

DRAINAGE REPORT

KILKENNEY HEIGHTS II
13-Lot Open Space Subdivision
Maskel Road & Abbe Road
South Windsor, Connecticut

December 20, 2019

Revised October 1, 2020

Prepare For:

Mannarino Builders, Inc.
400 Chapel Road, unit 3-F
South Windsor, Ct. 06074

Prepared By:



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Project Summary

Mannarino Builders, Inc. proposes to construct a 13-Lot open space subdivision on Maskel Road and Abbe Road in South Windsor, Connecticut. 12.32 acres will be preserved as open space. Another 0.8 acres will be preserved by conservation easement. The development includes the extension of Maskel Road to Abbe Road and the construction of a stormwater collection, treatment and detention system including a stormwater pocket pond. This report analyzes the performance of this stormwater system and demonstrates compliance with the Town's public improvement specifications for stormwater design.

Property

The subject parcel includes two lots totally 21.58 acres north of the Maskel Road cul-de-sac and east of Abbe Road. The subject parcel has frontage on both Maskel Road and Abbe Road. The property contains an intermittent watercourse in the northeast corner identified as Dry Brook. The parcel also contains an isolated wetland (8,866 s.f.) along the western boundary. A 175' wide utility pole easement runs north and south along the east side of Maskel Road. The parcel slopes from east to west to the isolated wetland and then into a drainage ditch along the northern boundary where it discharges to the town drainage system in Abbe Road.

Soil Evaluation

The Web Soil Survey identifies the on-site soils as primarily Wapping Very Fine Sandy Loam, which is classified as HSG C soil. The soils survey and descriptions are attached to the Appendix C of this report.

Hydraulic & Hydrologic Calculations

A stormwater pocket pond is proposed to provide treatment and detention of stormwater. The performance of the basin was analyzed using the SCS Unit Hydrograph Method and HydroCAD 10.00 software. The attached report details the results of this analysis. Rainfall depth for the 100, 25, 10 and 2-year design storms were taken from online NOAA Rainfall Data (Appendix C). Hydrographs for these storms were generated using a Type III, 24-hour rainfall and routed through the proposed basin.

Runoff curve numbers were initially selected for pre-development and post-development conditions assuming HSG C soils. These curve numbers produced higher peak flow rates than

expected for pre-development conditions. Using typical C soil CN values for woods (70) produces a 10-year predevelopment peak flow of 9.98 cfs. The runoff from the site collects in a 15" ACCMP pipe on Abbe Road which does not have capacity for this flow. The Town Engineer was not aware of any reports of flooding at Abbe Road so it is unlikely this rate is reflective of actual conditions. Another indication that the typical C soil CN values are too high for this site is that a Rational Method analysis also produces lower peak rates. In accordance with the Town's guidelines we prepared a Rational Method analysis of the roadway pipe network for initial pipe sizing purposes. This analysis produced a 10-year peak discharge to the stormwater basin of 9.2 cfs. Using the typical C soil CN values produces a peak flow of 13.03 cfs to the basin, an inconsistent result. To calibrate the hydrologic model, we selected CN values between the typical B and C soils as follows:

Table 1 – CN Value Comparison

Description	B-Soils	C-Soils	Calibrated Soils
Woods	55	70	61
Lawn	61	74	67
Wetlands (D soil)			77
Impervious	98	98	98

Using the calibrated CN values, the peak flows for predevelopment conditions were reduced from 9.98 cfs to 6.62 cfs which is more consistent with the observed conditions downstream. It also imposes a stricter limitation on discharge from the development. Using the calibrated CN values and an equivalent Tc produced a peak flow of 11.40 which matches the Rational Method analysis. This indicates the selected CN values are appropriate.

Time of concentration for the existing conditions was calculated using sheet flow, shallow concentrated flow and open channel flow for the most remove travel path within each watershed. Since time of concentration is greatly influenced by sheet flow, we conservatively assumed a much longer sheet flow for existing conditions than for proposed conditions. Time of concentration for the smaller watersheds to each drainage structure were assumed to be 5 minutes for mostly paved areas and 10 minutes for mostly lawn areas. This is consistent with CT DOT Drainage Manual practices. The flow path for Tc calculation is depicted on the attached Pre and Post Development Drainage Area Maps in Appendix A&B.

Pipes were sized for the 10-year storm to maintain at least 12" of freeboard below the structure top of frame. The Rational Method Pipe Sizing Chart comparing 10-year flow to pipe full flow capacity is attached for reference in Appendix E. But the HydroCAD report in Appendix D provides a comprehensive hydraulic grade analysis of the pipe system. Watershed areas for

each structure are depicted on the attached Post Development Drainage Area Map in Appendix B. To demonstrate compliance with the minimum freeboard requirement, the hydraulic analysis from the HydroCAD report is summarized in table 2 below.

Table 2 – Hydraulic Grade Line Analysis (10-Year Storm)

STR#	TF	HGL	Freeboard
YD#1	313.00	306.64	6.36
YD#2	309.38	306.24	3.14
YD#3	308.38	305.38	3.00
YD#4	307.39	304.32	3.07
CB#1	308.60	305.61	2.99
CB#2	308.60	304.04	4.56
YD#5	304.94	302.00	2.94
CB#2A	306.65	301.84	4.81
CB#3	304.48	301.40	3.08
YD#6	302.54	299.72	2.82
CB#4	304.48	299.66	4.82
YD#7	302.79	298.43	4.36
CB#5	302.90	298.26	4.64
CB#6	299.49	297.05	2.44
CB#7	299.49	297.05	2.44
DMH#1	299.00	296.52	2.48
DMH#2	299.50	290.33	9.17
YD#8	290.50	287.39	3.11
CB#9	290.76	287.39	3.37
CB#10	290.76	287.39	3.37

Water Quality Treatment

The stormwater pond includes a permanent pool below the outlet elevation (294.0) which provides for removal of total suspended solids (TSS) through settlement. A sediment forebay is provided at the pipe inlet for pre-treatment. An aquatic bench is provided between the forebay and permanent pool to provide additional filtration and pollutant removal. The permanent pool is sized to meet or exceed the minimum water quality volume as defined by the CT DEP Stormwater Quality Manual. While not all the site follows through the treatment basin, we have maximized the treated area to the maximum extent practicable and conservatively calculated the WQV based on the entire site. The required WQV is computed as follows:

$$WQV = (1") [0.05+0.009(I)] (A)/12 \times 43,560$$

Where,

I = Impervious Coverage (%) = 19.64%

A = Watershed Area (ac.) = 7.648 ac.

Therefore,

$$WQV = (1'') [0.05 + 0.009(19.64)] (7.648) / 12 \times 43,560 = 6,295 \text{ c.f.}$$

The proposed pond has a permanent pool volume of 7,651 c.f. below the outlet elevation 294.0, which exceeds the minimum required volume.

A portion of this permanent pool storage is provided in the forebay which is designed to trap coarse sediment prior to discharge to the rest of the pond. The forebay should contain at least 10% of the WQV or 630 c.f. The forebay has a capacity of 2,021 c.f. below elevation 293.5.

The surplus storage capacity in the forebay provides ample room for sediment storage.

Hydrographs for the proposed watershed areas were routed through the pond and outlet pipe to determine post-development discharge rates and compare to existing rate. The pre and post development analysis from the HydroCAD report are summarized in Table 3 below.

Table 3 – Pre & Post Development Peak Flow Rates (cfs)

Storm	Pre Q	Post Q
2-year	1.43	1.07
10-year	6.22	5.18
25-year	10.03	8.70
100-year	16.66	13.27

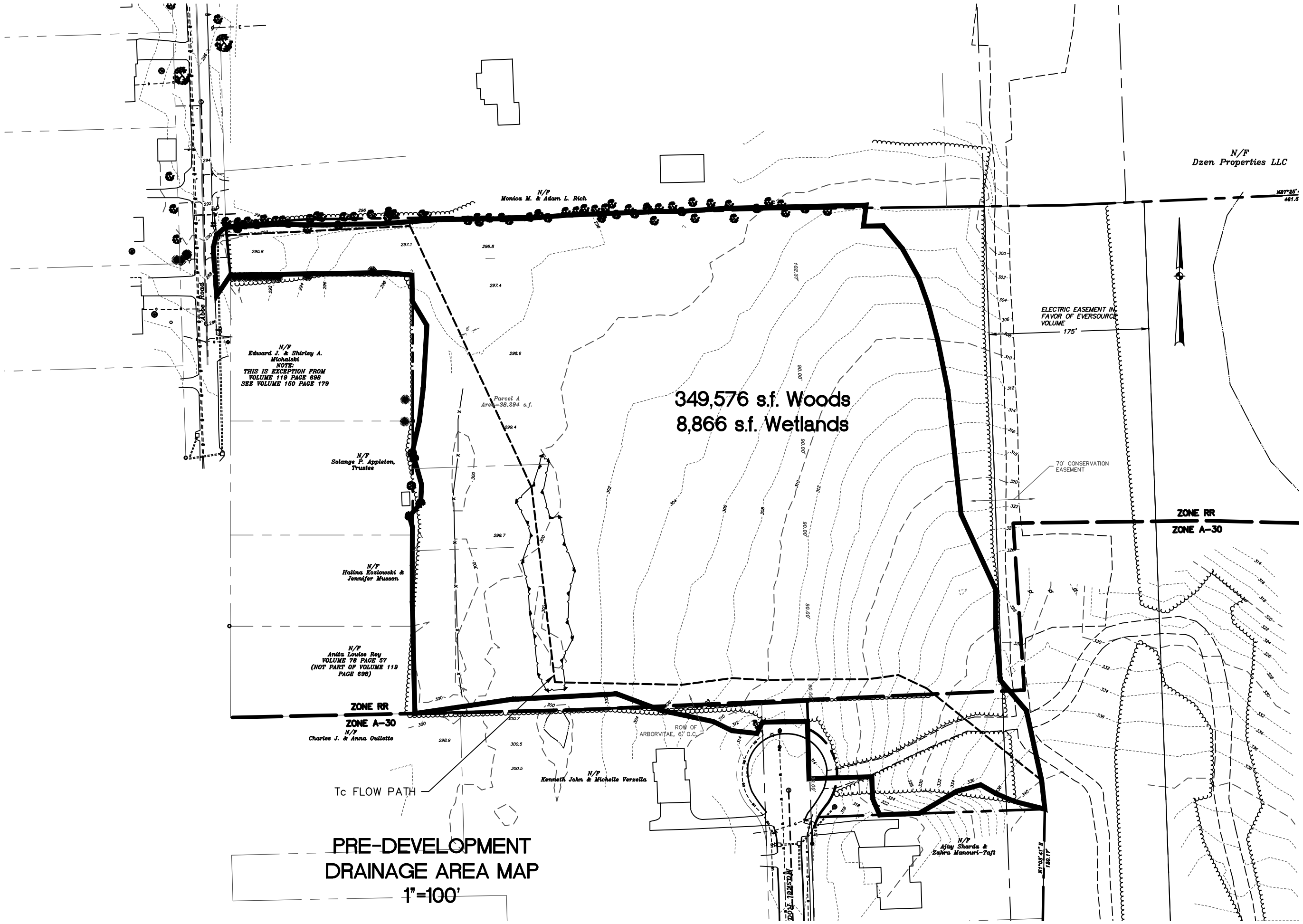
This analysis demonstrates that the proposed development will not increase peak flow rates to the town drainage system in Abbe Road.

Conclusion

Based on this analysis, it is our professional opinion that the proposed development will not adversely impact downstream properties. Stormwater will be adequately treated for TSS and other pollutants. Peak rates will not increase.

