

***Drainage Report
for
443 Valley Farm Road, Town of Washington***

Prepared for:

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443 Valley Farm Road
Millbrook, NY 12545

May 19, 2025



Prepared by:
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1.0 INTRODUCTION

The subject property is a developed residential parcel located at 415-443 Valley Farm Road in the Town of Washington, Dutchess County. The parcel's 911 address is listed as 415-443 Valley Farm Road, Millbrook, NY 12545 and is further identified in the Town's tax map as Tax Parcel # 135889-6766-00-289555.

The parcel contains 4 single-family residences which are situated along the subject property's central portion. The property also contains accessory structures and features including detached garages & sheds, a driveway, and a pond which is located along the property's eastern boundary. The scope of the project will be limited to the house listed as 443 and the area adjacent to the house. The owner wishes to remodel the residence through the demolition and reconstruction of the house's southern wing and the construction of a standing seam roof along the house's eastern side. The proposed development will result in the creation of ±1,873 square feet of impervious roof area that will generate stormwater runoff during rain events. Due to the house being located within the adjacent area of the property's pond, which is classified as a wetland by the Town of Washington, a stormwater management practice will be needed to prevent the runoff from going into the pond. For this, a rain garden is proposed for water quality treatment. The runoff from the roof area will be collected via gutters and conveyed to the rain garden the runoff will infiltrate into the ground.

2.0 METHODOLOGY AND REGULATORY COMPLIANCE

The proposed project will result in a total 0.06 acres of disturbance and therefore is not subject to the requirements of NYSDEC GP-0-25-001 General Permit for Construction Activities. As the project area has pre-existing development that is grandfathered in the drainage area for the project shall only comprise of the impervious roof area created by the remodeling. A drainage analysis was performed to evaluate stormwater runoff volumes and patterns from the new roof area and demonstrate that the proposed rain garden has the necessary capacity to fully store and infiltrate the runoff volume from the impervious (post-development) area and that no adverse impacts will occur to the pond.

3.0 SOIL CONDITIONS

A review of the Soil Survey of Dutchess County indicates that there is a single soil type present along the project areas and associated contributing drainage area. Supporting information has been provided in Appendix B. Table I below summarizes the characteristics of the soil types present within the drainage area.

Table I: Soil Types

Map Unit	Soil Names	Depth to Water Table (ft)	Depth to Bedrock (ft)	Hydrologic Soil Group
DwC	Dutchess-Cardigan complex, rolling, rocky	> 6.67	> 6.67	B

Source: websoilsurvey.sc.egov.usda.gov

4.0 INFILTRATION ANALYSIS

Soil Testing

Boring Hole Results:

On May 8th, 2025, Hudson Land Design (HLD) personnel visited the site to conduct soil testing for the stormwater management practice (SMP) along the southern and eastern sides of 443 Valley Farm Road. Boring holes were dug along the potential SMP areas, and the soil composition was ascertained. The soil composition in the boring holes are as follows:

Test Pit 1: Topsoil (0 to 2 inches), followed by silt loam with small gravel and bony shale (2 to 35 inches). No water, mottling, or bedrock was encountered in the hole.

Test Pit 2: Topsoil (0 to 2 inches), followed by silt loam with small gravel (2 to 8 inches). No water or mottling was encountered in the hole. Bedrock, in the form of hard shale, was encountered at a depth of 8 inches.

Test Pit 3: Topsoil (0 to 3 inches), followed by silt loam with small gravel (2 to 35 inches). No water, mottling, or bedrock was encountered in the hole.

Infiltration Testing Results:

On the same day the boring holes were dug, infiltration tests were performed in the 35-inch deep boring holes (#1 and #3) to determine the infiltration qualities of the soil for the design of the SMP. The infiltration rates attained during the infiltration testing are as follows:

Infiltration Test 1 (performed in Test Pit 1): 17.2 inches/hour, 8.7 inches/hour, 7.6 inches/hour.

Infiltration Test 2: No infiltration test was performed in Test Pit 2 as the depth to bedrock was too shallow for an in-ground SMP system.

Infiltration Test 3 (performed in Test Pit 3): 12.8 inches/hour, 5.5 inches/hour, 3.6 inches/hour.

Conclusions:

The results from the soil testing indicates that there are two areas available for the placement of a SMP that includes infiltration as there are no boundary layers (bedrock or groundwater) that would impede its implementation. The infiltration testing results also indicate that an infiltration-type rain garden can be used as the infiltration rates of the soil is faster than 0.5 inches/hour. Therefore, an infiltration rain garden is proposed for the capture and treatment of the development's stormwater runoff, as described in the following sections.

5.0 PROPOSED DRAINAGE CONDITIONS

5.1 Developed Drainage Area

As previously stated, the existing drainage conditions for the residence have been grandfathered in and an analysis of the pre-development conditions is not required. The post-development, contributing drainage area to the proposed rain garden SMP will consist of the new roof area created by the development, plus a small portion of exiting rooftop runoff that is captured by the new standing seam metal roof, plus some land area for the rain garden and uphill slope.

The Subcatchment area is comprised of 0.043 acres (1,857 sq. ft.) of impervious roof area and 0.033 acre (1,497 sq. ft.) of pervious area. The soil in this subcatchment area are hydrologic soil

group B, which per the USDA NCRS Web Soil Survey is classified as “well drained”. A drainage map can be found in Appendix A.

5.2 Water Quality Volume

Runoff rates for proposed conditions have been calculated for the drainage area and is based on the design calculations for rain garden systems. The Water Quality Volume (WQv) for the contributing drainage area was determined as follows:

Drainage Area (A) = 0.077 acres

90% Rainfall Event Number (P) = 1.35

Impervious Coverage in Drainage Area (I) = 55%

$R_v = 0.05 + 0.009 * I$ (minimum R_v of 0.2)

Then:

$$WQv = \frac{P * R_v * A}{12}$$

$$WQv = \frac{1.35 \text{ inches} * [0.05 + (0.009 * 55)] * 0.077 \text{ acres}}{12 \text{ inches/foot}}$$

WQv = 0.0047 acre-foot

Therefore, the rain garden must be sized to accommodate water quality volume of 0.0047 acre-foot for the post-development drainage area.

The sizing for the rain garden is determined as follows:

$$A_f = \frac{WQv * d_f}{k * (h_f + d_f) * t_f}$$

Where:

A_f = Surface Area of Bed (square feet)

WQv = Water Quality Volume (cubic feet)

d_f = Filter Bed Depth (feet)

k = Permeability Flow Rate of Filter Media

h_f = Average Height of Ponding (ft)(0.5 ft max)

t_f = Design Filter Bed Drain Time (2 days)

The calculated surface area of the bed is 202 square feet. The layout provides 202 square feet of bed surface area. Refer to calculations in Appendix C.

5.3 Hydrologic Model

The rain garden is capable of fully infiltrating the contributing runoff for storm events modeled up to and including the 10-year design storm. The infiltration rate modeled took into consideration the slowest infiltration rate from field testing of 3.7 inches per hour, and rounded down to 3 inches per hour to be conservative. The rain garden is designed such that the lower berm will act as a

wide overflow weir for larger storm events. The peak elevation associated with the 25-year storm rises such that the weir is overtopped by 0.01 feet, or 1/8 of an inch. Modeling can be found in Appendix D.

