

STORMWATER MANAGEMENT SUMMARY REPORT

for

Altera 769, LLC

**Proposed Office Building
Block 166.15, Lot 9
769 Northfield Avenue (CR 508)
Township of West Orange
Essex County, New Jersey**

Prepared by:



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A handwritten signature in dark ink, appearing to read 'RJC', is positioned above a horizontal line.

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- Drainage Area Maps

I. INTRODUCTION

The intention of this study is to analyze the stormwater drainage conditions that will occur as a result of the proposed office building renovation which includes modifications to the existing parking lot to satisfy current ADA regulations and other associated site improvements. The subject site is located at 769 Northfield Avenue (CR 508) in the Township of West Orange, Essex County, New Jersey and is identified as Block 166.15, Lot 9 on the Township of West Orange Tax Maps.

The scope of this study focuses on the overall drainage conditions that will result from the proposed improvements. Under proposed conditions impervious coverage will increase by 3,561 SF (1.7%).

The primary design constraints for this project are based on requirements established in the Township of West Orange Land Use Ordinance. More specifically, the stormwater management design will serve to maintain existing drainage patterns and will not have a negative impact on downstream facilities. The project does not meet the definition of a “major development” under NJAC 7:8 since there will be less than an acre of disturbance and less than a quarter acre of additional impervious coverage proposed.

II. EXISTING SITE CONDITIONS

The subject site consists of 212,742 SF (4.88 acres) of which is partially developed with one (3) three-story office building and associated paved parking areas and drive aisles. The site currently consists of 59.3% impervious surface area including building and pavement areas. Currently, the majority of stormwater runoff generated by the pavement areas sheet flows in a westerly direction where it is collected by on-site inlets and conveyed to an on-site underground stormwater management structure. Ultimately stormwater is tributary to the existing underground stormwater conveyance system within Northfield Avenue.

Based upon the Essex County Soil Survey, the soil types native to the site include:

SOIL TYPE	SOIL TYPE NAME	HYDRAULIC SOIL GROUP
BogB	Boonton Loam, 3 to 8 percent slopes	C
BogBc	Boonton Loam, 0 to 8 percent slopes, extremely stony	C
BouB	Boonton – Urban Land, Boonton Substratum Complex, 0 to 8 percent slopes	C
URBONB	Urban Land, Boonton Substratum, 0 to 8 percent slopes	C

The site has been evaluated using the TR-55 ‘Urban Hydrology for Small Watersheds’ standards.

III. PROPOSED SITE CONDITIONS

The proposed site improvements include the renovation of the existing building, upgrades to the existing parking lot to satisfy current ADA regulations and associated site improvements. The proposed site improvements will result in an increase in 3,561 SF (1.7%) of impervious coverage.

The existing drainage patterns on-site shall remain relatively unchanged. Stormwater runoff generated by the roof of the renovated building will remain relatively unchanged. Runoff generated by the portions of the site that are not covered with building shall continue to sheet flow west and be collected by various on-site inlets. A stormwater management basin consisting of a network of underground pipes has been designed to accommodate the stormwater runoff generated by the minor parking addition in the rear of the lot. The system shall detain and release runoff at a controlled rate to an existing on-site inlet (POI 1) where it is ultimately tributary to the existing on-site stormwater management system. Outside of the parking area addition, impervious coverage will be decreased through the addition of various landscaped areas. Associated calculations are included within the Appendix of this report.

IV. SUBSURFACE STORMWATER MANAGEMENT BASIN DESIGN

The stormwater management basin has been designed to accommodate the increase in impervious coverage associated with the minor rear parking lot addition. The remainder of the proposed site improvements outside of this area will result in a decrease in impervious coverage through the addition of various landscaped areas. By maintaining existing drainage patterns and tributary stormwater to the existing on-site stormwater structures/conveyance system outside of the parking addition through reductions in impervious coverage, there will be a decrease in in peak flows for design storms when compared to existing conditions.

The proposed basin has been designed to reduce tributary stormwater runoff to POI 1 thereby decreasing runoff to the existing stormwater vault when compared to existing conditions. Specifically, the subsurface basin has been designed to accommodate the 100-yr design storm while maintaining post-development peak runoff rates at or below pre-development conditions. Therefore, there will be no negative impacts to the on-site stormwater management system or downstream facilities. As such, the stormwater management basin has been designed to meet the applicable standards set forth by NJAC 7:8 and the Township of West Orange. Associated calculations are included within the Appendix of this report and details have been provided on the accompanying engineering drawings.

V. RUNOFF RATES

The following is a comparison of pre and post development runoff rates for POI 1:

PEAK RUNOFF RATES			
Design Storm	Existing Runoff	Proposed Runoff	Difference
2-yr	0.64 CFS	0.56 CFS	-0.08 CFS
10-yr	1.16 CFS	0.77 CFS	-0.39 CFS
100-yr	2.26 CFS	2.09 CFS	-0.17 CFS

As can be seen above, the stormwater management system has been designed to not exceed the existing tributary runoff rates for the given design storms.

VI. WATER QUALITY & GROUNDWATER RECHARGE

The proposed development will have less than an acre of disturbance and will not increase regulated motor vehicular surfaces on-site by more than $\frac{1}{4}$ acre. Additionally, the proposed project is located on a previously developed parcel located within the Metropolitan Planning Area (PA-1). Therefore, compliance with the stormwater quality and groundwater recharge standards under NJAC 7:8 and the Township of West Orange Ordinance is not required.

VII. CONCLUSION

The proposed project has been designed in a manner that will not adversely impact the existing drainage patterns, adjacent roadways or adjacent parcels. The stormwater runoff rates for the 2, 10, and 100-year design storms will decrease under proposed conditions therefore the proposed project will not adversely impact adjacent parcels nor the existing stormwater conveyance systems that surround the subject site. With that stated, it is evident that the proposed development will not have a negative impact on the existing stormwater management system within the vicinity of the subject parcel.

APPENDIX

NRCS WEB SOIL SURVEY

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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 1:12,000.

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: Essex County, New Jersey
Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 25, 2014—Sep 27, 2014

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
BogB	Boonton loam, 3 to 8 percent slopes	0.4	8.2%
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	0.5	9.6%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	0.6	11.3%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	3.5	70.9%
Totals for Area of Interest		4.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

Custom Soil Resource Report

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Essex County, New Jersey

BogB—Boonton loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: b066
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Boonton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oa - 1 to 3 inches: highly decomposed plant material
A - 3 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Haledon

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Boonton, moderately well drained

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: b128

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Boonton, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton, Extremely Stony

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Oa - 1 to 3 inches: highly decomposed plant material

A - 3 to 5 inches: loam

Custom Soil Resource Report

BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Boonton, moderately well drained, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Haledon, extremely stony

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: b12f
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Boonton and similar soils: 50 percent
Urban land, boonton substratum: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy basal till derived from basalt

Typical profile

A - 0 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Hydric soil rating: No

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material

H2 - 12 to 47 inches: silt loam

2CBt1 - 47 to 58 inches: loamy sand

2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Udorthents, boonton substratum

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w9cn

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton substratum: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material

H2 - 12 to 47 inches: silt loam

2CBt1 - 47 to 58 inches: loamy sand

2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Boonton

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Udorthents, boonton substratum

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic layer.

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

RUSLE2 Related Attributes—Essex County, New Jersey								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
BogB—Boonton loam, 3 to 8 percent slopes								
Boonton	80	492	C	.32	3	46.1	43.8	10.1
Boonton, moderately well drained	10	492	C	.32	3	46.1	43.8	10.1
Haledon	10	492	C	.37	3	30.8	56.4	12.8
BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony								
Boonton, extremely stony	85	492	C	.32	3	46.1	43.8	10.1
Boonton, moderately well drained, extremely stony	10	492	C	.32	3	46.1	43.8	10.1
Haledon, extremely stony	5	492	C	.37	3	30.8	56.4	12.8
BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes								
Boonton	50	492	C	.32	4	46.1	43.8	10.1
Urban land, Boonton substratum	40	656	—	.49	—	30.9	53.6	15.5
Udorthents, Boonton substratum	10	492	D	.28	5	46.0	44.0	10.0

RUSLE2 Related Attributes--Essex County, New Jersey								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes								
Urban land, Boonton substratum	90	656	—	.49	—	30.9	53.6	15.5
Boonton	5	492	C	.32	4	46.1	43.8	10.1
Udorthents, Boonton substratum	5	492	D	.28	5	46.0	44.0	10.0

Data Source Information

Soil Survey Area: Essex County, New Jersey
 Survey Area Data: Version 16, Jun 1, 2020

RUNOFF CURVE NUMBER (CN) CALCULATION



Existing and Proposed Drainage Area Summary and Average Curve Number(CN) Calculations

Project: Altera Development Company, LLC
 Job #: 2530-99-006
 Location: Township of West Orange, Essex County, NJ

Computed By: PF
 Checked By: RJC
 Date: 8/5/2021

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG B - Open Space Area (acre)	HSG C - Open Space Area (sf)	Curve Number (CN) Used	HSG D - Wooded Area (acre)	HSG C - Wooded Area (sf)	Curve Number (CN) Used	Avg. Curve Number	Total Area (acres)	Total Area (sf)	TC (Min.)
[POI-1] - EX DA-1	0.16	6,910	98	0.00	-	74	0.24	10,395	70	81	0.40	17,305	10.4
[POI-2] - EX DA-2*	0.81	35,380	98	0.00	-	74	0.03	1,206	70	97	0.84	36,586	10.4
EX DA-3 Undetained	1.83	79,529	98	0.03	1,100	74	2.79	121,612	70	81	4.64	202,241	10.4
[POI-1] - DA-1 Detained	0.28	12,260	98	0.01	600	74	0.27	11,620	70	84	0.56	24,480	6.0
[POI-2] - DA-2 Detained*	0.81	35,167	98	0.00	-	74	0.03	1,419	70	97	0.84	36,586	6.0
DA-3 Undetained	1.81	78,787	98	0.03	1,340	74	2.78	120,916	70	81	4.62	201,043	6.0

Per Essex County Soil Survey	BogB	C	Soil	Boonton Loam, 3 to 8 percent slopes
	BogBc	C	Soil	Boonton Loam, 0 to 8 percent slopes, extremely stony
	BouB	C	Soil	Boonton – Urban Land, Boonton Substratum Complex, 0 to 8 percent slopes
	URBONB	C	Soil	Urban Land, Boonton Substratum, 0 to 8 percent slopes

