STORMWATER MANAGEMENT DESIGN MEMO

Project name	**Lake Hawkeye Conceptual Design**
Project no.	**1940113922**
Client	**TeraWulf**
Memo no.	**1**
Version	**0**
To	**TeraWulf**
From	**Ramboll**
Prepared by	**Carley Wood**
Checked by	**Andrew Stering**
Approved by	**Brian Whittaker**

Date March 25, 2026

This memorandum is a summary with attachments, and is organized as follows:

- Introduction
- Methodology
- Soils
- Pre-developed Conditions
- Post-developed Conditions
- Stormwater Quality
- Runoff Reduction Volume
- Erosion and Sediment Controls
- Downstream Drainage Area Analysis
- Conclusion
- Attachments (Bound Separately)
  - Attachment 1 – USGS Map
  - Attachment 2 – Soil Survey Information
  - *Attachment 3 – Pre-developed and Post-Developed Drainage Area Maps* **(See note 1 below)**
  - *Attachment 4 – Pre-developed Conditions Stormwater Calculations* **(See note 1 below)**
  - Attachment 5 – Post-developed Conditions Stormwater Management and Water Quality Calculations

1. *These attachments are still in development and will be produced and included upon final design and SWPPP development prior to the submission for the construction general permit.*

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1 Introduction

The Developer, TeraWulf, has authorized Ramboll to design the storm sewer and stormwater management facilities within the data center site. The purpose of this memorandum is to summarize pre- and post-developed conditions including the stormwater quantity and quality measures to be provided.

The TeraWulf data center is located in the Town of Lansing, NY, south of Genoa, NY, east of Interlaken, NY, and west of Groton, NY. The site location is shown on the USGS Map (Attachment 1).

This site discharges directly to Cayuga Lake (a fifth order or higher water body) which according to pages 4-6 and 4-7 of the stormwater design manual waives the requirement of Channel protection volume (CPv), Overbank Flood Control Criteria (Qp), and Extreme Flood Control (Qf). As such, the site will be designed focusing on water quality volume (WQv) and runoff reduction volume (RRv) with the ultimate goal of providing RRv ≥ WQv eliminating the need for additional Water Quality Treatment practices on site.

2 Methodology

The Autodesk Storm and Sanitary Analysis (ASSA) Modeling Software which utilizes the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Technical Release No. 55 (SCS TR-55) and TR-20 (SCS TR-20) methodologies were utilized to determine pre- and post-development stormwater runoff rates and to design the stormwater management facilities. The storm sewer system will be designed to convey a 10-year storm and flood routes will be designed to convey a 100-year frequency in accordance with the Town of Lansing standards.

Rainfall data was obtained from NRCC and NRCS joint collaborative website (http://precip.eas.cornell.edu) Extreme Precipitation in New York & New England, An Interactive Web Tool for Extreme Precipitation Analysis. The following is a summary of the 24-hour extreme precipitation estimates for the site.

2-1. Summary of 24-hour Extreme Precipitation Estimates (inches)

	2-year	5-year	10-year	25-year	50-year	100-year
Site	**2.30**	**2.84**	**3.34**	**4.12**	**4.84**	**5.68**
Source: Values were taken from http://precip.eas.cornell.edu website.						

3 Soils

A USDA Web Soil Survey of the data center site in Tompkins County, New York identifies numerous soil types on the site. The predominant soil types are Hudson-Cayuga silt loams, 2 to 6 percent slopes

(HuB) and Hudson-Cayuga silt loams, 6 to 12 percent slopes, eroded (HuC3). See Attachment 2 for the Soil Survey Information on the soils located on the project site.

4 Pre-developed Conditions

The 540-acre site generally consists of woods and brush with a retired power plant facility on site. The site has been divided into two drainage areas under pre-developed conditions. The two drainage areas are located at the west end of the site. The northernmost drainage area is a tributary discharging into Cayuga Lake. The southern drainage area is located near the retired power plant facility and discharges through an existing culvert into Cayuga Lake through two 54" diameter concrete pipes. The drainage areas will be included as Attachment 3 (Pre-developed and Drainage Area Maps) upon completion and development of the full SWPPP prior to the construction general permit application.

The following is a summary of the pre-developed peak stormwater runoff rates for various design storms. The information and models used to estimate these rates can be found in Attachment 4 – Pre-Developed Conditions Stormwater Calculations.

5 Post-developed Conditions

It is proposed to develop the site with a data center complex, replacing a portion of the northwestern wooded areas of the site. As the project results in the disturbance of more than 1-acre of land a NYSDEC SPDES Permit for Stormwater Discharges from Construction Activities must be obtained for the project. The SPDES Permit requires stormwater quality measures be provided.