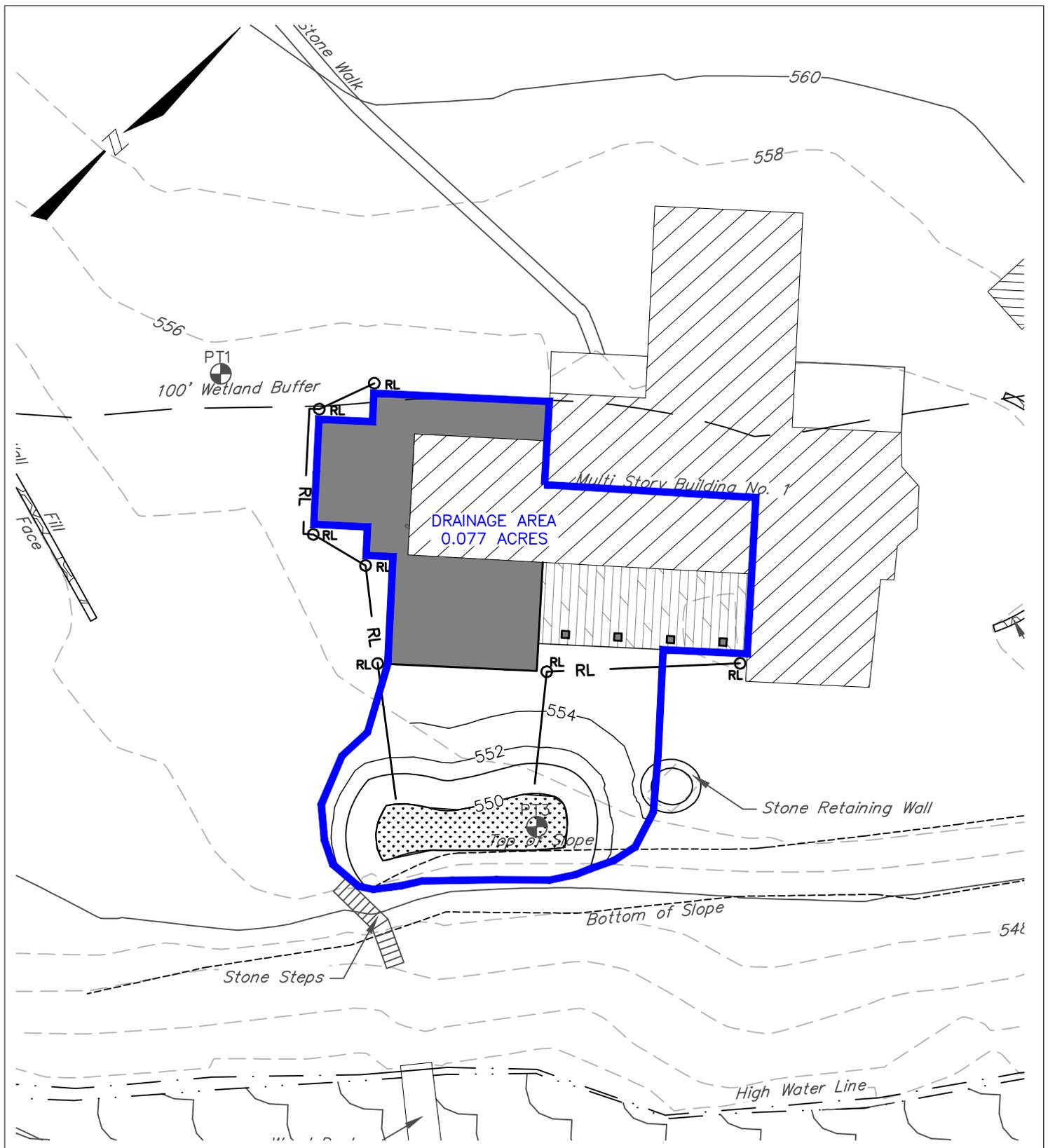
6.0 DRAINAGE ANALYSIS CONCLUSIONS

The rain garden has been designed to provide adequate water quality volume treatment while also allowing for groundwater recharge and no overland flow directly to the wetland (the lake) for up to the 10-year design storm.

7.0 EROSION AND SEDIMENT CONTROL

Contractors shall adhere to the temporary and permanent erosion control measures as indicated on the plan. Repairs shall be made as necessary to remain in compliance with the New York State Standards and Specifications for Erosion and Sediment Control, 2016. The site plans include detailed erosion and sediment control practices for this project.

APPENDIX A
DRAINAGE MAPS



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 PROFESSIONAL ENGINEERING P.C.
 174 MAIN ST., BEACON, NEW YORK 12508
 13 CHAMBERS ST., NEWBURGH, NEW YORK 12550
 PH: 845-440-6926

DRAINAGE AREA MAP
 CONWAY SCHMIDT ADDITION

443 VALLEY FARM ROAD
 TOWN OF WASHINGTON
 DUTCHESS COUNTY, NEW YORK
 TAX ID: 6766-00-289555

JOB #: 2025:013
 DATE: 5/19/25
 SCALE: 1" = 20'
 TITLE: SWPPP-1
 SHEET: 1 OF 1

APPENDIX B
SOILS AND RAINFALL DATA

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Metadata for Point	
Smoothing State	Yes
Location	
Latitude	41.825 degrees North
Longitude	73.695 degrees West
Elevation	170 feet
Date/Time	Wed May 07 2025 17:15:11 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day
1yr	0.31	0.47	0.59	0.77	0.96	1.20	1yr	0.83	1.12	1.38	1.71	2.11	2.60	2.93	1yr	2.30	2.82	3.27	3.92	4.51
2yr	0.37	0.57	0.71	0.94	1.18	1.48	2yr	1.02	1.36	1.70	2.09	2.56	3.12	3.52	2yr	2.76	3.38	3.88	4.61	5.22
5yr	0.45	0.70	0.88	1.17	1.50	1.88	5yr	1.29	1.68	2.17	2.66	3.23	3.91	4.49	5yr	3.46	4.32	4.95	5.74	6.50
10yr	0.51	0.81	1.02	1.38	1.80	2.27	10yr	1.55	1.98	2.61	3.20	3.87	4.64	5.40	10yr	4.11	5.20	5.95	6.78	7.68
25yr	0.61	0.97	1.24	1.71	2.28	2.91	25yr	1.97	2.45	3.35	4.09	4.91	5.82	6.91	25yr	5.15	6.64	7.59	8.46	9.57
50yr	0.71	1.13	1.45	2.04	2.74	3.50	50yr	2.36	2.89	4.04	4.92	5.87	6.92	8.33	50yr	6.12	8.01	9.14	10.01	11.32
100yr	0.82	1.32	1.71	2.42	3.29	4.23	100yr	2.84	3.40	4.88	5.92	7.03	8.22	10.05	100yr	7.28	9.66	11.00	11.84	13.38
200yr	0.95	1.55	2.01	2.87	3.96	5.10	200yr	3.42	4.01	5.89	7.12	8.42	9.78	12.13	200yr	8.65	11.66	13.26	14.01	15.84
500yr	1.16	1.91	2.50	3.62	5.07	6.56	500yr	4.38	4.98	7.56	9.11	10.68	12.30	15.56	500yr	10.89	14.97	16.99	17.52	19.79

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day
1yr	0.23	0.35	0.43	0.58	0.72	0.91	1yr	0.62	0.89	1.15	1.45	1.72	2.12	2.75	1yr	1.88	2.64	2.99	3.46	3.89
2yr	0.36	0.55	0.68	0.92	1.13	1.34	2yr	0.98	1.31	1.51	1.97	2.45	3.05	3.41	2yr	2.70	3.28	3.77	4.49	5.09
5yr	0.41	0.63	0.79	1.08	1.37	1.58	5yr	1.18	1.54	1.74	2.28	2.89	3.66	4.13	5yr	3.24	3.97	4.61	5.34	5.99
10yr	0.46	0.71	0.87	1.22	1.58	1.76	10yr	1.36	1.72	1.93	2.54	3.24	4.20	4.75	10yr	3.72	4.56	5.34	6.07	6.76
25yr	0.53	0.81	1.01	1.44	1.89	2.00	25yr	1.63	1.96	2.18	2.96	3.70	5.07	5.66	25yr	4.49	5.45	6.49	7.19	7.91
50yr	0.60	0.91	1.13	1.62	2.18	2.20	50yr	1.88	2.15	2.39	3.32	4.10	5.83	6.46	50yr	5.16	6.22	7.51	8.16	8.87
100yr	0.67	1.01	1.27	1.84	2.52	2.43	100yr	2.17	2.38	2.61	3.74	4.59	6.73	7.37	100yr	5.96	7.08	8.71	9.28	9.98
200yr	0.76	1.15	1.45	2.10	2.93	2.36	200yr	2.53	2.31	2.85	4.23	5.12	7.77	8.39	200yr	6.88	8.07	10.07	10.54	11.18
500yr	0.91	1.36	1.74	2.53	3.60	2.61	500yr	3.11	2.55	3.17	5.00	5.95	9.43	9.93	500yr	8.35	9.54	12.21	12.46	12.98