Appendix

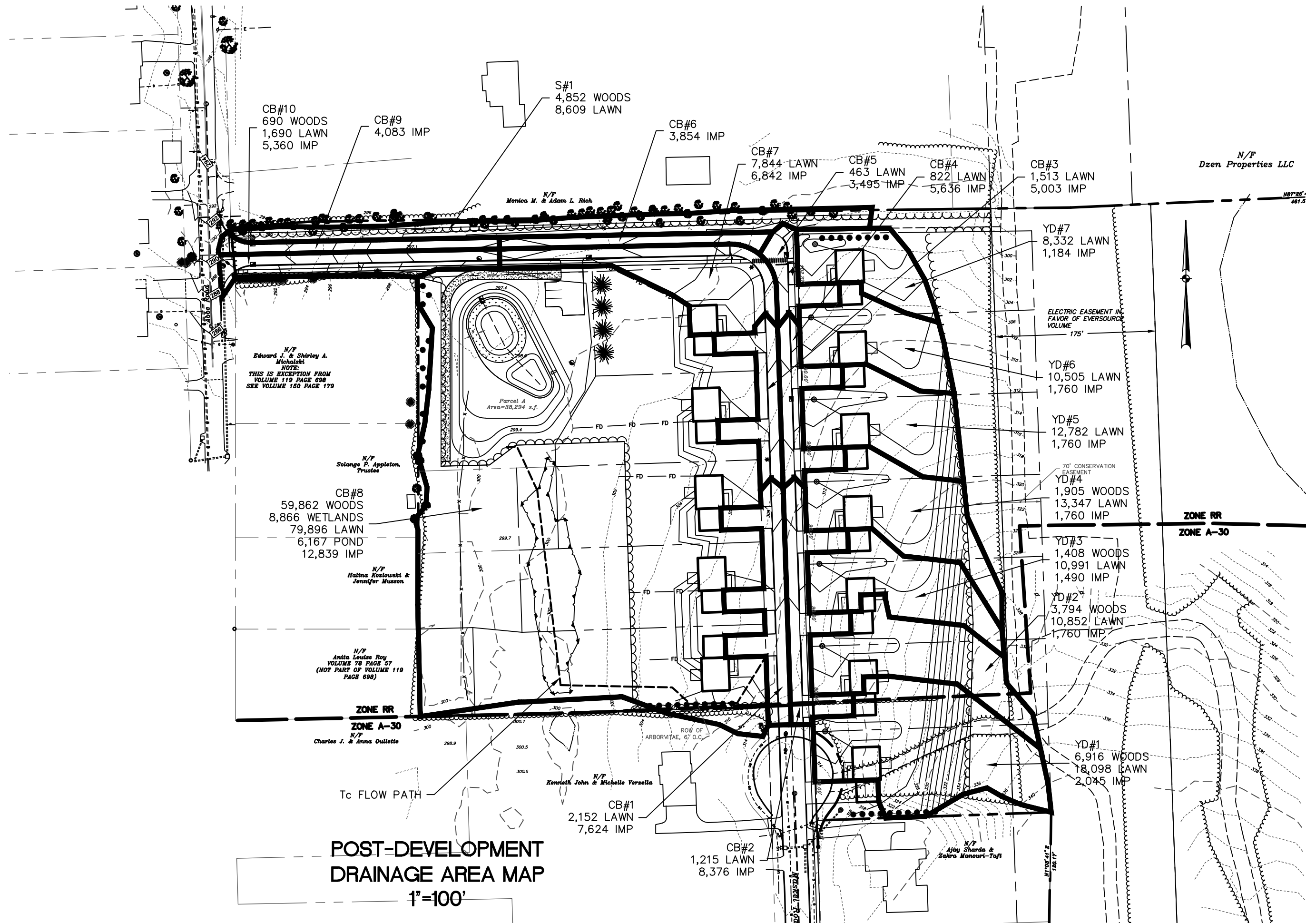
**A - Pre-Development Drainage Area Map, 1"= 100'
(11"x17" sheet)**



PRE-DEVELOPMENT
DRAINAGE AREA MAP

1"=100'

**B - Post-Development Drainage Area Map, 1"= 100'
(11"x17" sheet)**



C - NOAA Rainfall Data, Web Soil Survey & Soil Descriptions



NOAA Atlas 14, Volume 10, Version 3
Location name: South Windsor, Connecticut, USA*
Latitude: 41.8652°, Longitude: -72.541°
Elevation: 291.12 ft**

* source: ESRI Maps

** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.336 (0.258-0.437)	0.407 (0.312-0.530)	0.523 (0.399-0.684)	0.619 (0.470-0.814)	0.751 (0.555-1.03)	0.851 (0.616-1.20)	0.955 (0.674-1.39)	1.07 (0.718-1.60)	1.24 (0.804-1.92)	1.38 (0.874-2.17)
10-min	0.476 (0.365-0.620)	0.576 (0.442-0.751)	0.740 (0.566-0.969)	0.876 (0.666-1.15)	1.06 (0.786-1.46)	1.21 (0.873-1.69)	1.35 (0.955-1.97)	1.52 (1.02-2.26)	1.76 (1.14-2.71)	1.96 (1.24-3.08)
15-min	0.560 (0.429-0.729)	0.678 (0.520-0.884)	0.871 (0.666-1.14)	1.03 (0.784-1.36)	1.25 (0.924-1.72)	1.42 (1.03-1.99)	1.59 (1.12-2.32)	1.79 (1.20-2.66)	2.07 (1.34-3.19)	2.30 (1.46-3.62)
30-min	0.754 (0.578-0.981)	0.915 (0.701-1.19)	1.18 (0.901-1.54)	1.40 (1.06-1.84)	1.70 (1.25-2.34)	1.93 (1.40-2.71)	2.16 (1.53-3.15)	2.43 (1.63-3.62)	2.82 (1.82-4.34)	3.13 (1.98-4.93)
60-min	0.948 (0.727-1.23)	1.15 (0.883-1.50)	1.49 (1.14-1.94)	1.76 (1.34-2.32)	2.15 (1.58-2.95)	2.44 (1.76-3.42)	2.74 (1.93-3.99)	3.08 (2.06-4.58)	3.56 (2.30-5.49)	3.96 (2.51-6.23)
2-hr	1.22 (0.942-1.58)	1.48 (1.14-1.91)	1.89 (1.45-2.46)	2.24 (1.71-2.93)	2.71 (2.02-3.72)	3.07 (2.24-4.30)	3.45 (2.46-5.03)	3.90 (2.62-5.77)	4.57 (2.97-7.01)	5.14 (3.27-8.04)
3-hr	1.41 (1.09-1.82)	1.70 (1.31-2.19)	2.17 (1.68-2.82)	2.57 (1.97-3.35)	3.12 (2.33-4.26)	3.52 (2.58-4.93)	3.96 (2.84-5.78)	4.49 (3.02-6.63)	5.30 (3.44-8.10)	6.00 (3.82-9.34)
6-hr	1.77 (1.37-2.27)	2.14 (1.66-2.75)	2.76 (2.13-3.56)	3.27 (2.51-4.24)	3.97 (2.98-5.41)	4.48 (3.31-6.26)	5.05 (3.65-7.36)	5.75 (3.89-8.44)	6.85 (4.46-10.4)	7.80 (4.97-12.1)
12-hr	2.17 (1.69-2.77)	2.66 (2.07-3.40)	3.45 (2.69-4.43)	4.12 (3.19-5.31)	5.03 (3.79-6.82)	5.70 (4.23-7.92)	6.43 (4.67-9.34)	7.35 (4.99-10.7)	8.80 (5.75-13.3)	10.1 (6.43-15.5)
24-hr	2.54 (1.99-3.22)	3.15 (2.47-4.01)	4.15 (3.25-5.30)	4.99 (3.88-6.40)	6.13 (4.65-8.30)	6.97 (5.21-9.67)	7.90 (5.78-11.5)	9.09 (6.18-13.2)	11.0 (7.19-16.5)	12.6 (8.11-19.3)
2-day	2.85 (2.25-3.60)	3.59 (2.83-4.54)	4.79 (3.77-6.08)	5.79 (4.53-7.39)	7.17 (5.48-9.67)	8.17 (6.15-11.3)	9.29 (6.87-13.5)	10.8 (7.35-15.5)	13.2 (8.66-19.6)	15.3 (9.87-23.3)
3-day	3.10 (2.46-3.91)	3.91 (3.10-4.93)	5.23 (4.13-6.62)	6.33 (4.96-8.05)	7.84 (6.01-10.5)	8.93 (6.74-12.3)	10.2 (7.54-14.7)	11.8 (8.07-17.0)	14.5 (9.54-21.5)	16.9 (10.9-25.5)
4-day	3.34 (2.65-4.20)	4.20 (3.33-5.28)	5.61 (4.43-7.08)	6.78 (5.33-8.60)	8.38 (6.44-11.2)	9.55 (7.22-13.2)	10.9 (8.07-15.7)	12.6 (8.63-18.1)	15.5 (10.2-22.9)	18.0 (11.6-27.2)
7-day	3.98 (3.17-4.98)	4.95 (3.94-6.20)	6.54 (5.19-8.22)	7.86 (6.20-9.93)	9.67 (7.45-12.9)	11.0 (8.33-15.0)	12.5 (9.27-17.9)	14.4 (9.89-20.5)	17.5 (11.6-25.8)	20.3 (13.2-30.5)
10-day	4.62 (3.69-5.77)	5.65 (4.51-7.06)	7.34 (5.84-9.20)	8.74 (6.91-11.0)	10.7 (8.22-14.1)	12.1 (9.15-16.4)	13.6 (10.1-19.4)	15.6 (10.8-22.2)	18.8 (12.5-27.6)	21.7 (14.0-32.3)
20-day	6.65 (5.35-8.25)	7.74 (6.22-9.62)	9.54 (7.63-11.9)	11.0 (8.77-13.8)	13.1 (10.1-17.1)	14.6 (11.0-19.5)	16.2 (12.0-22.5)	18.2 (12.6-25.6)	21.1 (14.1-30.7)	23.6 (15.4-35.0)
30-day	8.38 (6.76-10.4)	9.50 (7.65-11.8)	11.3 (9.10-14.1)	12.9 (10.3-16.1)	14.9 (11.5-19.4)	16.5 (12.5-21.9)	18.2 (13.3-24.9)	20.0 (13.9-28.0)	22.6 (15.1-32.8)	24.8 (16.1-36.6)
45-day	10.6 (8.54-13.0)	11.7 (9.46-14.5)	13.6 (10.9-16.8)	15.2 (12.1-18.9)	17.3 (13.4-22.3)	19.0 (14.3-24.9)	20.6 (15.0-27.8)	22.3 (15.6-31.1)	24.5 (16.5-35.4)	26.2 (17.1-38.6)
60-day	12.4 (10.0-15.2)	13.6 (11.0-16.7)	15.5 (12.5-19.2)	17.1 (13.7-21.3)	19.3 (15.0-24.8)	21.1 (15.9-27.5)	22.8 (16.5-30.4)	24.3 (17.0-33.8)	26.3 (17.7-37.8)	27.6 (18.1-40.6)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



