

DRAINAGE REPORT

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

December 20, 2019

Revised March 23, 2020

Prepare For:

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

Prepared By:



Contents

Project Summary.....	- 3 -
Property	- 3 -
Soil Evaluation.....	- 3 -
Hydraulic & Hydrologic Calculations.....	- 3 -
Conclusion.....	- 6 -
Appendix	- 7 -
• A - Pre-Development Drainage Area Map, 1"= 100' (11"x17" sheet)	
• B - Post-Development Drainage Area Map, 1"= 100' (11"x17" sheet)	
• C - NOAA Rainfall Data, Web Soil Survey & Soil Descriptions	
• D - HydroCAD Pre & Post Analysis	
• E – Pipe Sizing Chart	

Project Summary

Mannarino Builders, Inc. proposes to construct a 13-Lot open space subdivision on Maskel Road and Abbe Road in South Windsor, Connecticut. 12.29 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 9.23 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 9.6 cfs. Using the typical C soil CN values produces a peak flow of 11.43 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	66
Wetlands (D soil)			77
Impervious	98	98	98

Using the calibrated CN values, the peak flows for predevelopment conditions were reduced from 9.23 cfs to 5.75 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 9.6 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	313.0	306.64	6.36
YD#2	312.5	306.24	6.26
YD#3	310.5	305.38	5.12
YD#4	308.5	304.31	4.19
CB#1	308.6	305.60	3.00
CB#2	308.6	304.04	4.56
YD#5	306.5	301.82	4.68
CB#3	304.5	301.40	3.10
YD#6	304.5	299.72	4.78
CB#4	304.5	299.66	4.84
YD#7	301.5	298.41	3.09
CB#5	302.9	298.27	4.63
CB#6	299.5	297.04	2.46
CB#7	299.5	297.04	2.46
YD#8	299.0	297.56	1.44
DMH#1	300.1	296.66	3.44
DMH#1A	301.0	296.37	4.63
DMH#2	299.5	290.46	9.04
YD#9	289.0	287.43	1.57
CB#9	289.3	287.43	1.87
CB#10	289.3	287.43	1.87

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 (%) = 20%

A = Watershed Area (ac.) = 8.226 ac.

Therefore,

$$WQV = (1'') [0.05 + 0.009(20)] (8.226) / 12 \times 43,560 = 6,868 \text{ c.f.}$$

The proposed pond has a permanent pool volume of 7,134 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 687 c.f. The forebay has a capacity of 2,013 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	1.32	1.31
10-year	5.75	5.59
25-year	9.27	8.92
100-year	15.40	12.67

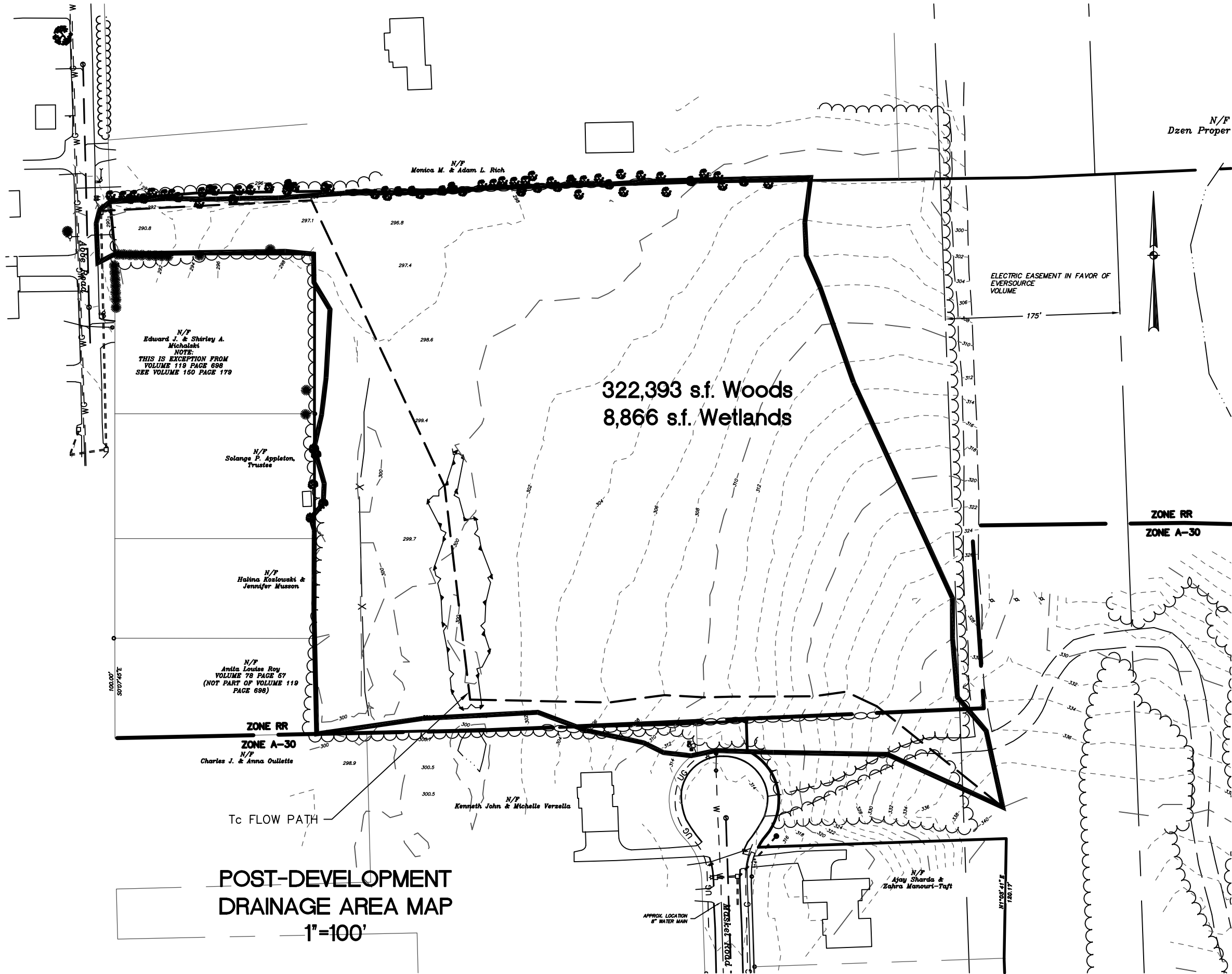
This analysis demonstrates that the proposed development will not increase peak flow rates to the town drainage system in Abbe Road.