Under post-developed conditions the site will consist of twenty-eight (28) drainage areas that will be directed to stormwater management areas (SMA's). The SMA's will provide the required stormwater runoff reduction volume. The area that was tributary to the pre-developed Drainage Area upstream of the site will be bypassed with swales of adequate size to be designed at a later date.

The SMA's are designed to provide mitigation for stormwater quality in accordance with NYSDEC requirements and the stormwater design manual. Per the NYSDEC General Permit for Stormwater Discharges from Construction Activity, Permit No. GP-0-25-001 (effective January 29, 2025 with an expiration date of January 28, 2030) (CGP), the Channel Protection Volume (CPv), Overbank Flood Control Criteria (Qp), and Extreme Flood Control Criteria (Qf) requirements do not apply as this site discharges directly into a fifth order or larger water body. The points of discharge are required to be adequately protected against scour and erosion.

The runoff reduction practices are all sized to store and infiltrate the WQv storm with overflow to each practice being discharged through an on-site stormwater network. The discharge point for the proposed stormwater network will be protected from erosion and discharge to the existing dual-54" culverts on site that direct flow to Cayuga lake.

The post-developed condition calculations are provided in Attachment 5 (Post-Developed Conditions Stormwater Management and Water Quality Calculations) and the post-developed drainage area map is still in development but will be included as attachment 4 (Post-developed Drainage Area Maps) upon

final SWPPP development and permit application. Conceptual level design drawings are included under separate cover. A table of the post construction drainage areas (DA)'s is included below:

5-1. Summary of Post Construction Drainage Areas[1]

DA	SMP Description	Area (acres)	Impervious area (acres)	DA	SMP Description	Area (acres)	Impervious area (acres)
1	Stormwater planters (RR-7)	1.22	1.22	**15**	Tree Trench (RR-3)	0.09	Yes
2	Stormwater Planters (RR-7)	1.22	1.22	**16**	Tree Trench (RR-3)	0.17	0.17
3	Stormwater Planters (RR-7)	1.22	1.22	**17**	Tree Trench (RR-3)	0.16	0.16
4	Stormwater Planters (RR-7)	1.22	1.22	**18**	Tree Trench (RR-3)	0.16	0.16
5	Stormwater Planters (RR-7)	1.22	1.22	**19**	Tree Trench (RR-3)	0.08	0.08
6	Stormwater Planters (RR-7)	1.22	1.22	**20**	Tree Trench (RR-3)	0.07	0.07
7	Stormwater Planters (RR-7)	0.15	0.15	**21**	Tree Trench (RR-3)	0.17	0.17
8	Stormwater Planters (RR-7)	0.15	0.15	**22**	Stormwater Planters (RR-7)	4.71	4.71
9	Stormwater Planters (RR-7)	1.63	0.66	**23**	Stormwater Planters (RR-7)	4.71	4.71
10	Tree Trench (RR-3)	17.97	14.56	**24**	Stormwater Planters (RR-7)	1.11	1.11
11	Tree Trench (RR-3)	0.24	0.24	**25**	Stormwater Planters (RR-7)	1.11	1.11
12	Tree Trench (RR-3)	0.41	0.41	**26**	Tree Trench (RR-3)	7.89	3.44
13	Tree Trench (RR-3)	0.34	0.34	**27**	Tree Trench (RR-3)	0.91	0.91
14	Tree Trench (RR-3)	0.47	0.47	**28**	Tree Trench (RR-3)	1.91	1.91

6 Stormwater Quality

Stormwater quality measures in accordance with the requirements of the NYS Stormwater Management Design Manual are provided by the SMPs. The following is a summary table of the WQv required for each drainage area going towards a post-construction stormwater practice. No additional stormwater treatment was required since the RRv was equal to the WQv required (see section 7). Calculations of the stormwater quality volume for each SMA are provided in Attachment 5 (Post-developed Conditions Stormwater Management and Water Quality Calculations).

6-1. Summary of WQv Required[1]

Post-construction Drainage Area (DA)	WQv Required (cubic ft)	Post-construction Drainage Area (DA)	WQv Required (cubic ft)
1	4,207	**15**	310
2	4,207	**16**	579
3	4,207	**17**	545
4	4,207	**18**	545
5	4,207	**19**	272
6	4,207	**20**	238
7	509	**21**	579
8	509	**22**	16,243
9	2,452	**23**	16,243
10	50,829	**24**	3,828
11	828	**25**	3,828
12	1,414	**26**	12,671
13	1,172	**27**	3,138
14	1,621	**28**	6,587

7 Runoff Reduction Volume

The proposed Stormwater Planters (RR-7) and tree trenches (RR-3) will provide RRv for the site. The minimum required RRv was not calculated since RRv provided was ≥ WQv. RRv practices and volumes are shown below.

