

DRAINAGE REPORT

PART OF LOT 4, BLOCK 4 FALCON HILLS SUBDIVISION FILING No. 1

FRONTIER SPORTSMAN'S CLUB
3885 PHEASANT LANE
PEYTON, COLORADO
80831

PREPARED FOR: MT2 METALS TREATMENT TECHNOLOGIES
14045 WEST 66TH AVENUE
ARVADA, CO 80004

APRIL 21, 2020

Prepared by

Richard Lyon, P.E.

Rocky Mountain Group

2910 Austin Bluffs Parkway | Colorado Springs, CO 80918 | 719-434-5638




PCD File No.: PPR-19-054

DRAINAGE REPORT STATEMENTS

1. ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City/County for drainage reports and said report is in conformity with the master plan for the drainage basin. I accept responsibility for liability caused by negligent acts, errors or omissions on my part in preparing this report:


Richard D. Lyon Colorado P.E. No. 53921



2. DEVELOPER'S STATEMENT:

I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Frontier Sportman's Club, Inc.
Business Name

Signature: 

Printed Name: Neisha Heidelberg

Title: Communications Director

Address: P.O. Box 1701

Colorado Springs, CO 80901

3. EL PASO COUNTY:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Jennifer Irvine, P.E.
County Engineer / ECM Administrator

Date

Conditions:

TABLE OF CONTENTS

1.0	EXISTING CONDITIONS.....	1
1.1	EXISTING SITE.....	1
1.2	EXISTING DRAINAGE CONDITIONS	1
2.0	PROPOSED CONDITIONS	3
3.0	FLOODPLAIN IMPACTS	5
4.0	FOUR-STEP PROCESS	5
5.0	PUBLIC IMPROVEMENTS / DRAINAGE BASIN FEE	5
6.0	SUMMARY.....	5
7.0	REFERENCES	6

APPENDICES

APPENDIX A – FEMA FLOOD INSURANCE STUDY MAP

APPENDIX B – USGS SOILS MAP

APPENDIX C – EPA SWMM REPORT

APPENDIX D – SUB-BASIN DELINEATION EXHIBITS

1.0 EXISTING CONDITIONS

1.1 EXISTING SITE

The Frontier Sportsman's Club located at 3885 Pheasant Lane is located in Peyton, Colorado east of Pheasant Lane, west of East Blaney Road, north of Blaney Road South, and South of Partridge Lane in El Paso County. The 40.71 acre lot is zoned A-35 RR-5, is schedule number 4330000017 and the legal description reads as "NW4SE4, TOG with R/W Easement over nly 30.0 ft of E2SE4 SEC 30-13-64, TOG with nly 60.0 ft of Lot 4 Blk 4 Falcon Hills Sub No. 1". The land use is a commercial gun range. The property is surrounded by vacant agricultural land to the north, and agriculturally zoned residences in all other directions. A vicinity map is shown as part of the plan set and the surrounding parcels with labels are included in the plan set.

1.2 EXISTING DRAINAGE CONDITIONS

The property currently consists of two major berms on the southeast corner of the parcel. These berms are typically a minimum of 10' in height and graded at 2:1 slope and are utilized as a backdrop for the shooting range areas. The vast majority of the parcel is native grasses, weeds, and shrubs with 1.6 percent of the property consisting of impervious pavement for the parking area and structures. The existing slopes on the property vary from 2:1 berm slopes and 2 to 10 percent for overlot grades.

There is an informal stream line and a portion of the property to south east designated as Zone A that is a part of an unnamed tributary shown on the FEMA flood plain map firmette in Appendix A. According to FEMA flood plain map 08041C0563G revised December 7, 2018, the waterway line and Zone A within this parcel are not a part of the Jimmy Camp Creek or any formally designated creek or stream. There are no observed engineered embankments or protected/shielded water ways within the property for the water way line shown on the flood zone map.

According to the USGS soils survey map, the western half of the parcel consists of Bresser sandy loam, cool which is typically formed in thick eolian material and noncalcareous coarse textured alluvial materials derived from arkosic deposits or granite. The eastern region consists of Blakeland loamy sand which is typically formed in eolian and alluvial materials from arkose deposits. The Bresser clay loam is hydrologic soil group B which are soils having a moderate infiltration rate when thoroughly wet. The Blakeland loamy sand is hydrologic soil group A which have high infiltration rates and low runoff potential when thoroughly wet.

No soil borings or a geotechnical report were conducted for this site.

As part of this drainage letter, current criteria will be applied with updated basin and sub-basin delineations for existing conditions. The criteria used to analyze the existing drainage conditions for the 5-year and 100-year storm events is per the Drainage Criteria Manual and EPA SWMM was used to calculation peak flows. The City of Colorado Springs and El Paso County Drainage

Criteria Manual, Volumes 1 and 2, were used for hydrologic and hydraulic calculations and criteria such as time of concentration, rainfall intensity, and runoff coefficients for various land uses.

The existing drainage conditions of the lot are presented in the civil exhibit and calculations in the Appendix. The off-site basins remain delineated the same for the existing and conditions and have the following peak flows:

OS-1 (37.42 acres ; $Q_5 = 5.35$ cfs ; $Q_{100} = 28.23$ cfs) The upstream northern off-site sub-basin that flows to the property's north property boundary. The sub-basin immediately contributes to **DP1** and ultimately contributes to **DP4** which flows off-site due east to an unnamed tributary.

OS-2 (47.63 acres ; $Q_5 = 6.85$ cfs ; $Q_{100} = 36.63$ cfs) The off-site upstream area west, northwest, and south that flows onto the property and ultimately contributes to **DP4** which flows off-site due east to an unnamed tributary.

OS-3 (1.03 acres ; $Q_5 = 0.46$ cfs ; $Q_{100} = 2.47$ cfs) The southern off-site sub-basin that flows onto the property to a low point at **DP2** and when overflowing ultimately contributes to **DP4** which flows off-site due east to an unnamed tributary.

OS-4 (1.26 acres ; $Q_5 = 0.75$ cfs ; $Q_{100} = 4.02$ cfs) An off-site area to the northeast of the property that flows into sub-basin **E-4** and ultimately contributes to **DP4** which flows off-site due east to an unnamed tributary.

E-1 (1.74 acres ; $Q_5 = 1.05$ cfs ; $Q_{100} = 5.69$ cfs) The on-site sub-basin near the east property line with a low point at **DP1** and when the low point overflows, it ultimately contributes to **DP4** which flows off-site to an unnamed tributary.

E-2 (2.21 acres ; $Q_5 = 0.99$ cfs ; $Q_{100} = 5.28$ cfs) The on-site sub-basin at the south property line with a low point at **DP2**. If the low point is assumed to be fully saturated the ultimate flow route is to **DP4** which flows off-site due east to an unnamed tributary.

E-3 (31.30 acres ; $Q_5 = 8.44$ cfs ; $Q_{100} = 34.39$ cfs) The on-site sub-basin that is the majority of the property which directly flows to the subtle water way near the central berms and ultimately contributes to **DP4** which flows off-site due east to an unnamed tributary.

E-4 (2.31 acres ; $Q_5 = 1.18$ cfs ; $Q_{100} = 6.14$ cfs) The on-site sub-basin west of the **DP2** low point which flows southeast and ultimately contributes to **DP4** which flows off-site due east to an unnamed tributary.

DP1 ($Q_5 = 5.35$ cfs ; $Q_{100} = 28.23$ cfs) The north property line of the parcel where upstream off-site flow enters the property. The flow route beyond the Design Point is through the property along the unnamed tributary and to **DP4**.

DP2 ($Q_5 = 1.80$ cfs ; $Q_{100} = 9.71$ cfs) The low point area of sub-basin **E-1** which ultimately flows to **DP4** if the low point is fully saturated and overflows.

DP3 ($Q_5 = 1.45$ cfs ; $Q_{100} = 7.74$ cfs)::: the low point area of sub-basin E-2 and off-site sub-basin OS-3 which would experience ponding and ultimately flow to DP4.

DP4 ($Q_5 = 23.66$ cfs ; $Q_{100} = 118.19$ cfs)::: the outlet point of the property to the south east which ultimately flows off-site due east to an unnamed tributary within a FEMA Zone A. Because this is not a formally named tributary and is outside of FEMA's studied extents, FEMA does not have any available literature or calculations for this waterway.

2.0 PROPOSED CONDITIONS

The proposed project consists of earthwork of new berms and shooting range areas. The limits of disturbance in order to create the berms and flat areas is 148,030 square feet (3.39 acres) with an unadjusted cut/fill of 29,720 cubic yards of cut and 1,150 cubic yards of fill for a net of 28,570 cubic yards of cut. With an assumed 33 percent swell and compaction factor, this yields 39,530 cubic yards of cut and 1,530 cubic yards of fill for a net of 38,000 cubic yards of cut.

The earthwork of the new berms, especially the most northern berm, does reroute the waterway shown on the firmette map. The intention is to have any water way depression routed around the proposed berms and continue to its existing location through the property. The new berms will result in some areas of 2:1 and 1:1 slopes as well as flat areas for the shooting ranges but overall are not adding any impervious area to the basin and are graded to stay within the historical drainage pattern of the site and water way. The results of the hydrologic sub-basin delineations between the existing and proposed conditions are included as part of this report. The design point or outlet of the site is the southeast location of the property in which the Flood Zone A, part of an unnamed tributary, exits the property limits to the east.

The off-site sub-basins are unaltered by the project and therefore have the same delineations and peak flows. The developed conditions sub-basins very closely correspond to their existing conditions sub-basins, i.e. D-1 corresponds to the developed conditions of existing sub-basin E-1, etc. Slight variation in flow path lengths and delineations due to the proposed grading result in slightly different acreages and flows for the developed conditions but are overall consistent with the existing conditions as there is no proposed impervious area for the project.

D-1 (1.76 acres ; $Q_5 = 0.93$ cfs ; $Q_{100} = 4.86$ cfs) The on-site sub-basin near the east property line with a low point at DP2 and ultimately contributes to DP4 which flows off-site due east to an unnamed tributary.

D-2 (3.67 acres ; $Q_5 = 1.42$ cfs ; $Q_{100} = 7.75$ cfs) The on-site sub-basin at the south property line with a low point at DP3 and ultimately contributes to DP4 which flows off-site due east to an unnamed tributary. The sub-basin is marginally larger than its existing conditions delineations due to the new southwest embankments.

D-3 (30.19 acres ; $Q_5 = 7.50$ cfs ; $Q_{100} = 24.38$ cfs) The on-site sub-basin that is the majority of the property which directly flows to the subtle water way shown on the plans and ultimately contributes to DP4 which flows off-site due east to an unnamed tributary. The sub-basin is marginally smaller than its existing conditions delineation due to the new berms. The time of concentration is increased due to the flatter range areas.

D-4 (1.95 acres ; $Q_5 = 0.74$ cfs ; $Q_{100} = 4.07$ cfs) The on-site sub-basin that at the west property line which flows to the DP2 low point which ultimately contributes to DP4 which flows off-site due east to an unnamed tributary.

Because no impervious area is proposed and the land disturbance to unimproved land is to remain unimproved, the design point storm event flows are similar to that of the existing conditions of the site. Earthwork alterations on-site for berms and embankments may presumably only alter the time of concentration of some sub-basins due to longer or shorter flow patterns. Below are the results of the Design Points due to the earthwork proposed for the developed conditions.

DP1 ($Q_5 = 5.35$ cfs ; $Q_{100} = 28.23$ cfs): is the north property line of the parcel where upstream off-site flow enters the property. The flow route beyond the Design Point is through the property along the unnamed tributary and to DP4.

DP2 ($Q_5 = 1.67$ cfs ; $Q_{100} = 8.88$ cfs): the low point area of sub-basin D-1 which ultimately flows to DP4 if the low point is fully saturated and overflows.

DP3 ($Q_5 = 1.88$ cfs ; $Q_{100} = 10.21$ cfs): the low point area of sub-basin D-2 and off-site sub-basin OS-3 which would experience ponding and ultimately flow to DP4.

DP4 ($Q_5 = 22.63$ cfs ; $Q_{100} = 108.68$ cfs): the outlet point of the property to the south east which ultimately flows off-site due east to an unnamed tributary within a FEMA Zone A. Because this is not a formally named tributary and is outside of FEMA's studied extents, FEMA does not have any available literature or calculations for this waterway.

