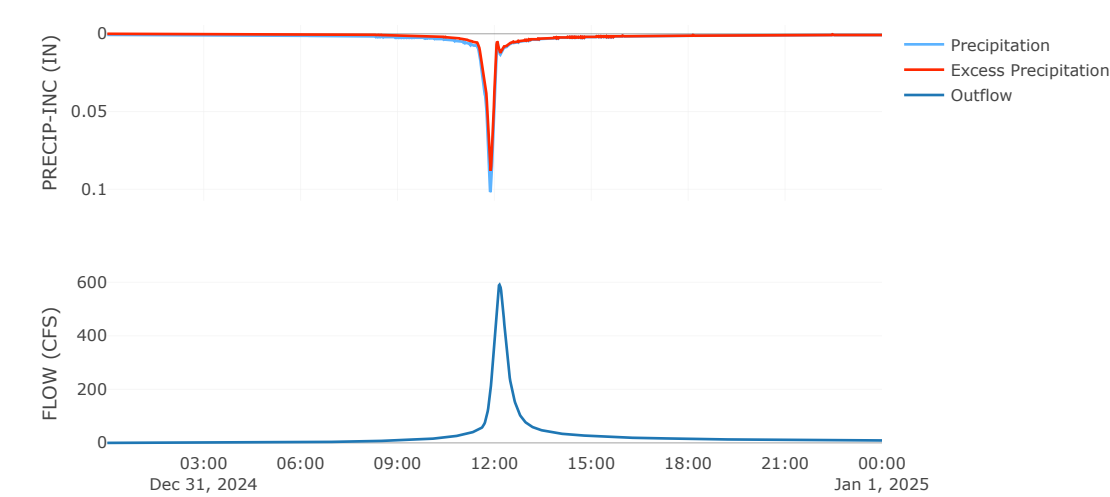
Area (MI2) : 0.31
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.8

Transform: Scs	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 5	
Peak Discharge (CFS)	590.77
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.09
Precipitation Volume (AC - FT)	70.75
Loss Volume (AC - FT)	18.64
Excess Volume (AC - FT)	52.11
Direct Runoff Volume (AC - FT)	51.84
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



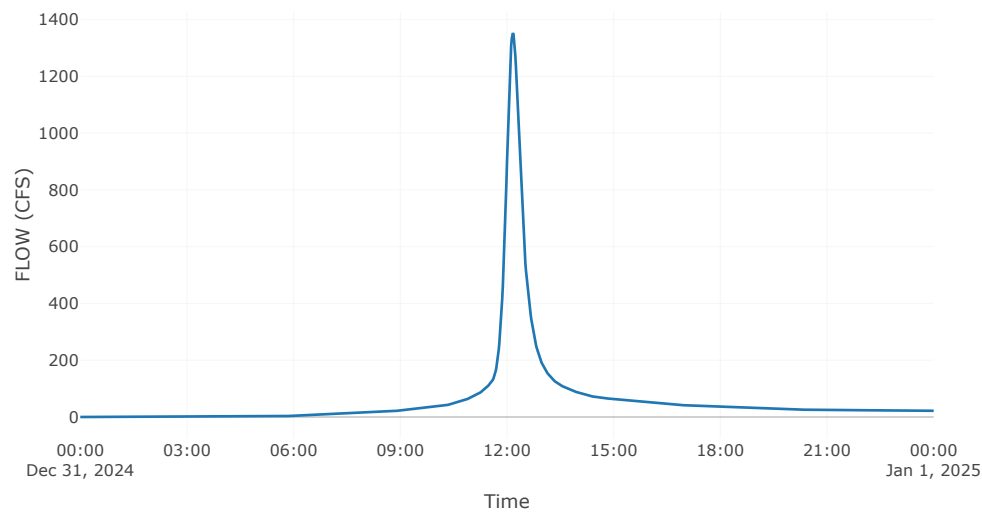
Junction: J - 12

Downstream : RCH - 12

Results: J - 12

Peak Discharge (CFS)	1352.75
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.06

Outflow

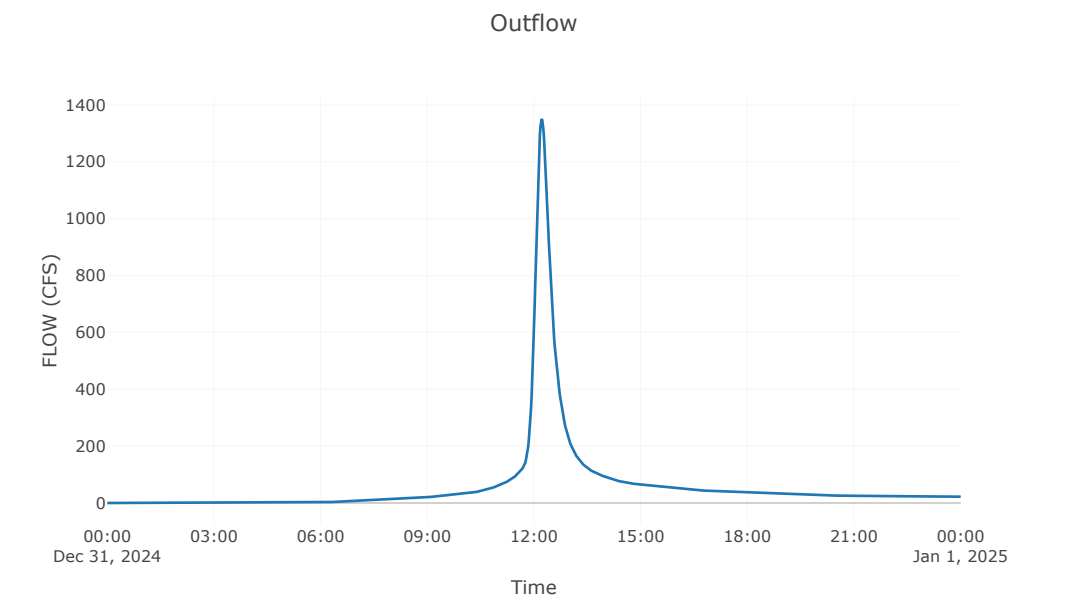


Reach: RCH - 12

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1501.96
Energy Slope (FT/FT)	0.03
Mannings n	0.09
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1127

Results: RCH - 12	
Peak Discharge (CFS)	1350.53
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	3.04
Peak Inflow (CFS)	1352.75
Inflow Volume (AC - FT)	123.44



Subbasin: SB - 26

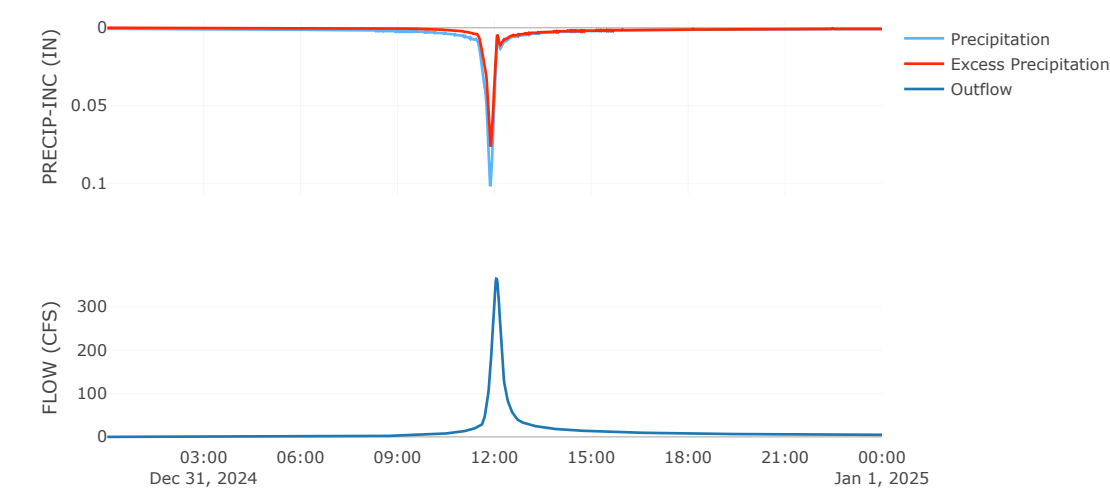
Area (MI2) : 0.18
Latitude Degrees : 31.76
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	84.4

Transform: SCS	
Lag	10.19
Unitgraph Type	Standard

Results: SB - 26	
Peak Discharge (CFS)	364.76
Time of Peak Discharge	31Dec2024, 12:03
Volume (IN)	2.59
Precipitation Volume (AC - FT)	40.08
Loss Volume (AC - FT)	15.37
Excess Volume (AC - FT)	24.7
Direct Runoff Volume (AC - FT)	24.62
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 20

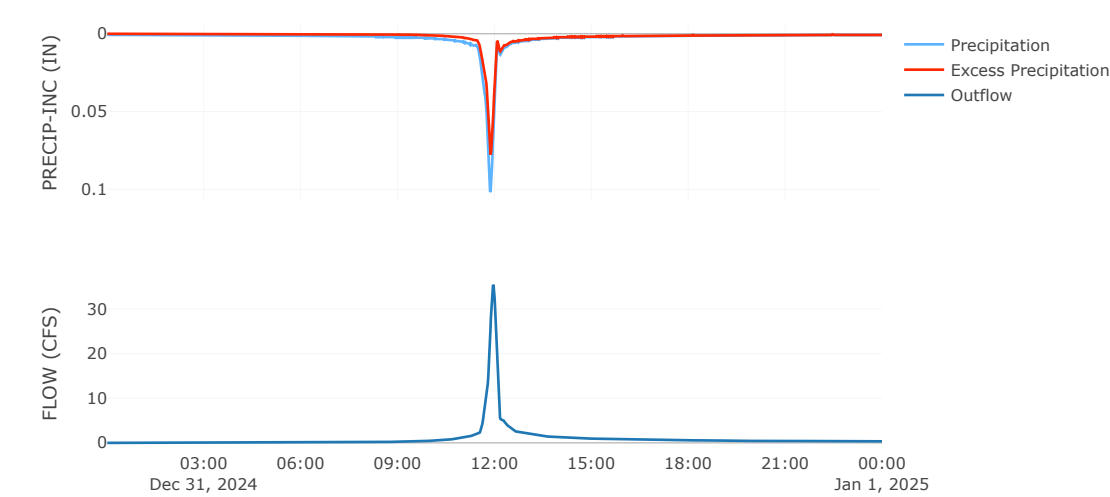
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85

Transform: Scs	
Lag	3.99
Unitgraph Type	Standard

Results: SB - 20	
Peak Discharge (CFS)	35.41
Time of Peak Discharge	31Dec2024, 11:57
Volume (IN)	2.65
Precipitation Volume (AC - FT)	2.97
Loss Volume (AC - FT)	1.1
Excess Volume (AC - FT)	1.87
Direct Runoff Volume (AC - FT)	1.87
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



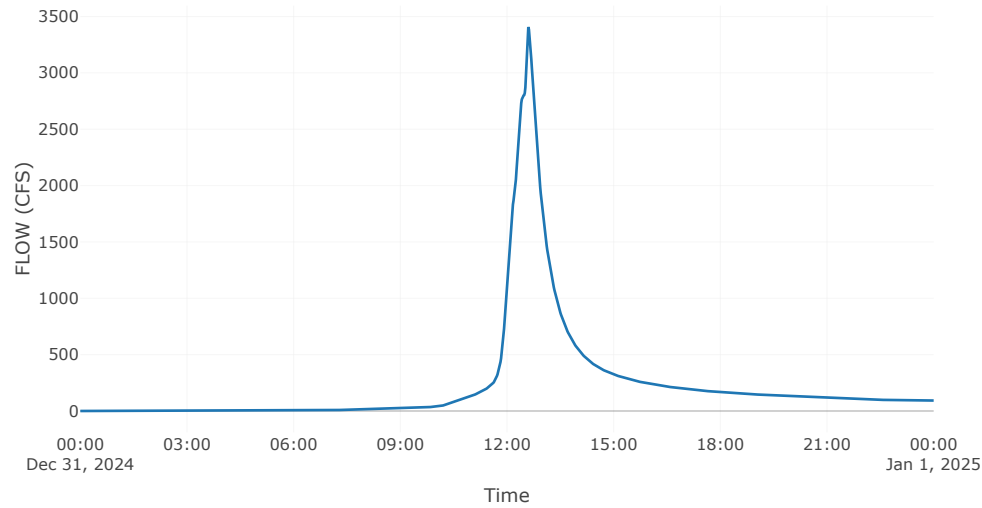
Junction: J - 4

Downstream : RCH - 4

Results: J - 4

Peak Discharge (CFS)	3406.98
Time of Peak Discharge	31Dec2024, 12:36
Volume (IN)	2.79

Outflow

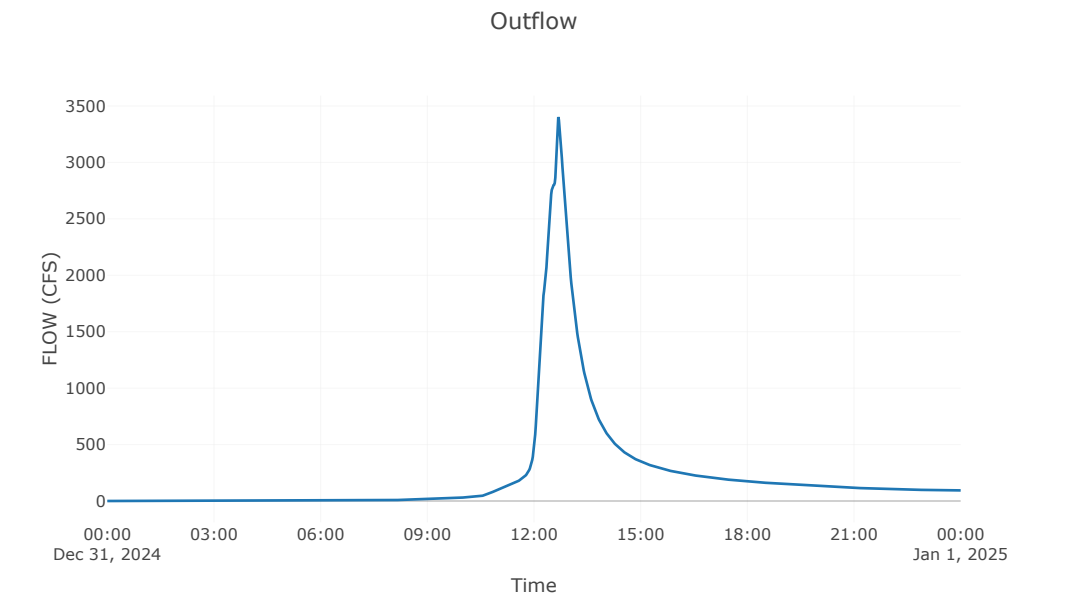


Reach: RCH - 4

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1941.67
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2698

Results: RCH - 4	
Peak Discharge (CFS)	3402.53
Time of Peak Discharge	31Dec2024, 12:41
Volume (IN)	2.77
Peak Inflow (CFS)	3406.98
Inflow Volume (AC - FT)	464.89



Subbasin: SB - 30

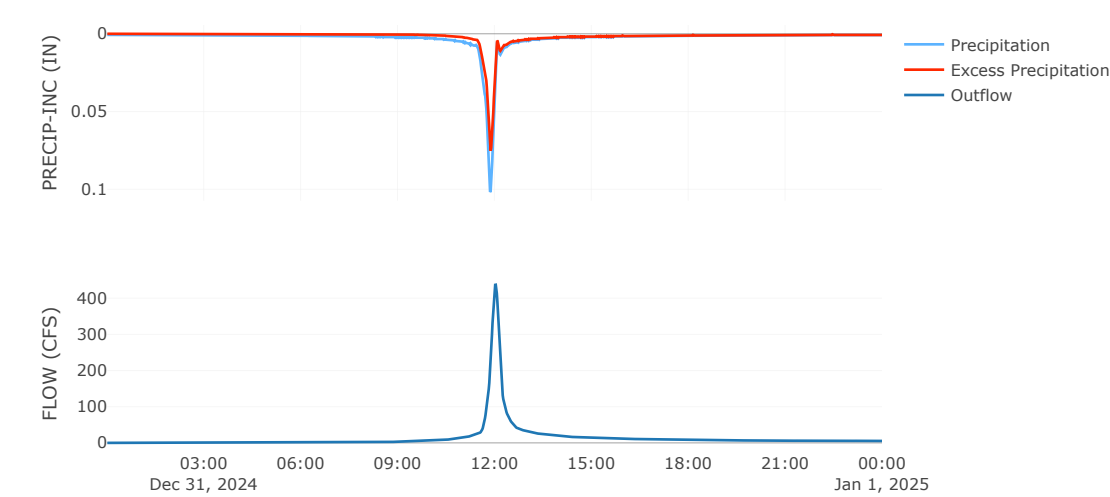
Area (MI2) : 0.2
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 1

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	83.9

Transform: SCS	
Lag	8.18
Unitgraph Type	Standard

Results: SB - 30	
Peak Discharge (CFS)	437.16
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.55
Precipitation Volume (AC - FT)	44.96
Loss Volume (AC - FT)	17.72
Excess Volume (AC - FT)	27.24
Direct Runoff Volume (AC - FT)	27.16
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 28

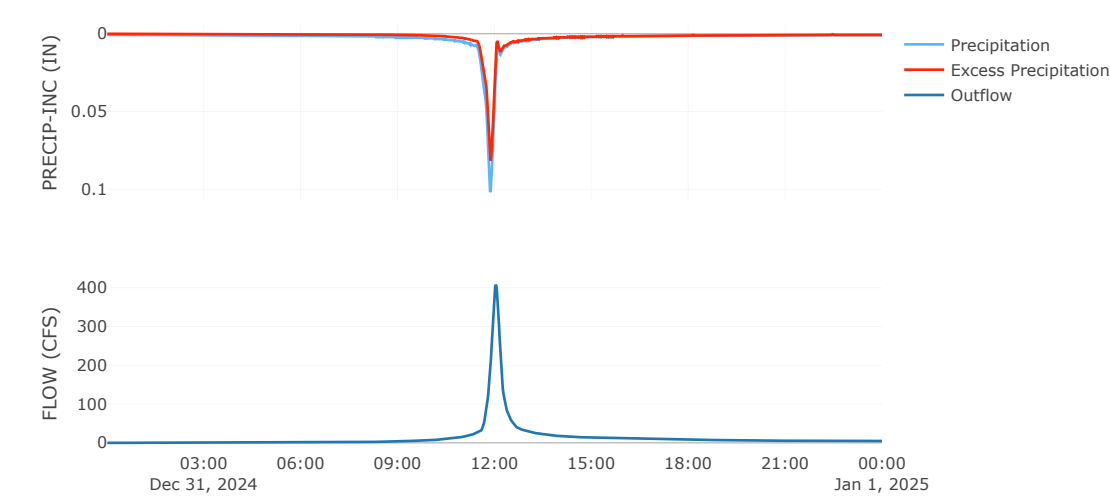
Area (MI2) : 0.18
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	8.99
Unitgraph Type	Standard

Results: SB - 28	
Peak Discharge (CFS)	407.64
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	2.8
Precipitation Volume (AC - FT)	39.72
Loss Volume (AC - FT)	13.26
Excess Volume (AC - FT)	26.45
Direct Runoff Volume (AC - FT)	26.38
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



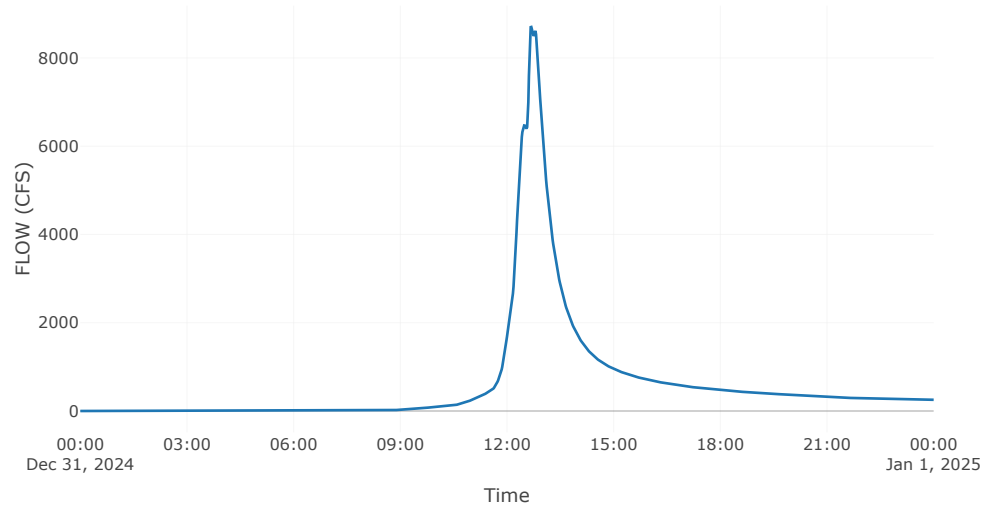
Junction: J - 1

Downstream : RCH - 1

Results: J - 1

Peak Discharge (CFS)	8701.22
Time of Peak Discharge	31Dec2024, 12:41
Volume (IN)	2.77

Outflow

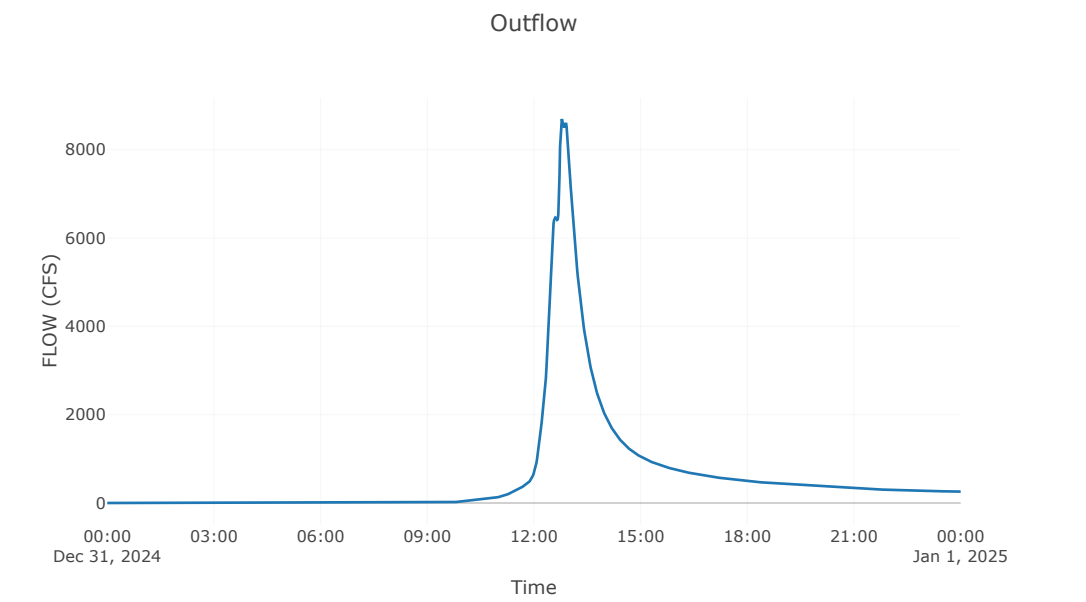


Reach: RCH - 1

Downstream : Florida Canyon Wash

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3145.34
Energy Slope (FT/FT)	0.02
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	6824

Results: RCH - 1	
Peak Discharge (CFS)	8695.45
Time of Peak Discharge	31Dec2024, 12:47
Volume (IN)	2.74
Peak Inflow (CFS)	8701.22
Inflow Volume (AC - FT)	1243.89



Subbasin: SB - 31

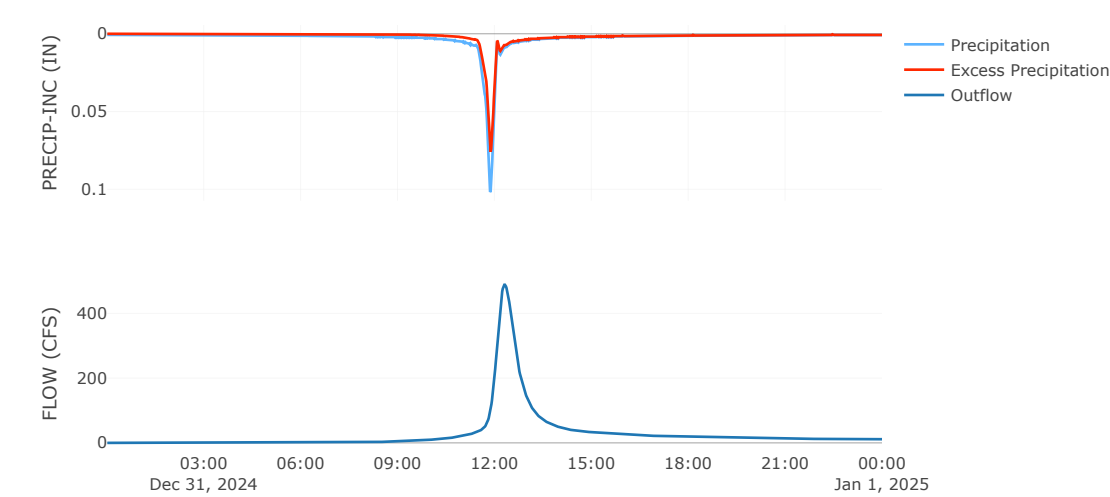
Area (MI2) : 0.41
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : Florida Canyon Wash

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	84.2

Transform: SCS	
Lag	26.25
Unitgraph Type	Standard

Results: SB - 31	
Peak Discharge (CFS)	488.42
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.56
Precipitation Volume (AC - FT)	92.57
Loss Volume (AC - FT)	35.9
Excess Volume (AC - FT)	56.67
Direct Runoff Volume (AC - FT)	56.15
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 33

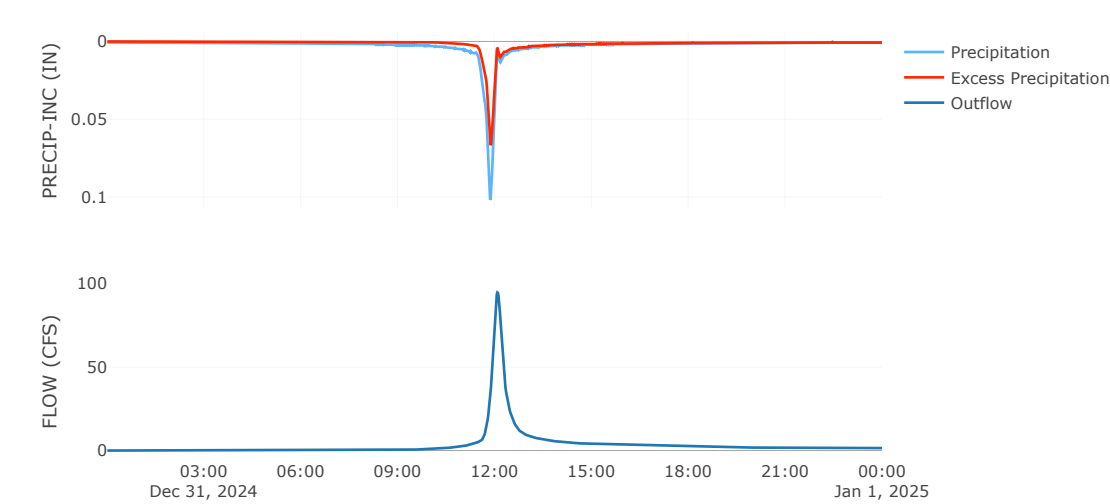
Area (MI2) : 0.06
Latitude Degrees : 31.78
Longitude Degrees : -110.88
Downstream : Florida Canyon Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.3
Initial Abstraction	0.5

Transform: Scs	
Lag	12.05
Unitgraph Type	Standard

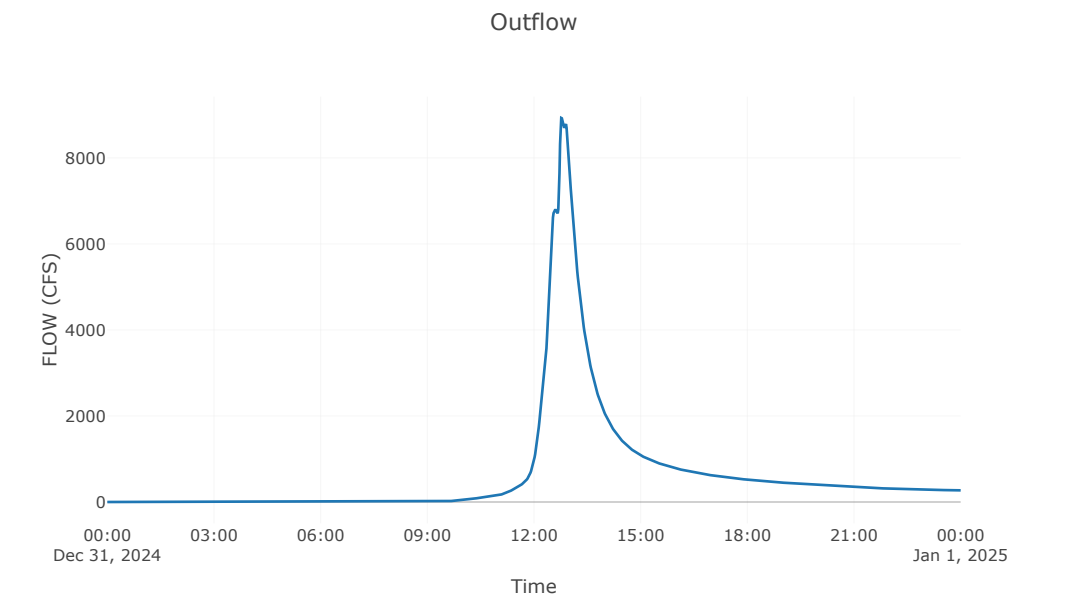
Results: SB - 33	
Peak Discharge (CFS)	94.85
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	2.23
Precipitation Volume (AC - FT)	12.98
Loss Volume (AC - FT)	6.09
Excess Volume (AC - FT)	6.9
Direct Runoff Volume (AC - FT)	6.86
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Sink: Florida Canyon Wash

Results: Florida Canyon Wash	
Peak Discharge (CFS)	8927.6
Time of Peak Discharge	31Dec2024, 12:46
Volume (IN)	2.73



Subbasin: SB - 3

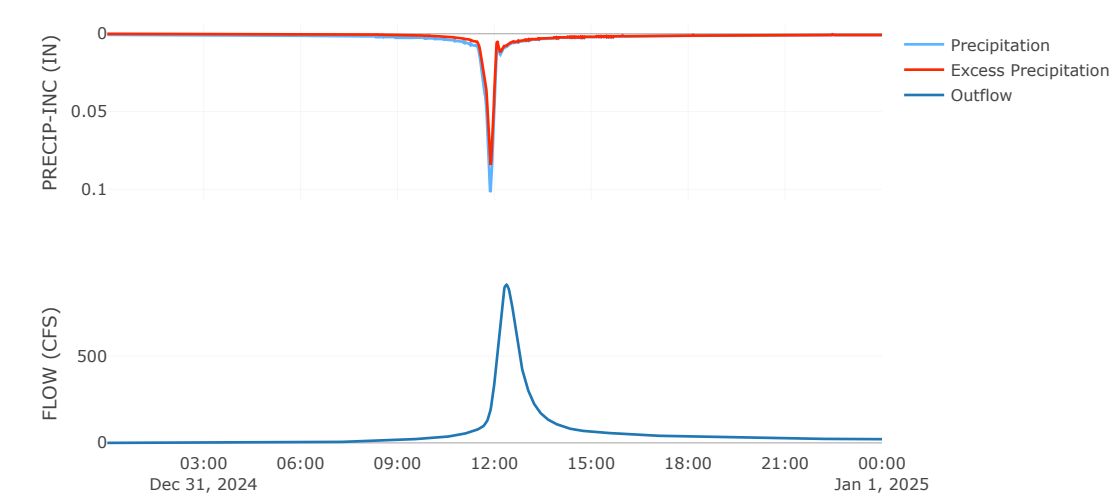
Area (MI2) : 0.74
Latitude Degrees : 31.78
Longitude Degrees : -110.85
Downstream : J - 7

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88

Transform: Scs	
Lag	29.77
Unitgraph Type	Standard

Results: SB - 3	
Peak Discharge (CFS)	911.85
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	2.9
Precipitation Volume (AC - FT)	166.58
Loss Volume (AC - FT)	50.78
Excess Volume (AC - FT)	115.8
Direct Runoff Volume (AC - FT)	114.68
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 2

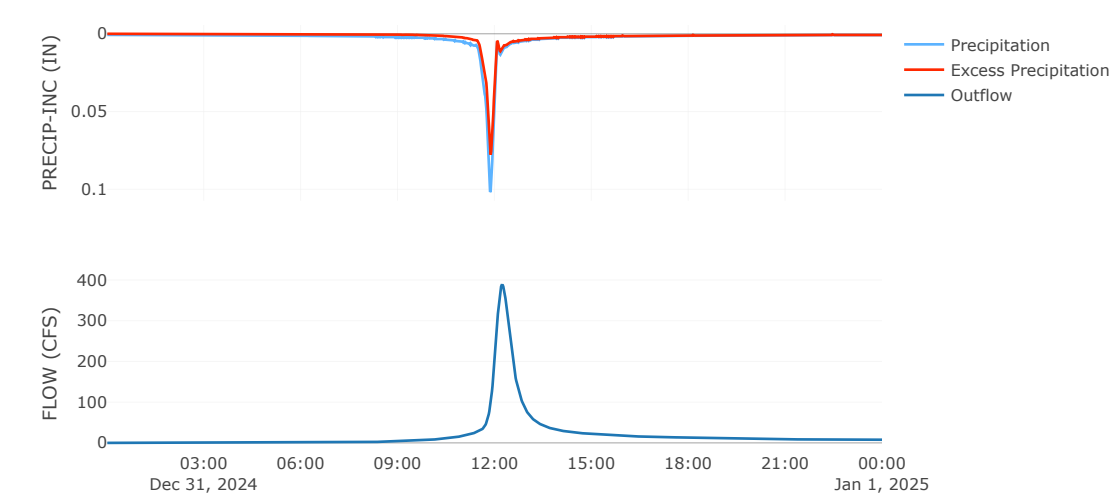
Area (MI2) : 0.28
Latitude Degrees : 31.78
Longitude Degrees : -110.86
Downstream : J - 7

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	85

Transform: SCS	
Lag	21.65
Unitgraph Type	Standard

Results: SB - 2	
Peak Discharge (CFS)	388.32
Time of Peak Discharge	31Dec2024, 12:14
Volume (IN)	2.63
Precipitation Volume (AC - FT)	63.01
Loss Volume (AC - FT)	23.36
Excess Volume (AC - FT)	39.64
Direct Runoff Volume (AC - FT)	39.34
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



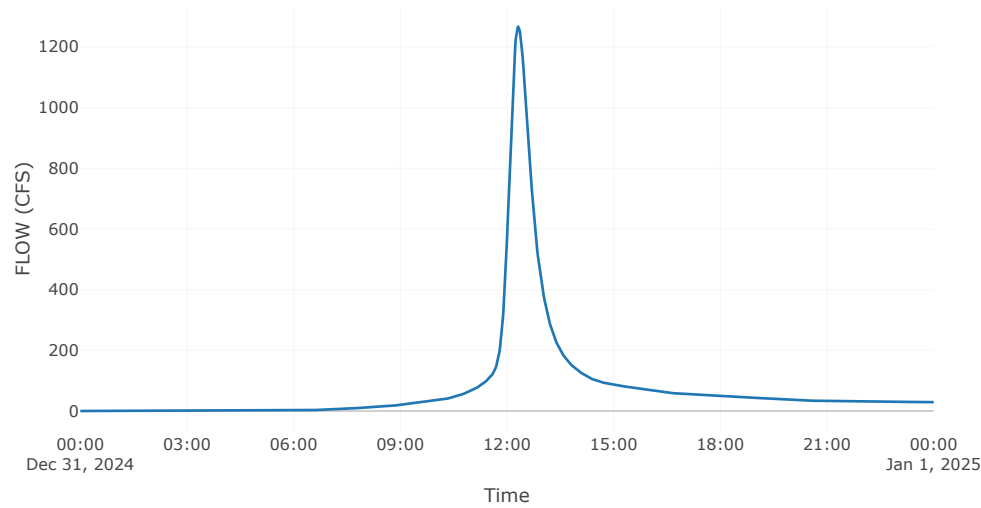
Junction: J - 7

Downstream : RCH - 7

Results: J - 7

Peak Discharge (CFS)	1265.48
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	2.83

Outflow

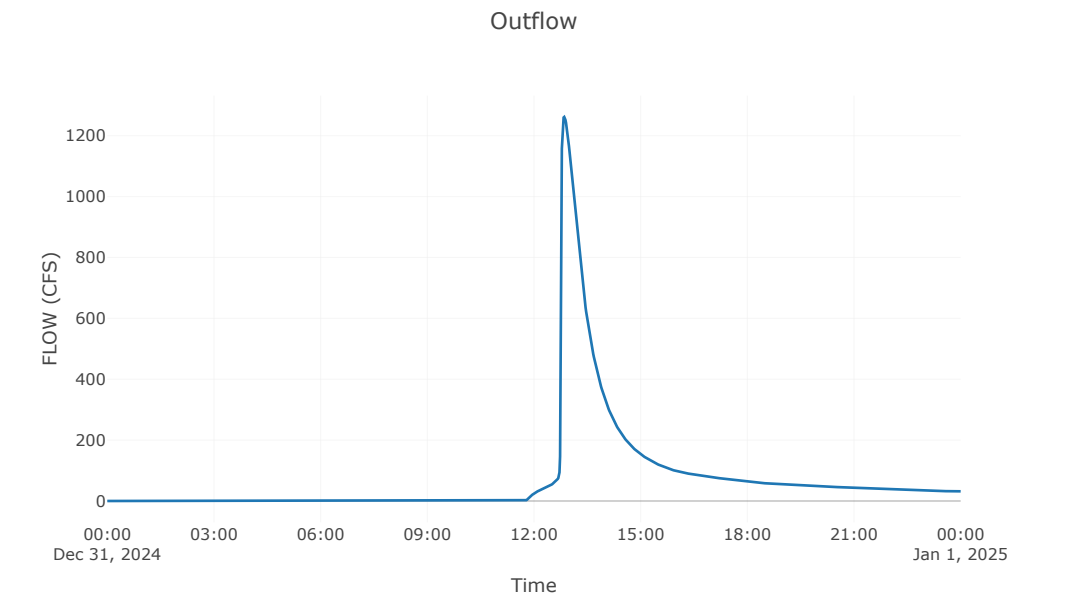


Reach: RCH - 7

Downstream : Medium Wash

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5200.73
Energy Slope (FT/FT)	0.02
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1040

Results: RCH - 7	
Peak Discharge (CFS)	1261.46
Time of Peak Discharge	31Dec2024, 12:51
Volume (IN)	2.66
Peak Inflow (CFS)	1265.48
Inflow Volume (AC - FT)	154.03



Subbasin: SB - 25

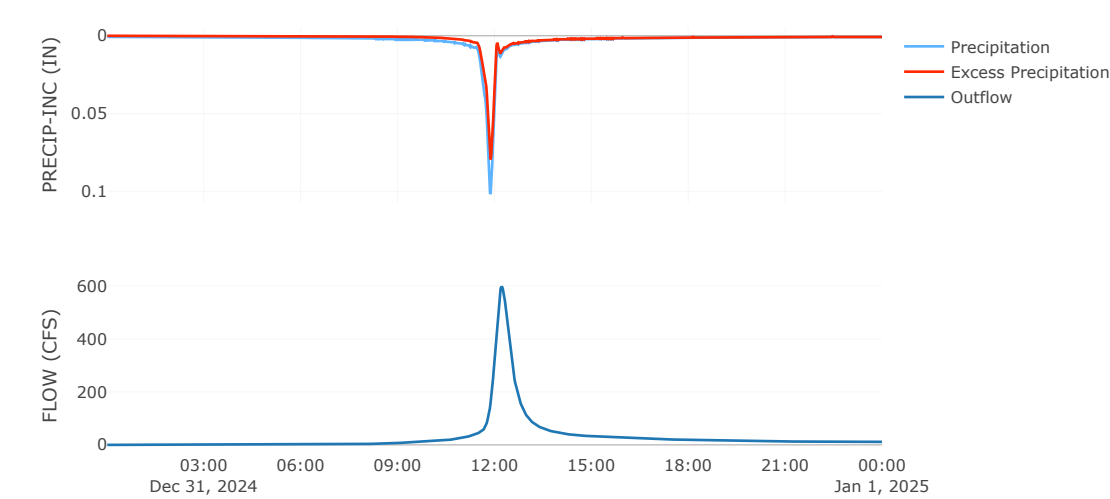
Area (MI2) : 0.41
Latitude Degrees : 31.78
Longitude Degrees : -110.87
Downstream : Medium Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.8

Transform: Scs	
Lag	20.79
Unitgraph Type	Standard

Results: SB - 25	
Peak Discharge (CFS)	596.95
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	2.71
Precipitation Volume (AC - FT)	91.94
Loss Volume (AC - FT)	32.51
Excess Volume (AC - FT)	59.43
Direct Runoff Volume (AC - FT)	59.01
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

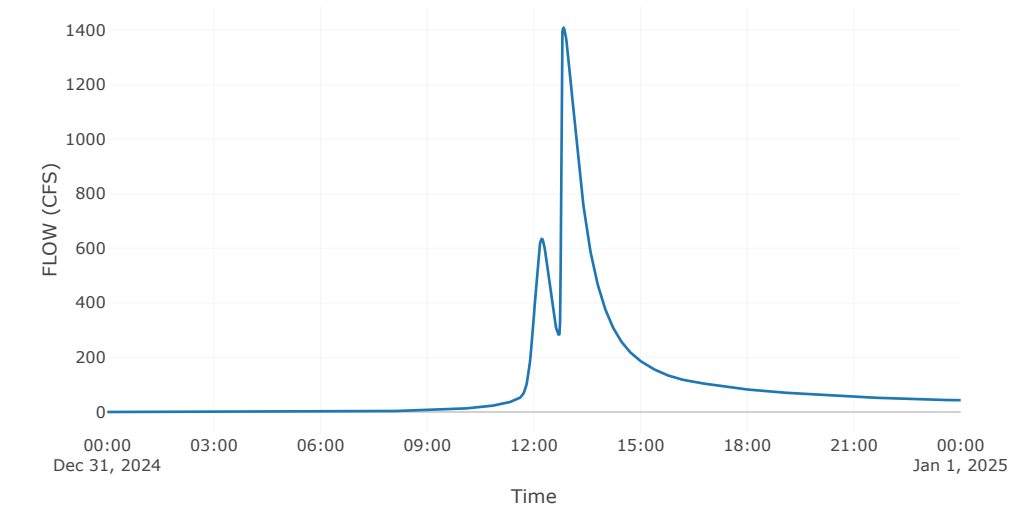


Sink: Medium Wash

Results: Medium Wash

Peak Discharge (CFS)	1407.81
Time of Peak Discharge	31Dec2024, 12:50
Volume (IN)	2.67

Outflow



Subbasin: SB - 1

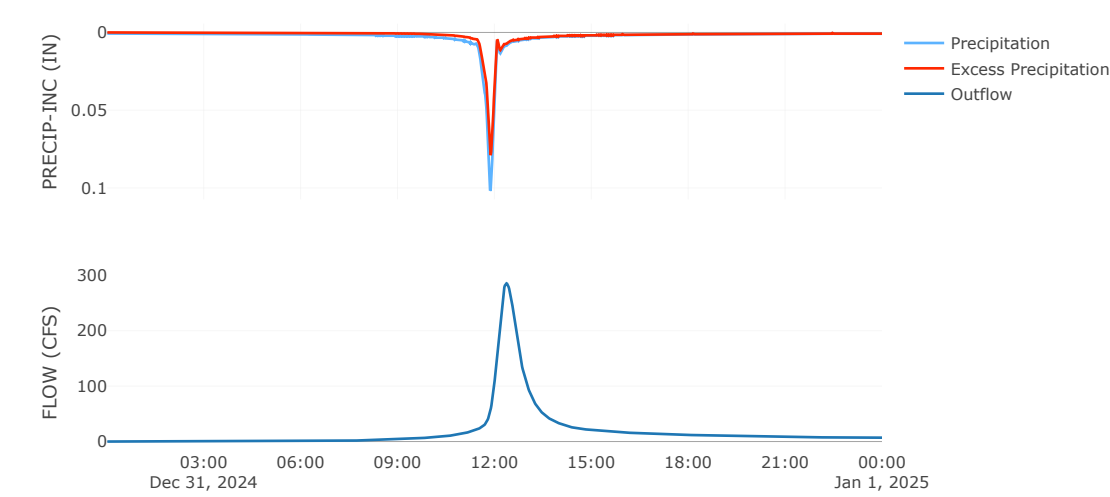
Area (MI2) : 0.25
Latitude Degrees : 31.78
Longitude Degrees : -110.88
Downstream : Small Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.3
Initial Abstraction	0.3

Transform: Scs	
Lag	29.7
Unitgraph Type	Standard

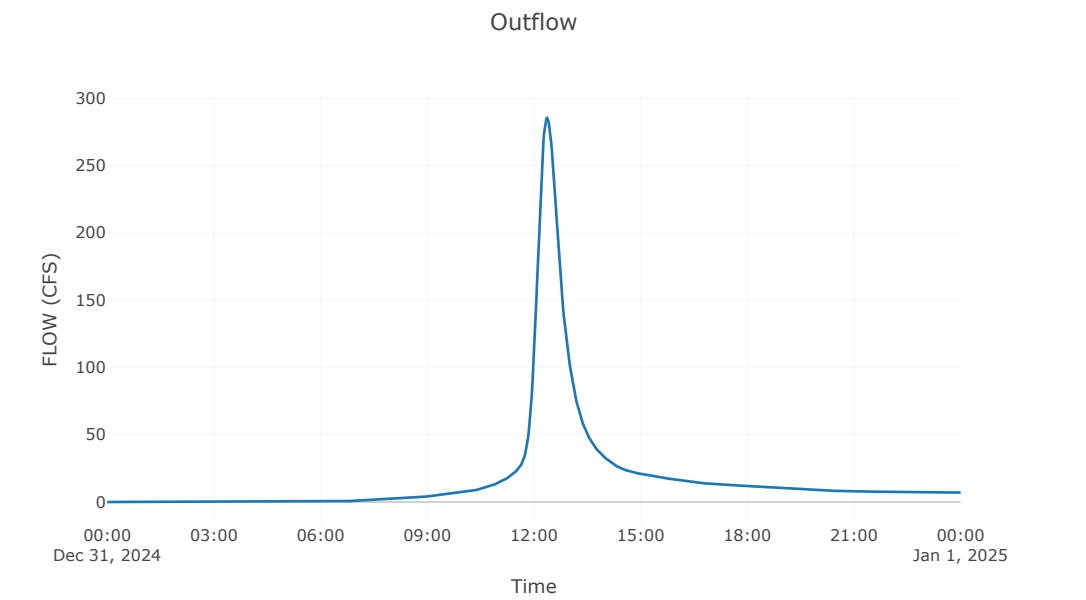
Results: SB - 1	
Peak Discharge (CFS)	285.33
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	2.69
Precipitation Volume (AC - FT)	56.14
Loss Volume (AC - FT)	19.92
Excess Volume (AC - FT)	36.22
Direct Runoff Volume (AC - FT)	35.86
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Sink: Small Wash