NOAA Atlas 14, Volume 10, Version 3
Location name: South Windsor, Connecticut, USA*
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POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.03 (3.10-5.24)	4.88 (3.74-6.36)	6.28 (4.79-8.21)	7.43 (5.64-9.77)	9.01 (6.66-12.4)	10.2 (7.39-14.4)	11.5 (8.09-16.7)	12.9 (8.62-19.2)	14.9 (9.65-23.0)	16.6 (10.5-26.1)
10-min	2.86 (2.19-3.72)	3.46 (2.65-4.51)	4.44 (3.40-5.81)	5.26 (4.00-6.91)	6.38 (4.72-8.78)	7.23 (5.24-10.2)	8.12 (5.73-11.8)	9.12 (6.11-13.6)	10.6 (6.83-16.3)	11.7 (7.43-18.5)
15-min	2.24 (1.72-2.92)	2.71 (2.08-3.54)	3.48 (2.66-4.56)	4.12 (3.14-5.43)	5.01 (3.70-6.89)	5.67 (4.11-7.97)	6.37 (4.50-9.28)	7.15 (4.80-10.7)	8.28 (5.36-12.8)	9.21 (5.83-14.5)
30-min	1.51 (1.16-1.96)	1.83 (1.40-2.39)	2.36 (1.80-3.08)	2.80 (2.13-3.68)	3.40 (2.51-4.67)	3.85 (2.79-5.41)	4.33 (3.05-6.31)	4.86 (3.26-7.24)	5.63 (3.64-8.68)	6.26 (3.96-9.85)
60-min	0.948 (0.727-1.23)	1.15 (0.883-1.50)	1.49 (1.14-1.94)	1.76 (1.34-2.32)	2.15 (1.58-2.95)	2.44 (1.76-3.42)	2.74 (1.93-3.99)	3.08 (2.06-4.58)	3.56 (2.30-5.49)	3.96 (2.51-6.23)
2-hr	0.610 (0.471-0.791)	0.738 (0.568-0.957)	0.946 (0.727-1.23)	1.12 (0.855-1.46)	1.36 (1.01-1.86)	1.53 (1.12-2.15)	1.72 (1.23-2.52)	1.95 (1.31-2.89)	2.29 (1.48-3.50)	2.57 (1.63-4.02)
3-hr	0.468 (0.362-0.605)	0.565 (0.437-0.731)	0.724 (0.558-0.939)	0.856 (0.656-1.12)	1.04 (0.774-1.42)	1.17 (0.859-1.64)	1.32 (0.945-1.92)	1.50 (1.01-2.21)	1.77 (1.15-2.70)	2.00 (1.27-3.11)
6-hr	0.295 (0.229-0.379)	0.358 (0.278-0.460)	0.460 (0.356-0.594)	0.545 (0.420-0.707)	0.662 (0.497-0.903)	0.748 (0.552-1.05)	0.843 (0.609-1.23)	0.960 (0.649-1.41)	1.14 (0.745-1.74)	1.30 (0.830-2.01)
12-hr	0.180 (0.141-0.230)	0.220 (0.172-0.282)	0.287 (0.223-0.368)	0.342 (0.264-0.441)	0.417 (0.315-0.566)	0.473 (0.351-0.657)	0.534 (0.388-0.775)	0.610 (0.414-0.891)	0.730 (0.477-1.10)	0.834 (0.534-1.28)
24-hr	0.106 (0.083-0.134)	0.131 (0.103-0.167)	0.173 (0.135-0.221)	0.208 (0.162-0.267)	0.256 (0.194-0.346)	0.291 (0.217-0.403)	0.329 (0.241-0.477)	0.379 (0.258-0.550)	0.457 (0.300-0.686)	0.526 (0.338-0.804)
2-day	0.059 (0.047-0.075)	0.075 (0.059-0.095)	0.100 (0.079-0.127)	0.121 (0.094-0.154)	0.149 (0.114-0.201)	0.170 (0.128-0.236)	0.194 (0.143-0.281)	0.224 (0.153-0.324)	0.275 (0.180-0.409)	0.319 (0.206-0.484)
3-day	0.043 (0.034-0.054)	0.054 (0.043-0.069)	0.073 (0.057-0.092)	0.088 (0.069-0.112)	0.109 (0.083-0.146)	0.124 (0.094-0.171)	0.141 (0.105-0.205)	0.164 (0.112-0.236)	0.201 (0.132-0.299)	0.234 (0.151-0.354)
4-day	0.035 (0.028-0.044)	0.044 (0.035-0.055)	0.058 (0.046-0.074)	0.071 (0.055-0.090)	0.087 (0.067-0.117)	0.099 (0.075-0.137)	0.113 (0.084-0.163)	0.131 (0.090-0.188)	0.161 (0.106-0.239)	0.188 (0.121-0.283)
7-day	0.024 (0.019-0.030)	0.029 (0.023-0.037)	0.039 (0.031-0.049)	0.047 (0.037-0.059)	0.058 (0.044-0.077)	0.065 (0.050-0.089)	0.074 (0.055-0.106)	0.086 (0.059-0.122)	0.104 (0.069-0.154)	0.121 (0.078-0.181)
10-day	0.019 (0.015-0.024)	0.024 (0.019-0.029)	0.031 (0.024-0.038)	0.036 (0.029-0.046)	0.044 (0.034-0.059)	0.050 (0.038-0.068)	0.057 (0.042-0.081)	0.065 (0.045-0.093)	0.078 (0.052-0.115)	0.090 (0.059-0.135)
20-day	0.014 (0.011-0.017)	0.016 (0.013-0.020)	0.020 (0.016-0.025)	0.023 (0.018-0.029)	0.027 (0.021-0.036)	0.030 (0.023-0.041)	0.034 (0.025-0.047)	0.038 (0.026-0.053)	0.044 (0.029-0.064)	0.049 (0.032-0.073)
30-day	0.012 (0.009-0.014)	0.013 (0.011-0.016)	0.016 (0.013-0.020)	0.018 (0.014-0.022)	0.021 (0.016-0.027)	0.023 (0.017-0.030)	0.025 (0.018-0.035)	0.028 (0.019-0.039)	0.031 (0.021-0.045)	0.034 (0.022-0.051)
45-day	0.010 (0.008-0.012)	0.011 (0.009-0.013)	0.013 (0.010-0.016)	0.014 (0.011-0.017)	0.016 (0.012-0.021)	0.018 (0.013-0.023)	0.019 (0.014-0.026)	0.021 (0.014-0.029)	0.023 (0.015-0.033)	0.024 (0.016-0.036)
60-day	0.009 (0.007-0.011)	0.009 (0.008-0.012)	0.011 (0.009-0.013)	0.012 (0.010-0.015)	0.013 (0.010-0.017)	0.015 (0.011-0.019)	0.016 (0.011-0.021)	0.017 (0.012-0.023)	0.018 (0.012-0.026)	0.019 (0.013-0.028)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Soil Map—State of Connecticut (Maskel Rd Extension)



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: State of Connecticut

Survey Area Data: Version 18, Dec 6, 2018

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

Date(s) aerial images were photographed: Aug 27, 2016—Oct 30, 2017

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
6	Wilbraham and Menlo soils, 0 to 8 percent slopes, extremely stony	0.0	0.1%
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	0.4	3.4%
54B	Wapping very fine sandy loam, 2 to 8 percent slopes, very stony	6.2	51.7%
66B	Narragansett silt loam, 2 to 8 percent slopes	3.9	32.1%
67B	Narragansett silt loam, 3 to 8 percent slopes, very stony	1.5	12.7%
Totals for Area of Interest		12.1	100.0%

State of Connecticut

66B—Narragansett silt loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lq3

Elevation: 0 to 1,200 feet

Mean annual precipitation: 43 to 54 inches

Mean annual air temperature: 45 to 55 degrees F

Frost-free period: 140 to 185 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Narragansett and similar soils: 80 percent

Minor components: 20 percent

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

Description of Narragansett

Setting

Landform: Hills, till plains

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam

Bw1 - 6 to 15 inches: silt loam

Bw2 - 15 to 24 inches: silt loam

Bw3 - 24 to 28 inches: gravelly silt loam

2C - 28 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Broadbrook

Percent of map unit: 5 percent
Landform: Drumlins, hills, till plains
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Leicester

Percent of map unit: 3 percent
Landform: Depressions, drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Unnamed, red parent material

Percent of map unit: 2 percent
Hydric soil rating: No

Canton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Wapping

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sutton

Percent of map unit: 1 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 18, Dec 6, 2018

State of Connecticut

53A—Wapping very fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9lp6

Elevation: 0 to 1,200 feet

Mean annual precipitation: 43 to 54 inches

Mean annual air temperature: 45 to 55 degrees F

Frost-free period: 140 to 185 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Wapping and similar soils: 80 percent

Minor components: 20 percent

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

Description of Wapping

Setting

Landform: Hills, till plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or sandstone and shale

Typical profile

Ap - 0 to 11 inches: very fine sandy loam

Bw1 - 11 to 16 inches: very fine sandy loam

Bw2 - 16 to 20 inches: very fine sandy loam

2C1 - 20 to 28 inches: gravelly sandy loam

2C2 - 28 to 36 inches: gravelly loamy sand

2C3 - 36 to 80 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Moderately well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Narragansett

Percent of map unit: 5 percent

Landform: Hills, till plains

Down-slope shape: Linear

Across-slope shape: Convex

Hydric soil rating: No

Leicester

Percent of map unit: 5 percent

Landform: Depressions, drainageways

Down-slope shape: Linear

Across-slope shape: Concave

Hydric soil rating: Yes

Wilbraham

Percent of map unit: 3 percent

Landform: Depressions, drainageways

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Menlo

Percent of map unit: 3 percent

Landform: Depressions, drainageways

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Ludlow

Percent of map unit: 2 percent

Landform: Drumlins, hills

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Watchaug

Percent of map unit: 2 percent

Landform: Hills, till plains

Down-slope shape: Linear

Across-slope shape: Concave

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Connecticut

Survey Area Data: Version 18, Dec 6, 2018

State of Connecticut

6—Wilbraham and Menlo soils, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2wh25

Elevation: 0 to 790 feet

Mean annual precipitation: 36 to 53 inches

Mean annual air temperature: 41 to 54 degrees F

Frost-free period: 140 to 220 days

Farmland classification: Not prime farmland

Map Unit Composition

Wilbraham, extremely stony, and similar soils: 60 percent

Menlo, extremely stony, and similar soils: 30 percent

Minor components: 10 percent

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

Description of Wilbraham, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills, drainageways, depressions

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Red coarse-loamy lodgment till derived from basalt and/or sandstone and shale

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

Ap - 2 to 10 inches: silt loam

Bw1 - 10 to 21 inches: silt loam

Bw2 - 21 to 27 inches: silt loam

Cd - 27 to 63 inches: gravelly loam

Properties and qualities

Slope: 0 to 8 percent

Percent of area covered with surface fragments: 9.0 percent

Depth to restrictive feature: 16 to 35 inches to densic material

Natural drainage class: Poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 0 to 10 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C/D

Hydric soil rating: Yes

Description of Menlo, Extremely Stony

Setting

Landform: Drainageways, depressions

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Coarse-loamy lodgment till derived from basalt and/or sandstone and shale

Typical profile

Oa - 0 to 5 inches: highly decomposed plant material

A - 5 to 16 inches: mucky silt loam

Bg1 - 16 to 22 inches: flaggy very fine sandy loam

Bg2 - 22 to 27 inches: flaggy fine sandy loam

Cd1 - 27 to 40 inches: fine sandy loam

Cd2 - 40 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Percent of area covered with surface fragments: 9.0 percent

Depth to restrictive feature: 20 to 36 inches to densic material

Natural drainage class: Very poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C/D

Hydric soil rating: Yes

Minor Components

Watchaug

Percent of map unit: 5 percent

Landform: Ground moraines, hills

Landform position (two-dimensional): Backslope, footslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Concave

Hydric soil rating: No

Ludlow

Percent of map unit: 5 percent

Landform: Hills, drumlins

Landform position (two-dimensional): Summit, footslope,
backslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Concave

Across-slope shape: Linear

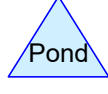
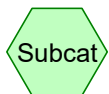
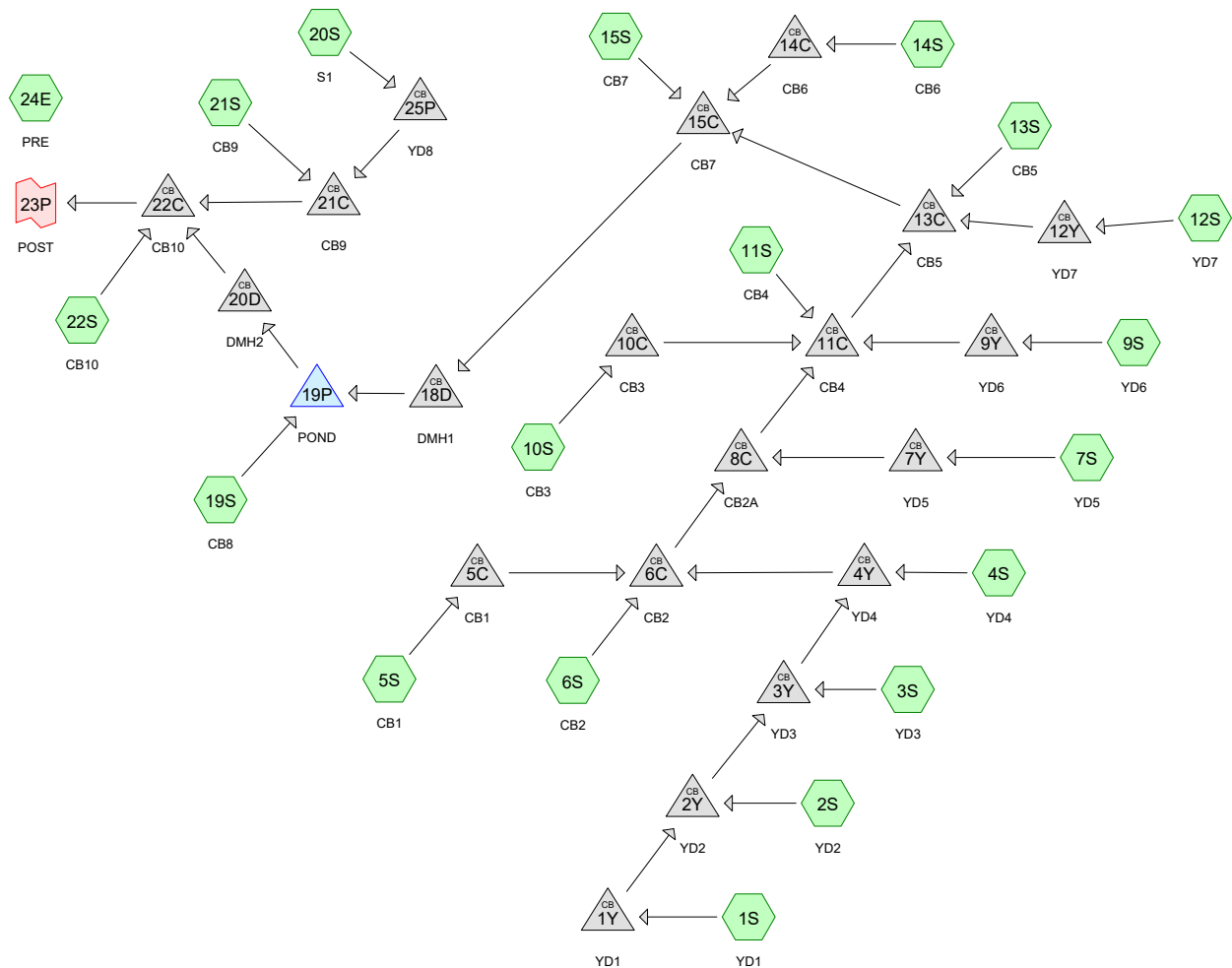
Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Connecticut