The storm water peak flow of DP1 remains the same for the 100-year storm event as there is no earthwork proposed off-site. The peak flow of DP2 is decreased by 0.83 cfs during a 100-year storm event due to new embankment construction delineating the sub-basin slightly and routing the water over a longer flow path. The peak flow of DP3 is increased by 2.47 cfs during a 100-year storm event due to an expansion of the delineation due to earthwork to the southwest range area. The 100-year storm event peak flow of DP4 is decreased by 9.51 cfs due to an increase in time of concentration with overland flow over the flattened range areas within the embankments. Overall, the proposed conditions do not negatively impact the property or adjacent properties and waterways and are consistent with the historic drainage pattern of the site and surrounding area.

As part of the construction process, proper erosion control measures will be required for development of the site including silt fencing and sediment control logs along downstream limits of disturbance to minimize off-site transport of construction sediment. Other control measures such as rock socks along channelized flow areas, a vehicle tracking pad, a concrete washout area, and erosion blankets are to be installed in appropriate areas. An erosion control plan and stormwater management plan is provided in the development plan set as a guide to proper control measure placement.

The Developed Drainage Plan includes the following notes for Builders and Property Owners:

1. Proposed site conditions shall not significantly vary from the conditions presented in this report. The degree to which variance from the proposed conditions allowed is at the discretion of the County. The most critical variable is the percent impervious of the site.
2. Individual builders shall provide positive drainage away from structures and account for potential cross-lot drainage impacts within the lot.
3. The builders and property owner shall implement and maintain erosion control best management practices/control measures for protection of downstream properties and facilities.
4. Recognizing the location of this subdivision adjacent to the storm inlets and developed downstream properties, the builders and property owner shall take extra care in providing and maintaining erosion control BMP's/control measures at downstream property boundaries.

3.0 FLOODPLAIN IMPACTS

According to the FEMA floodplain map for this area, El Paso County FIRM Panel No. 08041C0563G, dated December 7, 2018 (see Appendix A), the majority of the parcel does not fall within a FEMA flood zone and a part of the (0.79 acres) parcel to the south east falls into Zone A, an area subject to inundation by the 1-percent-annual-chance flood event.

4.0 FOUR-STEP PROCESS

The development activity is excluded from post construction permanent BMP's because it is land disturbance of undeveloped land that will remain undeveloped and per section I.7.1.B.7 of the El Paso County Engineering Criteria Manual. A Four-Step Process is not required for this scope of work.

5.0 PUBLIC IMPROVEMENTS / DRAINAGE BASIN FEE

No public drainage improvements are required or proposed for this project. According to El Paso County policies, drainage basin fees are due based on the impervious area projected for the new development but are not applicable with site development plans; therefore, no drainage fees are due.

6.0 SUMMARY

The proposed drainage patterns for the lot will generally remain consistent with historic conditions and the overall 100-year storm event flow to the unnamed tributary is decreased due to an increase in time of concentration of overland flow through the property after the earthwork. The development will have no impact to downstream facilities or drainage basins, there are no recommended improvements for the downstream unnamed tributary. The proposed grading of shooting range backdrop embankments is 2:1 slope with geotextile within the embankment for

slope stabilization. This is a typical build for a shooting range backdrop to ensure an effective soil mass with an appropriate height and angle to reduce the likelihood of ricochet bullets and is considered an essential safety standard. The slopes adjacent to the range areas are graded at 3:1 for slope stability and to prevent erosion. While the disturbance area is greater than one acre, there will be no installation of impervious areas. The development activity is excluded from post construction permanent BMP's because it is land disturbance of undeveloped land that will remain undeveloped and per section I.7.1.B.7 of the El Paso County Engineering Criteria Manual. Should the proposed site plan for this lot vary significantly from the assumptions made in this Drainage Letter Report, a revised report with updated calculations shall be required. Additionally, should the proposed development vary and cause an increase in storm runoff volumes and result in significant impacts to downstream facilities, the proposed development shall be subject to detention and water quality requirements. Installation and maintenance of proper erosion control practices during and after construction will ensure that this developed site will not adversely affect downstream or surrounding areas.

7.0 REFERENCES

Jimmy Camp Creek Drainage Basin Planning Study Development of Alternatives & Design of Selected Plan Report, Prepared for City of Colorado Springs, Prepared By Kiowa Engineering Corporation, dated March 9, 2015

El Paso County Engineering Criteria Manual, Appendix I, July 2019

El Paso County / City of Colorado Springs Drainage Criteria Manuals Volumes I and II, Volume I Chapter 6 & 13, May 2014; Volume II May 2014; Volume I dated 1991 and 1994 revisions.

APPENDIX A – FEMA FLOOD ZONE MAP

National Flood Hazard Layer FIRMette



38°53'29.38"N



Legend

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

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>	With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
	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 <i>Zone X</i>
	Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
	Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
	Area with Flood Risk due to Levee <i>Zone D</i>

OTHER AREAS	Area of Minimal Flood Hazard <i>Zone X</i>
	NO SCREEN
	Effective LOMRs
	Area of Undetermined Flood Hazard <i>Zone D</i>

GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall

OTHER FEATURES	Cross Sections with 1% Annual Chance Water Surface Elevation
	20.2
	17.5
	Coastal Transect
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature

MAP PANELS	Digital Data Available
	No Digital Data Available
	Unmapped

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

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/21/2020 at 1:54:19 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

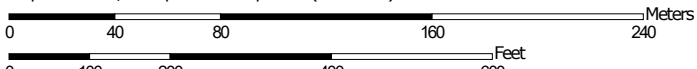
APPENDIX B – USGS SOILS MAPS

Soil Map—El Paso County Area, Colorado
(Frontier Sportsman's Club - Soils Map)



Soil Map may not be valid at this scale.

Map Scale: 1:2,860 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 17, Sep 13, 2019

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

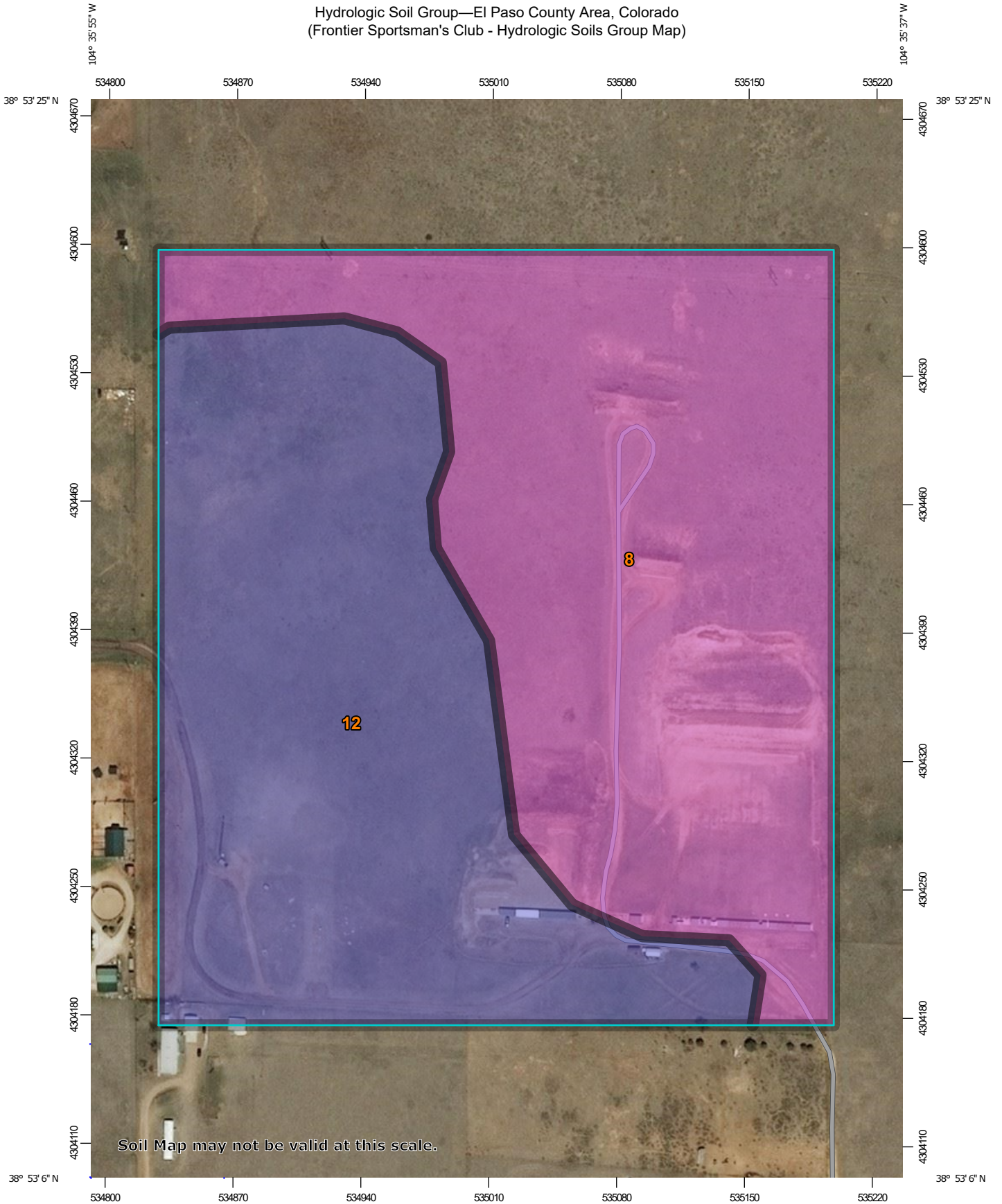
Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

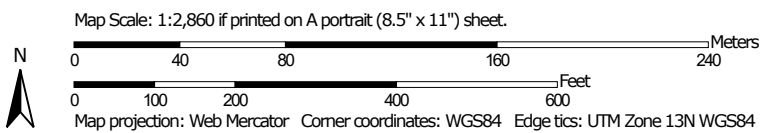
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	20.2	52.1%
12	Bresser sandy loam, cool, 3 to 5 percent slopes	18.5	47.9%
Totals for Area of Interest		38.8	100.0%

Hydrologic Soil Group—El Paso County Area, Colorado
(Frontier Sportsman's Club - Hydrologic Soils Group Map)



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

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The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	20.2	52.1%
12	Bresser sandy loam, cool, 3 to 5 percent slopes	B	18.5	47.9%
Totals for Area of Interest			38.8	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

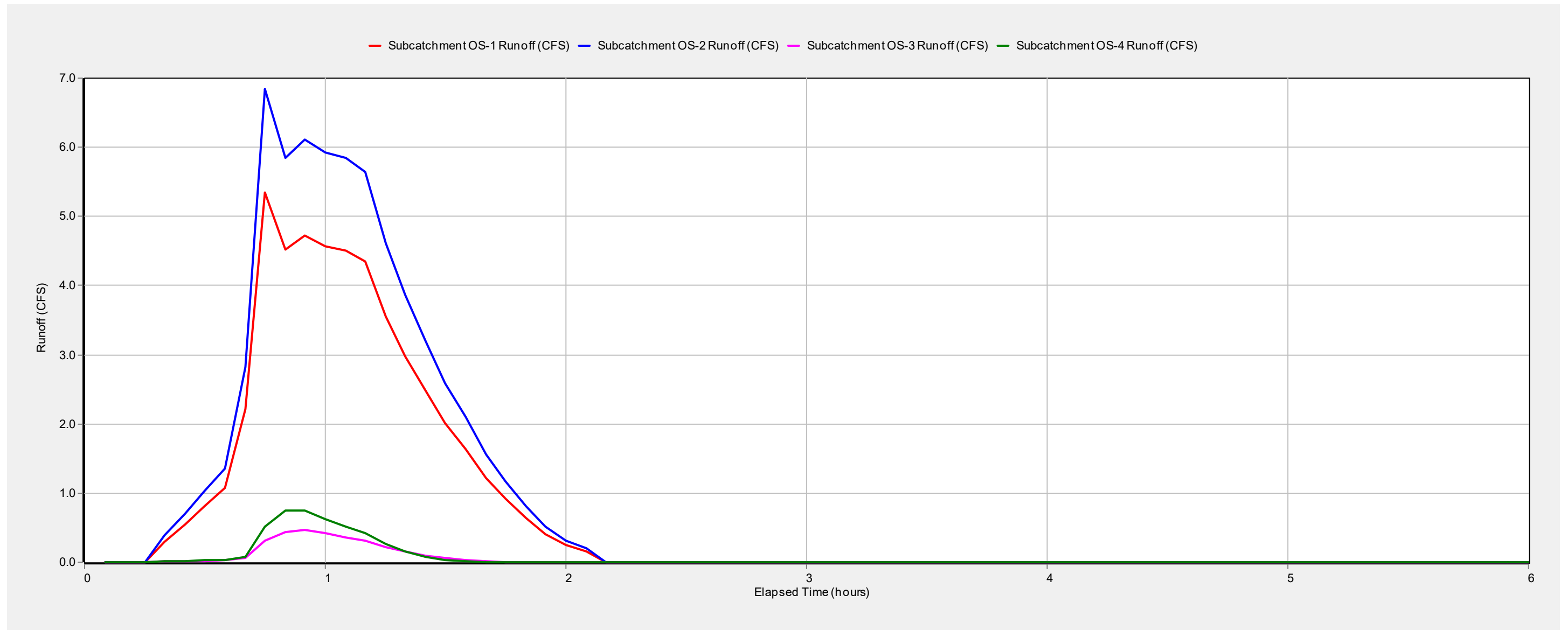
APPENDIX C – HYDROLOGY CALCULATIONS (EPA SWMM)