Results: Small Wash	
Peak Discharge (CFS)	285.33
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	2.69



Project: Madera_Canyon

Simulation Run: MW 100y3h +15%P

Simulation Start: 30 December 2024, 24:00

Simulation End: 31 December 2024, 24:00

HMS Version: 4.11

Executed: 20 January 2025, 15:58

Global Parameter Summary - Subbasin

Element Name	Location	
	Longitude Degrees	Latitude Degrees
SB - 17	-110.84	31.73
SB - 16	-110.83	31.73
SB - 15	-110.85	31.73
SB - 18	-110.84	31.73
SB - 22	-110.84	31.75
SB - 9	-110.84	31.75
SB - 12	-110.85	31.75
SB - 7	-110.86	31.75
SB - 27	-110.85	31.76
SB - 23	-110.86	31.77
SB - 4	-110.86	31.77
SB - 29	-110.87	31.77
SB - 10	-110.88	31.74
SB - 14	-110.88	31.74
SB - 13	-110.86	31.74
SB - 11	-110.86	31.75
SB - 19	-110.87	31.75
SB - 21	-110.88	31.75
SB - 24	-110.88	31.75
SB - 8	-110.87	31.75
SB - 6	-110.87	31.76
SB - 5	-110.87	31.76
SB - 26	-110.88	31.76
SB - 20	-110.88	31.77
SB - 30	-110.87	31.77
SB - 28	-110.88	31.77
SB - 31	-110.88	31.77
SB - 3	-110.85	31.78
SB - 2	-110.86	31.78
SB - 25	-110.87	31.78
SB - 1	-110.88	31.78

Area (Ml2)	
Element Name	Area (Ml2)
SB - 17	0.29
SB - 16	0.28
SB - 15	0.21
SB - 18	0.2
SB - 22	1.05
SB - 9	0.55
SB - 12	0.65
SB - 7	0.31
SB - 27	0.86
SB - 23	0.13
SB - 4	0.38
SB - 29	0.01
SB - 10	0.47
SB - 14	0.35
SB - 13	0.4
SB - 11	0.29
SB - 19	0.12
SB - 21	0.04
SB - 24	0.28
SB - 8	0.23
SB - 6	0.44
SB - 5	0.31
SB - 26	0.18
SB - 20	0.01
SB - 30	0.2
SB - 28	0.18
SB - 31	0.41
SB - 3	0.74
SB - 2	0.28
SB - 25	0.41
SB - 1	0.24

Downstream

Element Name	Downstream
SB - 17	J - 14
SB - 16	J - 14
SB - 15	J - 10
SB - 18	J - 10
SB - 22	J - 5
SB - 9	J - 5
SB - 12	J - 9
SB - 7	J - 9
SB - 27	J - 3
SB - 23	J - 3
SB - 4	J - 2
SB - 29	J - 2
SB - 10	J - 11
SB - 14	J - 11
SB - 13	J - 13
SB - 11	J - 13
SB - 19	J - 8
SB - 21	J - 8
SB - 24	J - 6
SB - 8	J - 6
SB - 6	J - 12
SB - 5	J - 12
SB - 26	J - 4
SB - 20	J - 4
SB - 30	J - 1
SB - 28	J - 1
SB - 31	Sink - 1
SB - 3	J - 7
SB - 2	J - 7
SB - 25	Medium Wash

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number
SB - 17	0	88.8
SB - 16	0	86.4
SB - 15	0	88.2
SB - 18	0	86.5
SB - 22	0	88.4
SB - 9	0	88.2
SB - 12	0	88.9
SB - 7	0	89.6
SB - 27	0	86.3
SB - 23	0	86.6
SB - 4	0	89.7
SB - 29	0	81.1
SB - 10	0	87.3
SB - 14	0	86.7
SB - 13	0	89
SB - 11	0	89.5
SB - 19	0	86.9
SB - 21	0	82.3
SB - 24	0	82.7
SB - 8	0	88.5
SB - 6	0	89.3
SB - 5	0	89.8
SB - 26	0	84.4
SB - 20	0	85
SB - 30	0	83.9
SB - 28	0	86.7
SB - 31	0	84.2
SB - 3	0	88
SB - 2	0	85
SB - 25	0	85.8
SB - 1	0	85.5

Transform: Scs		
Element Name	Lag	Unitgraph Type
SB - 17	10.79	Standard
SB - 16	7.54	Standard
SB - 15	9.18	Standard
SB - 18	8.12	Standard
SB - 22	16.31	Standard
SB - 9	17.23	Standard
SB - 12	23.36	Standard
SB - 7	12.72	Standard
SB - 27	18.98	Standard
SB - 23	11.82	Standard
SB - 4	16.15	Standard
SB - 29	3.27	Standard
SB - 10	16.66	Standard
SB - 14	33.79	Standard
SB - 13	14.12	Standard
SB - 11	14.46	Standard
SB - 19	12.64	Standard
SB - 21	6.2	Standard
SB - 24	11.31	Standard
SB - 8	17.71	Standard
SB - 6	18.63	Standard
SB - 5	16.66	Standard
SB - 26	10.19	Standard
SB - 20	3.99	Standard
SB - 30	8.18	Standard
SB - 28	8.99	Standard
SB - 31	26.25	Standard
SB - 3	29.77	Standard
SB - 2	21.65	Standard
SB - 25	20.79	Standard
SB - 1	29.7	Standard

Global Parameter Summary - Reach

Downstream	
Element Name	Downstream
RCH - 14	J - 10
RCH - 10	J - 5
RCH - 5	J - 3
RCH - 9	J - 3
RCH - 3	J - 2
RCH - 2	J - 1
RCH - 11	J - 8
RCH - 13	J - 8
RCH - 8	J - 6
RCH - 6	J - 4
RCH - 12	J - 4
RCH - 4	J - 1
RCH - 1	Sink - 1
RCH - 7	Medium Wash

Route: Kinematic Wave												
Element Name	Method	Channel	Length (FT)	Energy Slope (FT/FT)	Mannings n	Shape	Number of Subreaches	Width (FT)	Side Slope (FT/FT)	Initial Variable	Index Parameter Type	Ir F
RCH - 14	Kinematic Wave	Kinematic Wave	2187.23	0.15	0.22	Trapezoid	5	8	4	Combined Inflow	Index Flow	1
RCH - 10	Kinematic Wave	Kinematic Wave	11173.72	0.15	0.19	Trapezoid	5	10	4	Combined Inflow	Index Flow	1
RCH - 5	Kinematic Wave	Kinematic Wave	11542.83	0.05	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	3
RCH - 9	Kinematic Wave	Kinematic Wave	6275.53	0.06	0.11	Trapezoid	5	15	4	Combined Inflow	Index Flow	1
RCH - 3	Kinematic Wave	Kinematic Wave	727.7	0.03	0.08	Trapezoid	5	200	4	Combined Inflow	Index Flow	4
RCH - 2	Kinematic Wave	Kinematic Wave	4383.33	0.03	0.11	Trapezoid	5	400	4	Combined Inflow	Index Flow	4
RCH - 11	Kinematic Wave	Kinematic Wave	1004.26	0.05	0.13	Trapezoid	5	80	4	Combined Inflow	Index Flow	8
RCH - 13	Kinematic Wave	Kinematic Wave	6298.97	0.1	0.17	Trapezoid	5	90	4	Combined Inflow	Index Flow	1
RCH - 8	Kinematic Wave	Kinematic Wave	3385.93	0.04	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	2
RCH - 6	Kinematic Wave	Kinematic Wave	5289.14	0.03	0.1	Trapezoid	5	250	4	Combined Inflow	Index Flow	2
RCH - 12	Kinematic Wave	Kinematic Wave	1501.96	0.03	0.09	Trapezoid	5	80	4	Combined Inflow	Index Flow	1
RCH - 4	Kinematic Wave	Kinematic Wave	1941.67	0.03	0.11	Trapezoid	5	300	4	Combined Inflow	Index Flow	2
RCH - 1	Kinematic Wave	Kinematic Wave	3145.34	0.02	0.1	Trapezoid	5	400	4	Combined Inflow	Index Flow	6
RCH - 7	Kinematic Wave	Kinematic Wave	5200.73	0.02	0.22	Trapezoid	5	300	4	Combined Inflow	Index Flow	10

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SB - 17	0.29	737.34	31Dec2024, 12:04	3.4
SB - 16	0.28	769.14	31Dec2024, 12:01	3.17
J - 14	0.57	1480.79	31Dec2024, 12:02	3.29
RCH - 14	0.57	1474.4	31Dec2024, 12:06	3.27
SB - 15	0.21	564.07	31Dec2024, 12:02	3.35
SB - 18	0.2	542.92	31Dec2024, 12:01	3.18
J - 10	0.98	2478.99	31Dec2024, 12:04	3.27
RCH - 10	0.98	2447.38	31Dec2024, 12:20	3.19
SB - 22	1.05	2168.09	31Dec2024, 12:09	3.36
SB - 9	0.55	1098.89	31Dec2024, 12:10	3.34
J - 5	2.57	4725.74	31Dec2024, 12:18	3.29
RCH - 5	2.57	4657.76	31Dec2024, 12:36	3.18
SB - 12	0.65	1101.01	31Dec2024, 12:15	3.4
SB - 7	0.31	746.34	31Dec2024, 12:05	3.48
J - 9	0.96	1680.25	31Dec2024, 12:10	3.43
RCH - 9	0.96	1678.03	31Dec2024, 12:19	3.39
SB - 27	0.86	1537.93	31Dec2024, 12:11	3.15
SB - 23	0.13	299.74	31Dec2024, 12:05	3.18
J - 3	4.52	6372.95	31Dec2024, 12:36	3.22
RCH - 3	4.52	6372.96	31Dec2024, 12:37	3.21
SB - 4	0.38	815.01	31Dec2024, 12:08	3.49
SB - 29	0.01	16.82	31Dec2024, 11:57	2.68

J - 2	4.91	6578.47	31Dec2024, 12:37	3.23
RCH - 2	4.91	6527.89	31Dec2024, 12:46	3.17
SB - 10	0.47	925.85	31Dec2024, 12:09	3.25
SB - 14	0.35	427.03	31Dec2024, 12:26	3.17
J - 11	0.81	1214.85	31Dec2024, 12:11	3.22
RCH - 11	0.81	1213.34	31Dec2024, 12:13	3.2
SB - 13	0.4	906.79	31Dec2024, 12:07	3.42
SB - 11	0.29	659.85	31Dec2024, 12:07	3.47
J - 13	0.69	1566.63	31Dec2024, 12:07	3.44
RCH - 13	0.69	1558.42	31Dec2024, 12:20	3.35
SB - 19	0.12	277.39	31Dec2024, 12:05	3.21
SB - 21	0.04	97.85	31Dec2024, 12:00	2.79
J - 8	1.66	2836.73	31Dec2024, 12:18	3.26
RCH - 8	1.66	2827.87	31Dec2024, 12:24	3.22
SB - 24	0.28	594.22	31Dec2024, 12:04	2.82
SB - 8	0.23	457.65	31Dec2024, 12:10	3.37
J - 6	2.17	3257.09	31Dec2024, 12:24	3.18
RCH - 6	2.17	3239.24	31Dec2024, 12:35	3.11
SB - 6	0.44	864.42	31Dec2024, 12:11	3.45
SB - 5	0.31	665.23	31Dec2024, 12:09	3.5
J - 12	0.76	1524.84	31Dec2024, 12:10	3.47
RCH - 12	0.76	1522.66	31Dec2024, 12:13	3.45
SB - 26	0.18	417.66	31Dec2024, 12:03	2.98
SB - 20	0.01	40.39	31Dec2024, 11:57	3.04
J - 4	3.12	3927.84	31Dec2024, 12:34	3.19
RCH - 4	3.12	3919.89	31Dec2024, 12:39	3.16
SB - 30	0.2	500.88	31Dec2024, 12:01	2.93
SB - 28	0.18	462.96	31Dec2024, 12:02	3.2
J - 1	8.4	10094.29	31Dec2024, 12:45	3.16
RCH - 1	8.4	10082.67	31Dec2024, 12:50	3.13
SB - 31	0.41	561.1	31Dec2024, 12:18	2.94
Sink - 1	8.82	10330.76	31Dec2024, 12:44	3.12
SB - 3	0.74	1033.86	31Dec2024, 12:22	3.3
SB - 2	0.28	444.55	31Dec2024, 12:14	3.02
J - 7	1.02	1438.87	31Dec2024, 12:19	3.23
RCH - 7	1.02	1432.18	31Dec2024, 12:49	3.04
SB - 25	0.41	681.46	31Dec2024, 12:13	3.1
Medium Wash	1.43	1607.67	31Dec2024, 12:48	3.06
SB - 1	0.24	315.85	31Dec2024, 12:22	3.06

Subbasin: SB - 17

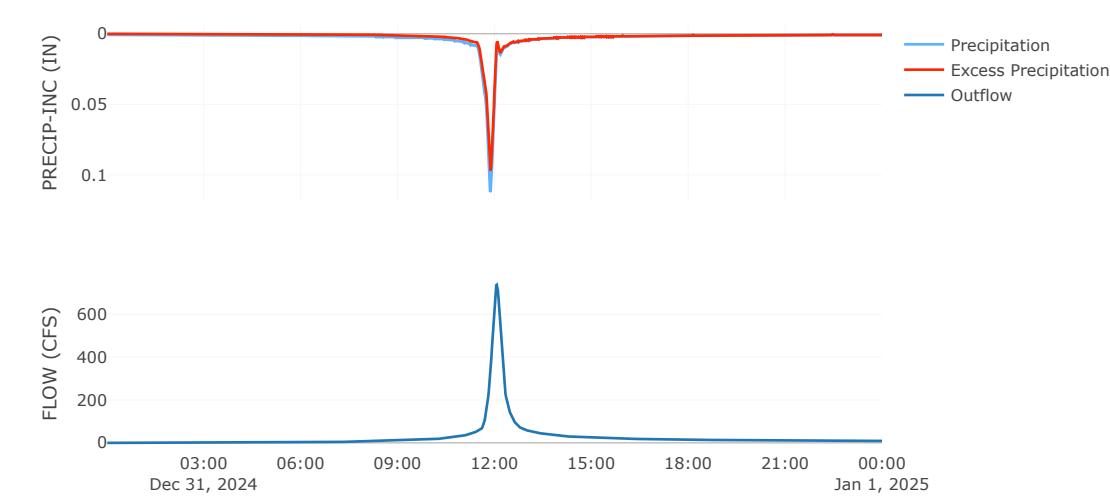
Area (MI2) : 0.29
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 14

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.8

Transform: Scs	
Lag	10.79
Unitgraph Type	Standard

Results: SB - 17	
Peak Discharge (CFS)	737.34
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	3.4
Precipitation Volume (AC - FT)	71.13
Loss Volume (AC - FT)	18.86
Excess Volume (AC - FT)	52.27
Direct Runoff Volume (AC - FT)	52.09
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 16

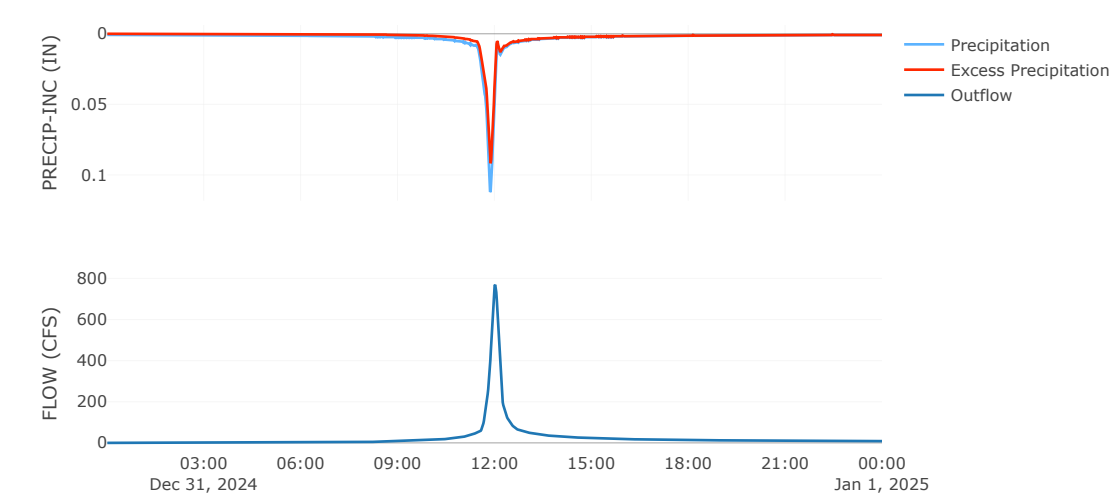
Area (MI2) : 0.28
Latitude Degrees : 31.73
Longitude Degrees : -110.83
Downstream : J - 14

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	86.4

Transform: SCS	
Lag	7.54
Unitgraph Type	Standard

Results: SB - 16	
Peak Discharge (CFS)	769.14
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	3.17
Precipitation Volume (AC - FT)	69.1
Loss Volume (AC - FT)	21.85
Excess Volume (AC - FT)	47.25
Direct Runoff Volume (AC - FT)	47.13
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



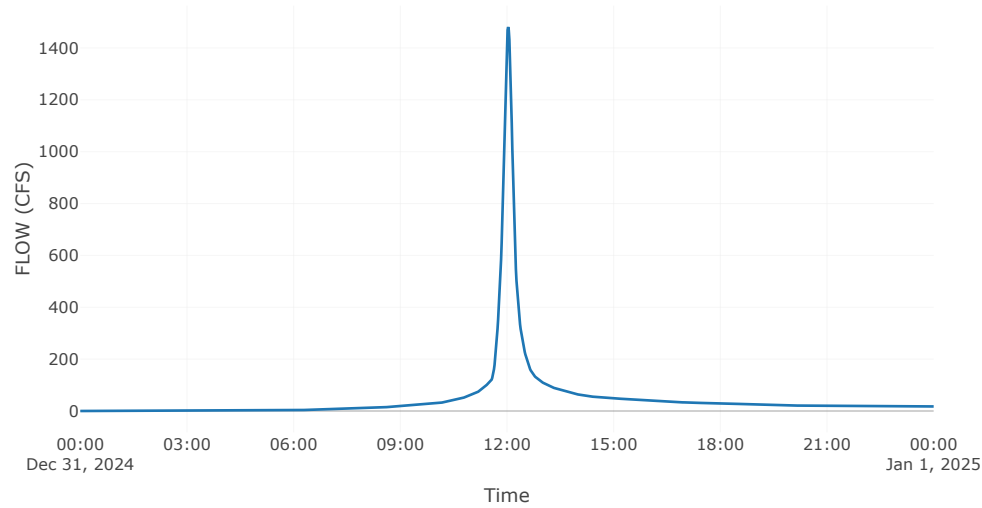
Junction: J - 14

Downstream : RCH - 14

Results: J - 14

Peak Discharge (CFS)	1480.79
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	3.29

Outflow

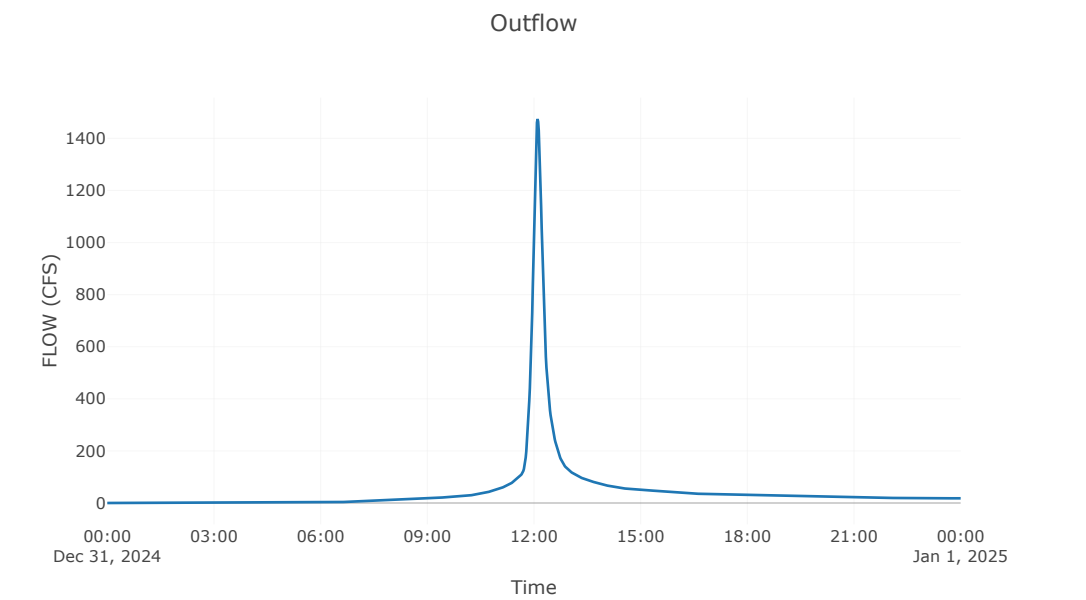


Reach: RCH - 14

Downstream : J - 10

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	2187.23
Energy Slope (FT/FT)	0.15
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	8
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1081

Results: RCH - 14	
Peak Discharge (CFS)	1474.4
Time of Peak Discharge	31Dec2024, 12:06
Volume (IN)	3.27
Peak Inflow (CFS)	1480.79
Inflow Volume (AC - FT)	99.23



Subbasin: SB - 15

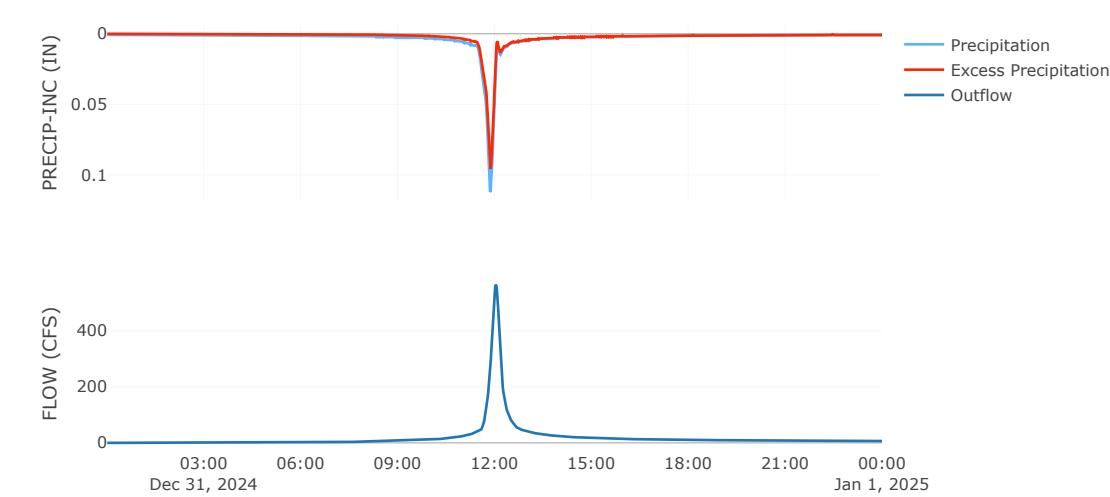
Area (MI2) : 0.21
Latitude Degrees : 31.73
Longitude Degrees : -110.85
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	9.18
Unitgraph Type	Standard

Results: SB - 15	
Peak Discharge (CFS)	564.07
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	3.35
Precipitation Volume (AC - FT)	51.75
Loss Volume (AC - FT)	14.39
Excess Volume (AC - FT)	37.36
Direct Runoff Volume (AC - FT)	37.25
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 18

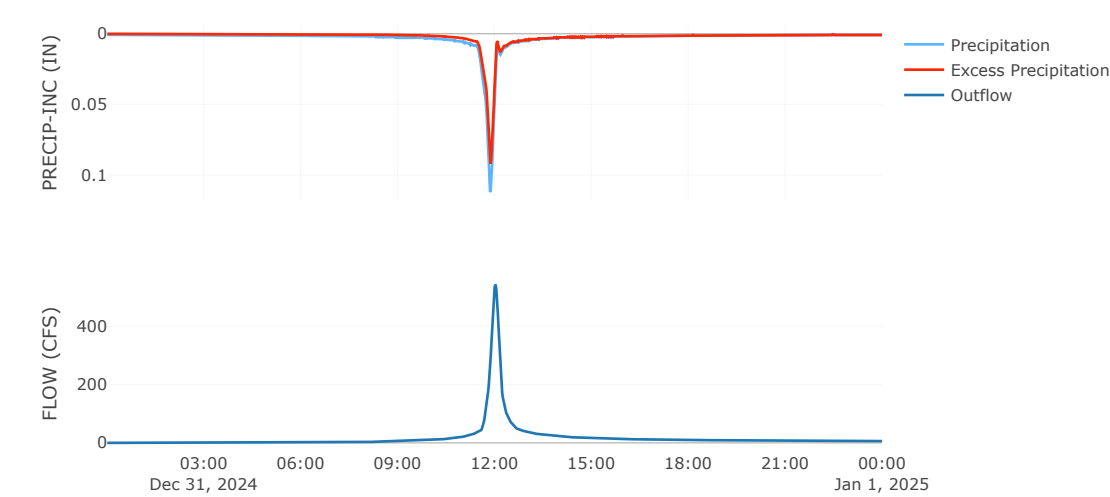
Area (MI2) : 0.2
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.5

Transform: Scs	
Lag	8.12
Unitgraph Type	Standard

Results: SB - 18	
Peak Discharge (CFS)	542.92
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	3.18
Precipitation Volume (AC - FT)	49.82
Loss Volume (AC - FT)	15.65
Excess Volume (AC - FT)	34.17
Direct Runoff Volume (AC - FT)	34.08
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

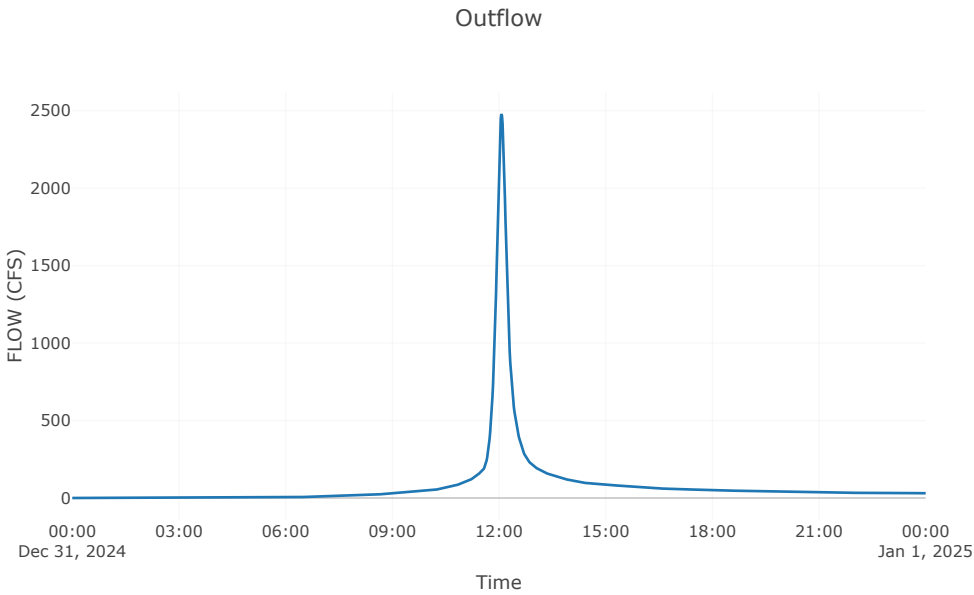


Junction: J - 10

Downstream : RCH - 10

Results: J - 10

Peak Discharge (CFS)	2478.99
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	3.27

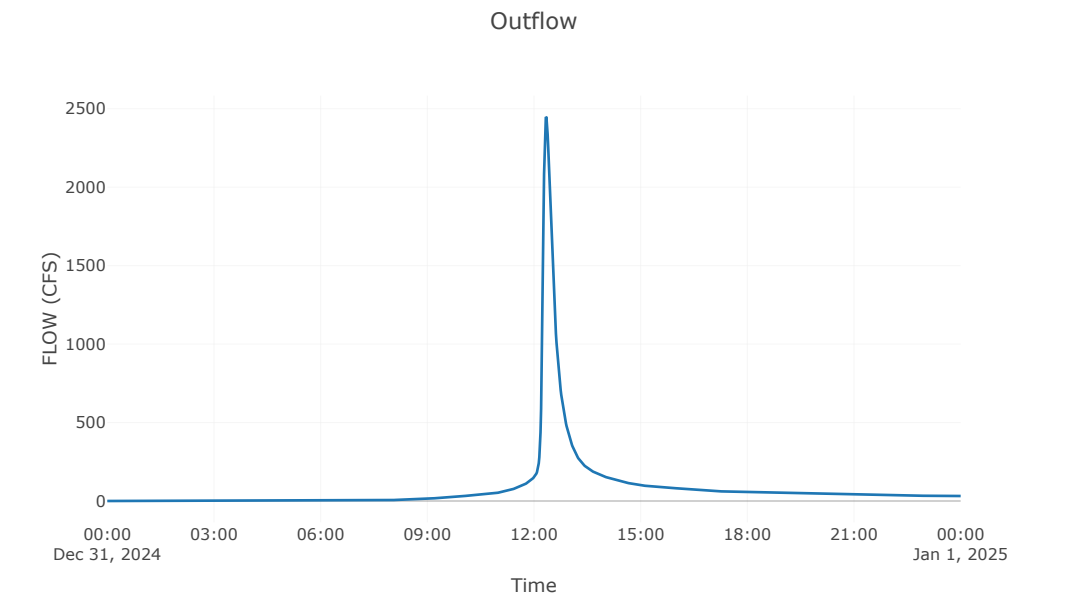


Reach: RCH - 10

Downstream : J - 5

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11173.72
Energy Slope (FT/FT)	0.15
Mannings n	0.19
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	10
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1793

Results: RCH - 10	
Peak Discharge (CFS)	2447.38
Time of Peak Discharge	31Dec2024, 12:20
Volume (IN)	3.19
Peak Inflow (CFS)	2478.99
Inflow Volume (AC - FT)	169.96



Subbasin: SB - 22

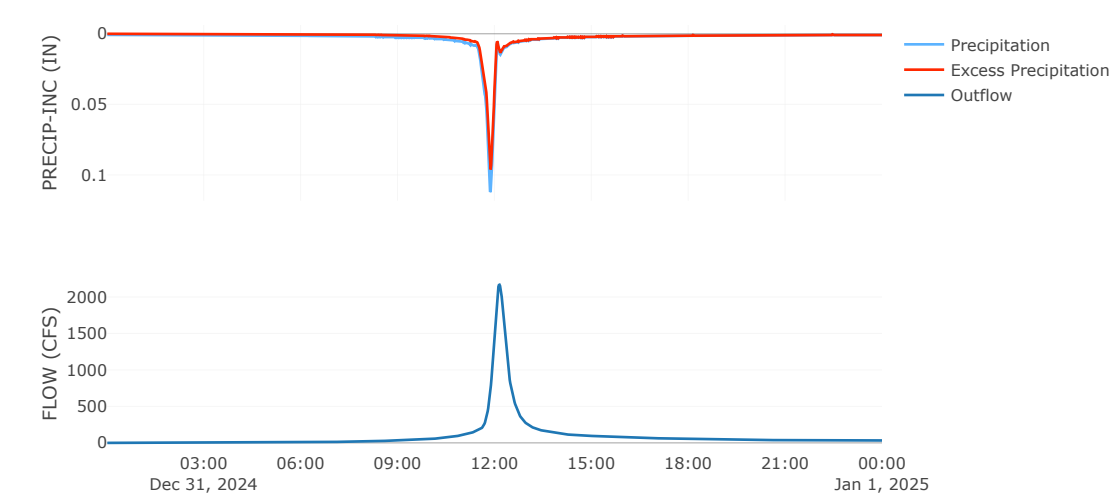
Area (MI2) : 1.05
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.4

Transform: Scs	
Lag	16.31
Unitgraph Type	Standard

Results: SB - 22	
Peak Discharge (CFS)	2168.09
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.36
Precipitation Volume (AC - FT)	259.72
Loss Volume (AC - FT)	71.11
Excess Volume (AC - FT)	188.6
Direct Runoff Volume (AC - FT)	187.64
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 9

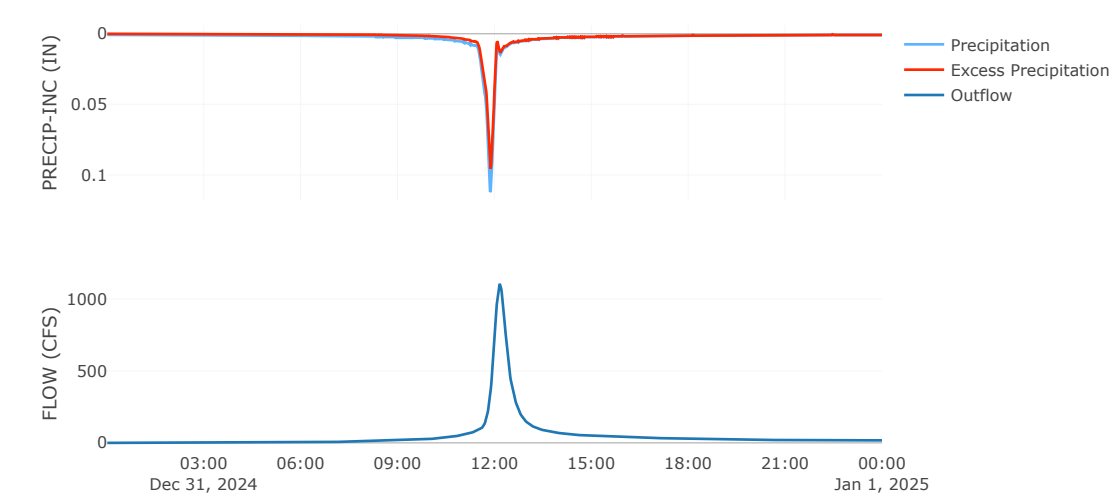
Area (MI2) : 0.55
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	17.23
Unitgraph Type	Standard

Results: SB - 9	
Peak Discharge (CFS)	1098.89
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.34
Precipitation Volume (AC - FT)	136.61
Loss Volume (AC - FT)	37.99
Excess Volume (AC - FT)	98.62
Direct Runoff Volume (AC - FT)	98.09
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

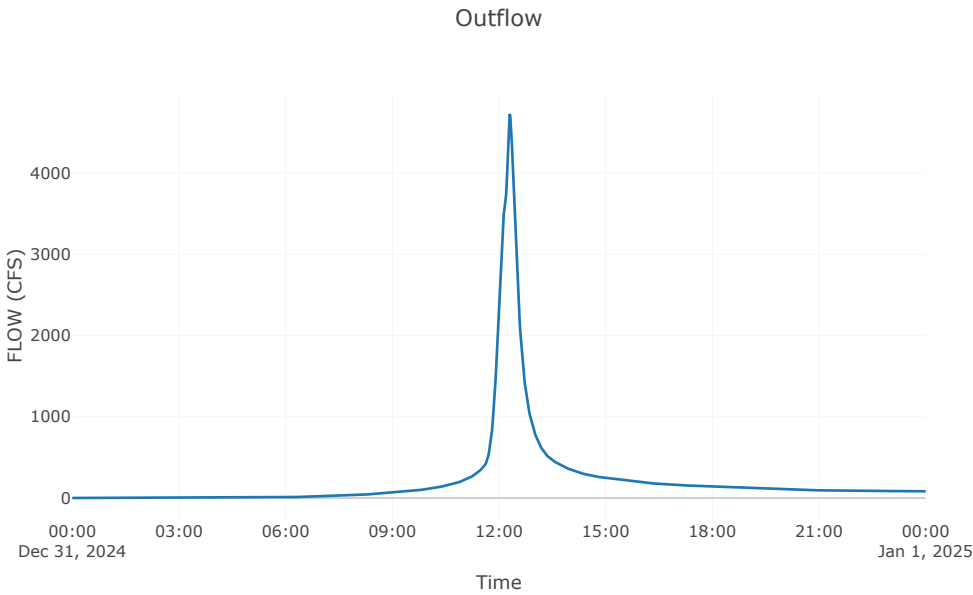


Junction: J - 5

Downstream : RCH - 5

Results: J - 5

Peak Discharge (CFS)	4725.74
Time of Peak Discharge	31Dec2024, 12:18
Volume (IN)	3.29

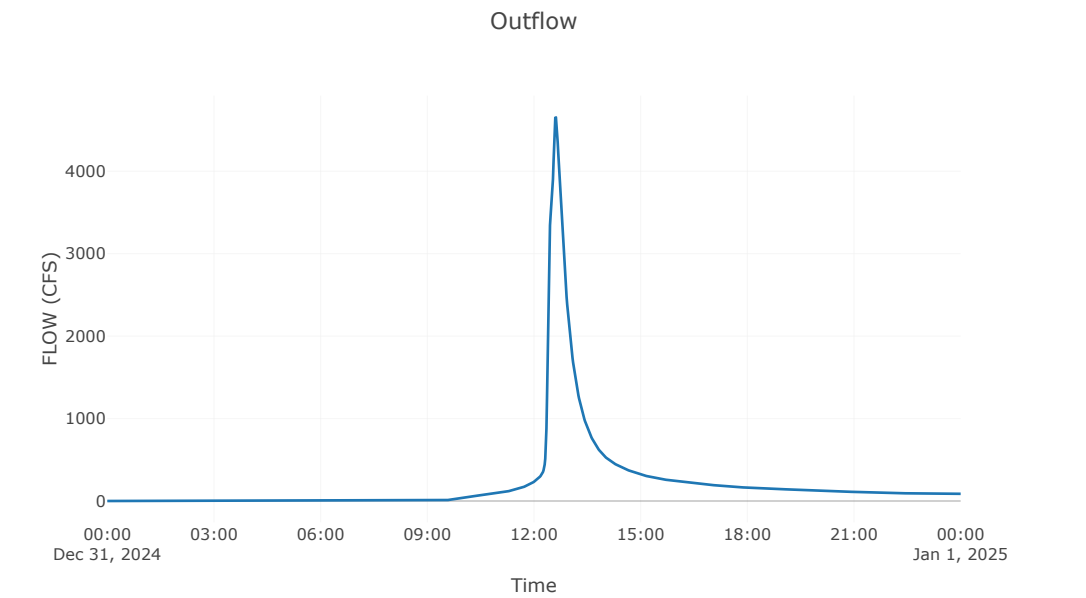


Reach: RCH - 5

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11542.83
Energy Slope (FT/FT)	0.05
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	3272

Results: RCH - 5	
Peak Discharge (CFS)	4657.76
Time of Peak Discharge	31Dec2024, 12:36
Volume (IN)	3.18
Peak Inflow (CFS)	4725.74
Inflow Volume (AC - FT)	451.87



Subbasin: SB - 12

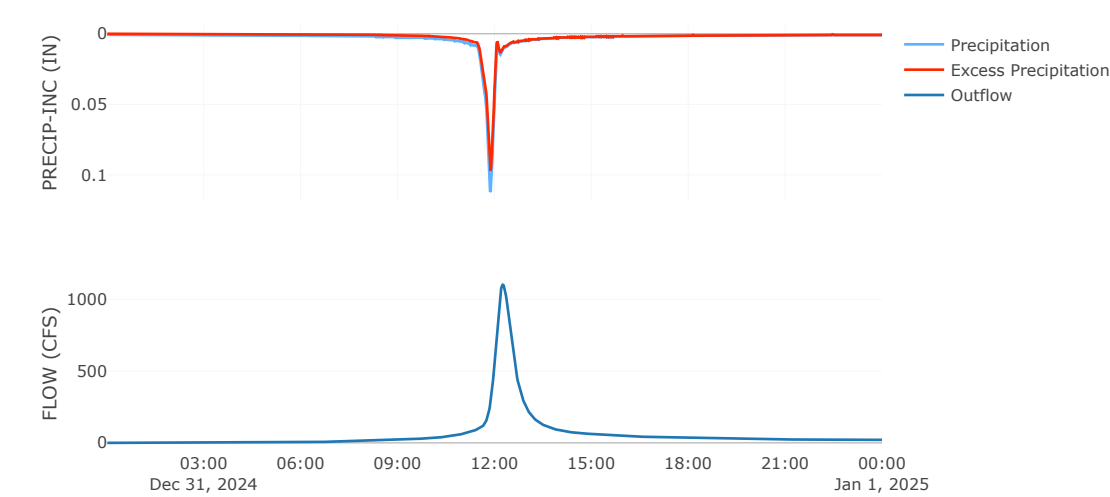
Area (MI2) : 0.65
Latitude Degrees : 31.75
Longitude Degrees : -110.85
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.9

Transform: Scs	
Lag	23.36
Unitgraph Type	Standard

Results: SB - 12	
Peak Discharge (CFS)	1101.01
Time of Peak Discharge	31Dec2024, 12:15
Volume (IN)	3.4
Precipitation Volume (AC - FT)	162.14
Loss Volume (AC - FT)	42.64
Excess Volume (AC - FT)	119.5
Direct Runoff Volume (AC - FT)	118.63
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 7

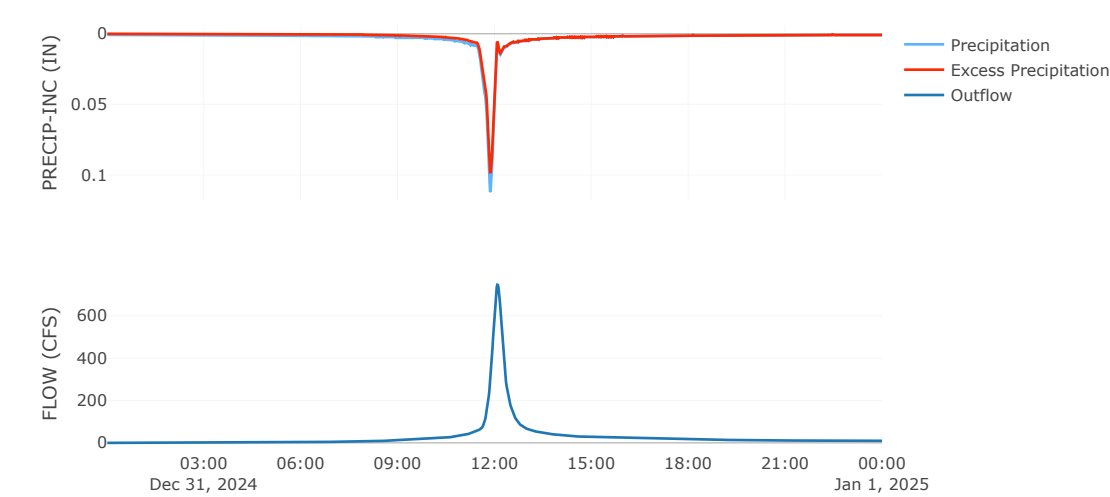
Area (MI2) : 0.31
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.6

Transform: Scs	
Lag	12.72
Unitgraph Type	Standard

Results: SB - 7	
Peak Discharge (CFS)	746.34
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	3.48
Precipitation Volume (AC - FT)	76.19
Loss Volume (AC - FT)	18.87
Excess Volume (AC - FT)	57.31
Direct Runoff Volume (AC - FT)	57.09
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



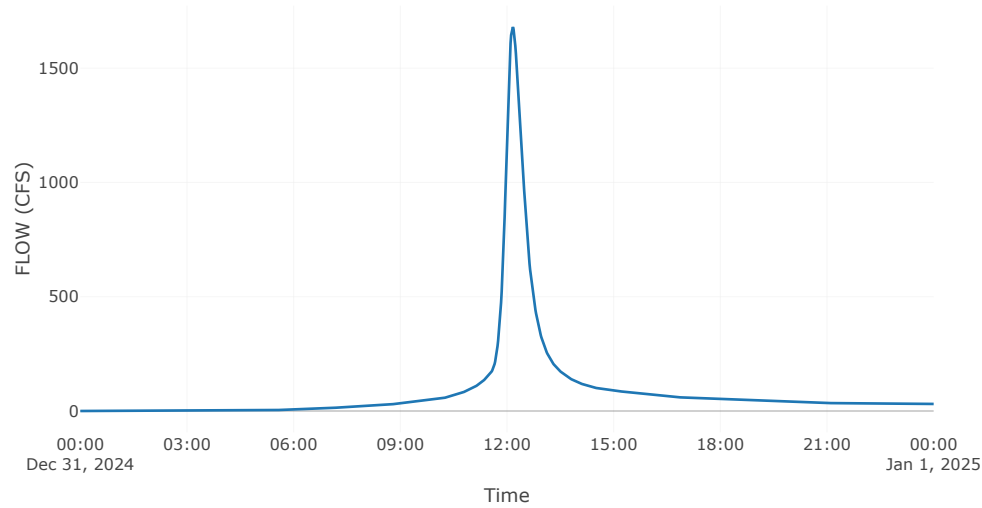
Junction: J - 9

Downstream : RCH - 9

Results: J - 9

Peak Discharge (CFS)	1680.25
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.43

Outflow

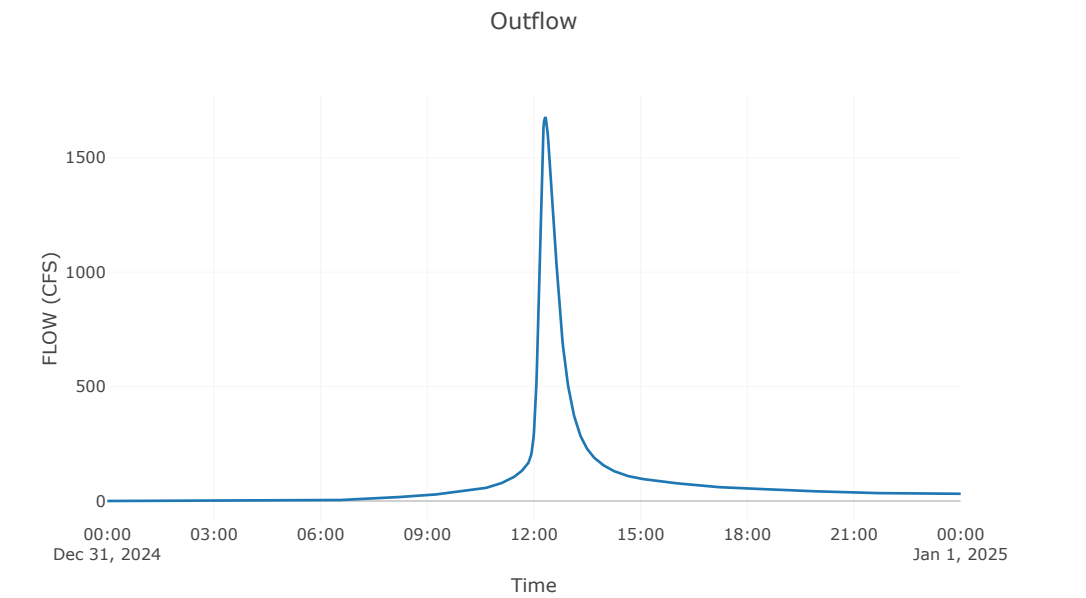


Reach: RCH - 9

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6275.53
Energy Slope (FT/FT)	0.06
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	15
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1237