[1] Note – several practices were consolidated on the attached stormwater calculations due to limitations in the excel sheet provided by NYSDEC which only allows a maximum of 10 individual locations of each practice. For example, drainage areas 1 & 2 were consolidated into just 1 in the attached printouts.

7-1. Summary of Required and Provided Runoff Reduction Volumes (RRv)

DA	Runoff Reduction Volume Practice	RRv Provided (cubic ft)[2]	Is RRv ≥ WQv?	DA	Runoff Reduction Volume Practice	RRv Required (cubic ft)	Is RRv ≥ WQv?
1	Stormwater planters (RR-7)	4,207	Yes	15	Tree Trench (RR-3)	310	Yes
2	Stormwater Planters (RR-7)	4,207	Yes	16	Tree Trench (RR-3)	579	Yes
3	Stormwater Planters (RR-7)	4,207	Yes	17	Tree Trench (RR-3)	545	Yes
4	Stormwater Planters (RR-7)	4,207	Yes	18	Tree Trench (RR-3)	545	Yes
5	Stormwater Planters (RR-7)	4,207	Yes	19	Tree Trench (RR-3)	272	Yes
6	Stormwater Planters (RR-7)	4,207	Yes	20	Tree Trench (RR-3)	238	Yes
7	Stormwater Planters (RR-7)	509	Yes	21	Tree Trench (RR-3)	579	Yes
8	Stormwater Planters (RR-7)	509	Yes	22	Stormwater Planters (RR-7)	16,243	Yes
9	Stormwater Planters (RR-7)	2,452	Yes	23	Stormwater Planters (RR-7)	16,243	Yes
10	Tree Trench (RR-3)	50,829	Yes	24	Stormwater Planters (RR-7)	3,828	Yes
11	Tree Trench (RR-3)	828	Yes	25	Stormwater Planters (RR-7)	3,828	Yes
12	Tree Trench (RR-3)	1,414	Yes	26	Tree Trench (RR-3)	12,671	Yes
13	Tree Trench (RR-3)	1,172	Yes	27	Tree Trench (RR-3)	3,138	Yes
14	Tree Trench (RR-3)	1,621	Yes	28	Tree Trench (RR-3)	6,587	Yes

Of note – several of the stormwater planters are shown in the conceptual level plans as a consolidated unit. The design intent of these is to divide the planters up into discrete areas receiving rooftop flow through a spreader box so that the planters are able to treat and infiltrate the stormwater reaching

[2] Part of the calculation of RRv provided by each practice sets the maximum value to the WQv of the drainage area. All practices are sized greater than the requirement to treat the WQv and would provide more RRv than shown if the maximum wasn't set.

them. This meets design intent of the stormwater design manual and each practice where the drainage area exceeds 15,000 should be seen as several discrete planters in a shared area.

8 Erosion and Sediment Controls

Contractors shall install erosion and sediment control measures to eliminate transport of sediment offsite. Erosion and sediment control measures will be discussed in Section 5.1 of the SWPPP and detailed in the Construction Drawings upon detailed design and permit applications. These measures will be implemented by the Contractor and shall adhere to the specifications in the Contract Documents. Unless specific approval has been obtained from the NYSDEC the Contractors shall only disturb up to 5 acres at one time, which may require phasing of the construction to stabilize completed areas prior to disturbing additional areas. The construction sequence outlining the specific measures and sequence for provision of the measures is provided in the Contract Drawings, which are bound separately from this SWPPP. Development of a detention basin or other temporary erosion and sediment controls may be required and are not shown on the conceptual level design plans.

9 Conclusion

Runoff reduction practices are distributed across the proposed development site to work as a decentralized stormwater management system. The areas of the runoff reduction practices were set during conceptual design to be greater than what would be required for the water quality volume of the upstream area so that the entire water quality volume is reduced as part of the project. Since the Runoff Reduction Volume is equal to the Water Quality Volume, no additional quality treatment practices are required. Additionally, the stormwater runoff will be directed into a water body of order 5 or higher, so there are no stormwater quantity management requirements for the site. The stormwater system and drainage facilities were designed in accordance with the NYS DEC Stormwater Management Design Manual, most recent edition. In total, the Water Quality Volume for the site was approximately 3.45 acre-feet, all of which is reduced using a combination of Tree Trenches (RR-3) & Stormwater Planters (RR-7).