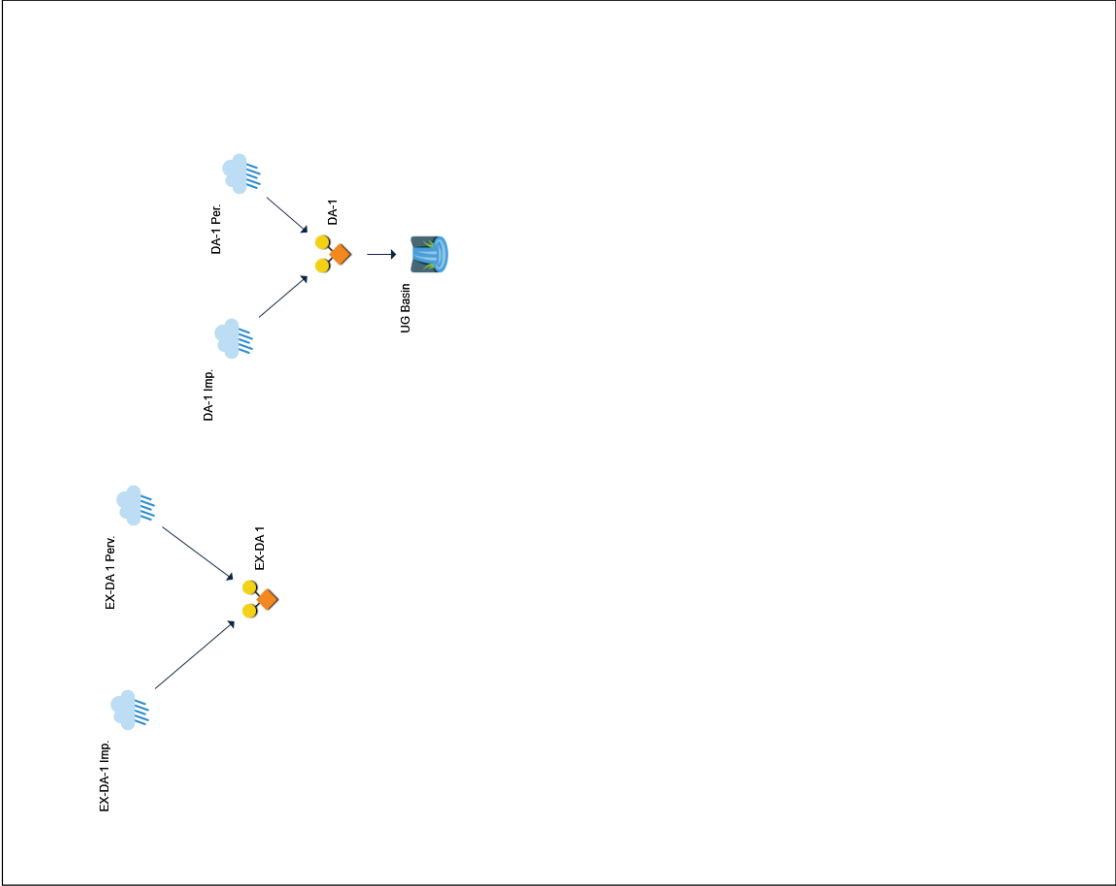
Description	Runoff Curve Number (CN)
Impervious Surface	98
Open Space (lawn) (good)	74
Woods	70

*Remaining On-Site Tributary Area to Existing Underground Stormwater Management Structure

TIME OF CONCENTRATION (T_c) CALCULATIONS

10.4 min

**EXISTING & PROPOSED CONDITIONS
FOR 2YR, 10YR & 100YR STORM EVENTS
(HYDROGRAPHS CREATED USING HYDROLOGY STUDIO
2020 COMPUTER SOFTWARE)**



Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	EX-DA-1 Imp.		0.434			0.663			1,103
2	NRCS Runoff	EX-DA 1 Per.		0.209			0.501			1,158
3	Junction	EX-DA 1		0.641			1.164			2,262
5	NRCS Runoff	DA-1 Imp.		0.890			1.358			2,260
6	NRCS Runoff	DA-1 Per.		0.297			0.707			1,611
7	Junction	DA-1		1.187			2.065			3,871
8	Pond Route	UG Basin		0.561			0.774			2,089

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.20

Project Name:

08-09-2021

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX-DA-1 Imp.	0.434	12.17	1,921	---		
2	NRCS Runoff	EX-DA-1 Perc.	0.209	12.20	873	---		
3	Junction	EX-DA 1	0.641	12.17	2,793	1, 2		
5	NRCS Runoff	DA-1 Imp.	0.890	12.10	3,056	---		
6	NRCS Runoff	DA-1 Perc.	0.297	12.10	933	---		
7	Junction	DA-1	1.187	12.10	3,988	5, 6		
8	Pond Route	UG Basin	0.561	12.20	3,987	7	470.94	469

Hydrograph Report

Project Name:

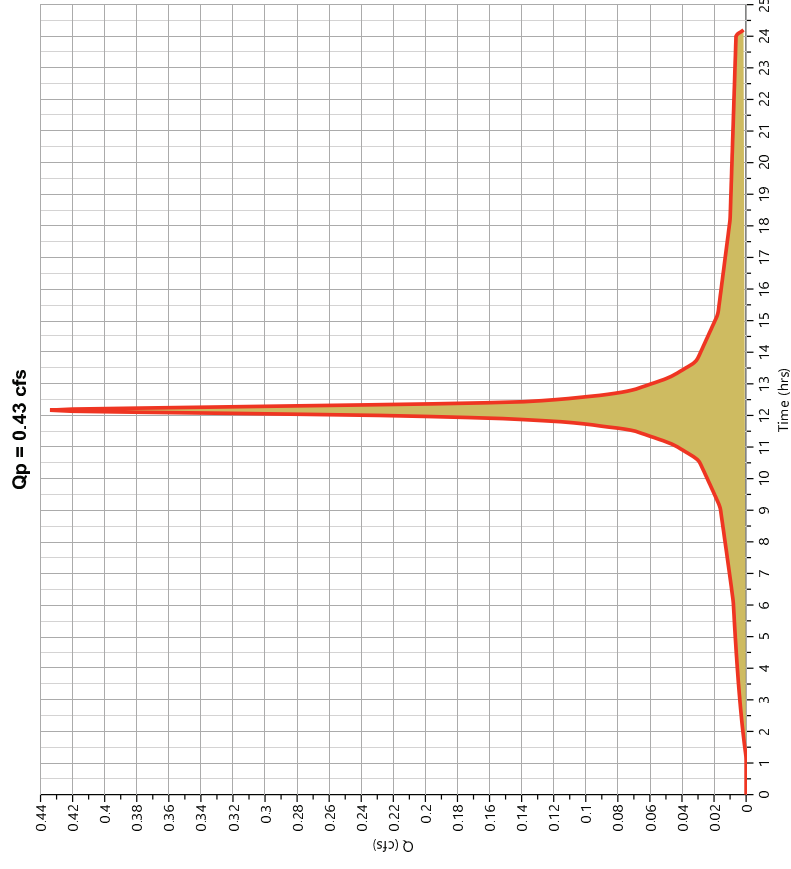
Hydrology Studio v 3.0.0.20

08-09-2021

EX-DA-1 Imp.

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.434 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 1,921 cuft
Drainage Area	= 0.16 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.4 min
Total Rainfall	= 3.44 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:
08-09-2021

Hydrology Studio v 3.0.0.20

EX-DA 1 Perv.

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.209 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 873 cuft
Drainage Area	= 0.24 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.4 min
Total Rainfall	= 3.44 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.21 cfs



Hydrograph Report

Project Name:
08-09-2021

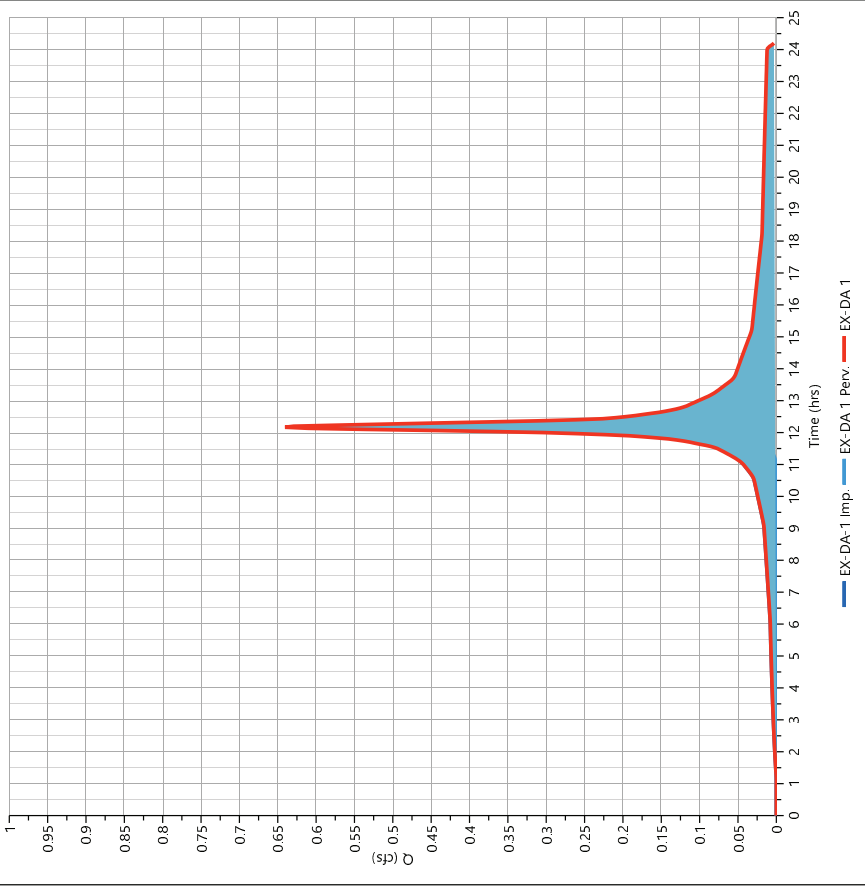
Hydrology Studio v 3.0.0.20

EX-DA 1

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 0.641 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,793 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.4 ac

Qp = 0.64 cfs

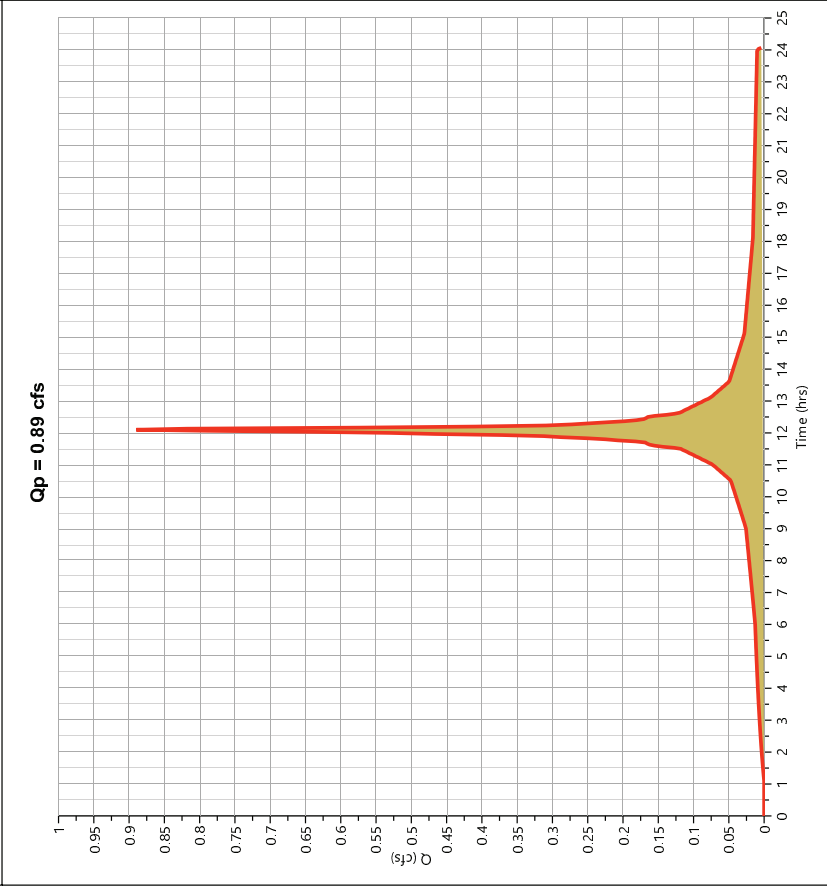


Hydrograph Report

DA-1 Imp.