Conclusion

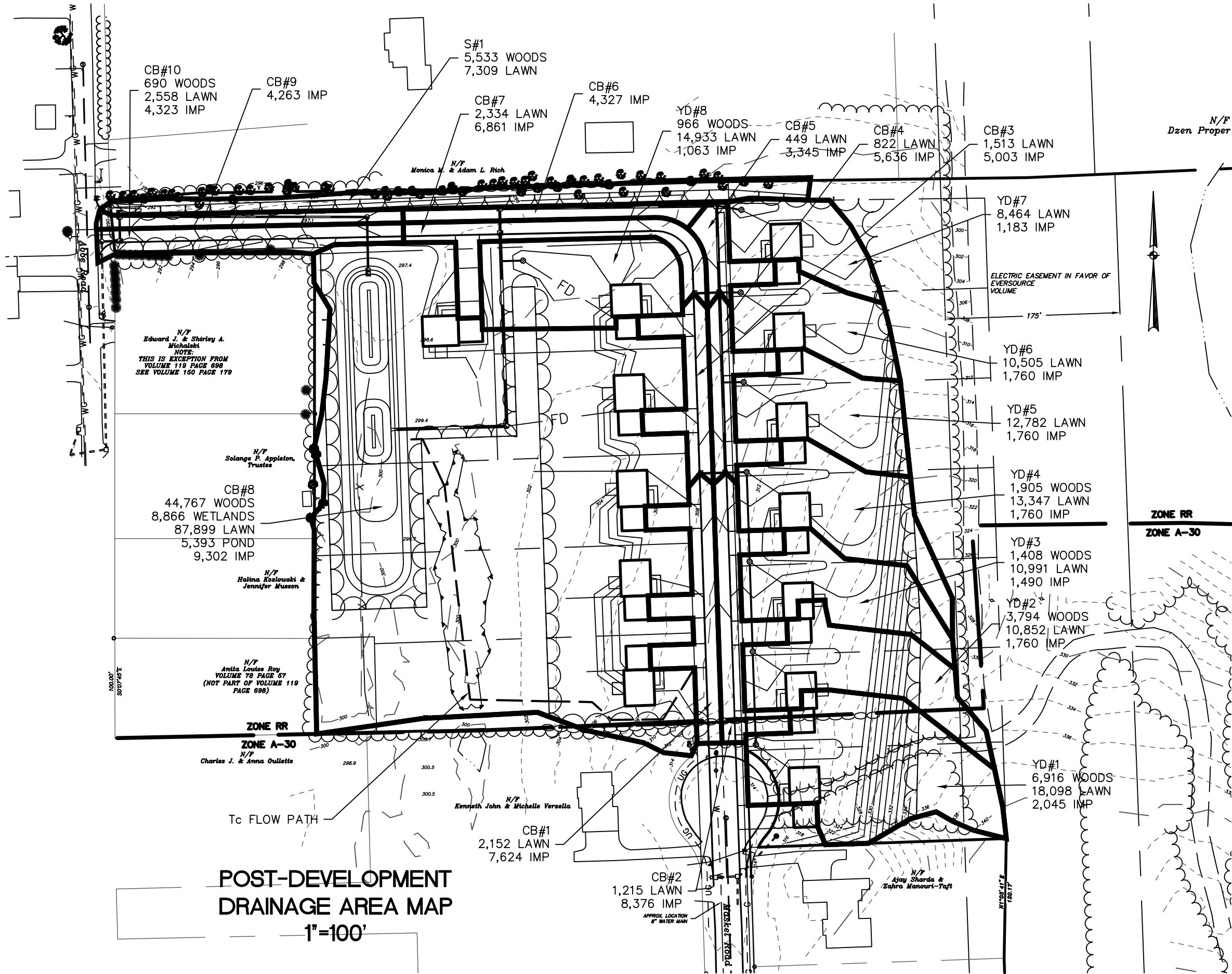
Based on this analysis, it is our professional opinion that the proposed development will not adversely impact downstream properties. Stormwater will be adequately treated for TSS and other pollutants. Peak rates will not increase.

Appendix

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



**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

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

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.

[Back to Top](#)

PF graphical



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

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

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.

[Back to Top](#)