ATTACHMENT 1
USGS Map

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
OnDemand Topo

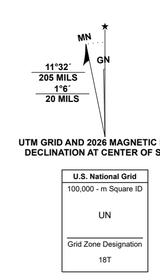
7.5-MINUTE TOPO QUADRANGLE
NEW YORK - CUSTOM EXTENT
7.5-MINUTE TOPO

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: UNIVERSAL TRANSVERSE MERCATOR, ZONE 18T

Data is provided by The National Map (TNM), is the best available at the time of map generation, and includes data content from supporting themes of Elevation, Hydrography, Geographic Names, Boundaries, Transportation, Structures, Land Cover, and Orthoimagery. Refer to associated Federal Geographic Data Committee (FGDC) Metadata for additional source data information.

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands. Temporal changes may have occurred since these data were collected and some data may no longer represent actual surface conditions.

Learn About The National Map: https://nationalmap.gov



UTM GRID AND 2026 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

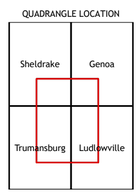
U.S. National Grid
100,000 - m Square ID
UN
Grid Zone Designation
18T

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
CONTOUR SMOOTHNESS = Medium

QUADRANGLE LOCATION



ADJOINING QUADRANGLES

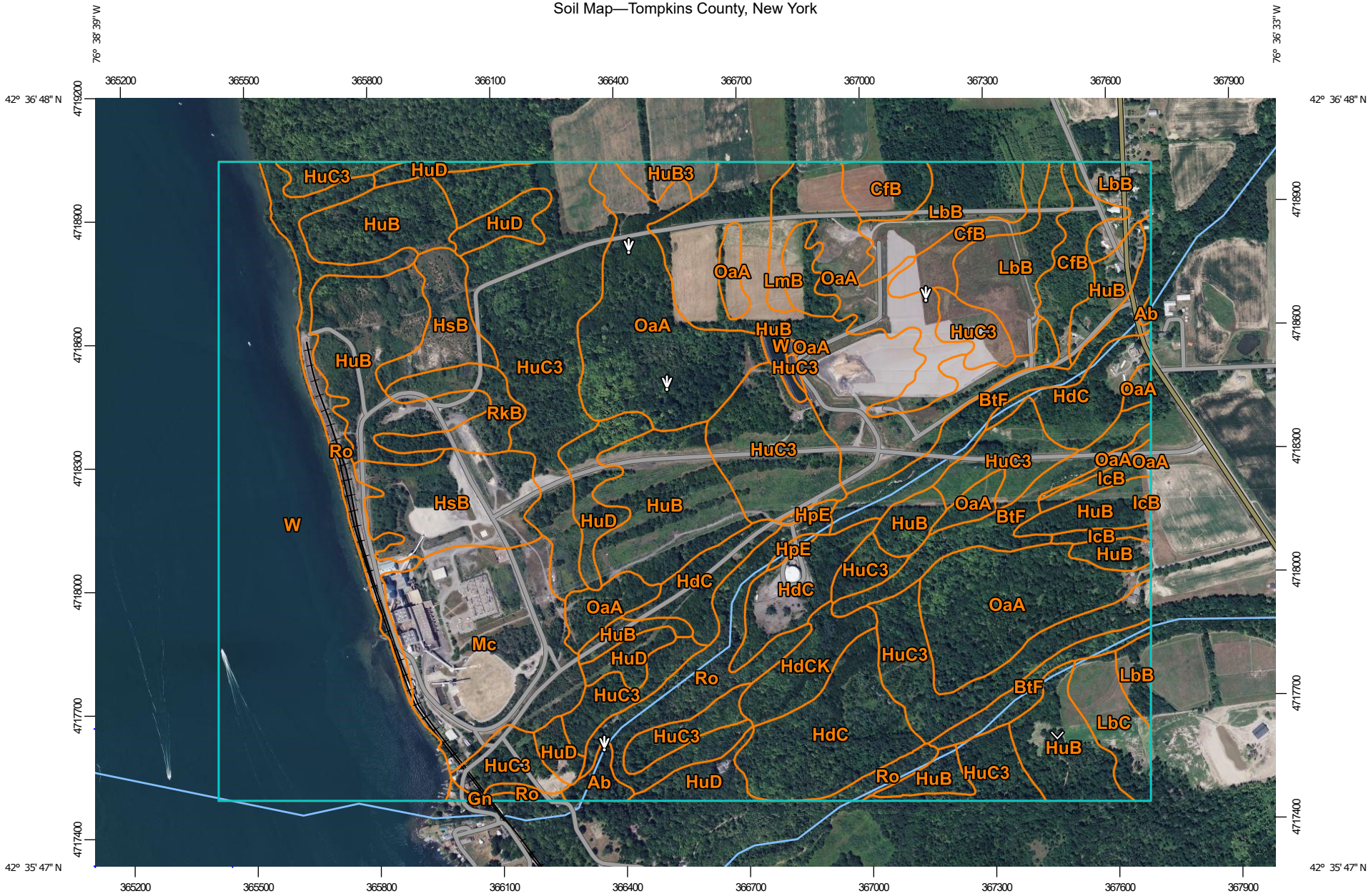
ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD