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.890 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 3,056 cuft
Drainage Area	= 0.28 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

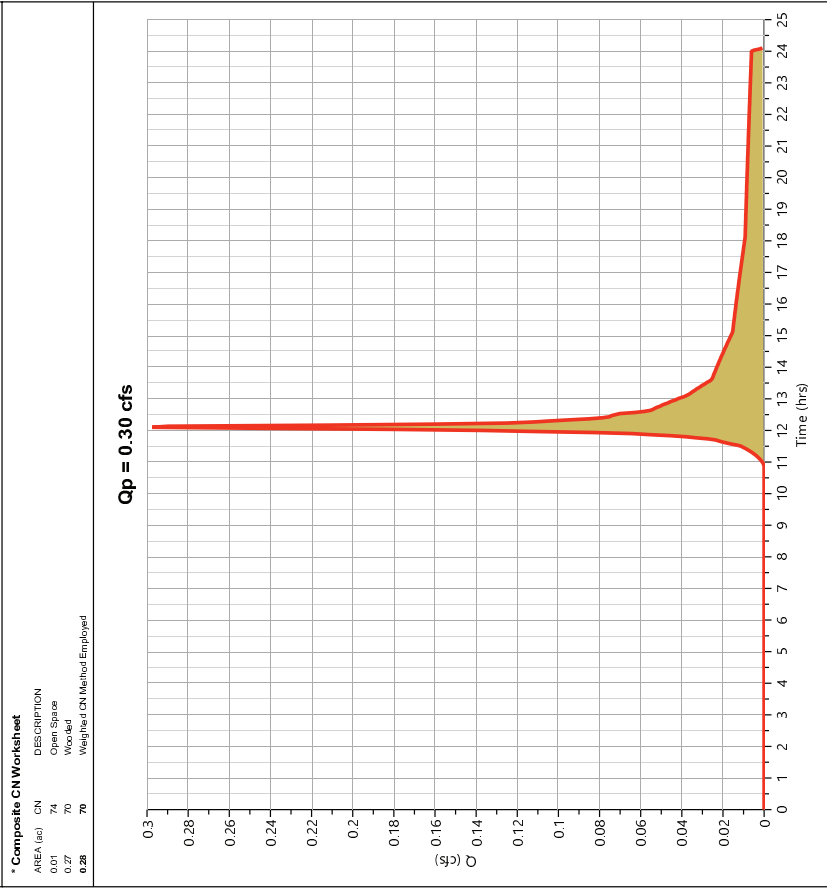


Hydrograph Report

DA-1 Per.

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.297 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 933 cuft
Drainage Area	= 0.28 ac	Curve Number	= 70.14*
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



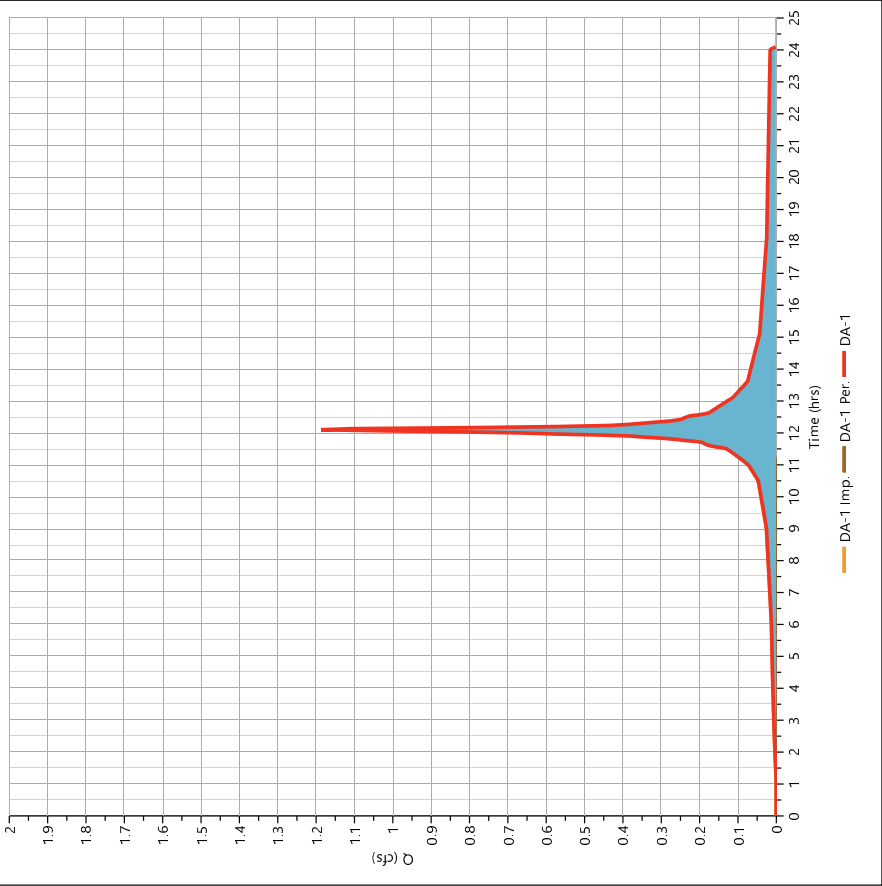
Hydrograph Report

DA-1

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 1,187 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,988 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.56 ac

Qp = 1.19 cfs



Hydrograph Report

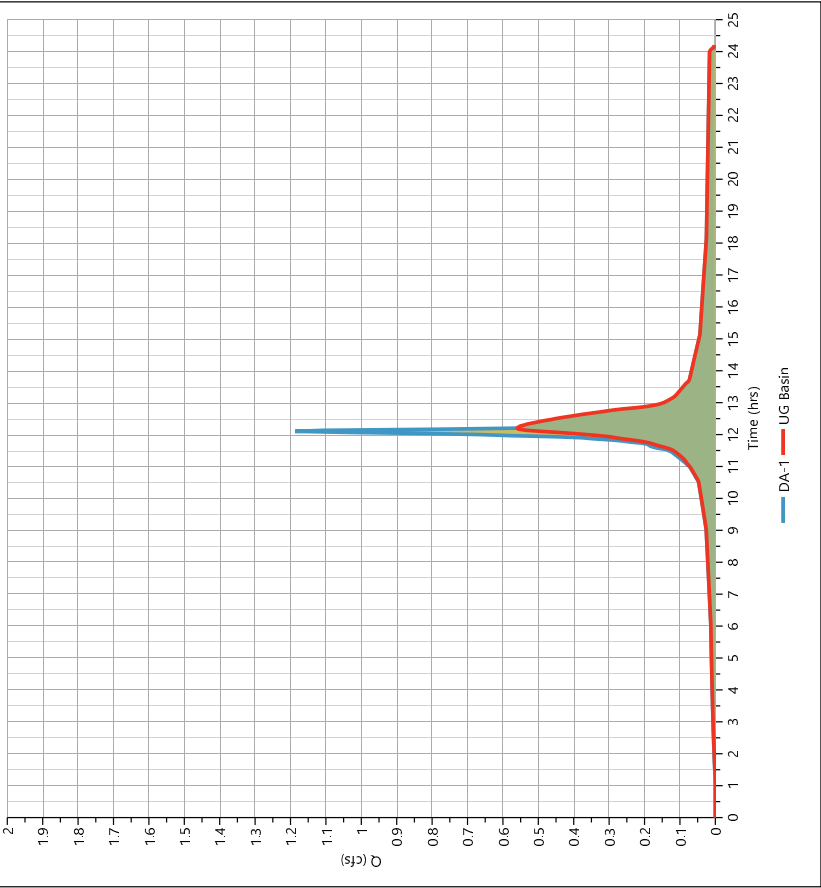
UG Basin

Hyd. No. 8

Hydrograph Type	= Pond Route	Peak Flow	= 0.561 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,987 cuft
Inflow Hydrograph	= 7 - DA-1	Max. Elevation	= 470.94 ft
Pond Name	= UG Basin	Max. Storage	= 469 cuft

Center of mass detention time = 6 min

Qp = 0.56 cfs



Pond Report

Project Name:

Hydrology Studio v 3.0.0.20

Project Name:

Hydrology Studio v 3.0.0.20

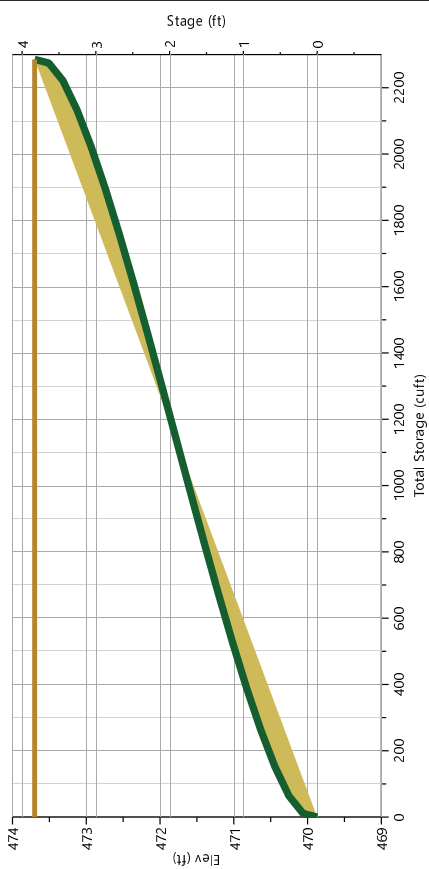
UG Basin

Stage-Storage

08-09-2021

Underground Chambers			Stage / Storage Table			
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Invert Elev Down, ft	469.87	0.00	469.87	n/a	0.000	0.000
Chamber Rise, ft	3.50	0.19	470.06	n/a	10.9	10.9
Chamber Shape	Circular	0.38	470.25	n/a	53.0	63.9
Chamber Span, ft	3.50	0.57	470.44	n/a	88.9	153
Barrel Length, ft	110.00	0.77	470.64	n/a	111	264
No. Barrels	2	0.96	470.83	n/a	126	390
Barrel Slope, %	0.30	1.15	471.02	n/a	138	528
Headers, y/n	Yes	1.34	471.21	n/a	147	675
Stone Encasement, y/n	No	1.53	471.40	n/a	153	828
Encasement Bottom Elevation, ft	0.00	1.72	471.59	n/a	157	985
Encasement Width per Chamber, ft	0.00	2.11	471.79	n/a	158	1,143
Encasement Depth, ft	0.00	2.30	472.17	n/a	158	1,301
Encasement Voids, %	40.00	2.49	472.36	n/a	153	1,458
		2.68	472.55	n/a	147	1,611
		2.87	472.74	n/a	138	1,758
		3.06	472.93	n/a	126	1,896
		3.26	473.13	n/a	111	2,022
		3.45	473.32	n/a	88.8	2,133
		3.64	473.51	n/a	52.9	2,222
		3.83	473.70	n/a	10.9	2,275
						2,285