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day
1yr	0.35	0.54	0.65	0.88	1.08	1.26	1yr	0.93	1.23	1.44	1.89	2.34	2.77	3.15	1yr	2.45	3.03	3.55	4.19	4.78
2yr	0.40	0.62	0.76	1.03	1.27	1.48	2yr	1.10	1.45	1.65	2.12	2.69	3.23	3.66	2yr	2.85	3.52	4.02	4.76	5.40
5yr	0.48	0.74	0.92	1.27	1.61	1.86	5yr	1.39	1.82	2.18	2.76	3.47	4.20	4.84	5yr	3.71	4.65	5.32	6.22	7.01
10yr	0.57	0.88	1.09	1.53	1.98	2.26	10yr	1.71	2.21	2.70	3.38	4.27	5.12	6.02	10yr	4.54	5.79	6.60	7.61	8.57
25yr	0.73	1.11	1.38	1.97	2.59	2.92	25yr	2.24	2.86	3.62	4.49	5.65	6.67	8.07	25yr	5.91	7.76	8.82	9.99	11.21
50yr	0.87	1.33	1.65	2.38	3.20	3.57	50yr	2.76	3.49	4.52	5.52	6.98	8.16	10.07	50yr	7.23	9.69	11.00	12.27	13.77
100yr	1.05	1.59	1.99	2.87	3.93	4.36	100yr	3.40	4.26	5.67	6.78	8.75	9.99	12.61	100yr	8.84	12.12	13.72	15.11	16.94
200yr	1.26	1.89	2.40	3.48	4.85	6.46	200yr	4.18	6.32	7.11	8.34	10.83	12.21	15.79	200yr	10.80	15.18	17.16	18.60	20.87
500yr	1.62	2.41	3.10	4.50	6.40	8.72	500yr	5.52	8.53	9.65	10.96	14.36	15.92	21.31	500yr	14.09	20.50	23.12	24.51	27.51





United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Dutchess County, New York**

**443 Valley Farm Road, Town of
Washington**



Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.

Map Scale: 1:595 if printed on A landscape (11" x 8.5") sheet.

0 5 10 20 30 Meters

0 25 50 100 150 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DwC	Dutchess-Cardigan complex, rolling, rocky	0.7	100.0%
W	Water	0.0	0.0%
Totals for Area of Interest		0.7	100.0%

Map Unit Descriptions

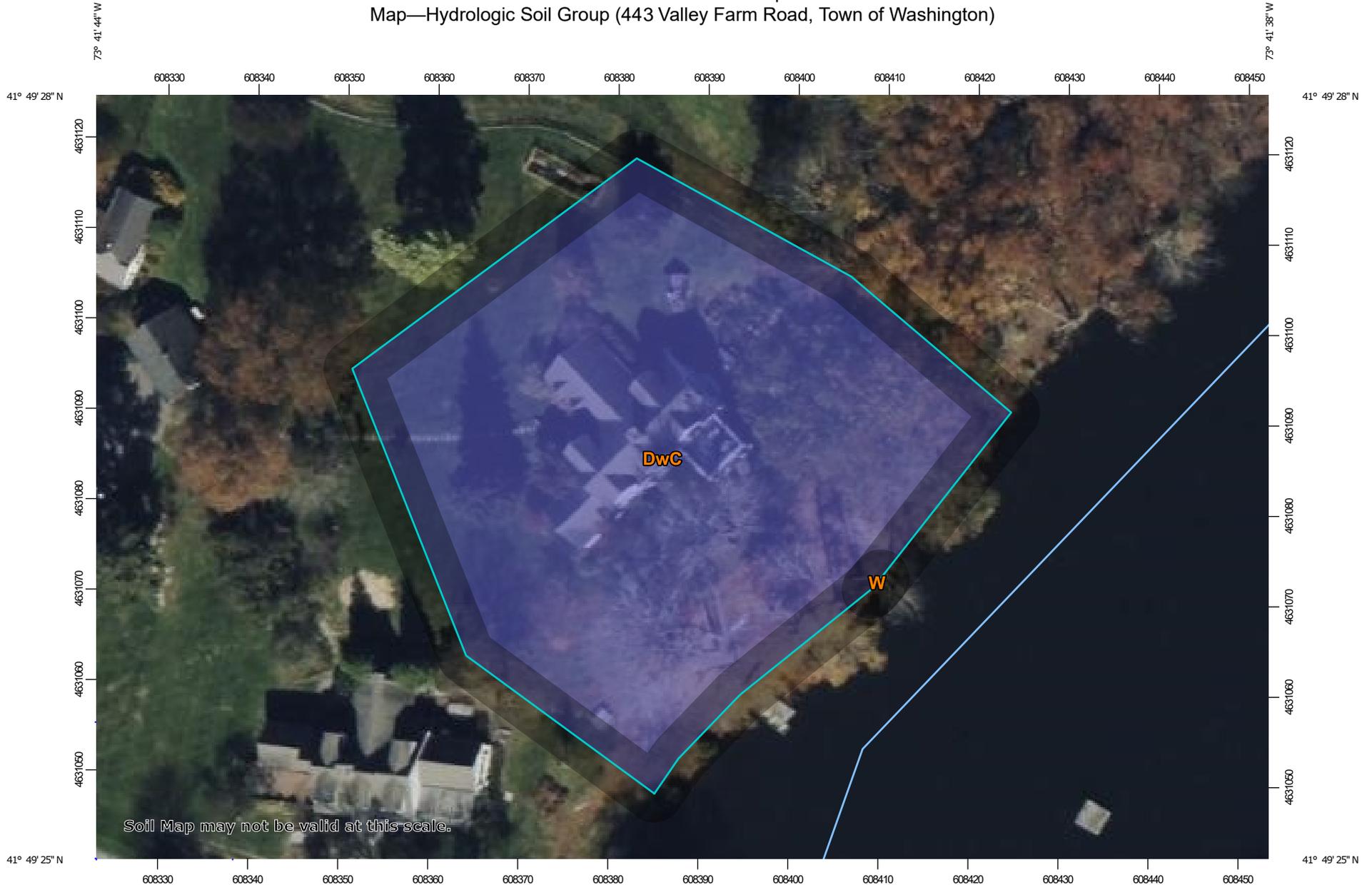
The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

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.

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,

Custom Soil Resource Report
Map—Hydrologic Soil Group (443 Valley Farm Road, Town of Washington)



Map Scale: 1:595 if printed on A landscape (11" x 8.5") sheet.

0 5 10 20 30 Meters

0 25 50 100 150 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
 Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

Soils

-  C
-  C/D
-  D
-  Not rated or not available

Water Features

-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

-  Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Dutchess County, New York
 Survey Area Data: Version 21, Aug 29, 2024

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

Date(s) aerial images were photographed: Oct 21, 2022—Oct 27, 2022

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

Table—Hydrologic Soil Group (443 Valley Farm Road, Town of Washington)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DwC	Dutchess-Cardigan complex, rolling, rocky	B	0.7	100.0%
W	Water		0.0	0.0%
Totals for Area of Interest			0.7	100.0%

Rating Options—Hydrologic Soil Group (441 Valley Farm Road, Town of Washington)

Aggregation Method: Dominant Condition
Component Percent Cutoff: None Specified
Tie-break Rule: Higher