MT2 PHEASANT LANE - 5 YEAR EXISTING CONDITIONS

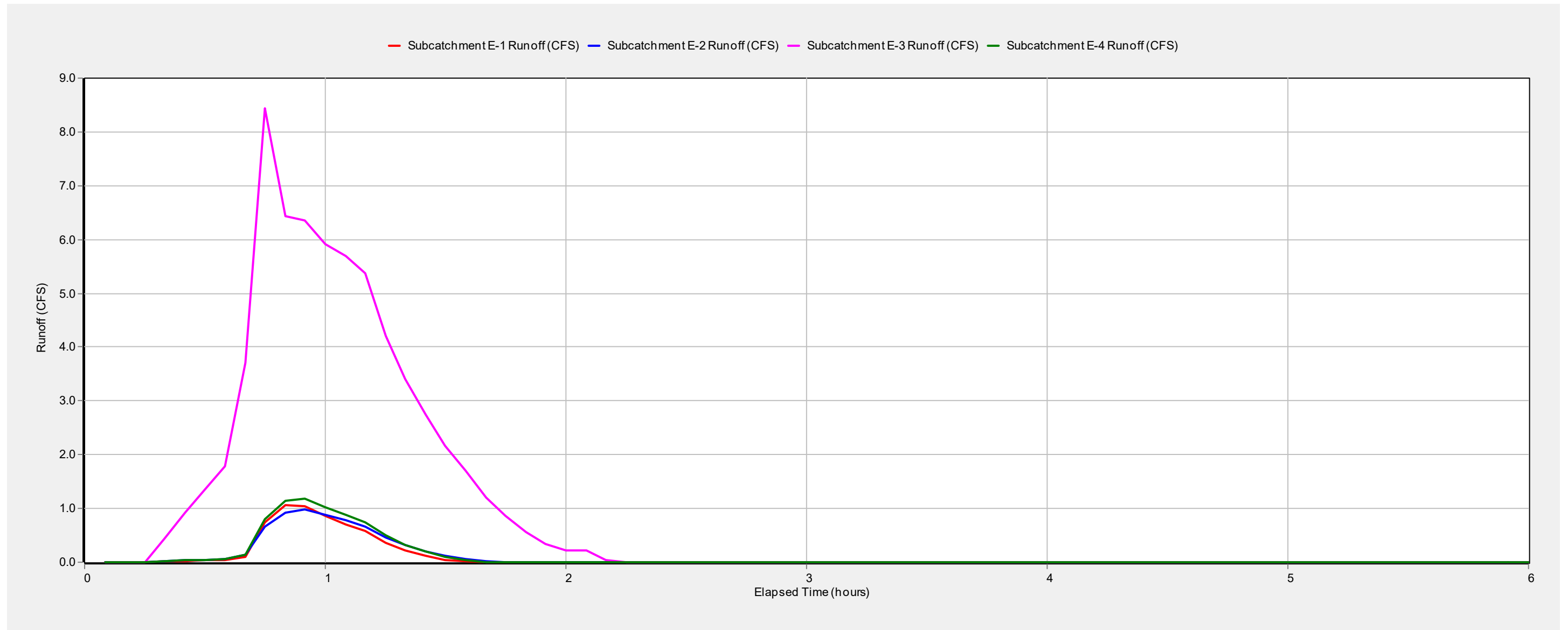
Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10 ⁶ gal	Peak Runoff CFS	Runoff Coeff
E-1	1.68	0.00	0.00	1.40	0.03	0.24	0.27	0.01	1.05	0.164
E-2	1.68	0.00	0.00	1.44	0.03	0.20	0.23	0.01	0.99	0.140
E-3	1.68	0.00	0.00	1.51	0.06	0.10	0.17	0.14	8.44	0.099
E-4	1.68	0.00	0.00	1.43	0.03	0.22	0.25	0.02	1.18	0.150
OS-1	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.11	5.35	0.064
OS-2	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.14	6.85	0.065
OS-3	1.68	0.00	0.00	1.44	0.03	0.20	0.24	0.01	0.46	0.140
OS-4	1.68	0.00	0.00	1.41	0.03	0.24	0.27	0.01	0.75	0.162

MT2 PHEASANT LANE - 5 YEAR EXISTING CONDITIONS



MT2 PHEASANT LANE - 5 YEAR EXISTING CONDITIONS

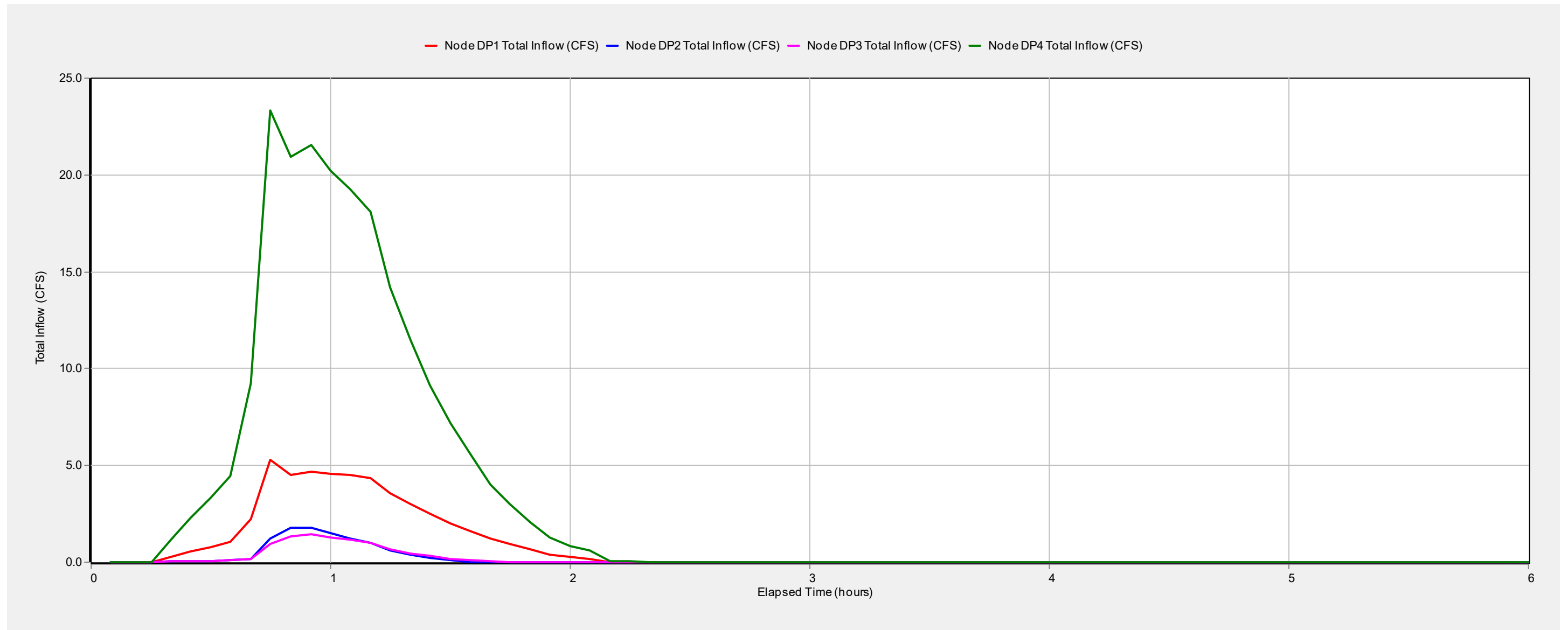


MT2 PHEASANT LANE - 5 YEAR EXISTING CONDITIONS

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal	Flow Balance Error Percent
DP1	JUNCTION	5.35	5.35	0	00:45	0.109	0.109	0.000
DP2	JUNCTION	1.80	1.80	0	00:50	0.0223	0.0223	0.000
DP3	JUNCTION	1.45	1.45	0	00:55	0.0207	0.0207	0.000
DP4	OUTFALL	16.09	23.66	0	00:45	0.298	0.45	0.000

MT2 PHEASANT LANE - 5 YEAR EXISTING CONDITIONS



MT2 PHEASANT LANE - 5 YEAR EXISTING CONDITIONS

Element Count

Number of rain gages 1
 Number of subcatchments ... 8
 Number of nodes 4
 Number of links 3
 Number of pollutants 0
 Number of land uses 0

Raingage Summary

Name	Data Source	Data	Recording Type	Interval
RG1	5-YR		CUMULATIVE	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
OS-1	37.42	1159.00	2.00	4.2500	RG1	DP1
OS-2	47.63	1729.00	2.00	3.2500	RG1	DP4
OS-3	1.03	124.00	2.00	8.2400	RG1	DP3
E-1	1.74	309.00	2.00	10.1000	RG1	DP2
E-2	2.21	254.00	2.00	8.9400	RG1	DP3
E-3	31.30	2215.00	4.00	2.0200	RG1	DP4
E-4	2.31	335.00	2.00	8.5100	RG1	DP4
OS-4	1.26	171.00	2.00	16.1000	RG1	DP2

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
------	------	--------------	------------	-------------	-----------------

DP2	JUNCTION	6672.00	6674.00	0.0
DP3	JUNCTION	6670.00	6673.00	0.0
DP1	JUNCTION	6696.00	0.00	0.0
DP4	OUTFALL	6661.95	0.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C24	DP2	DP4	CONDUIT	350.0	2.8726	0.1625
C34	DP3	DP4	CONDUIT	470.0	1.7130	0.1625
C14	DP1	DP4	CONDUIT	1680.0	2.0272	0.1625

Cross Section Summary

Conduit	Shape	Full Depth	Full Hyd. Area	Max. Rad.	No. of Width	Full Barrels	Flow
C24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

- Flow Units CFS
- Process Models:
 - Rainfall/Runoff YES
 - RDII NO
 - Snowmelt NO
 - Groundwater NO
 - Flow Routing YES
 - Ponding Allowed NO
 - Water Quality NO

Infiltration Method HORTON
 Flow Routing Method KINWAVE
 Starting Date 10/18/2019 00:00:00
 Ending Date 10/18/2019 06:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Wet Time Step 00:01:00
 Dry Time Step 01:00:00
 Routing Time Step 5.00 sec

	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
	-----	-----
Total Precipitation	17.476	1.679
Evaporation Loss	0.000	0.000
Infiltration Loss	16.071	1.544
Surface Runoff	1.381	0.133
Final Storage	0.026	0.002
Continuity Error (%)	-0.008	

	Volume	Volume
Flow Routing Continuity	acre-feet	10 ⁶ gal
	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.381	0.450
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.381	0.450
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Highest Flow Instability Indexes

All links are stable.