Stage-Storage



UG Basin

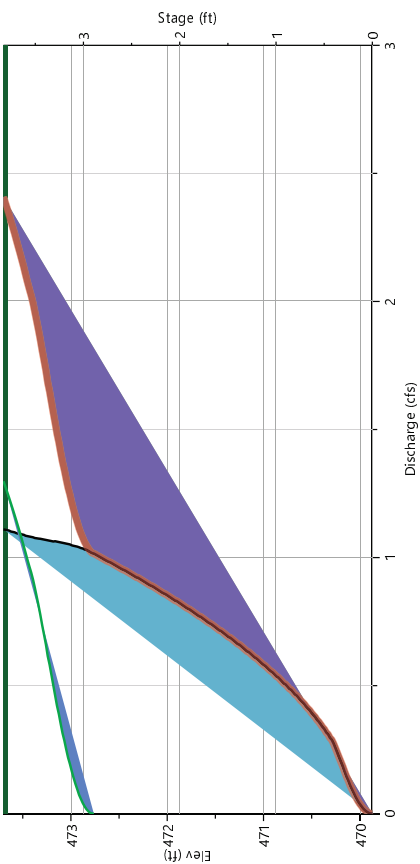
Stage-Discharge

08-09-2021

Culvert / Orifices		Orifices			Culvert	Weirs			Riser*	Weirs			Ancillary
		1*	2*	3		1*	2	3		1*	2	3	
Rise, in	18	5	8		18								
Span, in	18	5	8		1								
No. Barrels	1	1	1		469.87								
Invert Elevation, ft					0.60								
Orifice Coefficient, Co					10								
Length, ft					1								
Barrel Slope, %					0.012								
N-Value, n													
Shape / Type													
Crest Elevation, ft													
Crest Length, ft													
Angle, deg													
Weir Coefficient, Cw													

*Routes through Culvert.

Stage-Discharge



Pond Report

Project Name:

Hydrology Studio v 3.0.0.20

08-09-2021

UG Basin

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Curv. (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			PI Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	469.87	0.000	0.000	0.000	0.000			0.000						0.000
0.19	470.06	10.9	0.080 ic	0.080	0.000			0.000						0.080
0.38	470.25	63.9	0.256 ic	0.256	0.000			0.000						0.256
0.57	470.44	153	0.366 ic	0.366	0.000			0.000						0.366
0.77	470.64	264	0.453 ic	0.453	0.000			0.000						0.453
0.96	470.83	390	0.525 oc	0.525	0.000			0.000						0.525
1.15	471.02	528	0.587 oc	0.587	0.000			0.000						0.587
1.34	471.21	675	0.647 oc	0.647	0.000			0.000						0.647
1.53	471.40	828	0.702 oc	0.702	0.000			0.000						0.702
1.72	471.59	985	0.752 oc	0.752	0.000			0.000						0.752
1.92	471.79	1,143	0.801 oc	0.801	0.000			0.000						0.801
2.11	471.98	1,301	0.847 oc	0.847	0.000			0.000						0.847
2.30	472.17	1,458	0.890 oc	0.890	0.000			0.000						0.890
2.49	472.36	1,611	0.932 oc	0.932	0.000			0.000						0.932
2.68	472.55	1,768	0.973 oc	0.973	0.000			0.000						0.973
2.87	472.74	1,896	1.012 oc	1.012	0.000			0.000						1.012
3.06	472.93	2,022	1.138 oc	1.043	0.095			0.000						1.138
3.26	473.13	2,133	1.450 oc	1.061	0.390			0.000						1.450
3.45	473.32	2,222	1.849 oc	1.073	0.775			0.000						1.849
3.64	473.51	2,275	2.160 oc	1.090	1.070			0.000						2.160
3.83	473.70	2,285	2.408 oc	1.110	1.298			0.000						2.408

Suffix key: ic = inlet control, oc = orified control, s = submerged weir

Pond Report

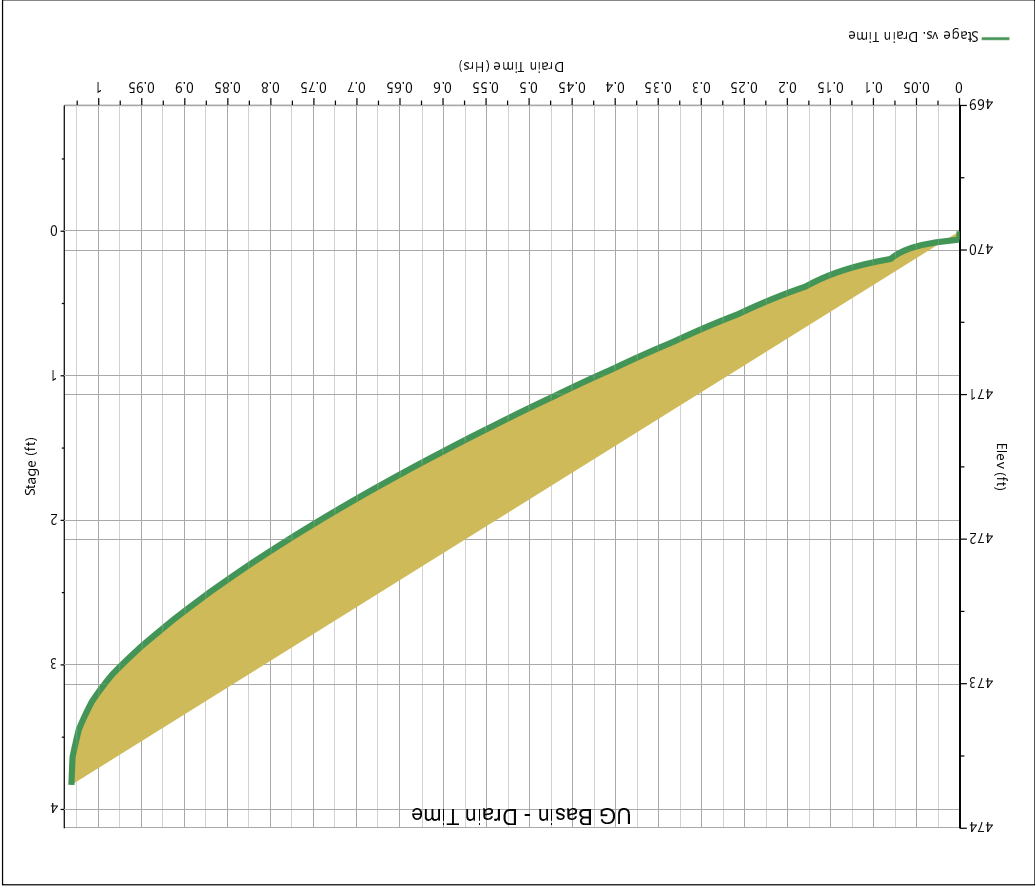
Project Name:

Hydrology Studio v 3.0.0.20

08-09-2021

UG Basin

Pond Drawdown



Hydrograph 10-yr Summary

Project Name:
08-09-2021

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX-DA-1 Imp.	0.663	12.17	2,984	---		
2	NRCS Runoff	EX-DA-1 Per.	0.501	12.17	1,977	---		
3	Junction	EX-DA-1	1.164	12.17	4,962	1, 2		
5	NRCS Runoff	DA-1 Imp.	1.358	12.10	4,748	---		
6	NRCS Runoff	DA-1 Per.	0.707	12.10	2,108	---		
7	Junction	DA-1	2.065	12.10	6,856	5, 6		
8	Pond Route	UG Basin	0.774	12.23	6,855	7	471.68	1,057

Hydrograph Report

Project Name:
08-09-2021

Hydrology Studio v 3.0.0.20	Hyd. No. 1
EX-DA-1 Imp.	
Hydrograph Type = NRCS Runoff	Peak Flow = 0.663 cfs
Storm Frequency = 10-yr	Time to Peak = 12.17 hrs
Time Interval = 2 min	Runoff Volume = 2,984 cuft
Drainage Area = 0.16 ac	Curve Number = 98
Tc Method = User	Time of Conc. (Tc) = 10.4 min
Total Rainfall = 5.22 in	Design Storm = NOAA-D
Storm Duration = 24 hrs	Shape Factor = 484

Qp = 0.66 cfs



Hydrograph Report

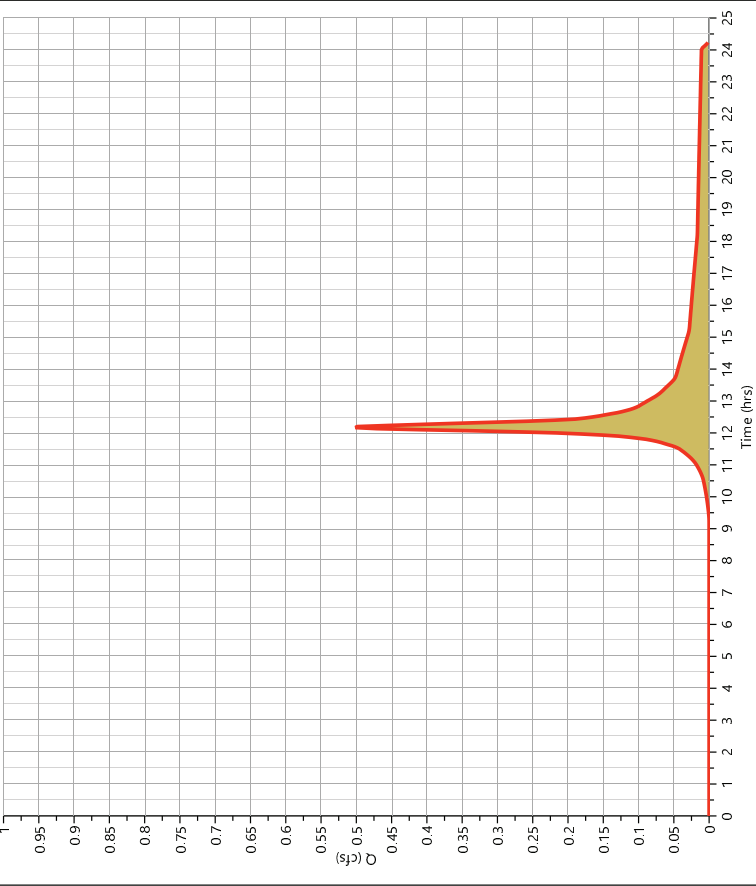
Project Name:
08-09-2021

EX-DA 1 Perv.