Survey Area Data: Version 18, Dec 6, 2018

D - HydroCAD Pre & Post Analysis



Routing Diagram for 2019-022 Mannarino Maskel Rd Rev2
 Prepared by J.R. Russo & Associates LLC, Printed 10/5/2020
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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment 1S: YD1	Runoff Area=27,059 sf 7.56% Impervious Runoff Depth>0.70" Tc=10.0 min CN=68 Runoff=0.38 cfs 0.036 af
Subcatchment 2S: YD2	Runoff Area=16,406 sf 10.73% Impervious Runoff Depth>0.75" Tc=10.0 min CN=69 Runoff=0.25 cfs 0.024 af
Subcatchment 3S: YD3	Runoff Area=13,889 sf 10.73% Impervious Runoff Depth>0.80" Tc=10.0 min CN=70 Runoff=0.23 cfs 0.021 af
Subcatchment 4S: YD4	Runoff Area=17,012 sf 10.35% Impervious Runoff Depth>0.80" Tc=10.0 min CN=70 Runoff=0.28 cfs 0.026 af
Subcatchment 5S: CB1	Runoff Area=9,776 sf 77.99% Impervious Runoff Depth>2.21" Tc=5.0 min CN=91 Runoff=0.58 cfs 0.041 af
Subcatchment 6S: CB2	Runoff Area=9,591 sf 87.33% Impervious Runoff Depth>2.49" Tc=5.0 min CN=94 Runoff=0.62 cfs 0.046 af
Subcatchment 7S: YD5	Runoff Area=14,542 sf 12.10% Impervious Runoff Depth>0.85" Tc=10.0 min CN=71 Runoff=0.26 cfs 0.024 af
Subcatchment 9S: YD6	Runoff Area=12,265 sf 14.35% Impervious Runoff Depth>0.85" Tc=10.0 min CN=71 Runoff=0.22 cfs 0.020 af
Subcatchment 10S: CB3	Runoff Area=6,516 sf 76.78% Impervious Runoff Depth>2.21" Tc=5.0 min CN=91 Runoff=0.38 cfs 0.028 af
Subcatchment 11S: CB4	Runoff Area=6,458 sf 87.27% Impervious Runoff Depth>2.49" Tc=5.0 min CN=94 Runoff=0.42 cfs 0.031 af
Subcatchment 12S: YD7	Runoff Area=9,516 sf 12.44% Impervious Runoff Depth>0.85" Tc=10.0 min CN=71 Runoff=0.17 cfs 0.015 af
Subcatchment 13S: CB5	Runoff Area=3,958 sf 88.30% Impervious Runoff Depth>2.49" Tc=5.0 min CN=94 Runoff=0.26 cfs 0.019 af
Subcatchment 14S: CB6	Runoff Area=3,854 sf 100.00% Impervious Runoff Depth>2.92" Tc=5.0 min CN=98 Runoff=0.27 cfs 0.022 af
Subcatchment 15S: CB7	Runoff Area=14,686 sf 46.59% Impervious Runoff Depth>1.43" Tc=5.0 min CN=81 Runoff=0.56 cfs 0.040 af
Subcatchment 19S: CB8	Runoff Area=167,630 sf 7.66% Impervious Runoff Depth>0.75" Flow Length=539' Tc=13.3 min CN=69 Runoff=2.30 cfs 0.240 af
Subcatchment 20S: S1	Runoff Area=13,461 sf 0.00% Impervious Runoff Depth>0.57" Tc=10.0 min CN=65 Runoff=0.14 cfs 0.015 af

2019-022 Mannarino Maskel Rd Rev2*Type III 24-hr 2-Year Rainfall=3.15"*

Prepared by J.R. Russo & Associates LLC

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Subcatchment 21S: CB9	Runoff Area=4,083 sf 100.00% Impervious Runoff Depth>2.92" Tc=5.0 min CN=98 Runoff=0.29 cfs 0.023 af
Subcatchment 22S: CB10	Runoff Area=7,740 sf 69.25% Impervious Runoff Depth>1.95" Tc=5.0 min CN=88 Runoff=0.41 cfs 0.029 af
Subcatchment 24E: PRE	Runoff Area=358,442 sf 0.00% Impervious Runoff Depth>0.42" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=1.43 cfs 0.287 af
Pond 1Y: YD1	Peak Elev=306.33' Inflow=0.38 cfs 0.036 af 12.0" Round Culvert n=0.010 L=92.0' S=0.0054 '/' Outflow=0.38 cfs 0.036 af
Pond 2Y: YD2	Peak Elev=305.89' Inflow=0.61 cfs 0.060 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=0.61 cfs 0.060 af
Pond 3Y: YD3	Peak Elev=304.95' Inflow=0.80 cfs 0.081 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=0.80 cfs 0.081 af
Pond 4Y: YD4	Peak Elev=303.79' Inflow=1.01 cfs 0.107 af 15.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=1.01 cfs 0.107 af
Pond 5C: CB1	Peak Elev=305.47' Inflow=0.58 cfs 0.041 af 15.0" Round Culvert n=0.010 L=26.0' S=0.0077 '/' Outflow=0.58 cfs 0.041 af
Pond 6C: CB2	Peak Elev=303.59' Inflow=1.51 cfs 0.194 af 15.0" Round Culvert n=0.010 L=86.0' S=0.0266 '/' Outflow=1.51 cfs 0.194 af
Pond 7Y: YD5	Peak Elev=301.69' Inflow=0.26 cfs 0.024 af 8.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.26 cfs 0.024 af
Pond 8C: CB2A	Peak Elev=301.36' Inflow=1.77 cfs 0.217 af 15.0" Round Culvert n=0.010 L=94.0' S=0.0267 '/' Outflow=1.77 cfs 0.217 af
Pond 9Y: YD6	Peak Elev=299.27' Inflow=0.22 cfs 0.020 af 8.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=0.22 cfs 0.020 af
Pond 10C: CB3	Peak Elev=301.29' Inflow=0.38 cfs 0.028 af 15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.38 cfs 0.028 af
Pond 11C: CB4	Peak Elev=298.98' Inflow=2.43 cfs 0.295 af 15.0" Round Culvert n=0.010 L=63.0' S=0.0143 '/' Outflow=2.43 cfs 0.295 af
Pond 12Y: YD7	Peak Elev=298.24' Inflow=0.17 cfs 0.015 af 8.0" Round Culvert n=0.010 L=33.0' S=0.0061 '/' Outflow=0.17 cfs 0.015 af
Pond 13C: CB5	Peak Elev=297.76' Inflow=2.69 cfs 0.329 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0067 '/' Outflow=2.69 cfs 0.329 af
Pond 14C: CB6	Peak Elev=296.40' Inflow=0.27 cfs 0.021 af 18.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.27 cfs 0.021 af

2019-022 Mannarino Maskel Rd Rev2*Type III 24-hr 2-Year Rainfall=3.15"*

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Pond 15C: CB7

Peak Elev=296.39' Inflow=3.05 cfs 0.390 af
18.0" Round Culvert n=0.010 L=116.0' S=0.0073 '/' Outflow=3.05 cfs 0.390 af

Pond 18D: DMH1

Peak Elev=295.60' Inflow=3.05 cfs 0.390 af
18.0" Round Culvert n=0.010 L=23.0' S=0.0087 '/' Outflow=3.05 cfs 0.390 af

Pond 19P: POND

Peak Elev=295.31' Storage=19,857 cf Inflow=4.77 cfs 0.630 af
Outflow=0.99 cfs 0.503 af

Pond 20D: DMH2

Peak Elev=289.47' Inflow=0.99 cfs 0.502 af
15.0" Round Culvert n=0.010 L=248.0' S=0.0125 '/' Outflow=0.99 cfs 0.502 af

Pond 21C: CB9

Peak Elev=286.44' Inflow=0.34 cfs 0.038 af
15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.34 cfs 0.038 af

Pond 22C: CB10

Peak Elev=286.43' Inflow=1.07 cfs 0.567 af
15.0" Round Culvert n=0.010 L=31.0' S=0.0065 '/' Outflow=1.07 cfs 0.567 af

Pond 25P: YD8

Peak Elev=286.52' Inflow=0.14 cfs 0.015 af
12.0" Round Culvert n=0.010 L=6.0' S=0.0333 '/' Outflow=0.14 cfs 0.015 af

Link 23P: POST

Inflow=1.07 cfs 0.566 af
Primary=1.07 cfs 0.566 af

Total Runoff Area = 16.457 ac Runoff Volume = 0.985 af Average Runoff Depth = 0.72"
89.56% Pervious = 14.739 ac 10.44% Impervious = 1.719 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment 1S: YD1	Runoff Area=27,059 sf 7.56% Impervious Runoff Depth>1.87" Tc=10.0 min CN=68 Runoff=1.14 cfs 0.097 af
Subcatchment 2S: YD2	Runoff Area=16,406 sf 10.73% Impervious Runoff Depth>1.95" Tc=10.0 min CN=69 Runoff=0.73 cfs 0.061 af
Subcatchment 3S: YD3	Runoff Area=13,889 sf 10.73% Impervious Runoff Depth>2.02" Tc=10.0 min CN=70 Runoff=0.64 cfs 0.054 af
Subcatchment 4S: YD4	Runoff Area=17,012 sf 10.35% Impervious Runoff Depth>2.02" Tc=10.0 min CN=70 Runoff=0.79 cfs 0.066 af
Subcatchment 5S: CB1	Runoff Area=9,776 sf 77.99% Impervious Runoff Depth>3.97" Tc=5.0 min CN=91 Runoff=1.01 cfs 0.074 af
Subcatchment 6S: CB2	Runoff Area=9,591 sf 87.33% Impervious Runoff Depth>4.30" Tc=5.0 min CN=94 Runoff=1.04 cfs 0.079 af
Subcatchment 7S: YD5	Runoff Area=14,542 sf 12.10% Impervious Runoff Depth>2.10" Tc=10.0 min CN=71 Runoff=0.70 cfs 0.059 af
Subcatchment 9S: YD6	Runoff Area=12,265 sf 14.35% Impervious Runoff Depth>2.10" Tc=10.0 min CN=71 Runoff=0.59 cfs 0.049 af
Subcatchment 10S: CB3	Runoff Area=6,516 sf 76.78% Impervious Runoff Depth>3.97" Tc=5.0 min CN=91 Runoff=0.67 cfs 0.049 af
Subcatchment 11S: CB4	Runoff Area=6,458 sf 87.27% Impervious Runoff Depth>4.30" Tc=5.0 min CN=94 Runoff=0.70 cfs 0.053 af
Subcatchment 12S: YD7	Runoff Area=9,516 sf 12.44% Impervious Runoff Depth>2.10" Tc=10.0 min CN=71 Runoff=0.46 cfs 0.038 af
Subcatchment 13S: CB5	Runoff Area=3,958 sf 88.30% Impervious Runoff Depth>4.30" Tc=5.0 min CN=94 Runoff=0.43 cfs 0.033 af
Subcatchment 14S: CB6	Runoff Area=3,854 sf 100.00% Impervious Runoff Depth>4.75" Tc=5.0 min CN=98 Runoff=0.43 cfs 0.035 af
Subcatchment 15S: CB7	Runoff Area=14,686 sf 46.59% Impervious Runoff Depth>2.97" Tc=5.0 min CN=81 Runoff=1.18 cfs 0.084 af
Subcatchment 19S: CB8	Runoff Area=167,630 sf 7.66% Impervious Runoff Depth>1.94" Flow Length=539' Tc=13.3 min CN=69 Runoff=6.72 cfs 0.624 af
Subcatchment 20S: S1	Runoff Area=13,461 sf 0.00% Impervious Runoff Depth>1.64" Tc=10.0 min CN=65 Runoff=0.49 cfs 0.042 af