Water Features

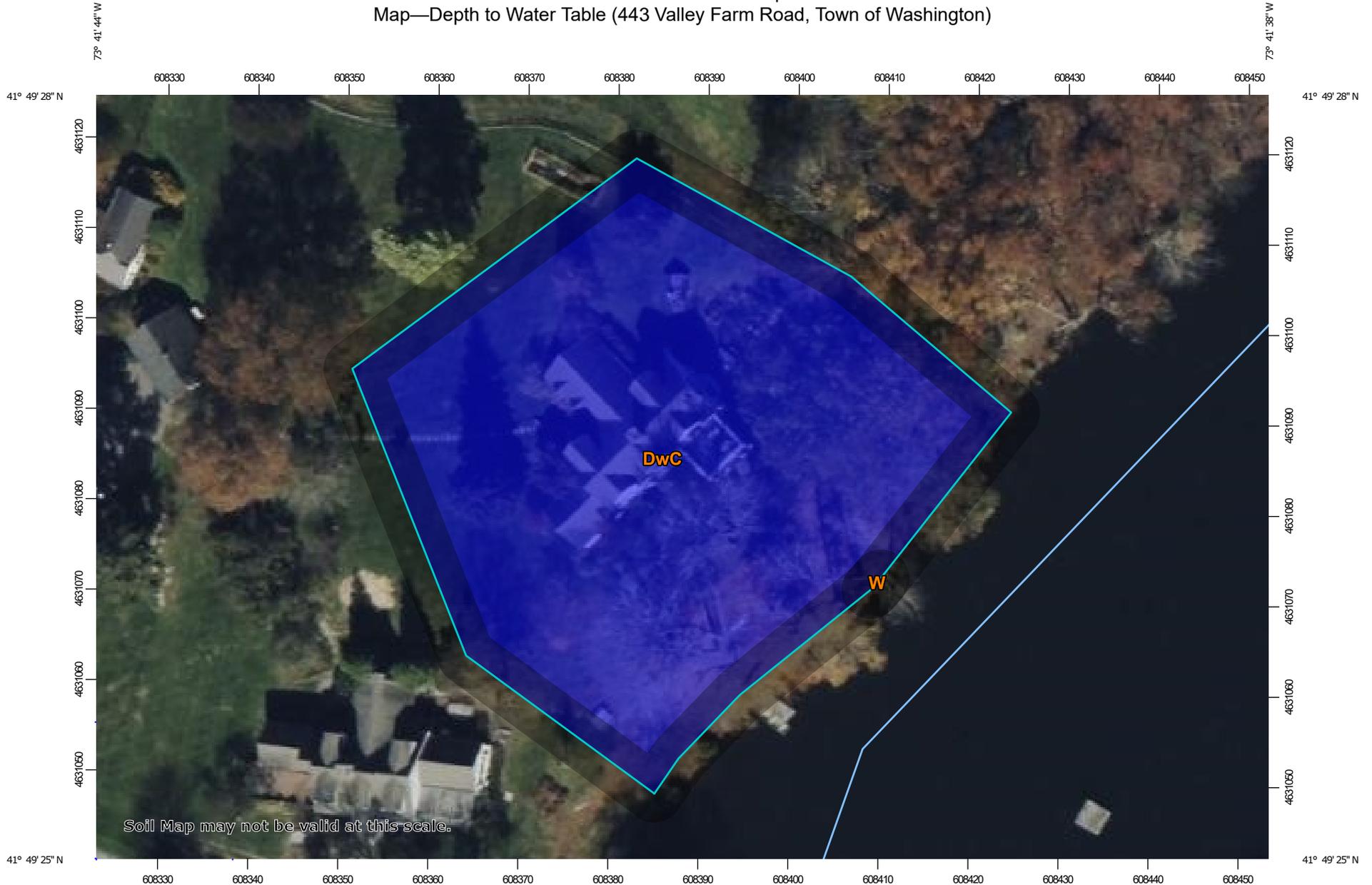
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table (441 Valley Farm Road, Town of Washington)

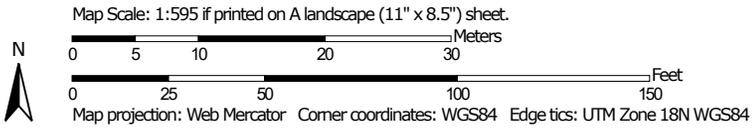
"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Depth to Water Table (443 Valley Farm Road, Town of Washington)



Soil Map may not be valid at this scale.



MAP LEGEND

- Area of Interest (AOI)**
 -  Area of Interest (AOI)
- Soils**
 - Soil Rating Polygons**
 -  0 - 25
 -  25 - 50
 -  50 - 100
 -  100 - 150
 -  150 - 200
 -  > 200
 -  Not rated or not available
 - Soil Rating Lines**
 -  0 - 25
 -  25 - 50
 -  50 - 100
 -  100 - 150
 -  150 - 200
 -  > 200
 -  Not rated or not available
 - Soil Rating Points**
 -  0 - 25
 -  25 - 50
 -  50 - 100
 -  100 - 150
 -  150 - 200
 -  > 200
- Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography
-  Not rated or not available

MAP INFORMATION

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

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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.

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

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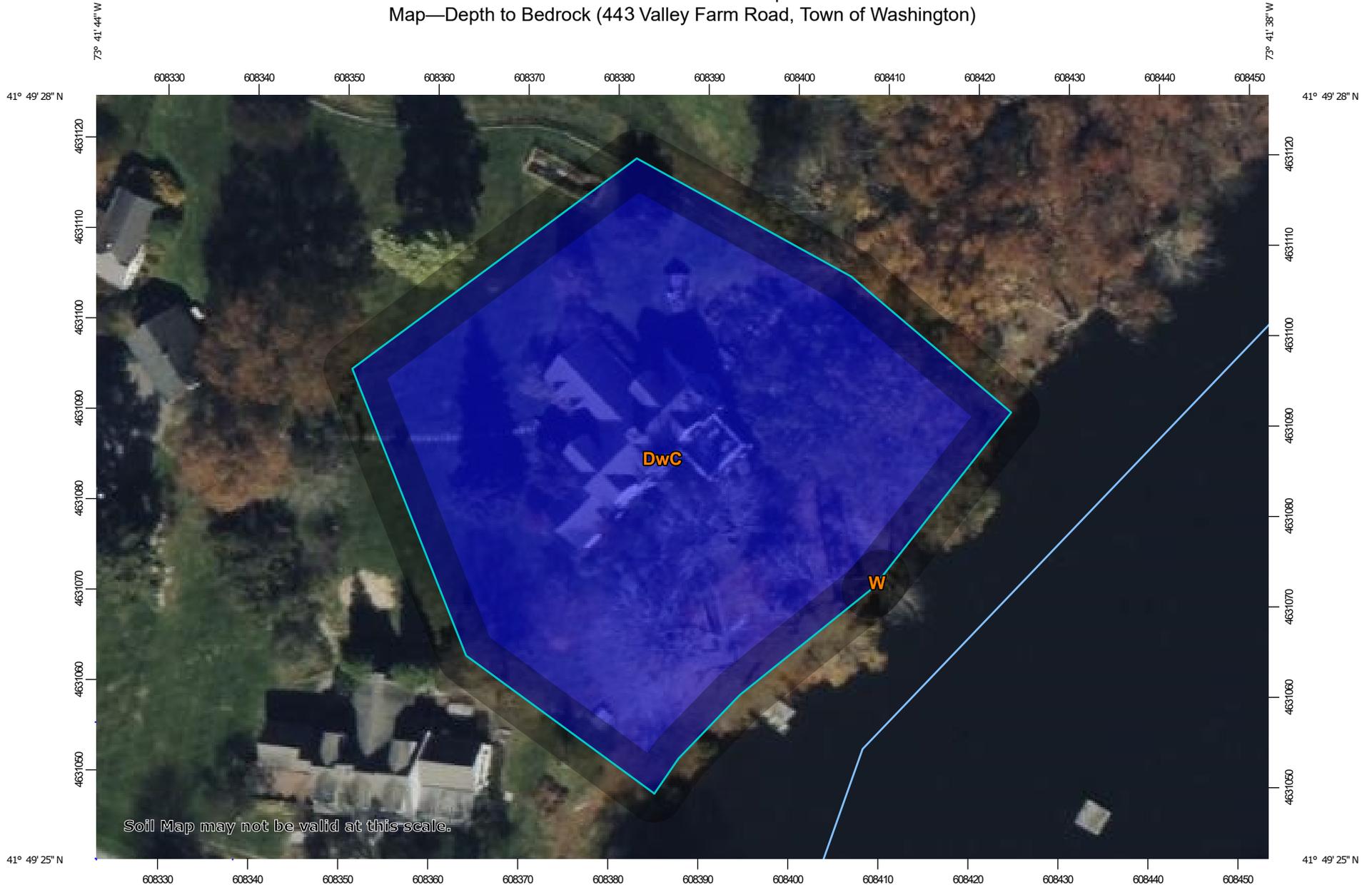
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Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
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W	Water	>200	0.0	0.0%
Totals for Area of Interest			0.7	100.0%

Custom Soil Resource Report
Map—Depth to Bedrock (443 Valley Farm Road, Town of Washington)



Soil Map may not be valid at this scale.

Map Scale: 1:595 if printed on A landscape (11" x 8.5") sheet.