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

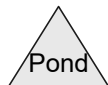
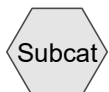
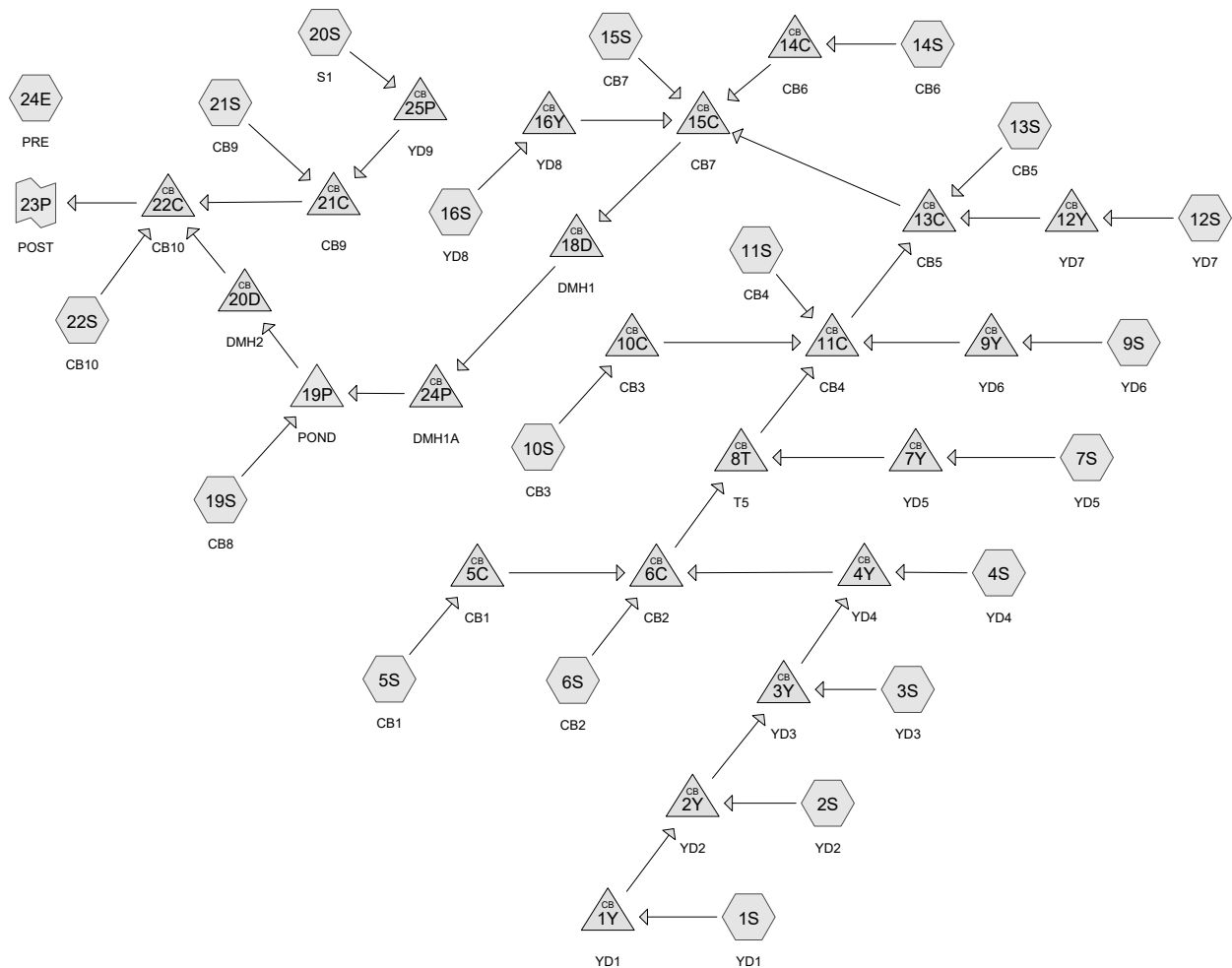
Hydric soil rating: No

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 Rev1
 Prepared by J.R. Russo & Associates, LLC, Printed 4/7/2020
 HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

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

Subcatchment1S: 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
Subcatchment2S: 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
Subcatchment3S: 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
Subcatchment4S: 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
Subcatchment5S: 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
Subcatchment6S: 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
Subcatchment7S: 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
Subcatchment9S: 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
Subcatchment10S: 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
Subcatchment11S: 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
Subcatchment12S: YD7	Runoff Area=9,647 sf 12.26% Impervious Runoff Depth>0.85" Tc=10.0 min CN=71 Runoff=0.17 cfs 0.016 af
Subcatchment13S: CB5	Runoff Area=3,794 sf 88.17% Impervious Runoff Depth>2.49" Tc=5.0 min CN=94 Runoff=0.25 cfs 0.018 af
Subcatchment14S: CB6	Runoff Area=4,327 sf 100.00% Impervious Runoff Depth>2.92" Tc=5.0 min CN=98 Runoff=0.31 cfs 0.024 af
Subcatchment15S: CB7	Runoff Area=9,195 sf 74.62% Impervious Runoff Depth>2.12" Tc=5.0 min CN=90 Runoff=0.52 cfs 0.037 af
Subcatchment16S: YD8	Runoff Area=16,962 sf 6.27% Impervious Runoff Depth>0.75" Tc=10.0 min CN=69 Runoff=0.26 cfs 0.024 af
Subcatchment19S: CB8	Runoff Area=156,227 sf 5.95% Impervious Runoff Depth>0.75" Flow Length=539' Tc=13.3 min CN=69 Runoff=2.14 cfs 0.224 af

Subcatchment20S: S1	Runoff Area=12,842 sf 0.00% Impervious Runoff Depth>0.53" Tc=10.0 min CN=64 Runoff=0.12 cfs 0.013 af
Subcatchment21S: CB9	Runoff Area=4,263 sf 100.00% Impervious Runoff Depth>2.92" Tc=5.0 min CN=98 Runoff=0.30 cfs 0.024 af
Subcatchment22S: CB10	Runoff Area=7,571 sf 57.10% Impervious Runoff Depth>1.64" Tc=5.0 min CN=84 Runoff=0.33 cfs 0.024 af
Subcatchment24E: PRE	Runoff Area=331,259 sf 0.00% Impervious Runoff Depth>0.42" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=1.32 cfs 0.265 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=303.78' Inflow=1.01 cfs 0.107 af 15.0" Round Culvert n=0.010 L=19.0' S=0.0105 '/' Outflow=1.01 cfs 0.107 af
Pond 5C: CB1	Peak Elev=305.46' Inflow=0.58 cfs 0.041 af 15.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/' 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=88.0' S=0.0273 '/' Outflow=1.51 cfs 0.194 af
Pond 7Y: YD5	Peak Elev=301.36' Inflow=0.26 cfs 0.024 af 8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/' Outflow=0.26 cfs 0.024 af
Pond 8T: T5	Peak Elev=301.25' Inflow=1.77 cfs 0.217 af 15.0" Round Culvert n=0.010 L=88.0' S=0.0273 '/' Outflow=1.77 cfs 0.217 af
Pond 9Y: YD6	Peak Elev=299.26' Inflow=0.22 cfs 0.020 af 8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/' 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=21.0' S=0.0095 '/' 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=83.0' S=0.0108 '/' Outflow=2.43 cfs 0.295 af
Pond 12Y: YD7	Peak Elev=298.23' Inflow=0.17 cfs 0.016 af 8.0" Round Culvert n=0.010 L=23.0' S=0.0087 '/' Outflow=0.17 cfs 0.016 af
Pond 13C: CB5	Peak Elev=297.76' Inflow=2.69 cfs 0.328 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0056 '/' Outflow=2.69 cfs 0.328 af