 Routing Time Step Summary

 Minimum Time Step : 5.00 sec
 Average Time Step : 5.00 sec
 Maximum Time Step : 5.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 1.00
 Percent Not Converging : 0.00

 Subcatchment Runoff Summary

Subcatchment	Total Precip	Total Runon	Total Evap	Total Infil	Imperv Runoff	Perv Runoff	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff
	in	in	in	in	in	in	in	10^6 gal	CFS	
OS-1	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.11	5.35	0.064
OS-2	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.14	6.85	0.065
OS-3	1.68	0.00	0.00	1.44	0.03	0.20	0.24	0.01	0.46	0.140
E-1	1.68	0.00	0.00	1.40	0.03	0.24	0.27	0.01	1.05	0.164
E-2	1.68	0.00	0.00	1.44	0.03	0.20	0.23	0.01	0.99	0.140
E-3	1.68	0.00	0.00	1.51	0.06	0.10	0.17	0.14	8.44	0.099
E-4	1.68	0.00	0.00	1.43	0.03	0.22	0.25	0.02	1.18	0.150
OS-4	1.68	0.00	0.00	1.41	0.03	0.24	0.27	0.01	0.75	0.162

 Node Depth Summary

Node	Average Depth	Maximum Depth	Maximum HGL	Time of Occurrence	Max Depth	Reported
	Type	Feet	Feet	Feet	days hr:min	Feet
DP2	JUNCTION	0.00	0.00	6672.00	0 00:00	0.00
DP3	JUNCTION	0.00	0.00	6670.00	0 00:00	0.00
DP1	JUNCTION	0.00	0.00	6696.00	0 00:00	0.00
DP4	OUTFALL	0.00	0.00	6661.95	0 00:00	0.00

 Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Maximum Time of Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
DP2	JUNCTION	1.80	1.80	0 00:50	0.0223	0.0223	0.000
DP3	JUNCTION	1.45	1.45	0 00:55	0.0207	0.0207	0.000
DP1	JUNCTION	5.35	5.35	0 00:45	0.109	0.109	0.000
DP4	OUTFALL	16.09	23.66	0 00:45	0.298	0.45	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcmt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
DP4	47.01	5.92	23.66	0.450
System	47.01	5.92	23.66	0.450

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
C24	DUMMY	1.80	0 00:50			
C34	DUMMY	1.45	0 00:55			
C14	DUMMY	5.35	0 00:45			

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Apr 21 10:55:54 2020

Analysis ended on: Tue Apr 21 10:55:54 2020

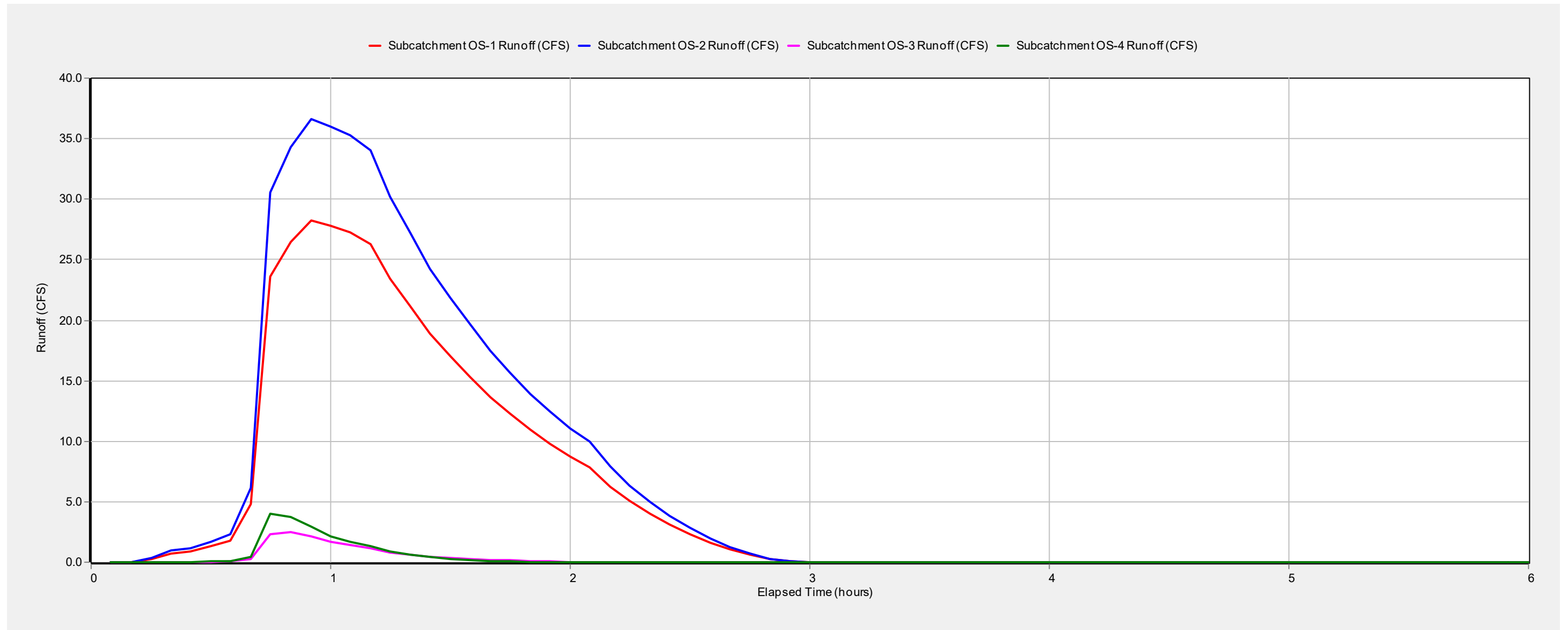
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MT2 PHEASANT LANE - 100 YEAR EXISTING CONDITIONS

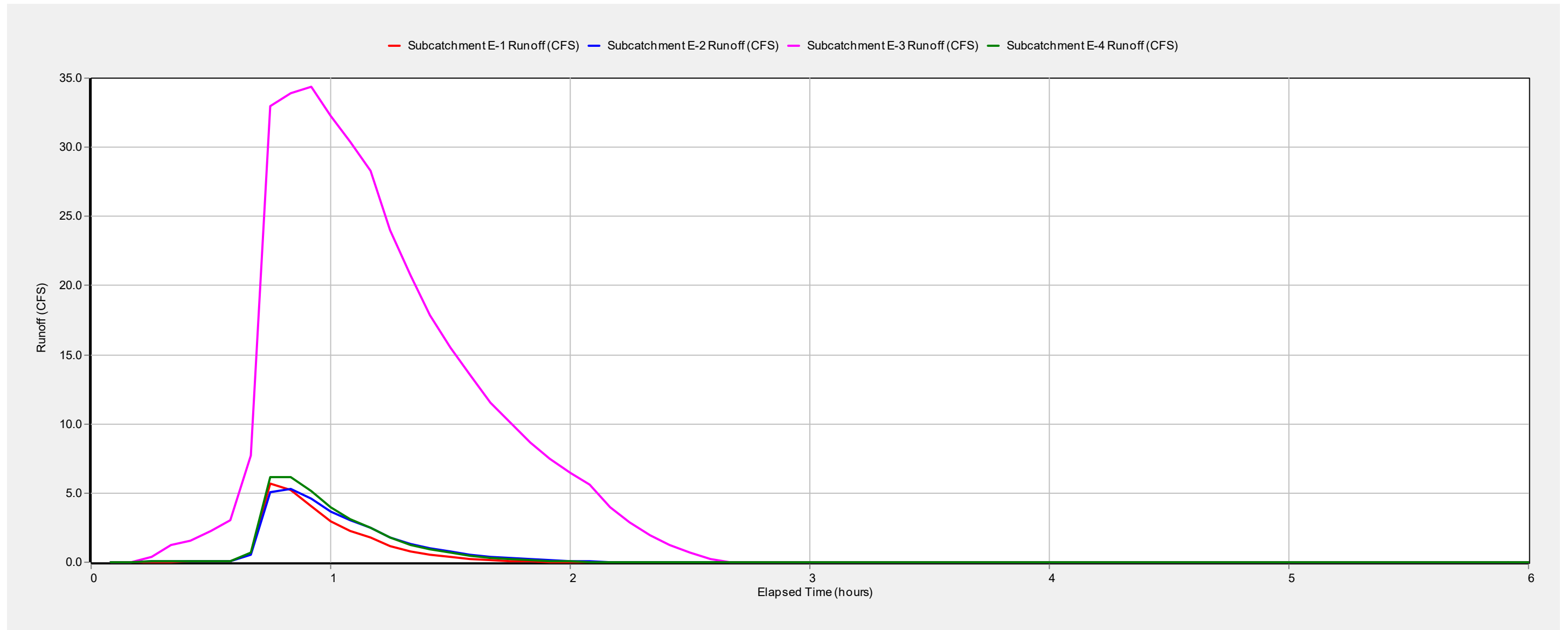
Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10 ⁶ gal	Peak Runoff CFS	Runoff Coeff
E-1	2.82	0.00	0.00	1.59	0.05	1.17	1.23	0.06	5.69	0.436
E-2	2.82	0.00	0.00	1.65	0.05	1.11	1.17	0.07	5.28	0.413
E-3	2.82	0.00	0.00	1.87	0.11	0.84	0.95	0.80	34.39	0.336
E-4	2.82	0.00	0.00	1.62	0.05	1.14	1.19	0.07	6.14	0.424
OS-1	2.82	0.00	0.00	2.04	0.05	0.72	0.78	0.79	28.23	0.275
OS-2	2.82	0.00	0.00	2.04	0.05	0.73	0.78	1.01	36.63	0.277
OS-3	2.82	0.00	0.00	1.65	0.05	1.11	1.17	0.03	2.47	0.414
OS-4	2.82	0.00	0.00	1.59	0.05	1.17	1.22	0.04	4.02	0.434

MT2 PHEASANT LANE - 100 YEAR EXISTING CONDITIONS



MT2 PHEASANT LANE - 100 YEAR EXISTING CONDITIONS

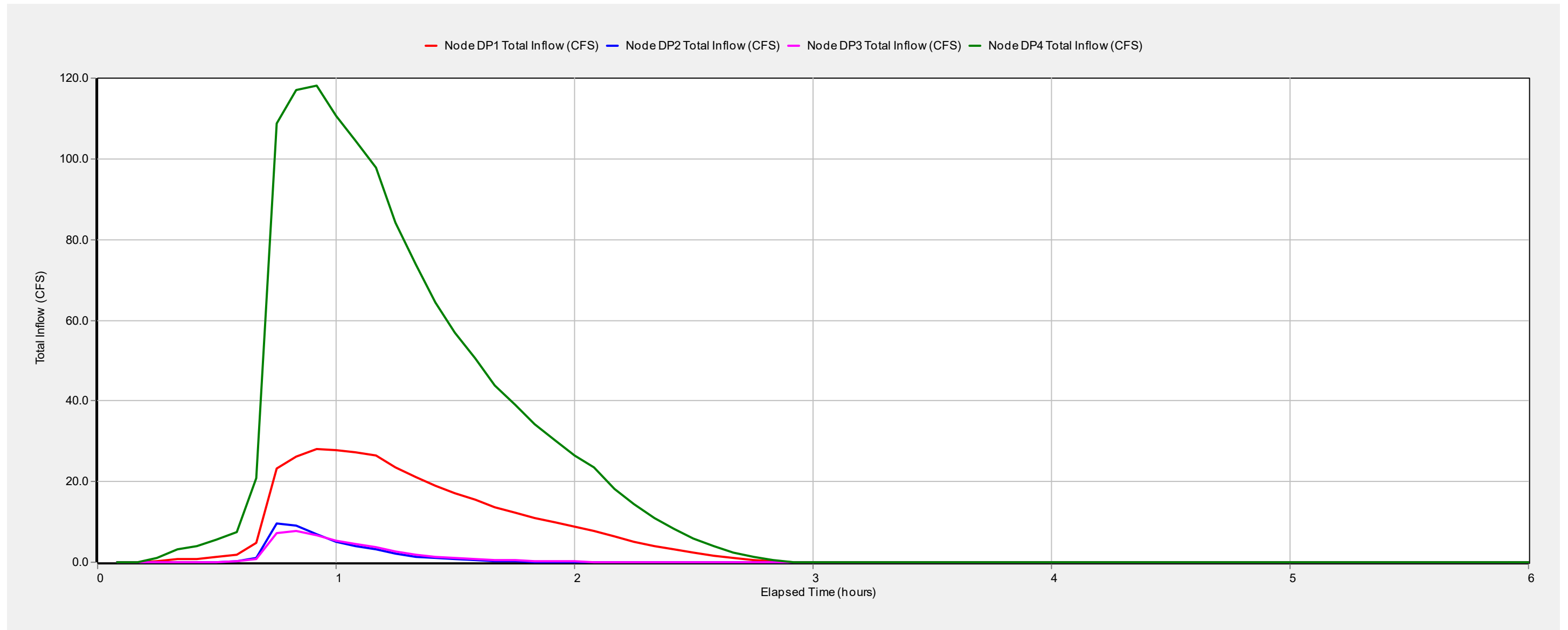


MT2 PHEASANT LANE - 100 YEAR EXISTING CONDITIONS

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal	Flow Balance Error Percent
DP1	JUNCTION	28.23	28.23	0	00:55	0.788	0.788	0.000
DP2	JUNCTION	9.71	9.71	0	00:45	0.1	0.1	0.000
DP3	JUNCTION	7.74	7.74	0	00:50	0.103	0.103	0.000
DP4	OUTFALL	76.15	118.19	0	00:55	1.89	2.88	0.000