0 5 10 20 30 Meters

0 25 50 100 150 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
 Area of Interest (AOI)

Soils

Soil Rating Polygons

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

Soil Rating Lines

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

Soil Rating Points

-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200

Water Features
 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background
 Aerial Photography

 Not rated or not available

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: Dutchess County, New York
 Survey Area Data: Version 21, Aug 29, 2024

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

Date(s) aerial images were photographed: Oct 21, 2022—Oct 27, 2022

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

Table—Depth to Bedrock (443 Valley Farm Road, Town of Washington)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
DwC	Dutchess-Cardigan complex, rolling, rocky	>200	0.7	100.0%
W	Water	>200	0.0	0.0%
Totals for Area of Interest			0.7	100.0%

Rating Options—Depth to Bedrock (443 Valley Farm Road, Town of Washington)

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Drainage Class (443 Valley Farm Road, Town of Washington)

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

APPENDIX C
WATER QUALITY VOLUME CALCULATIONS

Job: Schmidt Conway - Valley Farms Road
 Job No.: 2025:013
 Description: Rain Garden Design
 Prep. By: LP Date: 5/13/2025
 Check By: DGK Date: 5/13/2025



Stormwater Quality:

Stormwater Quality will be accomplished by treating the runoff volume generated by the 90% rainfall of the average annual stormwater runoff volume (July 2024 NYS Stormwater Design Manual).

Volume Generated By 90 % Rule (Per Ch. 4 of the NYS Stormwater Management Design Manual):

$$WQ_v = [P \times R_v \times A] / 12$$

- WQ_v** = Water quality volume (in acre-feet)
- R_v** = 0.05+0.009(I) = Minimum R_v = 0.2
- I** = Impervious Cover (Percentage)
- P** = 90 % Rainfall Event Number
- A** = Site area in acres

Water Quality Volume For The Development Conveyed to Treatment Practice

Area	Total Area (acres)	Impervious Area (acres)	Impervious Cover (%)	R _v	P	WQ _v (ac-ft)	WQ _v (cf)	Method of Treatment
Roof Area	0.077	0.043	55	0.55	1.35	0.0047	207	Rain Garden

Job: Schmidt Conway - Valley Farms Road
 Job No.: 2025:013
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Rain Garden Design

Step 1 - Calculate Water Quality Volume

Water quality volume (WQ_v)= 207 cubic feet (see Sheet 1)

Step 2 - Solve for drainage layer & soil media storage volume (per Ch. 5 of the NYS Stormwater Management Design Manual)

V_{SM} = Volume of the soil media (cf) = $(A_{RG})(D_{SM})(P_{SM})$	
V_{DL} = Volume of the drainage layer (cf) = $(A_{RG})(D_{DL})(P_{DL})$	Provided:
where A_{RG} = Rain garden surface area (sf)	202 square feet
D_{SM} = Depth of the soil media, typically 1.0 to 1.5 feet (ft)	1.0 feet
D_{DL} = Depth of the drainage layer, typically 0.05 to 1.0 feet (ft)	0.83 feet
P_{SM} = Porosity of the soil media ($\geq 20\%$)	20%
P_{DL} = Porosity of the drainage layer ($\geq 40\%$)	40%
D_p = Depth of ponding above surface, maximum 0.5 feet (ft)	0.5 feet

$WQ_v \leq V_{SM} + V_{DL} + (D_p \times A_{RG})$

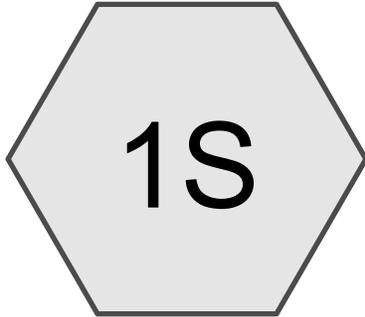
V_{SM} = 40 cubic feet
 V_{DL} = 67 cubic feet
 WQ_v = 209 cubic feet

Water Quality Volume: Provided: Required:
 209 cubic feet > **207 cubic feet** meets min. requirement

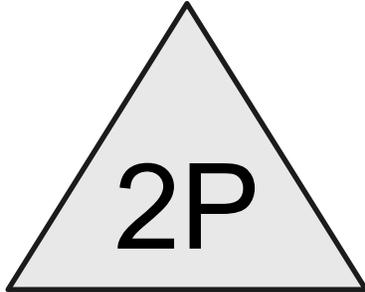
General Notes:

- 1) Rain gardens shall be located downgradient and a minimum of 10 feet from basement foundations
- 2) Rain gardens shall not be located in areas with steep slopes. However, design modifications can be implemented on moderate slopes.
- 3) In compacted soils and clay, additional excavation is necessary, along with gravel bed, and, under some circumstances, an underdrain system.
- 4) The length to width ratio should be 2:1 with the long axis perpendicular to the slope.

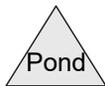
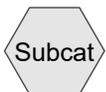
APPENDIX D
HYDROLOGIC MODELING



Roof



RG



443 Valley Farm Rd

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Type II 24-hr 1-yr Rainfall=2.60"

Revised 5/19/25 Printed 5/19/2025

Page 2

Summary for Subcatchment 1S: Roof

Runoff = 0.15 cfs @ 11.96 hrs, Volume= 0.006 af, Depth> 0.98"

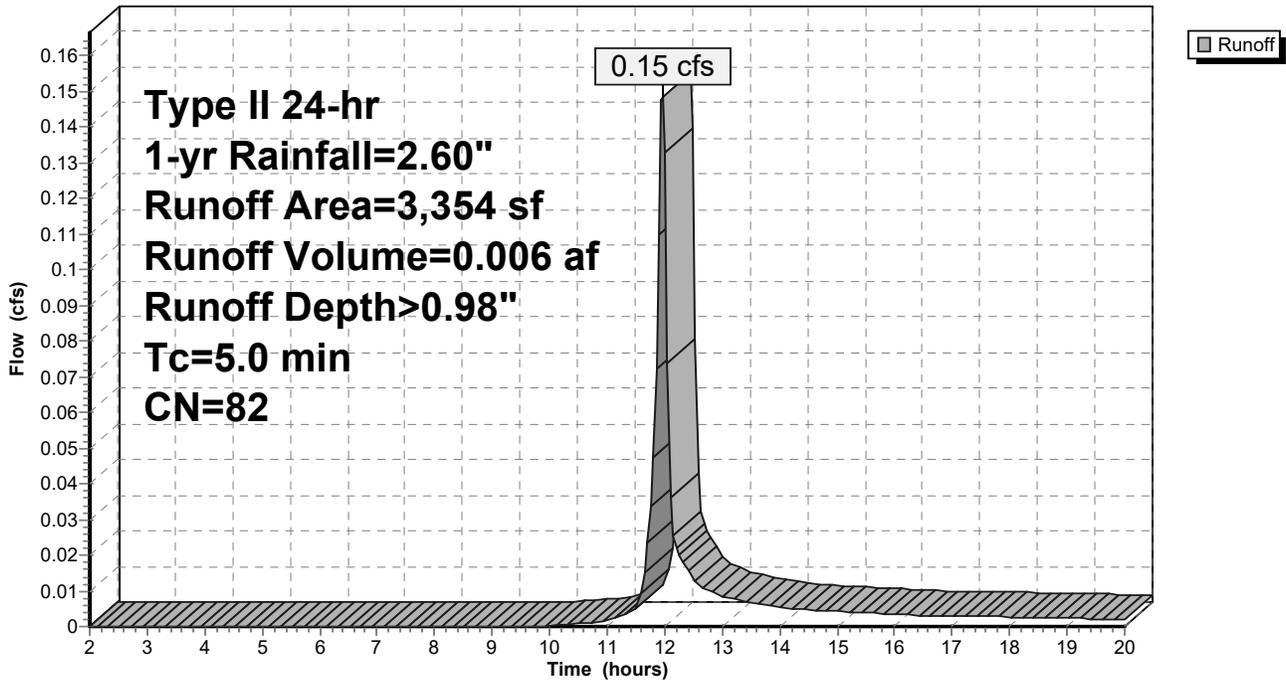
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.60"

Area (sf)	CN	Description
1,873	98	Paved parking, HSG A
1,481	61	>75% Grass cover, Good, HSG B
3,354	82	Weighted Average
1,481		44.16% Pervious Area
1,873		55.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min Tc

Subcatchment 1S: Roof

Hydrograph



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Type II 24-hr 1-yr Rainfall=2.60"

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Summary for Pond 2P: RG

Inflow Area = 0.077 ac, 55.84% Impervious, Inflow Depth > 0.98" for 1-yr event
 Inflow = 0.15 cfs @ 11.96 hrs, Volume= 0.006 af
 Outflow = 0.02 cfs @ 12.18 hrs, Volume= 0.006 af, Atten= 84%, Lag= 13.2 min
 Discarded = 0.02 cfs @ 12.18 hrs, Volume= 0.006 af
 Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 550.35' @ 12.18 hrs Surf.Area= 337 sf Storage= 95 cf