Results: RCH - 9	
Peak Discharge (CFS)	1678.03
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	3.39
Peak Inflow (CFS)	1680.25
Inflow Volume (AC - FT)	175.72



Subbasin: SB - 27

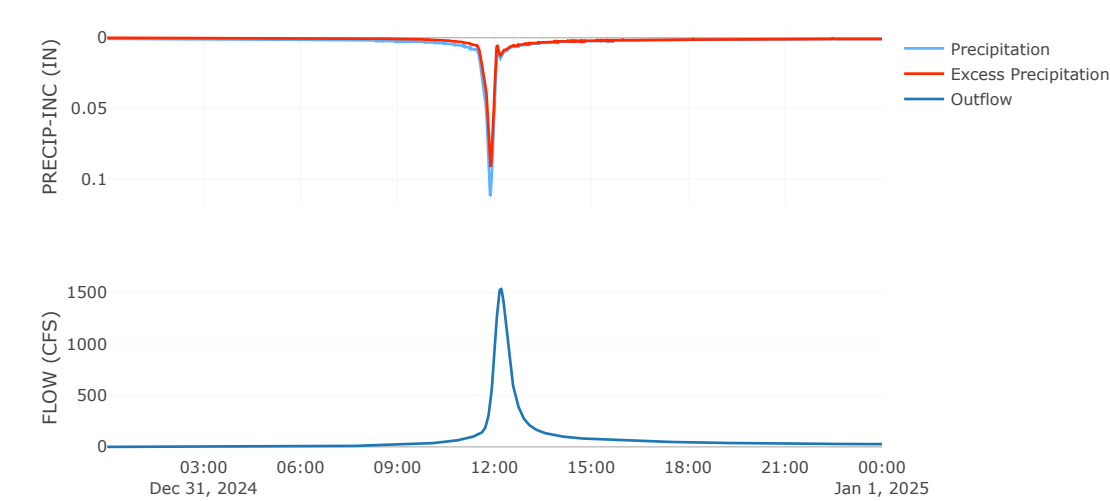
Area (MI2) : 0.86
Latitude Degrees : 31.76
Longitude Degrees : -110.85
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.3

Transform: Scs	
Lag	18.98
Unitgraph Type	Standard

Results: SB - 27	
Peak Discharge (CFS)	1537.93
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	3.15
Precipitation Volume (AC - FT)	212.97
Loss Volume (AC - FT)	67.79
Excess Volume (AC - FT)	145.19
Direct Runoff Volume (AC - FT)	144.29
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 23

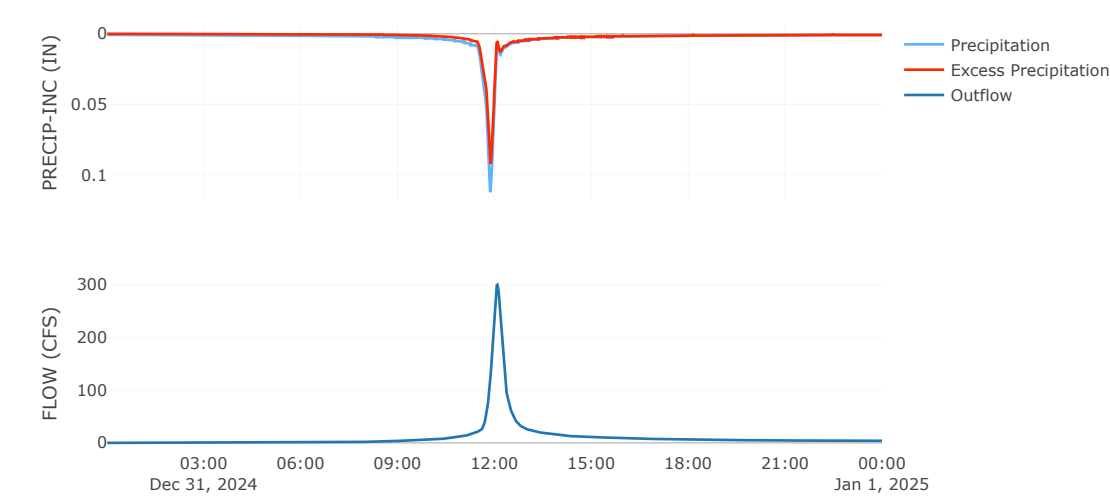
Area (MI2) : 0.13
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.6

Transform: Scs	
Lag	11.82
Unitgraph Type	Standard

Results: SB - 23	
Peak Discharge (CFS)	299.74
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	3.18
Precipitation Volume (AC - FT)	31.82
Loss Volume (AC - FT)	9.93
Excess Volume (AC - FT)	21.89
Direct Runoff Volume (AC - FT)	21.81
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



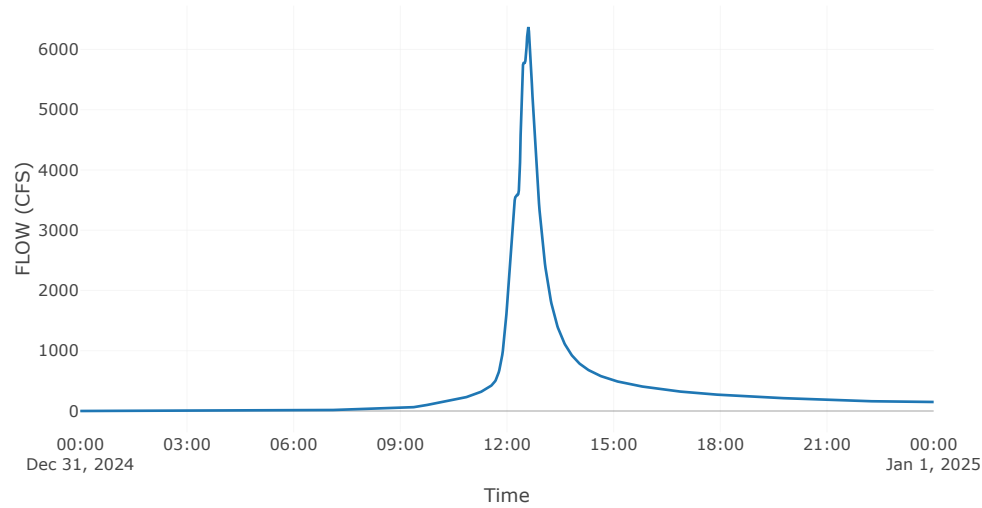
Junction: J - 3

Downstream : RCH - 3

Results: J - 3

Peak Discharge (CFS)	6372.95
Time of Peak Discharge	31Dec2024, 12:36
Volume (IN)	3.22

Outflow

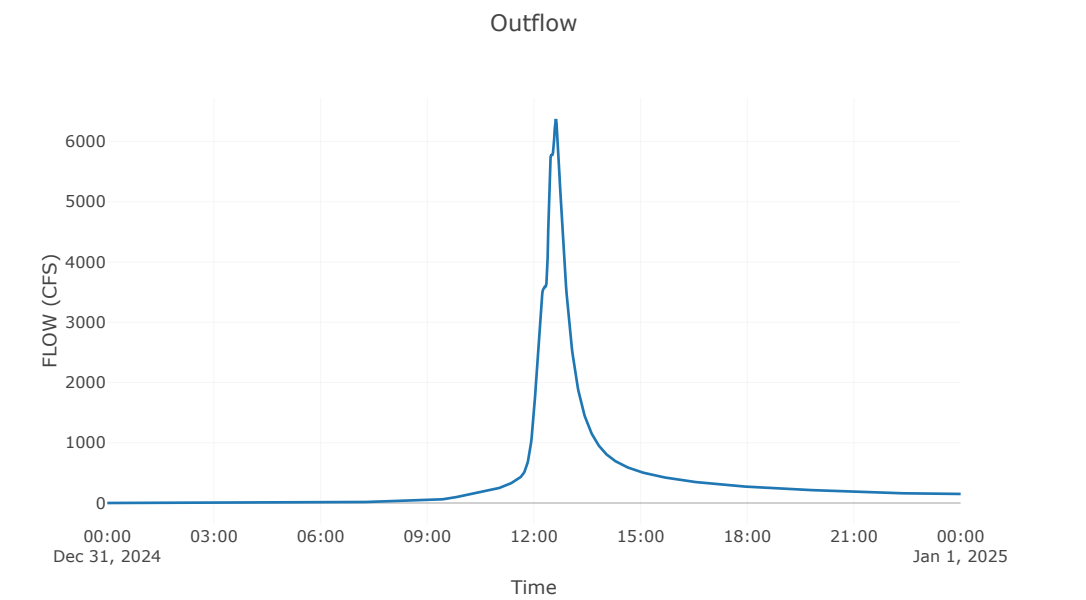


Reach: RCH - 3

Downstream : J - 2

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	727.7
Energy Slope (FT/FT)	0.03
Mannings n	0.08
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	200
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4227

Results: RCH - 3	
Peak Discharge (CFS)	6372.96
Time of Peak Discharge	31Dec2024, 12:37
Volume (IN)	3.21
Peak Inflow (CFS)	6372.95
Inflow Volume (AC - FT)	775.82



Subbasin: SB - 4

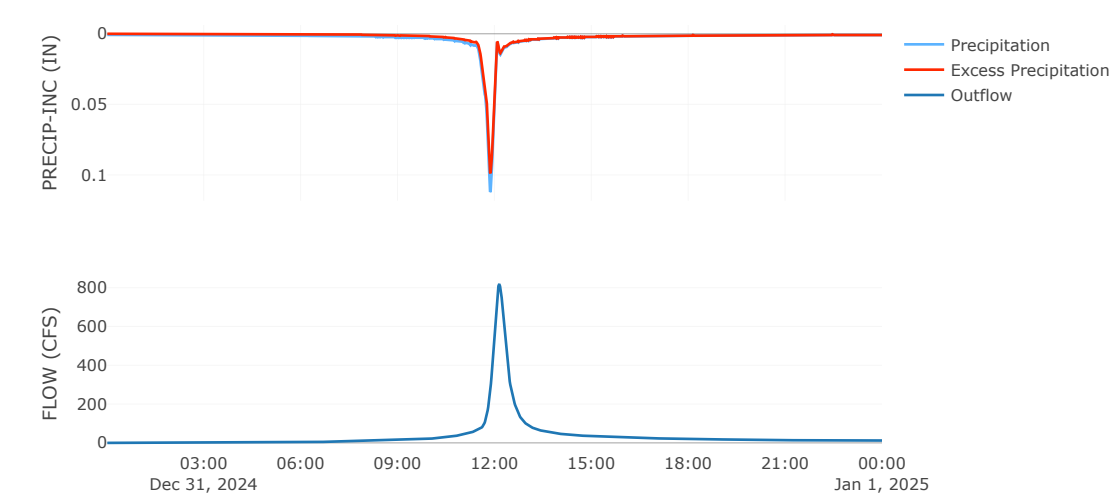
Area (MI2) : 0.38
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.7

Transform: Scs	
Lag	16.15
Unitgraph Type	Standard

Results: SB - 4	
Peak Discharge (CFS)	815.01
Time of Peak Discharge	31Dec2024, 12:08
Volume (IN)	3.49
Precipitation Volume (AC - FT)	94.11
Loss Volume (AC - FT)	23.11
Excess Volume (AC - FT)	71
Direct Runoff Volume (AC - FT)	70.65
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 29

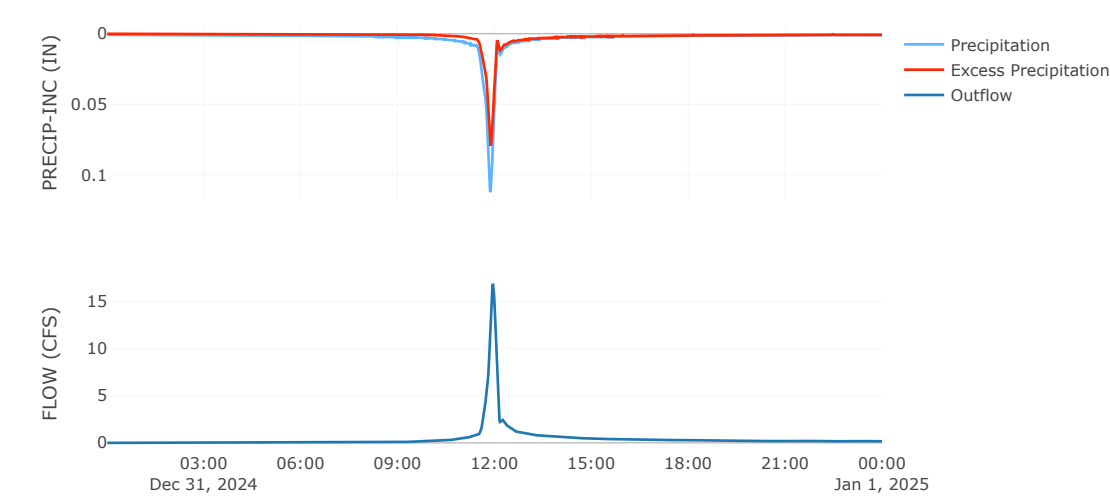
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 2

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	81.1

Transform: SCS	
Lag	3.27
Unitgraph Type	Standard

Results: SB - 29	
Peak Discharge (CFS)	16.82
Time of Peak Discharge	31Dec2024, 11:57
Volume (IN)	2.68
Precipitation Volume (AC - FT)	1.49
Loss Volume (AC - FT)	0.63
Excess Volume (AC - FT)	0.86
Direct Runoff Volume (AC - FT)	0.86
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



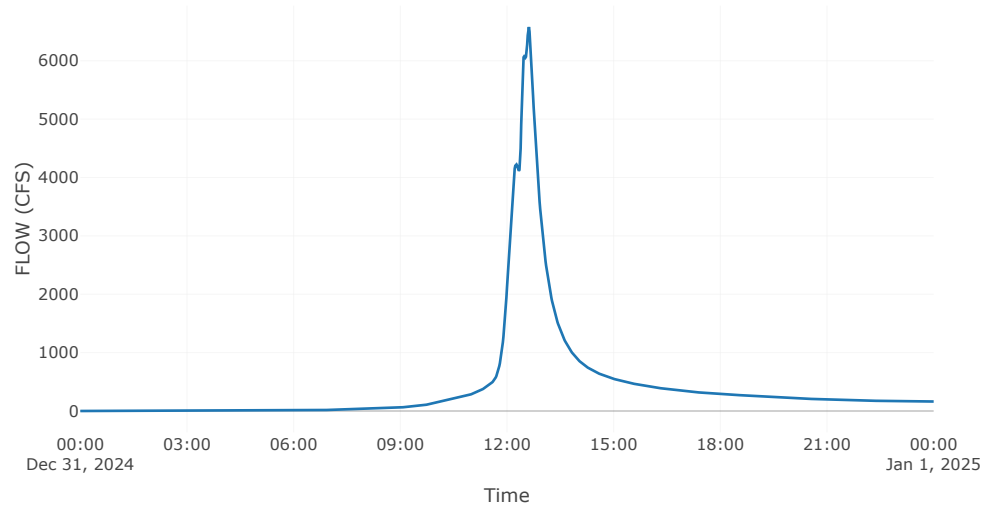
Junction: J - 2

Downstream : RCH - 2

Results: J - 2

Peak Discharge (CFS)	6578.47
Time of Peak Discharge	31Dec2024, 12:37
Volume (IN)	3.23

Outflow

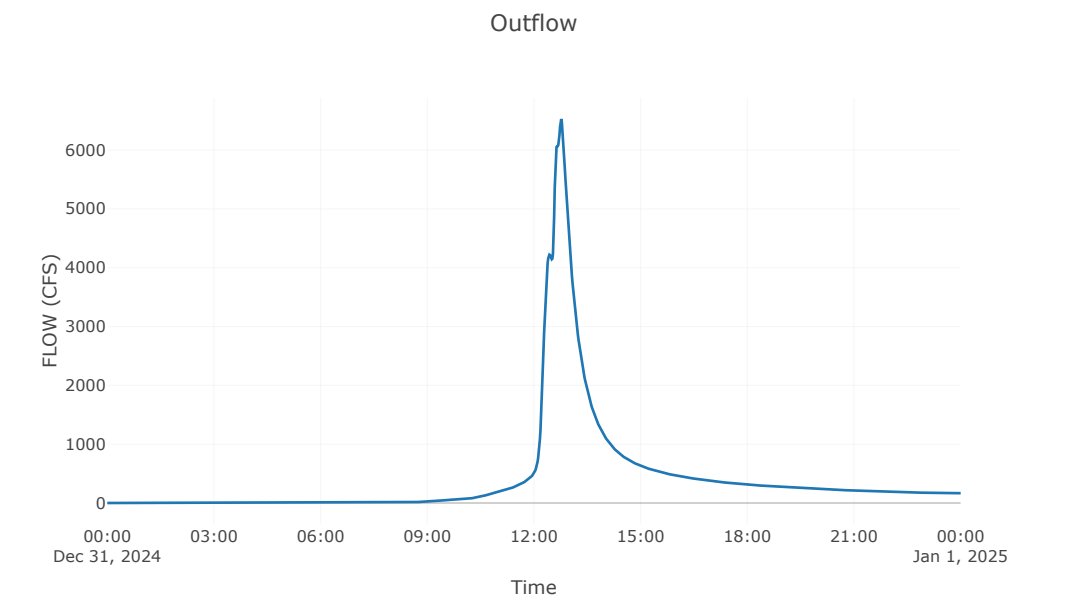


Reach: RCH - 2

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	4383.33
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4346

Results: RCH - 2	
Peak Discharge (CFS)	6527.89
Time of Peak Discharge	31Dec2024, 12:46
Volume (IN)	3.17
Peak Inflow (CFS)	6578.47
Inflow Volume (AC - FT)	845.95



Subbasin: SB - 10

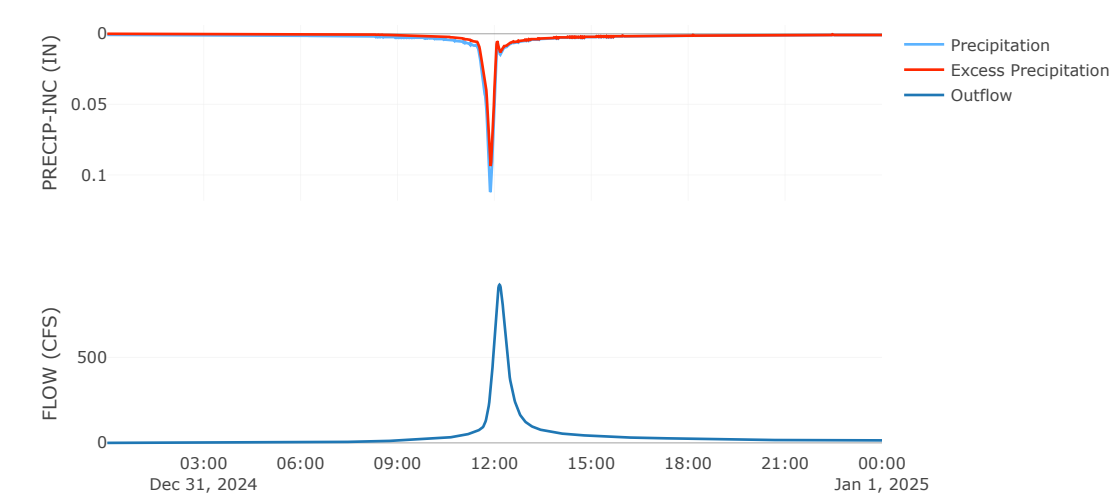
Area (MI2) : 0.47
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	87.3

Transform: SCS	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 10	
Peak Discharge (CFS)	925.85
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.25
Precipitation Volume (AC - FT)	115.45
Loss Volume (AC - FT)	34.32
Excess Volume (AC - FT)	81.13
Direct Runoff Volume (AC - FT)	80.69
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 14

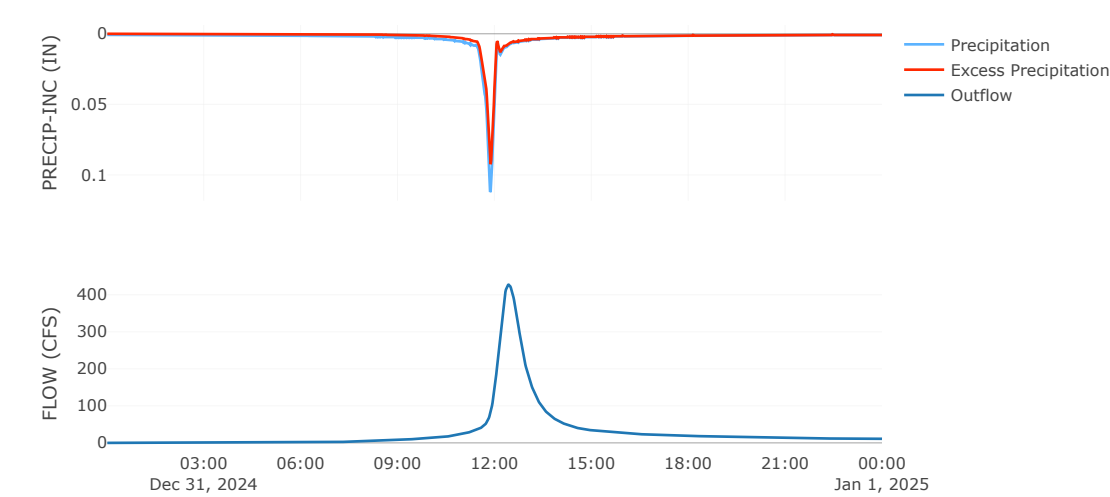
Area (MI2) : 0.35
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	33.79
Unitgraph Type	Standard

Results: SB - 14	
Peak Discharge (CFS)	427.03
Time of Peak Discharge	31Dec2024, 12:26
Volume (IN)	3.17
Precipitation Volume (AC - FT)	85.83
Loss Volume (AC - FT)	26.6
Excess Volume (AC - FT)	59.23
Direct Runoff Volume (AC - FT)	58.57
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



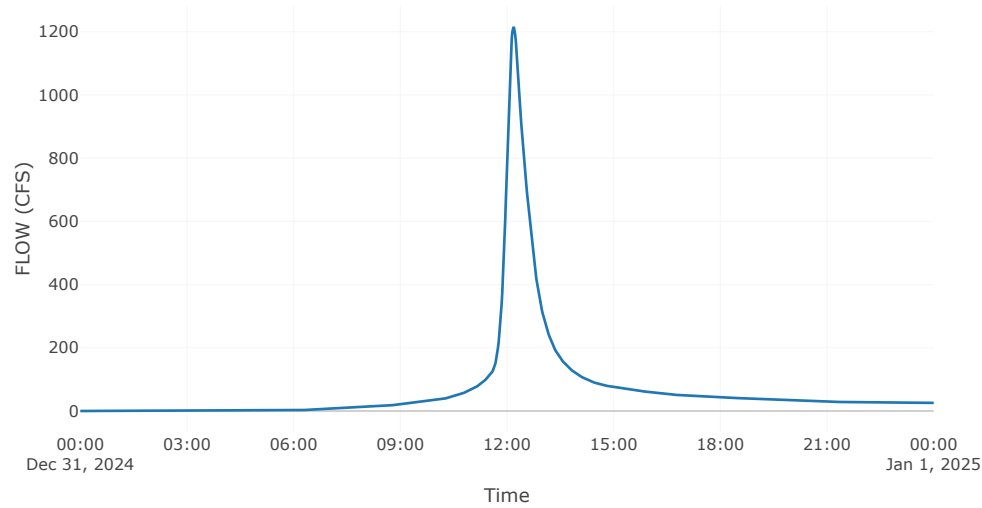
Junction: J - 11

Downstream : RCH - 11

Results: J - 11

Peak Discharge (CFS)	1214.85
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	3.22

Outflow

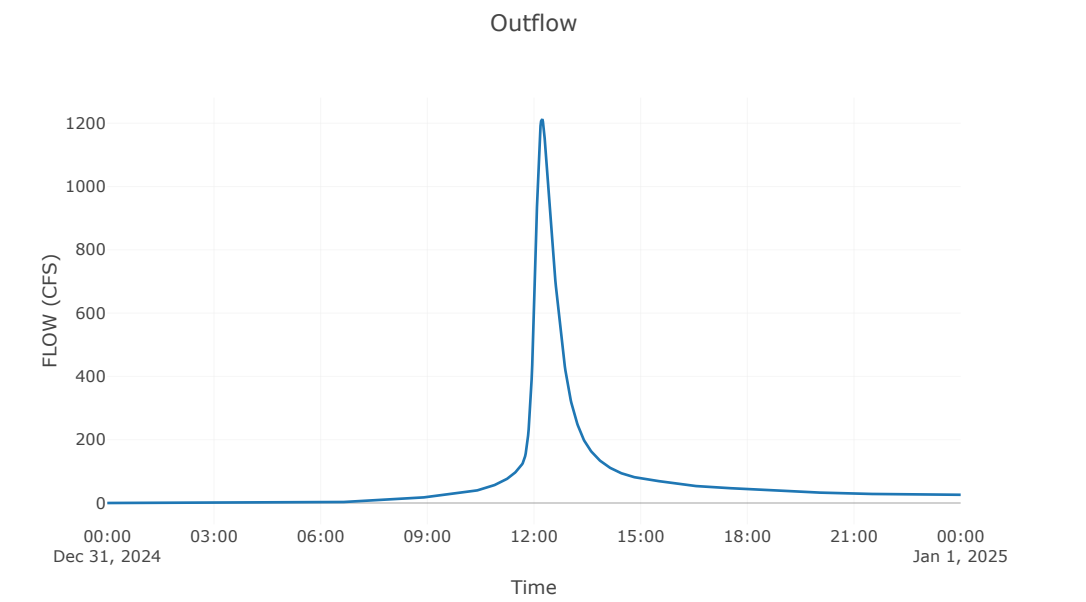


Reach: RCH - II

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1004.26
Energy Slope (FT/FT)	0.05
Mannings n	0.13
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	877

Results: RCH - II	
Peak Discharge (CFS)	1213.34
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	3.2
Peak Inflow (CFS)	1214.85
Inflow Volume (AC - FT)	139.27



Subbasin: SB - 13

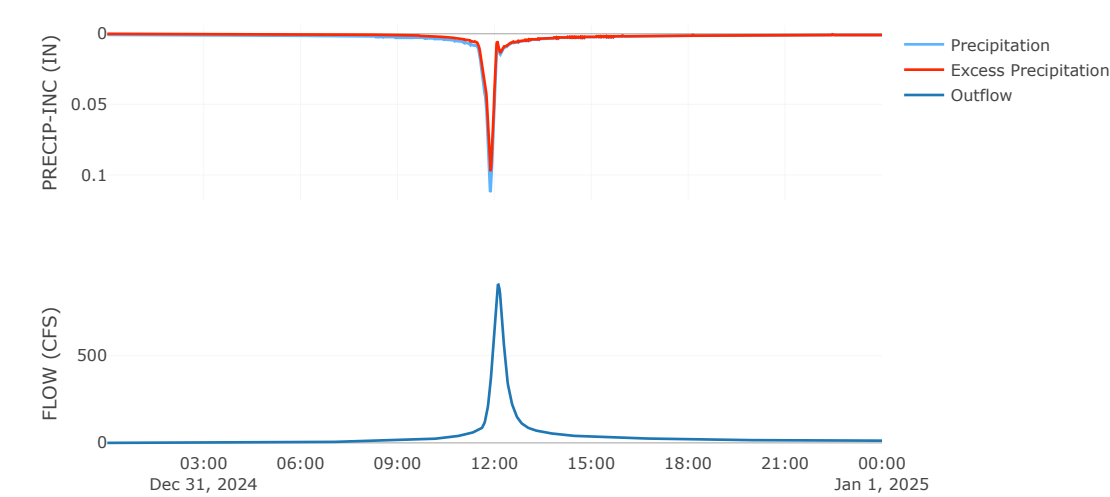
Area (MI2) : 0.4
Latitude Degrees : 31.74
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	89

Transform: SCS	
Lag	14.12
Unitgraph Type	Standard

Results: SB - 13	
Peak Discharge (CFS)	906.79
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.42
Precipitation Volume (AC - FT)	98.94
Loss Volume (AC - FT)	25.81
Excess Volume (AC - FT)	73.13
Direct Runoff Volume (AC - FT)	72.81
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 11

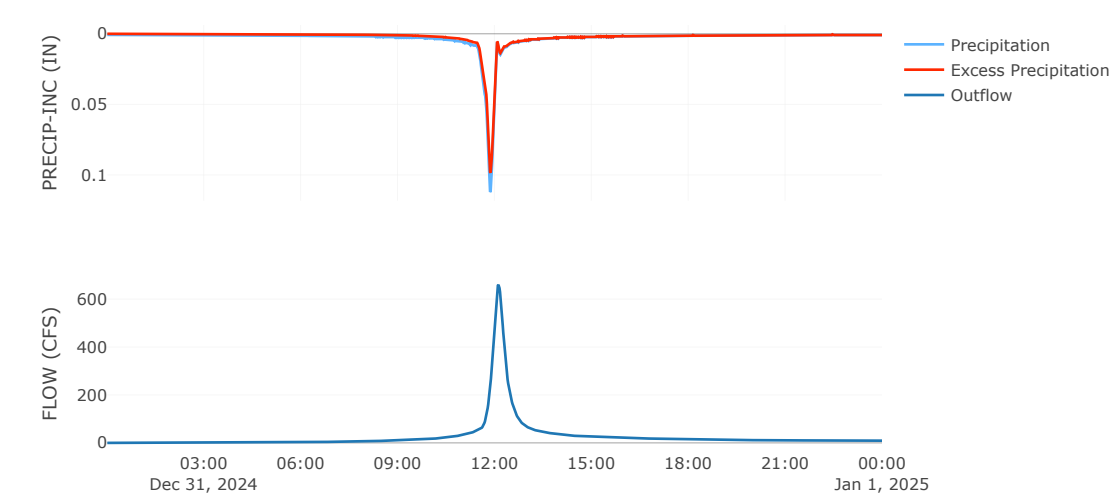
Area (MI2) : 0.29
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.5

Transform: Scs	
Lag	14.46
Unitgraph Type	Standard

Results: SB - 11	
Peak Discharge (CFS)	659.85
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.47
Precipitation Volume (AC - FT)	72
Loss Volume (AC - FT)	17.99
Excess Volume (AC - FT)	54
Direct Runoff Volume (AC - FT)	53.77
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



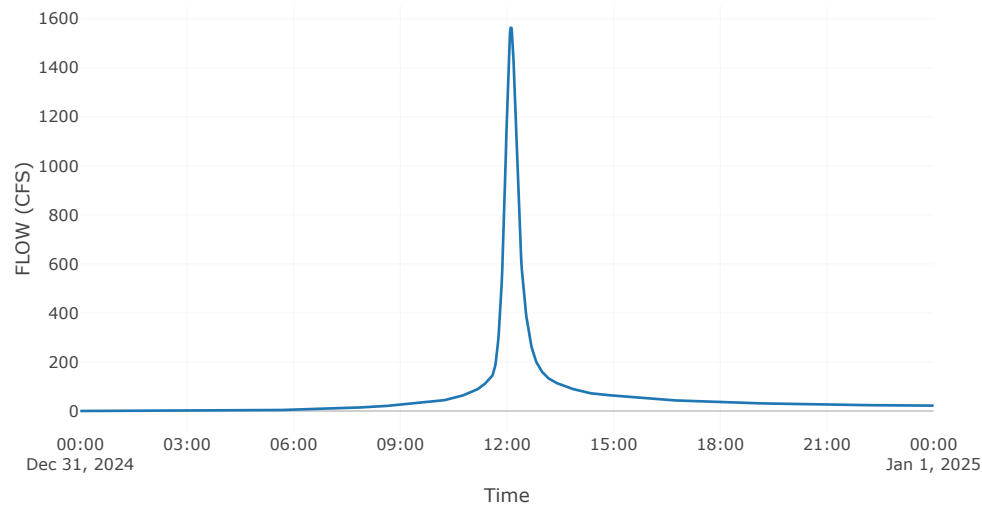
Junction: J - 13

Downstream : RCH - 13

Results: J - 13

Peak Discharge (CFS)	1566.63
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.44

Outflow

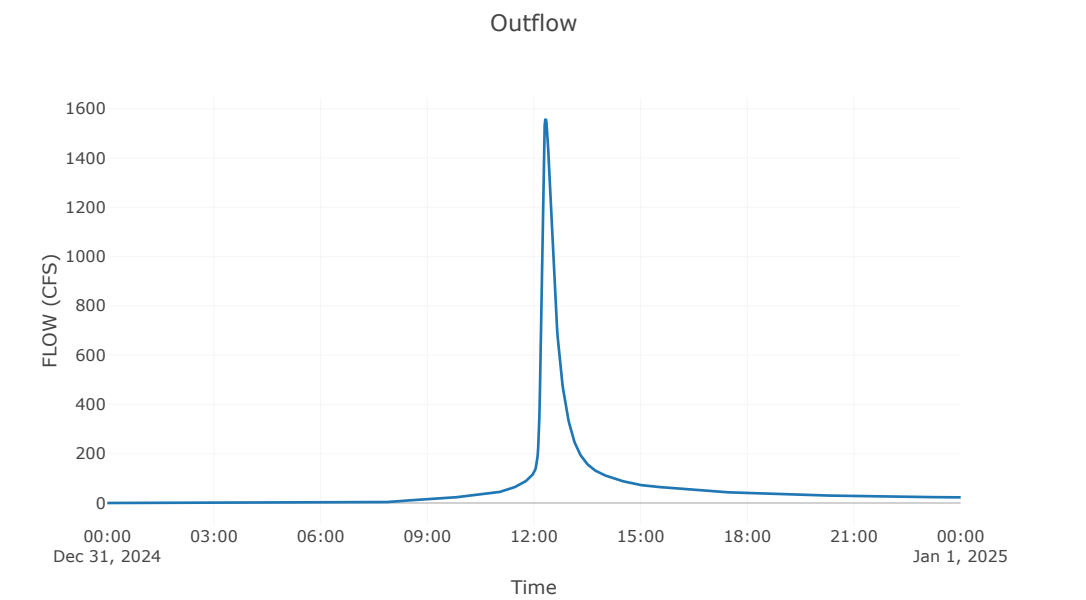


Reach: RCH - 13

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6298.97
Energy Slope (FT/FT)	0.1
Mannings n	0.17
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	90
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1157

Results: RCH - 13	
Peak Discharge (CFS)	1558.42
Time of Peak Discharge	31Dec2024, 12:20
Volume (IN)	3.35
Peak Inflow (CFS)	1566.63
Inflow Volume (AC - FT)	126.58



Subbasin: SB - 19

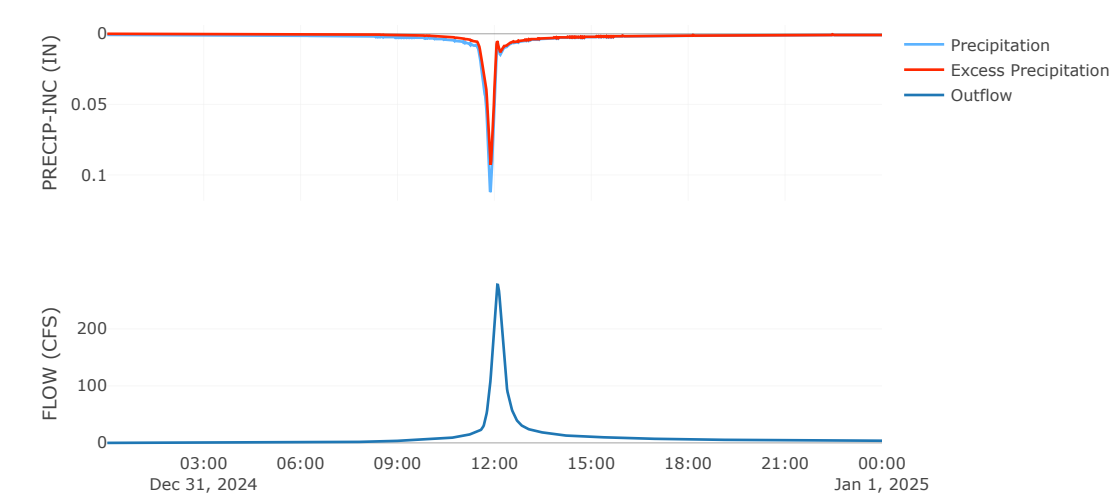
Area (MI2) : 0.12
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 8

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.9

Transform: Scs	
Lag	12.64
Unitgraph Type	Standard

Results: SB - 19	
Peak Discharge (CFS)	277.39
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	3.21
Precipitation Volume (AC - FT)	30.19
Loss Volume (AC - FT)	9.23
Excess Volume (AC - FT)	20.96
Direct Runoff Volume (AC - FT)	20.87
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 21

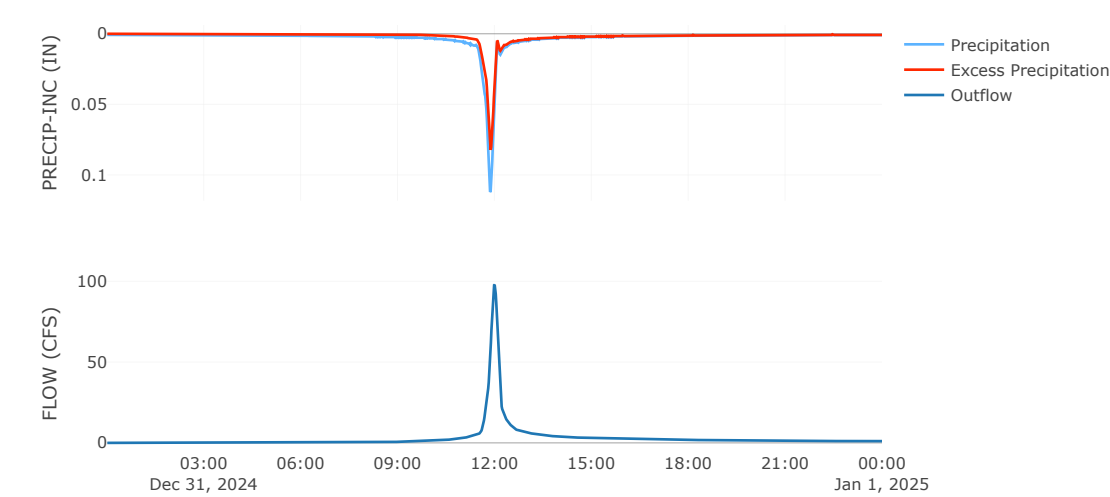
Area (MI2) : 0.04
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 8

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	82.3

Transform: SCS	
Lag	6.2
Unitgraph Type	Standard

Results: SB - 21	
Peak Discharge (CFS)	97.85
Time of Peak Discharge	31Dec2024, 12:00
Volume (IN)	2.79
Precipitation Volume (AC - FT)	9.34
Loss Volume (AC - FT)	3.73
Excess Volume (AC - FT)	5.62
Direct Runoff Volume (AC - FT)	5.6
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

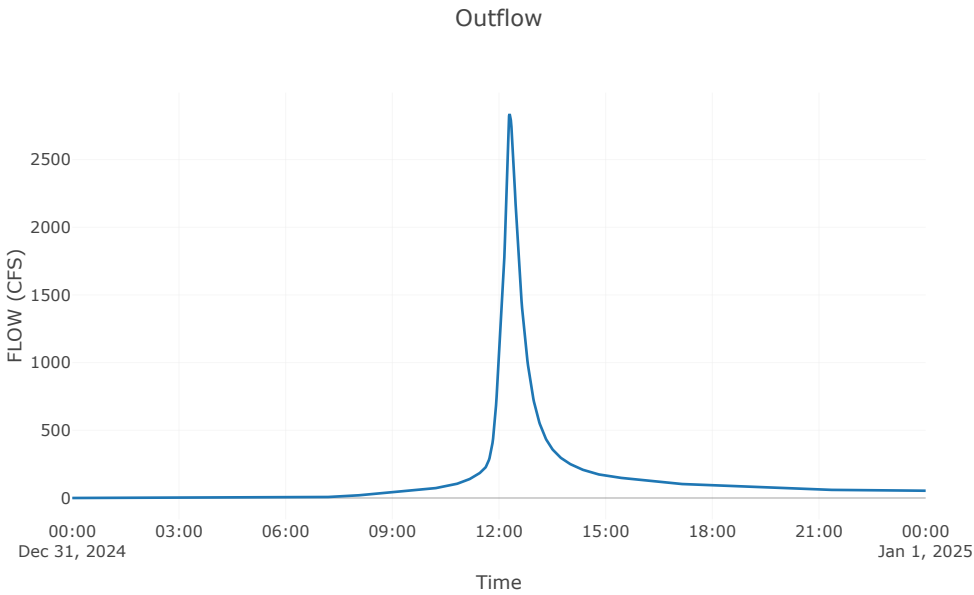


Junction: J - 8

Downstream : RCH - 8

Results: J - 8

Peak Discharge (CFS)	2836.73
Time of Peak Discharge	31Dec2024, 12:18
Volume (IN)	3.26

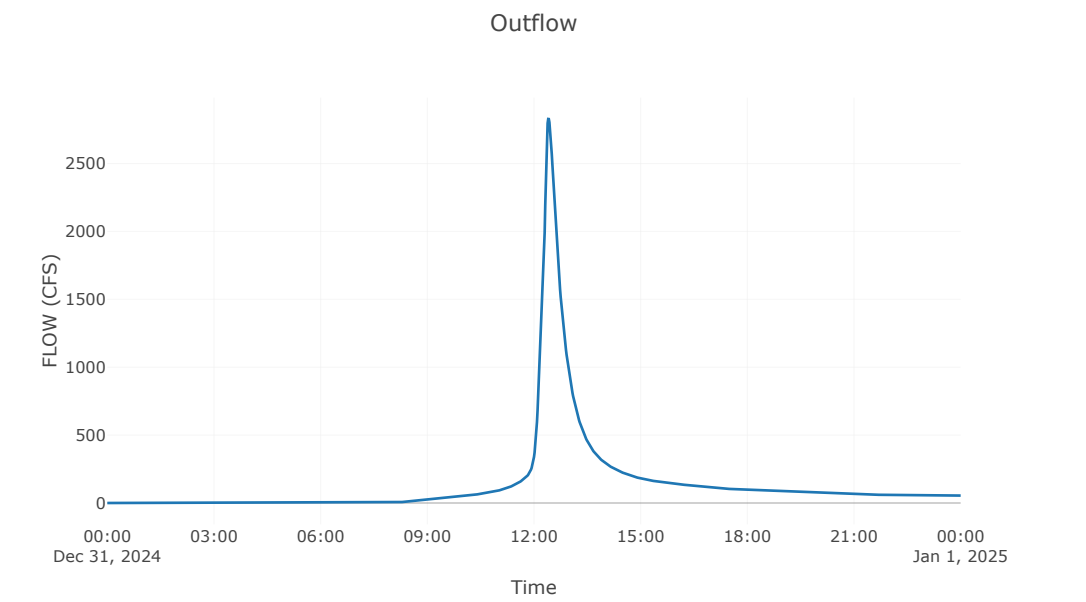


Reach: RCH - 8

Downstream : J - 6

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3385.93
Energy Slope (FT/FT)	0.04
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2043

Results: RCH - 8	
Peak Discharge (CFS)	2827.87
Time of Peak Discharge	31Dec2024, 12:24
Volume (IN)	3.22
Peak Inflow (CFS)	2836.73
Inflow Volume (AC - FT)	288.56



Subbasin: SB - 24

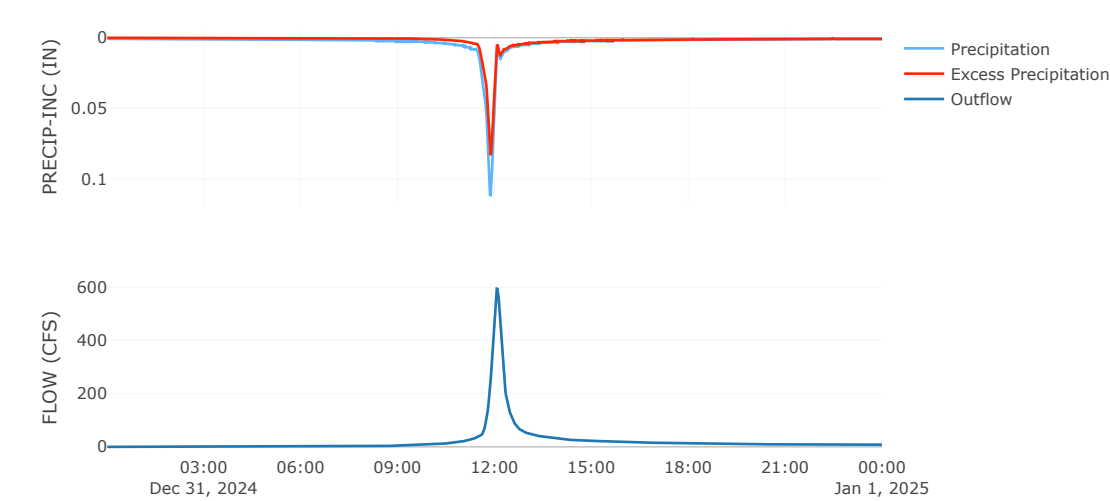
Area (MI2) : 0.28
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 6

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	82.7

Transform: SCS	
Lag	11.31
Unitgraph Type	Standard

Results: SB - 24	
Peak Discharge (CFS)	594.22
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	2.82
Precipitation Volume (AC - FT)	69.15
Loss Volume (AC - FT)	27.05
Excess Volume (AC - FT)	42.1
Direct Runoff Volume (AC - FT)	41.93
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 8

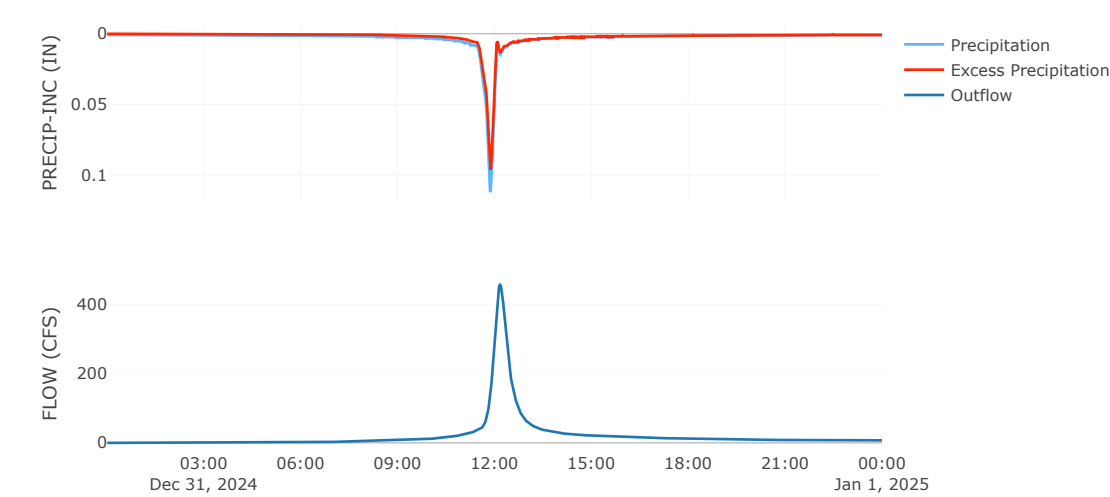
Area (MI2) : 0.23
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 6