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.501 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 1,977 cuft
Drainage Area	= 0.24 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.4 min
Total Rainfall	= 5.22 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.50 cfs



Hydrograph Report

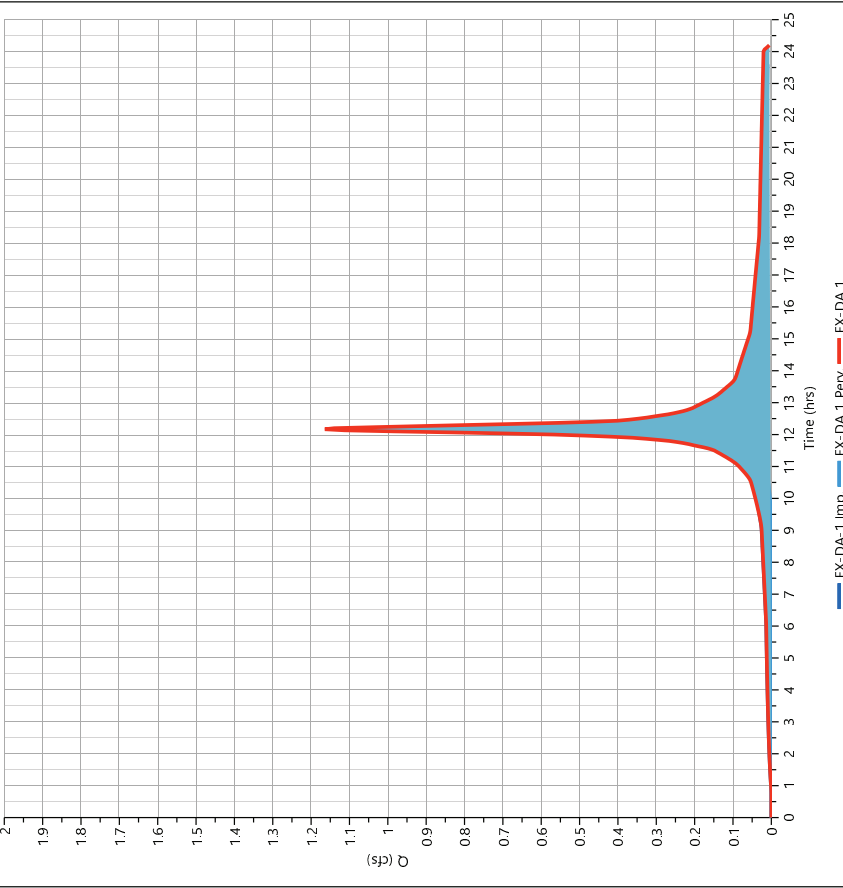
Project Name:
08-09-2021

EX-DA 1

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1,164 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,962 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.4 ac

Qp = 1.16 cfs



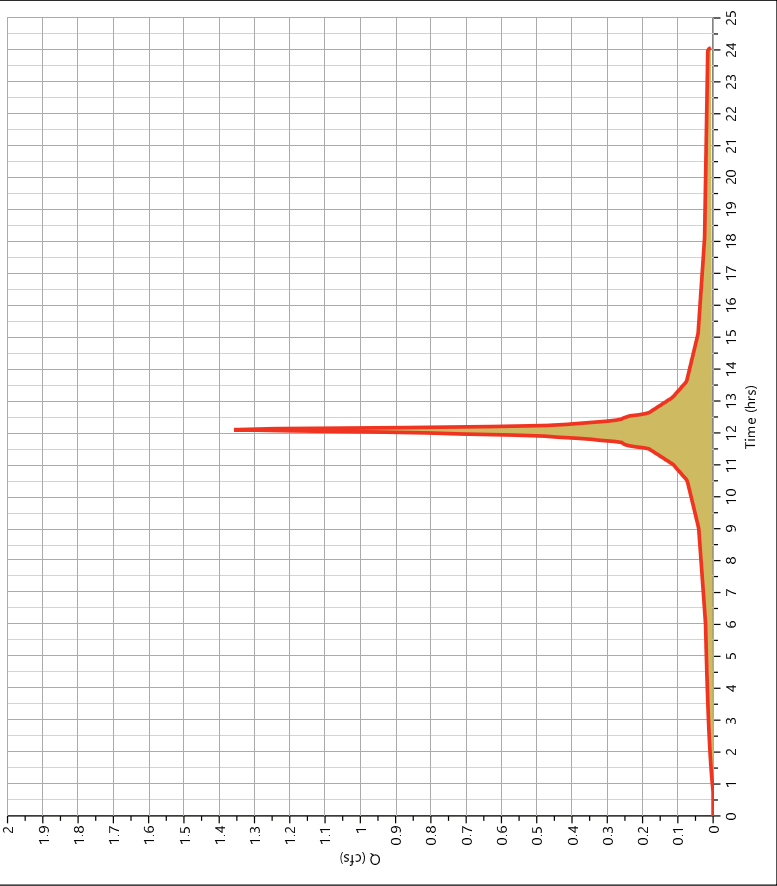
Hydrograph Report

DA-1 Imp.

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,358 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 4,748 cuft
Drainage Area	= 0.28 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.36 cfs



Hydrograph Report

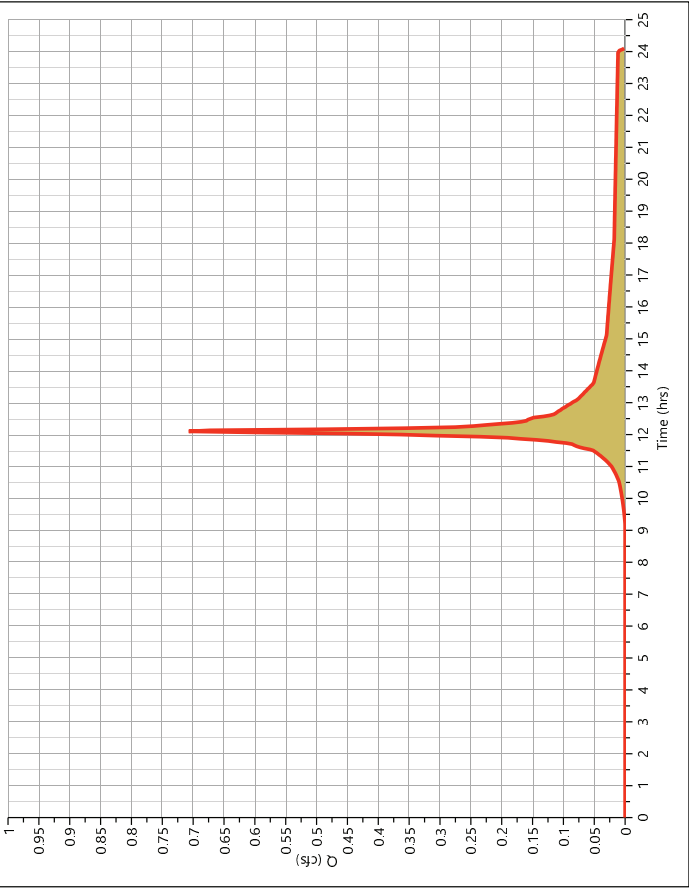
DA-1 Per.

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.707 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,108 cuft
Drainage Area	= 0.28 ac	Curve Number	= 70.14*
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*Composite CN Worksheet	
AREA (ac)	CN
0.01	74
0.27	70
0.28	70
Weighted CN Method Employed	

Qp = 0.71 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.20

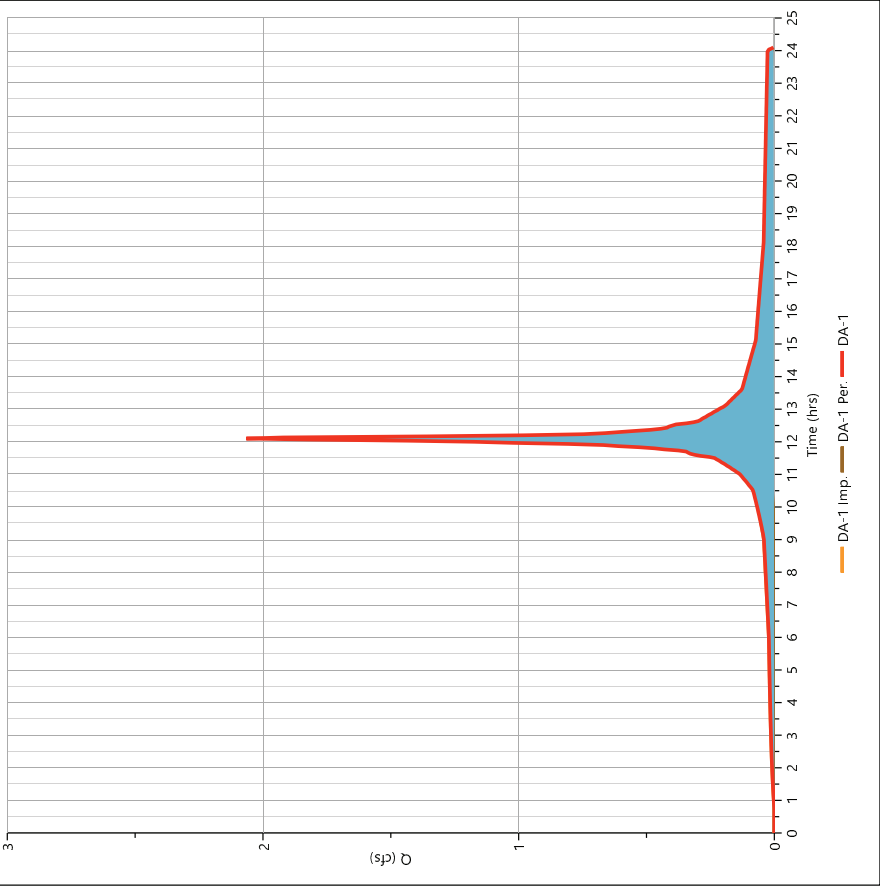
08-09-2021

DA-1

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 2.065 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 6.856 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.56 ac