Plug-Flow detention time= 33.5 min calculated for 0.006 af (100% of inflow)
 Center-of-Mass det. time= 32.6 min (829.6 - 797.0)

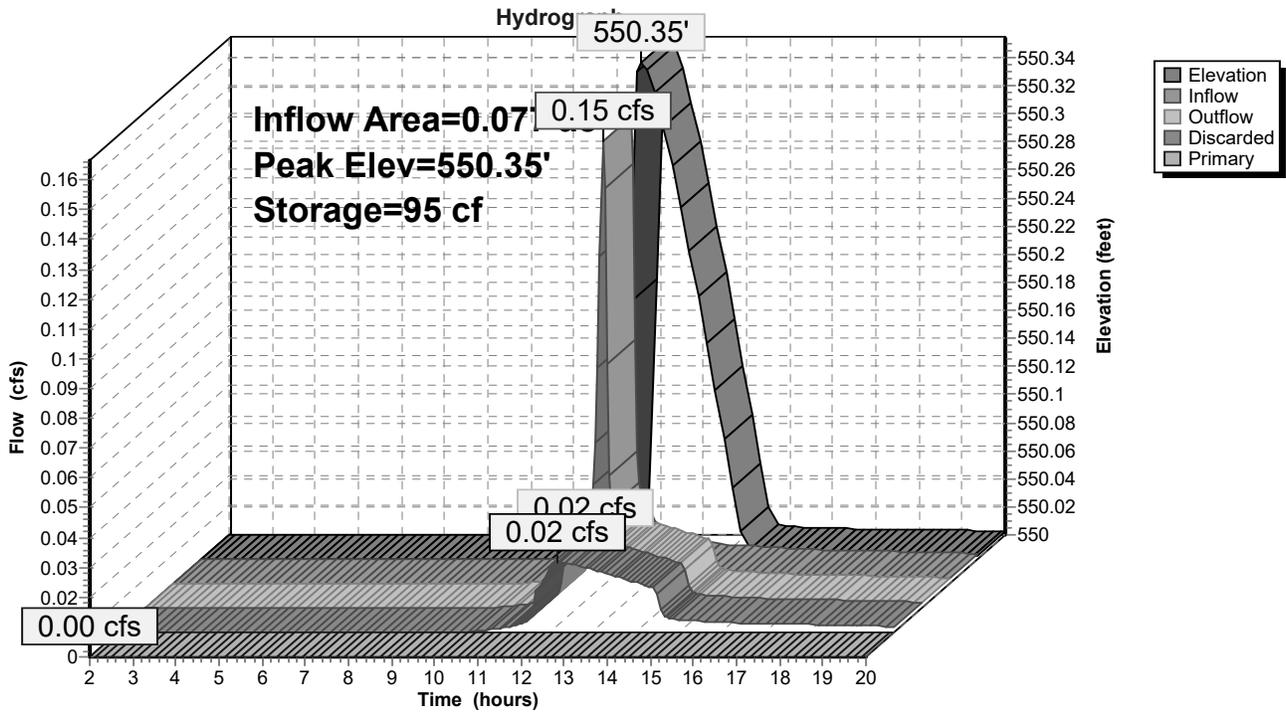
Volume	Invert	Avail.Storage	Storage Description
#1	550.00'	1,053 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
550.00	202	0	0
551.00	583	393	393
552.00	738	661	1,053

Device	Routing	Invert	Outlet Devices
#1	Discarded	550.00'	3.000 in/hr Exfiltration over Surface area
#2	Primary	551.00'	35.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

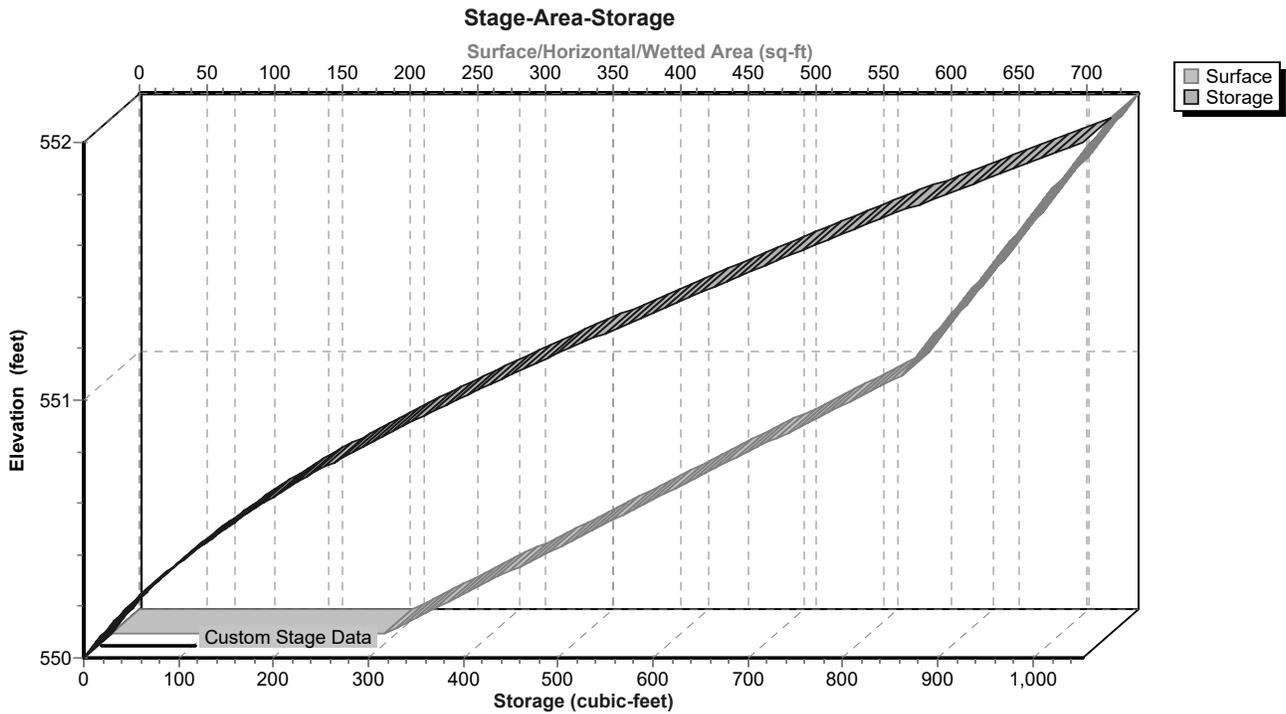
Discarded OutFlow Max=0.02 cfs @ 12.18 hrs HW=550.35' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=550.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: RG



Pond 2P: RG



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Type II 24-hr 10-yr Rainfall=4.64"

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Summary for Subcatchment 1S: Roof

Runoff = 0.38 cfs @ 11.96 hrs, Volume= 0.016 af, Depth> 2.56"