Interstate Route · US Route · State Route

7.5-MINUTE TOPO, NY
2026

ATTACHMENT 2
Soil Survey Information


76° 38' 39" W
76° 36' 33" W
42° 36' 48" N
42° 35' 47" N
365200
365500
365800
366100
366400
366700
367000
367300
367600
367900
4719200
4718900
4718600
4718300
4718000
4717700
4717400
HuC3
HuD
HuB3
CfB
LbB
HuB
HuD
OaA
LmB
OaA
LbB
CfB
HuB
Ab
HsB
OaA
HuB
W
OaA
HuC3
HuB
HuC3
HuC3
BtF
HdC
OaA
RkB
Ro
HuC3
HuC3
OaA
OaA
IcB
HsB
HuB
HuD
HpE
HuB
OaA
BtF
HuB
IcB
W
IcB
HpE
HuB
HuC3
HdC
HdC
OaA
OaA
HuB
Mc
HuD
HdCK
HuC3
Ro
BtF
LbB
HuC3
LbC
HdC
HuD
HuB
HuC3
Ro
HuB
HuC3
Ab
HuD
Gn
Ro
Map Scale: 1:13,200 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
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 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 1:20,000.

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: Tompkins County, New York
Survey Area Data: Version 21, Sep 2, 2025

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

Date(s) aerial images were photographed: Apr 1, 2020—Oct 1, 2020

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
Ab	Alluvial land	3.3	0.4%
BtF	Bath, Valois, and Lansing soils, 35 to 60 percent slopes	36.0	4.1%
CfB	Conesus gravelly silt loam, 3 to 8 percent slopes	23.6	2.7%
Gn	Genesee silt loam	0.9	0.1%
HdC	Howard gravelly loam, 5 to 15 percent simple slopes	55.4	6.3%
HdCK	Howard gravelly loam, 5 to 15 percent complex slopes	10.0	1.1%
HpE	Howard and Palmyra soils, 25 to 35 percent slopes	1.7	0.2%
HsB	Hudson silty clay loam, 2 to 6 percent slopes	33.1	3.8%
HuB	Hudson-Cayuga silt loams, 2 to 6 percent slopes	154.3	17.6%
HuB3	Hudson-Cayuga silt loams, 2 to 6 percent slopes, eroded	3.8	0.4%
HuC3	Hudson-Cayuga silt loams, 6 to 12 percent slopes, eroded	139.9	16.0%
HuD	Hudson-Cayuga silt loams, 12 to 20 percent slopes	28.3	3.2%
IcB	Ilion silty clay loam, 2 to 6 percent slopes	5.1	0.6%
LbB	Lansing gravelly silt loam, 3 to 8 percent slopes	37.6	4.3%
LbC	Lansing gravelly silt loam, 8 to 15 percent slopes	9.8	1.1%
LmB	Lima silt loam, 3 to 8 percent slopes	4.4	0.5%
Mc	Made land	45.7	5.2%
OaA	Ovid silt loam, 0 to 6 percent slopes	104.6	11.9%
RkB	Rhinebeck silt loam, 2 to 6 percent slopes	10.3	1.2%
Ro	Rock outcrop	45.8	5.2%
W	Water	121.7	13.9%
Totals for Area of Interest		**875.2**	**100.0%**

ATTACHMENT 5
Post-developed Conditions Stormwater Management and Water Quality Calculations

Step 2 - Calculate Water Quality Volume

Is this project subject to Section 4.3 of the NYS Design Manual for Enhanced Phosphorus Removal?	No
What is the nature of this construction project?	New Construction