Qp = 2.07 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.20

08-09-2021

UG Basin

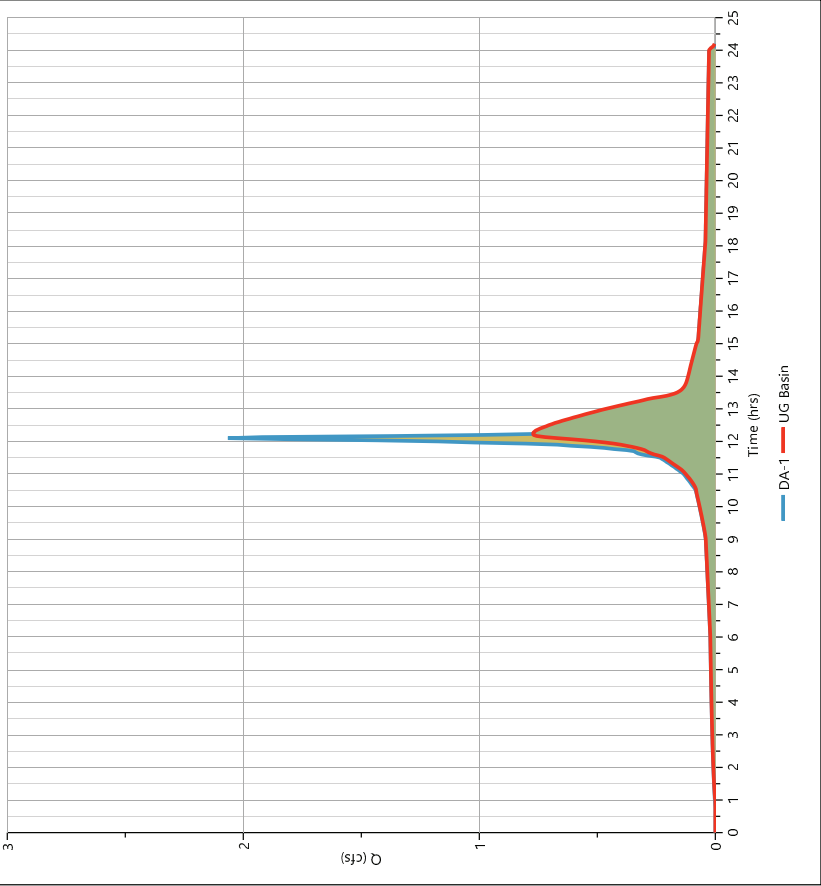
Hyd. No. 8

Hydrograph Type	= Pond Route	Peak Flow	= 0.774 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 6.855 cuft
Inflow Hydrograph	= 7 - DA-1	Max. Elevation	= 471.68 ft
Pond Name	= UG Basin	Max. Storage	= 1,057 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 9 min

Qp = 0.77 cfs



Hydrograph 100-yr Summary

Project Name:
08-09-2021

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX-DA-1 Imp.	1.103	12.17	5,043	---		
2	NRCS Runoff	EX-DA-1 Pen.	1.158	12.17	4,525	---		
3	Junction	EX-DA-1	2,262	12.17	9,568	1,2		
5	NRCS Runoff	DA-1 Imp.	2,260	12.10	8,023	---		
6	NRCS Runoff	DA-1 Per.	1,811	12.10	4,815	---		
7	Junction	DA-1	3,871	12.10	12,838	5, 6		
8	Pond Route	UG Basin	2,089	12.20	12,837	7	473.56	2,261

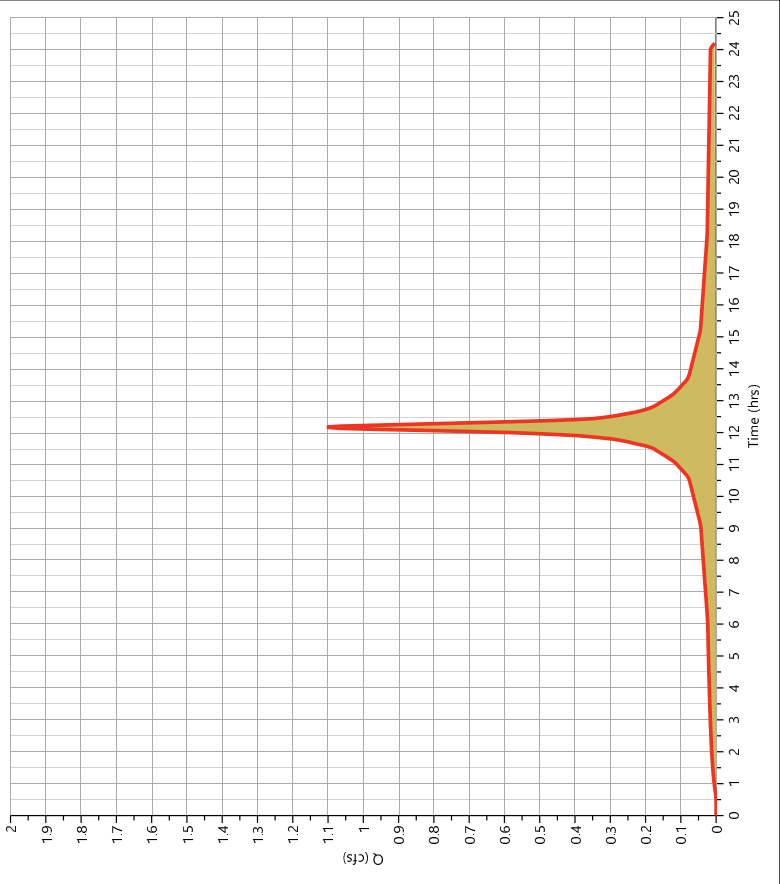
Hydrograph Report

Project Name:
08-09-2021

Hydrology Studio v 3.0.0.20
EX-DA-1 Imp.
Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,103 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 5,043 cuft
Drainage Area	= 0.16 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.4 min
Total Rainfall	= 8.66 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.10 cfs



Hydrograph Report

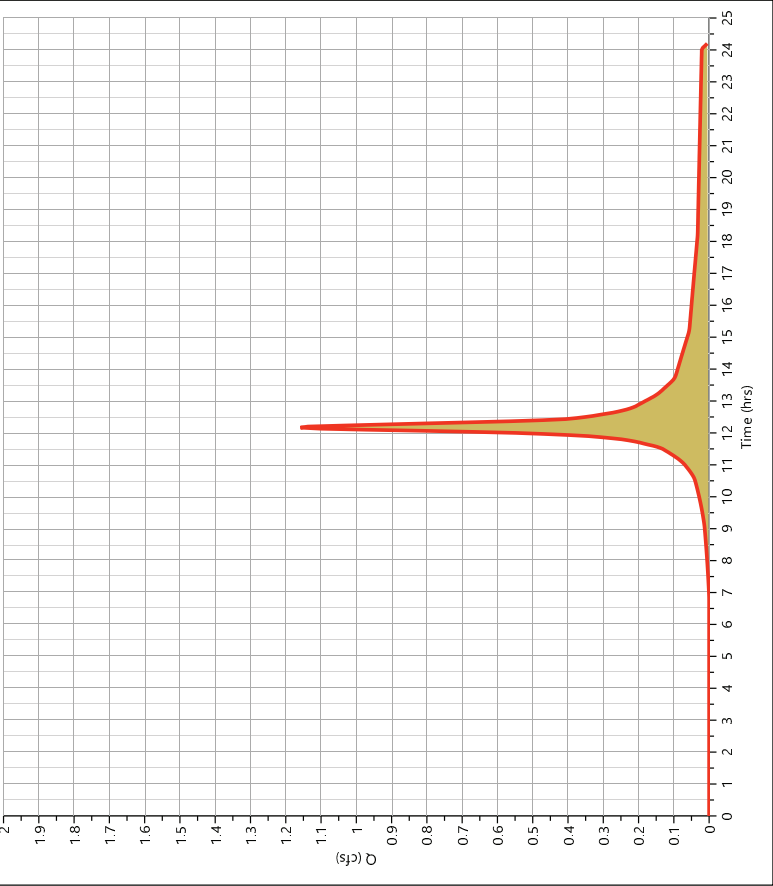
Project Name:
08-09-2021

EX-DA 1 Perv.

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1,158 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 4,525 cuft
Drainage Area	= 0.24 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.4 min
Total Rainfall	= 8.66 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 1.16 cfs



Hydrograph Report

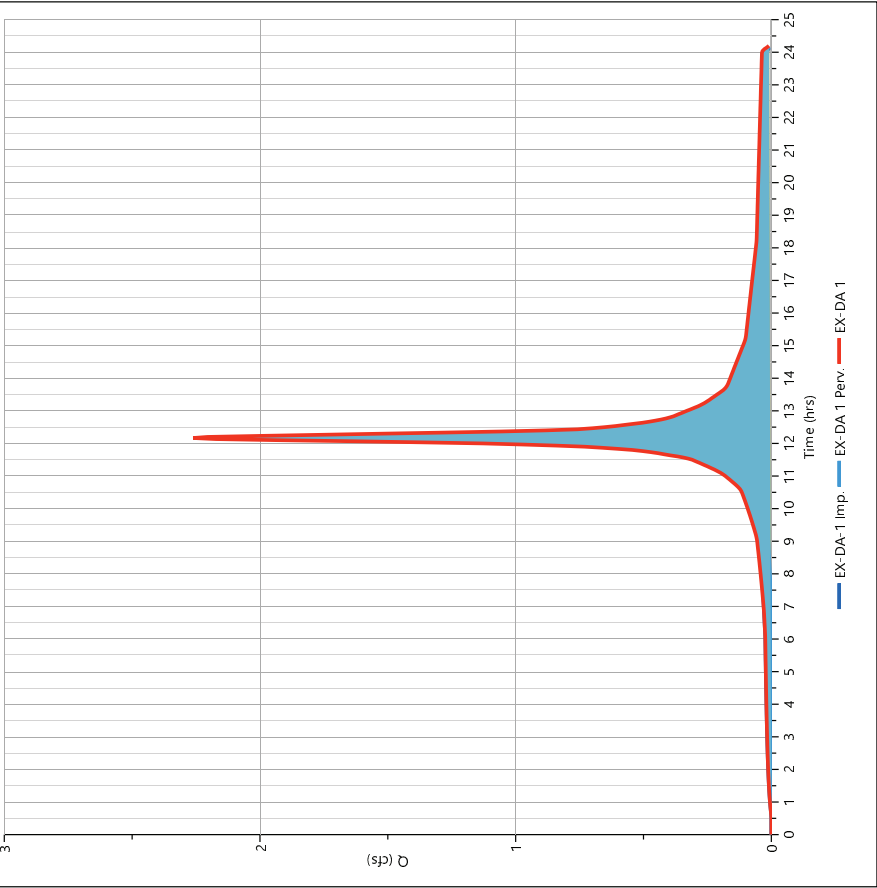
Project Name:
08-09-2021

EX-DA 1

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 2,262 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,568 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.4 ac

Qp = 2.26 cfs



Hydrograph Report

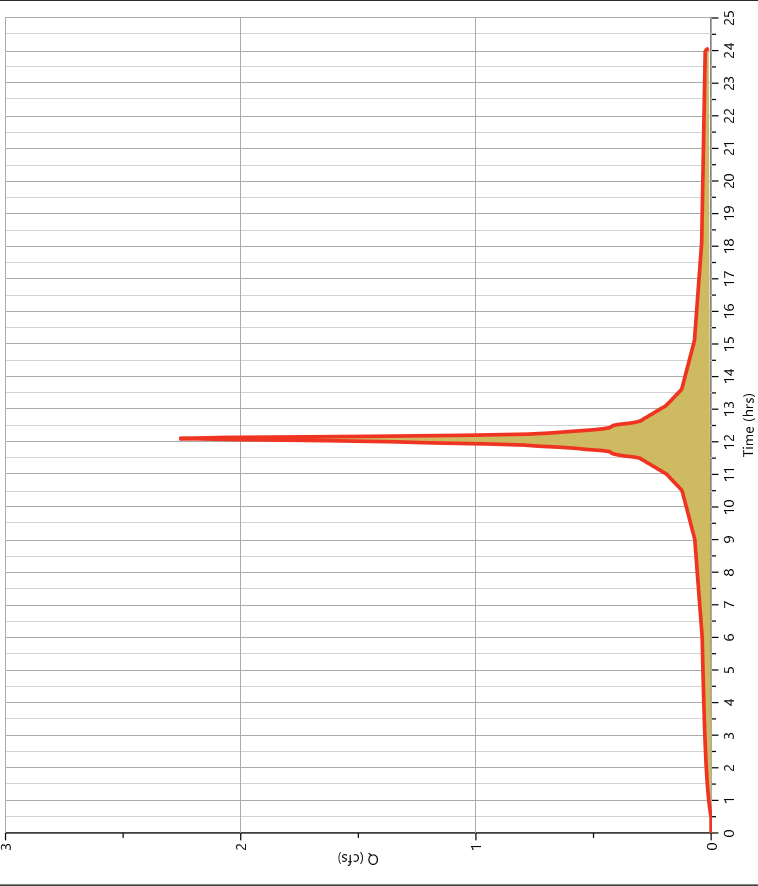
Project Name:
08-09-2021

DA-1 Imp.