2019-022 Mannarino Maskel Rd Rev2*Type III 24-hr 10-Year Rainfall=4.99"*

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Subcatchment 21S: CB9	Runoff Area=4,083 sf 100.00% Impervious Runoff Depth>4.75" Tc=5.0 min CN=98 Runoff=0.46 cfs 0.037 af
Subcatchment 22S: CB10	Runoff Area=7,740 sf 69.25% Impervious Runoff Depth>3.66" Tc=5.0 min CN=88 Runoff=0.75 cfs 0.054 af
Subcatchment 24E: PRE	Runoff Area=358,442 sf 0.00% Impervious Runoff Depth>1.35" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=6.22 cfs 0.925 af
Pond 1Y: YD1	Peak Elev=306.64' Inflow=1.14 cfs 0.097 af 12.0" Round Culvert n=0.010 L=92.0' S=0.0054 '/' Outflow=1.14 cfs 0.097 af
Pond 2Y: YD2	Peak Elev=306.24' Inflow=1.81 cfs 0.158 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=1.81 cfs 0.158 af
Pond 3Y: YD3	Peak Elev=305.38' Inflow=2.36 cfs 0.211 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=2.36 cfs 0.211 af
Pond 4Y: YD4	Peak Elev=304.32' Inflow=2.93 cfs 0.277 af 15.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=2.93 cfs 0.277 af
Pond 5C: CB1	Peak Elev=305.61' Inflow=1.01 cfs 0.074 af 15.0" Round Culvert n=0.010 L=26.0' S=0.0077 '/' Outflow=1.01 cfs 0.074 af
Pond 6C: CB2	Peak Elev=304.04' Inflow=3.77 cfs 0.430 af 15.0" Round Culvert n=0.010 L=86.0' S=0.0266 '/' Outflow=3.77 cfs 0.430 af
Pond 7Y: YD5	Peak Elev=302.00' Inflow=0.70 cfs 0.059 af 8.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.70 cfs 0.059 af
Pond 8C: CB2A	Peak Elev=301.84' Inflow=4.24 cfs 0.488 af 15.0" Round Culvert n=0.010 L=94.0' S=0.0267 '/' Outflow=4.24 cfs 0.488 af
Pond 9Y: YD6	Peak Elev=299.72' Inflow=0.59 cfs 0.049 af 8.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=0.59 cfs 0.049 af
Pond 10C: CB3	Peak Elev=301.40' Inflow=0.67 cfs 0.049 af 15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.67 cfs 0.049 af
Pond 11C: CB4	Peak Elev=299.66' Inflow=5.39 cfs 0.639 af 15.0" Round Culvert n=0.010 L=63.0' S=0.0143 '/' Outflow=5.39 cfs 0.639 af
Pond 12Y: YD7	Peak Elev=298.43' Inflow=0.46 cfs 0.038 af 8.0" Round Culvert n=0.010 L=33.0' S=0.0061 '/' Outflow=0.46 cfs 0.038 af
Pond 13C: CB5	Peak Elev=298.26' Inflow=5.98 cfs 0.710 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0067 '/' Outflow=5.98 cfs 0.710 af
Pond 14C: CB6	Peak Elev=297.05' Inflow=0.43 cfs 0.035 af 18.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.43 cfs 0.035 af

2019-022 Mannarino Maskel Rd Rev2*Type III 24-hr 10-Year Rainfall=4.99"*

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Pond 15C: CB7

Peak Elev=297.05' Inflow=6.63 cfs 0.828 af
18.0" Round Culvert n=0.010 L=116.0' S=0.0073 '/' Outflow=6.63 cfs 0.828 af

Pond 18D: DMH1

Peak Elev=296.52' Inflow=6.63 cfs 0.827 af
18.0" Round Culvert n=0.010 L=23.0' S=0.0087 '/' Outflow=6.63 cfs 0.827 af

Pond 19P: POND

Peak Elev=296.24' Storage=32,400 cf Inflow=11.40 cfs 1.449 af
Outflow=4.96 cfs 1.282 af

Pond 20D: DMH2

Peak Elev=290.33' Inflow=4.96 cfs 1.281 af
15.0" Round Culvert n=0.010 L=248.0' S=0.0125 '/' Outflow=4.96 cfs 1.281 af

Pond 21C: CB9

Peak Elev=287.39' Inflow=0.75 cfs 0.079 af
15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.75 cfs 0.079 af

Pond 22C: CB10

Peak Elev=287.39' Inflow=5.18 cfs 1.413 af
15.0" Round Culvert n=0.010 L=31.0' S=0.0065 '/' Outflow=5.18 cfs 1.413 af

Pond 25P: YD8

Peak Elev=287.39' Inflow=0.49 cfs 0.042 af
12.0" Round Culvert n=0.010 L=6.0' S=0.0333 '/' Outflow=0.49 cfs 0.042 af

Link 23P: POST

Inflow=5.18 cfs 1.411 af
Primary=5.18 cfs 1.411 af

Total Runoff Area = 16.457 ac Runoff Volume = 2.513 af Average Runoff Depth = 1.83"
89.56% Pervious = 14.739 ac 10.44% Impervious = 1.719 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment 1S: YD1	Runoff Area=27,059 sf 7.56% Impervious Runoff Depth>2.72" Tc=10.0 min CN=68 Runoff=1.69 cfs 0.141 af
Subcatchment 2S: YD2	Runoff Area=16,406 sf 10.73% Impervious Runoff Depth>2.81" Tc=10.0 min CN=69 Runoff=1.07 cfs 0.088 af
Subcatchment 3S: YD3	Runoff Area=13,889 sf 10.73% Impervious Runoff Depth>2.90" Tc=10.0 min CN=70 Runoff=0.93 cfs 0.077 af
Subcatchment 4S: YD4	Runoff Area=17,012 sf 10.35% Impervious Runoff Depth>2.90" Tc=10.0 min CN=70 Runoff=1.14 cfs 0.094 af
Subcatchment 5S: CB1	Runoff Area=9,776 sf 77.99% Impervious Runoff Depth>5.08" Tc=5.0 min CN=91 Runoff=1.27 cfs 0.095 af
Subcatchment 6S: CB2	Runoff Area=9,591 sf 87.33% Impervious Runoff Depth>5.42" Tc=5.0 min CN=94 Runoff=1.29 cfs 0.099 af
Subcatchment 7S: YD5	Runoff Area=14,542 sf 12.10% Impervious Runoff Depth>3.00" Tc=10.0 min CN=71 Runoff=1.01 cfs 0.083 af
Subcatchment 9S: YD6	Runoff Area=12,265 sf 14.35% Impervious Runoff Depth>3.00" Tc=10.0 min CN=71 Runoff=0.85 cfs 0.070 af
Subcatchment 10S: CB3	Runoff Area=6,516 sf 76.78% Impervious Runoff Depth>5.08" Tc=5.0 min CN=91 Runoff=0.85 cfs 0.063 af
Subcatchment 11S: CB4	Runoff Area=6,458 sf 87.27% Impervious Runoff Depth>5.42" Tc=5.0 min CN=94 Runoff=0.87 cfs 0.067 af
Subcatchment 12S: YD7	Runoff Area=9,516 sf 12.44% Impervious Runoff Depth>3.00" Tc=10.0 min CN=71 Runoff=0.66 cfs 0.055 af
Subcatchment 13S: CB5	Runoff Area=3,958 sf 88.30% Impervious Runoff Depth>5.42" Tc=5.0 min CN=94 Runoff=0.53 cfs 0.041 af
Subcatchment 14S: CB6	Runoff Area=3,854 sf 100.00% Impervious Runoff Depth>5.89" Tc=5.0 min CN=98 Runoff=0.54 cfs 0.043 af
Subcatchment 15S: CB7	Runoff Area=14,686 sf 46.59% Impervious Runoff Depth>4.00" Tc=5.0 min CN=81 Runoff=1.58 cfs 0.112 af
Subcatchment 19S: CB8	Runoff Area=167,630 sf 7.66% Impervious Runoff Depth>2.81" Flow Length=539' Tc=13.3 min CN=69 Runoff=9.88 cfs 0.900 af
Subcatchment 20S: S1	Runoff Area=13,461 sf 0.00% Impervious Runoff Depth>2.44" Tc=10.0 min CN=65 Runoff=0.75 cfs 0.063 af

Subcatchment 21S: CB9	Runoff Area=4,083 sf 100.00% Impervious Runoff Depth>5.89" Tc=5.0 min CN=98 Runoff=0.57 cfs 0.046 af
Subcatchment 22S: CB10	Runoff Area=7,740 sf 69.25% Impervious Runoff Depth>4.75" Tc=5.0 min CN=88 Runoff=0.96 cfs 0.070 af
Subcatchment 24E: PRE	Runoff Area=358,442 sf 0.00% Impervious Runoff Depth>2.07" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=10.03 cfs 1.422 af
Pond 1Y: YD1	Peak Elev=306.85' Inflow=1.69 cfs 0.140 af 12.0" Round Culvert n=0.010 L=92.0' S=0.0054 '/' Outflow=1.69 cfs 0.140 af
Pond 2Y: YD2	Peak Elev=306.49' Inflow=2.68 cfs 0.228 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=2.68 cfs 0.228 af
Pond 3Y: YD3	Peak Elev=305.84' Inflow=3.47 cfs 0.305 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=3.47 cfs 0.305 af
Pond 4Y: YD4	Peak Elev=304.90' Inflow=4.30 cfs 0.400 af 15.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=4.30 cfs 0.400 af
Pond 5C: CB1	Peak Elev=305.68' Inflow=1.27 cfs 0.095 af 15.0" Round Culvert n=0.010 L=26.0' S=0.0077 '/' Outflow=1.27 cfs 0.095 af
Pond 6C: CB2	Peak Elev=304.45' Inflow=5.36 cfs 0.594 af 15.0" Round Culvert n=0.010 L=86.0' S=0.0266 '/' Outflow=5.36 cfs 0.594 af
Pond 7Y: YD5	Peak Elev=302.52' Inflow=1.01 cfs 0.083 af 8.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=1.01 cfs 0.083 af
Pond 8C: CB2A	Peak Elev=302.37' Inflow=6.01 cfs 0.677 af 15.0" Round Culvert n=0.010 L=94.0' S=0.0267 '/' Outflow=6.01 cfs 0.677 af
Pond 9Y: YD6	Peak Elev=300.52' Inflow=0.85 cfs 0.070 af 8.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=0.85 cfs 0.070 af
Pond 10C: CB3	Peak Elev=301.46' Inflow=0.85 cfs 0.063 af 15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.85 cfs 0.063 af
Pond 11C: CB4	Peak Elev=300.44' Inflow=7.44 cfs 0.877 af 15.0" Round Culvert n=0.010 L=63.0' S=0.0143 '/' Outflow=7.44 cfs 0.877 af
Pond 12Y: YD7	Peak Elev=299.39' Inflow=0.66 cfs 0.055 af 8.0" Round Culvert n=0.010 L=33.0' S=0.0061 '/' Outflow=0.66 cfs 0.055 af
Pond 13C: CB5	Peak Elev=299.37' Inflow=8.23 cfs 0.972 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0067 '/' Outflow=8.23 cfs 0.972 af
Pond 14C: CB6	Peak Elev=298.36' Inflow=0.54 cfs 0.043 af 18.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.54 cfs 0.043 af

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Pond 15C: CB7

Peak Elev=298.36' Inflow=9.05 cfs 1.127 af
18.0" Round Culvert n=0.010 L=116.0' S=0.0073 '/' Outflow=9.05 cfs 1.127 af

Pond 18D: DMH1

Peak Elev=297.48' Inflow=9.05 cfs 1.126 af
18.0" Round Culvert n=0.010 L=23.0' S=0.0087 '/' Outflow=9.05 cfs 1.126 af

Pond 19P: POND

Peak Elev=296.73' Storage=39,844 cf Inflow=16.29 cfs 2.025 af
Outflow=8.38 cfs 1.837 af

Pond 20D: DMH2

Peak Elev=292.20' Inflow=8.38 cfs 1.835 af
15.0" Round Culvert n=0.010 L=248.0' S=0.0125 '/' Outflow=8.38 cfs 1.835 af

Pond 21C: CB9

Peak Elev=288.69' Inflow=1.07 cfs 0.109 af
15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=1.07 cfs 0.109 af

Pond 22C: CB10

Peak Elev=288.69' Inflow=8.70 cfs 2.012 af
15.0" Round Culvert n=0.010 L=31.0' S=0.0065 '/' Outflow=8.70 cfs 2.012 af

Pond 25P: YD8

Peak Elev=288.70' Inflow=0.75 cfs 0.063 af
12.0" Round Culvert n=0.010 L=6.0' S=0.0333 '/' Outflow=0.75 cfs 0.063 af