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.5

Transform: Scs	
Lag	17.71
Unitgraph Type	Standard

Results: SB - 8	
Peak Discharge (CFS)	457.65
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.37
Precipitation Volume (AC - FT)	57.33
Loss Volume (AC - FT)	15.57
Excess Volume (AC - FT)	41.75
Direct Runoff Volume (AC - FT)	41.52
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



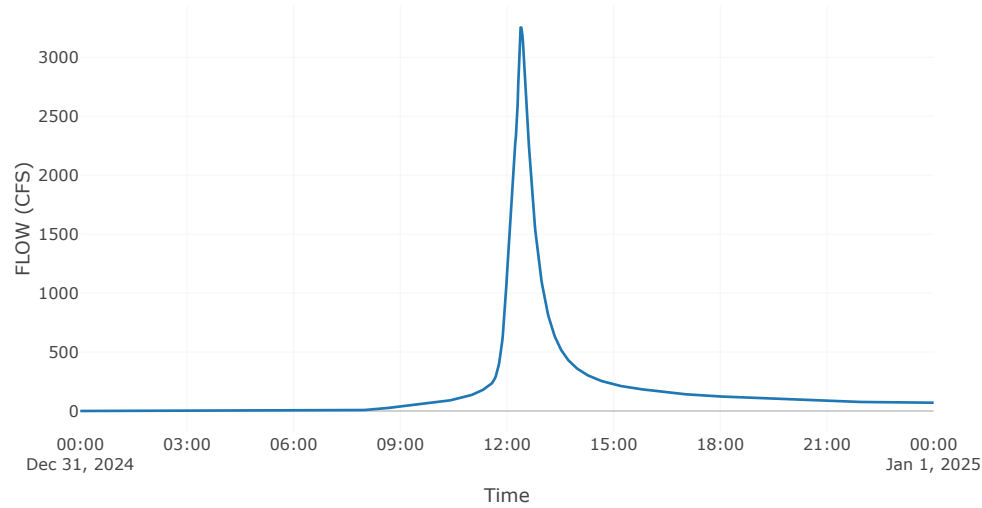
Junction: J - 6

Downstream : RCH - 6

Results: J - 6

Peak Discharge (CFS)	3257.09
Time of Peak Discharge	31Dec2024, 12:24
Volume (IN)	3.18

Outflow

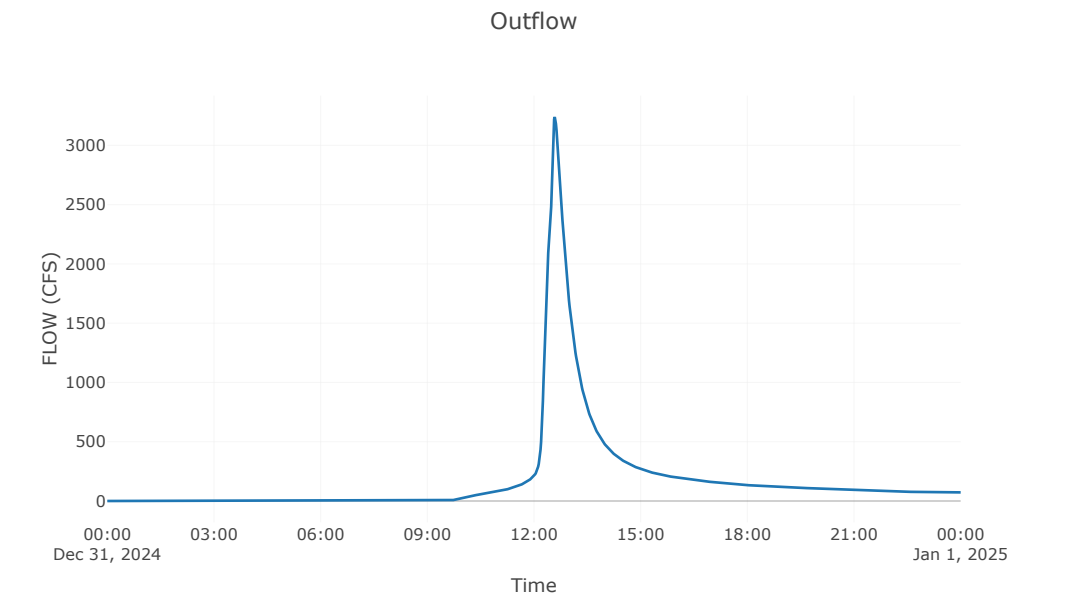


Reach: RCH - 6

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5289.14
Energy Slope (FT/FT)	0.03
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	250
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2306

Results: RCH - 6	
Peak Discharge (CFS)	3239.24
Time of Peak Discharge	31Dec2024, 12:35
Volume (IN)	3.11
Peak Inflow (CFS)	3257.09
Inflow Volume (AC - FT)	368.48



Subbasin: SB - 6

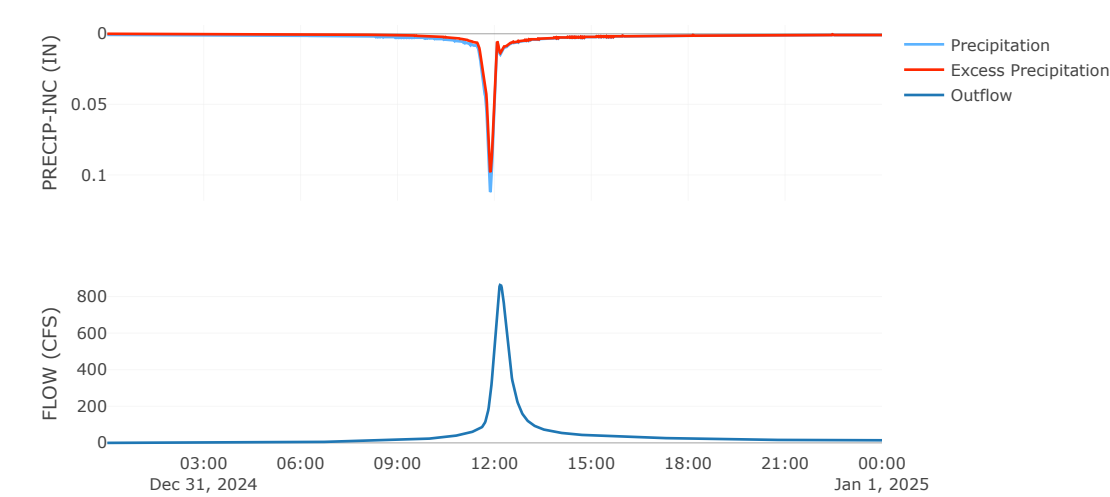
Area (MI2) : 0.44
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	89.3

Transform: SCS	
Lag	18.63
Unitgraph Type	Standard

Results: SB - 6	
Peak Discharge (CFS)	864.42
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	3.45
Precipitation Volume (AC - FT)	109.42
Loss Volume (AC - FT)	27.83
Excess Volume (AC - FT)	81.6
Direct Runoff Volume (AC - FT)	81.13
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 5

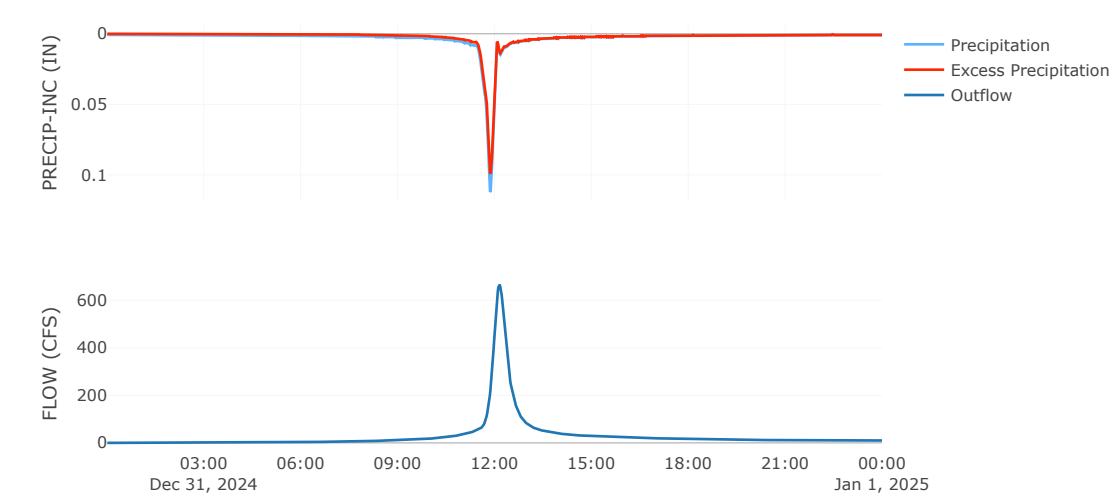
Area (MI2) : 0.31
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.8

Transform: Scs	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 5	
Peak Discharge (CFS)	665.23
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.5
Precipitation Volume (AC - FT)	77.92
Loss Volume (AC - FT)	18.96
Excess Volume (AC - FT)	58.96
Direct Runoff Volume (AC - FT)	58.66
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



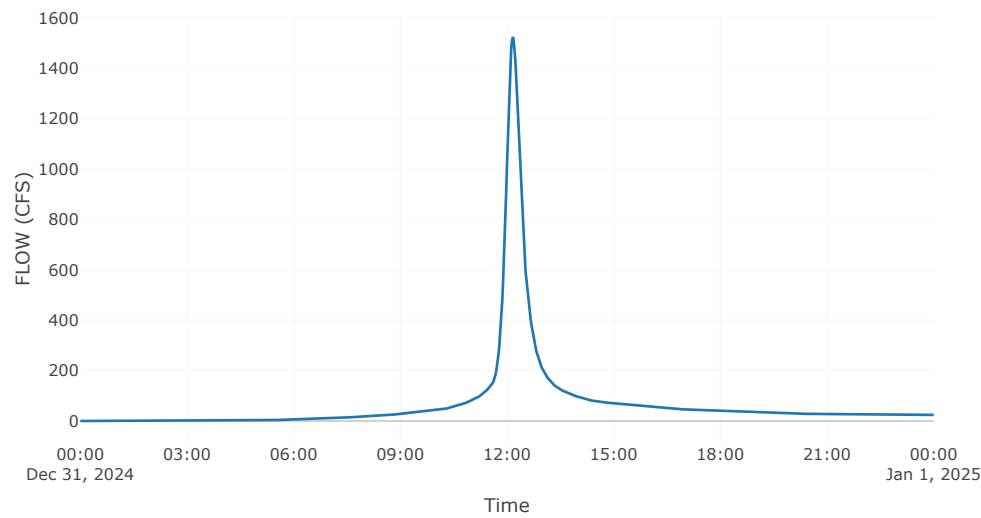
Junction: J - 12

Downstream : RCH - 12

Results: J - 12

Peak Discharge (CFS)	1524.84
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.47

Outflow

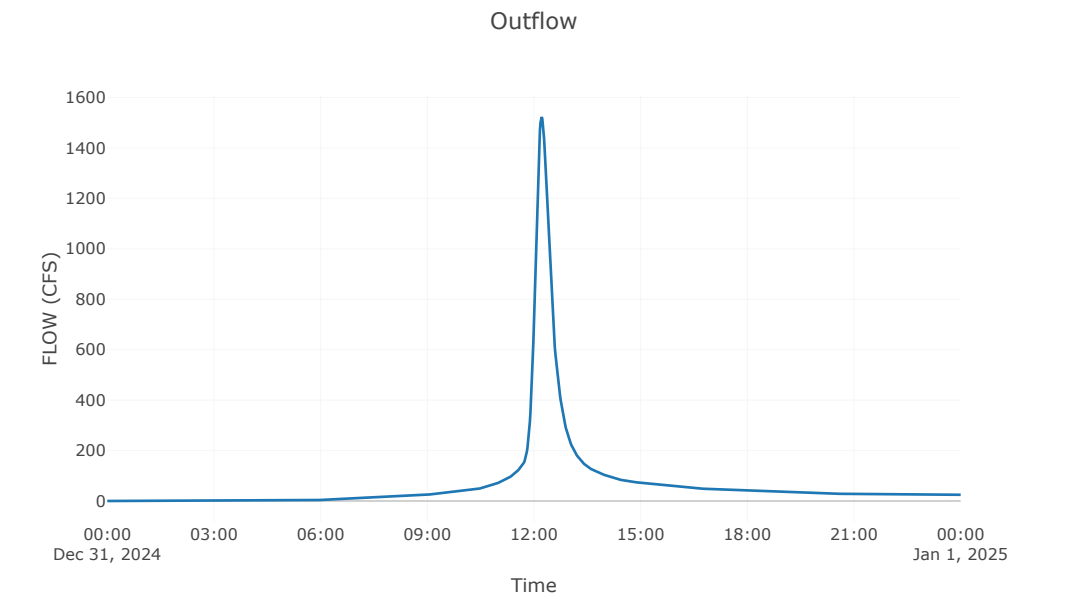


Reach: RCH - 12

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1501.96
Energy Slope (FT/FT)	0.03
Mannings n	0.09
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1127

Results: RCH - 12	
Peak Discharge (CFS)	1522.66
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	3.45
Peak Inflow (CFS)	1524.84
Inflow Volume (AC - FT)	139.79



Subbasin: SB - 26

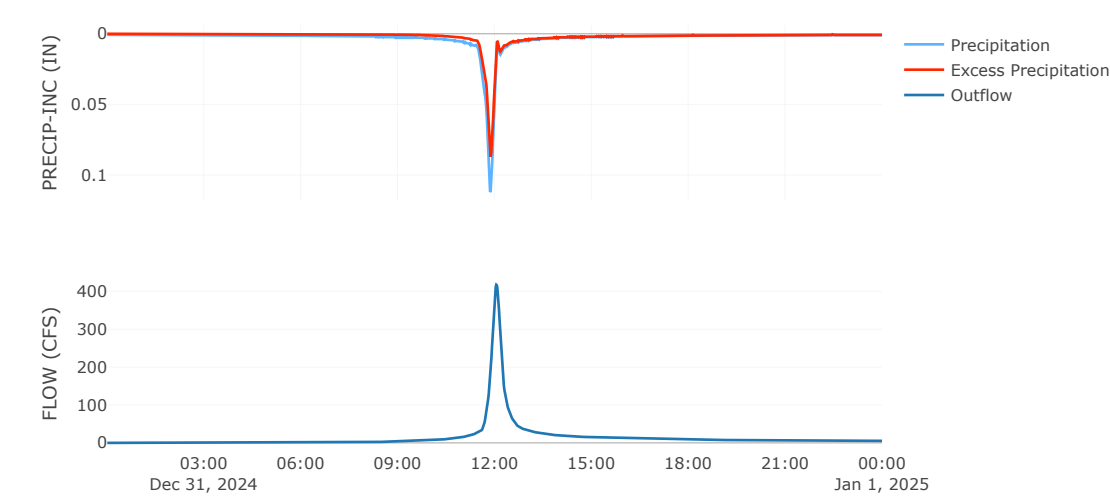
Area (MI2) : 0.18
Latitude Degrees : 31.76
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	84.4

Transform: Scs	
Lag	10.19
Unitgraph Type	Standard

Results: SB - 26	
Peak Discharge (CFS)	417.66
Time of Peak Discharge	31Dec2024, 12:03
Volume (IN)	2.98
Precipitation Volume (AC - FT)	44.14
Loss Volume (AC - FT)	15.77
Excess Volume (AC - FT)	28.37
Direct Runoff Volume (AC - FT)	28.27
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 20

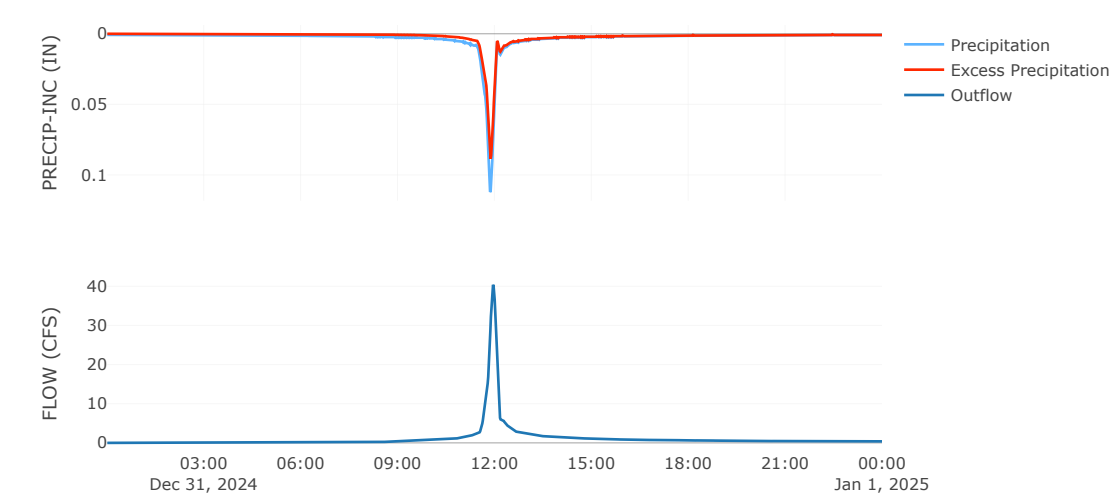
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: SCS	
Percent Impervious Area	0
Curve Number	85

Transform: SCS	
Lag	3.99
Unitgraph Type	Standard

Results: SB - 20	
Peak Discharge (CFS)	40.39
Time of Peak Discharge	31Dec2024, 11:57
Volume (IN)	3.04
Precipitation Volume (AC - FT)	3.27
Loss Volume (AC - FT)	1.13
Excess Volume (AC - FT)	2.14
Direct Runoff Volume (AC - FT)	2.14
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



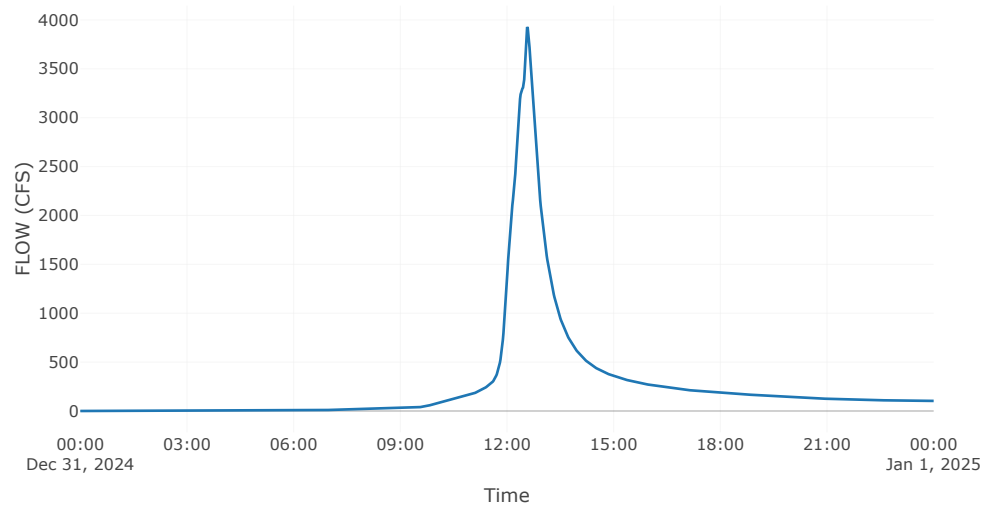
Junction: J - 4

Downstream : RCH - 4

Results: J - 4

Peak Discharge (CFS)	3927.84
Time of Peak Discharge	31Dec2024, 12:34
Volume (IN)	3.19

Outflow

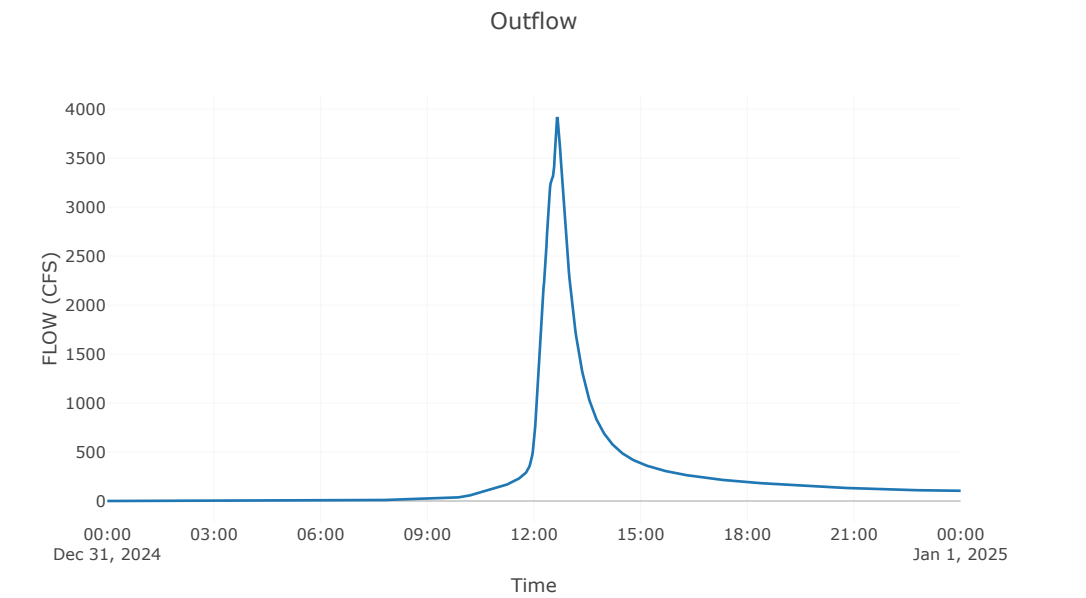


Reach: RCH - 4

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1941.67
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2698

Results: RCH - 4	
Peak Discharge (CFS)	3919.89
Time of Peak Discharge	31Dec2024, 12:39
Volume (IN)	3.16
Peak Inflow (CFS)	3927.84
Inflow Volume (AC - FT)	529.78



Subbasin: SB - 30

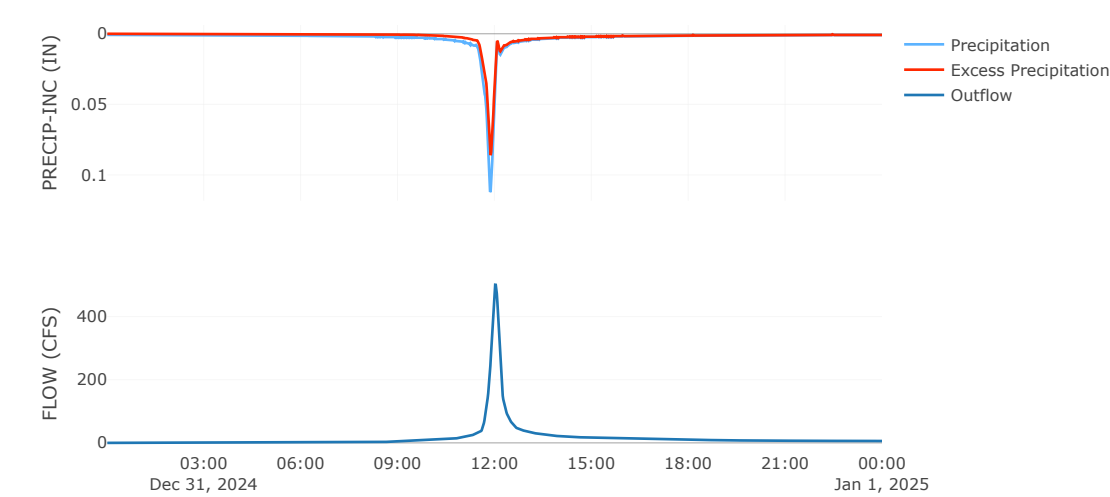
Area (MI2) : 0.2
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	83.9

Transform: Scs	
Lag	8.18
Unitgraph Type	Standard

Results: SB - 30	
Peak Discharge (CFS)	500.88
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	2.93
Precipitation Volume (AC - FT)	49.52
Loss Volume (AC - FT)	18.19
Excess Volume (AC - FT)	31.33
Direct Runoff Volume (AC - FT)	31.24
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 28

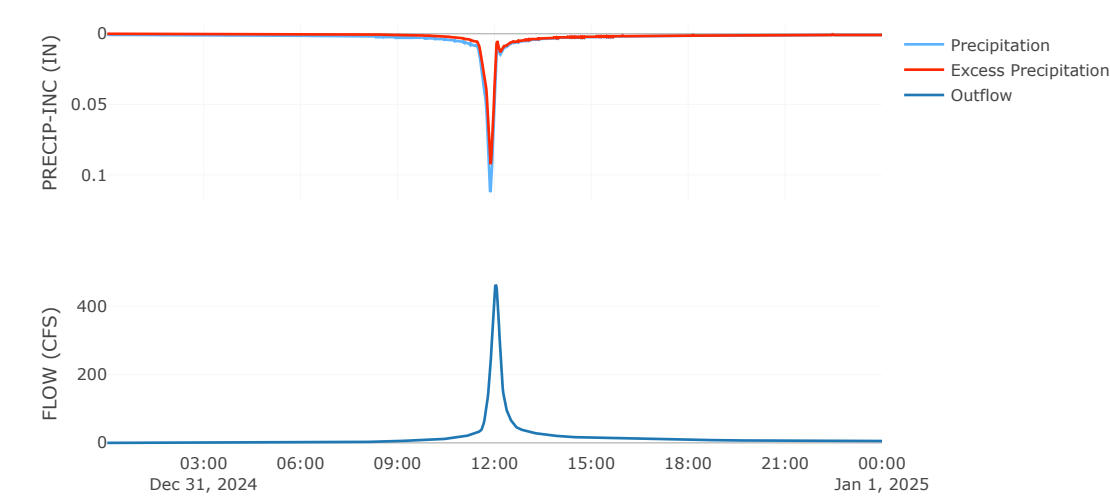
Area (MI2) : 0.18
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	8.99
Unitgraph Type	Standard

Results: SB - 28	
Peak Discharge (CFS)	462.96
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	3.2
Precipitation Volume (AC - FT)	43.74
Loss Volume (AC - FT)	13.56
Excess Volume (AC - FT)	30.19
Direct Runoff Volume (AC - FT)	30.1
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



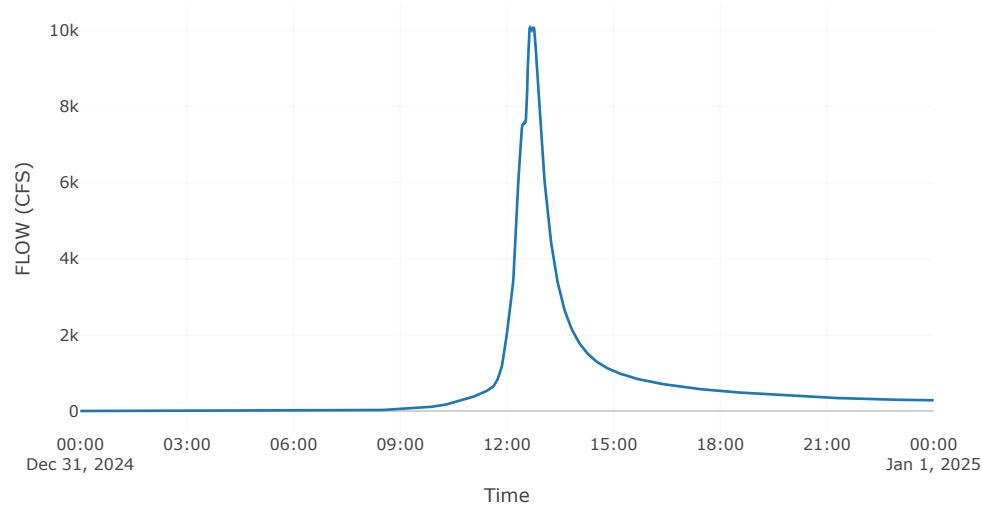
Junction: J - 1

Downstream : RCH - 1

Results: J - 1

Peak Discharge (CFS)	10094.29
Time of Peak Discharge	31Dec2024, 12:45
Volume (IN)	3.16

Outflow

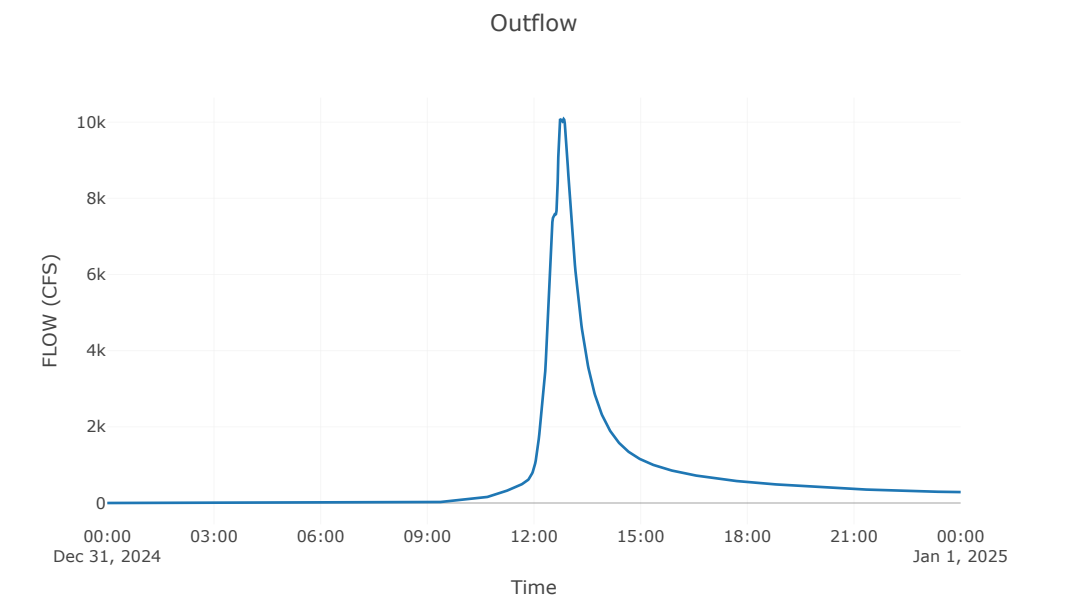


Reach: RCH - 1

Downstream : Sink - 1

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3145.34
Energy Slope (FT/FT)	0.02
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	6824

Results: RCH - 1	
Peak Discharge (CFS)	10082.67
Time of Peak Discharge	31Dec2024, 12:50
Volume (IN)	3.13
Peak Inflow (CFS)	10094.29
Inflow Volume (AC - FT)	1417.92



Subbasin: SB - 31

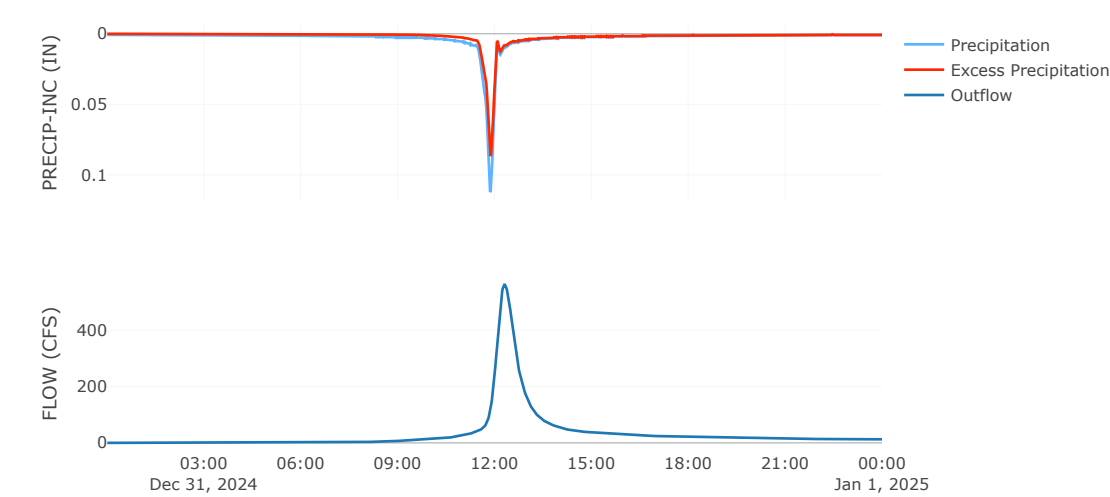
Area (MI2) : 0.41
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : Sink - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	84.2

Transform: Scs	
Lag	26.25
Unitgraph Type	Standard

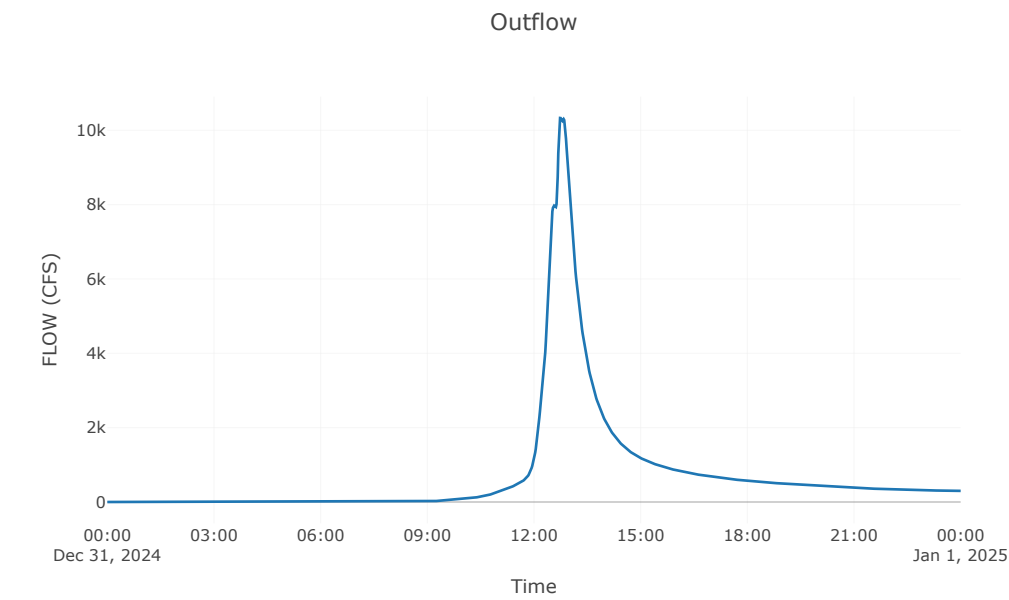
Results: SB - 31	
Peak Discharge (CFS)	561.1
Time of Peak Discharge	31Dec2024, 12:18
Volume (IN)	2.94
Precipitation Volume (AC - FT)	101.96
Loss Volume (AC - FT)	36.84
Excess Volume (AC - FT)	65.12
Direct Runoff Volume (AC - FT)	64.54
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Sink: Sink-1

Results: Sink-1	
Peak Discharge (CFS)	10330.76
Time of Peak Discharge	31Dec2024, 12:44
Volume (IN)	3.12



Subbasin: SB - 3

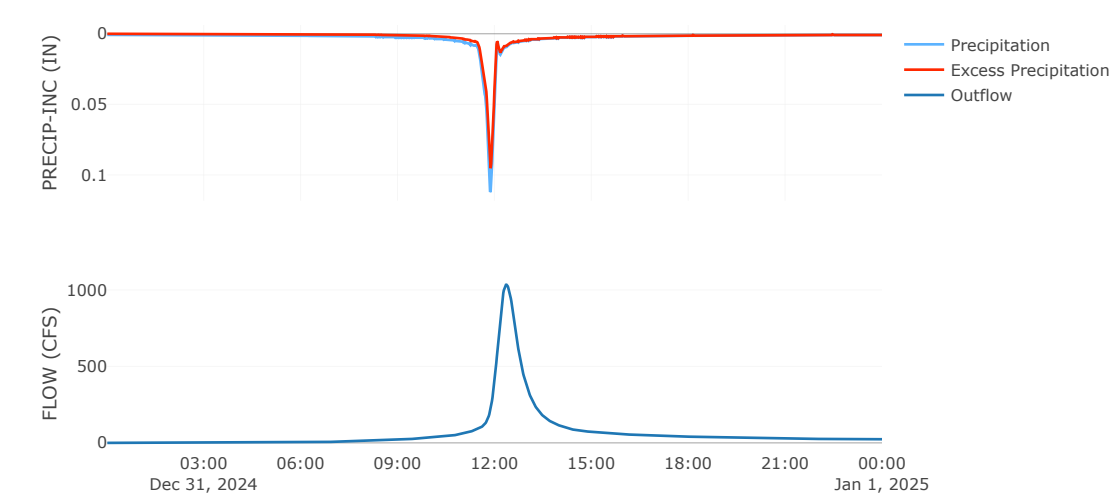
Area (MI2) : 0.74
Latitude Degrees : 31.78
Longitude Degrees : -110.85
Downstream : J - 7

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88

Transform: Scs	
Lag	29.77
Unitgraph Type	Standard

Results: SB - 3	
Peak Discharge (CFS)	1033.86
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	3.3
Precipitation Volume (AC - FT)	183.48
Loss Volume (AC - FT)	51.81
Excess Volume (AC - FT)	131.67
Direct Runoff Volume (AC - FT)	130.42
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 2

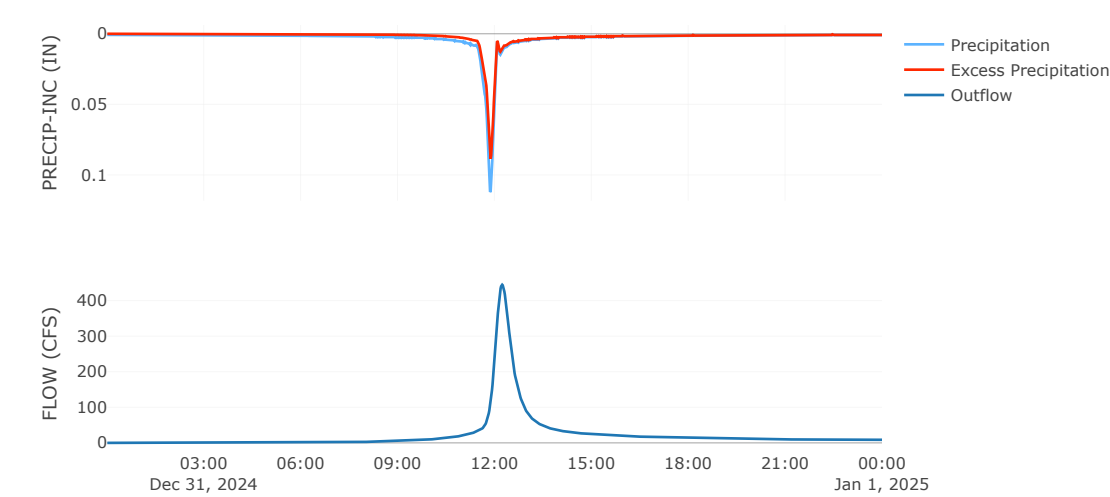
Area (MI2) : 0.28
Latitude Degrees : 31.78
Longitude Degrees : -110.86
Downstream : J - 7

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85

Transform: Scs	
Lag	21.65
Unitgraph Type	Standard

Results: SB - 2	
Peak Discharge (CFS)	444.55
Time of Peak Discharge	31Dec2024, 12:14
Volume (IN)	3.02
Precipitation Volume (AC - FT)	69.4
Loss Volume (AC - FT)	23.95
Excess Volume (AC - FT)	45.45
Direct Runoff Volume (AC - FT)	45.12
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



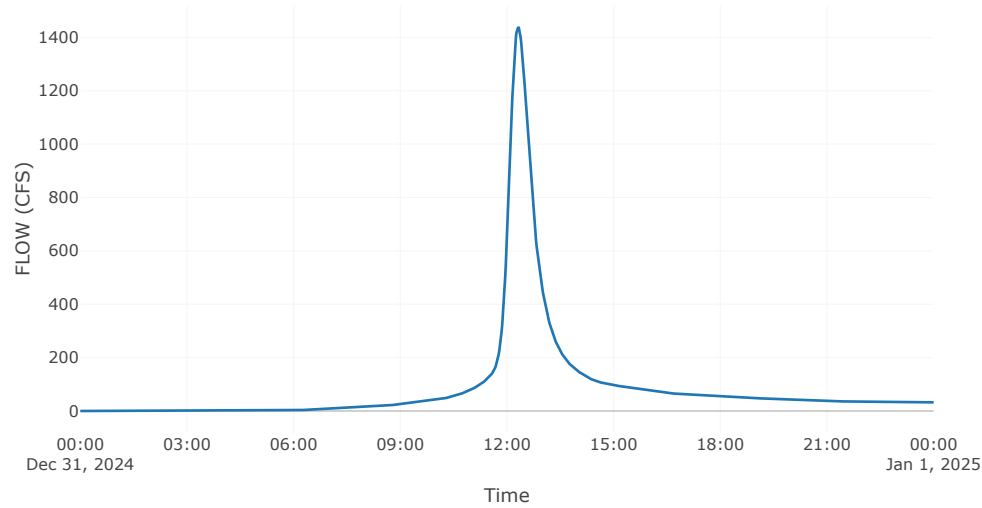
Junction: J - 7

Downstream : RCH - 7

Results: J - 7

Peak Discharge (CFS)	1438.87
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	3.23

Outflow

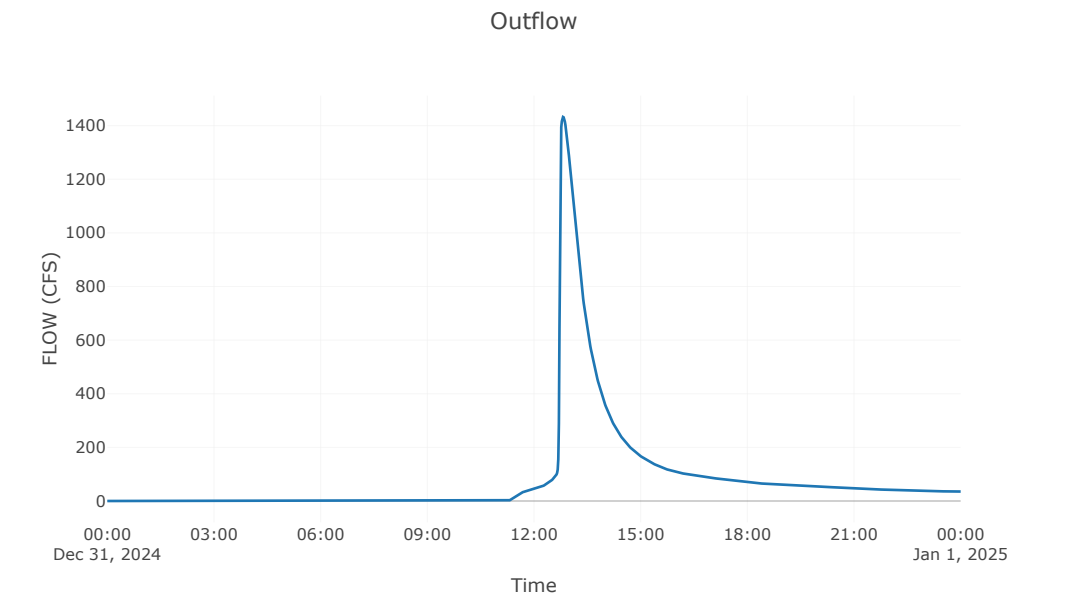


Reach: RCH - 7

Downstream : Medium Wash

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5200.73
Energy Slope (FT/FT)	0.02
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1040

Results: RCH - 7	
Peak Discharge (CFS)	1432.18
Time of Peak Discharge	31Dec2024, 12:49
Volume (IN)	3.04
Peak Inflow (CFS)	1438.87
Inflow Volume (AC - FT)	175.54



Subbasin: SB - 25

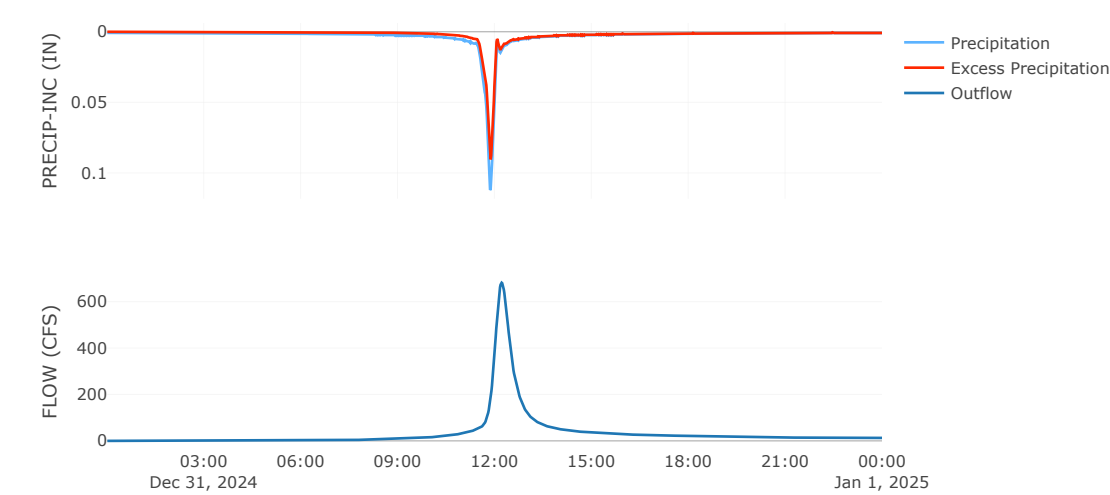
Area (MI2) : 0.41
Latitude Degrees : 31.78
Longitude Degrees : -110.87
Downstream : Medium Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.8

Transform: Scs	
Lag	20.79
Unitgraph Type	Standard

Results: SB - 25	
Peak Discharge (CFS)	681.46
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	3.1
Precipitation Volume (AC - FT)	101.27
Loss Volume (AC - FT)	33.28
Excess Volume (AC - FT)	67.99
Direct Runoff Volume (AC - FT)	67.52
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

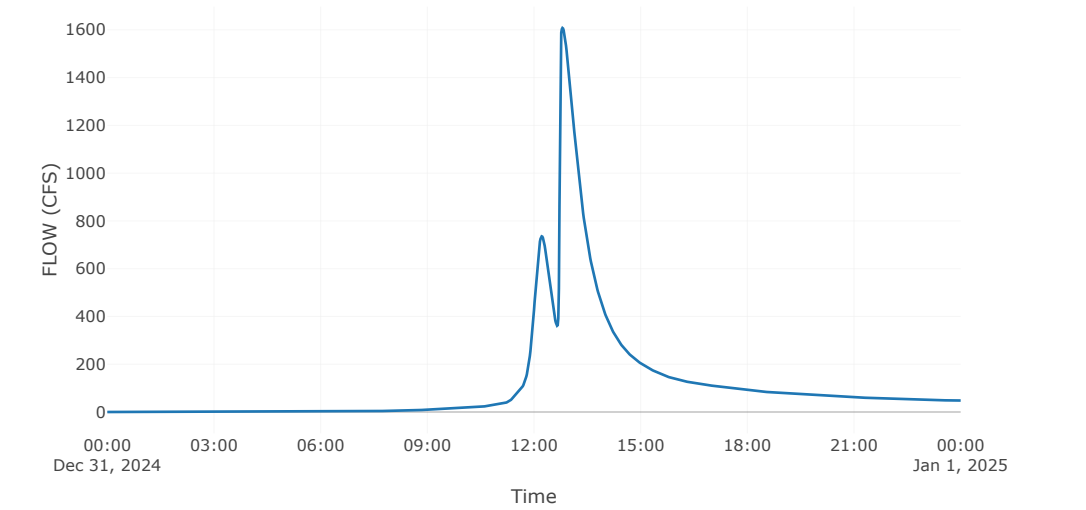


Sink: Medium Wash

Results: Medium Wash

Peak Discharge (CFS)	1607.67
Time of Peak Discharge	31Dec2024, 12:48
Volume (IN)	3.06