Design Point:	1	
P=	1.00	inches

Enter 90% Rainfall Event as P

Calculate Required WQv

Drainage Area Number	Contributing Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (cf)	SMP Description
1	2.44	2.44	100	0.95	8,414	Stormwater Planter
2						
3	2.44	2.44	100	0.95	8,414	Stormwater Planter
4						
5	2.44	2.44	100	0.95	8,414	Stormwater Planter
6						
7	0.30	0.30	100	0.95	1,017	Stormwater Planter
8						
9	1.63	0.66	40	0.41	2,452	Stormwater Planter
10	17.97	14.56	81	0.78	50,829	Tree Trench
11	0.24	0.24	100	0.95	828	Tree Trench
12	0.41	0.41	100	0.95	1,414	Tree Trench
13	0.34	0.34	100	0.95	1,172	Tree Trench
14	0.47	0.47	100	0.95	1,621	Tree Trench
15	0.09	0.09	100	0.95	310	Tree Trench
16	0.80	0.80	100	0.95	2,759	Tree Trench
17						
18						
19						
20						
21						
22	11.64	11.64	100	0.95	40,141	Stormwater Planter
23						
24						
25						
26	7.89	3.44	44	0.44	12,671	Tree Trench
27	0.91	0.91	100	0.95	3,138	Tree Trench
28	1.91	1.91	100	0.95	6,587	Tree Trench
29						
30						
Total	51.92	43.09	83	0.80	**150181**	**Required WQv**

Steps 3 and 5 - Apply RR Techniques and Standard SMPs

Runoff Reduction Volume and Treated Volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**(cf)**	**(cf)**
RR Techniques	Conservation of Natural Areas	RR-1	0.00		0	
	Sheet Flow to Riparian Buffer/Filter Strip	RR-2	0.00	0.00	0	
	Tree Planting/Tree Pit/Tree Trench	RR-3	31.03	23.17	81,329	
	Disconnection of Rooftop Runoff	RR-4		0.00	0	
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	20.89	19.92	68,852	
	Rainwater Harvesting Systems	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Extensive & Intensive)	RR-10	0.00	0.00	0	
	Stream Daylighting	RR-11				
Standard SMPs w/ RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00	0.00	0	0
	Infiltration Bioretention	F-4	0.00	0.00	0	0
	Filtration Bioretention	F-5	0.00	0.00	0	0
	Bioslope	F-6	0.00	0.00	0	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention	P-1	0.00	0.00		0
	Wet Pond	P-2	0.00	0.00		0
	Wet Extended Detention	P-3	0.00	0.00		0
	Multiple Pond System	P-4	0.00	0.00		0
	Shallow Wetland	W-1	0.00	0.00		0
	Extended Detention Shallow Wetland	W-2	0.00	0.00		0
	Pond/Wetland System	W-3	0.00	0.00		0
	Pocket Wetland	W-4	0.00	0.00		0
	Gravel Wetland	W-5	0.00	0.00		0
	Surface Sand Filter	F-1	0.00	0.00		0
	Underground Sand Filter	F-2	0.00	0.00		0
	Perimeter Sand Filter	F-3	0.00	0.00		0
	Wet Swale	O-2	0.00	0.00		0
Alt. SMPs	Flow Based Alternative Practice	-	0.00	0.00		0
	Volume Based Alternative Practice	-				
	Totals by RR Technique →		51.92	43.09	150,181	
	Totals by Standard SMP w/RRV →		0.00	0.00	0	0
	Totals by Standard SMP →		0.00	0.00		0
	Totals by Alternative SMP →		0.00	0.00		0
	Totals (RR Techniques + all SMPs) →		51.92	43.09	150,181	0

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
10	17.97	14.56	81	0.78	50,829	1.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	10.00	
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.50	
Enter depth to seasonal high water table (ft)	40	
Enter depth to bedrock (ft)	42	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	19	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	50,829	cf	
Enter Filter Bed Depth	df	3.00	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.50	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	21784	sf	
Provided Filter Bed Surface Area	Af	24584	sf	

Calculate Runoff Reduction		
RRv Provided	**50,829**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
11	0.24	0.24	100	0.95	828	1.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	3.00	
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.50	
Enter depth to seasonal high water table (ft)	15	
Enter depth to bedrock (ft)	15	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	828	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	355	sf	
Provided Filter Bed Surface Area	Af	400	sf	

Calculate Runoff Reduction		
RRv Provided	**828**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
12	0.41	0.41	100	0.95	1,414	1.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	10	
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.5	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	1,414	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	606	sf	
Provided Filter Bed Surface Area	Af	893	sf	