2019-022 Mannarino Maskel Rd Rev1*Type III 24-hr 2-Year Rainfall=3.15"*

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 4

Pond 14C: CB6

Peak Elev=296.45' Inflow=0.31 cfs 0.024 af
18.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/ Outflow=0.31 cfs 0.024 af

Pond 15C: CB7

Peak Elev=296.45' Inflow=3.24 cfs 0.414 af
24.0" Round Culvert n=0.010 L=96.0' S=0.0050 '/ Outflow=3.24 cfs 0.414 af

Pond 16Y: YD8

Peak Elev=297.29' Inflow=0.26 cfs 0.024 af
8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/ Outflow=0.26 cfs 0.024 af

Pond 18D: DMH1

Peak Elev=295.94' Inflow=3.24 cfs 0.414 af
24.0" Round Culvert n=0.010 L=187.0' S=0.0050 '/ Outflow=3.24 cfs 0.414 af

Pond 19P: POND

Peak Elev=295.43' Storage=18,792 cf Inflow=4.71 cfs 0.636 af
Outflow=1.23 cfs 0.533 af

Pond 20D: DMH2

Peak Elev=289.53' Inflow=1.23 cfs 0.532 af
15.0" Round Culvert n=0.010 L=241.0' S=0.0129 '/ Outflow=1.23 cfs 0.532 af

Pond 21C: CB9

Peak Elev=286.47' Inflow=0.33 cfs 0.037 af
15.0" Round Culvert n=0.010 L=22.0' S=0.0091 '/ Outflow=0.33 cfs 0.037 af

Pond 22C: CB10

Peak Elev=286.47' Inflow=1.31 cfs 0.592 af
15.0" Round Culvert n=0.010 L=15.0' S=0.0133 '/ Outflow=1.31 cfs 0.592 af

Pond 24P: DMH1A

Peak Elev=295.44' Inflow=3.24 cfs 0.413 af
24.0" Round Culvert n=0.010 L=21.0' S=0.0090 '/ Outflow=3.24 cfs 0.413 af

Pond 25P: YD9

Peak Elev=286.49' Inflow=0.12 cfs 0.013 af
12.0" Round Culvert n=0.010 L=2.0' S=0.1000 '/ Outflow=0.12 cfs 0.013 af

Link 23P: POST

Inflow=1.31 cfs 0.591 af
Primary=1.31 cfs 0.591 af

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

Subcatchment1S: 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
Subcatchment2S: 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
Subcatchment3S: 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
Subcatchment4S: 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
Subcatchment5S: 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
Subcatchment6S: 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
Subcatchment7S: 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
Subcatchment9S: 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
Subcatchment10S: 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
Subcatchment11S: 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
Subcatchment12S: YD7	Runoff Area=9,647 sf 12.26% Impervious Runoff Depth>2.10" Tc=10.0 min CN=71 Runoff=0.47 cfs 0.039 af
Subcatchment13S: CB5	Runoff Area=3,794 sf 88.17% Impervious Runoff Depth>4.30" Tc=5.0 min CN=94 Runoff=0.41 cfs 0.031 af
Subcatchment14S: CB6	Runoff Area=4,327 sf 100.00% Impervious Runoff Depth>4.75" Tc=5.0 min CN=98 Runoff=0.49 cfs 0.039 af
Subcatchment15S: CB7	Runoff Area=9,195 sf 74.62% Impervious Runoff Depth>3.86" Tc=5.0 min CN=90 Runoff=0.93 cfs 0.068 af
Subcatchment16S: YD8	Runoff Area=16,962 sf 6.27% Impervious Runoff Depth>1.95" Tc=10.0 min CN=69 Runoff=0.75 cfs 0.063 af
Subcatchment19S: CB8	Runoff Area=156,227 sf 5.95% Impervious Runoff Depth>1.94" Flow Length=539' Tc=13.3 min CN=69 Runoff=6.27 cfs 0.581 af

2019-022 Mannarino Maskel Rd Rev1

Prepared by J.R. Russo & Associates, LLC

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

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

Printed 4/7/2020

Page 6

Subcatchment20S: S1	Runoff Area=12,842 sf 0.00% Impervious Runoff Depth>1.57" Tc=10.0 min CN=64 Runoff=0.44 cfs 0.039 af
Subcatchment21S: CB9	Runoff Area=4,263 sf 100.00% Impervious Runoff Depth>4.75" Tc=5.0 min CN=98 Runoff=0.48 cfs 0.039 af
Subcatchment22S: CB10	Runoff Area=7,571 sf 57.10% Impervious Runoff Depth>3.26" Tc=5.0 min CN=84 Runoff=0.66 cfs 0.047 af
Subcatchment24E: PRE	Runoff Area=331,259 sf 0.00% Impervious Runoff Depth>1.35" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=5.75 cfs 0.855 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=304.31' Inflow=2.93 cfs 0.277 af 15.0" Round Culvert n=0.010 L=19.0' S=0.0105 '/' Outflow=2.93 cfs 0.277 af
Pond 5C: CB1	Peak Elev=305.60' Inflow=1.01 cfs 0.074 af 15.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/' 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=88.0' S=0.0273 '/' Outflow=3.77 cfs 0.430 af
Pond 7Y: YD5	Peak Elev=301.82' Inflow=0.70 cfs 0.059 af 8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/' Outflow=0.70 cfs 0.059 af
Pond 8T: T5	Peak Elev=301.73' Inflow=4.24 cfs 0.488 af 15.0" Round Culvert n=0.010 L=88.0' S=0.0273 '/' 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=20.0' S=0.0100 '/' 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=21.0' S=0.0095 '/' 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=83.0' S=0.0108 '/' Outflow=5.39 cfs 0.639 af
Pond 12Y: YD7	Peak Elev=298.41' Inflow=0.47 cfs 0.039 af 8.0" Round Culvert n=0.010 L=23.0' S=0.0087 '/' Outflow=0.47 cfs 0.039 af
Pond 13C: CB5	Peak Elev=298.27' Inflow=5.98 cfs 0.709 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0056 '/' Outflow=5.98 cfs 0.709 af