MT2 PHEASANT LANE - 100 YEAR EXISTING CONDITIONS



MT2 PHEASANT LANE - 100 YEAR EXISTING CONDITIONS

Element Count

Number of rain gages 1
 Number of subcatchments ... 8
 Number of nodes 4
 Number of links 3
 Number of pollutants 0
 Number of land uses 0

Raingage Summary

Name	Data Source	Data	Recording Type	Interval
RG1	100-YR		CUMULATIVE	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
OS-1	37.42	1159.00	2.00	4.2500	RG1	DP1
OS-2	47.63	1729.00	2.00	3.2500	RG1	DP4
OS-3	1.03	124.00	2.00	8.2400	RG1	DP3
E-1	1.74	309.00	2.00	10.1000	RG1	DP2
E-2	2.21	254.00	2.00	8.9400	RG1	DP3
E-3	31.30	2215.00	4.00	2.0200	RG1	DP4
E-4	2.31	335.00	2.00	8.5100	RG1	DP4
OS-4	1.26	171.00	2.00	16.1000	RG1	DP2

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
------	------	--------------	------------	-------------	-----------------

DP2	JUNCTION	6672.00	6674.00	0.0
DP3	JUNCTION	6670.00	6673.00	0.0
DP1	JUNCTION	6696.00	0.00	0.0
DP4	OUTFALL	6661.95	0.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C24	DP2	DP4	CONDUIT	350.0	2.8726	0.1625
C34	DP3	DP4	CONDUIT	470.0	1.7130	0.1625
C14	DP1	DP4	CONDUIT	1680.0	2.0272	0.1625

Cross Section Summary

Conduit	Shape	Full Depth	Full Hyd. Area	Max. Rad.	No. of Width	Full Barrels	Flow
C24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

- Flow Units CFS
- Process Models:
- Rainfall/Runoff YES
- RDII NO
- Snowmelt NO
- Groundwater NO
- Flow Routing YES
- Ponding Allowed NO
- Water Quality NO

Infiltration Method HORTON
 Flow Routing Method KINWAVE
 Starting Date 10/18/2019 00:00:00
 Ending Date 10/18/2019 06:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Wet Time Step 00:01:00
 Dry Time Step 01:00:00
 Routing Time Step 5.00 sec

	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
	-----	-----
Total Precipitation	29.353	2.820
Evaporation Loss	0.000	0.000
Infiltration Loss	20.486	1.968
Surface Runoff	8.845	0.850
Final Storage	0.026	0.002
Continuity Error (%)	-0.012	

	Volume	Volume
Flow Routing Continuity	acre-feet	10 ⁶ gal
	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	8.845	2.882
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	8.845	2.882
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Highest Flow Instability Indexes

All links are stable.

 Routing Time Step Summary

 Minimum Time Step : 5.00 sec
 Average Time Step : 5.00 sec
 Maximum Time Step : 5.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 1.00
 Percent Not Converging : 0.00

 Subcatchment Runoff Summary

Subcatchment	Total Precip	Total Runon	Total Evap	Total Infil	Imperv Runoff	Perv Runoff	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff
	in	in	in	in	in	in	in	10 ⁶ gal	CFS	
OS-1	2.82	0.00	0.00	2.04	0.05	0.72	0.78	0.79	28.23	0.275
OS-2	2.82	0.00	0.00	2.04	0.05	0.73	0.78	1.01	36.63	0.277
OS-3	2.82	0.00	0.00	1.65	0.05	1.11	1.17	0.03	2.47	0.414
E-1	2.82	0.00	0.00	1.59	0.05	1.17	1.23	0.06	5.69	0.436
E-2	2.82	0.00	0.00	1.65	0.05	1.11	1.17	0.07	5.28	0.413
E-3	2.82	0.00	0.00	1.87	0.11	0.84	0.95	0.80	34.39	0.336
E-4	2.82	0.00	0.00	1.62	0.05	1.14	1.19	0.07	6.14	0.424
OS-4	2.82	0.00	0.00	1.59	0.05	1.17	1.22	0.04	4.02	0.434

 Node Depth Summary

Node	Average Depth	Maximum Depth	Maximum HGL	Time of Occurrence	Max Depth	Reported
	Type	Feet	Feet	Feet	days hr:min	Feet
DP2	JUNCTION	0.00	0.00	6672.00	0 00:00	0.00
DP3	JUNCTION	0.00	0.00	6670.00	0 00:00	0.00
DP1	JUNCTION	0.00	0.00	6696.00	0 00:00	0.00
DP4	OUTFALL	0.00	0.00	6661.95	0 00:00	0.00

 Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Maximum Time of Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
DP2	JUNCTION	9.71	9.71	0 00:45	0.1	0.1	0.000
DP3	JUNCTION	7.74	7.74	0 00:50	0.103	0.103	0.000
DP1	JUNCTION	28.23	28.23	0 00:55	0.788	0.788	0.000
DP4	OUTFALL	76.15	118.19	0 00:55	1.89	2.88	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
DP4	48.24	36.98	118.19	2.882
System	48.24	36.98	118.19	2.882

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
C24	DUMMY	9.71	0 00:45			
C34	DUMMY	7.74	0 00:50			
C14	DUMMY	28.23	0 00:55			

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Apr 21 10:51:18 2020

Analysis ended on: Tue Apr 21 10:51:18 2020

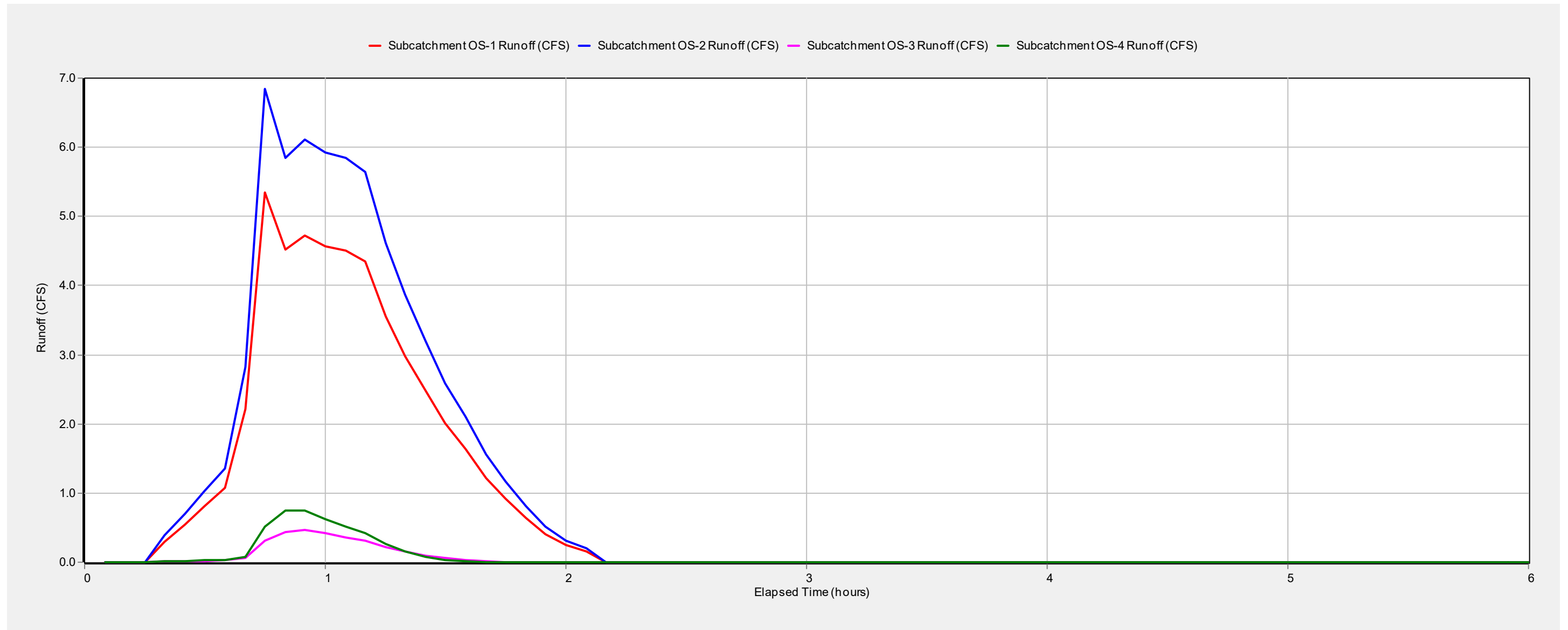
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MT2 PHEASANT LANE - 5 YEAR DEVELOPED CONDITIONS

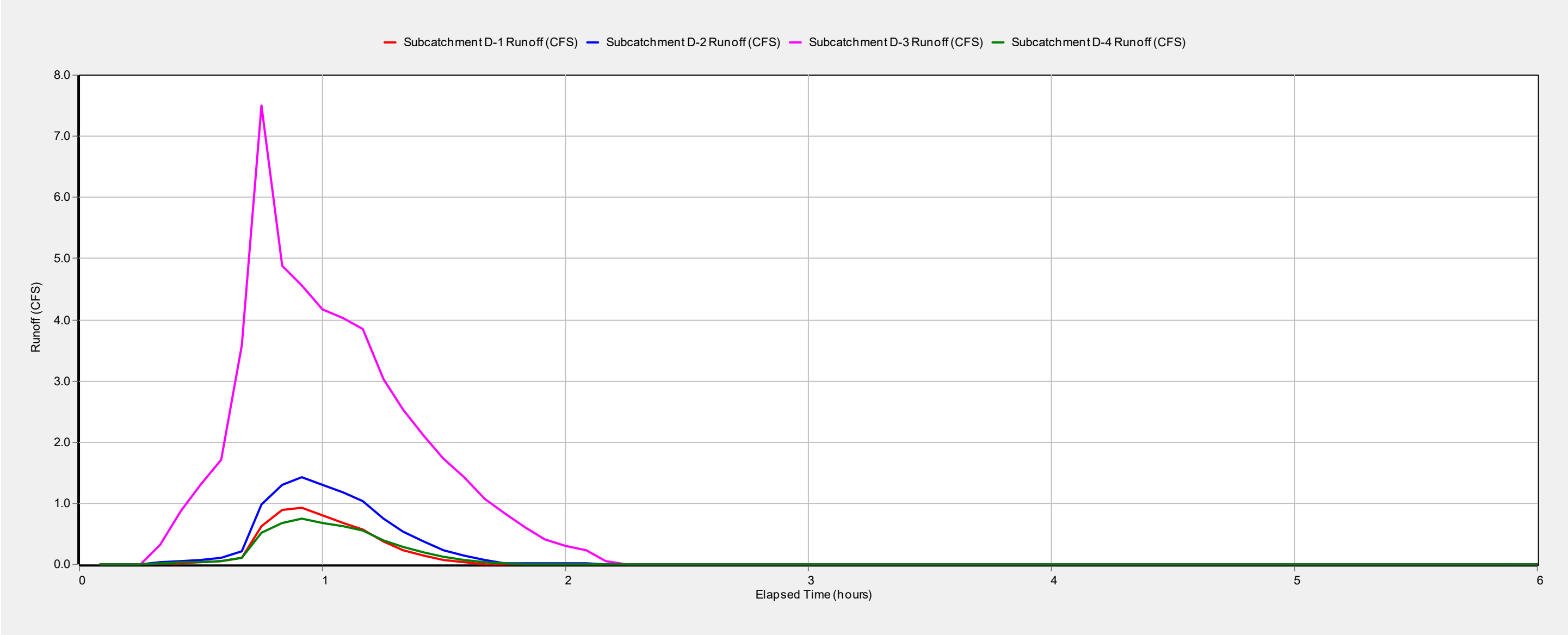
Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10 ⁶ gal	Peak Runoff CFS	Runoff Coeff
D-1	1.68	0.00	0.00	1.42	0.03	0.22	0.26	0.01	0.93	0.152
D-2	1.68	0.00	0.00	1.46	0.03	0.19	0.22	0.02	1.42	0.129
D-3	1.68	0.00	0.00	1.54	0.06	0.08	0.14	0.11	7.50	0.082
D-4	1.68	0.00	0.00	1.46	0.03	0.18	0.22	0.01	0.74	0.128
OS-1	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.11	5.35	0.064
OS-2	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.14	6.85	0.065
OS-3	1.68	0.00	0.00	1.44	0.03	0.20	0.24	0.01	0.46	0.140
OS-4	1.68	0.00	0.00	1.41	0.03	0.24	0.27	0.01	0.75	0.162