Outflow



Subbasin: SB - 1

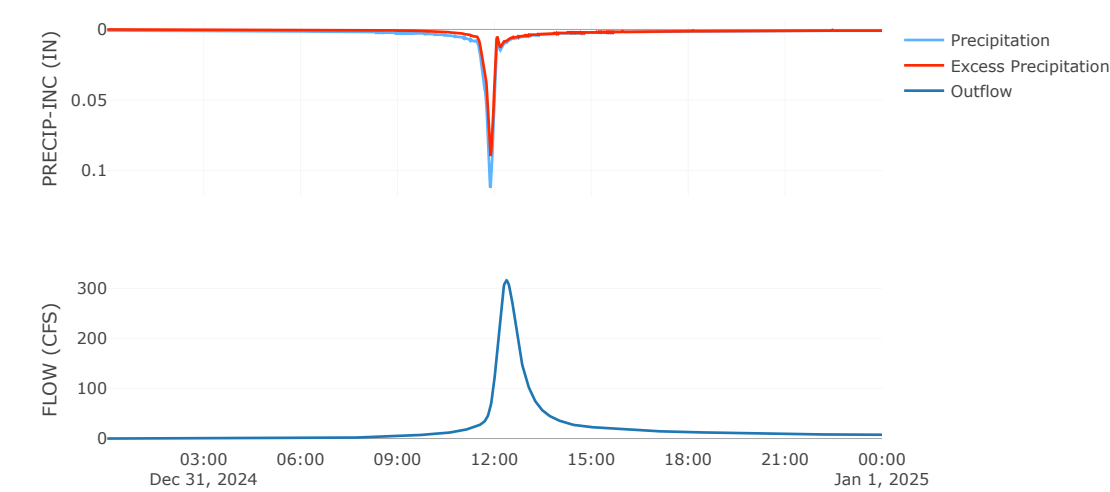
Area (MI2) : 0.24
Latitude Degrees : 31.78
Longitude Degrees : -110.88

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.5

Transform: Scs	
Lag	29.7
Unitgraph Type	Standard

Results: SB - 1	
Peak Discharge (CFS)	315.85
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	3.06
Precipitation Volume (AC - FT)	60.05
Loss Volume (AC - FT)	20.11
Excess Volume (AC - FT)	39.94
Direct Runoff Volume (AC - FT)	39.55
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Project: Madera_Canyon

Simulation Run: MW 500y3h

Simulation Start: 30 December 2024, 24:00

Simulation End: 31 December 2024, 24:00

HMS Version: 4.11

Executed: 20 January 2025, 15:58

Global Parameter Summary - Subbasin

Element Name	Location	
	Longitude Degrees	Latitude Degrees
SB - 17	-110.84	31.73
SB - 16	-110.83	31.73
SB - 15	-110.85	31.73
SB - 18	-110.84	31.73
SB - 22	-110.84	31.75
SB - 9	-110.84	31.75
SB - 12	-110.85	31.75
SB - 7	-110.86	31.75
SB - 27	-110.85	31.76
SB - 23	-110.86	31.77
SB - 4	-110.86	31.77
SB - 29	-110.87	31.77
SB - 10	-110.88	31.74
SB - 14	-110.88	31.74
SB - 13	-110.86	31.74
SB - 11	-110.86	31.75
SB - 19	-110.87	31.75
SB - 21	-110.88	31.75
SB - 24	-110.88	31.75
SB - 8	-110.87	31.75
SB - 6	-110.87	31.76
SB - 5	-110.87	31.76
SB - 26	-110.88	31.76
SB - 20	-110.88	31.77
SB - 30	-110.87	31.77
SB - 28	-110.88	31.77
SB - 31	-110.88	31.77
SB - 3	-110.85	31.78
SB - 2	-110.86	31.78
SB - 25	-110.87	31.78
SB - 1	-110.88	31.78

Area (Ml2)	
Element Name	Area (Ml2)
SB - 17	0.29
SB - 16	0.28
SB - 15	0.21
SB - 18	0.2
SB - 22	1.05
SB - 9	0.55
SB - 12	0.65
SB - 7	0.31
SB - 27	0.86
SB - 23	0.13
SB - 4	0.38
SB - 29	0.01
SB - 10	0.47
SB - 14	0.35
SB - 13	0.4
SB - 11	0.29
SB - 19	0.12
SB - 21	0.04
SB - 24	0.28
SB - 8	0.23
SB - 6	0.44
SB - 5	0.31
SB - 26	0.18
SB - 20	0.01
SB - 30	0.2
SB - 28	0.18
SB - 31	0.41
SB - 3	0.74
SB - 2	0.28
SB - 25	0.41
SB - 1	0.24

Downstream

Element Name	Downstream
SB - 17	J - 14
SB - 16	J - 14
SB - 15	J - 10
SB - 18	J - 10
SB - 22	J - 5
SB - 9	J - 5
SB - 12	J - 9
SB - 7	J - 9
SB - 27	J - 3
SB - 23	J - 3
SB - 4	J - 2
SB - 29	J - 2
SB - 10	J - 11
SB - 14	J - 11
SB - 13	J - 13
SB - 11	J - 13
SB - 19	J - 8
SB - 21	J - 8
SB - 24	J - 6
SB - 8	J - 6
SB - 6	J - 12
SB - 5	J - 12
SB - 26	J - 4
SB - 20	J - 4
SB - 30	J - 1
SB - 28	J - 1
SB - 31	Sink - 1
SB - 3	J - 7
SB - 2	J - 7
SB - 25	Medium Wash

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number
SB - 17	0	88.8
SB - 16	0	86.4
SB - 15	0	88.2
SB - 18	0	86.5
SB - 22	0	88.4
SB - 9	0	88.2
SB - 12	0	88.9
SB - 7	0	89.6
SB - 27	0	86.3
SB - 23	0	86.6
SB - 4	0	89.7
SB - 29	0	81.1
SB - 10	0	87.3
SB - 14	0	86.7
SB - 13	0	89
SB - 11	0	89.5
SB - 19	0	86.9
SB - 21	0	82.3
SB - 24	0	82.7
SB - 8	0	88.5
SB - 6	0	89.3
SB - 5	0	89.8
SB - 26	0	84.4
SB - 20	0	85
SB - 30	0	83.9
SB - 28	0	86.7
SB - 31	0	84.2
SB - 3	0	88
SB - 2	0	85
SB - 25	0	85.8
SB - 1	0	85.5

Transform: Scs		
Element Name	Lag	Unitgraph Type
SB - 17	10.79	Standard
SB - 16	7.54	Standard
SB - 15	9.18	Standard
SB - 18	8.12	Standard
SB - 22	16.31	Standard
SB - 9	17.23	Standard
SB - 12	23.36	Standard
SB - 7	12.72	Standard
SB - 27	18.98	Standard
SB - 23	11.82	Standard
SB - 4	16.15	Standard
SB - 29	3.27	Standard
SB - 10	16.66	Standard
SB - 14	33.79	Standard
SB - 13	14.12	Standard
SB - 11	14.46	Standard
SB - 19	12.64	Standard
SB - 21	6.2	Standard
SB - 24	11.31	Standard
SB - 8	17.71	Standard
SB - 6	18.63	Standard
SB - 5	16.66	Standard
SB - 26	10.19	Standard
SB - 20	3.99	Standard
SB - 30	8.18	Standard
SB - 28	8.99	Standard
SB - 31	26.25	Standard
SB - 3	29.77	Standard
SB - 2	21.65	Standard
SB - 25	20.79	Standard
SB - 1	29.7	Standard

Global Parameter Summary - Reach

Downstream	
Element Name	Downstream
RCH - 14	J - 10
RCH - 10	J - 5
RCH - 5	J - 3
RCH - 9	J - 3
RCH - 3	J - 2
RCH - 2	J - 1
RCH - 11	J - 8
RCH - 13	J - 8
RCH - 8	J - 6
RCH - 6	J - 4
RCH - 12	J - 4
RCH - 4	J - 1
RCH - 1	Sink - 1
RCH - 7	Medium Wash

Route: Kinematic Wave												
Element Name	Method	Channel	Length (FT)	Energy Slope (FT/FT)	Mannings n	Shape	Number of Subreaches	Width (FT)	Side Slope (FT/FT)	Initial Variable	Index Parameter Type	Ir F
RCH - 14	Kinematic Wave	Kinematic Wave	2187.23	0.15	0.22	Trapezoid	5	8	4	Combined Inflow	Index Flow	1
RCH - 10	Kinematic Wave	Kinematic Wave	11173.72	0.15	0.19	Trapezoid	5	10	4	Combined Inflow	Index Flow	1
RCH - 5	Kinematic Wave	Kinematic Wave	11542.83	0.05	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	3
RCH - 9	Kinematic Wave	Kinematic Wave	6275.53	0.06	0.11	Trapezoid	5	15	4	Combined Inflow	Index Flow	1
RCH - 3	Kinematic Wave	Kinematic Wave	727.7	0.03	0.08	Trapezoid	5	200	4	Combined Inflow	Index Flow	4
RCH - 2	Kinematic Wave	Kinematic Wave	4383.33	0.03	0.11	Trapezoid	5	400	4	Combined Inflow	Index Flow	4
RCH - 11	Kinematic Wave	Kinematic Wave	1004.26	0.05	0.13	Trapezoid	5	80	4	Combined Inflow	Index Flow	8
RCH - 13	Kinematic Wave	Kinematic Wave	6298.97	0.1	0.17	Trapezoid	5	90	4	Combined Inflow	Index Flow	1
RCH - 8	Kinematic Wave	Kinematic Wave	3385.93	0.04	0.12	Trapezoid	5	130	4	Combined Inflow	Index Flow	2
RCH - 6	Kinematic Wave	Kinematic Wave	5289.14	0.03	0.1	Trapezoid	5	250	4	Combined Inflow	Index Flow	2
RCH - 12	Kinematic Wave	Kinematic Wave	1501.96	0.03	0.09	Trapezoid	5	80	4	Combined Inflow	Index Flow	1
RCH - 4	Kinematic Wave	Kinematic Wave	1941.67	0.03	0.11	Trapezoid	5	300	4	Combined Inflow	Index Flow	2
RCH - 1	Kinematic Wave	Kinematic Wave	3145.34	0.02	0.1	Trapezoid	5	400	4	Combined Inflow	Index Flow	6
RCH - 7	Kinematic Wave	Kinematic Wave	5200.73	0.02	0.22	Trapezoid	5	300	4	Combined Inflow	Index Flow	10

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SB - 17	0.29	852.38	31Dec2024, 12:04	3.96
SB - 16	0.28	895.86	31Dec2024, 12:01	3.72
J - 14	0.57	1718.83	31Dec2024, 12:02	3.84
RCH - 14	0.57	1710.9	31Dec2024, 12:06	3.82
SB - 15	0.21	653.47	31Dec2024, 12:02	3.9
SB - 18	0.2	632.63	31Dec2024, 12:01	3.73
J - 10	0.98	2888.83	31Dec2024, 12:04	3.82
RCH - 10	0.98	2845.55	31Dec2024, 12:20	3.74
SB - 22	1.05	2512.73	31Dec2024, 12:09	3.92
SB - 9	0.55	1275.02	31Dec2024, 12:09	3.89
J - 5	2.57	5613.84	31Dec2024, 12:17	3.84
RCH - 5	2.57	5530.09	31Dec2024, 12:34	3.72
SB - 12	0.65	1275.23	31Dec2024, 12:15	3.96
SB - 7	0.31	861.18	31Dec2024, 12:05	4.05
J - 9	0.96	1944.27	31Dec2024, 12:09	3.99
RCH - 9	0.96	1940.06	31Dec2024, 12:18	3.94
SB - 27	0.86	1797.53	31Dec2024, 12:11	3.7
SB - 23	0.13	349.3	31Dec2024, 12:05	3.73
J - 3	4.52	7647.82	31Dec2024, 12:34	3.76
RCH - 3	4.52	7646.29	31Dec2024, 12:34	3.75
SB - 4	0.38	940.64	31Dec2024, 12:08	4.05
SB - 29	0.01	19.97	31Dec2024, 11:56	3.2

J - 2	4.91	7917.36	31Dec2024, 12:34	3.78
RCH - 2	4.91	7865.62	31Dec2024, 12:43	3.71
SB - 10	0.47	1077.58	31Dec2024, 12:09	3.8
SB - 14	0.35	498.94	31Dec2024, 12:26	3.72
J - 11	0.81	1416.81	31Dec2024, 12:11	3.77
RCH - 11	0.81	1415.65	31Dec2024, 12:13	3.75
SB - 13	0.4	1048.3	31Dec2024, 12:07	3.98
SB - 11	0.29	761.68	31Dec2024, 12:07	4.03
J - 13	0.69	1809.98	31Dec2024, 12:07	4
RCH - 13	0.69	1798.97	31Dec2024, 12:19	3.91
SB - 19	0.12	323.15	31Dec2024, 12:05	3.76
SB - 21	0.04	115.63	31Dec2024, 12:00	3.31
J - 8	1.66	3310.74	31Dec2024, 12:17	3.81
RCH - 8	1.66	3300.37	31Dec2024, 12:23	3.76
SB - 24	0.28	703.18	31Dec2024, 12:04	3.35
SB - 8	0.23	530.4	31Dec2024, 12:10	3.92
J - 6	2.17	3829.47	31Dec2024, 12:22	3.73
RCH - 6	2.17	3809.39	31Dec2024, 12:33	3.65
SB - 6	0.44	999.06	31Dec2024, 12:11	4.01
SB - 5	0.31	767.36	31Dec2024, 12:09	4.06
J - 12	0.76	1760.99	31Dec2024, 12:10	4.03
RCH - 12	0.76	1758.36	31Dec2024, 12:13	4.01
SB - 26	0.18	490.76	31Dec2024, 12:03	3.51
SB - 20	0.01	47.27	31Dec2024, 11:57	3.58
J - 4	3.12	4673.44	31Dec2024, 12:32	3.73
RCH - 4	3.12	4657.94	31Dec2024, 12:36	3.7
SB - 30	0.2	589.44	31Dec2024, 12:01	3.47
SB - 28	0.18	539.09	31Dec2024, 12:02	3.75
J - 1	8.4	12199.92	31Dec2024, 12:41	3.7
RCH - 1	8.4	12182.66	31Dec2024, 12:46	3.67
SB - 31	0.41	661.84	31Dec2024, 12:18	3.48
Sink - 1	8.82	12476.11	31Dec2024, 12:46	3.66
SB - 3	0.74	1201.73	31Dec2024, 12:22	3.86
SB - 2	0.28	522.28	31Dec2024, 12:14	3.56
J - 7	1.02	1677.75	31Dec2024, 12:19	3.78
RCH - 7	1.02	1668.18	31Dec2024, 12:47	3.57
SB - 25	0.41	798.1	31Dec2024, 12:13	3.64
Medium Wash	1.43	1886.82	31Dec2024, 12:46	3.59
SB - 1	0.24	370.64	31Dec2024, 12:22	3.6

Subbasin: SB - 17

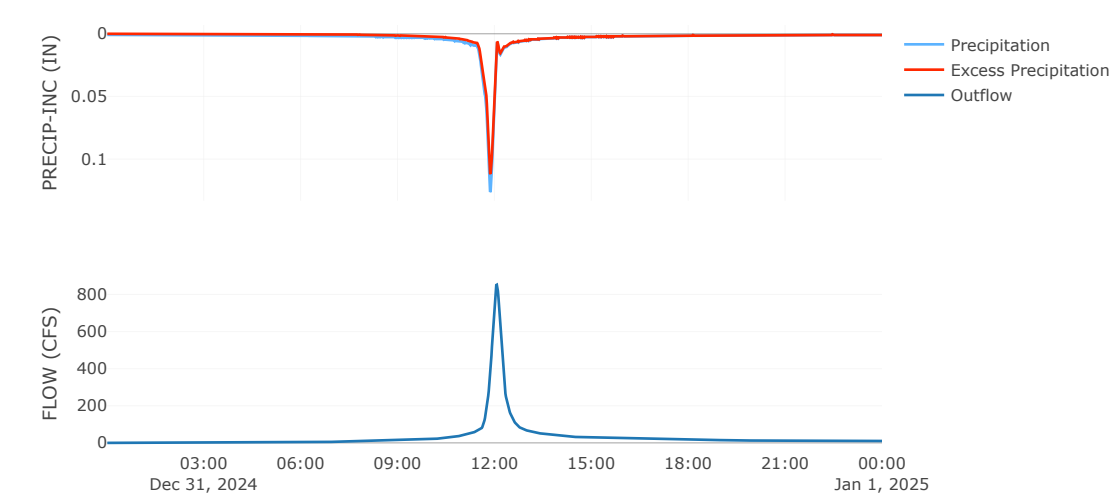
Area (MI2) : 0.29
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 14

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.8

Transform: Scs	
Lag	10.79
Unitgraph Type	Standard

Results: SB - 17	
Peak Discharge (CFS)	852.38
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	3.96
Precipitation Volume (AC - FT)	80.14
Loss Volume (AC - FT)	19.27
Excess Volume (AC - FT)	60.87
Direct Runoff Volume (AC - FT)	60.67
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 16

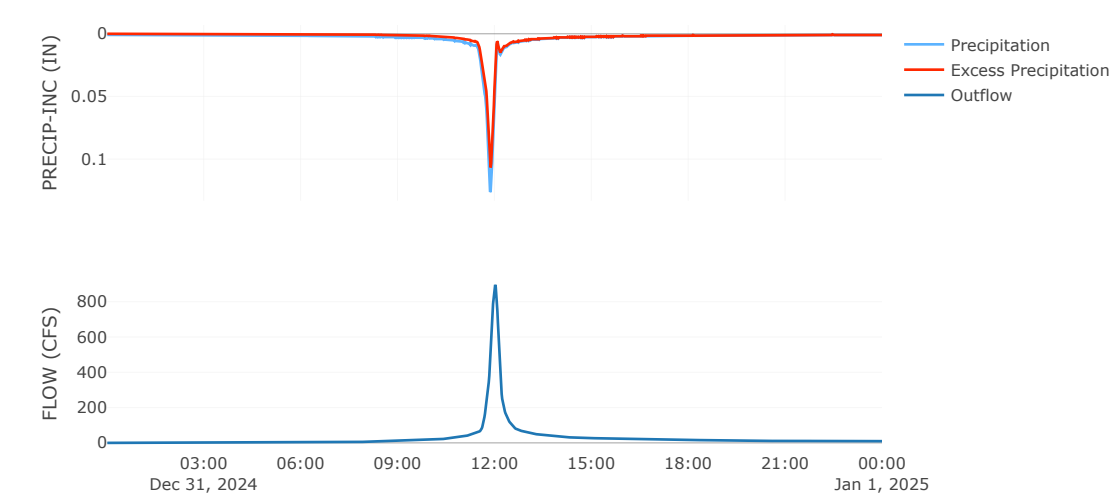
Area (MI2) : 0.28
Latitude Degrees : 31.73
Longitude Degrees : -110.83
Downstream : J - 14

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.4

Transform: Scs	
Lag	7.54
Unitgraph Type	Standard

Results: SB - 16	
Peak Discharge (CFS)	895.86
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	3.72
Precipitation Volume (AC - FT)	77.85
Loss Volume (AC - FT)	22.41
Excess Volume (AC - FT)	55.43
Direct Runoff Volume (AC - FT)	55.3
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

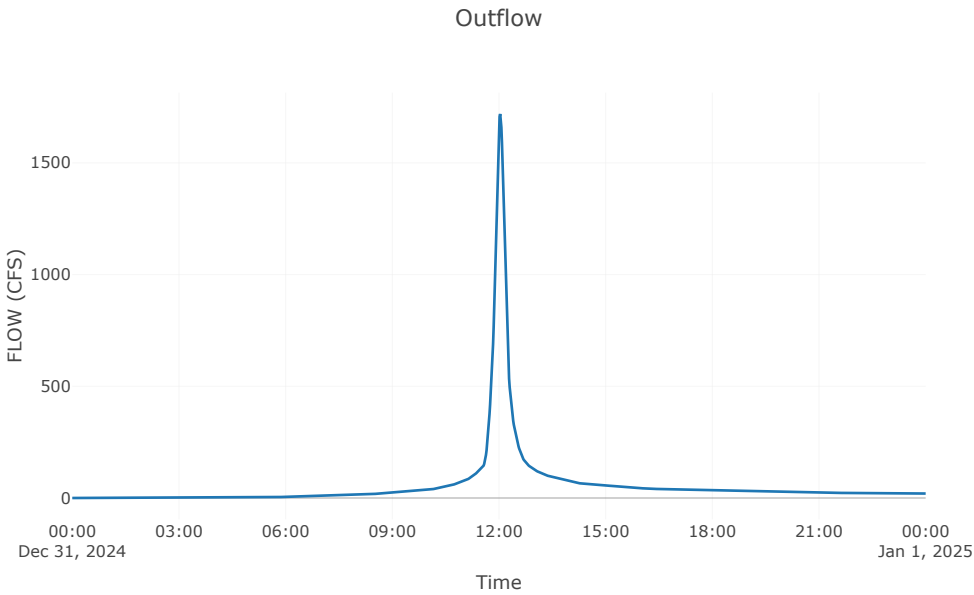


Junction: J - 14

Downstream : RCH - 14

Results: J - 14

Peak Discharge (CFS)	1718.83
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	3.84

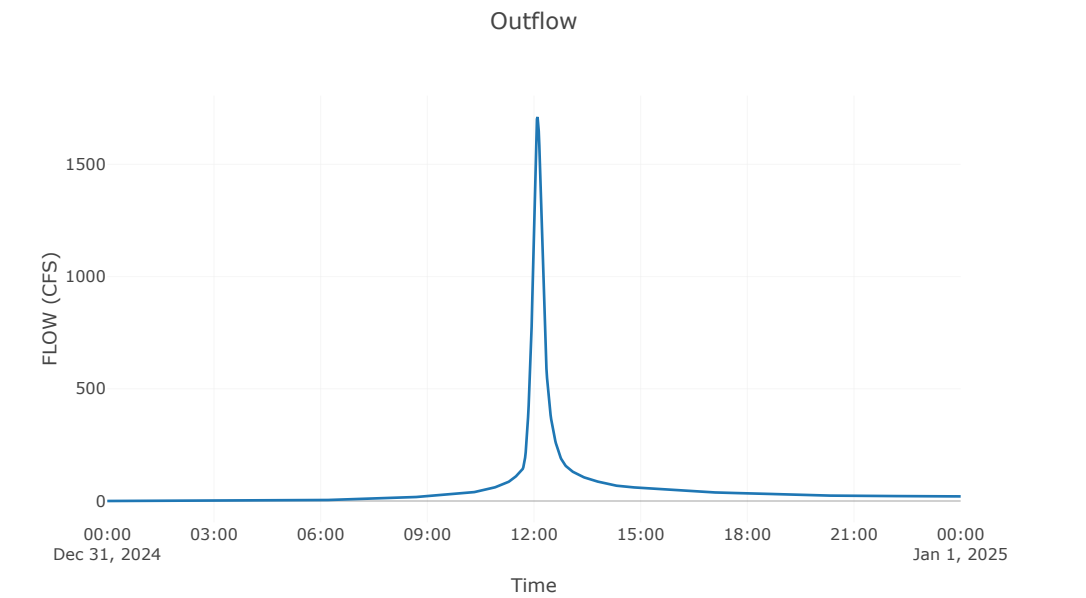


Reach: RCH - 14

Downstream : J - 10

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	2187.23
Energy Slope (FT/FT)	0.15
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	8
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1081

Results: RCH - 14	
Peak Discharge (CFS)	1710.9
Time of Peak Discharge	31Dec2024, 12:06
Volume (IN)	3.82
Peak Inflow (CFS)	1718.83
Inflow Volume (AC - FT)	115.97



Subbasin: SB - 15

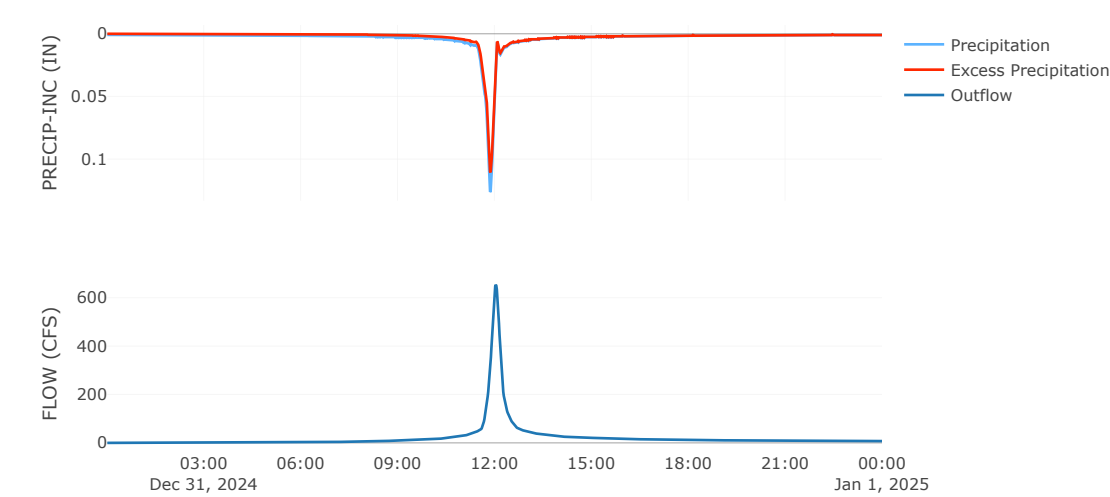
Area (MI2) : 0.21
Latitude Degrees : 31.73
Longitude Degrees : -110.85
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	9.18
Unitgraph Type	Standard

Results: SB - 15	
Peak Discharge (CFS)	653.47
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	3.9
Precipitation Volume (AC - FT)	58.3
Loss Volume (AC - FT)	14.72
Excess Volume (AC - FT)	43.58
Direct Runoff Volume (AC - FT)	43.46
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 18

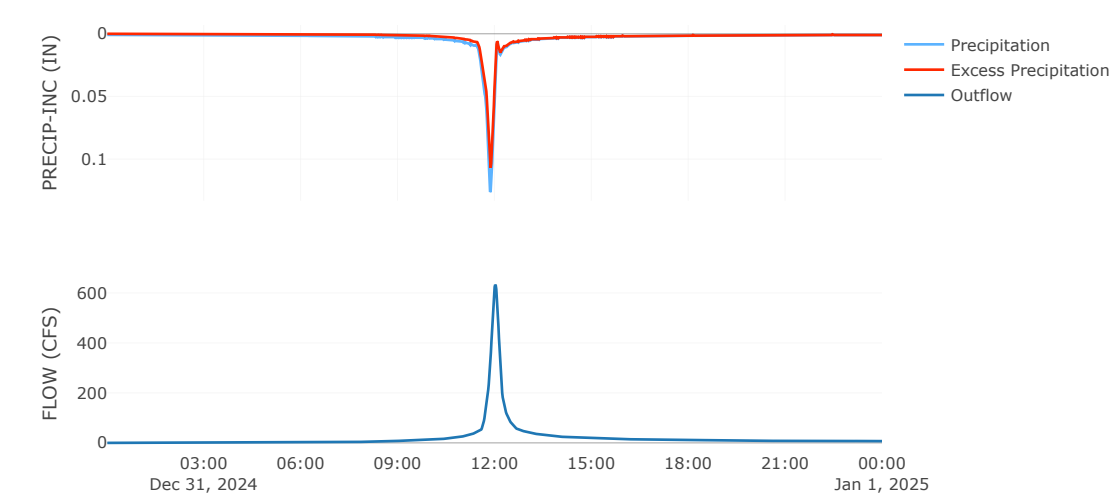
Area (MI2) : 0.2
Latitude Degrees : 31.73
Longitude Degrees : -110.84
Downstream : J - 10

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.5

Transform: Scs	
Lag	8.12
Unitgraph Type	Standard

Results: SB - 18	
Peak Discharge (CFS)	632.63
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	3.73
Precipitation Volume (AC - FT)	56.12
Loss Volume (AC - FT)	16.05
Excess Volume (AC - FT)	40.07
Direct Runoff Volume (AC - FT)	39.97
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



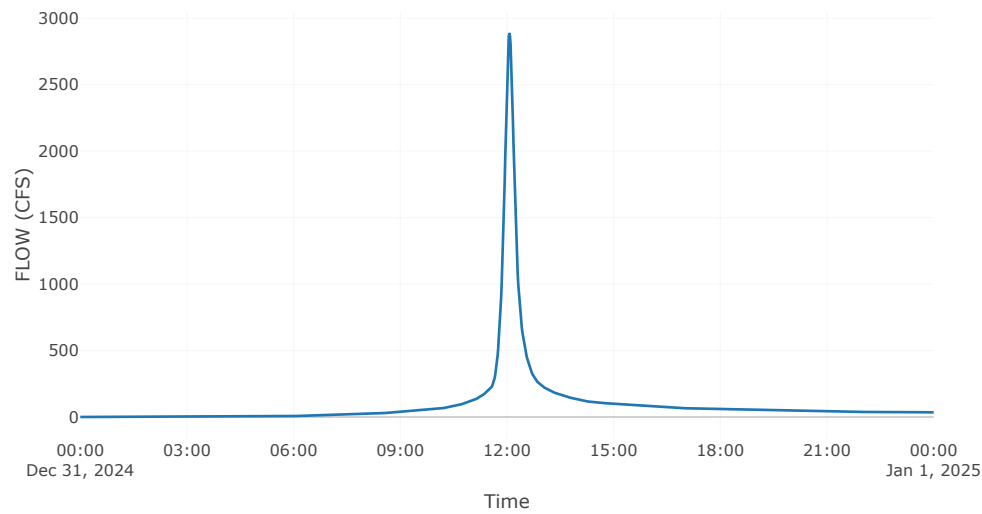
Junction: J - 10

Downstream : RCH - 10

Results: J - 10

Peak Discharge (CFS)	2888.83
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	3.82

Outflow

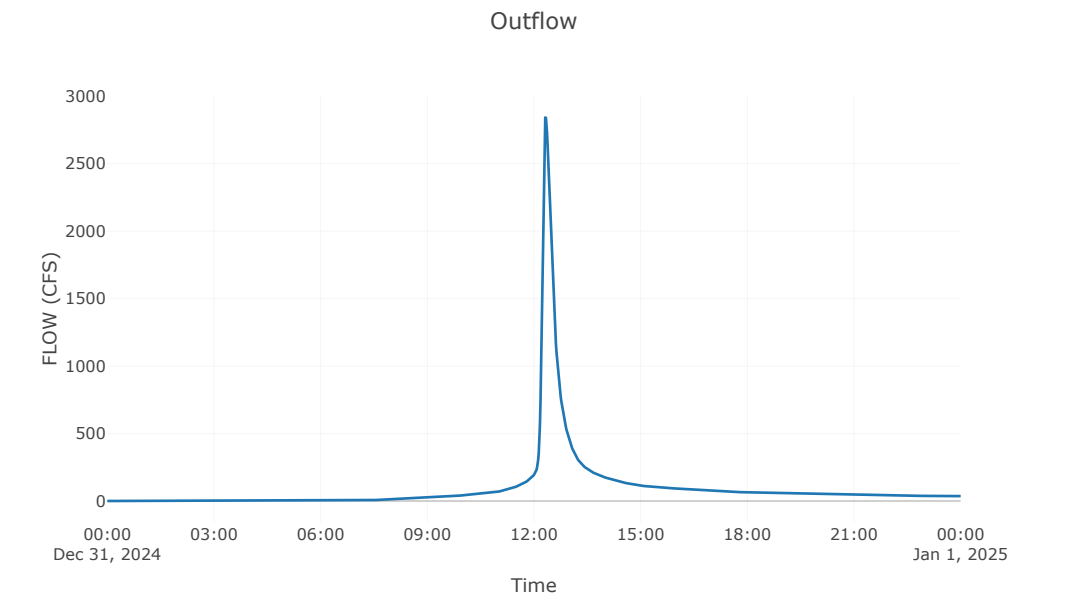


Reach: RCH - 10

Downstream : J - 5

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11173.72
Energy Slope (FT/FT)	0.15
Mannings n	0.19
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	10
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1793

Results: RCH - 10	
Peak Discharge (CFS)	2845.55
Time of Peak Discharge	31Dec2024, 12:20
Volume (IN)	3.74
Peak Inflow (CFS)	2888.83
Inflow Volume (AC - FT)	198.72



Subbasin: SB - 22

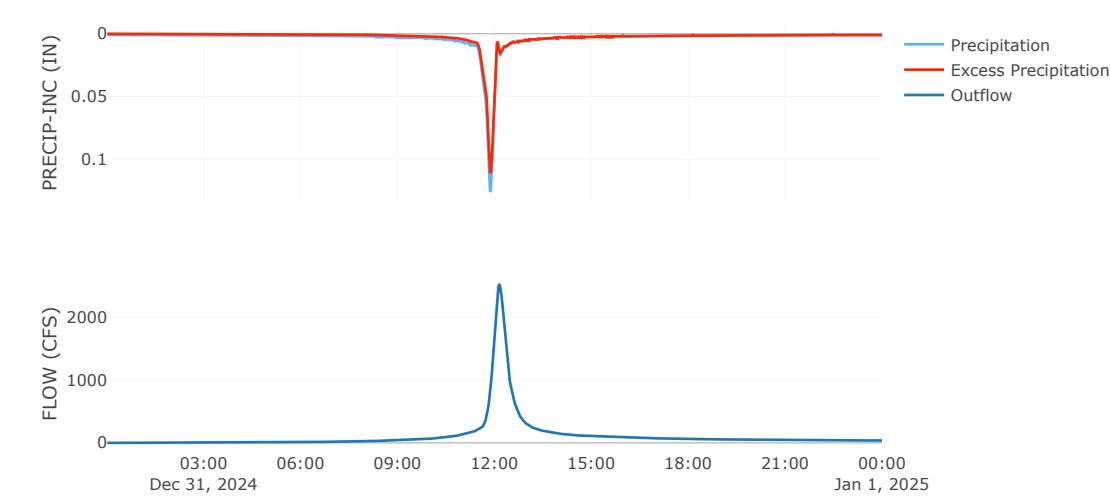
Area (MI2) : 1.05
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.4

Transform: Scs	
Lag	16.31
Unitgraph Type	Standard

Results: SB - 22	
Peak Discharge (CFS)	2512.73
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.92
Precipitation Volume (AC - FT)	292.59
Loss Volume (AC - FT)	72.69
Excess Volume (AC - FT)	219.9
Direct Runoff Volume (AC - FT)	218.8
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 9

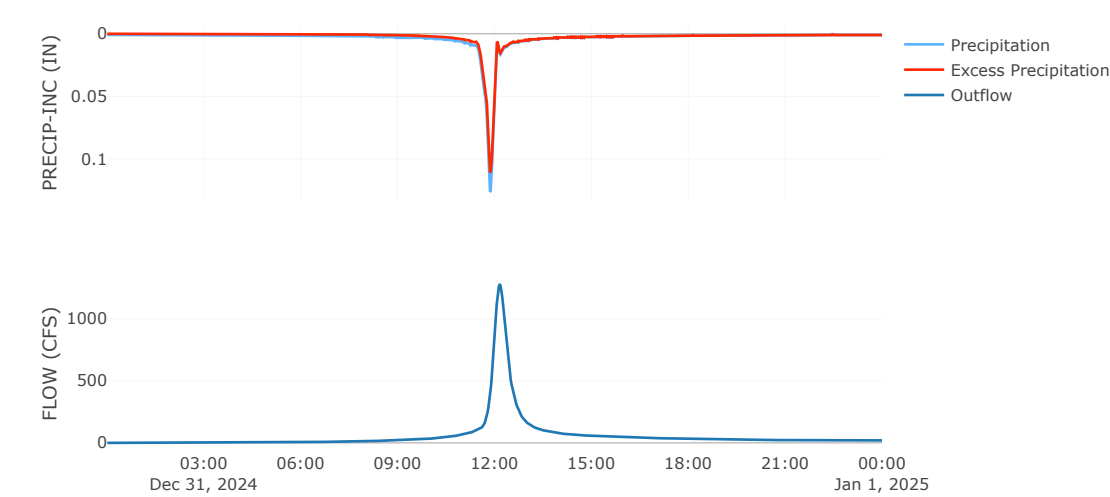
Area (MI2) : 0.55
Latitude Degrees : 31.75
Longitude Degrees : -110.84
Downstream : J - 5

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.2

Transform: Scs	
Lag	17.23
Unitgraph Type	Standard

Results: SB - 9	
Peak Discharge (CFS)	1275.02
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.89
Precipitation Volume (AC - FT)	153.9
Loss Volume (AC - FT)	38.85
Excess Volume (AC - FT)	115.05
Direct Runoff Volume (AC - FT)	114.45
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



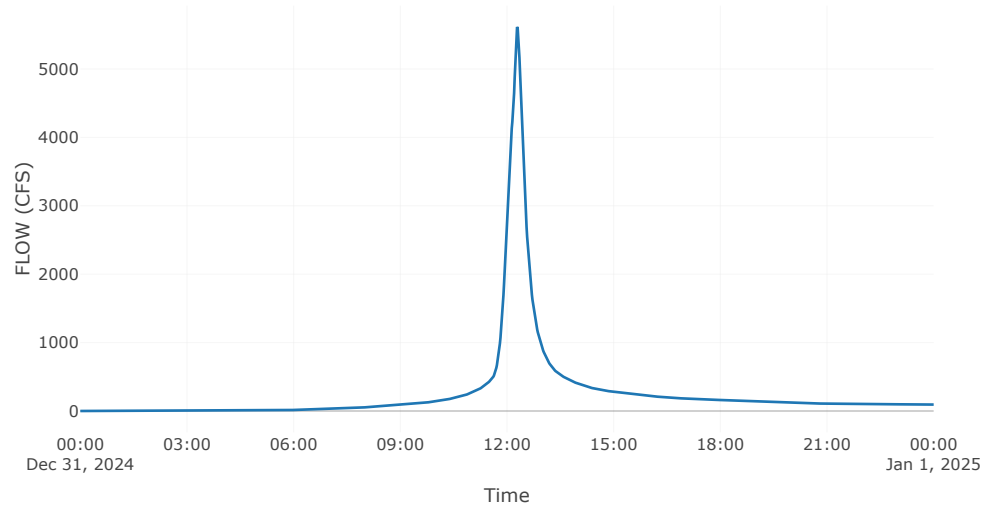
Junction: J - 5

Downstream : RCH - 5

Results: J - 5

Peak Discharge (CFS)	5613.84
Time of Peak Discharge	31Dec2024, 12:17
Volume (IN)	3.84

Outflow

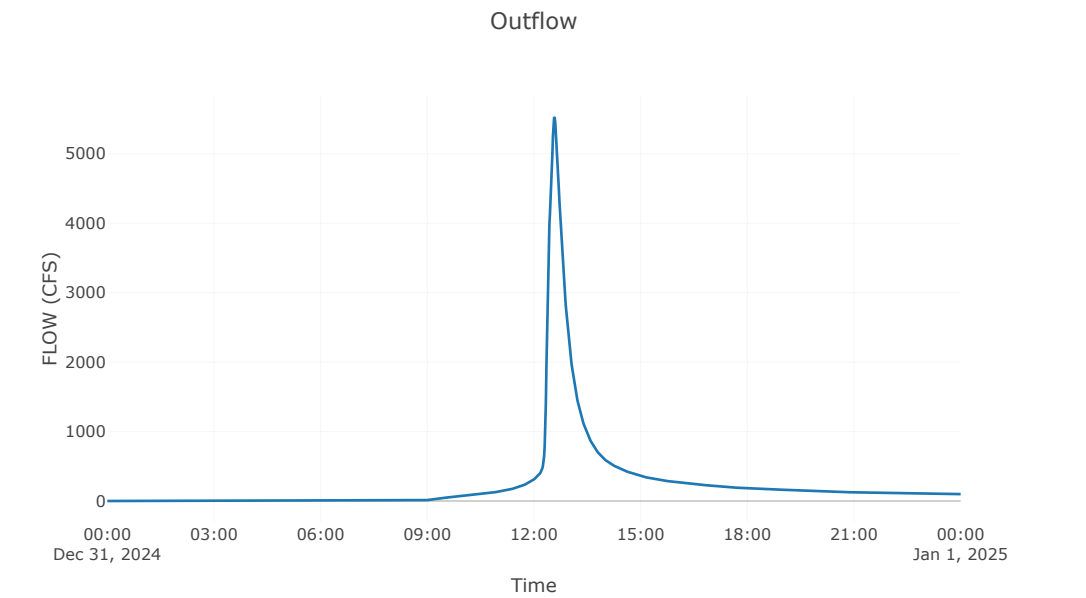


Reach: RCH - 5

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	11542.83
Energy Slope (FT/FT)	0.05
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	3272

Results: RCH - 5	
Peak Discharge (CFS)	5530.09
Time of Peak Discharge	31Dec2024, 12:34
Volume (IN)	3.72
Peak Inflow (CFS)	5613.84
Inflow Volume (AC - FT)	527.67



Subbasin: SB - 12

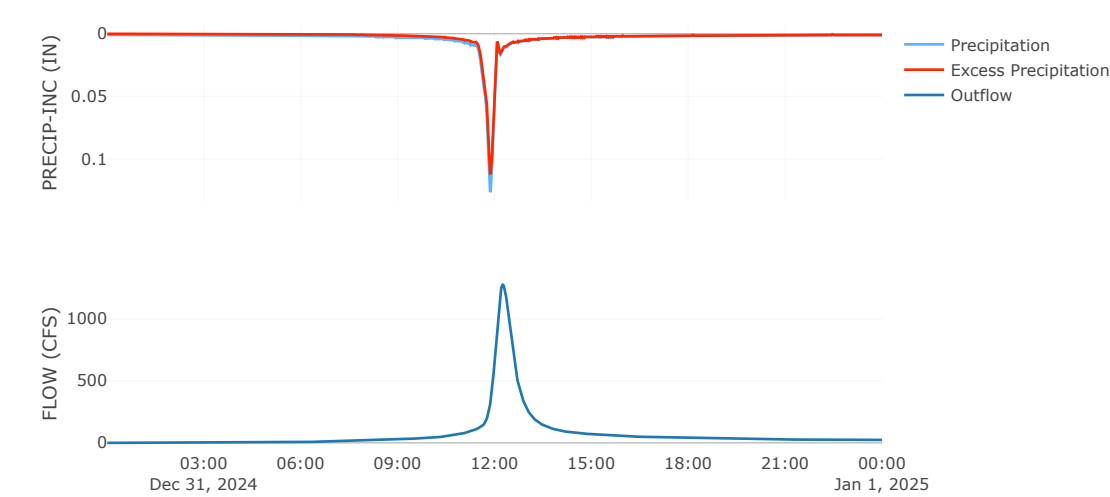
Area (MI2) : 0.65
Latitude Degrees : 31.75
Longitude Degrees : -110.85
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.9

Transform: Scs	
Lag	23.36
Unitgraph Type	Standard

Results: SB - 12	
Peak Discharge (CFS)	1275.23
Time of Peak Discharge	31Dec2024, 12:15
Volume (IN)	3.96
Precipitation Volume (AC - FT)	182.66
Loss Volume (AC - FT)	43.55
Excess Volume (AC - FT)	139.11
Direct Runoff Volume (AC - FT)	138.13
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 7

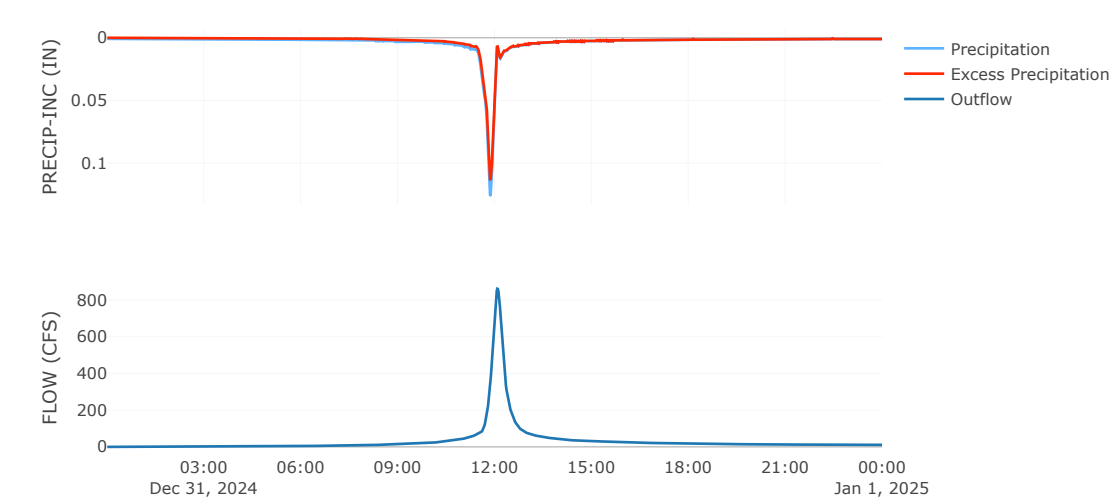
Area (MI2) : 0.31
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 9

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.6

Transform: Scs	
Lag	12.72
Unitgraph Type	Standard

Results: SB - 7	
Peak Discharge (CFS)	861.18
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	4.05
Precipitation Volume (AC - FT)	85.83
Loss Volume (AC - FT)	19.25
Excess Volume (AC - FT)	66.58
Direct Runoff Volume (AC - FT)	66.33
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

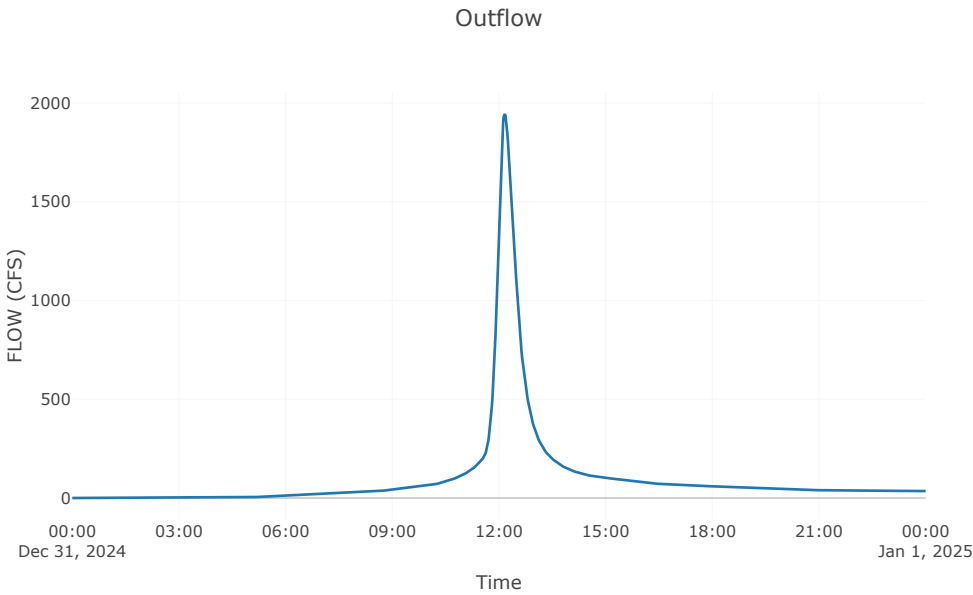


Junction: J - 9

Downstream : RCH - 9

Results: J - 9

Peak Discharge (CFS)	1944.27
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.99