2019-022 Mannarino Maskel Rd Rev1*Type III 24-hr 10-Year Rainfall=4.99"*

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 7

Pond 14C: CB6

Peak Elev=297.04' Inflow=0.49 cfs 0.039 af
18.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/ Outflow=0.49 cfs 0.039 af

Pond 15C: CB7

Peak Elev=297.04' Inflow=7.08 cfs 0.879 af
24.0" Round Culvert n=0.010 L=96.0' S=0.0050 '/ Outflow=7.08 cfs 0.879 af

Pond 16Y: YD8

Peak Elev=297.56' Inflow=0.75 cfs 0.063 af
8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/ Outflow=0.75 cfs 0.063 af

Pond 18D: DMH1

Peak Elev=296.66' Inflow=7.08 cfs 0.878 af
24.0" Round Culvert n=0.010 L=187.0' S=0.0050 '/ Outflow=7.08 cfs 0.878 af

Pond 19P: POND

Peak Elev=296.31' Storage=30,584 cf Inflow=10.87 cfs 1.457 af
Outflow=5.39 cfs 1.321 af

Pond 20D: DMH2

Peak Elev=290.46' Inflow=5.39 cfs 1.319 af
15.0" Round Culvert n=0.010 L=241.0' S=0.0129 '/ Outflow=5.39 cfs 1.319 af

Pond 21C: CB9

Peak Elev=287.43' Inflow=0.73 cfs 0.077 af
15.0" Round Culvert n=0.010 L=22.0' S=0.0091 '/ Outflow=0.73 cfs 0.077 af

Pond 22C: CB10

Peak Elev=287.43' Inflow=5.59 cfs 1.442 af
15.0" Round Culvert n=0.010 L=15.0' S=0.0133 '/ Outflow=5.59 cfs 1.442 af

Pond 24P: DMH1A

Peak Elev=296.37' Inflow=7.08 cfs 0.877 af
24.0" Round Culvert n=0.010 L=21.0' S=0.0090 '/ Outflow=7.08 cfs 0.877 af

Pond 25P: YD9

Peak Elev=287.43' Inflow=0.44 cfs 0.039 af
12.0" Round Culvert n=0.010 L=2.0' S=0.1000 '/ Outflow=0.44 cfs 0.039 af

Link 23P: POST

Inflow=5.59 cfs 1.440 af
Primary=5.59 cfs 1.440 af

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

Subcatchment1S: 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
Subcatchment2S: 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
Subcatchment3S: 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
Subcatchment4S: 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
Subcatchment5S: 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
Subcatchment6S: 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
Subcatchment7S: 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
Subcatchment9S: 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
Subcatchment10S: 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
Subcatchment11S: 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
Subcatchment12S: YD7	Runoff Area=9,647 sf 12.26% Impervious Runoff Depth>3.00" Tc=10.0 min CN=71 Runoff=0.67 cfs 0.055 af
Subcatchment13S: CB5	Runoff Area=3,794 sf 88.17% Impervious Runoff Depth>5.42" Tc=5.0 min CN=94 Runoff=0.51 cfs 0.039 af
Subcatchment14S: CB6	Runoff Area=4,327 sf 100.00% Impervious Runoff Depth>5.89" Tc=5.0 min CN=98 Runoff=0.60 cfs 0.049 af
Subcatchment15S: CB7	Runoff Area=9,195 sf 74.62% Impervious Runoff Depth>4.97" Tc=5.0 min CN=90 Runoff=1.18 cfs 0.087 af
Subcatchment16S: YD8	Runoff Area=16,962 sf 6.27% Impervious Runoff Depth>2.81" Tc=10.0 min CN=69 Runoff=1.10 cfs 0.091 af
Subcatchment19S: CB8	Runoff Area=156,227 sf 5.95% Impervious Runoff Depth>2.81" Flow Length=539' Tc=13.3 min CN=69 Runoff=9.21 cfs 0.839 af

2019-022 Mannarino Maskel Rd Rev1

Prepared by J.R. Russo & Associates, LLC

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Type III 24-hr 25-Year Rainfall=6.13"

Printed 4/7/2020

Page 9

Subcatchment20S: S1	Runoff Area=12,842 sf 0.00% Impervious Runoff Depth>2.35" Tc=10.0 min CN=64 Runoff=0.68 cfs 0.058 af
Subcatchment21S: CB9	Runoff Area=4,263 sf 100.00% Impervious Runoff Depth>5.89" Tc=5.0 min CN=98 Runoff=0.59 cfs 0.048 af
Subcatchment22S: CB10	Runoff Area=7,571 sf 57.10% Impervious Runoff Depth>4.32" Tc=5.0 min CN=84 Runoff=0.87 cfs 0.063 af
Subcatchment24E: PRE	Runoff Area=331,259 sf 0.00% Impervious Runoff Depth>2.07" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=9.27 cfs 1.314 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=19.0' S=0.0105 '/' Outflow=4.30 cfs 0.400 af
Pond 5C: CB1	Peak Elev=305.67' Inflow=1.27 cfs 0.095 af 15.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/' 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=88.0' S=0.0273 '/' Outflow=5.36 cfs 0.594 af
Pond 7Y: YD5	Peak Elev=302.41' Inflow=1.01 cfs 0.083 af 8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/' Outflow=1.01 cfs 0.083 af
Pond 8T: T5	Peak Elev=302.26' Inflow=6.01 cfs 0.677 af 15.0" Round Culvert n=0.010 L=88.0' S=0.0273 '/' 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=20.0' S=0.0100 '/' Outflow=0.85 cfs 0.070 af
Pond 10C: CB3	Peak Elev=301.45' Inflow=0.85 cfs 0.063 af 15.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/' Outflow=0.85 cfs 0.063 af
Pond 11C: CB4	Peak Elev=300.41' Inflow=7.44 cfs 0.877 af 15.0" Round Culvert n=0.010 L=83.0' S=0.0108 '/' Outflow=7.44 cfs 0.877 af
Pond 12Y: YD7	Peak Elev=298.74' Inflow=0.67 cfs 0.055 af 8.0" Round Culvert n=0.010 L=23.0' S=0.0087 '/' Outflow=0.67 cfs 0.055 af
Pond 13C: CB5	Peak Elev=298.67' Inflow=8.23 cfs 0.971 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0056 '/' Outflow=8.23 cfs 0.971 af