Calculate Runoff Reduction		
RRv Provided	**1,414**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
13	0.34	0.34	100	0.95	1,172	1.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	0.5	
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.5	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	1,172	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	502	sf	
Provided Filter Bed Surface Area	Af	797.9	sf	

Calculate Runoff Reduction		
RRv Provided	**1,172**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
14	0.47	0.47	100	0.95	1,621	1.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	10	
Enter underlying soil infiltration rate (based on	0.5	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	1,621	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	695	sf	
Provided Filter Bed Surface Area	Af	908	sf	

Calculate Runoff Reduction		
RRv Provided	**1,621**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
15	0.09	0.09	100	0.95	310	11.64	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	0.5	
Enter underlying soil infiltration rate (based on	0.5	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	310	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	133	sf	
Provided Filter Bed Surface Area	Af	400	sf	

Calculate Runoff Reduction		
RRv Provided	**310**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
16	0.80	0.80	100	0.95	2,759	0.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	10	
Enter underlying soil infiltration rate (based on	0.5	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	2,759	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	1182	sf	
Provided Filter Bed Surface Area	Af	2175	sf	

Calculate Runoff Reduction		
RRv Provided	**2,759**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
26	7.89	3.44	44	0.44	12,671	0.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	10	
Enter underlying soil infiltration rate (based on	0.5	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	12,671	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	5430	sf	
Provided Filter Bed Surface Area	Af	5475	sf	

Calculate Runoff Reduction		
RRv Provided	**12,671**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
27	0.91	0.91	100	0.95	3,138	0.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	10	
Enter underlying soil infiltration rate (based on	0.5	
Enter depth to seasonal high water table (ft)	24	
Enter depth to bedrock (ft)	26	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	3,138	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	1345	sf	
Provided Filter Bed Surface Area	Af	1350	sf	

Calculate Runoff Reduction		
RRv Provided	**3,138**	**cf**

Tree Trench (RR-3)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
28	1.91	1.91	100	0.95	6,587	0.00	Tree Trench

Design Criteria		
Is the contributing area a designated hotspot?	No	
Enter the slope of the contributing area (%)	10	
Enter underlying soil infiltration rate (based on	0.5	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter surface layer depth (inches)	3	
Enter filter media width (ft)	10	
Enter drainage layer depth (inches)	24	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	6,587	cf	
Enter Filter Bed Depth	df	3	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Enter Filter Time	tf	2	days	
Required Filter Bed Surface Area	Af	2823	sf	
Provided Filter Bed Surface Area	Af	2850	sf	

Calculate Runoff Reduction		
RRv Provided	**6,587**	**cf**

Stormwater Planter (RR-7)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
1	2.44	2.44	100	0.95	8,414	1.00	Stormwater Planter

Select stormwater planter type	Infiltration Stormwater Planter

Design Criteria		
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.5	
Is the contributing area a designated hotspot?	No	
Does the contributing area exceed 15,000 sf?	Yes	Does not meet design criteria as a single unit. Distribute flow into discrete planters
Does contributing area contain parking lot or roadway runoff?	No	
Enter depth to seasonal high water table (ft) (4 ft min separation in sole source aquifer)	13	
Enter depth to bedrock (ft)	13	
Enter depth of surface layer (inches)	3	
Enter drainage layer depth (inches)	6	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	8,414	cf	
Enter Depth of Soil Media	df	2.5	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Filter Time	tf	2	days	
Required Filter Area	Af	3506	sf	
Enter Provided Filter Area	Af	5503.89	sf	
Recalculated Water Quality Volume (based on provided filter area)	WQv calc	13209.336	cf	

Calculate Runoff Reduction		
RRv Provided	**8,414**	**cf**

Stormwater Planter (RR-7)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
3	2.44	2.44	100	0.95	8,414	1.00	Stormwater Planter

Select stormwater planter type	Infiltration Stormwater Planter	
Design Criteria		
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.5	
Is the contributing area a designated hotspot?	No	
Does the contributing area exceed 15,000 sf?	Yes	Does not meet design criteria as a single unit. Distribute flow into discrete planters
Does contributing area contain parking lot or roadway runoff?	No	
Enter depth to seasonal high water table (ft) (4 ft min separation in sole source aquifer)	10	
Enter depth to bedrock (ft)	12	
Enter depth of surface layer (inches)	3	
Enter drainage layer depth (inches)	6	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	8,414	cf	
Enter Depth of Soil Media	df	2.5	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Filter Time	tf	2	days	
Required Filter Area	Af	3506	sf	
Enter Provided Filter Area	Af	5503.89	sf	
Recalculated Water Quality Volume (based on provided filter area)	WQv calc	13209.336	cf	