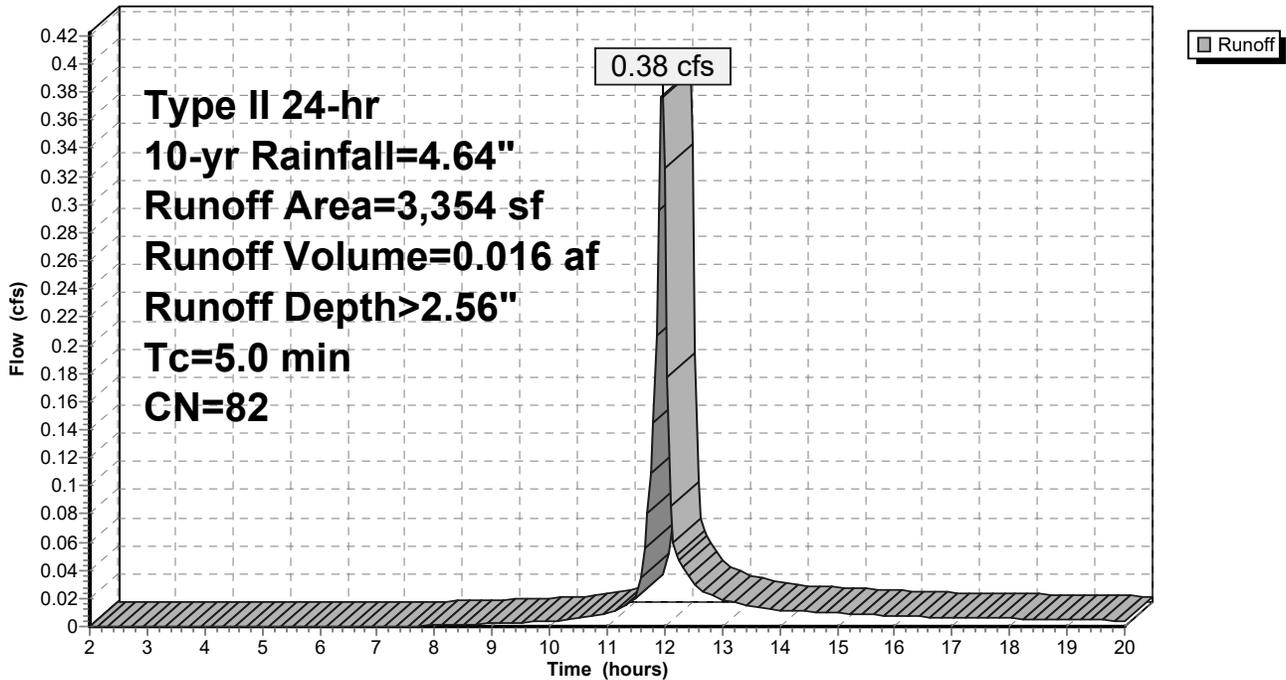
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-yr Rainfall=4.64"

Area (sf)	CN	Description
1,873	98	Paved parking, HSG A
1,481	61	>75% Grass cover, Good, HSG B
3,354	82	Weighted Average
1,481		44.16% Pervious Area
1,873		55.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min Tc

Subcatchment 1S: Roof

Hydrograph



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Type II 24-hr 10-yr Rainfall=4.64"

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Summary for Pond 2P: RG

Inflow Area = 0.077 ac, 55.84% Impervious, Inflow Depth > 2.56" for 10-yr event
 Inflow = 0.38 cfs @ 11.96 hrs, Volume= 0.016 af
 Outflow = 0.04 cfs @ 12.41 hrs, Volume= 0.016 af, Atten= 90%, Lag= 27.3 min
 Discarded = 0.04 cfs @ 12.41 hrs, Volume= 0.016 af
 Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 550.85' @ 12.41 hrs Surf.Area= 527 sf Storage= 311 cf

Plug-Flow detention time= 83.0 min calculated for 0.016 af (100% of inflow)
 Center-of-Mass det. time= 82.1 min (858.4 - 776.3)

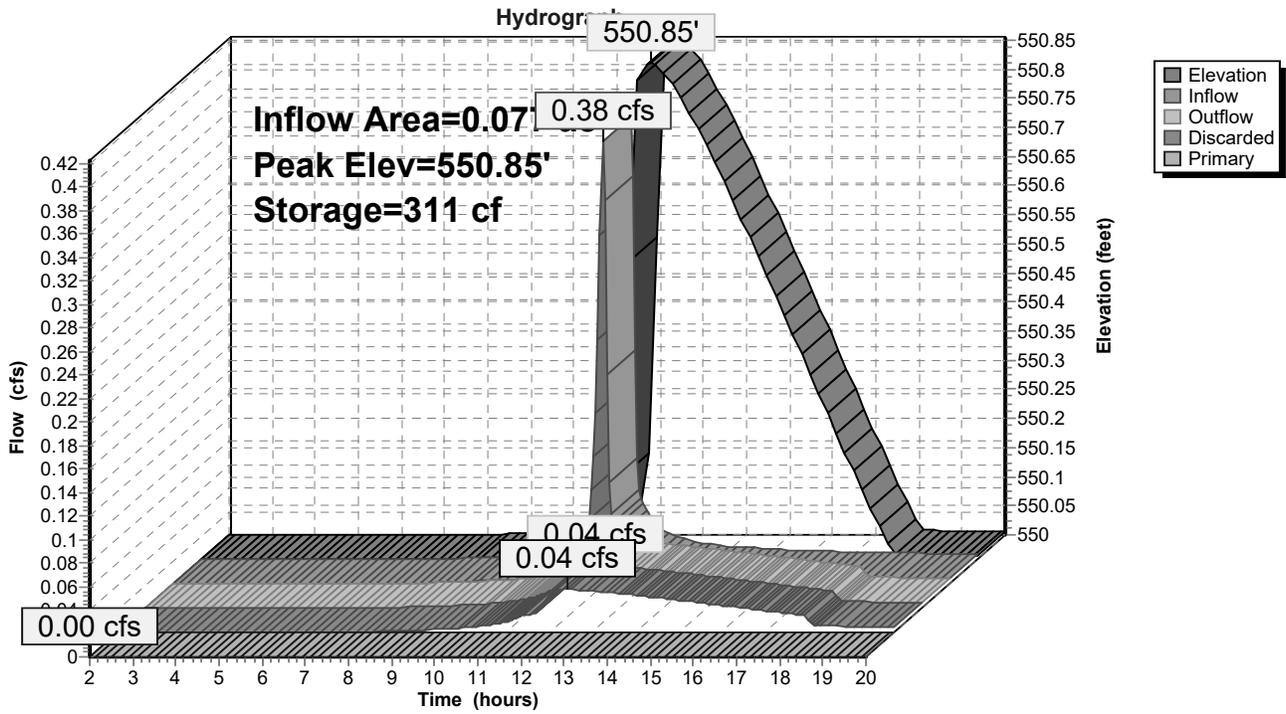
Volume	Invert	Avail.Storage	Storage Description
#1	550.00'	1,053 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
550.00	202	0	0
551.00	583	393	393
552.00	738	661	1,053

Device	Routing	Invert	Outlet Devices
#1	Discarded	550.00'	3.000 in/hr Exfiltration over Surface area
#2	Primary	551.00'	35.0' long x 2.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88
			2.85 3.07 3.20 3.32

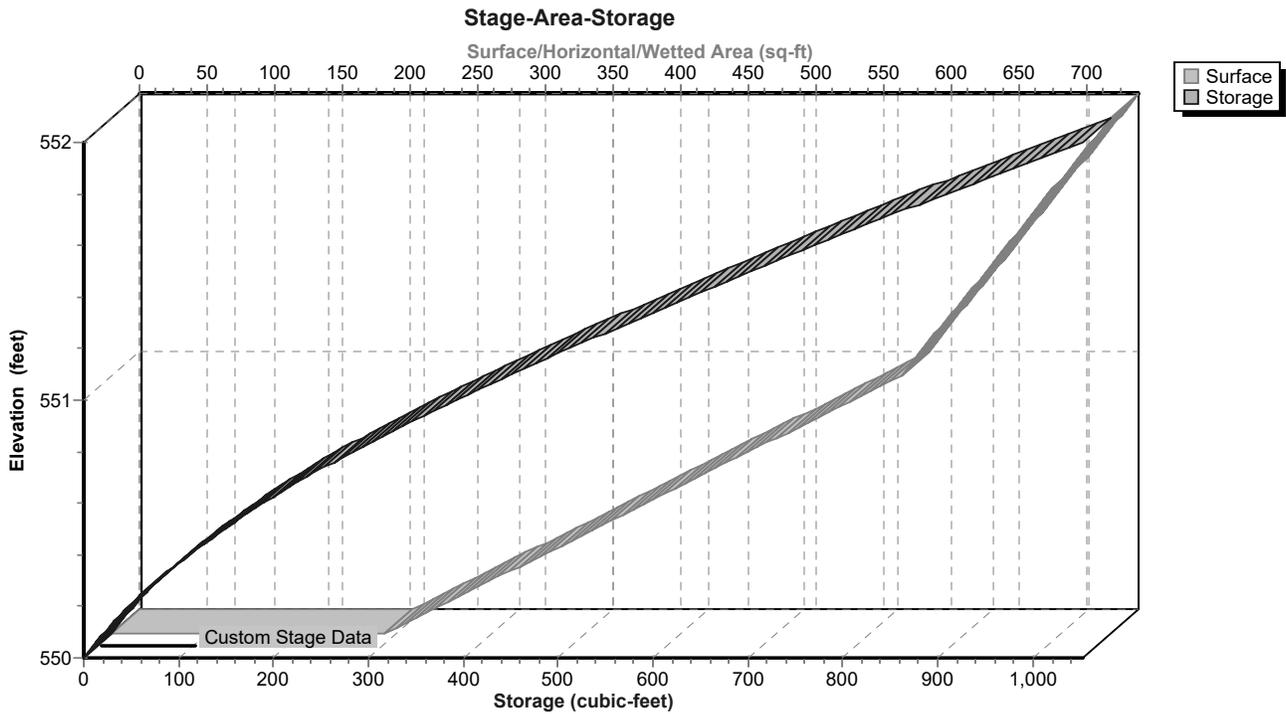
Discarded OutFlow Max=0.04 cfs @ 12.41 hrs HW=550.85' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=550.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: RG