2019-022 Mannarino Maskel Rd Rev1*Type III 24-hr 25-Year Rainfall=6.13"*

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 10

Pond 14C: CB6

Peak Elev=297.56' Inflow=0.60 cfs 0.049 af
18.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/ Outflow=0.60 cfs 0.049 af

Pond 15C: CB7

Peak Elev=297.56' Inflow=9.69 cfs 1.197 af
24.0" Round Culvert n=0.010 L=96.0' S=0.0050 '/ Outflow=9.69 cfs 1.197 af

Pond 16Y: YD8

Peak Elev=297.76' Inflow=1.10 cfs 0.091 af
8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/ Outflow=1.10 cfs 0.091 af

Pond 18D: DMH1

Peak Elev=297.26' Inflow=9.69 cfs 1.196 af
24.0" Round Culvert n=0.010 L=187.0' S=0.0050 '/ Outflow=9.69 cfs 1.196 af

Pond 19P: POND

Peak Elev=296.76' Storage=37,744 cf Inflow=15.13 cfs 2.033 af
Outflow=8.63 cfs 1.879 af

Pond 20D: DMH2

Peak Elev=292.45' Inflow=8.63 cfs 1.877 af
15.0" Round Culvert n=0.010 L=241.0' S=0.0129 '/ Outflow=8.63 cfs 1.877 af

Pond 21C: CB9

Peak Elev=288.80' Inflow=1.02 cfs 0.106 af
15.0" Round Culvert n=0.010 L=22.0' S=0.0091 '/ Outflow=1.02 cfs 0.106 af

Pond 22C: CB10

Peak Elev=288.80' Inflow=8.92 cfs 2.043 af
15.0" Round Culvert n=0.010 L=15.0' S=0.0133 '/ Outflow=8.92 cfs 2.043 af

Pond 24P: DMH1A

Peak Elev=296.98' Inflow=9.69 cfs 1.195 af
24.0" Round Culvert n=0.010 L=21.0' S=0.0090 '/ Outflow=9.69 cfs 1.195 af

Pond 25P: YD9

Peak Elev=288.80' Inflow=0.68 cfs 0.058 af
12.0" Round Culvert n=0.010 L=2.0' S=0.1000 '/ Outflow=0.68 cfs 0.058 af

Link 23P: POST

Inflow=8.92 cfs 2.041 af
Primary=8.92 cfs 2.041 af

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

Subcatchment1S: 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
Subcatchment2S: 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
Subcatchment3S: 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
Subcatchment4S: 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
Subcatchment5S: 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
Subcatchment6S: 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
Subcatchment7S: 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
Subcatchment9S: 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
Subcatchment10S: 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
Subcatchment11S: 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
Subcatchment12S: YD7	Runoff Area=9,647 sf 12.26% Impervious Runoff Depth>4.48" Tc=10.0 min CN=71 Runoff=1.01 cfs 0.083 af
Subcatchment13S: CB5	Runoff Area=3,794 sf 88.17% Impervious Runoff Depth>7.18" Tc=5.0 min CN=94 Runoff=0.67 cfs 0.052 af
Subcatchment14S: CB6	Runoff Area=4,327 sf 100.00% Impervious Runoff Depth>7.66" Tc=5.0 min CN=98 Runoff=0.78 cfs 0.063 af
Subcatchment15S: CB7	Runoff Area=9,195 sf 74.62% Impervious Runoff Depth>6.70" Tc=5.0 min CN=90 Runoff=1.56 cfs 0.118 af
Subcatchment16S: YD8	Runoff Area=16,962 sf 6.27% Impervious Runoff Depth>4.26" Tc=10.0 min CN=69 Runoff=1.68 cfs 0.138 af
Subcatchment19S: CB8	Runoff Area=156,227 sf 5.95% Impervious Runoff Depth>4.25" Flow Length=539' Tc=13.3 min CN=69 Runoff=14.07 cfs 1.272 af

2019-022 Mannarino Maskel Rd Rev1*Type III 24-hr 100-Year Rainfall=7.90"*

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 12

Subcatchment20S: S1	Runoff Area=12,842 sf 0.00% Impervious Runoff Depth>3.69" Tc=10.0 min CN=64 Runoff=1.10 cfs 0.091 af
Subcatchment21S: CB9	Runoff Area=4,263 sf 100.00% Impervious Runoff Depth>7.66" Tc=5.0 min CN=98 Runoff=0.76 cfs 0.062 af
Subcatchment22S: CB10	Runoff Area=7,571 sf 57.10% Impervious Runoff Depth>6.00" Tc=5.0 min CN=84 Runoff=1.19 cfs 0.087 af
Subcatchment24E: PRE	Runoff Area=331,259 sf 0.00% Impervious Runoff Depth>3.34" Flow Length=1,315' Tc=35.7 min CN=61 Runoff=15.40 cfs 2.117 af
Pond 1Y: YD1	Peak Elev=309.18' 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=308.95' 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=308.22' 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=307.42' Inflow=6.55 cfs 0.605 af 15.0" Round Culvert n=0.010 L=19.0' S=0.0105 ' / ' Outflow=6.55 cfs 0.605 af
Pond 5C: CB1	Peak Elev=306.90' Inflow=1.68 cfs 0.128 af 15.0" Round Culvert n=0.010 L=21.0' S=0.0095 ' / ' Outflow=1.68 cfs 0.128 af
Pond 6C: CB2	Peak Elev=306.89' Inflow=7.94 cfs 0.864 af 15.0" Round Culvert n=0.010 L=88.0' S=0.0273 ' / ' Outflow=7.94 cfs 0.864 af
Pond 7Y: YD5	Peak Elev=305.90' Inflow=1.52 cfs 0.125 af 8.0" Round Culvert n=0.010 L=20.0' S=0.0100 ' / ' Outflow=1.52 cfs 0.125 af
Pond 8T: T5	Peak Elev=305.74' Inflow=8.92 cfs 0.988 af 15.0" Round Culvert n=0.010 L=88.0' S=0.0273 ' / ' Outflow=8.92 cfs 0.988 af
Pond 9Y: YD6	Peak Elev=303.87' Inflow=1.28 cfs 0.105 af 8.0" Round Culvert n=0.010 L=20.0' S=0.0100 ' / ' Outflow=1.28 cfs 0.105 af
Pond 10C: CB3	Peak Elev=303.76' Inflow=1.12 cfs 0.085 af 15.0" Round Culvert n=0.010 L=21.0' S=0.0095 ' / ' Outflow=1.12 cfs 0.085 af
Pond 11C: CB4	Peak Elev=303.76' Inflow=10.79 cfs 1.266 af 15.0" Round Culvert n=0.010 L=83.0' S=0.0108 ' / ' Outflow=10.79 cfs 1.266 af
Pond 12Y: YD7	Peak Elev=301.24' Inflow=1.01 cfs 0.083 af 8.0" Round Culvert n=0.010 L=23.0' S=0.0087 ' / ' Outflow=1.01 cfs 0.083 af
Pond 13C: CB5	Peak Elev=301.19' Inflow=11.81 cfs 1.400 af 18.0" Round Culvert n=0.010 L=216.0' S=0.0056 ' / ' Outflow=11.81 cfs 1.400 af