Calculate Runoff Reduction		
RRv Provided	**8,414**	**cf**

Stormwater Planter (RR-7)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
5	2.44	2.44	100	0.95	8,414	1.00	Stormwater Planter

Select stormwater planter type	Infiltration Stormwater Planter	
Design Criteria		
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.5	
Is the contributing area a designated hotspot?	No	
Does the contributing area exceed 15,000 sf?	Yes	Does not meet design criteria as a single unit. Distribute flow into discrete planters
Does contributing area contain parking lot or roadway runoff?	No	
Enter depth to seasonal high water table (ft) (4 ft min separation in sole source aquifer)	5	
Enter depth to bedrock (ft)	7	
Enter depth of surface layer (inches)	3	
Enter drainage layer depth (inches)	6	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	8,414	cf	
Enter Depth of Soil Media	df	2.5	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Filter Time	tf	2	days	
Required Filter Area	Af	3506	sf	
Enter Provided Filter Area	Af	5503.89	sf	
Recalculated Water Quality Volume (based on provided filter area)	WQv calc	13209.336	cf	

Calculate Runoff Reduction		
RRv Provided	**8,414**	**cf**

Stormwater Planter (RR-7)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
7	0.30	0.30	100	0.95	1,017	1.00	Stormwater Planter

Select stormwater planter type	Infiltration Stormwater Planter

Design Criteria		
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.5	
Is the contributing area a designated hotspot?	No	
Does the contributing area exceed 15,000 sf?	No	
Does contributing area contain parking lot or roadway runoff?	No	
Enter depth to seasonal high water table (ft) (4 ft min separation in sole source aquifer)	2	
Enter depth to bedrock (ft)	3	
Enter depth of surface layer (inches)	3	
Enter drainage layer depth (inches)	6	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	1,017	cf	
Enter Depth of Soil Media	df	2.5	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Filter Time	tf	2	days	
Required Filter Area	Af	424	sf	
Enter Provided Filter Area	Af	707.5	sf	
Recalculated Water Quality Volume (based on provided filter area)	WQv calc	1698	cf	

Calculate Runoff Reduction		
RRv Provided	**1,017**	**cf**

Stormwater Planter (RR-7)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
9	1.63	0.66	40	0.41	2,452	1.00	Stormwater Planter

Select stormwater planter type	Infiltration Stormwater Planter	
Design Criteria		
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0.5	
Is the contributing area a designated hotspot?	No	
Does the contributing area exceed 15,000 sf?	Yes	Does not meet design criteria as a single unit. Distribute flow into discrete planters
Does contributing area contain parking lot or roadway runoff?	No	
Enter depth to seasonal high water table (ft) (4 ft min separation in sole source aquifer)	2	
Enter depth to bedrock (ft)	3	
Enter depth of surface layer (inches)	3	
Enter drainage layer depth (inches)	6	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	2,452	cf	
Enter Depth of Soil Media	df	2.5	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Filter Time	tf	2	days	
Required Filter Area	Af	1022	sf	
Enter Provided Filter Area	Af	3150	sf	
Recalculated Water Quality Volume (based on provided filter area)	WQv calc	7560	cf	

Calculate Runoff Reduction		
RRv Provided	**2,452**	**cf**

Stormwater Planter (RR-7)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
22	11.64	11.64	100	0.95	40,141	0.00	Stormwater Planter

Select stormwater planter type	Infiltration Stormwater Planter	
Design Criteria		
Enter underlying soil infiltration rate (based on	0.5	
Is the contributing area a designated hotspot?	No	
Does the contributing area exceed 15,000 sf?	Yes	Does not meet design criteria as a single unit. Distribute flow into discrete planters
Does contributing area contain parking lot or	No	
Enter depth to seasonal high water table (ft)	2	
Enter depth to bedrock (ft)	2	
Enter depth of surface layer (inches)	3	
Enter drainage layer depth (inches)	6	

Sizing Criteria				
		Value	Units	Notes
Water Quality Volume	WQv	40,141	cf	
Enter Depth of Soil Media	df	2.5	ft	
Permeability Flow Rate	k	1	ft/day	
Enter Average Height of Ponding	hf	0.5	ft	
Filter Time	tf	2	days	
Required Filter Area	Af	16725	sf	
Enter Provided Filter Area	Af	17200	sf	
Recalculated Water Quality Volume (based on	WQv calc	41280	cf	

Calculate Runoff Reduction		
RRv Provided	**40,141**	**cf**