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.260 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 8,023 cuft
Drainage Area	= 0.28 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 2.26 cfs



Hydrograph Report

Project Name:
08-09-2021

DA-1 Per.

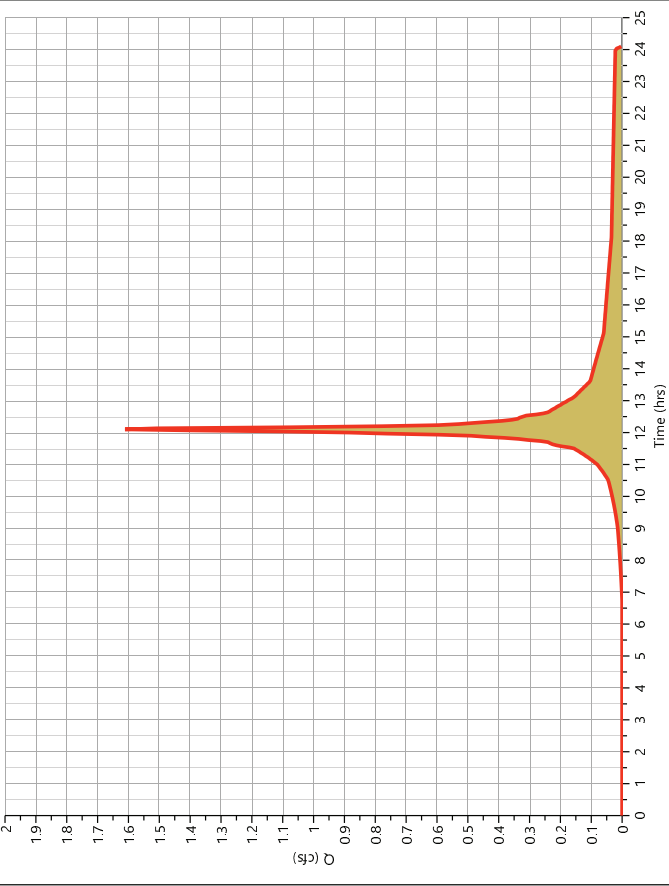
Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.611 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 4,815 cuft
Drainage Area	= 0.28 ac	Curve Number	= 70.14*
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.01	74	Open Space
0.27	70	Wooded
0.28	70	Weighted CN Method Employed

Qp = 1.61 cfs



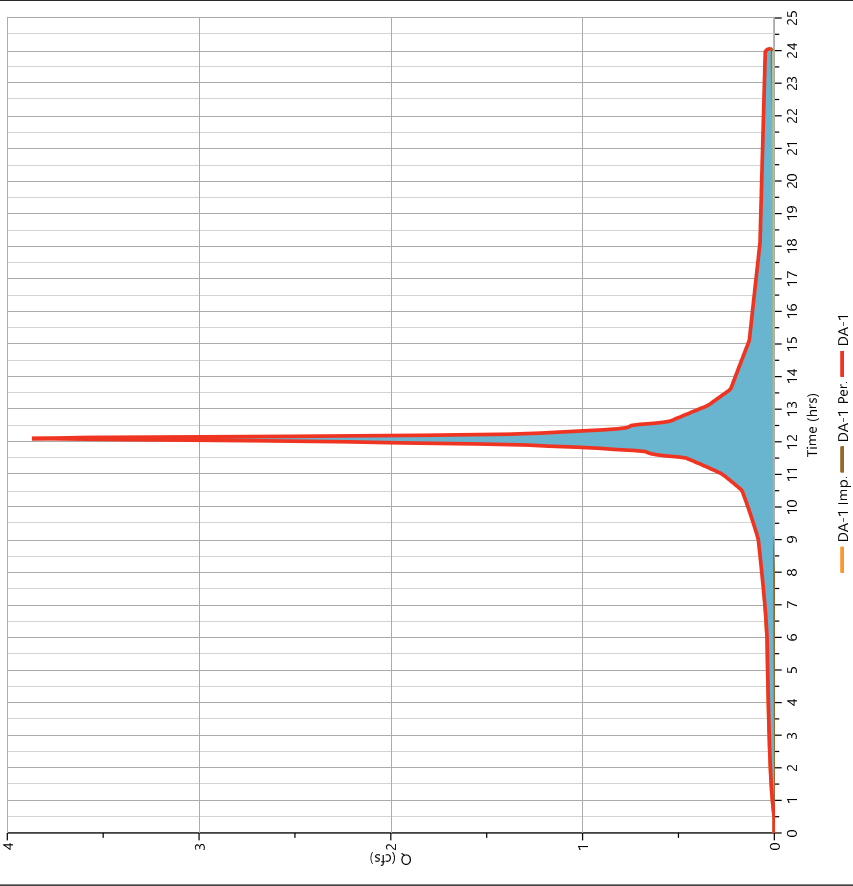
Hydrograph Report

DA-1

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 3.871 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,838 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.56 ac

Qp = 3.87 cfs



Hydrograph Report

UG Basin

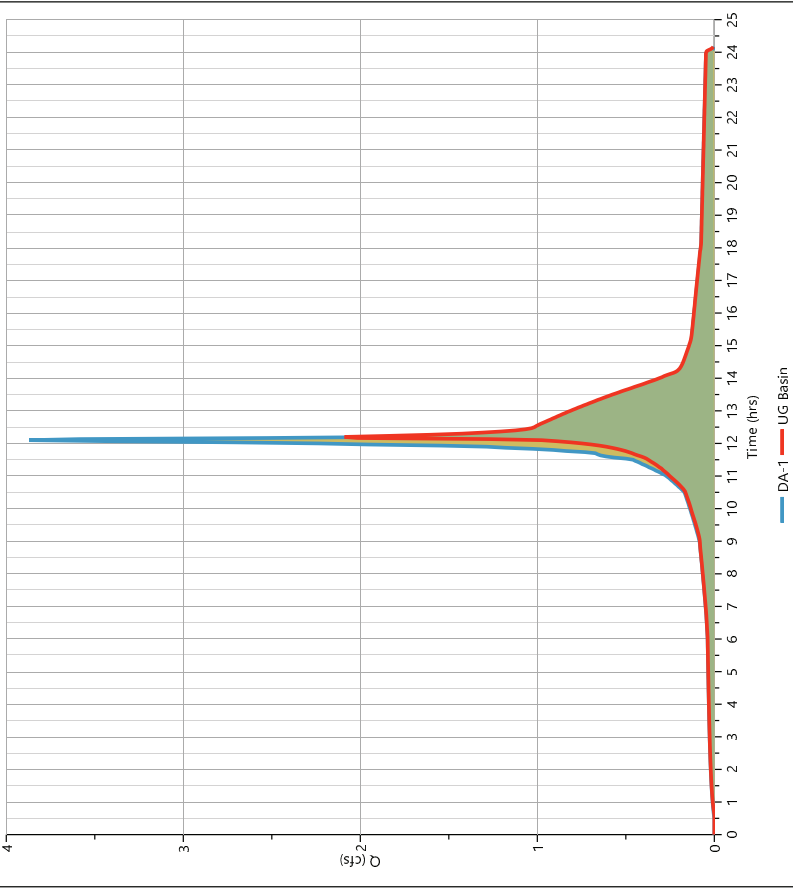
Hyd. No. 8

Hydrograph Type	= Pond Route	Peak Flow	= 2.089 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,837 cuft
Inflow Hydrograph	= 7 - DA-1	Max. Elevation	= 473.56 ft
Pond Name	= UG Basin	Max. Storage	= 2,261 cuft

Pond Routing by Storage Indication Method

Center of mass retention time = 13 min

Qp = 2.09 cfs



IDF Report

IDF filename: TRENTON.idf
08-09-2021

Equation Coefficients	Intensity = B / (Tc + D)^E (in/hr)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Minimum Tc = 5 minutes

Tc (min)	Intensity Values (in/hr)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Cf	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0

Cf = Correlation Factor applied to Rational Method runoff coefficient.

Intensity (in/hr)

Time (min)

Precipitation Report

Precipitation filename: Essex County NRCS.pcp
08-09-2021

Hydrology Studio v 3.0.0.20 (Rainfall totals in inches)

Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active		✓			✓			✓
> SCS Dimensionless Storms								
SCS 6hr	0	0	0	0	0	0	0	0
Type I, 24-hr	0	0	0	0	0	0	0	0
Type IA, 24-hr	0	0	0	0	0	0	0	0
Type II, 24-hr	0	0	0	0	0	0	0	0
Type II FL, 24-hr	0	0	0	0	0	0	0	0
Type III, 24-hr	2.85	3.44	0	4.40	5.22	6.44	7.49	8.66
> IDF-Based Synthetic Storms								
1-hr	0	0	0	0	0	0	0	0
2-hr	0	0	0	0	0	0	0	0
3-hr	0	0	0	0	0	0	0	0
6-hr	0	0	0	0	0	0	0	0
12-hr	0	0	0	0	0	0	0	0
24-hr	0	0	0	0	0	0	0	0
> 1st Quartile (0 to 6 hrs)								
Huff Distribution								
1-hr	0.76	0.98	0	1.33	1.61	2.01	2.34	2.69
2-hr	0.69	1.14	0	1.50	1.80	2.24	2.60	2.99
3-hr	0.98	1.24	0	1.59	1.90	2.33	2.68	3.07
6-hr	1.20	1.50	0	1.86	2.18	2.64	3.01	3.41
> 2nd Quartile (>6 to 12 hrs)								
Huff Distribution								
8-hr	0	0	0	0	0	0	0	0
12-hr	0	0	0	0	0	0	0	0
> 3rd Quartile (>12 to 24 hrs)								
Huff Distribution								
18-hr	0	0	0	0	0	0	0	0
24-hr	0	0	0	0	0	0	0	0
> Custom Storm Distributions								
Custom Storms								
NJ Water Quality	1.25	0	0	0	0	0	0	0
My Custom Storm 2	0	0	0	0	0	0	0	0
My Custom Storm 3	0	0	0	0	0	0	0	0
My Custom Storm 4	0	0	0	0	0	0	0	0
My Custom Storm 5	0	0	0	0	0	0	0	0
My Custom Storm 6	0	0	0	0	0	0	0	0
My Custom Storm 7	0	0	0	0	0	0	0	0
My Custom Storm 8	0	0	0	0	0	0	0	0
My Custom Storm 9	0	0	0	0	0	0	0	0
My Custom Storm 10	0	0	0	0	0	0	0	0