MT2 PHEASANT LANE - 5 YEAR DEVELOPED CONDITIONS



MT2 PHEASANT LANE - 5 YEAR DEVELOPED CONDITIONS

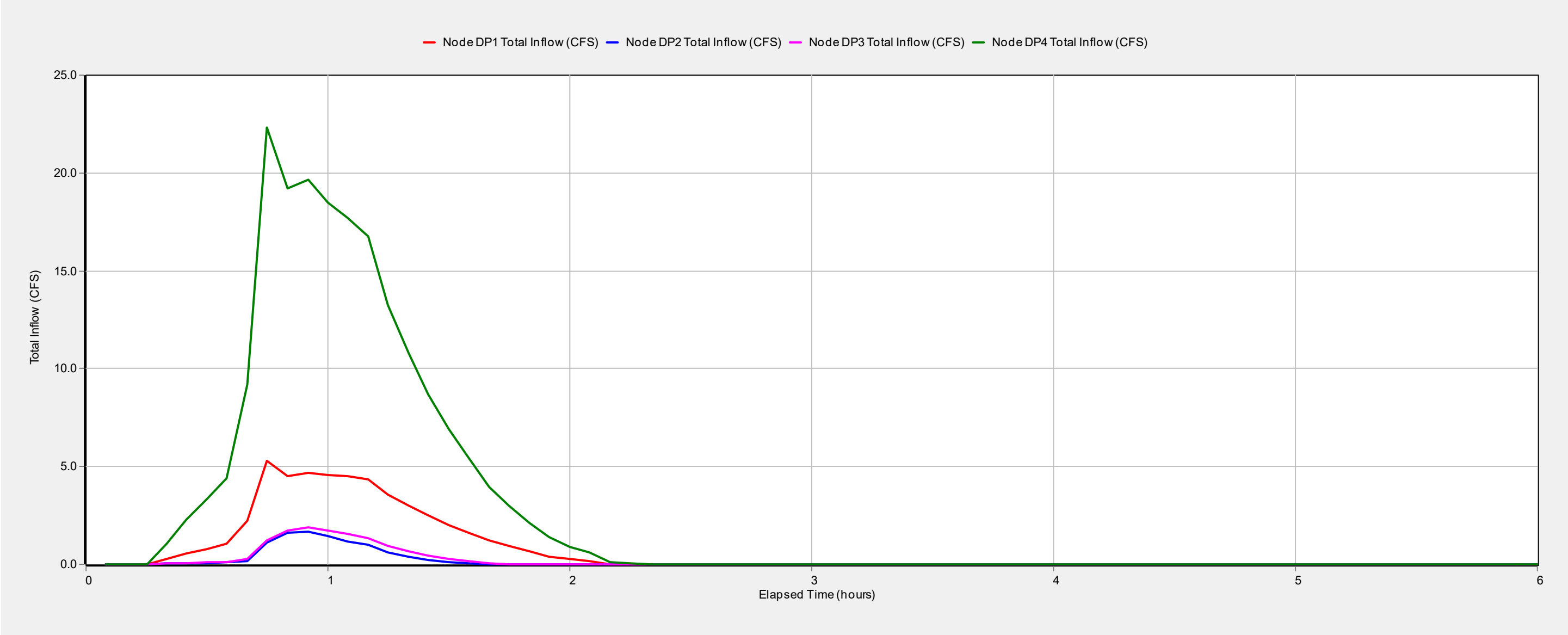


MT2 PHEASANT LANE - 5 YEAR DEVELOPED CONDITIONS

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal	Flow Balance Error Percent
DP1	JUNCTION	5.35	5.35	0	00:45	0.109	0.109	0.000
DP2	JUNCTION	1.67	1.67	0	00:55	0.0215	0.0215	0.000
DP3	JUNCTION	1.88	1.88	0	00:55	0.0282	0.0282	0.000
DP4	OUTFALL	14.85	22.63	0	00:45	0.265	0.424	0.000

MT2 PHEASANT LANE - 5 YEAR DEVELOPED CONDITIONS



MT2 PHEASANT LANE - 5 YEAR DEVELOPED CONDITIONS

Element Count

Number of rain gages 1
 Number of subcatchments ... 8
 Number of nodes 4
 Number of links 3
 Number of pollutants 0
 Number of land uses 0

Raingage Summary

Name	Data Source	Data	Recording Type	Interval
RG1	5-YR		CUMULATIVE	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
OS-1	37.42	1159.00	2.00	4.2500	RG1	DP1
OS-2	47.63	1729.00	2.00	3.2500	RG1	DP4
OS-3	1.03	124.00	2.00	8.2400	RG1	DP3
E-1	1.76	313.00	2.00	6.2800	RG1	DP2
E-2	3.67	373.00	2.00	7.4900	RG1	DP3
E-3	30.19	1265.00	4.00	2.3200	RG1	DP4
E-4	1.95	184.00	2.00	8.3700	RG1	DP4
OS-4	1.26	171.00	2.00	16.1000	RG1	DP2

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
------	------	--------------	------------	-------------	-----------------

DP2	JUNCTION	6672.00	6674.00	0.0
DP3	JUNCTION	6670.00	6673.00	0.0
DP1	JUNCTION	6696.00	0.00	0.0
DP4	OUTFALL	6661.95	0.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C24	DP2	DP4	CONDUIT	350.0	2.8726	0.1625
C34	DP3	DP4	CONDUIT	470.0	1.7130	0.1625
C14	DP1	DP4	CONDUIT	1680.0	2.0272	0.1625

Cross Section Summary

Conduit	Shape	Full Depth	Full Hyd. Area	Max. Rad.	No. of Width	Full Barrels	Flow
C24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

- Flow Units CFS
- Process Models:
- Rainfall/Runoff YES
- RDII NO
- Snowmelt NO
- Groundwater NO
- Flow Routing YES
- Ponding Allowed NO
- Water Quality NO

Infiltration Method HORTON
 Flow Routing Method KINWAVE
 Starting Date 10/18/2019 00:00:00
 Ending Date 10/18/2019 06:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Wet Time Step 00:01:00
 Dry Time Step 01:00:00
 Routing Time Step 5.00 sec

	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
	-----	-----
Total Precipitation	17.477	1.679
Evaporation Loss	0.000	0.000
Infiltration Loss	16.151	1.552
Surface Runoff	1.301	0.125
Final Storage	0.026	0.002
Continuity Error (%)	-0.007	

	Volume	Volume
Flow Routing Continuity	acre-feet	10 ⁶ gal
	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.301	0.424
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.301	0.424
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Highest Flow Instability Indexes

 All links are stable.

 Routing Time Step Summary

Minimum Time Step : 5.00 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
Percent Not Converging : 0.00

Subcatchment Runoff Summary

Subcatchment	Total Precip	Total Runon	Total Evap	Total Infil	Imperv Runoff	Perv Runoff	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff
	in	in	in	in	in	in	in	10^6 gal	CFS	
OS-1	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.11	5.35	0.064
OS-2	1.68	0.00	0.00	1.57	0.03	0.08	0.11	0.14	6.85	0.065
OS-3	1.68	0.00	0.00	1.44	0.03	0.20	0.24	0.01	0.46	0.140
E-1	1.68	0.00	0.00	1.42	0.03	0.22	0.26	0.01	0.93	0.152
E-2	1.68	0.00	0.00	1.46	0.03	0.19	0.22	0.02	1.42	0.129
E-3	1.68	0.00	0.00	1.54	0.06	0.08	0.14	0.11	7.50	0.082
E-4	1.68	0.00	0.00	1.46	0.03	0.18	0.22	0.01	0.74	0.128
OS-4	1.68	0.00	0.00	1.41	0.03	0.24	0.27	0.01	0.75	0.162

Node Depth Summary

Node	Average Depth	Maximum Depth	Maximum HGL	Time of Occurrence	Max Depth	Reported
	Type	Feet	Feet	Feet	days hr:min	Feet
DP2	JUNCTION	0.00	0.00	6672.00	0 00:00	0.00
DP3	JUNCTION	0.00	0.00	6670.00	0 00:00	0.00
DP1	JUNCTION	0.00	0.00	6696.00	0 00:00	0.00
DP4	OUTFALL	0.00	0.00	6661.95	0 00:00	0.00

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Maximum Time of Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
DP2	JUNCTION	1.67	1.67	0 00:55	0.0215	0.0215	0.000
DP3	JUNCTION	1.88	1.88	0 00:55	0.0282	0.0282	0.000
DP1	JUNCTION	5.35	5.35	0 00:45	0.109	0.109	0.000
DP4	OUTFALL	14.85	22.63	0 00:45	0.265	0.424	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcmt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
DP4	49.21	5.33	22.63	0.424
System	49.21	5.33	22.63	0.424

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
C24	DUMMY	1.67	0 00:55			
C34	DUMMY	1.88	0 00:55			
C14	DUMMY	5.35	0 00:45			

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Apr 21 11:00:02 2020

Analysis ended on: Tue Apr 21 11:00:02 2020

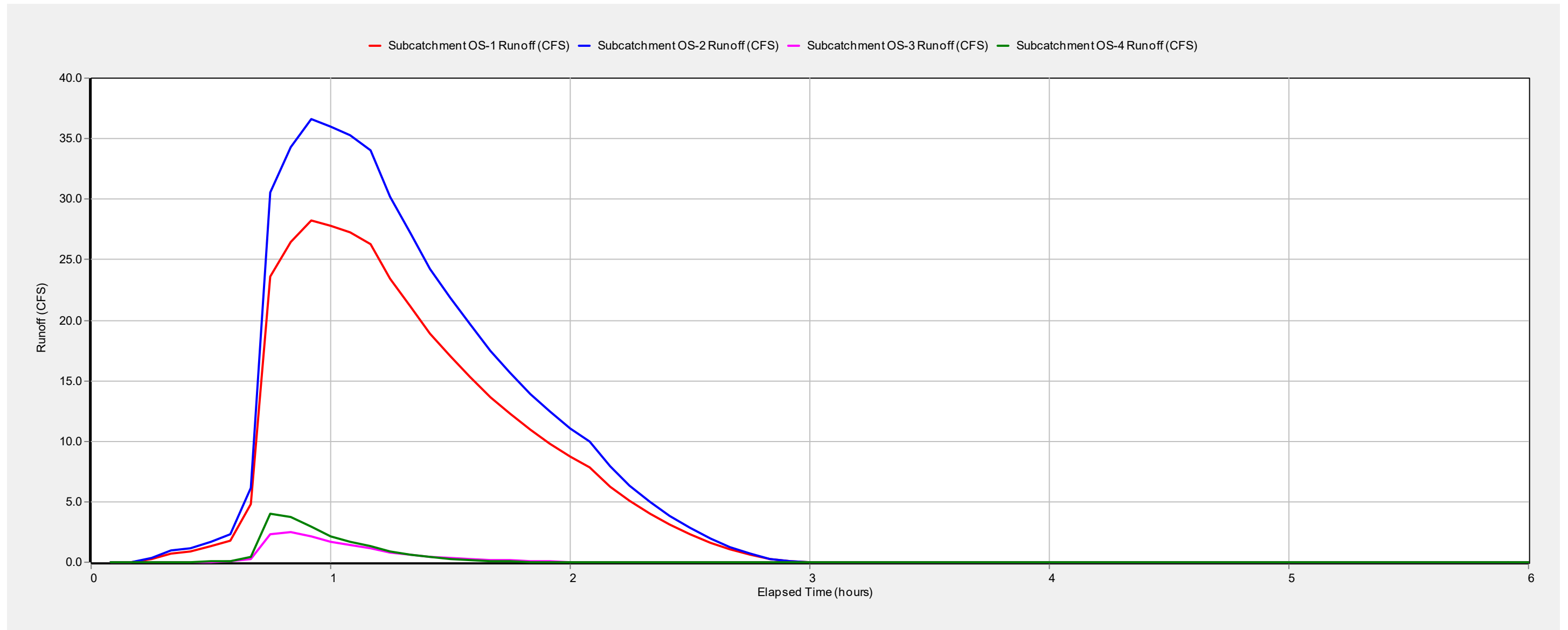
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MT2 PHEASANT LANE - 100 YEAR DEVELOPED CONDITIONS