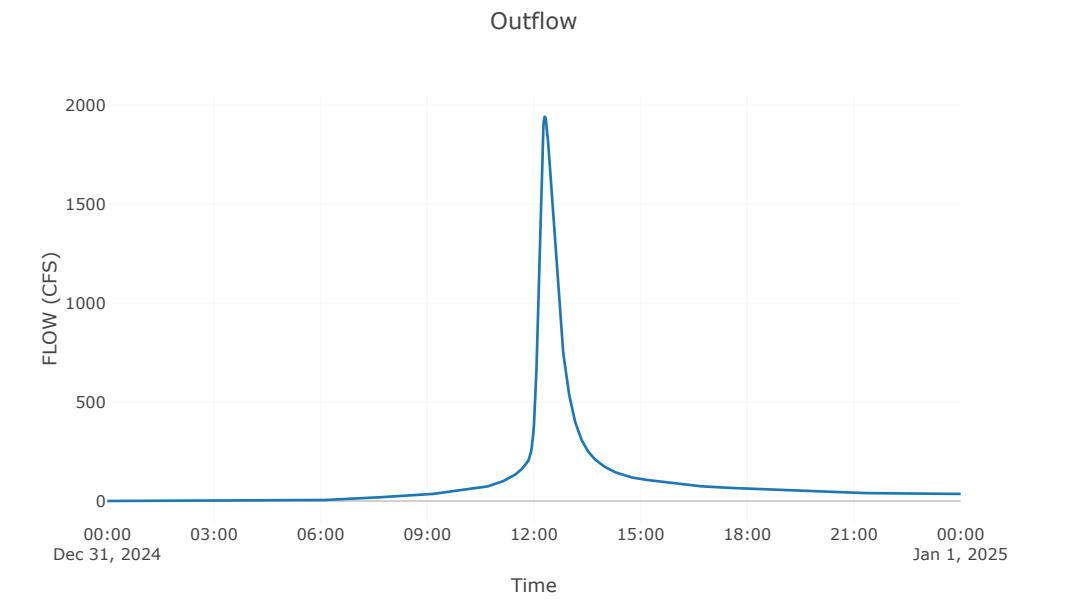


Reach: RCH - 9

Downstream : J - 3

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6275.53
Energy Slope (FT/FT)	0.06
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	15
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1237

Results: RCH - 9	
Peak Discharge (CFS)	1940.06
Time of Peak Discharge	31Dec2024, 12:18
Volume (IN)	3.94
Peak Inflow (CFS)	1944.27
Inflow Volume (AC - FT)	204.45



Subbasin: SB - 27

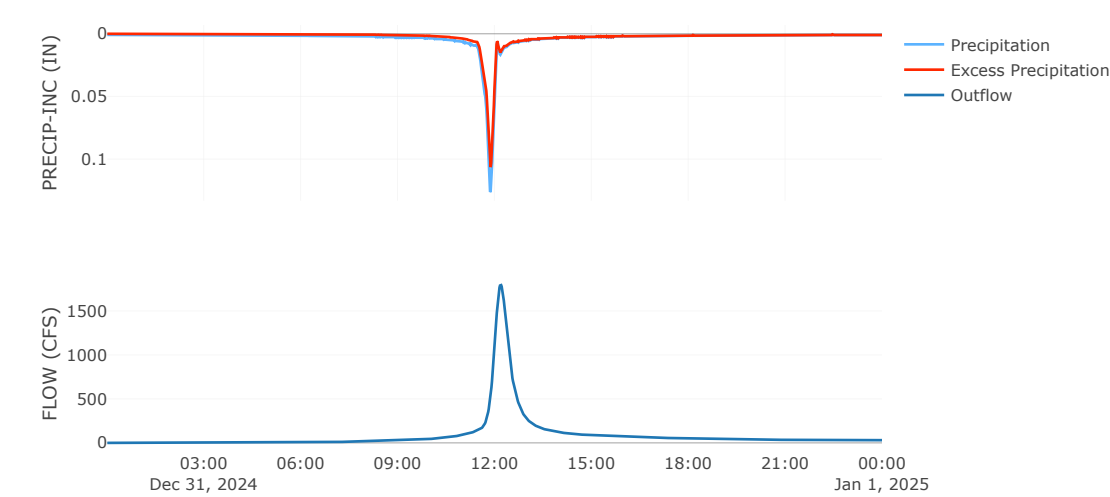
Area (MI2) : 0.86
Latitude Degrees : 31.76
Longitude Degrees : -110.85
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.3

Transform: Scs	
Lag	18.98
Unitgraph Type	Standard

Results: SB - 27	
Peak Discharge (CFS)	1797.53
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	3.7
Precipitation Volume (AC - FT)	239.93
Loss Volume (AC - FT)	69.55
Excess Volume (AC - FT)	170.38
Direct Runoff Volume (AC - FT)	169.35
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 23

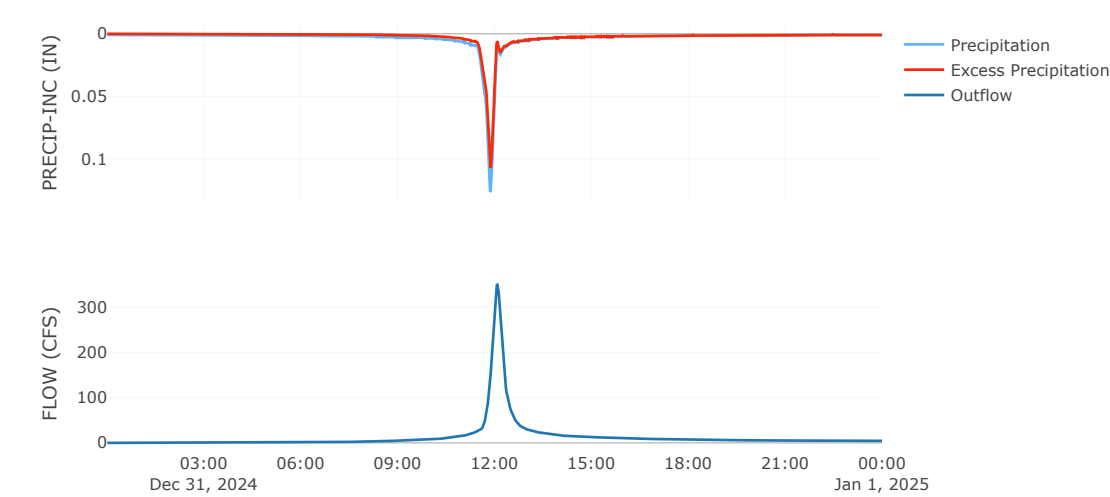
Area (MI2) : 0.13
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 3

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.6

Transform: Scs	
Lag	11.82
Unitgraph Type	Standard

Results: SB - 23	
Peak Discharge (CFS)	349.3
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	3.73
Precipitation Volume (AC - FT)	35.85
Loss Volume (AC - FT)	10.18
Excess Volume (AC - FT)	25.67
Direct Runoff Volume (AC - FT)	25.57
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



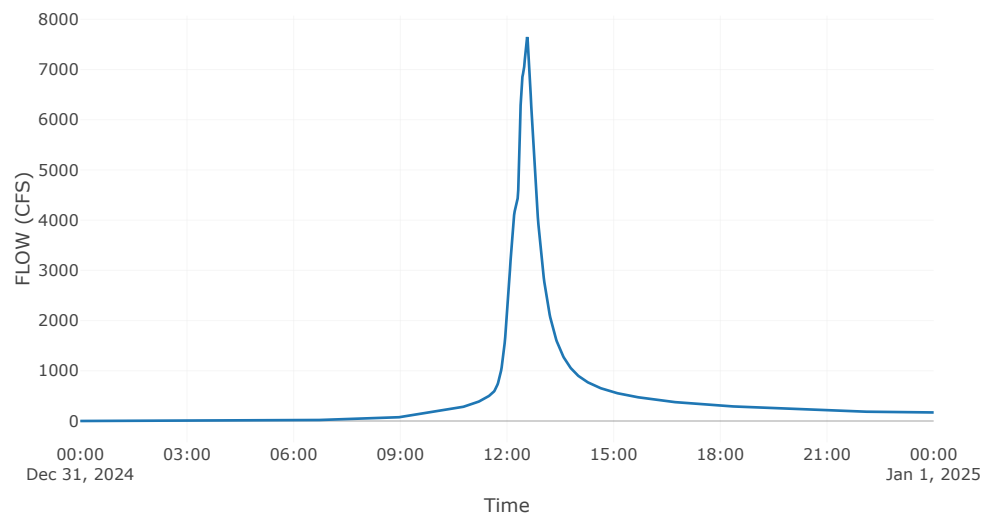
Junction: J - 3

Downstream : RCH - 3

Results: J - 3

Peak Discharge (CFS)	7647.82
Time of Peak Discharge	31Dec2024, 12:34
Volume (IN)	3.76

Outflow

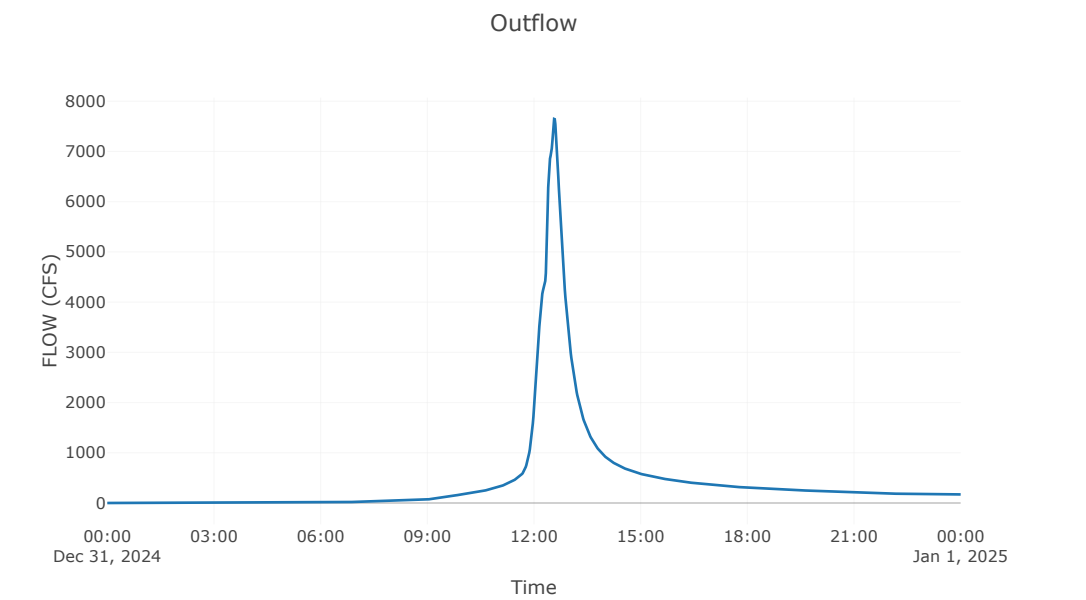


Reach: RCH - 3

Downstream : J - 2

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	727.7
Energy Slope (FT/FT)	0.03
Mannings n	0.08
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	200
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4227

Results: RCH - 3	
Peak Discharge (CFS)	7646.29
Time of Peak Discharge	31Dec2024, 12:34
Volume (IN)	3.75
Peak Inflow (CFS)	7647.82
Inflow Volume (AC - FT)	907.28



Subbasin: SB - 4

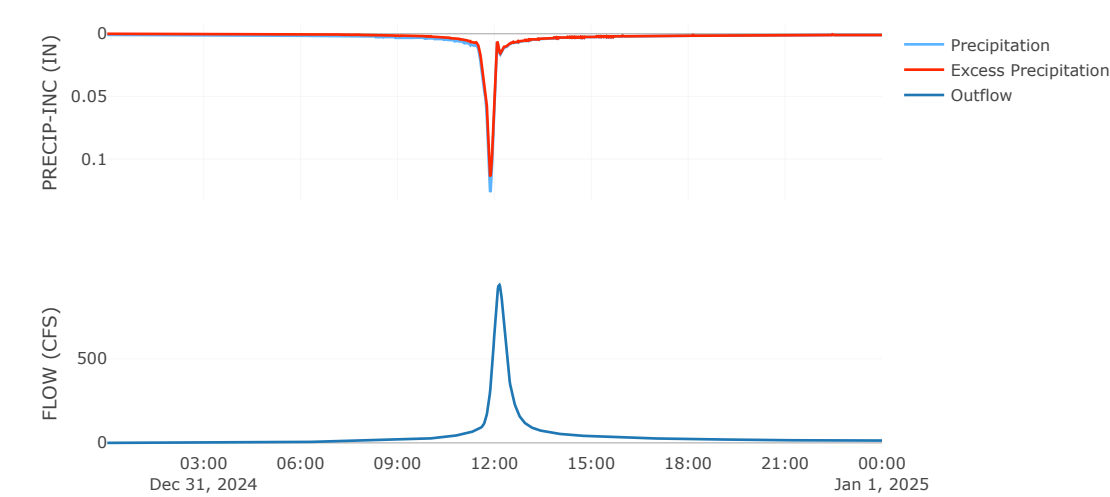
Area (MI2) : 0.38
Latitude Degrees : 31.77
Longitude Degrees : -110.86
Downstream : J - 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.7

Transform: Scs	
Lag	16.15
Unitgraph Type	Standard

Results: SB - 4	
Peak Discharge (CFS)	940.64
Time of Peak Discharge	31Dec2024, 12:08
Volume (IN)	4.05
Precipitation Volume (AC - FT)	106.02
Loss Volume (AC - FT)	23.57
Excess Volume (AC - FT)	82.45
Direct Runoff Volume (AC - FT)	82.06
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 29

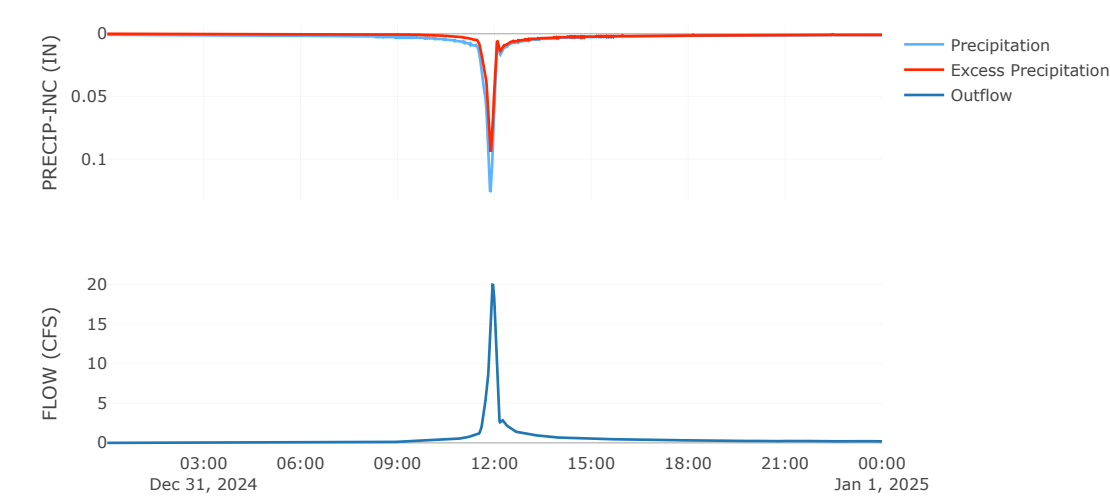
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	81.1

Transform: Scs	
Lag	3.27
Unitgraph Type	Standard

Results: SB - 29	
Peak Discharge (CFS)	19.97
Time of Peak Discharge	31Dec2024, 11:56
Volume (IN)	3.2
Precipitation Volume (AC - FT)	1.68
Loss Volume (AC - FT)	0.65
Excess Volume (AC - FT)	1.03
Direct Runoff Volume (AC - FT)	1.02
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



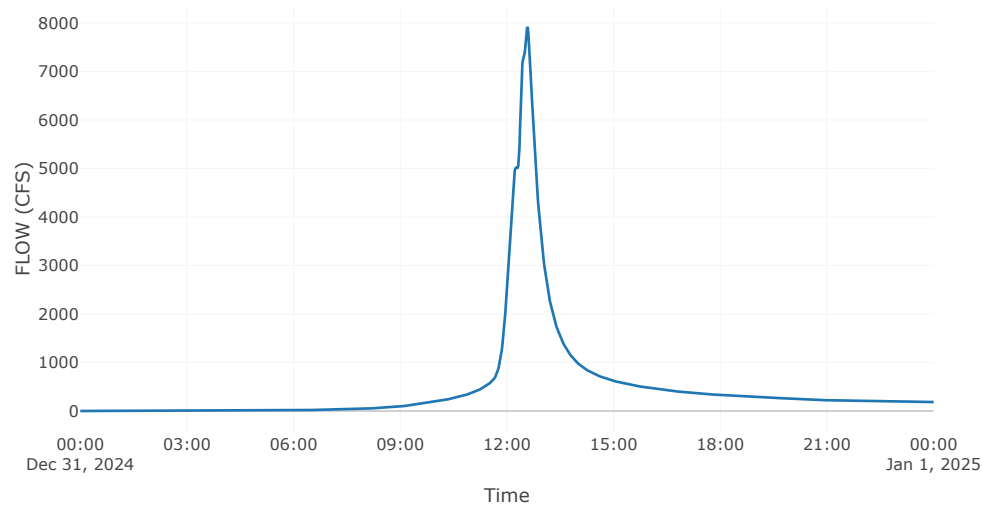
Junction: J - 2

Downstream : RCH - 2

Results: J - 2

Peak Discharge (CFS)	7917.36
Time of Peak Discharge	31Dec2024, 12:34
Volume (IN)	3.78

Outflow

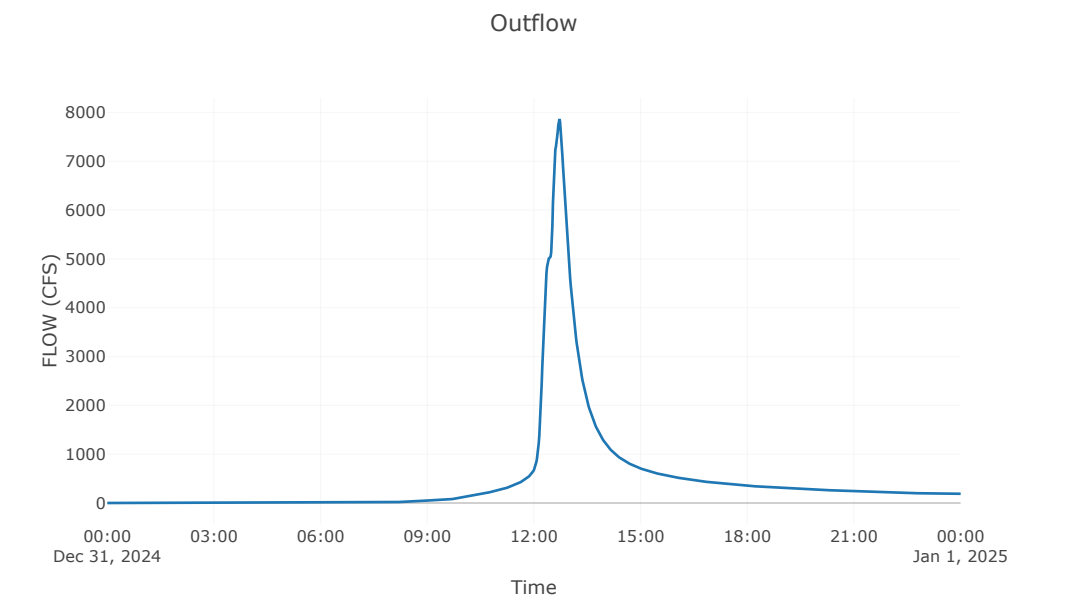


Reach: RCH - 2

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	4383.33
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	4346

Results: RCH - 2	
Peak Discharge (CFS)	7865.62
Time of Peak Discharge	31Dec2024, 12:43
Volume (IN)	3.71
Peak Inflow (CFS)	7917.36
Inflow Volume (AC - FT)	988.85



Subbasin: SB - 10

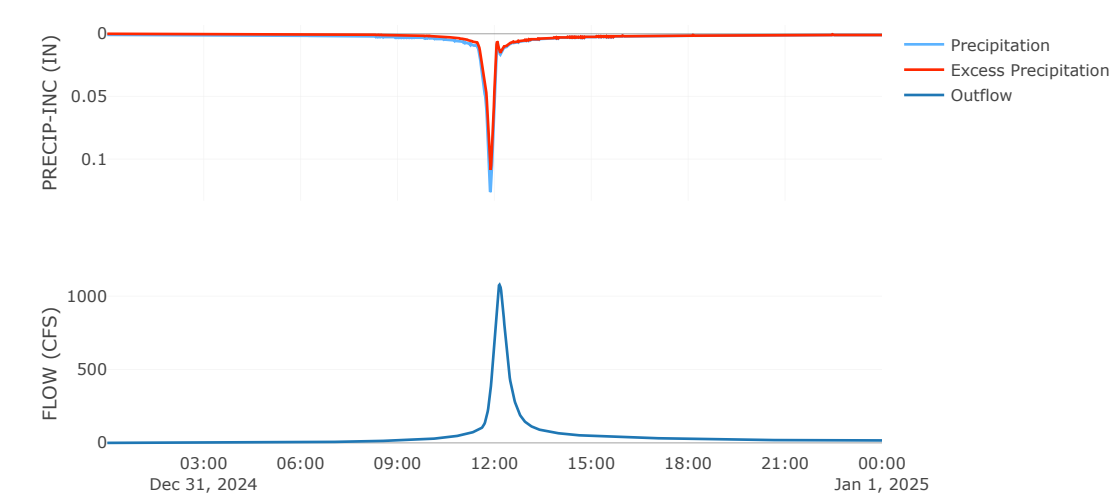
Area (MI2) : 0.47
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	87.3

Transform: Scs	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 10	
Peak Discharge (CFS)	1077.58
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	3.8
Precipitation Volume (AC - FT)	130.06
Loss Volume (AC - FT)	35.15
Excess Volume (AC - FT)	94.91
Direct Runoff Volume (AC - FT)	94.41
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 14

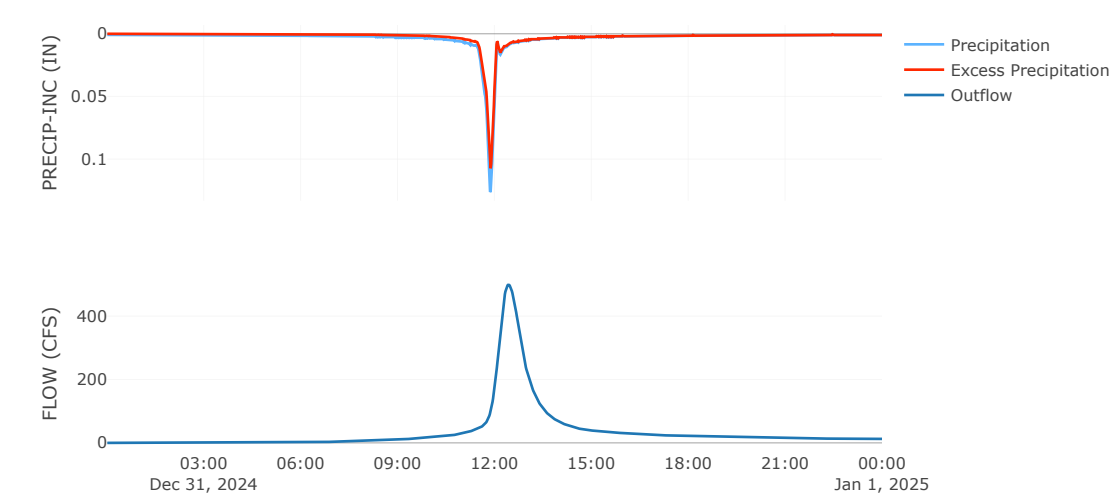
Area (MI2) : 0.35
Latitude Degrees : 31.74
Longitude Degrees : -110.88
Downstream : J - 11

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	33.79
Unitgraph Type	Standard

Results: SB - 14	
Peak Discharge (CFS)	498.94
Time of Peak Discharge	31Dec2024, 12:26
Volume (IN)	3.72
Precipitation Volume (AC - FT)	96.69
Loss Volume (AC - FT)	27.27
Excess Volume (AC - FT)	69.42
Direct Runoff Volume (AC - FT)	68.67
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

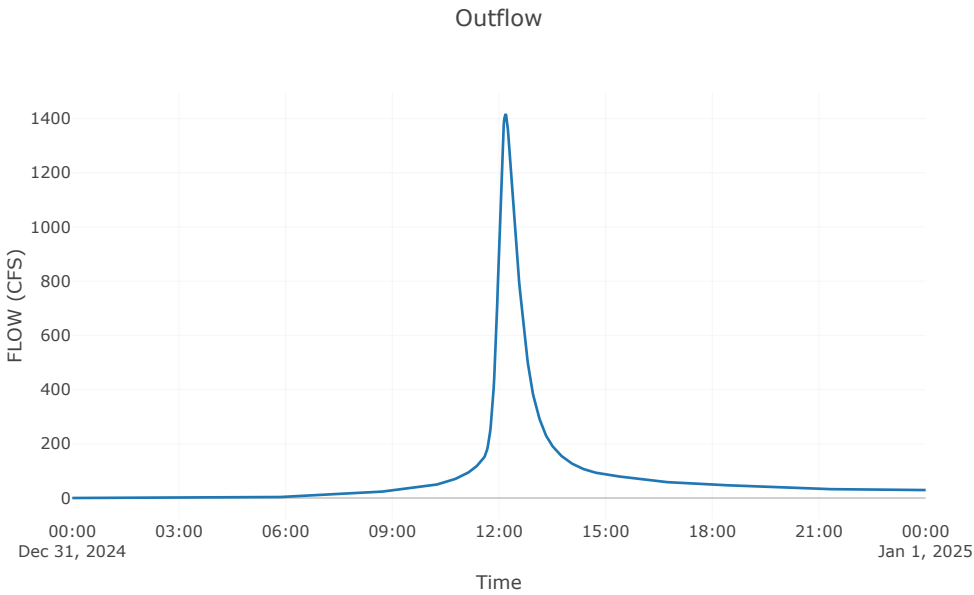


Junction: J - 11

Downstream : RCH - 11

Results: J - 11

Peak Discharge (CFS)	1416.81
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	3.77

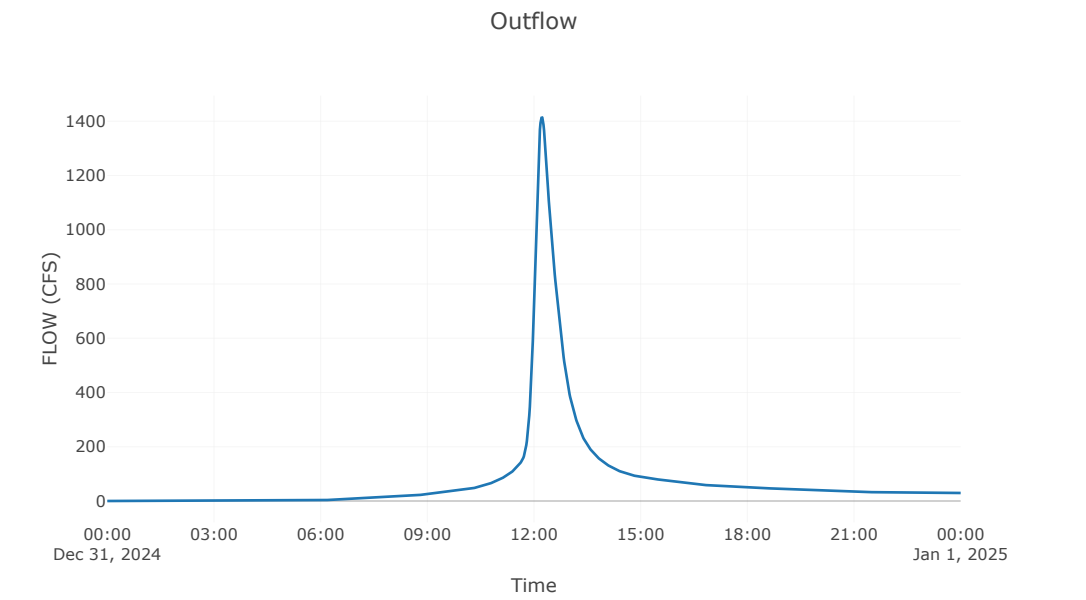


Reach: RCH - II

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1004.26
Energy Slope (FT/FT)	0.05
Mannings n	0.13
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	877

Results: RCH - II	
Peak Discharge (CFS)	1415.65
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	3.75
Peak Inflow (CFS)	1416.81
Inflow Volume (AC - FT)	163.09



Subbasin: SB - 13

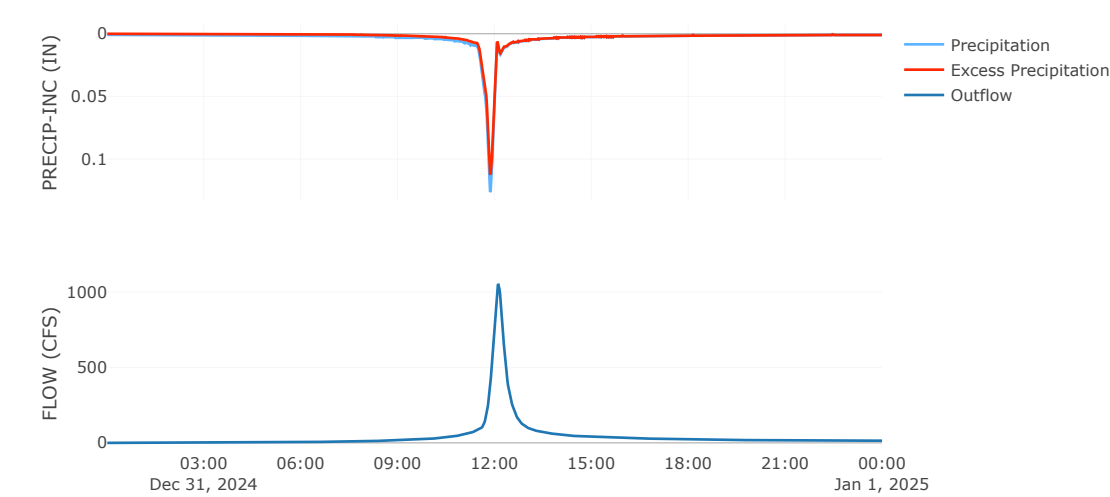
Area (MI2) : 0.4
Latitude Degrees : 31.74
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89

Transform: Scs	
Lag	14.12
Unitgraph Type	Standard

Results: SB - 13	
Peak Discharge (CFS)	1048.3
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	3.98
Precipitation Volume (AC - FT)	111.46
Loss Volume (AC - FT)	26.35
Excess Volume (AC - FT)	85.11
Direct Runoff Volume (AC - FT)	84.75
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 11

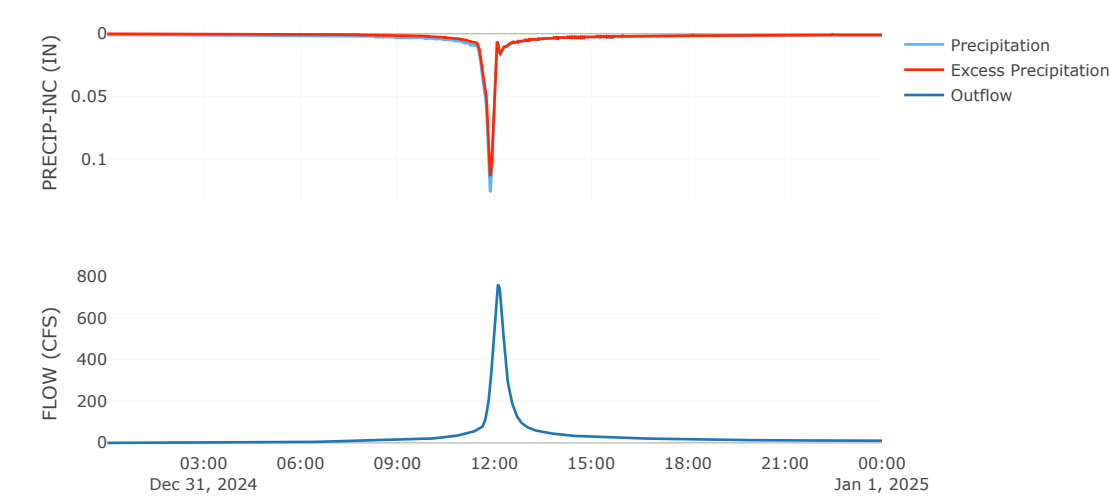
Area (MI2) : 0.29
Latitude Degrees : 31.75
Longitude Degrees : -110.86
Downstream : J - 13

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.5

Transform: Scs	
Lag	14.46
Unitgraph Type	Standard

Results: SB - 11	
Peak Discharge (CFS)	761.68
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	4.03
Precipitation Volume (AC - FT)	81.11
Loss Volume (AC - FT)	18.36
Excess Volume (AC - FT)	62.75
Direct Runoff Volume (AC - FT)	62.48
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



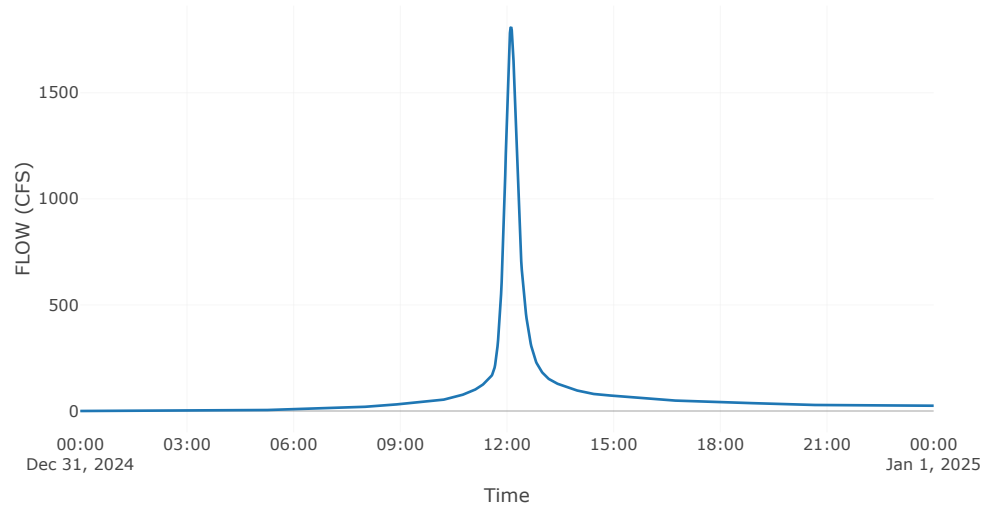
Junction: J - 13

Downstream : RCH - 13

Results: J - 13

Peak Discharge (CFS)	1809.98
Time of Peak Discharge	31Dec2024, 12:07
Volume (IN)	4

Outflow

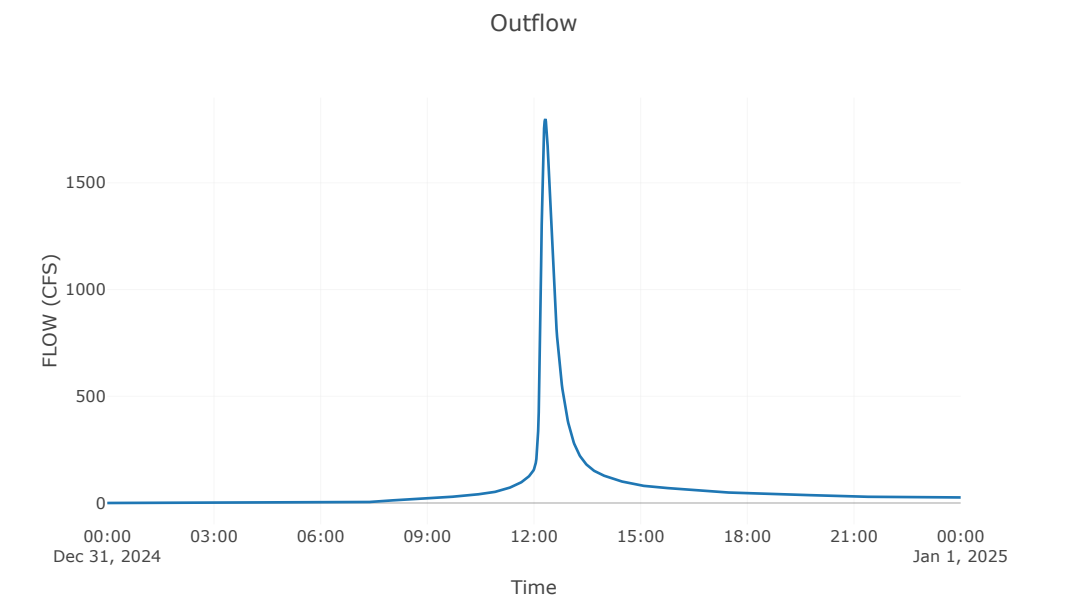


Reach: RCH - 13

Downstream : J - 8

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	6298.97
Energy Slope (FT/FT)	0.1
Mannings n	0.17
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	90
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1157

Results: RCH - 13	
Peak Discharge (CFS)	1798.97
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	3.91
Peak Inflow (CFS)	1809.98
Inflow Volume (AC - FT)	147.23



Subbasin: SB - 19

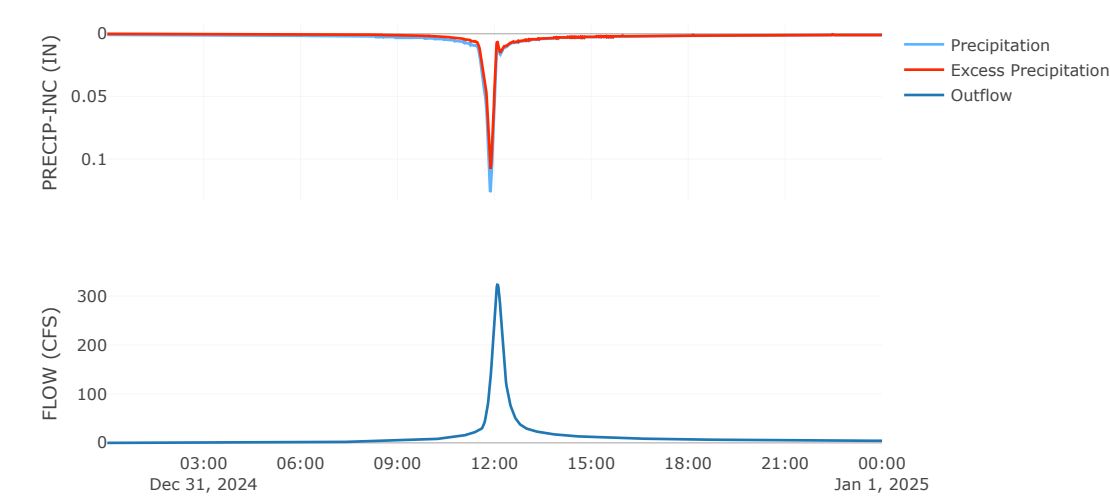
Area (MI2) : 0.12
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 8

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.9

Transform: Scs	
Lag	12.64
Unitgraph Type	Standard

Results: SB - 19	
Peak Discharge (CFS)	323.15
Time of Peak Discharge	31Dec2024, 12:05
Volume (IN)	3.76
Precipitation Volume (AC - FT)	34.01
Loss Volume (AC - FT)	9.46
Excess Volume (AC - FT)	24.55
Direct Runoff Volume (AC - FT)	24.45
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 21

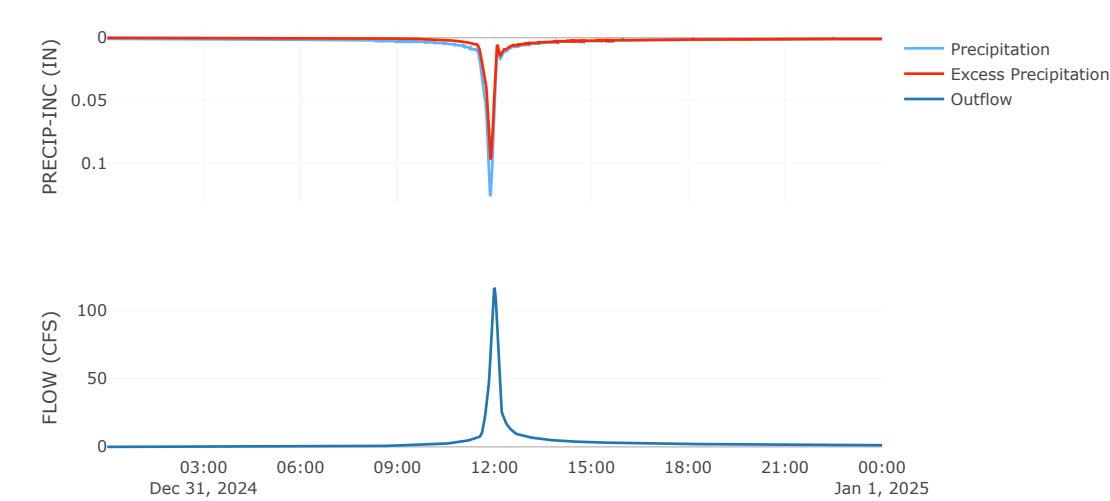
Area (MI2) : 0.04
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 8

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	82.3

Transform: Scs	
Lag	6.2
Unitgraph Type	Standard

Results: SB - 21	
Peak Discharge (CFS)	115.63
Time of Peak Discharge	31Dec2024, 12:00
Volume (IN)	3.31
Precipitation Volume (AC - FT)	10.53
Loss Volume (AC - FT)	3.85
Excess Volume (AC - FT)	6.67
Direct Runoff Volume (AC - FT)	6.66
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



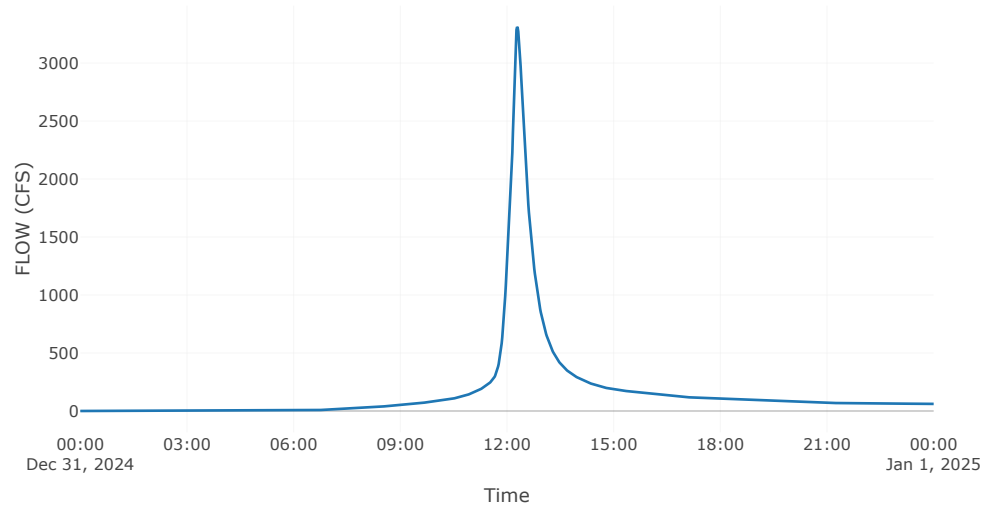
Junction: J - 8

Downstream : RCH - 8

Results: J - 8

Peak Discharge (CFS)	3310.74
Time of Peak Discharge	31Dec2024, 12:17
Volume (IN)	3.81

Outflow

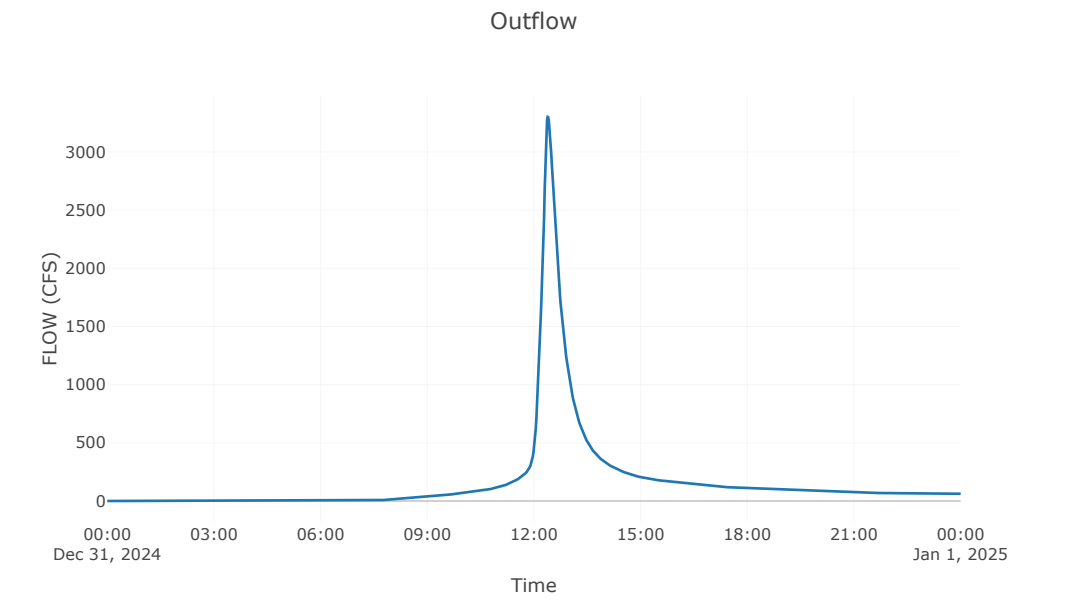


Reach: RCH - 8

Downstream : J - 6

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3385.93
Energy Slope (FT/FT)	0.04
Mannings n	0.12
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	130
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2043

Results: RCH - 8	
Peak Discharge (CFS)	3300.37
Time of Peak Discharge	31Dec2024, 12:23
Volume (IN)	3.76
Peak Inflow (CFS)	3310.74
Inflow Volume (AC - FT)	337.25