Link 23P: POST

Inflow=8.70 cfs 2.010 af
Primary=8.70 cfs 2.010 af

Total Runoff Area = 16.457 ac Runoff Volume = 3.632 af Average Runoff Depth = 2.65"
89.56% Pervious = 14.739 ac 10.44% Impervious = 1.719 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment 1S: YD1	Runoff Area=27,059 sf 7.56% Impervious Runoff Depth>4.14" Tc=10.0 min CN=68 Runoff=2.61 cfs 0.215 af
Subcatchment 2S: YD2	Runoff Area=16,406 sf 10.73% Impervious Runoff Depth>4.26" Tc=10.0 min CN=69 Runoff=1.63 cfs 0.134 af
Subcatchment 3S: YD3	Runoff Area=13,889 sf 10.73% Impervious Runoff Depth>4.37" Tc=10.0 min CN=70 Runoff=1.41 cfs 0.116 af
Subcatchment 4S: YD4	Runoff Area=17,012 sf 10.35% Impervious Runoff Depth>4.37" Tc=10.0 min CN=70 Runoff=1.73 cfs 0.142 af
Subcatchment 5S: CB1	Runoff Area=9,776 sf 77.99% Impervious Runoff Depth>6.82" Tc=5.0 min CN=91 Runoff=1.68 cfs 0.128 af
Subcatchment 6S: CB2	Runoff Area=9,591 sf 87.33% Impervious Runoff Depth>7.18" Tc=5.0 min CN=94 Runoff=1.69 cfs 0.132 af
Subcatchment 7S: YD5	Runoff Area=14,542 sf 12.10% Impervious Runoff Depth>4.48" Tc=10.0 min CN=71 Runoff=1.52 cfs 0.125 af
Subcatchment 9S: YD6	Runoff Area=12,265 sf 14.35% Impervious Runoff Depth>4.48" Tc=10.0 min CN=71 Runoff=1.28 cfs 0.105 af
Subcatchment 10S: CB3	Runoff Area=6,516 sf 76.78% Impervious Runoff Depth>6.82" Tc=5.0 min CN=91 Runoff=1.12 cfs 0.085 af
Subcatchment 11S: CB4	Runoff Area=6,458 sf 87.27% Impervious Runoff Depth>7.18" Tc=5.0 min CN=94 Runoff=1.14 cfs 0.089 af
Subcatchment 12S: YD7	Runoff Area=9,516 sf 12.44% Impervious Runoff Depth>4.48" Tc=10.0 min CN=71 Runoff=0.99 cfs 0.082 af
Subcatchment 13S: CB5	Runoff Area=3,958 sf 88.30% Impervious Runoff Depth>7.18" Tc=5.0 min CN=94 Runoff=0.70 cfs 0.054 af
Subcatchment 14S: CB6	Runoff Area=3,854 sf 100.00% Impervious Runoff Depth>7.66" Tc=5.0 min CN=98 Runoff=0.69 cfs 0.056 af
Subcatchment 15S: CB7	Runoff Area=14,686 sf 46.59% Impervious Runoff Depth>5.64" Tc=5.0 min CN=81 Runoff=2.20 cfs 0.159 af
Subcatchment 19S: CB8	Runoff Area=167,630 sf 7.66% Impervious Runoff Depth>4.25" Flow Length=539' Tc=13.3 min CN=69 Runoff=15.09 cfs 1.364 af
Subcatchment 20S: S1	Runoff Area=13,461 sf 0.00% Impervious Runoff Depth>3.81" Tc=10.0 min CN=65 Runoff=1.19 cfs 0.098 af

2019-022 Mannarino Maskel Rd Rev2*Type III 24-hr 100-Year Rainfall=7.90"*

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Subcatchment 21S: CB9	Runoff Area=4,083 sf 100.00% Impervious Runoff Depth>7.66" Tc=5.0 min CN=98 Runoff=0.73 cfs 0.060 af
Subcatchment 22S: CB10	Runoff Area=7,740 sf 69.25% Impervious Runoff Depth>6.47" Tc=5.0 min CN=88 Runoff=1.29 cfs 0.096 af
Subcatchment 24E: PRE	Runoff Area=358,442 sf 0.00% Impervious Runoff Depth>3.34" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=16.66 cfs 2.291 af
Pond 1Y: YD1	Peak Elev=309.20' Inflow=2.61 cfs 0.214 af 12.0" Round Culvert n=0.010 L=92.0' S=0.0054 '/' Outflow=2.61 cfs 0.214 af
Pond 2Y: YD2	Peak Elev=309.17' Inflow=4.11 cfs 0.348 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=4.11 cfs 0.348 af
Pond 3Y: YD3	Peak Elev=309.02' Inflow=5.31 cfs 0.464 af 12.0" Round Culvert n=0.010 L=89.0' S=0.0112 '/' Outflow=5.31 cfs 0.464 af
Pond 4Y: YD4	Peak Elev=308.61' Inflow=6.55 cfs 0.605 af 15.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=6.55 cfs 0.605 af
Pond 5C: CB1	Peak Elev=308.26' Inflow=1.68 cfs 0.128 af 15.0" Round Culvert n=0.010 L=26.0' S=0.0077 '/' Outflow=1.68 cfs 0.128 af
Pond 6C: CB2	Peak Elev=308.26' Inflow=7.94 cfs 0.864 af 15.0" Round Culvert n=0.010 L=86.0' S=0.0266 '/' Outflow=7.94 cfs 0.864 af
Pond 7Y: YD5	Peak Elev=307.60' Inflow=1.52 cfs 0.125 af 8.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=1.52 cfs 0.125 af
Pond 8C: CB2A	Peak Elev=307.48' Inflow=8.92 cfs 0.988 af 15.0" Round Culvert n=0.010 L=94.0' S=0.0267 '/' Outflow=8.92 cfs 0.988 af
Pond 9Y: YD6	Peak Elev=306.10' Inflow=1.28 cfs 0.105 af 8.0" Round Culvert n=0.010 L=25.0' S=0.0080 '/' Outflow=1.28 cfs 0.105 af
Pond 10C: CB3	Peak Elev=306.02' Inflow=1.12 cfs 0.085 af 15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=1.12 cfs 0.085 af
Pond 11C: CB4	Peak Elev=306.02' Inflow=10.79 cfs 1.266 af 15.0" Round Culvert n=0.010 L=63.0' S=0.0143 '/' Outflow=10.79 cfs 1.266 af
Pond 12Y: YD7	Peak Elev=303.61' Inflow=0.99 cfs 0.082 af 8.0" Round Culvert n=0.010 L=33.0' S=0.0061 '/' Outflow=0.99 cfs 0.082 af
Pond 13C: CB5	Peak Elev=303.56' Inflow=11.81 cfs 1.401 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0067 '/' Outflow=11.81 cfs 1.401 af
Pond 14C: CB6	Peak Elev=301.32' Inflow=0.69 cfs 0.056 af 18.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=0.69 cfs 0.056 af

2019-022 Mannarino Maskel Rd Rev2*Type III 24-hr 100-Year Rainfall=7.90"*

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Pond 15C: CB7

Peak Elev=301.32' Inflow=12.97 cfs 1.615 af
18.0" Round Culvert n=0.010 L=116.0' S=0.0073 '/' Outflow=12.97 cfs 1.615 af

Pond 18D: DMH1

Peak Elev=299.30' Inflow=12.97 cfs 1.614 af
18.0" Round Culvert n=0.010 L=23.0' S=0.0087 '/' Outflow=12.97 cfs 1.614 af

Pond 19P: POND

Peak Elev=297.64' Storage=55,131 cf Inflow=24.11 cfs 2.977 af
Outflow=12.74 cfs 2.761 af

Pond 20D: DMH2

Peak Elev=296.34' Inflow=12.74 cfs 2.759 af
15.0" Round Culvert n=0.010 L=248.0' S=0.0125 '/' Outflow=12.74 cfs 2.759 af

Pond 21C: CB9

Peak Elev=291.57' Inflow=1.60 cfs 0.158 af
15.0" Round Culvert n=0.010 L=24.0' S=0.0083 '/' Outflow=1.60 cfs 0.158 af

Pond 22C: CB10

Peak Elev=291.57' Inflow=13.27 cfs 3.010 af
15.0" Round Culvert n=0.010 L=31.0' S=0.0065 '/' Outflow=13.27 cfs 3.010 af

Pond 25P: YD8

Peak Elev=291.57' Inflow=1.19 cfs 0.098 af
12.0" Round Culvert n=0.010 L=6.0' S=0.0333 '/' Outflow=1.19 cfs 0.098 af

Link 23P: POST

Inflow=13.27 cfs 3.007 af
Primary=13.27 cfs 3.007 af

Total Runoff Area = 16.457 ac Runoff Volume = 5.529 af Average Runoff Depth = 4.03"
89.56% Pervious = 14.739 ac 10.44% Impervious = 1.719 ac

Summary for Subcatchment 1S: YD1

Runoff = 1.14 cfs @ 12.15 hrs, Volume= 0.097 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	6,916	61	Woods, Good, HSG C
*	18,098	67	>75% Grass cover, Good, HSG C
	2,045	98	Roofs, HSG C
	27,059	68	Weighted Average
	25,014		92.44% Pervious Area
	2,045		7.56% Impervious Area

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

Summary for Subcatchment 2S: YD2

Runoff = 0.73 cfs @ 12.15 hrs, Volume= 0.061 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	3,794	61	Woods, Good, HSG C
*	10,852	67	>75% Grass cover, Good, HSG C
	1,760	98	Roofs, HSG C
	16,406	69	Weighted Average
	14,646		89.27% Pervious Area
	1,760		10.73% Impervious Area

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

Summary for Subcatchment 3S: YD3

Runoff = 0.64 cfs @ 12.15 hrs, Volume= 0.054 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

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	Area (sf)	CN	Description
*	1,408	61	Woods, Good, HSG C
*	10,991	67	>75% Grass cover, Good, HSG C
	1,490	98	Roofs, HSG C
	13,889	70	Weighted Average
	12,399		89.27% Pervious Area
	1,490		10.73% Impervious Area

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

Summary for Subcatchment 4S: YD4

Runoff = 0.79 cfs @ 12.15 hrs, Volume= 0.066 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	1,905	61	Woods, Good, HSG C
*	13,347	67	>75% Grass cover, Good, HSG C
	1,760	98	Roofs, HSG C
	17,012	70	Weighted Average
	15,252		89.65% Pervious Area
	1,760		10.35% Impervious Area

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

Summary for Subcatchment 5S: CB1

Runoff = 1.01 cfs @ 12.07 hrs, Volume= 0.074 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	2,152	67	>75% Grass cover, Good, HSG C
	7,624	98	Roofs, HSG C
	9,776	91	Weighted Average
	2,152		22.01% Pervious Area
	7,624		77.99% Impervious Area

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

Summary for Subcatchment 6S: CB2

Runoff = 1.04 cfs @ 12.07 hrs, Volume= 0.079 af, Depth> 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	1,215	67	>75% Grass cover, Good, HSG C
	8,376	98	Roofs, HSG C
	9,591	94	Weighted Average
	1,215		12.67% Pervious Area
	8,376		87.33% Impervious Area

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

Summary for Subcatchment 7S: YD5

Runoff = 0.70 cfs @ 12.15 hrs, Volume= 0.059 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	12,782	67	>75% Grass cover, Good, HSG C
	1,760	98	Roofs, HSG C
	14,542	71	Weighted Average
	12,782		87.90% Pervious Area
	1,760		12.10% Impervious Area

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

Summary for Subcatchment 9S: YD6

Runoff = 0.59 cfs @ 12.15 hrs, Volume= 0.049 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	10,505	67	>75% Grass cover, Good, HSG C
	1,760	98	Roofs, HSG C
	12,265	71	Weighted Average
	10,505		85.65% Pervious Area
	1,760		14.35% Impervious Area

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

Summary for Subcatchment 10S: CB3

Runoff = 0.67 cfs @ 12.07 hrs, Volume= 0.049 af, Depth> 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

Area (sf)	CN	Description
* 1,513	67	>75% Grass cover, Good, HSG C
5,003	98	Roofs, HSG C
6,516	91	Weighted Average
1,513		23.22% Pervious Area
5,003		76.78% Impervious Area

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

Summary for Subcatchment 11S: CB4

Runoff = 0.70 cfs @ 12.07 hrs, Volume= 0.053 af, Depth> 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

Area (sf)	CN	Description
* 822	67	>75% Grass cover, Good, HSG C
5,636	98	Roofs, HSG C
6,458	94	Weighted Average
822		12.73% Pervious Area
5,636		87.27% Impervious Area

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

Summary for Subcatchment 12S: YD7

Runoff = 0.46 cfs @ 12.15 hrs, Volume= 0.038 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

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	Area (sf)	CN	Description
*	8,332	67	>75% Grass cover, Good, HSG C
	1,184	98	Roofs, HSG C
	9,516	71	Weighted Average
	8,332		87.56% Pervious Area
	1,184		12.44% Impervious Area

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

Summary for Subcatchment 13S: CB5

Runoff = 0.43 cfs @ 12.07 hrs, Volume= 0.033 af, Depth> 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	463	67	>75% Grass cover, Good, HSG C
	3,495	98	Roofs, HSG C
	3,958	94	Weighted Average
	463		11.70% Pervious Area
	3,495		88.30% Impervious Area

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

Summary for Subcatchment 14S: CB6

Runoff = 0.43 cfs @ 12.07 hrs, Volume= 0.035 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
	3,854	98	Roofs, HSG C
	3,854		100.00% Impervious Area

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

Summary for Subcatchment 15S: CB7

Runoff = 1.18 cfs @ 12.08 hrs, Volume= 0.084 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	7,844	67	>75% Grass cover, Good, HSG C
	6,842	98	Roofs, HSG C
	14,686	81	Weighted Average
	7,844		53.41% Pervious Area
	6,842		46.59% Impervious Area

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

Summary for Subcatchment 19S: CB8

Runoff = 6.72 cfs @ 12.20 hrs, Volume= 0.624 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	59,862	61	Woods, Good, HSG C
*	8,866	77	Wooded Wetlands, Good, HSG D
*	79,896	67	>75% Grass cover, Good, HSG C
	6,167	98	Water Surface, 0% imp, HSG C
	12,839	98	Roofs, HSG C
	167,630	69	Weighted Average
	154,791		92.34% Pervious Area
	12,839		7.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	60	0.0833	0.19		Sheet Flow, Grass: Dense n= 0.240 P2= 3.15"
0.6	121	0.0450	3.42		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.5	79	0.0440	0.52		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
1.3	215		2.84		Lake or Reservoir, Mean Depth= 0.25'
3.5	64	0.0150	0.31		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
13.3	539	Total			