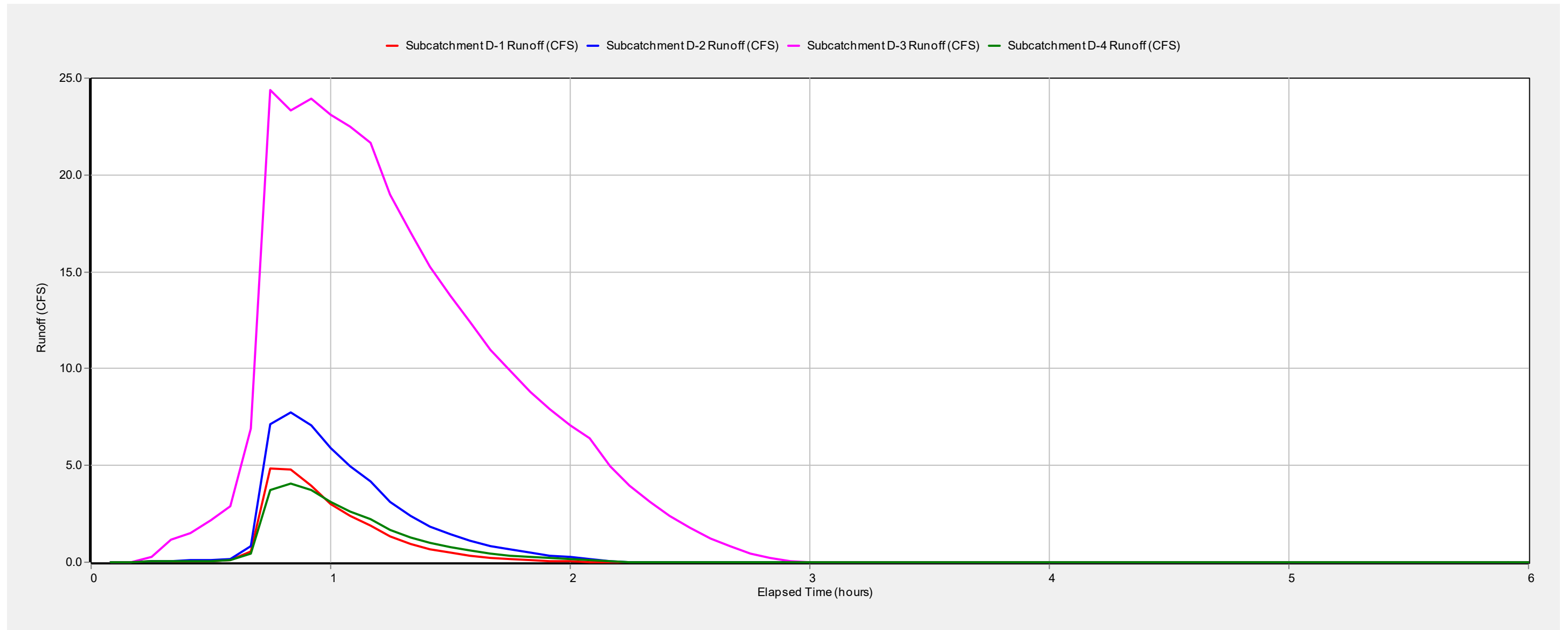
Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10 ⁶ gal	Peak Runoff CFS	Runoff Coeff
D-1	2.82	0.00	0.00	1.62	0.05	1.15	1.20	0.06	4.86	0.426
D-2	2.82	0.00	0.00	1.69	0.05	1.08	1.13	0.11	7.75	0.401
D-3	2.82	0.00	0.00	2.00	0.11	0.71	0.82	0.67	24.38	0.291
D-4	2.82	0.00	0.00	1.69	0.05	1.07	1.13	0.06	4.07	0.400
OS-1	2.82	0.00	0.00	2.04	0.05	0.72	0.78	0.79	28.23	0.275
OS-2	2.82	0.00	0.00	2.04	0.05	0.73	0.78	1.01	36.63	0.277
OS-3	2.82	0.00	0.00	1.65	0.05	1.11	1.17	0.03	2.47	0.414
OS-4	2.82	0.00	0.00	1.59	0.05	1.17	1.22	0.04	4.02	0.434

MT2 PHEASANT LANE - 100 YEAR DEVELOPED CONDITIONS



MT2 PHEASANT LANE - 100 YEAR DEVELOPED CONDITIONS

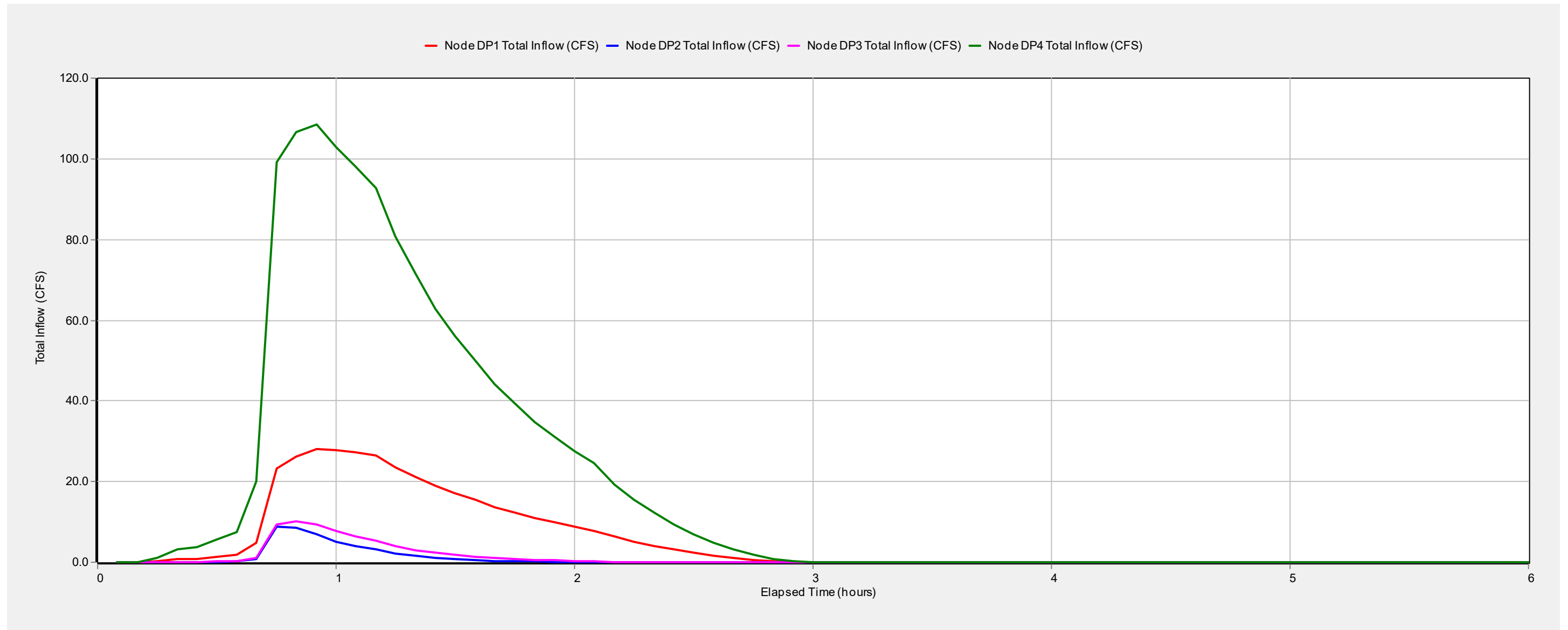


MT2 PHEASANT LANE - 100 YEAR DEVELOPED CONDITIONS

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10 ⁶ gal	Total Inflow Volume 10 ⁶ gal	Flow Balance Error Percent
DP1	JUNCTION	28.23	28.23	0	00:55	0.788	0.788	0.000
DP2	JUNCTION	8.88	8.88	0	00:45	0.0993	0.0993	0.000
DP3	JUNCTION	10.21	10.21	0	00:50	0.145	0.145	0.000
DP4	OUTFALL	64.31	108.68	0	00:55	1.74	2.78	0.000

MT2 PHEASANT LANE - 100 YEAR DEVELOPED CONDITIONS



MT2 PHEASANT LANE - 100 YEAR DEVELOPED CONDITIONS

Element Count

Number of rain gages 1
 Number of subcatchments ... 8
 Number of nodes 4
 Number of links 3
 Number of pollutants 0
 Number of land uses 0

Raingage Summary

Name	Data Source	Data	Recording Type	Interval
RG1	100-YR		CUMULATIVE	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
OS-1	37.42	1159.00	2.00	4.2500	RG1	DP1
OS-2	47.63	1729.00	2.00	3.2500	RG1	DP4
OS-3	1.03	124.00	2.00	8.2400	RG1	DP3
D-1	1.76	313.00	2.00	6.2800	RG1	DP2
D-2	3.67	373.00	2.00	7.4900	RG1	DP3
D-3	30.19	1265.00	4.00	2.3200	RG1	DP4
D-4	1.95	184.00	2.00	8.3700	RG1	DP4
OS-4	1.26	171.00	2.00	16.1000	RG1	DP2

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
------	------	--------------	------------	-------------	-----------------

DP2	JUNCTION	6672.00	6674.00	0.0
DP3	JUNCTION	6670.00	6673.00	0.0
DP1	JUNCTION	6696.00	0.00	0.0
DP4	OUTFALL	6661.95	0.00	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C24	DP2	DP4	CONDUIT	350.0	2.8726	0.1625
C34	DP3	DP4	CONDUIT	470.0	1.7130	0.1625
C14	DP1	DP4	CONDUIT	1680.0	2.0272	0.1625

Cross Section Summary

Conduit	Shape	Full Depth	Full Hyd. Area	Max. Rad.	No. of Width	Full Barrels	Flow
C24	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C34	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C14	DUMMY	0.00	0.00	0.00	0.00	1	0.00

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

- Flow Units CFS
- Process Models:
- Rainfall/Runoff YES
- RDII NO
- Snowmelt NO
- Groundwater NO
- Flow Routing YES
- Ponding Allowed NO
- Water Quality NO

Infiltration Method HORTON
 Flow Routing Method KINWAVE
 Starting Date 10/18/2019 00:00:00
 Ending Date 10/18/2019 06:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:05:00
 Wet Time Step 00:01:00
 Dry Time Step 01:00:00
 Routing Time Step 5.00 sec

	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
	-----	-----
Total Precipitation	29.354	2.820
Evaporation Loss	0.000	0.000
Infiltration Loss	20.809	1.999
Surface Runoff	8.522	0.819
Final Storage	0.026	0.002
Continuity Error (%)	-0.011	

	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	8.522	2.777
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	8.522	2.777
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

 Highest Flow Instability Indexes

 All links are stable.

 Routing Time Step Summary

Minimum Time Step : 5.00 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
Percent Not Converging : 0.00

Subcatchment Runoff Summary

Subcatchment	Total Precip	Total Runon	Total Evap	Total Infil	Imperv Runoff	Perv Runoff	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff
	in	in	in	in	in	in	in	10 ⁶ gal	CFS	
OS-1	2.82	0.00	0.00	2.04	0.05	0.72	0.78	0.79	28.23	0.275
OS-2	2.82	0.00	0.00	2.04	0.05	0.73	0.78	1.01	36.63	0.277
OS-3	2.82	0.00	0.00	1.65	0.05	1.11	1.17	0.03	2.47	0.414
D-1	2.82	0.00	0.00	1.62	0.05	1.15	1.20	0.06	4.86	0.426
D-2	2.82	0.00	0.00	1.69	0.05	1.08	1.13	0.11	7.75	0.401
D-3	2.82	0.00	0.00	2.00	0.11	0.71	0.82	0.67	24.38	0.291
D-4	2.82	0.00	0.00	1.69	0.05	1.07	1.13	0.06	4.07	0.400
OS-4	2.82	0.00	0.00	1.59	0.05	1.17	1.22	0.04	4.02	0.434

Node Depth Summary

Node	Average Depth	Maximum Depth	Maximum HGL	Time of Occurrence	Max Depth	Reported
	Type	Feet	Feet	Feet	days hr:min	Feet
DP2	JUNCTION	0.00	0.00	6672.00	0 00:00	0.00
DP3	JUNCTION	0.00	0.00	6670.00	0 00:00	0.00
DP1	JUNCTION	0.00	0.00	6696.00	0 00:00	0.00
DP4	OUTFALL	0.00	0.00	6661.95	0 00:00	0.00

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Maximum Time of Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
DP2	JUNCTION	8.88	8.88	0 00:45	0.0993	0.0993	0.000
DP3	JUNCTION	10.21	10.21	0 00:50	0.145	0.145	0.000
DP1	JUNCTION	28.23	28.23	0 00:55	0.788	0.788	0.000
DP4	OUTFALL	64.31	108.68	0 00:55	1.74	2.78	0.000

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcmt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
DP4	49.58	34.66	108.68	2.777
System	49.58	34.66	108.68	2.777

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Occurrence days hr:min	Maximum Veloc ft/sec	Maximum Full Flow	Maximum Full Depth
C24	DUMMY	8.88	0 00:45			
C34	DUMMY	10.21	0 00:50			
C14	DUMMY	28.23	0 00:55			

Conduit Surcharge Summary

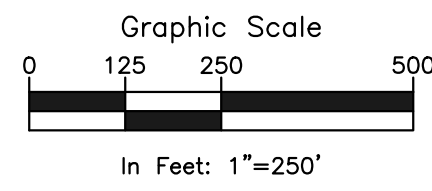
No conduits were surcharged.