Pond 14C: CB6

Peak Elev=299.21' Inflow=0.78 cfs 0.063 af
18.0" Round Culvert n=0.010 L=21.0' S=0.0095 '/' Outflow=0.78 cfs 0.063 af

Pond 15C: CB7

Peak Elev=299.21' Inflow=13.92 cfs 1.718 af
24.0" Round Culvert n=0.010 L=96.0' S=0.0050 '/' Outflow=13.92 cfs 1.718 af

Pond 16Y: YD8

Peak Elev=299.30' Inflow=1.68 cfs 0.138 af
8.0" Round Culvert n=0.010 L=20.0' S=0.0100 '/' Outflow=1.68 cfs 0.138 af

Pond 18D: DMH1

Peak Elev=298.62' Inflow=13.92 cfs 1.717 af
24.0" Round Culvert n=0.010 L=187.0' S=0.0050 '/' Outflow=13.92 cfs 1.717 af

Pond 19P: POND

Peak Elev=297.61' Storage=52,612 cf Inflow=22.33 cfs 2.986 af
Outflow=12.21 cfs 2.808 af

Pond 20D: DMH2

Peak Elev=295.99' Inflow=12.21 cfs 2.806 af
15.0" Round Culvert n=0.010 L=241.0' S=0.0129 '/' Outflow=12.21 cfs 2.806 af

Pond 21C: CB9

Peak Elev=291.10' Inflow=1.53 cfs 0.153 af
15.0" Round Culvert n=0.010 L=22.0' S=0.0091 '/' Outflow=1.53 cfs 0.153 af

Pond 22C: CB10

Peak Elev=291.10' Inflow=12.67 cfs 3.043 af
15.0" Round Culvert n=0.010 L=15.0' S=0.0133 '/' Outflow=12.67 cfs 3.043 af

Pond 24P: DMH1A

Peak Elev=298.03' Inflow=13.92 cfs 1.716 af
24.0" Round Culvert n=0.010 L=21.0' S=0.0090 '/' Outflow=13.92 cfs 1.716 af

Pond 25P: YD9

Peak Elev=291.11' Inflow=1.10 cfs 0.091 af
12.0" Round Culvert n=0.010 L=2.0' S=0.1000 '/' Outflow=1.10 cfs 0.091 af

Link 23P: POST

Inflow=12.67 cfs 3.040 af
Primary=12.67 cfs 3.040 af

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"

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 15

	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

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 17

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 = 0.47 cfs @ 12.15 hrs, Volume= 0.039 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"

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 18

	Area (sf)	CN	Description
*	8,464	67	>75% Grass cover, Good, HSG C
	1,183	98	Roofs, HSG C
	9,647	71	Weighted Average
	8,464		87.74% Pervious Area
	1,183		12.26% 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 = 0.41 cfs @ 12.07 hrs, Volume= 0.031 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
*	449	67	>75% Grass cover, Good, HSG C
	3,345	98	Roofs, HSG C
	3,794	94	Weighted Average
	449		11.83% Pervious Area
	3,345		88.17% 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 = 0.49 cfs @ 12.07 hrs, Volume= 0.039 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
	4,327	98	Roofs, HSG C
	4,327		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 = 0.93 cfs @ 12.07 hrs, Volume= 0.068 af, Depth> 3.86"

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
*	2,334	67	>75% Grass cover, Good, HSG C
	6,861	98	Roofs, HSG C
	9,195	90	Weighted Average
	2,334		25.38% Pervious Area
	6,861		74.62% Impervious Area

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

Summary for Subcatchment 16S: YD8

Runoff = 0.75 cfs @ 12.15 hrs, Volume= 0.063 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
*	966	61	Woods, Good, HSG C
*	14,933	67	>75% Grass cover, Good, HSG C
	1,063	98	Roofs, HSG C
	16,962	69	Weighted Average
	15,899		93.73% Pervious Area
	1,063		6.27% Impervious Area

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

Summary for Subcatchment 19S: CB8

Runoff = 6.27 cfs @ 12.20 hrs, Volume= 0.581 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"

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 20

	Area (sf)	CN	Description
*	44,767	61	Woods, Good, HSG C
*	8,866	77	Wooded Wetlands, Good, HSG D
*	87,899	67	>75% Grass cover, Good, HSG C
	5,393	98	Water Surface, 0% imp, HSG C
	9,302	98	Roofs, HSG C
	156,227	69	Weighted Average
	146,925		94.05% Pervious Area
	9,302		5.95% 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 = 0.44 cfs @ 12.16 hrs, Volume= 0.039 af, Depth> 1.57"