Summary for Subcatchment 20S: S1

Runoff = 0.49 cfs @ 12.15 hrs, Volume= 0.042 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	4,852	61	Woods, Good, HSG C
*	8,609	67	>75% Grass cover, Good, HSG C
	13,461	65	Weighted Average
	13,461		100.00% Pervious Area

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

Summary for Subcatchment 21S: CB9

Runoff = 0.46 cfs @ 12.07 hrs, Volume= 0.037 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
	4,083	98	Roofs, HSG C
	4,083		100.00% Impervious Area

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

Summary for Subcatchment 22S: CB10

Runoff = 0.75 cfs @ 12.07 hrs, Volume= 0.054 af, Depth> 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.99"

	Area (sf)	CN	Description
*	690	61	Woods, Good, HSG C
*	1,690	67	>75% Grass cover, Good, HSG C
	5,360	98	Roofs, HSG C
	7,740	88	Weighted Average
	2,380		30.75% Pervious Area
	5,360		69.25% Impervious Area

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

Summary for Subcatchment 24E: PRE

Runoff = 6.22 cfs @ 12.55 hrs, Volume= 0.925 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.99"

Area (sf)	CN	Description
* 349,576	61	Woods, Good, HSG C
* 8,866	77	Wooded Wetlands, Good, HSG D
358,442	61	Weighted Average
358,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	162	0.0740	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.15"
5.3	412	0.0680	1.30		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.3	215		2.84		Lake or Reservoir, Mean Depth= 0.25'
9.4	316	0.0125	0.56		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	210	0.0350	4.38	13.13	Channel Flow, Area= 3.0 sf Perim= 6.0' r= 0.50' n= 0.040 Earth, cobble bottom, clean sides
35.7	1,315	Total			

Summary for Pond 1Y: YD1

Inflow Area = 0.621 ac, 7.56% Impervious, Inflow Depth > 1.87" for 10-Year event
 Inflow = 1.14 cfs @ 12.15 hrs, Volume= 0.097 af
 Outflow = 1.14 cfs @ 12.20 hrs, Volume= 0.097 af, Atten= 0%, Lag= 3.0 min
 Primary = 1.14 cfs @ 12.20 hrs, Volume= 0.097 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 306.64' @ 12.23 hrs
 Flood Elev= 313.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	306.00'	12.0" Round Culvert L= 92.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 306.00' / 305.50' S= 0.0054 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.03 cfs @ 12.20 hrs HW=306.63' TW=306.22' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 1.03 cfs @ 2.82 fps)

Summary for Pond 2Y: YD2

Inflow Area = 0.998 ac, 8.75% Impervious, Inflow Depth > 1.90" for 10-Year event
 Inflow = 1.81 cfs @ 12.18 hrs, Volume= 0.158 af
 Outflow = 1.81 cfs @ 12.23 hrs, Volume= 0.158 af, Atten= 0%, Lag= 3.0 min
 Primary = 1.81 cfs @ 12.23 hrs, Volume= 0.158 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 306.24' @ 12.23 hrs

Flood Elev= 309.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	305.50'	12.0" Round Culvert L= 89.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 305.50' / 304.50' S= 0.0112 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=1.78 cfs @ 12.23 hrs HW=306.23' TW=305.35' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 1.78 cfs @ 2.91 fps)

Summary for Pond 3Y: YD3

Inflow Area = 1.317 ac, 9.23% Impervious, Inflow Depth > 1.93" for 10-Year event
 Inflow = 2.36 cfs @ 12.22 hrs, Volume= 0.211 af
 Outflow = 2.36 cfs @ 12.27 hrs, Volume= 0.211 af, Atten= 0%, Lag= 3.0 min
 Primary = 2.36 cfs @ 12.27 hrs, Volume= 0.211 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 305.38' @ 12.27 hrs

Flood Elev= 308.38'

Device	Routing	Invert	Outlet Devices
#1	Primary	304.50'	12.0" Round Culvert L= 89.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 304.50' / 303.50' S= 0.0112 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=2.31 cfs @ 12.27 hrs HW=305.37' TW=304.29' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 2.31 cfs @ 3.18 fps)

Summary for Pond 4Y: YD4

Inflow Area = 1.707 ac, 9.49% Impervious, Inflow Depth > 1.95" for 10-Year event
 Inflow = 2.93 cfs @ 12.26 hrs, Volume= 0.277 af
 Outflow = 2.93 cfs @ 12.31 hrs, Volume= 0.277 af, Atten= 0%, Lag= 3.0 min
 Primary = 2.93 cfs @ 12.31 hrs, Volume= 0.277 af

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Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 304.32' @ 12.33 hrs

Flood Elev= 307.39'

Device	Routing	Invert	Outlet Devices
#1	Primary	303.20'	15.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 303.20' / 303.00' S= 0.0080 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=2.79 cfs @ 12.31 hrs HW=304.31' TW=304.02' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 2.79 cfs @ 3.21 fps)**Summary for Pond 5C: CB1**

Inflow Area = 0.224 ac, 77.99% Impervious, Inflow Depth > 3.97" for 10-Year event
Inflow = 1.01 cfs @ 12.07 hrs, Volume= 0.074 af
Outflow = 1.01 cfs @ 12.12 hrs, Volume= 0.074 af, Atten= 0%, Lag= 3.0 min
Primary = 1.01 cfs @ 12.12 hrs, Volume= 0.074 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 305.61' @ 12.12 hrs

Flood Elev= 308.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	305.10'	15.0" Round Culvert L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 305.10' / 304.90' S= 0.0077 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=0.97 cfs @ 12.12 hrs HW=305.60' TW=303.88' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 0.97 cfs @ 3.15 fps)**Summary for Pond 6C: CB2**

Inflow Area = 2.152 ac, 24.60% Impervious, Inflow Depth > 2.40" for 10-Year event
Inflow = 3.77 cfs @ 12.28 hrs, Volume= 0.430 af
Outflow = 3.77 cfs @ 12.33 hrs, Volume= 0.430 af, Atten= 0%, Lag= 3.0 min
Primary = 3.77 cfs @ 12.33 hrs, Volume= 0.430 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 304.04' @ 12.33 hrs

Flood Elev= 308.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	303.00'	15.0" Round Culvert L= 86.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 303.00' / 300.71' S= 0.0266 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=3.74 cfs @ 12.33 hrs HW=304.03' TW=301.84' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 3.74 cfs @ 3.46 fps)

Summary for Pond 7Y: YD5

Inflow Area = 0.334 ac, 12.10% Impervious, Inflow Depth > 2.10" for 10-Year event
 Inflow = 0.70 cfs @ 12.15 hrs, Volume= 0.059 af
 Outflow = 0.70 cfs @ 12.20 hrs, Volume= 0.059 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.70 cfs @ 12.20 hrs, Volume= 0.059 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 302.00' @ 12.27 hrs

Flood Elev= 304.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	301.40'	8.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 301.40' / 301.20' S= 0.0083 ' / Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.52 cfs @ 12.20 hrs HW=301.95' TW=301.78' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 0.52 cfs @ 2.28 fps)

Summary for Pond 8C: CB2A

Inflow Area = 2.486 ac, 22.92% Impervious, Inflow Depth > 2.35" for 10-Year event
 Inflow = 4.24 cfs @ 12.31 hrs, Volume= 0.488 af
 Outflow = 4.24 cfs @ 12.36 hrs, Volume= 0.488 af, Atten= 0%, Lag= 3.0 min
 Primary = 4.24 cfs @ 12.36 hrs, Volume= 0.488 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 301.84' @ 12.36 hrs

Flood Elev= 306.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	300.71'	15.0" Round Culvert L= 94.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 300.71' / 298.20' S= 0.0267 ' / Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=4.23 cfs @ 12.36 hrs HW=301.84' TW=299.59' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 4.23 cfs @ 3.62 fps)

Summary for Pond 9Y: YD6

Inflow Area = 0.282 ac, 14.35% Impervious, Inflow Depth > 2.10" for 10-Year event
 Inflow = 0.59 cfs @ 12.15 hrs, Volume= 0.049 af
 Outflow = 0.59 cfs @ 12.20 hrs, Volume= 0.049 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.59 cfs @ 12.20 hrs, Volume= 0.049 af

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Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 299.72' @ 12.32 hrs

Flood Elev= 302.54'

Device	Routing	Invert	Outlet Devices
#1	Primary	299.00'	8.0" Round Culvert L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 299.00' / 298.80' S= 0.0080 '/ Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.25 cfs @ 12.20 hrs HW=299.53' TW=299.49' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 0.25 cfs @ 1.14 fps)**Summary for Pond 10C: CB3**

Inflow Area = 0.150 ac, 76.78% Impervious, Inflow Depth > 3.97" for 10-Year event
Inflow = 0.67 cfs @ 12.07 hrs, Volume= 0.049 af
Outflow = 0.67 cfs @ 12.12 hrs, Volume= 0.049 af, Atten= 0%, Lag= 3.0 min
Primary = 0.67 cfs @ 12.12 hrs, Volume= 0.049 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 301.40' @ 12.12 hrs

Flood Elev= 304.48'

Device	Routing	Invert	Outlet Devices
#1	Primary	301.00'	15.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 301.00' / 300.80' S= 0.0083 '/ Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=0.65 cfs @ 12.12 hrs HW=301.39' TW=299.19' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 0.65 cfs @ 2.94 fps)**Summary for Pond 11C: CB4**

Inflow Area = 3.065 ac, 27.87% Impervious, Inflow Depth > 2.50" for 10-Year event
Inflow = 5.39 cfs @ 12.23 hrs, Volume= 0.639 af
Outflow = 5.39 cfs @ 12.28 hrs, Volume= 0.639 af, Atten= 0%, Lag= 3.0 min
Primary = 5.39 cfs @ 12.28 hrs, Volume= 0.639 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 299.66' @ 12.28 hrs

Flood Elev= 304.48'

Device	Routing	Invert	Outlet Devices
#1	Primary	298.20'	15.0" Round Culvert L= 63.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.20' / 297.30' S= 0.0143 '/ Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=5.36 cfs @ 12.28 hrs HW=299.65' TW=298.22' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 5.36 cfs @ 4.37 fps)

Summary for Pond 12Y: YD7

Inflow Area = 0.218 ac, 12.44% Impervious, Inflow Depth > 2.10" for 10-Year event
 Inflow = 0.46 cfs @ 12.15 hrs, Volume= 0.038 af
 Outflow = 0.46 cfs @ 12.20 hrs, Volume= 0.038 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.46 cfs @ 12.20 hrs, Volume= 0.038 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 298.43' @ 12.20 hrs

Flood Elev= 302.79'

Device	Routing	Invert	Outlet Devices
#1	Primary	298.00'	8.0" Round Culvert L= 33.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 297.80' S= 0.0061 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.46 cfs @ 12.20 hrs HW=298.43' TW=298.06' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 0.46 cfs @ 2.76 fps)

Summary for Pond 13C: CB5

Inflow Area = 3.374 ac, 28.50% Impervious, Inflow Depth > 2.52" for 10-Year event
 Inflow = 5.98 cfs @ 12.27 hrs, Volume= 0.710 af
 Outflow = 5.98 cfs @ 12.32 hrs, Volume= 0.710 af, Atten= 0%, Lag= 3.0 min
 Primary = 5.98 cfs @ 12.32 hrs, Volume= 0.710 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 298.26' @ 12.35 hrs

Flood Elev= 302.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	297.00'	18.0" Round Culvert L= 216.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 297.00' / 295.55' S= 0.0067 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Primary OutFlow Max=5.74 cfs @ 12.32 hrs HW=298.25' TW=296.93' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 5.74 cfs @ 4.94 fps)

Summary for Pond 14C: CB6

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth > 4.75" for 10-Year event
 Inflow = 0.43 cfs @ 12.07 hrs, Volume= 0.035 af
 Outflow = 0.43 cfs @ 12.12 hrs, Volume= 0.035 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.43 cfs @ 12.12 hrs, Volume= 0.035 af

2019-022 Mannarino Maskel Rd Rev2

Type III 24-hr 10-Year Rainfall=4.99"

Prepared by J.R. Russo & Associates LLC

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Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 297.05' @ 12.57 hrs

Flood Elev= 299.49'

Device	Routing	Invert	Outlet Devices
#1	Primary	296.00'	18.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 296.00' / 295.80' S= 0.0083 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.12 hrs HW=296.47' TW=296.54' (Dynamic Tailwater)↑**1=Culvert** (Controls 0.00 cfs)**Summary for Pond 15C: CB7**

Inflow Area = 3.800 ac, 31.77% Impervious, Inflow Depth > 2.61" for 10-Year event
Inflow = 6.63 cfs @ 12.31 hrs, Volume= 0.828 af
Outflow = 6.63 cfs @ 12.36 hrs, Volume= 0.828 af, Atten= 0%, Lag= 3.0 min
Primary = 6.63 cfs @ 12.36 hrs, Volume= 0.828 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 297.05' @ 12.52 hrs