Subbasin: SB - 24

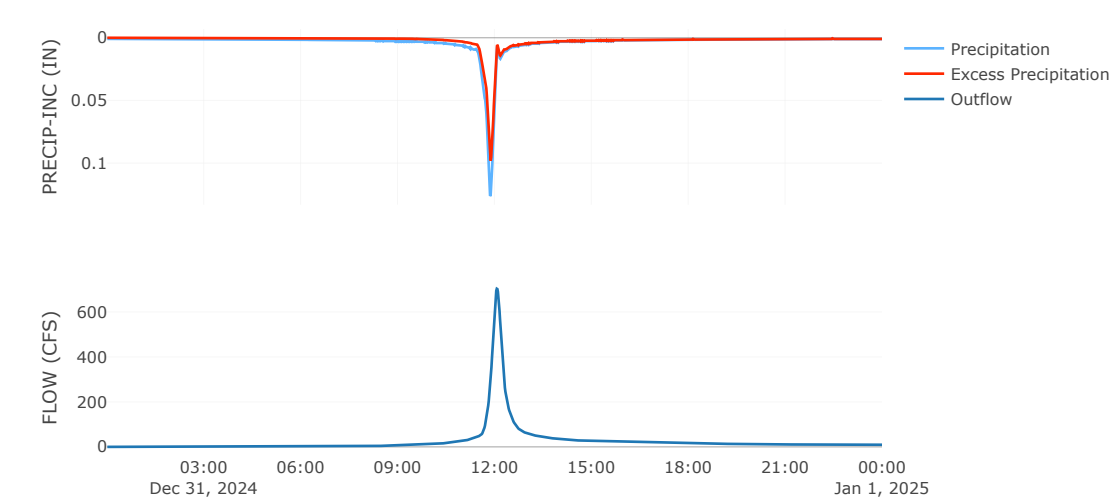
Area (MI2) : 0.28
Latitude Degrees : 31.75
Longitude Degrees : -110.88
Downstream : J - 6

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	82.7

Transform: Scs	
Lag	11.31
Unitgraph Type	Standard

Results: SB - 24	
Peak Discharge (CFS)	703.18
Time of Peak Discharge	31Dec2024, 12:04
Volume (IN)	3.35
Precipitation Volume (AC - FT)	77.9
Loss Volume (AC - FT)	27.93
Excess Volume (AC - FT)	49.97
Direct Runoff Volume (AC - FT)	49.78
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 8

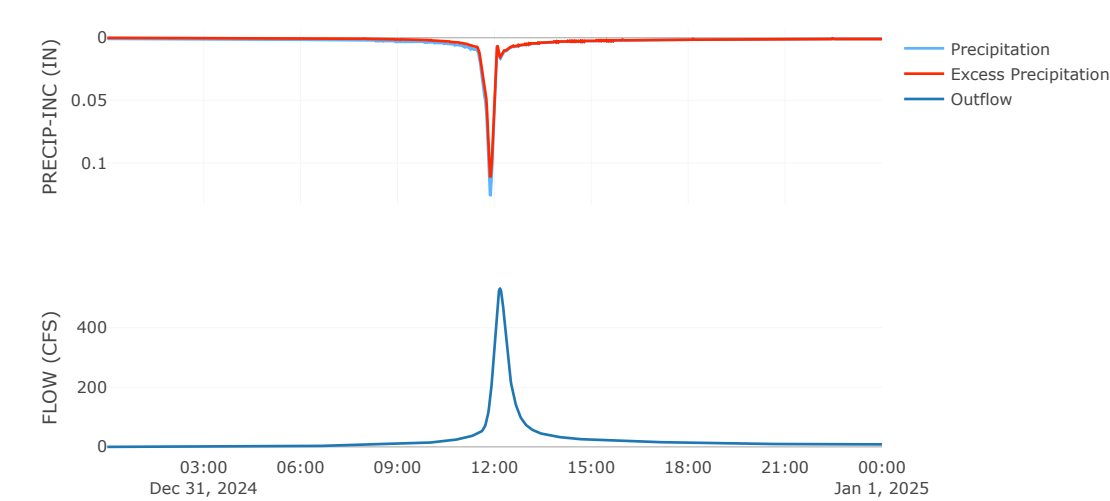
Area (MI2) : 0.23
Latitude Degrees : 31.75
Longitude Degrees : -110.87
Downstream : J - 6

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88.5

Transform: Scs	
Lag	17.71
Unitgraph Type	Standard

Results: SB - 8	
Peak Discharge (CFS)	530.4
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	3.92
Precipitation Volume (AC - FT)	64.58
Loss Volume (AC - FT)	15.92
Excess Volume (AC - FT)	48.67
Direct Runoff Volume (AC - FT)	48.4
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



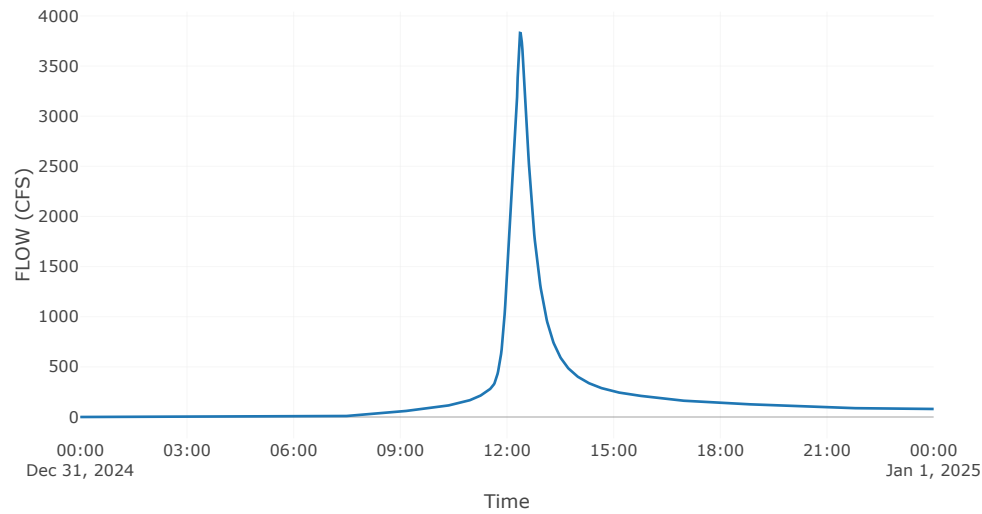
Junction: J - 6

Downstream : RCH - 6

Results: J - 6

Peak Discharge (CFS)	3829.47
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	3.73

Outflow

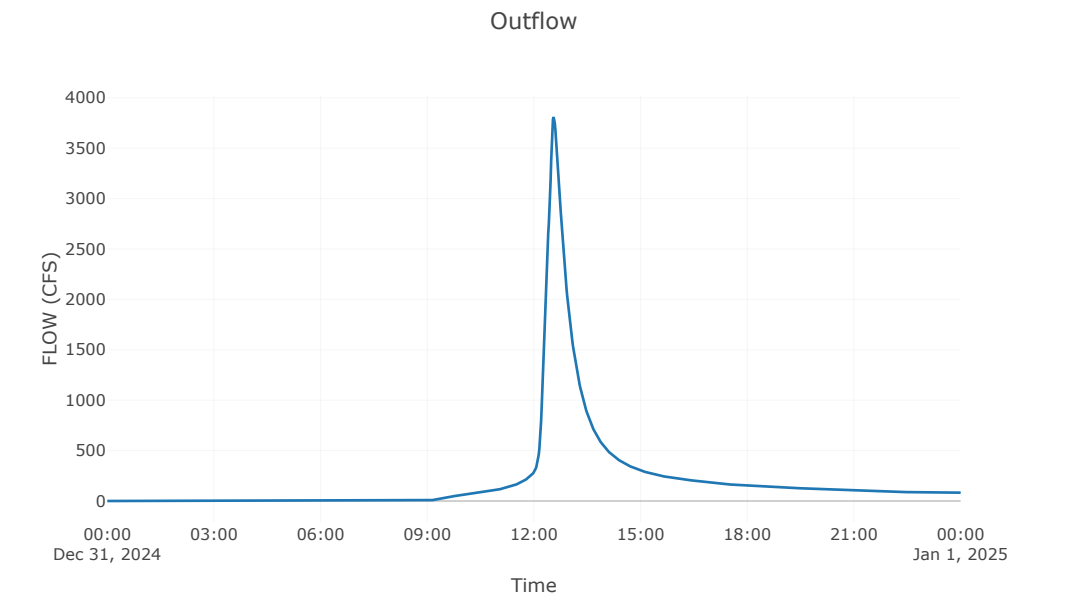


Reach: RCH - 6

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5289.14
Energy Slope (FT/FT)	0.03
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	250
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2306

Results: RCH - 6	
Peak Discharge (CFS)	3809.39
Time of Peak Discharge	31Dec2024, 12:33
Volume (IN)	3.65
Peak Inflow (CFS)	3829.47
Inflow Volume (AC - FT)	431.53



Subbasin: SB - 6

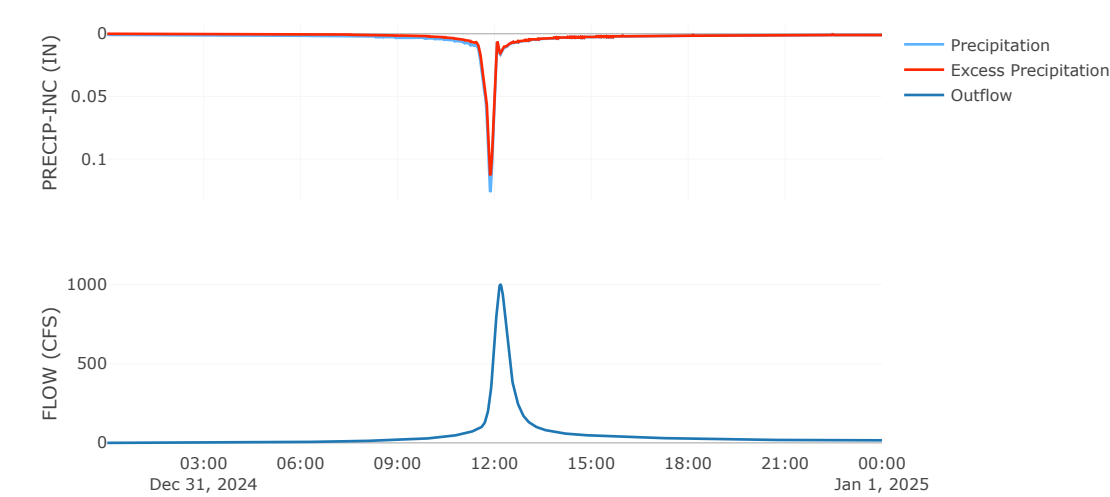
Area (MI2) : 0.44
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.3

Transform: Scs	
Lag	18.63
Unitgraph Type	Standard

Results: SB - 6	
Peak Discharge (CFS)	999.06
Time of Peak Discharge	31Dec2024, 12:11
Volume (IN)	4.01
Precipitation Volume (AC - FT)	123.27
Loss Volume (AC - FT)	28.4
Excess Volume (AC - FT)	94.88
Direct Runoff Volume (AC - FT)	94.34
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 5

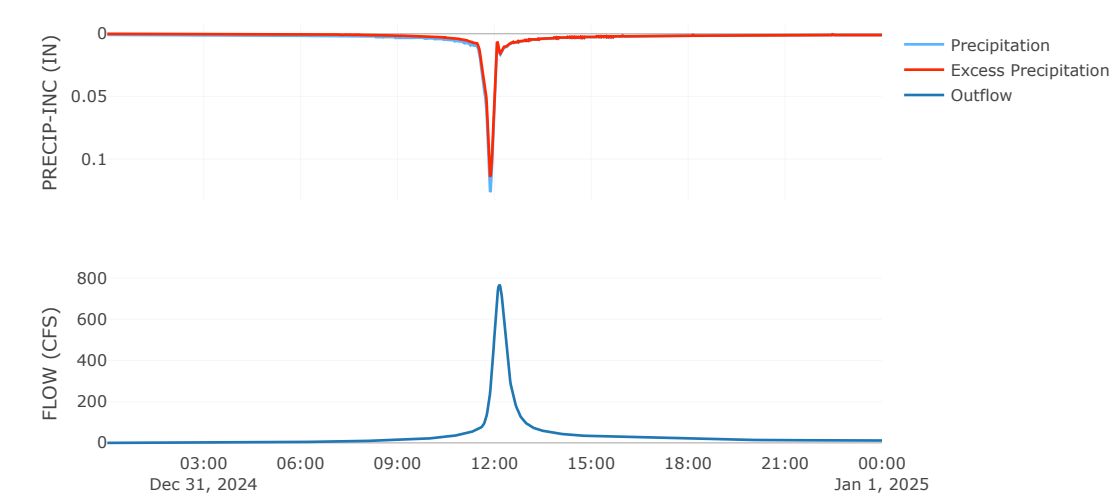
Area (MI2) : 0.31
Latitude Degrees : 31.76
Longitude Degrees : -110.87
Downstream : J - 12

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	89.8

Transform: Scs	
Lag	16.66
Unitgraph Type	Standard

Results: SB - 5	
Peak Discharge (CFS)	767.36
Time of Peak Discharge	31Dec2024, 12:09
Volume (IN)	4.06
Precipitation Volume (AC - FT)	87.79
Loss Volume (AC - FT)	19.33
Excess Volume (AC - FT)	68.45
Direct Runoff Volume (AC - FT)	68.11
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



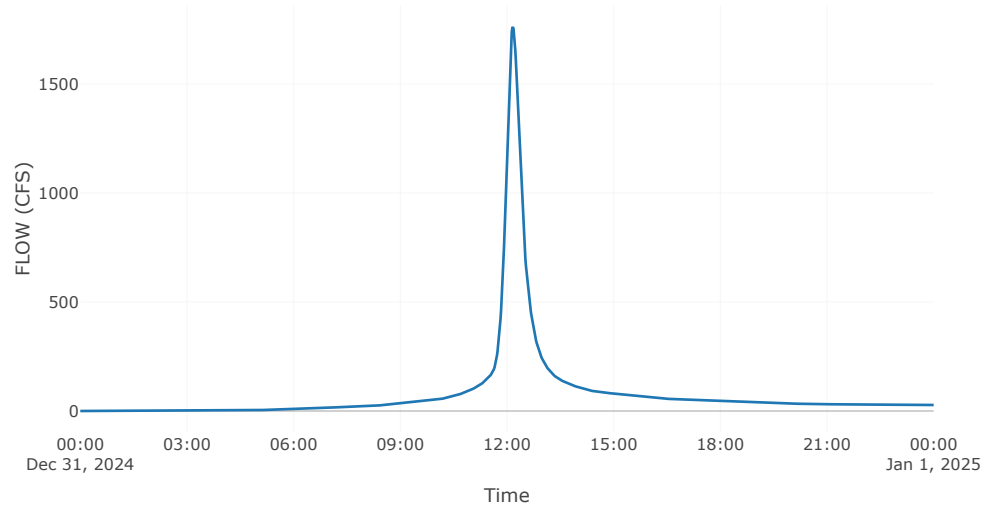
Junction: J - 12

Downstream : RCH - 12

Results: J - 12

Peak Discharge (CFS)	1760.99
Time of Peak Discharge	31Dec2024, 12:10
Volume (IN)	4.03

Outflow

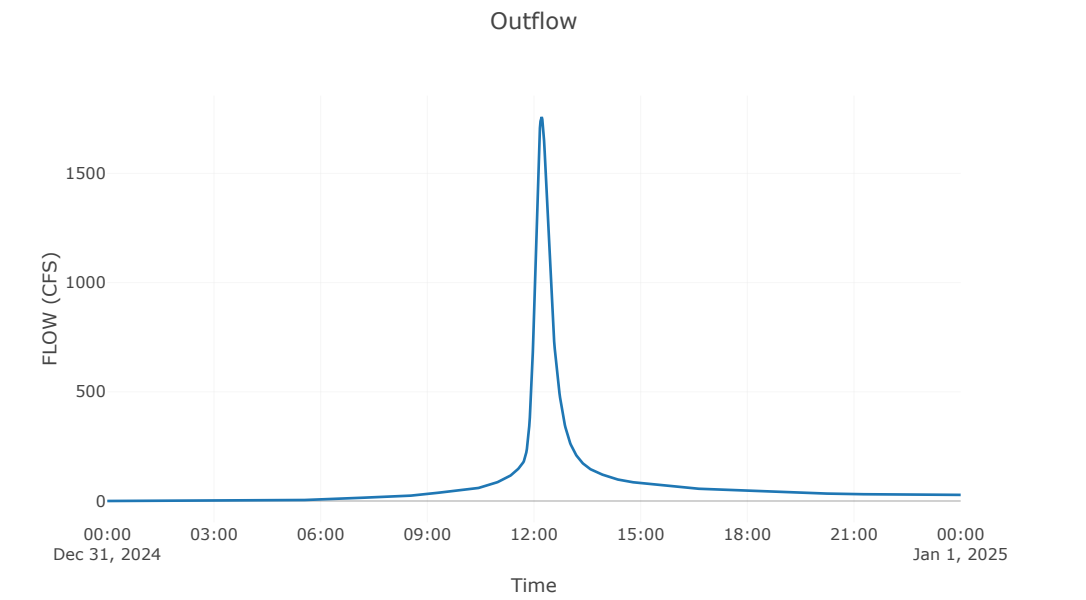


Reach: RCH - 12

Downstream : J - 4

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1501.96
Energy Slope (FT/FT)	0.03
Mannings n	0.09
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	80
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1127

Results: RCH - 12	
Peak Discharge (CFS)	1758.36
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	4.01
Peak Inflow (CFS)	1760.99
Inflow Volume (AC - FT)	162.46



Subbasin: SB - 26

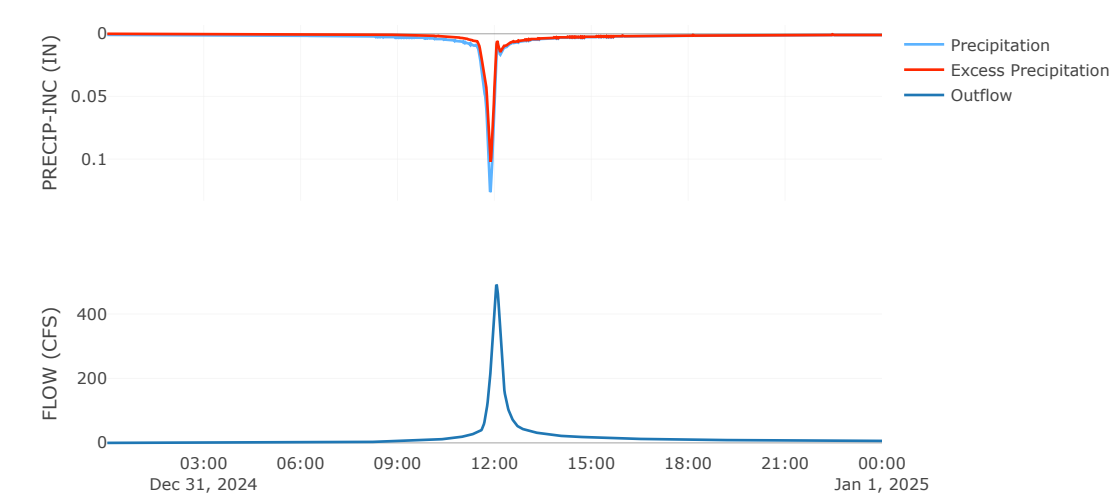
Area (MI2) : 0.18
Latitude Degrees : 31.76
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	84.4

Transform: Scs	
Lag	10.19
Unitgraph Type	Standard

Results: SB - 26	
Peak Discharge (CFS)	490.76
Time of Peak Discharge	31Dec2024, 12:03
Volume (IN)	3.51
Precipitation Volume (AC - FT)	49.73
Loss Volume (AC - FT)	16.23
Excess Volume (AC - FT)	33.49
Direct Runoff Volume (AC - FT)	33.38
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 20

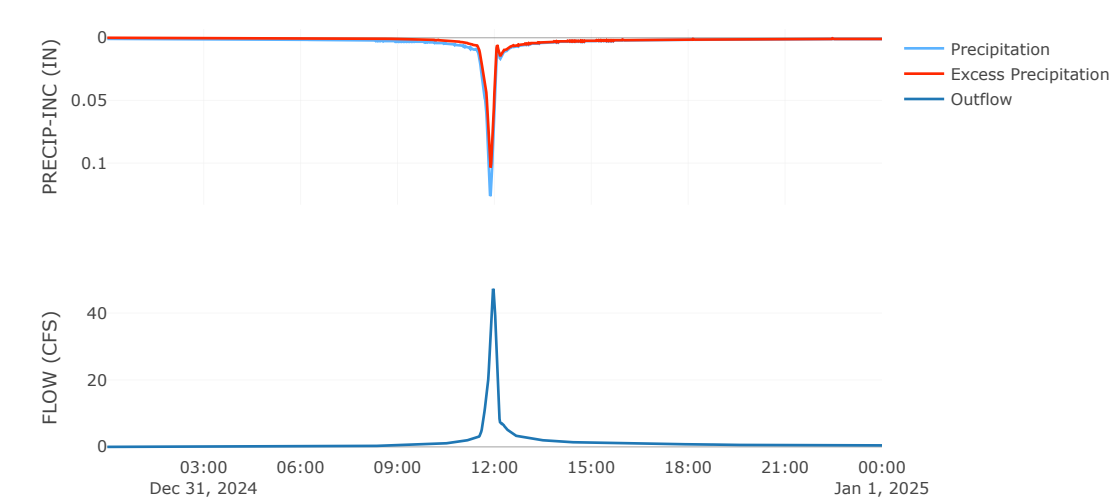
Area (MI2) : 0.01
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 4

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85

Transform: Scs	
Lag	3.99
Unitgraph Type	Standard

Results: SB - 20	
Peak Discharge (CFS)	47.27
Time of Peak Discharge	31Dec2024, 11:57
Volume (IN)	3.58
Precipitation Volume (AC - FT)	3.69
Loss Volume (AC - FT)	1.16
Excess Volume (AC - FT)	2.52
Direct Runoff Volume (AC - FT)	2.52
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



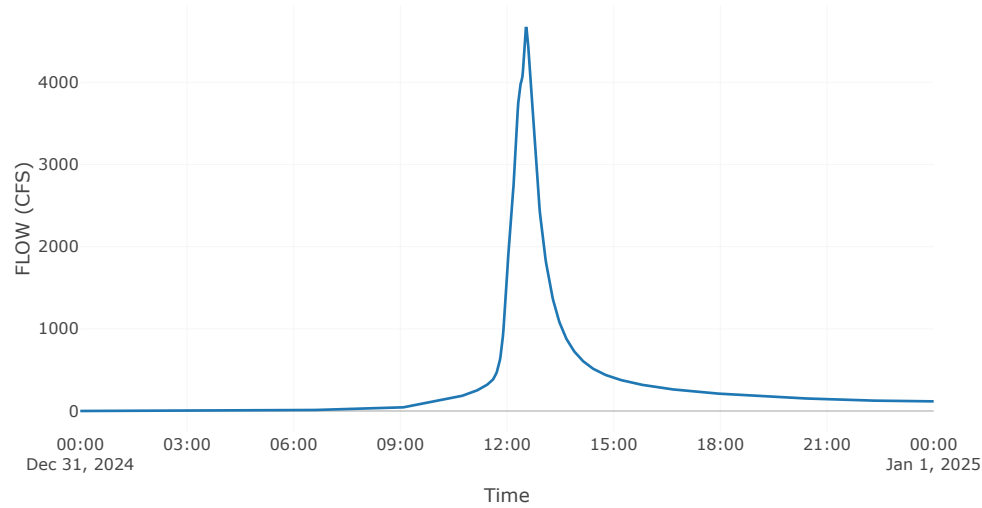
Junction: J - 4

Downstream : RCH - 4

Results: J - 4

Peak Discharge (CFS)	4673.44
Time of Peak Discharge	31Dec2024, 12:32
Volume (IN)	3.73

Outflow

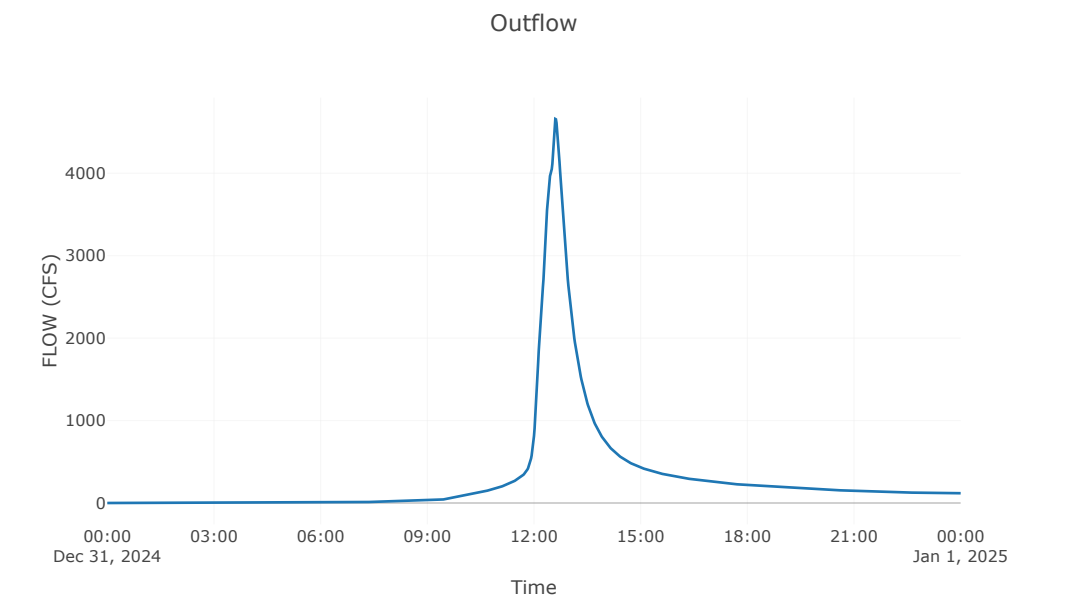


Reach: RCH - 4

Downstream : J - I

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	1941.67
Energy Slope (FT/FT)	0.03
Mannings n	0.11
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	2698

Results: RCH - 4	
Peak Discharge (CFS)	4657.94
Time of Peak Discharge	31Dec2024, 12:36
Volume (IN)	3.7
Peak Inflow (CFS)	4673.44
Inflow Volume (AC - FT)	620.09



Subbasin: SB - 30

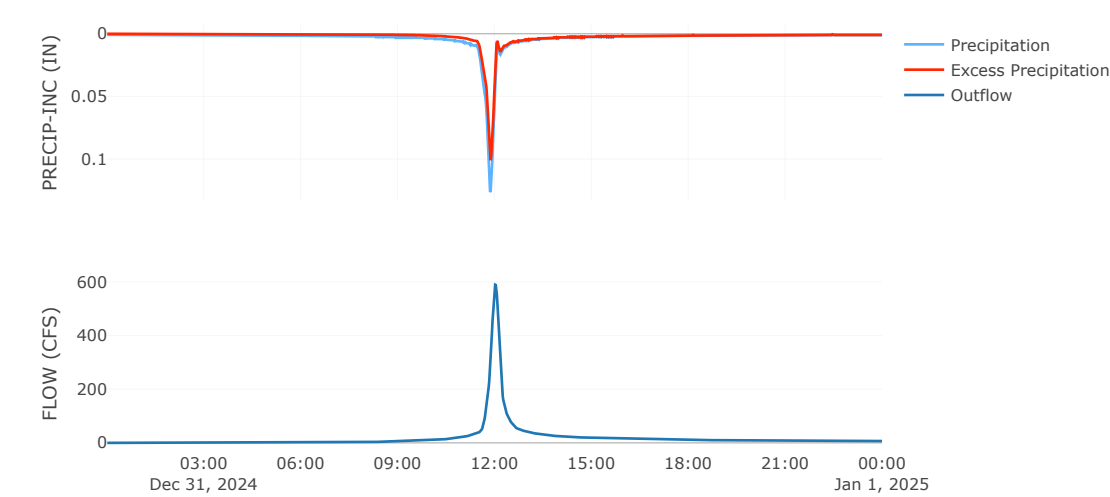
Area (MI2) : 0.2
Latitude Degrees : 31.77
Longitude Degrees : -110.87
Downstream : J - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	83.9

Transform: Scs	
Lag	8.18
Unitgraph Type	Standard

Results: SB - 30	
Peak Discharge (CFS)	589.44
Time of Peak Discharge	31Dec2024, 12:01
Volume (IN)	3.47
Precipitation Volume (AC - FT)	55.79
Loss Volume (AC - FT)	18.74
Excess Volume (AC - FT)	37.05
Direct Runoff Volume (AC - FT)	36.94
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 28

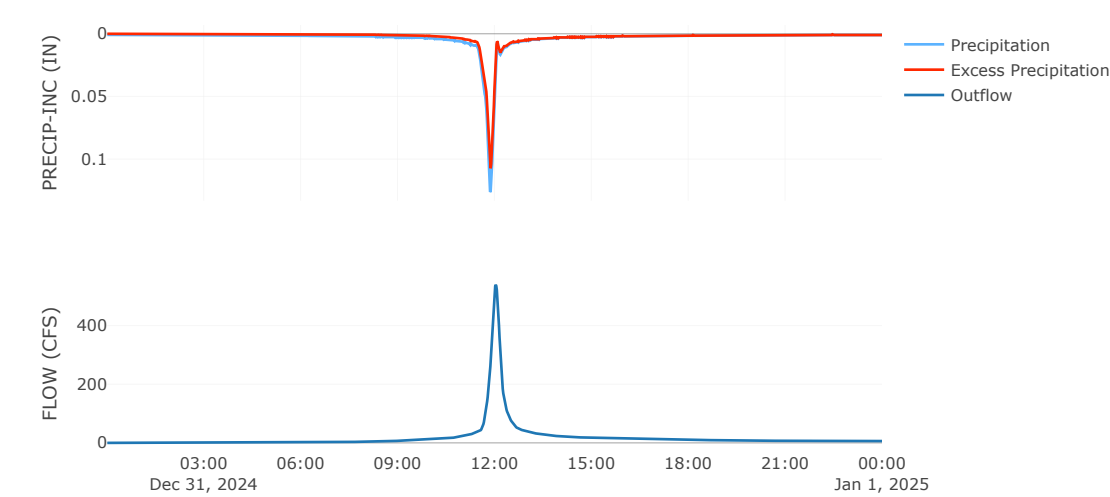
Area (MI2) : 0.18
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : J - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	86.7

Transform: Scs	
Lag	8.99
Unitgraph Type	Standard

Results: SB - 28	
Peak Discharge (CFS)	539.09
Time of Peak Discharge	31Dec2024, 12:02
Volume (IN)	3.75
Precipitation Volume (AC - FT)	49.28
Loss Volume (AC - FT)	13.9
Excess Volume (AC - FT)	35.38
Direct Runoff Volume (AC - FT)	35.28
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



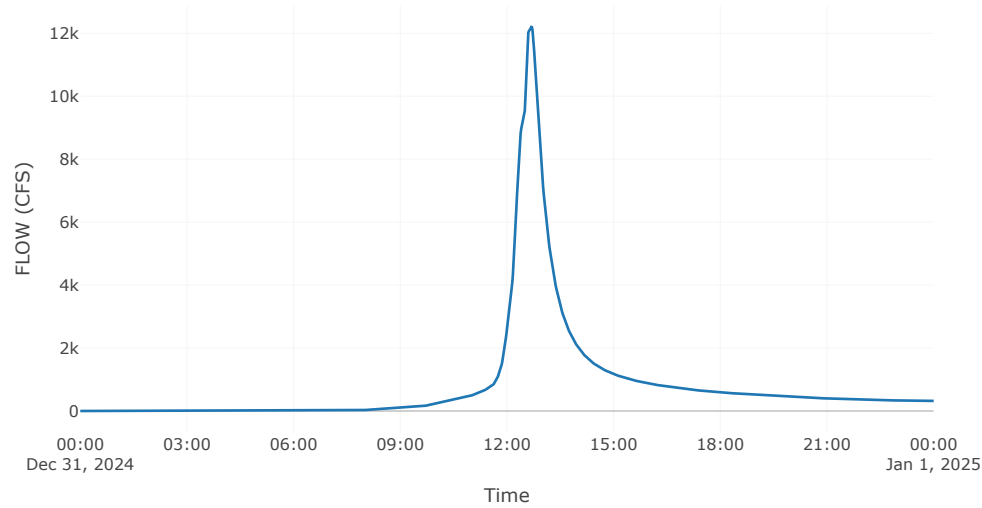
Junction: J - 1

Downstream : RCH - 1

Results: J - 1

Peak Discharge (CFS)	12199.92
Time of Peak Discharge	31Dec2024, 12:41
Volume (IN)	3.7

Outflow

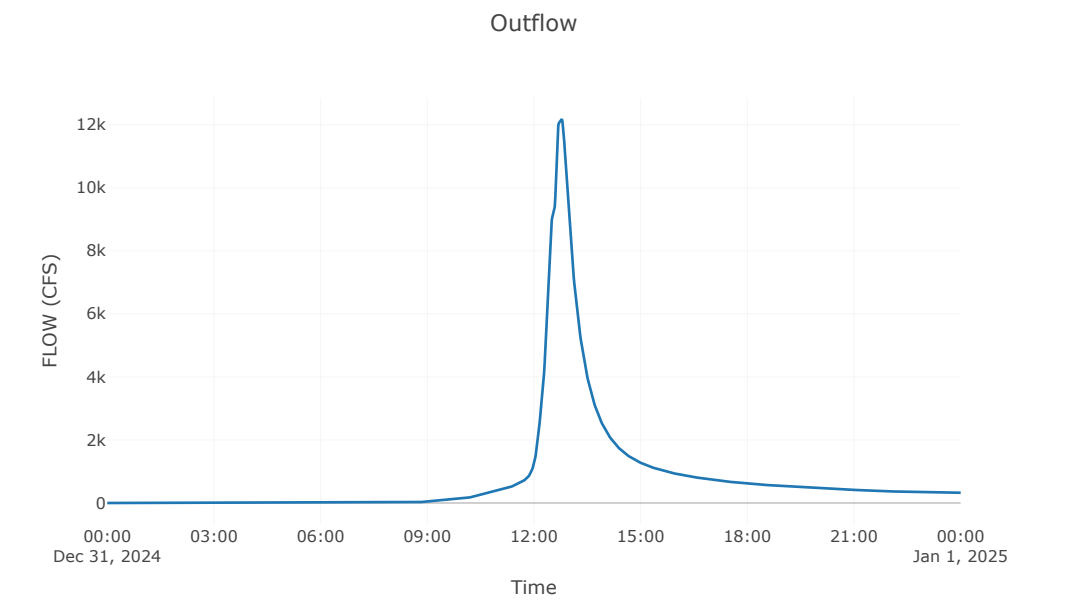


Reach: RCH - 1

Downstream : Sink - 1

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	3145.34
Energy Slope (FT/FT)	0.02
Mannings n	0.1
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	400
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	6824

Results: RCH - 1	
Peak Discharge (CFS)	12182.66
Time of Peak Discharge	31Dec2024, 12:46
Volume (IN)	3.67
Peak Inflow (CFS)	12199.92
Inflow Volume (AC - FT)	1660.15



Subbasin: SB - 31

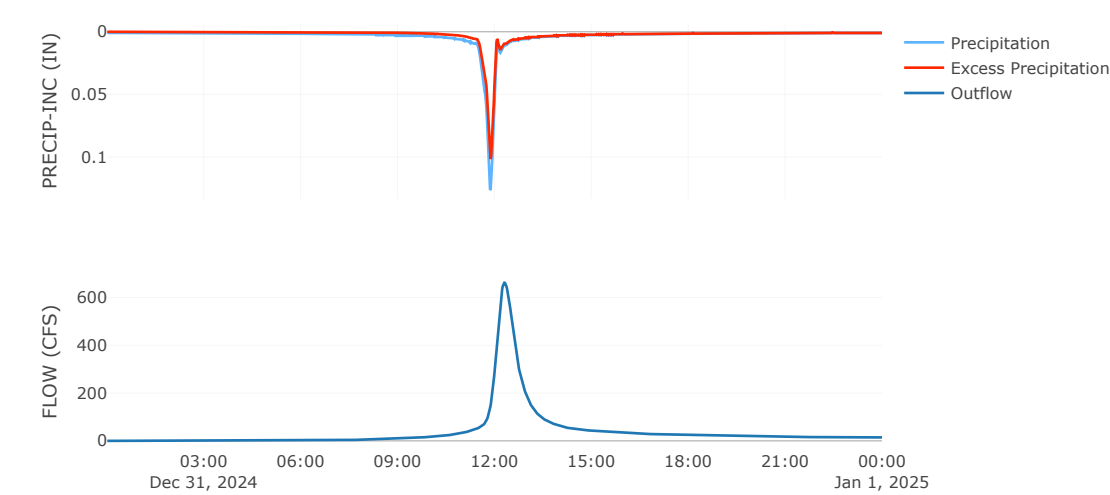
Area (MI2) : 0.41
Latitude Degrees : 31.77
Longitude Degrees : -110.88
Downstream : Sink - 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	84.2

Transform: Scs	
Lag	26.25
Unitgraph Type	Standard

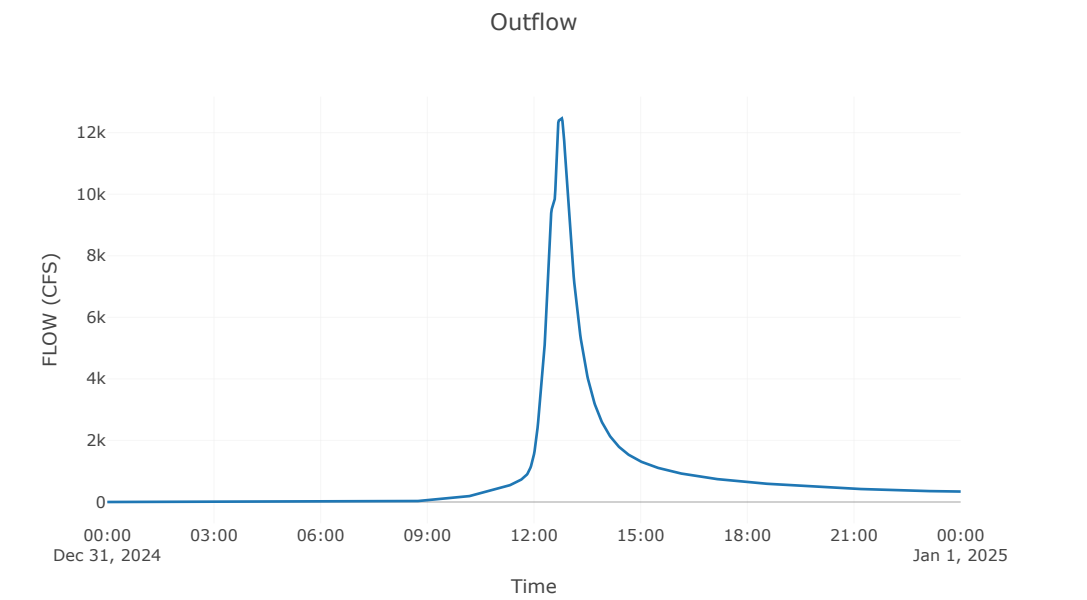
Results: SB - 31	
Peak Discharge (CFS)	661.84
Time of Peak Discharge	31Dec2024, 12:18
Volume (IN)	3.48
Precipitation Volume (AC - FT)	114.87
Loss Volume (AC - FT)	37.94
Excess Volume (AC - FT)	76.93
Direct Runoff Volume (AC - FT)	76.26
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Sink: Sink-1

Results: Sink-1	
Peak Discharge (CFS)	12476.11
Time of Peak Discharge	31Dec2024, 12:46
Volume (IN)	3.66



Subbasin: SB - 3

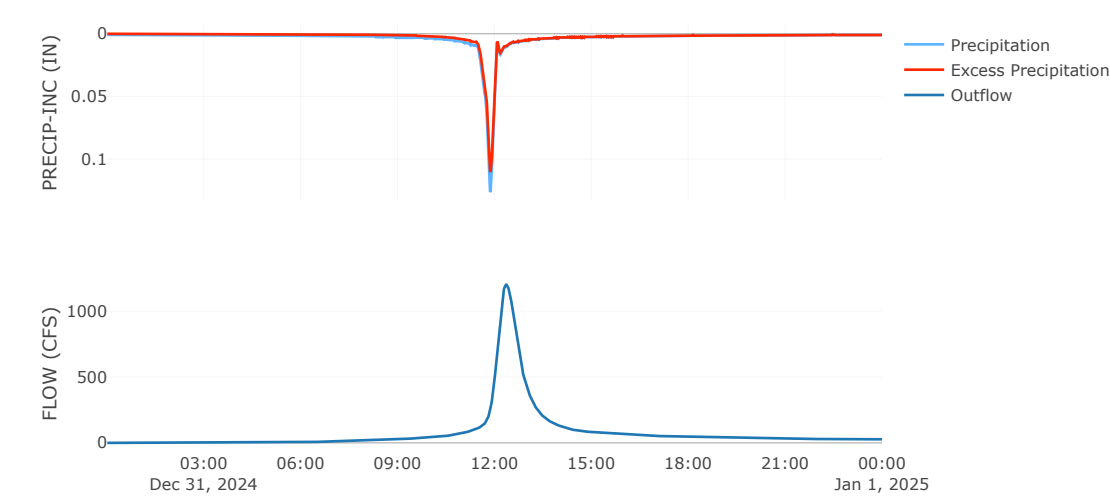
Area (MI2) : 0.74
Latitude Degrees : 31.78
Longitude Degrees : -110.85
Downstream : J - 7

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	88

Transform: Scs	
Lag	29.77
Unitgraph Type	Standard

Results: SB - 3	
Peak Discharge (CFS)	1201.73
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	3.86
Precipitation Volume (AC - FT)	206.71
Loss Volume (AC - FT)	53
Excess Volume (AC - FT)	153.7
Direct Runoff Volume (AC - FT)	152.28
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Subbasin: SB - 2

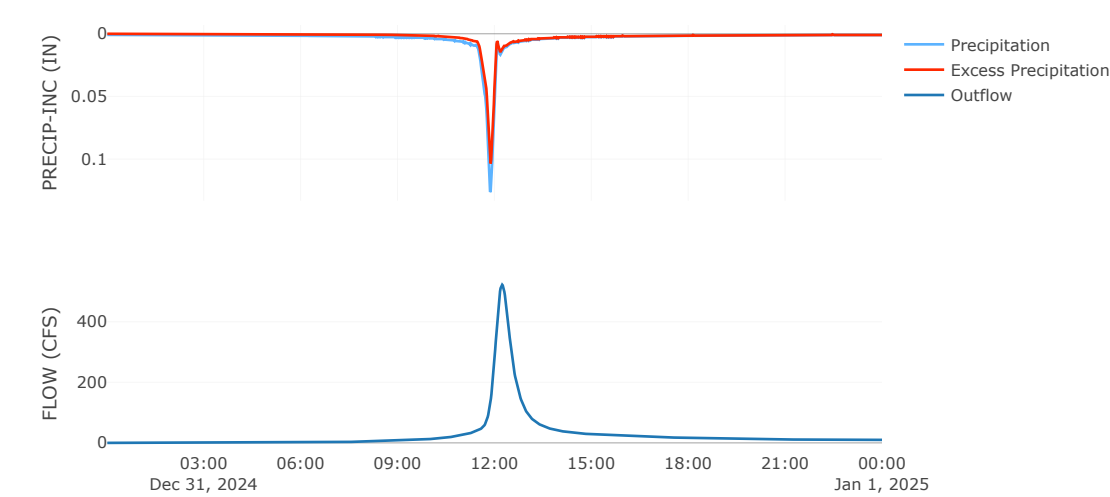
Area (MI2) : 0.28
Latitude Degrees : 31.78
Longitude Degrees : -110.86
Downstream : J - 7

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85

Transform: Scs	
Lag	21.65
Unitgraph Type	Standard

Results: SB - 2	
Peak Discharge (CFS)	522.28
Time of Peak Discharge	31Dec2024, 12:14
Volume (IN)	3.56
Precipitation Volume (AC - FT)	78.18
Loss Volume (AC - FT)	24.63
Excess Volume (AC - FT)	53.55
Direct Runoff Volume (AC - FT)	53.18
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

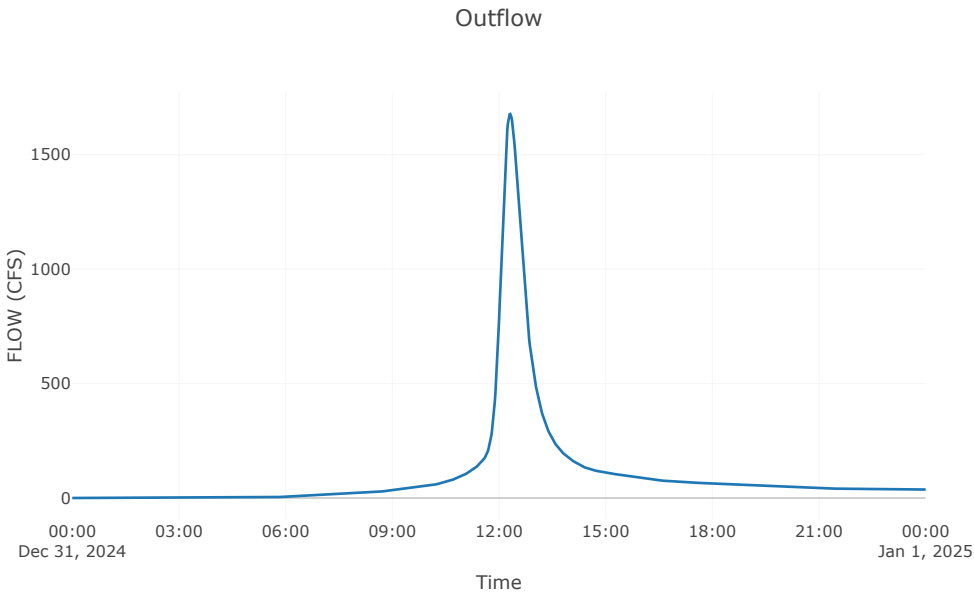


Junction: J - 7

Downstream : RCH - 7

Results: J - 7

Peak Discharge (CFS)	1677.75
Time of Peak Discharge	31Dec2024, 12:19
Volume (IN)	3.78