Pond 2P: RG



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Type II 24-hr 25-yr Rainfall=5.82"

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Summary for Subcatchment 1S: Roof

Runoff = 0.52 cfs @ 11.95 hrs, Volume= 0.023 af, Depth> 3.56"

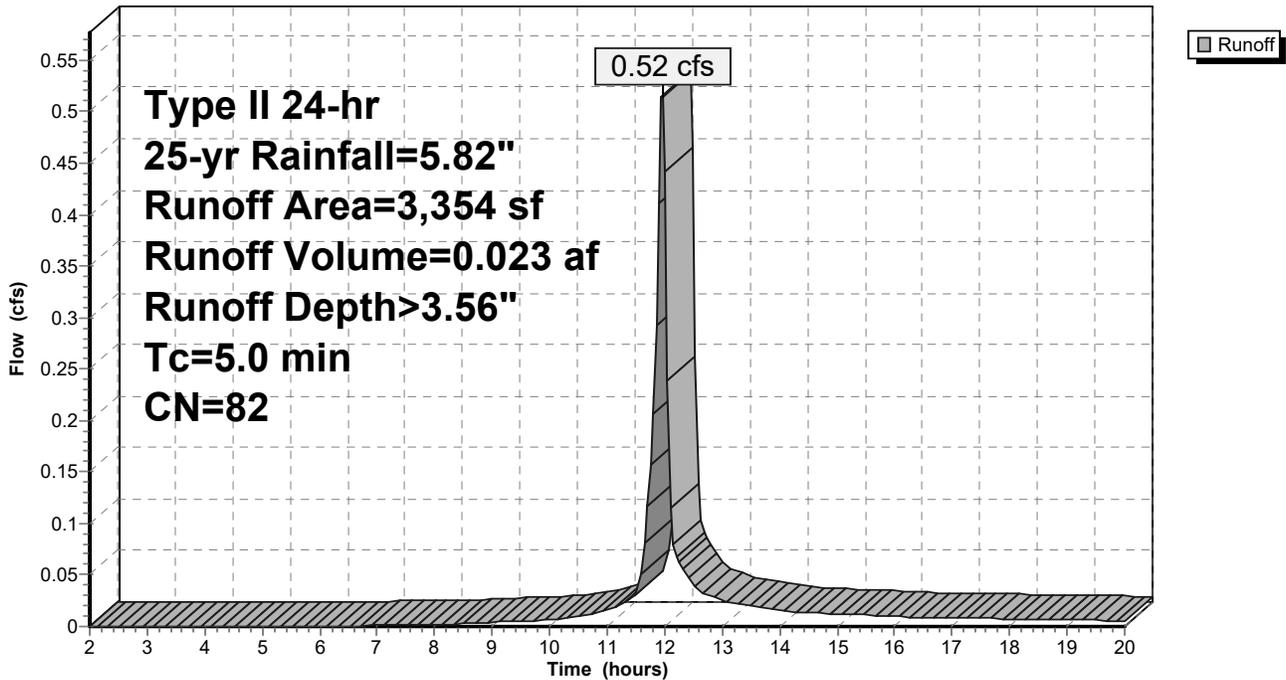
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.82"

Area (sf)	CN	Description
1,873	98	Paved parking, HSG A
1,481	61	>75% Grass cover, Good, HSG B
3,354	82	Weighted Average
1,481		44.16% Pervious Area
1,873		55.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min Tc

Subcatchment 1S: Roof

Hydrograph



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Type II 24-hr 25-yr Rainfall=5.82"

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Summary for Pond 2P: RG

Inflow Area = 0.077 ac, 55.84% Impervious, Inflow Depth > 3.56" for 25-yr event
 Inflow = 0.52 cfs @ 11.95 hrs, Volume= 0.023 af
 Outflow = 0.19 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 63%, Lag= 8.1 min
 Discarded = 0.04 cfs @ 12.10 hrs, Volume= 0.021 af
 Primary = 0.15 cfs @ 12.09 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 551.01' @ 12.09 hrs Surf.Area= 585 sf Storage= 400 cf

Plug-Flow detention time= 91.4 min calculated for 0.023 af (100% of inflow)
 Center-of-Mass det. time= 90.8 min (859.6 - 768.8)

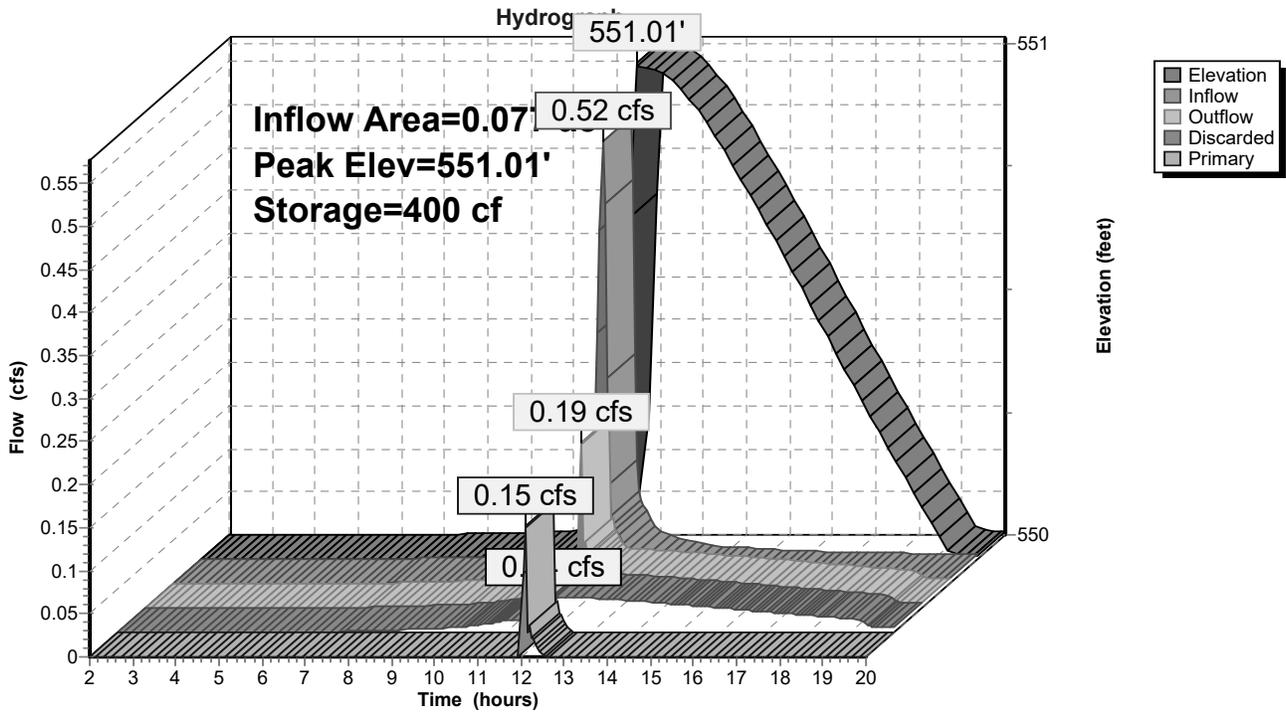
Volume	Invert	Avail.Storage	Storage Description
#1	550.00'	1,053 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
550.00	202	0	0
551.00	583	393	393
552.00	738	661	1,053

Device	Routing	Invert	Outlet Devices
#1	Discarded	550.00'	3.000 in/hr Exfiltration over Surface area
#2	Primary	551.00'	35.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.04 cfs @ 12.10 hrs HW=551.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.10 cfs @ 12.09 hrs HW=551.01' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 0.10 cfs @ 0.27 fps)

Pond 2P: RG



Pond 2P: RG