Analysis begun on: Tue Apr 21 11:07:14 2020

Analysis ended on: Tue Apr 21 11:07:14 2020

Total elapsed time: < 1 sec

APPENDIX D – SUB-BASIN DELINEATION EXHIBITS

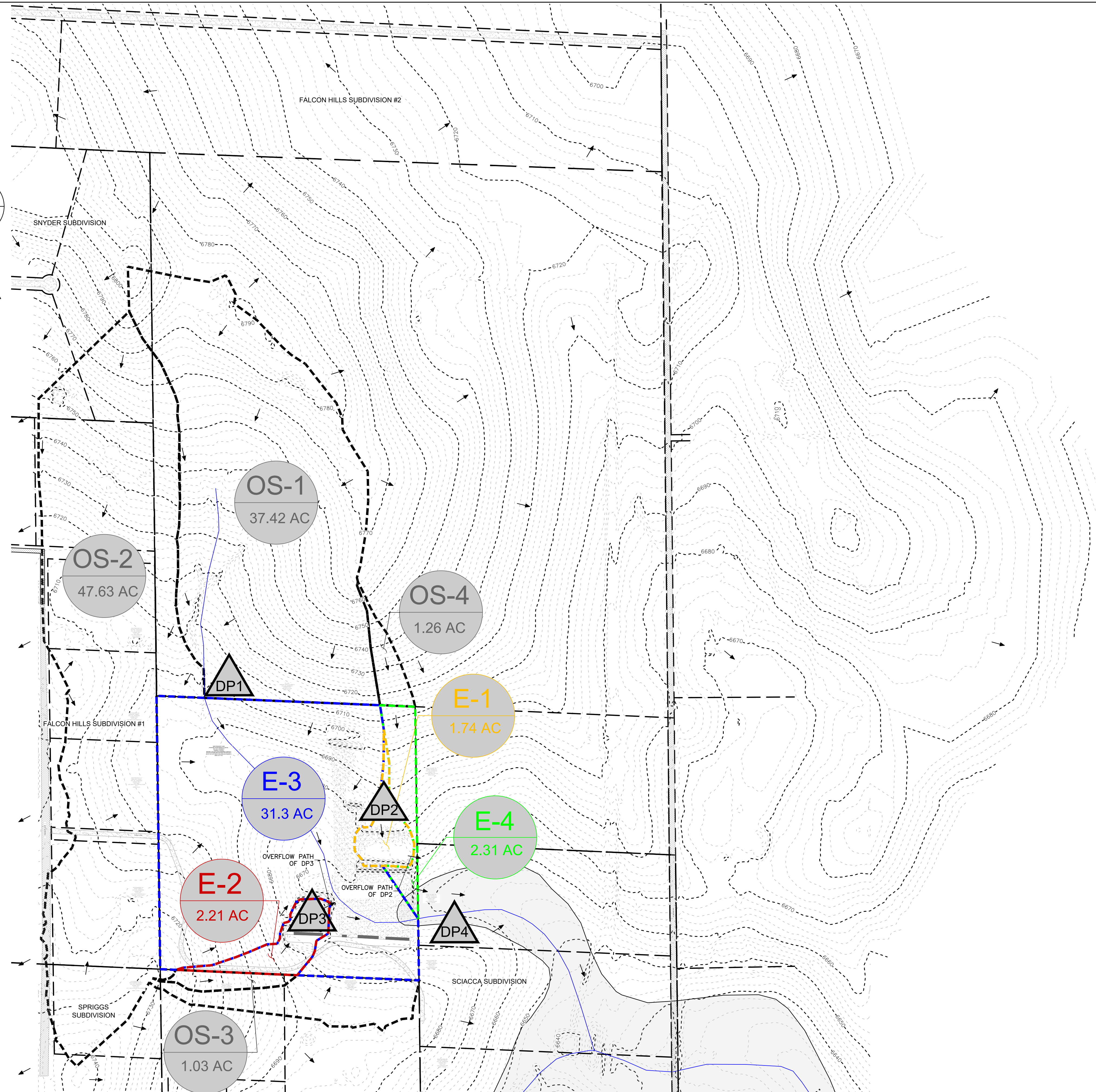


LEGEND

DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL
EX. STRUCTURE/BUILDING		BASIN IDENTIFIER	
EX. DIRT ROAD/AREA		AREA IN ACRES	
EX. ASPHALT PAVEMENT		DESIGN POINT ID	
EX. CONTOUR		FLOW ARROW	
DRAINAGE SUB-BASIN BOUNDARY			
SUBDIVISION LINE			
PROPERTY LINE			

DESIGN POINT	FLOW (CFS)
1	Q ₅ = 5.35 Q ₁₀₀ = 28.23
2	Q ₅ = 1.80 Q ₁₀₀ = 9.71
3	Q ₅ = 1.45 Q ₁₀₀ = 7.74
4	Q ₅ = 23.66 Q ₁₀₀ = 118.19

BASIN SUMMARY		
BASIN	Q(5)-CFS	Q(100)-CFS
OS-1	5.35	28.23
OS-2	6.85	36.63
OS-3	0.46	2.47
OS-4	0.75	4.02
E-1	1.05	5.69
E-2	0.99	5.28
E-3	8.44	34.39
E-4	1.18	6.14



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 19375 BEACON LITE RD., MONUMENT, CO 80132
 (719) 685-5145 WWW.ROCKYMOUNTAINENGINEERS.COM
 Structural, Geotechnical, Civil, Planning, Materials Testing, Forensics

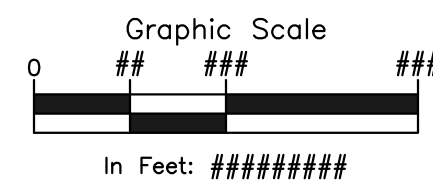
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FRONTIER SPORTSMAN'S CLUB
 3885 PHEASANT LANE
 PEYTON, CO
 MT2, LLC.

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EXISTING CONDITIONS SUB-BASIN DELINEATION		
SHEET NAME	PROJECT STATUS	
EXISTING CONDITIONS SUB-BASIN DELINEATION	COUNTY REVIEW	
ENG: RDL	CHECKED: RDL	DATE: 10/30/19
DRAWN: RDL		
CHECKED: RDL		
#	REVISION	DATE
	HYD. EXHIBIT 1	10/30/19
	CNTY. REV. 2	04/21/20
JOB NO.	170915	
SHEET NO.	C-EX-01	
	of 02	

NOTE: CONTOURS SHOWN ON THIS EXHIBIT ARE FINAL CONDITIONS CONTOURS, I.E. A COMPOSITION OF EXISTING SITE GRADES AND DEVELOPED EARTHWORK GRADES.

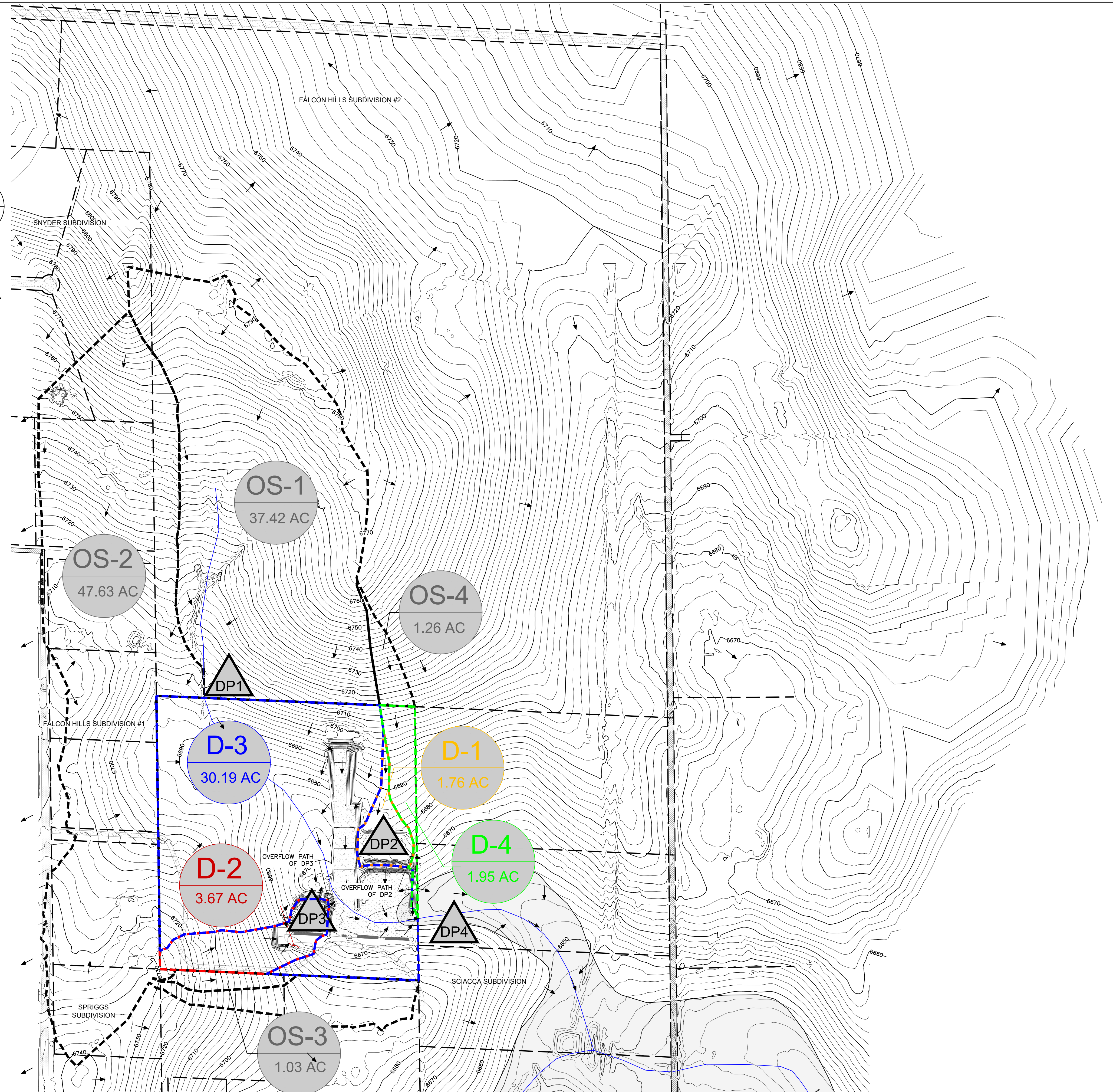


LEGEND

DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL
EX. STRUCTURE/BUILDING		BASIN IDENTIFIER	
EX. DIRT ROAD/AREA		AREA IN ACRES	
EX. ASPHALT PAVEMENT		DESIGN POINT ID	
EX. CONTOUR		FLOW ARROW	
DRAINAGE SUB-BASIN BOUNDARY			
SUBDIVISION LINE			
PROPERTY LINE			

DESIGN POINT	FLOW (CFS)
1	$Q_5 = 5.35$ $Q_{100} = 28.23$
2	$Q_5 = 1.67$ $Q_{100} = 8.88$
3	$Q_5 = 1.88$ $Q_{100} = 10.21$
4	$Q_5 = 22.63$ $Q_{100} = 108.68$

BASIN SUMMARY		
BASIN	Q(5)-CFS	Q(100)-CFS
OS-1	5.35	28.23
OS-2	6.85	36.63
OS-3	0.46	2.47
OS-4	0.75	4.02
D-1	0.93	4.86
D-2	1.42	7.75
D-3	7.50	24.38
D-4	0.74	4.07



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 3885 PHEASANT LANE
 PEYTON, CO
 MT2, LLC.

SHEET NAME
DEVELOPED CONDITIONS SUB-BASIN DELINEATION
 PROJECT STATUS
COUNTY REVIEW

ENG:	RDJ	
DRAWN:	RDJ	
CHECKED:	RDJ	
DATE	10/30/19	
#	REVISION	DATE
1	HYD. EXHIBIT 1	10/30/19
2	CNTY. REV. 2	04/21/20
3		
4		
5		
6		
7		
JOB NO.	170915	
SHEET NO.	C-EX-02	
	of 02	