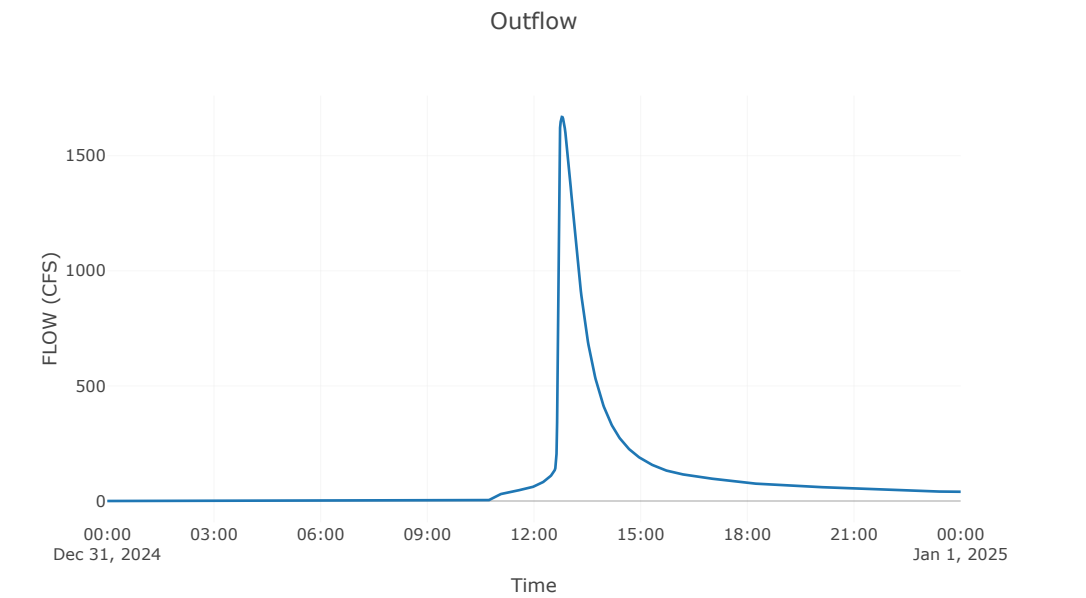


Reach: RCH - 7

Downstream : Medium Wash

Route: Kinematic Wave	
Method	Kinematic Wave
Channel	Kinematic Wave
Length (FT)	5200.73
Energy Slope (FT/FT)	0.02
Mannings n	0.22
Shape	Trapezoid
Number of Subreaches	5
Width (FT)	300
Side Slope (FT/FT)	4
Initial Variable	Combined Inflow
Index Parameter Type	Index Flow
Index Flow	1040

Results: RCH - 7	
Peak Discharge (CFS)	1668.18
Time of Peak Discharge	31Dec2024, 12:47
Volume (IN)	3.57
Peak Inflow (CFS)	1677.75
Inflow Volume (AC - FT)	205.46



Subbasin: SB - 25

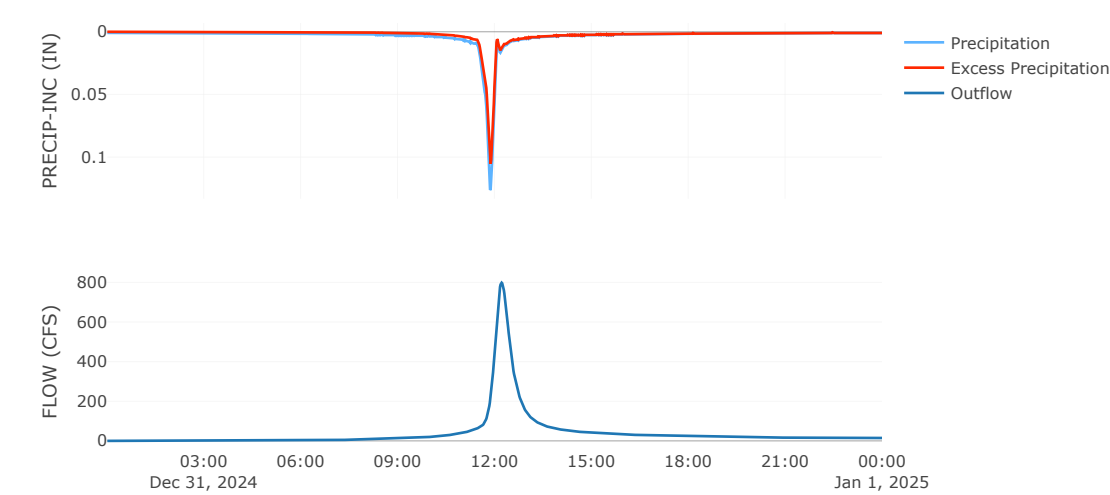
Area (MI2) : 0.41
Latitude Degrees : 31.78
Longitude Degrees : -110.87
Downstream : Medium Wash

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.8

Transform: Scs	
Lag	20.79
Unitgraph Type	Standard

Results: SB - 25	
Peak Discharge (CFS)	798.1
Time of Peak Discharge	31Dec2024, 12:13
Volume (IN)	3.64
Precipitation Volume (AC - FT)	114.09
Loss Volume (AC - FT)	34.18
Excess Volume (AC - FT)	79.91
Direct Runoff Volume (AC - FT)	79.37
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

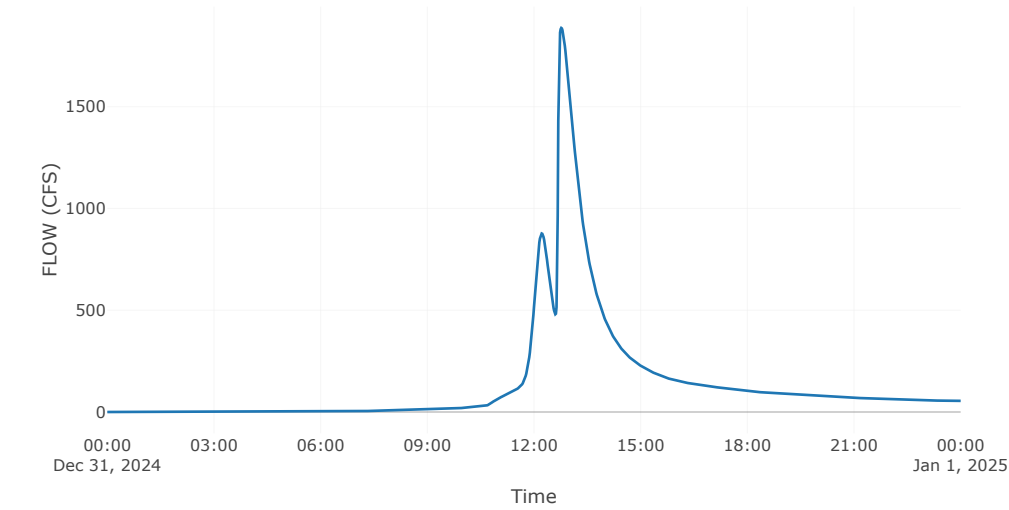


Sink: Medium Wash

Results: Medium Wash

Peak Discharge (CFS)	1886.82
Time of Peak Discharge	31Dec2024, 12:46
Volume (IN)	3.59

Outflow



Subbasin: SB - 1

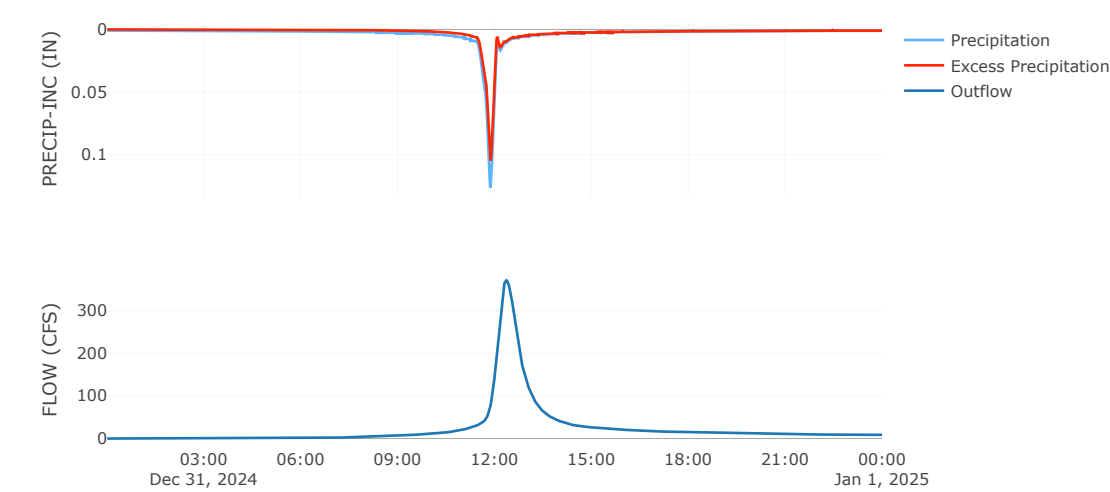
Area (MI2) : 0.24
Latitude Degrees : 31.78
Longitude Degrees : -110.88

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.5

Transform: Scs	
Lag	29.7
Unitgraph Type	Standard

Results: SB - 1	
Peak Discharge (CFS)	370.64
Time of Peak Discharge	31Dec2024, 12:22
Volume (IN)	3.6
Precipitation Volume (AC - FT)	67.65
Loss Volume (AC - FT)	20.66
Excess Volume (AC - FT)	46.99
Direct Runoff Volume (AC - FT)	46.54
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Basin North of Medium
Wash (Subbasin-32)
PC-HYDRO Output



HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methods provided by Pima County Regional Flood Control District

Client:	Pima County	Prepared by:	Elise McGuire
Project Name:	Madera Canyon Bridges	Date:	11/04/2025
Concentration Point:	Medium Wash 36-in Culvert	Job #	
Watershed Area:	32.04 Acres	Watershed Type	Undeveloped-Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	11.3	461	0.0245	0.035
2	13.1	443	0.0296	0.035
3	27.3	888	0.0307	0.035
4	53.3	1722	0.031	0.07

Length of Watercourse (Lc):	<u>3514</u> feet	Mean Slope:	<u>0.0298</u>
Length to Cen. of Gravity (Lca):	<u>1757</u> feet	Weighted Basin Fac:	<u>0.052</u>

RETURN PERIOD: 100-years NOAA Data Obtained: 2025-11-04 12:53:37 PM

Rainfall Depths:	NOAA Atlas 14 (90% UCL) @				Latitude: <u>31.7886</u>		Longitude: <u>-110.8837</u>			
Duration:	<u>5-min</u>	<u>10-min</u>	<u>15-min</u>	<u>30-min</u>	<u>1-hr</u>	<u>2-hr</u>	<u>3-hr</u>	<u>6-hr</u>	<u>12-hr</u>	<u>24-hr</u>
Point Values (in):	1	1.52	1.88	2.54	3.14	3.5	3.61	4.16	4.6	4.94

Soil Type	Percent	Veg %	Curve # (CN)	Veg. Cover Type(s):	Runoff Coef. (C)
C	100	20	88	Desert Brush	0.619
Imp.	0	-	99	-	0.962

Weighted Runoff Coef. (Cw):	<u>0.62</u>
Time of Concentration:	<u>15.05</u> min
Rainfall Intensity (i) @ Tc:	<u>7.5</u> in/hr
Runoff Supply Rate (q) @ Tc:	<u>4.64</u> in/hr
Total Volume (af):	<u>5.2</u> acre-feet
PEAK DISCHARGE:	<u>150</u> cfs



HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methods provided by Pima County Regional Flood Control District

Concentration Point:	Medium Wash 36-in Culvert	Return Period:	100 year
Peak Discharge:	150 cfs	Project Date:	11/04/2025
Time of Concentration:	15.05	Rise Time:	20.73
Runoff Volume:	5.198 af		

Hydrograph based on NOAA data obtained 2025-11-04 12:53:37 PM

Time (min)	Discharge (cfs)	Runoff Volume (af)
0	0	0
1	1.81	0.005
2	3.62	0.01
3	7.91	0.022
4	12.4	0.035
5	17.56	0.064
6	22.84	0.097
7	28.69	0.135
8	34.7	0.175
9	41.73	0.235
10	49.18	0.303
11	56.72	0.38
12	64.32	0.463
13	72.73	0.555
14	81.78	0.656
15	92.13	0.761
16	103.85	0.871
17	115.19	1.012
18	125.97	1.195
19	135.85	1.377
20	144.03	1.558
21	148.52	1.74
22	143.02	1.928
23	137.39	2.111
24	131.24	2.271
25	125.11	2.43
26	119.1	2.578
27	113.11	2.726
28	107.47	2.863
29	101.82	3.001

30	96.46	3.125
31	91.11	3.247
32	86.74	3.359
33	82.47	3.469
34	77.96	3.563
35	73.4	3.653
36	69.11	3.742
37	64.92	3.829
38	61.02	3.91
39	57.26	3.988
40	53.63	4.058
41	50.08	4.123
42	46.85	4.182
43	43.88	4.234
44	40.91	4.287
45	37.95	4.34
46	35.27	4.388
47	33.02	4.431
48	30.78	4.474
49	28.54	4.516
50	26.46	4.556
51	24.91	4.587
52	23.35	4.619
53	21.8	4.65
54	20.27	4.68
55	19.04	4.702
56	17.81	4.723
57	16.58	4.744
58	15.35	4.766
59	14.47	4.785
60	13.6	4.803
61	12.73	4.822
62	11.86	4.841
63	11.28	4.855
64	10.75	4.868
65	10.23	4.881
66	9.7	4.895
67	9.18	4.908
68	8.65	4.921
69	8.13	4.934
70	7.6	4.947
71	7.17	4.958
72	6.83	4.965
73	6.48	4.973

74	6.14	4.98
75	5.8	4.988
76	5.45	4.995
77	5.11	5.003
78	4.77	5.01
79	4.46	5.017
80	4.28	5.022
81	4.1	5.027
82	3.92	5.032
83	3.74	5.037
84	3.55	5.042
85	3.37	5.047
86	3.19	5.052
87	3.01	5.057
88	2.86	5.061
89	2.72	5.065
90	2.58	5.069
91	2.43	5.072
92	2.29	5.076
93	2.14	5.08
94	2	5.084
95	1.85	5.087
96	1.75	5.09
97	1.68	5.093
98	1.61	5.095
99	1.54	5.098
100	1.46	5.1
101	1.39	5.103
102	1.32	5.105
103	1.25	5.108
104	1.19	5.11
105	1.16	5.112
106	1.13	5.115
107	1.1	5.117
108	1.07	5.119
109	1.05	5.121
110	1.02	5.123
111	0.99	5.125
112	0.96	5.127
113	0.93	5.13
114	0.9	5.132
115	0.87	5.134
116	0.84	5.136
117	0.81	5.138

118	0.78	5.14
119	0.76	5.142
120	0.73	5.144
121	0.7	5.147
122	0.67	5.149
123	0.64	5.151
124	0.61	5.153
125	0.58	5.155
126	0.55	5.157
127	0.52	5.159
128	0.5	5.161
129	0.47	5.164
130	0.44	5.166
131	0.41	5.168
132	0.38	5.17
133	0.35	5.172
134	0.32	5.174
135	0.29	5.176
136	0.26	5.179
137	0.23	5.181
138	0.21	5.183
139	0.18	5.185
140	0.15	5.187
141	0.12	5.189
142	0.09	5.191
143	0.06	5.193
144	0.03	5.196
145	0	5.198



HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methods provided by Pima County Regional Flood Control District

Concentration Point:	Medium Wash 36-in Culvert	Return Period:	500 year
Peak Discharge:	222.4 cfs	Project Date:	11/04/2025
Time of Concentration:	12.85	Rise Time:	19.295
Runoff Volume:	7.172 af		

Hydrograph based on NOAA data obtained 2025-11-04 12:53:37 PM

Time (min)	Discharge (cfs)	Runoff Volume (af)
0	0	0
1	2.88	0.007
2	6.06	0.016
3	13.21	0.034
4	20.54	0.057
5	28.95	0.105
6	37.61	0.156
7	47.17	0.215
8	57.39	0.286
9	69.26	0.387
10	81.22	0.495
11	93.32	0.618
12	106.4	0.751
13	120.8	0.9
14	137.32	1.056
15	155.99	1.22
16	173.82	1.444
17	190.99	1.715
18	205.53	1.984
19	218.56	2.252
20	216.22	2.527
21	207.46	2.806
22	197.9	3.053
23	188.1	3.291
24	178.5	3.513
25	168.93	3.732
26	159.89	3.938
27	150.9	4.143
28	142.37	4.325
29	133.94	4.506

30	127.14	4.67
31	120.28	4.829
32	113.02	4.963
33	105.87	5.096
34	99.18	5.226
35	92.69	5.352
36	86.69	5.468
37	80.82	5.576
38	75.17	5.673
39	69.9	5.762
40	65.17	5.84
41	60.45	5.918
42	55.72	5.996
43	51.63	6.066
44	48.06	6.129
45	44.48	6.193
46	40.91	6.256
47	38.09	6.307
48	35.62	6.354
49	33.14	6.4
50	30.66	6.447
51	28.61	6.481
52	26.65	6.512
53	24.7	6.544
54	22.74	6.576
55	21.34	6.604
56	19.95	6.631
57	18.57	6.659
58	17.25	6.686
59	16.42	6.706
60	15.58	6.725
61	14.74	6.745
62	13.91	6.764
63	13.07	6.784
64	12.24	6.803
65	11.4	6.823
66	10.68	6.839
67	10.13	6.85
68	9.59	6.861
69	9.04	6.872
70	8.49	6.884
71	7.94	6.895
72	7.4	6.906
73	6.85	6.917

74	6.48	6.926
75	6.19	6.933
76	5.9	6.941
77	5.61	6.948
78	5.32	6.955
79	5.04	6.963
80	4.75	6.97
81	4.46	6.978
82	4.23	6.983
83	4	6.989
84	3.77	6.994
85	3.53	7
86	3.3	7.006
87	3.07	7.011
88	2.84	7.017
89	2.64	7.022
90	2.53	7.026
91	2.41	7.029
92	2.3	7.033
93	2.18	7.037
94	2.06	7.041
95	1.95	7.044
96	1.83	7.048
97	1.75	7.051
98	1.71	7.055
99	1.66	7.058
100	1.62	7.061
101	1.57	7.064
102	1.52	7.067
103	1.48	7.07
104	1.43	7.073
105	1.39	7.077
106	1.34	7.08
107	1.29	7.083
108	1.25	7.086
109	1.2	7.089
110	1.16	7.092
111	1.11	7.096
112	1.06	7.099
113	1.02	7.102
114	0.97	7.105
115	0.93	7.108
116	0.88	7.111
117	0.83	7.115

118	0.79	7.118
119	0.74	7.121
120	0.69	7.124
121	0.65	7.127
122	0.6	7.13
123	0.56	7.134
124	0.51	7.137
125	0.46	7.14
126	0.42	7.143
127	0.37	7.146
128	0.33	7.149
129	0.28	7.152
130	0.23	7.156
131	0.19	7.159
132	0.14	7.162
133	0.1	7.165
134	0.05	7.168
135	0	7.171

Bridge Drainage PC-HYDRO Output



HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methods provided by Pima County Regional Flood Control District

Client:	Pima County RFCD	Prepared by:	
Project Name:	Madera Canyon - Florida Wash	Date:	
Concentration Point:		Job #	
Watershed Area:	.08 Acres	Watershed Type	Shallow Streetflow-Paved

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	11.5	217	0.0528	0.04

Length of Watercourse (Lc):	217 feet	Mean Slope:	0.0528
Length to Cen. of Gravity (Lca):	100 feet	Weighted Basin Fac:	0.04

RETURN PERIOD: 10-years NOAA Data Obtained: 2026-01-28 10:53:51 AM

Rainfall Depths:	NOAA Atlas 14 (90% UCL) @				Latitude: 31.7821	Longitude: -110.8869				
Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.02	1.26	1.7	2.1	2.3	2.37	2.7	3.07	3.43

Soil Type	Percent	Veg %	Curve # (CN)	Veg. Cover Type(s):	Runoff Coef. (C)
B	100	20	83	Desert Brush	0.364
Imp.	100	-	99	-	0.945

Weighted Runoff Coef. (Cw):	0.94
Time of Concentration:	5 min
Rainfall Intensity (i) @ Tc:	8.04 in/hr
Runoff Supply Rate (q) @ Tc:	7.59 in/hr
Total Volume (af):	0.01 acre-feet
PEAK DISCHARGE:	0.6 cfs



HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methods provided by Pima County Regional Flood Control District

Client:	Pima County RFCD	Prepared by:	
Project Name:	Madera Canyon - Medium Wash	Date:	
Concentration Point:		Job #	
Watershed Area:	.06 Acres	Watershed Type	Shallow Streetflow-Paved

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4.6	167	0.0275	0.04

Length of Watercourse (Lc):	167 feet	Mean Slope:	0.0275
Length to Cen. of Gravity (Lca):	75 feet	Weighted Basin Fac:	0.04

RETURN PERIOD: 10-years NOAA Data Obtained: 2026-01-28 10:55:10 AM

Rainfall Depths:	NOAA Atlas 14 (90% UCL) @				Latitude: 31.7879	Longitude: -110.8845				
Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.66	1	1.24	1.67	2.07	2.26	2.33	2.65	3.01	3.36

Soil Type	Percent	Veg %	Curve # (CN)	Veg. Cover Type(s):	Runoff Coef. (C)
B	100	20	83	Desert Brush	0.359
Imp.	100	-	99	-	0.944

Weighted Runoff Coef. (Cw):	0.94
Time of Concentration:	5 min
Rainfall Intensity (i) @ Tc:	7.92 in/hr
Runoff Supply Rate (q) @ Tc:	7.47 in/hr
Total Volume (af):	0.01 acre-feet
PEAK DISCHARGE:	0.5 cfs

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Appendix D. Hydraulics

FHWA Hydraulic Toolbox Printout

Hydraulic Analysis Report

Project Data

Project Title: Madera Canyon Road Bridges

Designer: EM

Project Date: Tuesday, February 4, 2025

Project Units: U.S. Customary Units

Notes:

Bridge Scour Analysis:FC UBT Girder

Notes:

Scenario: 100y

Contraction Scour Summary

Contraction & Long Term Scour is applied method due to greater scour.

Clear Water Contraction Scour Depth 50.55 ft

Local Scour at Abutments Summary

Right Abutment

Abutment Scour Method: NCHRP Method

Abutment Scour Depth 3.23 ft

Total Scour at Abutment 3.23 ft

Main Channel Contraction Scour

Computation Type: Clear-Water and Live-Bed Scour

Input Parameters

Input Parameters for Scour Condition

Average Depth Upstream of Contraction (y1): 8.13 ft

D50 (D50): 0.199949 mm

Average Velocity Upstream (V): 13.25 ft/s

Computed Contraction Scour Condition: Live Bed

Input Parameters for Live Bed

Temperature of Water: 60.00 °F

Slope of Energy Grade Line at Approach Section (S1): 0.020000 ft/ft

Discharge in Contracted Section (Q2): 4627.00 cfs

Discharge Upstream that is Transporting Sediment (Q1): 3407.00 cfs

Bottom Width in Contracted Section (W2): 35.20 ft

Width Upstream that is Transporting Sediment (W1): 34.50 ft

Depth Prior to Scour in Contracted Section (y0): 11.40 ft

Unit Weight of Water (gamma w): 62.40 lb/ft³

Unit Weight of Sediment (gamma s): 165.00 lb/ft³

Results

Results of Scour Condition

Critical velocity above which bed material of size D and smaller will be transported (Vc): 1.38 ft/s

Results of Clear Water Method

Diameter of the smallest nontransportable particle in the bed material (Dm): 0.249936 mm

Average Depth in Contracted Section after Scour (y2): 61.95 ft

Scour Depth (ys): 50.55 ft

Results of Live Bed Method

k1 (k1): 0.69

Shear Velocity (V*): 2.29 ft/s

Fall Velocity (V*): 0.08 ft/s

Scour Depth (ys): -0.98 ft

Shear Applied to Bed by Live-Bed Scour (theta 0): 0.9861 lb/ft²

Shear Required for Movement of D50 Particle (Tau c): 0.0026 lb/ft²

Recommendations

Recommended Scour Condition: Live Bed

Recommended Scour Depth: 0.00 ft

Right Abutment Details

Abutment Scour

Computation Type: NCHRP

Input Parameters

NCHRP Method

Abutment Type: Spill-through abutment

Angle of Embankment to Flow: 90.00 Degrees

Centerline Length of Embankment: 50.80 ft

Projected Length of Embankment: 50.80 ft

Width of Flood Plain: 50.80 ft

Unit Discharge, Upstream in Main Channel (q_1): 124.10 cfs

Unit Discharge in the Constricted Area (q_2): 127.10 cfs/ft

D50: 0.199949 mm

Upstream Flow Depth: 8.60 ft

Flow Depth Prior to Scour: 8.80 ft

Result Parameters

q_2/q_1 : 1.02

Average Velocity Upstream: 14.43 ft/s

Critical Velocity above which Bed Material of Size D and Smaller will be Transported: 1.39 ft/s

Scour Condition: Live Bed

Embankment Length/Floodplain Width Ratio: 1.00

Scour Condition: a (Main Channel)

Amplification Factor: 1.37

Flow Depth including Contraction Scour: 8.78 ft

Maximum Flow Depth including Abutment Scour: 12.03 ft

Scour Hole Depth from NCHRP Method: 3.23 ft

Scenario: 500y

Contraction Scour Summary

Contraction & Long Term Scour is applied method due to greater scour.

Clear Water Contraction Scour Depth 50.55 ft

Local Scour at Abutments Summary

Right Abutment

Abutment Scour Method: NCHRP Method

Abutment Scour Depth 3.23 ft

Total Scour at Abutment 3.23 ft

Main Channel Contraction Scour

Computation Type: Clear-Water and Live-Bed Scour

Input Parameters

Input Parameters for Scour Condition

Average Depth Upstream of Contraction (y1): 8.13 ft

D50 (D50): 0.199949 mm

Average Velocity Upstream (V): 13.25 ft/s

Computed Contraction Scour Condition: Live Bed

Input Parameters for Live Bed

Temperature of Water: 60.00 °F

Slope of Energy Grade Line at Approach Section (S1): 0.020000 ft/ft

Discharge in Contracted Section (Q2): 4627.00 cfs

Discharge Upstream that is Transporting Sediment (Q1): 3407.00 cfs

Bottom Width in Contracted Section (W2): 35.20 ft

Width Upstream that is Transporting Sediment (W1): 34.50 ft

Depth Prior to Scour in Contracted Section (y0): 11.40 ft

Unit Weight of Water (gamma w): 62.40 lb/ft³

Unit Weight of Sediment (gamma s): 165.00 lb/ft³

Results

Results of Scour Condition

Critical velocity above which bed material of size D and smaller will be transported (V_c):
1.38 ft/s

Results of Clear Water Method

Diameter of the smallest nontransportable particle in the bed material (D_m): 0.249936 mm

Average Depth in Contracted Section after Scour (y_2): 61.95 ft

Scour Depth (y_s): 50.55 ft

Results of Live Bed Method

k_1 (k_1): 0.69

Shear Velocity (V^*): 2.29 ft/s

Fall Velocity (V^*): 0.08 ft/s

Scour Depth (y_s): -0.98 ft

Shear Applied to Bed by Live-Bed Scour (θ_0): 0.9861 lb/ft²

Shear Required for Movement of D50 Particle (τ_c): 0.0026 lb/ft²

Recommendations

Recommended Scour Condition: Live Bed

Recommended Scour Depth: 0.00 ft

Right Abutment Details

Abutment Scour

Computation Type: NCHRP

Input Parameters

NCHRP Method

Abutment Type: Spill-through abutment

Angle of Embankment to Flow: 90.00 Degrees

Centerline Length of Embankment: 50.80 ft

Projected Length of Embankment: 50.80 ft

Width of Flood Plain: 50.80 ft

Unit Discharge, Upstream in Main Channel (q_1): 124.10 cfs

Unit Discharge in the Constricted Area (q_2): 127.10 cfs/ft

D50: 0.199949 mm

Upstream Flow Depth: 8.60 ft

Flow Depth Prior to Scour: 8.80 ft

Result Parameters

q_2/q_1 : 1.02

Average Velocity Upstream: 14.43 ft/s

Critical Velocity above which Bed Material of Size D and Smaller will be Transported: 1.39 ft/s

Scour Condition: Live Bed

Embankment Length/Floodplain Width Ratio: 1.00

Scour Condition: a (Main Channel)

Amplification Factor: 1.37

Flow Depth including Contraction Scour: 8.78 ft

Maximum Flow Depth including Abutment Scour: 12.03 ft

Scour Hole Depth from NCHRP Method: 3.23 ft

Scour Summary Table

Long Term Degradation

Contraction Scour

Parameter	100y	500y	Units	Notes
Selected Contraction Computation Method	Clear-Water and Live-Bed Scour	Clear-Water and Live-Bed Scour		
Applied Contraction Scour Depth	0.00	0.00	ft	Live Bed
Clear Water Contraction Scour Depth	50.33	50.55	ft	
Live Bed Contraction Scour Depth	-0.99	-0.98	ft	

Local Scour at Piers

Local Scour at Abutments

Parameter	100y	500y	Units	Notes
Right Abutment				
Abutment Scour Depth	1.37	3.23	ft	NCHRP Method: Scour Condition A (includes LTD)
Max Flow Depth including Abutment Scour	10.87	12.03	ft	Including the long-term scour depth
Total Scour at Abutment	1.37	3.23	ft	

Bridge Scour Analysis:MW UBT Girder

Notes:

Scenario: 100y

Contraction Scour Summary

Contraction & Long Term Scour is applied method due to greater scour.

Applied Contraction Scour Depth 1.63 ft

Contraction & Long Term Scour is applied method due to greater scour.

Pressure Scour Depth 1.63 ft

Clear Water Contraction Scour Depth 16.54 ft

Live Bed Contraction Scour Depth 1.63 ft

Local Scour at Abutments Summary

Left Abutment

Abutment Scour Method: NCHRP Method

Abutment Scour Depth 3.65 ft

Total Scour at Abutment 3.65 ft

Main Channel Contraction Scour

Computation Type: Clear-Water and Live-Bed Scour

Input Parameters

Input Parameters for Scour Condition

Average Depth Upstream of Contraction (y1): 3.25 ft

D50 (D50): 0.199949 mm

Average Velocity Upstream (V): 8.72 ft/s

Computed Contraction Scour Condition: Live Bed

Input Parameters for Live Bed

Temperature of Water: 60.00 °F

Slope of Energy Grade Line at Approach Section (S1): 0.019000 ft/ft

Discharge in Contracted Section (Q2): 950.00 cfs

Discharge Upstream that is Transporting Sediment (Q1): 562.00 cfs

Bottom Width in Contracted Section (W_2): 26.30 ft

Width Upstream that is Transporting Sediment (W_1): 29.80 ft

Depth Prior to Scour in Contracted Section (y_0): 3.93 ft

Unit Weight of Water (γ_w): 62.40 lb/ft³

Unit Weight of Sediment (γ_s): 165.00 lb/ft³

Results

Results of Scour Condition

Critical velocity above which bed material of size D and smaller will be transported (V_c): 1.18 ft/s

Results of Clear Water Method

Diameter of the smallest nontransportable particle in the bed material (D_m): 0.249936 mm

Average Depth in Contracted Section after Scour (y_2): 20.47 ft

Scour Depth (y_s): 16.54 ft

Results of Live Bed Method

k_1 (k_1): 0.69

Shear Velocity (V^*): 1.41 ft/s

Fall Velocity (V^*): 0.08 ft/s

Scour Depth (y_s): 1.63 ft

Shear Applied to Bed by Live-Bed Scour (θ_0): 0.2125 lb/ft²

Shear Required for Movement of D50 Particle (τ_c): 0.0026 lb/ft²

Recommendations

Recommended Scour Condition: Live Bed

Recommended Scour Depth: 1.63 ft

Left Abutment Details

Abutment Scour

Computation Type: NCHRP

Input Parameters

NCHRP Method

Abutment Type: Spill-through abutment

Angle of Embankment to Flow: 90.00 Degrees

Centerline Length of Embankment: 22.30 ft

Projected Length of Embankment: 22.30 ft

Width of Flood Plain: 22.30 ft

Unit Discharge, Upstream in Main Channel (q_1): 40.30 cfs

Unit Discharge in the Constricted Area (q_2): 50.60 cfs/ft

D50: 0.199949 mm

Upstream Flow Depth: 3.90 ft

Flow Depth Prior to Scour: 4.30 ft

Result Parameters

q_2/q_1 : 1.26

Average Velocity Upstream: 10.33 ft/s

Critical Velocity above which Bed Material of Size D and Smaller will be Transported: 1.22 ft/s

Scour Condition: Live Bed

Embankment Length/Floodplain Width Ratio: 1.00

Scour Condition: a (Main Channel)

Amplification Factor: 1.68

Flow Depth including Contraction Scour: 4.74 ft

Maximum Flow Depth including Abutment Scour: 7.95 ft

Scour Hole Depth from NCHRP Method: 3.65 ft

Scenario: 500y

Contraction Scour Summary

Contraction & Long Term Scour is applied method due to greater scour.

Applied Contraction Scour Depth 1.63 ft

Contraction & Long Term Scour is applied method due to greater scour.

Pressure Scour Depth 1.63 ft

Clear Water Contraction Scour Depth 16.54 ft

Live Bed Contraction Scour Depth 1.63 ft

Local Scour at Abutments Summary

Left Abutment

Abutment Scour Method: NCHRP Method

Abutment Scour Depth 3.65 ft

Total Scour at Abutment 3.65 ft

Main Channel Contraction Scour

Computation Type: Clear-Water and Live-Bed Scour

Input Parameters

Input Parameters for Scour Condition

Average Depth Upstream of Contraction (y1): 3.25 ft

D50 (D50): 0.199949 mm

Average Velocity Upstream (V): 8.72 ft/s

Computed Contraction Scour Condition: Live Bed

Input Parameters for Live Bed

Temperature of Water: 60.00 °F

Slope of Energy Grade Line at Approach Section (S1): 0.019000 ft/ft

Discharge in Contracted Section (Q2): 950.00 cfs

Discharge Upstream that is Transporting Sediment (Q1): 562.00 cfs

Bottom Width in Contracted Section (W2): 26.30 ft

Width Upstream that is Transporting Sediment (W1): 29.80 ft

Depth Prior to Scour in Contracted Section (y0): 3.93 ft

Unit Weight of Water (γ_w): 62.40 lb/ft³

Unit Weight of Sediment (γ_s): 165.00 lb/ft³

Results

Results of Scour Condition

Critical velocity above which bed material of size D and smaller will be transported (V_c): 1.18 ft/s

Results of Clear Water Method

Diameter of the smallest nontransportable particle in the bed material (D_m): 0.249936 mm

Average Depth in Contracted Section after Scour (y_2): 20.47 ft

Scour Depth (y_s): 16.54 ft

Results of Live Bed Method

k_1 (k_1): 0.69

Shear Velocity (V^*): 1.41 ft/s

Fall Velocity (V^*): 0.08 ft/s

Scour Depth (y_s): 1.63 ft

Shear Applied to Bed by Live-Bed Scour (θ_0): 0.2125 lb/ft²

Shear Required for Movement of D50 Particle (τ_c): 0.0026 lb/ft²

Recommendations

Recommended Scour Condition: Live Bed

Recommended Scour Depth: 1.63 ft

Left Abutment Details

Abutment Scour

Computation Type: NCHRP

Input Parameters

NCHRP Method

Abutment Type: Spill-through abutment

Angle of Embankment to Flow: 90.00 Degrees

Centerline Length of Embankment: 22.30 ft

Projected Length of Embankment: 22.30 ft

Width of Flood Plain: 22.30 ft

Unit Discharge, Upstream in Main Channel (q_1): 40.30 cfs

Unit Discharge in the Constricted Area (q_2): 50.60 cfs/ft

D50: 0.199949 mm

Upstream Flow Depth: 3.90 ft

Flow Depth Prior to Scour: 4.30 ft

Result Parameters

q_2/q_1 : 1.26

Average Velocity Upstream: 10.33 ft/s

Critical Velocity above which Bed Material of Size D and Smaller will be Transported: 1.22 ft/s

Scour Condition: Live Bed

Embankment Length/Floodplain Width Ratio: 1.00

Scour Condition: a (Main Channel)

Amplification Factor: 1.68

Flow Depth including Contraction Scour: 4.74 ft

Maximum Flow Depth including Abutment Scour: 7.95 ft

Scour Hole Depth from NCHRP Method: 3.65 ft

Scour Summary Table

Long Term Degradation

Contraction Scour

Parameter	100y	500y	Units	Notes
Selected Contraction Computation Method	Clear-Water and Live-Bed Scour	Clear-Water and Live-Bed Scour		
Applied Contraction Scour Depth	1.68	1.63	ft	Live Bed
Clear Water Contraction Scour Depth	17.97	16.54	ft	
Live Bed Contraction Scour Depth	1.68	1.63	ft	

Local Scour at Piers

Local Scour at Abutments

Parameter	100y	500y	Units	Notes
Left Abutment				
Abutment Scour Depth	3.25	3.65	ft	NCHRP Method: Scour Condition A (includes LTD)
Max Flow Depth including Abutment Scour	7.25	7.95	ft	Including the long-term scour depth
Total Scour at Abutment	3.25	3.65	ft	

Drop Structure Scour Calculations

Drop Structure Scour

Project Madera Canyon Bridges
Proj. No.
Structure Florida Canyon
County Pima
Road Madera Canyon Rd
Date 2/10/2024
Engineer CJC

Based on SSCAFCA Sediment and Erosion Design Guide, 2008

NOTES

Calculation completed looking at scour depth at various drops in head at the outlet of the superbox alternatives.

$$d_s = K_v H_t^{0.225} q^{0.54} - d_m$$

ds	3.0	Depth of scour (ft)
q	66.3	Unit discharge (cfs/ft)
Q	6248	Culvert Discharge (ft^3/s)
w	94.25	Flow width (minus pier walls) (ft)
Kv	1.32	coefficient (English Customary units)
dm	7.9	tailwater depth (ft)
Ht	0.50	total drop in head (ft)

Input

Output

Drop Structure Scour

Project Madera Canyon Bridges
Proj. No.
Structure Florida Canyon
County Pima
Road Madera Canyon Rd
Date 2/10/2024
Engineer CJC

Based on SSCAFCA Sediment and Erosion Design Guide, 2008

NOTES

Calculation completed looking at scour depth at various drops in head at the outlet of the superbox alternatives.

$$d_s = K_v H_t^{0.225} q^{0.54} - d_m$$

ds	7.0	Depth of scour (ft)
q	66.3	Unit discharge (cfs/ft)
Q	6248	Culvert Discharge (ft^3/s)
w	94.25	Flow width (minus pier walls) (ft)
Kv	1.32	coefficient (English Customary units)
dm	7.9	tailwater depth (ft)
Ht	2.00	total drop in head (ft)

Input
Output

Drop Structure Scour

Project Madera Canyon Bridges
Proj. No.
Structure Medium Wash
County Pima
Road Madera Canyon Rd
Date 2/10/2024
Engineer CJC

Based on SSCAFCA Sediment and Erosion Design Guide, 2008

NOTES

Calculation completed looking at scour depth at various drops in head at the outlet of the superbox alternatives.

$$d_s = K_v H_t^{0.225} q^{0.54} - d_m$$

ds	1.2	Depth of scour (ft)
q	17.1	Unit discharge (cfs/ft)
Q	1608	Culvert Discharge (ft^3/s)
w	94.25	Flow width (minus pier walls) (ft)
Kv	1.32	coefficient (English Customary units)
dm	4	tailwater depth (ft)
Ht	0.50	total drop in head (ft)

Input
Output

Drop Structure Scour

Project Madera Canyon Bridges
Proj. No.
Structure Medium Wash
County Pima
Road Madera Canyon Rd
Date 2/10/2024
Engineer CJC

Based on SSCAFCA Sediment and Erosion Design Guide, 2008

NOTES

Calculation completed looking at scour depth at various drops in head at the outlet of the superbox alternatives.

$$d_s = K_v H_t^{0.225} q^{0.54} - d_m$$

ds	3.1	Depth of scour (ft)
q	17.1	Unit discharge (cfs/ft)
Q	1608	Culvert Discharge (ft^3/s)
w	94.25	Flow width (minus pier walls) (ft)
Kv	1.32	coefficient (English Customary units)
dm	4	tailwater depth (ft)
Ht	2.00	total drop in head (ft)

Input
Output

Culvert Apron Riprap Calculations



Project: **Madera Canyon Bridge Replacements**
Subject: **Riprap Sizing for 100-Year Event**
Task: **Pipe Culvert Rip Rap Pad Sizing**
Job #:

Computed: EMM
Checked:

Date: 11/4/2025
Date:

Structure	I.D. (in)	I.D. (ft)	Q (cfs)	TW (ft)	Check TW/D	TW _{adjusted} (ft)	Calc D ₅₀ (in)	Example Riprap Class ¹ HEC-14
Culvert 39+53.00	36	3.00	31	0.62	0.21	1.20	4.49	1

Reference: Hydraulic Engineering Circular No 14, Third Edition: Hydraulic Design of Energy Dissipators for Culverts and Channels. July 2006.

¹: Riprap Class taken from Table 10.1 of Hydraulic Engineering Circular No 14, Third Edition: Hydraulic Design of Energy Dissipators for Culverts and Channels. July 2006.

2: Minimum size used is Class 2 - D50=6in

3: Expected Q should be divided equally between barrels to avoid overly conservative D50 estimates.

4: Pull TW data from Hydraulic modeling software such as HY8 or HEC RAS.

$$D_{50} = 0.2 D \left(\frac{Q}{\sqrt{g D^{2.5}}} \right)^{1/2} \left(\frac{D}{TW} \right) \quad (10.4)$$

Example Riprap Classes and Apron Dimensions

Class	D ₅₀ (in)	Apron Length ¹ Factor	Apron Depth ¹ Factor
1	5	4	3.5
2	6	4	3.3
3	10	5	2.4
4	14	6	2.2
5	20	7	2
6	22	8	2

where,

D₅₀ = riprap size, m (ft)
Q = design discharge, m³/s (ft³/s)
D = culvert diameter (circular), m (ft)
TW = tailwater depth, m (ft)
g = acceleration due to gravity, 9.81 m/s² (32.2 ft/s²)

Tailwater depth for Equation 10.4 should be limited to between 0.4D and 1.0D. If tailwater is unknown, use 0.4D.

Whenever the flow is supercritical in the culvert, the culvert diameter is adjusted as follows:

$$D' = \frac{D + y_n}{2} \quad (10.5)$$

where,

D' = adjusted culvert rise, m (ft)
y_n = normal (supercritical) depth in the culvert, m (ft)

¹Apron Length=Apron length factor * D(culvert rise), Apron Depth = Apron Depth Factor * D₅₀

Source: FHWA, July 2006, HEC-14, Table 10.1, p. 10-18

Pipe Ref No.	No. of Barrels	I.D.	X	L	W	T	Used D ₅₀	Volume
		(in)	(ft)	(ft)	(ft)	(ft)	(in)	(CY)
Culvert 39+53.00	Single	36	9.00	12.00	13.00	1.65	6	8.07

¹Width adjusted for multiple barrels

²Dimensions modified due to site conditions and detail used (Type 2) (see "Special Pad" calcs)

³Length and Width shortened due to ROW, values from ACAD

X=3*I.D.

Bridge Drainage Spread Calculations

Worksheet for Florida Canyon Superbox

Project Description	
Solve For	Spread
Input Data	
Channel Slope	0.053 ft/ft
Discharge	0.60 cfs
Gutter Width	6.0 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Results	
Spread	4.4 ft
Flow Area	0.2 ft ²
Depth	1.0 in
Gutter Depression	0.0 in
Velocity	3.16 ft/s

Worksheet for Middle Wash Superbox

Project Description	
Solve For	Spread
Input Data	
Channel Slope	0.028 ft/ft
Discharge	0.50 cfs
Gutter Width	6.0 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Results	
Spread	4.6 ft
Flow Area	0.2 ft ²
Depth	1.1 in
Gutter Depression	0.0 in
Velocity	2.37 ft/s

Florida Canyon Wash Roadside Ditch Riprap Sizing



EM 1110-2-1601: RIPRAP STONE SIZE CALCULATION

General Notes:

Calculations are based on EM 1110-2-1601 Equation 3-3

SPREADSHEET LEGEND
HEADING
CONSTANT
USER FILL IN
AUTO-CALCULATES

$$D_{30} = S_f C_s C_v C_T d \left[\left(\frac{\gamma_w}{\gamma_s - \gamma_w} \right)^{1/2} \frac{V}{\sqrt{K_1 g d}} \right]^{2.5} \quad (3-3)$$

where

D_{30} = riprap size of which 30 percent is finer by weight, length

S_f = safety factor (see c below)

* C_s = stability coefficient for incipient failure, $D_{85}/D_{15} = 1.7$ to 5.2

= 0.30 for angular rock

* = 0.375 for rounded rock

C_v = vertical velocity distribution coefficient

= 1.0 for straight channels, inside of bends

= $1.283 - 0.2 \log (R/W)$, outside of bends (1 for $(R/W) > 26$)

= 1.25, downstream of concrete channels

= 1.25, ends of dikes

C_T = thickness coefficient (see d(1) below)

* = 1.0 for thickness = $1D_{100}(\text{max})$ or $1.5 D_{50}(\text{max})$, whichever is greater

* d = local depth of flow, length (same location as V)

γ_w = unit weight of water, weight/volume

* V = local depth-averaged velocity, V_{55} for side slope riprap, length/time

K_1 = side slope correction factor (see d(1) below)

g = gravitational constant, length/time²

Safety Factor, S_f

- Minimum SF is 1.1
- SF may be increased for imposed impact forces resulting from logs, trees, loose vessels, ice, etc...
- It is unlikely that an added SF should be used when blanket thickness exceeds 15"
- SF may be increased to compensate for inaccuracies in velocity, unit weight of rock, and depth
- SF should be increased where severe freeze-thaw is anticipated

Safety Factor, S_f =	1.10
Reasoning: SF of 1.1 is standard as recommended in EM 1110-2-1601	



Stability Coefficient for Incipient Failure, C_s

$D_{85}/D_{15} > 1.7$ for FHWA gradation
Rock Shape: Angular
Stability Coefficient $C_s = 0.300$

Vertical Velocity Distribution Coefficient, C_v

Channel Type: Outside of Bend
Radius of Bend, $R_c = 25.00$ ft
Channel Width, $W = 50$ ft
Stability Coefficient $C_v = 1.34$

Blanket Thickness Coefficient, C_T

Thickness Coefficient $C_T = 1.00$	<-- Plate B-40, 1.00 is the most conservative C_T
------------------------------------	---

Additional Inputs

Gravitational Constant, $g = 32.20$ ft/s ²	
Unit weight of water, $\gamma_w = 62.40$ lb/ft ³	
Unit weight of stone, $\gamma_s = 165.00$ lb/ft ³	
Local depth of flow, $d = 3.00$ ft	
Local depth averaged velocity, $V = 6.50$ ft/s	
Side Slope ($xH:1V$) = 2.00	
Angle of Repose = 40.00 Degrees	
Side slope correction factor, $K_1 = 0.72$	(Calculated by Eq. 3-4 in EM-1601)
Side slope correction factor, $K_1 = 0.88$	(Recommended for Design, Plate B-39)
Selected side slope correction factor, $K_1 = 0.72$	

Result

Computed $D_{30} = 0.38$ ft	
Computed $D_{50} = 0.46$ ft	($D_{50} = 1.2 D_{30}$ for FHWA gradation per NCHRP 568)
Computed $D_{50} = 5.52$ in	
Selected $D_{50} = 6$ in	(Table 4.1 from HEC-23 or Table 3.6 from NCHRP 568)

Blanket Thickness

$1 \times D_{100} = 12.00$ in
$1.5 \times D_{50} = 9.00$ in
Calculated Minimum Thickness = 12.00 in
Selected Minimum Thickness = 12.00 in

Gradation (Based on FHWA HEC-23 Table 4.1 in Design Guideline 4)

Nominal Riprap Class			D_{15}		D_{50}		D_{85}		D_{100}
Class	Weight	Size	Min	Max	Min	Max	Min	Max	Max
I	20 lb	6	3.7	5.2	5.7	6.9	7.8	9.2	12.0

(inch)

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