Flood Elev= 299.49'

Device	Routing	Invert	Outlet Devices
#1	Primary	295.55'	18.0" Round Culvert L= 116.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 295.55' / 294.70' S= 0.0073 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Primary OutFlow Max=6.18 cfs @ 12.36 hrs HW=296.98' TW=296.17' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 6.18 cfs @ 4.58 fps)**Summary for Pond 18D: DMH1**

Inflow Area = 3.800 ac, 31.77% Impervious, Inflow Depth > 2.61" for 10-Year event
Inflow = 6.63 cfs @ 12.36 hrs, Volume= 0.827 af
Outflow = 6.63 cfs @ 12.41 hrs, Volume= 0.827 af, Atten= 0%, Lag= 3.0 min
Primary = 6.63 cfs @ 12.41 hrs, Volume= 0.827 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 296.52' @ 12.61 hrs

Flood Elev= 299.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	294.70'	18.0" Round Culvert L= 23.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 294.70' / 294.50' S= 0.0087 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Primary OutFlow Max=5.89 cfs @ 12.41 hrs HW=296.30' TW=295.82' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 5.89 cfs @ 3.33 fps)

Summary for Pond 19P: POND

Inflow Area = 7.648 ac, 19.64% Impervious, Inflow Depth > 2.27" for 10-Year event
 Inflow = 11.40 cfs @ 12.23 hrs, Volume= 1.449 af
 Outflow = 4.96 cfs @ 12.81 hrs, Volume= 1.282 af, Atten= 56%, Lag= 34.9 min
 Primary = 4.96 cfs @ 12.81 hrs, Volume= 1.282 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Starting Elev= 294.00' Surf.Area= 15,747 sf Storage= 7,650 cf

Peak Elev= 296.24' @ 12.81 hrs Surf.Area= 24,250 sf Storage= 32,400 cf (24,750 cf above start)

Plug-Flow detention time= 207.7 min calculated for 1.107 af (76% of inflow)

Center-of-Mass det. time= 91.8 min (934.2 - 842.3)

Volume	Invert	Avail.Storage	Storage Description
#1	291.50'	2,700 cf	Permanent Pool (Prismatic) Listed below (Recalc)
#2	291.50'	2,021 cf	Forebay (Prismatic) Listed below (Recalc)
#3	293.50'	2,930 cf	Permanant Pool Above 293.5 (Prismatic) Listed below (Recalc)
#4	294.00'	63,453 cf	Extended Detention (Prismatic) Listed below (Recalc)
		71,103 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
291.50	838	0	0
292.00	1,066	476	476
293.50	1,899	2,224	2,700

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
291.50	544	0	0
292.00	749	323	323
293.50	1,514	1,697	2,021

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.50	5,552	0	0
294.00	6,167	2,930	2,930

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
294.00	6,167	0	0
295.00	11,131	8,649	8,649
296.00	14,147	12,639	21,288
298.00	18,500	32,647	53,935
298.50	19,573	9,518	63,453

2019-022 Mannarino Maskel Rd Rev2

Type III 24-hr 10-Year Rainfall=4.99"

Prepared by J.R. Russo & Associates LLC

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Device	Routing	Invert	Outlet Devices
#1	Primary	289.50'	15.0" Round Culvert L= 33.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 289.50' / 289.00' S= 0.0152 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf
#2	Device 1	294.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.50 1.50 2.80 Width (feet) 0.00 0.58 1.25 1.25
#3	Device 1	297.50'	16.0" x 48.0" Horiz. Orifice/Grate C= 0.600 in 19.4" x 72.0" Grate (55% open area) Limited to weir flow at low heads

Primary OutFlow Max=4.96 cfs @ 12.81 hrs HW=296.24' TW=290.32' (Dynamic Tailwater)↑ **1=Culvert** (Passes 4.96 cfs of 14.37 cfs potential flow)↑ **2=Custom Weir/Orifice** (Weir Controls 4.96 cfs @ 3.65 fps)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Summary for Pond 20D: DMH2**

Inflow Area = 7.648 ac, 19.64% Impervious, Inflow Depth > 2.01" for 10-Year event
 Inflow = 4.96 cfs @ 12.81 hrs, Volume= 1.281 af
 Outflow = 4.96 cfs @ 12.86 hrs, Volume= 1.281 af, Atten= 0%, Lag= 3.0 min
 Primary = 4.96 cfs @ 12.86 hrs, Volume= 1.281 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 290.33' @ 12.86 hrs

Flood Elev= 299.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	289.00'	15.0" Round Culvert L= 248.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 289.00' / 285.90' S= 0.0125 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=4.96 cfs @ 12.86 hrs HW=290.33' TW=287.38' (Dynamic Tailwater)↑ **1=Culvert** (Inlet Controls 4.96 cfs @ 4.04 fps)**Summary for Pond 21C: CB9**

Inflow Area = 0.403 ac, 23.27% Impervious, Inflow Depth > 2.36" for 10-Year event
 Inflow = 0.75 cfs @ 12.14 hrs, Volume= 0.079 af
 Outflow = 0.75 cfs @ 12.19 hrs, Volume= 0.079 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.75 cfs @ 12.19 hrs, Volume= 0.079 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 287.39' @ 12.95 hrs

Flood Elev= 290.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	286.10'	15.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 286.10' / 285.90' S= 0.0083 '/' Cc= 0.900
n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=0.70 cfs @ 12.19 hrs HW=286.70' TW=286.61' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 0.70 cfs @ 1.75 fps)

Summary for Pond 22C: CB10

Inflow Area = 8.229 ac, 20.89% Impervious, Inflow Depth > 2.06" for 10-Year event
Inflow = 5.18 cfs @ 12.85 hrs, Volume= 1.413 af
Outflow = 5.18 cfs @ 12.90 hrs, Volume= 1.413 af, Atten= 0%, Lag= 3.0 min
Primary = 5.18 cfs @ 12.90 hrs, Volume= 1.413 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 287.39' @ 12.90 hrs

Flood Elev= 290.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.90'	15.0" Round Culvert L= 31.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.90' / 285.70' S= 0.0065 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=5.18 cfs @ 12.90 hrs HW=287.39' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 5.18 cfs @ 4.48 fps)

Summary for Pond 25P: YD8

Inflow Area = 0.309 ac, 0.00% Impervious, Inflow Depth > 1.64" for 10-Year event
Inflow = 0.49 cfs @ 12.15 hrs, Volume= 0.042 af
Outflow = 0.49 cfs @ 12.20 hrs, Volume= 0.042 af, Atten= 0%, Lag= 3.0 min
Primary = 0.49 cfs @ 12.20 hrs, Volume= 0.042 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 287.39' @ 13.00 hrs

Flood Elev= 290.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	286.30'	12.0" Round Culvert L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 286.30' / 286.10' S= 0.0333 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.20 hrs HW=286.77' TW=286.71' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 0.38 cfs @ 1.55 fps)

Summary for Link 23P: POST

Inflow Area = 8.229 ac, 20.89% Impervious, Inflow Depth > 2.06" for 10-Year event
Inflow = 5.18 cfs @ 12.90 hrs, Volume= 1.411 af
Primary = 5.18 cfs @ 12.95 hrs, Volume= 1.411 af, Atten= 0%, Lag= 3.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

E – Pipe Sizing Chart & Gutter Flow Analysis

PIPE SIZING CHART															
Kilkenney Heights II - Open Space Subdivision (13-Lots), Maskel Road, South Windsor, CT															
STRUCTURE		AREA (S.F.)			Ax C		T _c	T _t	i ₁₀	Q ₁₀	PIPE GEOMETRY				
FROM	TO	Woods (C=0.15)	Lawn (C=0.35)	Imp. (C=0.9)	INC	TOTAL	(min.)	(min.)	(in/hr)	(cfs)	DIA.	Length	Slope	Qfull	Vfull
YD1	YD2	6,916	18,098	2,045	0.211	0.211	10.0	0.4	5.26	1.1	12	92	0.54	2.8	3.6
YD2	YD3	3,794	10,852	1,760	0.137	0.348	10.4	0.3	5.16	1.8	12	89	1.12	4.1	5.2
YD3	YD4	1,408	10,991	1,490	0.124	0.472	10.7	0.3	5.10	2.4	12	89	1.12	4.1	5.2
YD4	CB2	1,905	13,347	1,760	0.150	0.622	11.0	0.1	5.03	3.1	15	25	0.80	6.3	5.1
CB1	CB2		2,152	7,624	0.175	0.175	5.0	0.1	7.43	1.3	15	26	0.77	6.2	5.0
CB2	CB2A		1,215	8,376	0.183	0.980	11.1	0.2	5.02	4.9	15	86	2.66	11.4	9.3
YD5	CB2A		12,782	1,760	0.139	0.139	10.0	0.1	5.26	0.7	8	24	0.83	1.2	3.4
CB2A	CB4				0.000	1.119	11.2	0.2	4.98	5.6	15	94	2.67	11.5	9.3
CB3	CB4		1,513	5,003	0.116	0.116	5.0	0.1	7.43	0.9	15	24	0.83	6.4	5.2
YD6	CB4		10,505	1,760	0.121	0.121	10.0	0.1	5.26	0.6	8	25	0.80	1.2	3.4
CB4	CB5		822	5,636	0.123	1.478	11.4	0.2	4.94	7.3	15	63	1.43	8.4	6.8
YD7	CB5		8,332	1,184	0.091	0.091	10.0	0.2	5.26	0.5	8	33	0.61	1.0	2.9
CB5	CB7		463	3,495	0.076	1.646	11.5	0.7	4.91	8.1	18	216	0.67	9.3	5.3
CB6	CB7			3,854	0.080	0.080	5.0	0.1	7.43	0.6	18	24	0.83	10.4	5.9
CB7	DMH1		7,844	6,842	0.204	1.930	12.2	0.4	4.75	9.2	18	116	0.73	9.7	5.5
DMH1	CB8				0.000	1.930	12.6	0.1	4.67	9.0	18	23	0.87	10.6	6.0
CB8	DMH2	68,728	79,896	19,006	1.271	3.201	80.0	0.1	1.55	5.0	15	33	1.52	8.6	7.0
DMH2	CB10				0.000	3.201	80.1	0.6	1.55	4.9	15	248	1.25	7.8	6.4
YD8	CB9	4,852	8,609		0.086	0.086	10.0	0.0	5.26	0.5	12	6	3.33	7.1	9.0
CB9	CB10			4,083	0.084	0.170	10.0	0.1	5.26	0.9	15	24	0.83	6.4	5.2
CB10	Abbe	690	1,690	5,360	0.127	3.498	80.7	0.1	1.54	5.4	15	31	0.65	5.7	4.6
		14,023	98,916	52,589	1.930										

Kilkenny Heights II - Gutter Flow Analysis

Structure	Incremental AC to Inlet	Total AC to Inlet	Q ₁₀	Longitudinal Slope (S)	Cross Slope (S _x)	Pavement Roughness (n)	Width of Flow (T)	Depth of Flow (d)	Total Area of Flow	Area Bypass	AC Bypass
CB1	0.175	0.175	1.30	0.023	0.03125	0.015	5.03	0.16	0.396	0.084	0.037
CB3	0.116	0.153	1.14	0.023	0.03125	0.015	4.79	0.15	0.358	0.068	0.029
CB7	0.204	0.233	1.73	Sag	0.03125		5.88	0.18			
CB2	0.183	0.183	1.36	0.023	0.03125	0.015	5.12	0.16	0.409	0.221	0.099
CB2A	0.062	0.160	1.19	0.023	0.03125	0.015	4.87	0.15	0.371	0.194	0.084
CB4	0.062	0.145	1.08	0.023	0.03125	0.015	4.70	0.15	0.345	0.174	0.074
CB5	0.076	0.149	1.11	0.023	0.03125	0.015	4.75	0.15	0.352	0.180	0.076
CB6	0.080	0.156	1.16	Sag	0.03125		5.79	0.18			
A	Area			acres	Taken from Pipe Sizing Chart						
C	Runoff Coefficient				Taken from Pipe Sizing Chart						
T _c	Time of Concentration		5 min.		Assumed						
i ₁₀	Rainfall Intensity		7.43 in/hr		Taken from NOAA Table						
Q ₁₀	Flow Rate (10-year storm)		cfs		Q=A x C x i ₁₀						
W _g	Width of Grate		1.3541 ft		Type C CB Grate Inlet						
P	Weir perimeter of Grate		5.02 ft		Type C Single Type A Grate Inlet						
P	Weir perimeter of Grate		7.33 ft		Type C Double Type II CB Grate Inlet						
C _{FS}	Safety Factor for Clogging		1		Type C CB with 0% clogging						
C _w	Weir Coefficient		3								
T={Q ₁₀ (n)/[0.56(S _x ^{1.67})(S ^{0.5})]} ^{0.3745}				Gutter flow width on decline							
T=[Q ₁₀ (C _{FS})/C _w /P] ^{0.667} /S _x				Gutter flow width in sag							