Precipitation Report Cont'd

Precipitation filename: Essex County NRCS.pcp

Rainfall totals in inches

08-09-2021

Active	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
Huff Indiana	> Indianapolis		✓			✓			✓	
30-min		0	0	0	0	0	0	0	0	
1-hr		0	0	0	0	0	0	0	0	
2-hr		0	0	0	0	0	0	0	0	
3-hr		0	0	0	0	0	0	0	0	
6-hr		0	0	0	0	0	0	0	0	
12-hr		0	0	0	0	0	0	0	0	
24-hr		0	0	0	0	0	0	0	0	
Huff Indiana	> Evansville									
30-min		0	0	0	0	0	0	0	0	
1-hr		0	0	0	0	0	0	0	0	
2-hr		0	0	0	0	0	0	0	0	
3-hr		0	0	0	0	0	0	0	0	
6-hr		0	0	0	0	0	0	0	0	
12-hr		0	0	0	0	0	0	0	0	
24-hr		0	0	0	0	0	0	0	0	
Huff Indiana	> Fort Wayne									
30-min		0	0	0	0	0	0	0	0	
1-hr		0	0	0	0	0	0	0	0	
2-hr		0	0	0	0	0	0	0	0	
3-hr		0	0	0	0	0	0	0	0	
6-hr		0	0	0	0	0	0	0	0	
12-hr		0	0	0	0	0	0	0	0	
24-hr		0	0	0	0	0	0	0	0	
Huff Indiana	> South Bend									
30-min		0	0	0	0	0	0	0	0	
1-hr		0	0	0	0	0	0	0	0	
2-hr		0	0	0	0	0	0	0	0	
3-hr		0	0	0	0	0	0	0	0	
6-hr		0	0	0	0	0	0	0	0	
12-hr		0	0	0	0	0	0	0	0	
24-hr		0	0	0	0	0	0	0	0	

Precipitation Report Cont'd

Precipitation filename: Essex County NRCS.pcp

Rainfall totals in inches

08-09-2021

Active	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
NRCS Storms	> NRCS Dimensionless Storms		✓			✓			✓	
NRCS MSE1, 24-hr		0	0	0	0	0	0	0	0	
NRCS MSE2, 24-hr		0	0	0	0	0	0	0	0	
NRCS MSE3, 24-hr		0	0	0	0	0	0	0	0	
NRCS MSE4, 24-hr		0	0	0	0	0	0	0	0	
NRCS MSE5, 24-hr		0	0	0	0	0	0	0	0	
NRCS MSE6, 24-hr		0	0	0	0	0	0	0	0	
NOAA-A, 24-hr		0	0	0	0	0	0	0	0	
NOAA-B, 24-hr		0	0	0	0	0	0	0	0	
NOAA-C, 24-hr		0	0	0	0	0	0	0	0	
NOAA-D, 24-hr	✓	0	3.44	0	0	0	0	0	8.66	
NRCC-A, 24-hr		0	0	0	0	0	0	0	0	
NRCC-B, 24-hr		0	0	0	0	0	0	0	0	
NRCC-C, 24-hr		0	0	0	0	0	0	0	0	
NRCC-D, 24-hr		0	0	0	0	0	0	0	0	
CA-1, 24-hr		0	0	0	0	0	0	0	0	
CA-2, 24-hr		0	0	0	0	0	0	0	0	
CA-3, 24-hr		0	0	0	0	0	0	0	0	
CA-4, 24-hr		0	0	0	0	0	0	0	0	
CA-5, 24-hr		0	0	0	0	0	0	0	0	
CA-6, 24-hr		0	0	0	0	0	0	0	0	

INLET AREA CALCULATIONS AND STORMWATER COLLECTION SYSTEM CALCULATIONS (PIPE SIZING)



DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Altera - West Orange

Job #: 2530-99-006

Location: West Orange, NJ

Design Storm: 25-yr

Computed By: PAF

Checked By: RJC

Date: 8/5/2021

NOTES:

- 1) Design method used is Rational Method, unless otherwise noted.
- 2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Pipe Velocity (fps)
INLET-104	INLET-106	0.22	0.95	0.21	0.21	6.00	0.13	6.00	7.70	1.62	1.62	18	49.0	0.012	0.0100	11.38	6.44
INLET-106	INLET-105	0.37	0.95	0.35	0.56	6.00	0.11	6.13	7.70	2.70	4.31	18	41.0	0.012	0.0100	11.38	6.44

[illegible]

THIS PLAN SET IS FOR PERMITTING PURPOSES ONLY AND MAY NOT BE USED FOR CONSTRUCTION			
DATE: 06/28/2017	DESIGNED BY: JCS	CHECKED BY: JCS	SCALE: 1"=40'
PROJECT: ALTERA 769, LLC PROPOSED SITE IMPROVEMENTS BLOCK 166.15, LOT 9 769 NORTHFIELD AVENUE (CR 508) TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ			

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ROBERT J. COLUCCO III

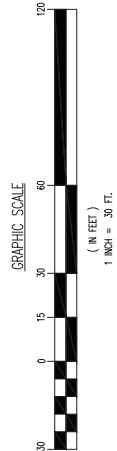
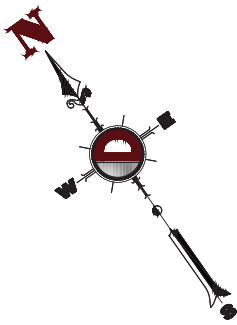
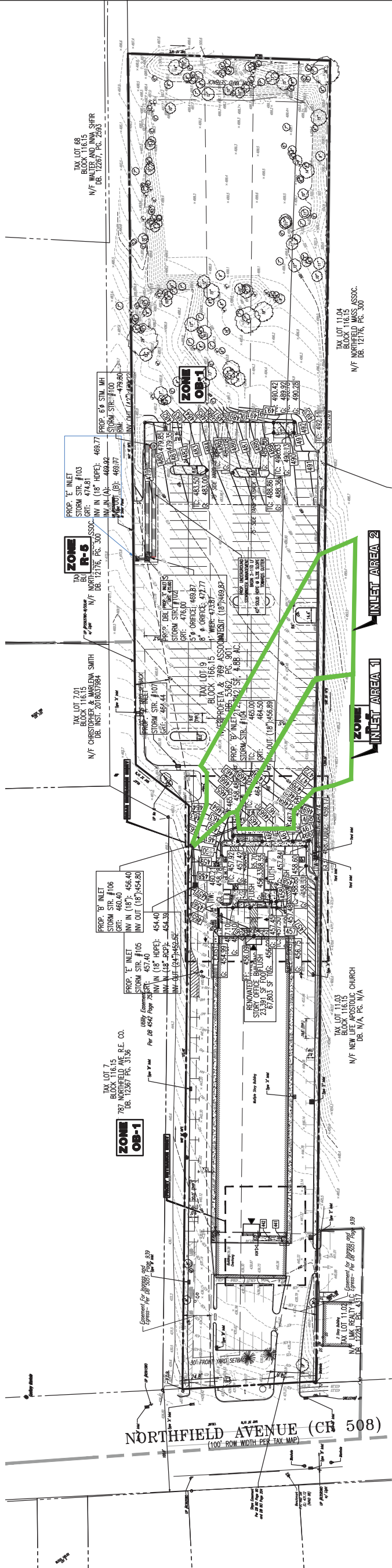
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JOSEPH C. SPARONE

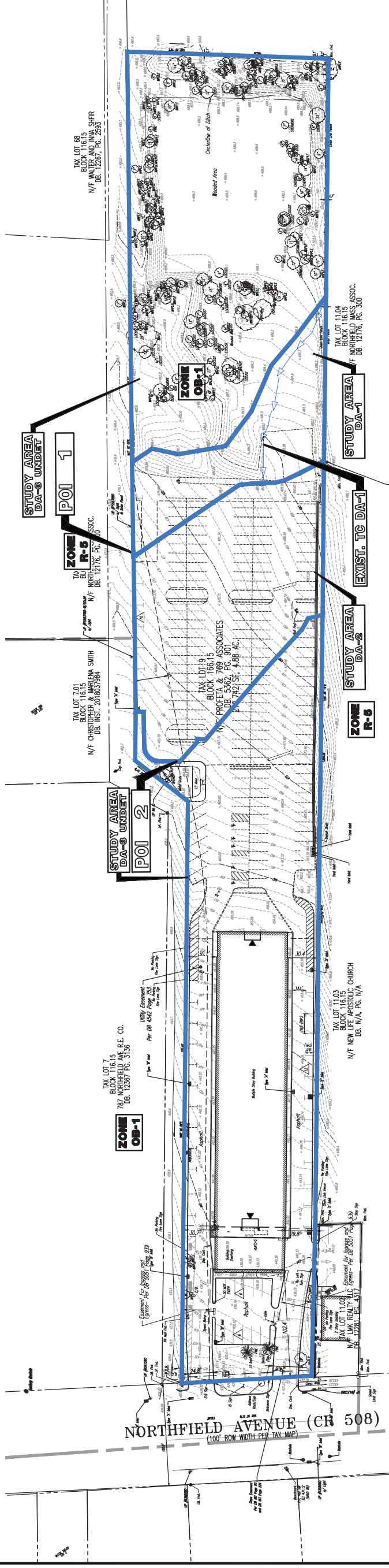
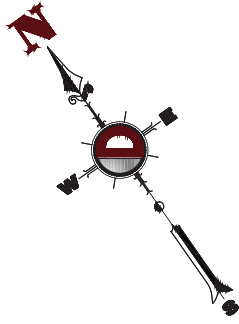
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE: INLET AREA MAP

SCALE: (A) 1" = 30'	DATE: 08/06/2021
(V)	
PROJECT NO:	2530-99-006



DRAINAGE AREA MAPS



GRAPHIC SCALE

(IN FEET)

1 INCH = .30 FT.

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PROFESSIONAL ENGINEER
NEW JERSEY LICENSE NO. 47204

TITLE: **EXISTING CONDITIONS
DRAINAGE AREA MAP**

SCALE: (H) 1" = 30' (V)	DATE: 08/06/2021
PROJECT No: 2530-99-006	

1

OF 3

Rev. $\frac{1}{2}$

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JOSEPH C. SPARONE

PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE:
**PROPOSED CONDITIONS
DRAINAGE AREA MAP**

PROJECT No:	2530-99-006
DATE	08/06/2021

SHEET No: **2** Rev. $\frac{A}{1}$: 0 of 3