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
*	5,533	61	Woods, Good, HSG C
*	7,309	67	>75% Grass cover, Good, HSG C
	12,842	64	Weighted Average
	12,842		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 = 0.48 cfs @ 12.07 hrs, Volume= 0.039 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"

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 21

Area (sf)	CN	Description
4,263	98	Roofs, HSG C
4,263		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 = 0.66 cfs @ 12.07 hrs, Volume= 0.047 af, Depth> 3.26"

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
*	2,558	67	>75% Grass cover, Good, HSG C
	4,323	98	Roofs, HSG C
	7,571	84	Weighted Average
	3,248		42.90% Pervious Area
	4,323		57.10% Impervious Area

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

Summary for Subcatchment 24E: PRE

Runoff = 5.75 cfs @ 12.55 hrs, Volume= 0.855 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
*	322,393	61	Woods, Good, HSG C
*	8,866	77	Wooded Wetlands, Good, HSG D
	331,259	61	Weighted Average
	331,259		100.00% Pervious Area

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 22

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= 312.50'

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= 310.50'

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=304.28' (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

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

Peak Elev= 304.31' @ 12.33 hrs

Flood Elev= 308.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	303.20'	15.0" Round Culvert L= 19.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 303.20' / 303.00' S= 0.0105 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=2.78 cfs @ 12.31 hrs HW=304.30' TW=304.02' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 2.78 cfs @ 3.23 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

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 24

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

Peak Elev= 305.60' @ 12.12 hrs

Flood Elev= 308.63'

Device	Routing	Invert	Outlet Devices
#1	Primary	305.10'	15.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 305.10' / 304.90' S= 0.0095 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=0.97 cfs @ 12.12 hrs HW=305.59' TW=303.88' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 0.97 cfs @ 3.23 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= 308.63'

Device	Routing	Invert	Outlet Devices
#1	Primary	303.00'	15.0" Round Culvert L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 303.00' / 300.60' S= 0.0273 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=3.74 cfs @ 12.33 hrs HW=304.03' TW=301.73' (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= 301.82' @ 12.29 hrs

Flood Elev= 306.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	301.00'	8.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 301.00' / 300.80' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.28 cfs @ 12.20 hrs HW=301.69' TW=301.67' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 0.28 cfs @ 0.96 fps)

Summary for Pond 8T: T5

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= 301.73' @ 12.36 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	300.60'	15.0" Round Culvert L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 300.60' / 298.20' S= 0.0273 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=4.23 cfs @ 12.36 hrs HW=301.73' 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

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= 304.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	299.00'	8.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 299.00' / 298.80' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.23 cfs @ 12.20 hrs HW=299.52' TW=299.49' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 0.23 cfs @ 1.08 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

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 26

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= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 301.00' / 300.80' S= 0.0095 '/' 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 @ 2.99 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= 83.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.20' / 297.30' S= 0.0108 '/' 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 = 0.221 ac, 12.26% Impervious, Inflow Depth > 2.10" for 10-Year event
Inflow = 0.47 cfs @ 12.15 hrs, Volume= 0.039 af
Outflow = 0.47 cfs @ 12.20 hrs, Volume= 0.039 af, Atten= 0%, Lag= 3.0 min
Primary = 0.47 cfs @ 12.20 hrs, Volume= 0.039 af

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

Peak Elev= 298.41' @ 12.20 hrs

Flood Elev= 301.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	298.00'	8.0" Round Culvert L= 23.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 298.00' / 297.80' S= 0.0087 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.47 cfs @ 12.20 hrs HW=298.41' TW=298.06' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 0.47 cfs @ 2.93 fps)

Summary for Pond 13C: CB5

Inflow Area = 3.374 ac, 28.40% Impervious, Inflow Depth > 2.52" for 10-Year event
 Inflow = 5.98 cfs @ 12.27 hrs, Volume= 0.709 af
 Outflow = 5.98 cfs @ 12.32 hrs, Volume= 0.709 af, Atten= 0%, Lag= 3.0 min
 Primary = 5.98 cfs @ 12.32 hrs, Volume= 0.709 af

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

Peak Elev= 298.27' @ 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' / 295.80' S= 0.0056 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Primary OutFlow Max=5.74 cfs @ 12.32 hrs HW=298.26' TW=296.96' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 5.74 cfs @ 4.91 fps)

Summary for Pond 14C: CB6

Inflow Area = 0.099 ac, 100.00% Impervious, Inflow Depth > 4.75" for 10-Year event
 Inflow = 0.49 cfs @ 12.07 hrs, Volume= 0.039 af
 Outflow = 0.49 cfs @ 12.12 hrs, Volume= 0.039 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.49 cfs @ 12.12 hrs, Volume= 0.039 af

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

Peak Elev= 297.04' @ 12.53 hrs

Flood Elev= 299.51'

Device	Routing	Invert	Outlet Devices
#1	Primary	296.00'	18.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 296.00' / 295.80' S= 0.0095 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.12 hrs HW=296.51' TW=296.56' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Summary for Pond 15C: CB7

Inflow Area = 4.073 ac, 30.43% Impervious, Inflow Depth > 2.59" for 10-Year event
 Inflow = 7.08 cfs @ 12.30 hrs, Volume= 0.879 af
 Outflow = 7.08 cfs @ 12.35 hrs, Volume= 0.879 af, Atten= 0%, Lag= 3.0 min
 Primary = 7.08 cfs @ 12.35 hrs, Volume= 0.879 af

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

Peak Elev= 297.04' @ 12.48 hrs

Flood Elev= 299.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	295.60'	24.0" Round Culvert L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 295.60' / 295.12' S= 0.0050 '/' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=6.46 cfs @ 12.35 hrs HW=297.00' TW=296.49' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 6.46 cfs @ 3.87 fps)

Summary for Pond 16Y: YD8

Inflow Area = 0.389 ac, 6.27% Impervious, Inflow Depth > 1.94" for 10-Year event
Inflow = 0.75 cfs @ 12.15 hrs, Volume= 0.063 af
Outflow = 0.75 cfs @ 12.20 hrs, Volume= 0.063 af, Atten= 0%, Lag= 3.0 min
Primary = 0.75 cfs @ 12.20 hrs, Volume= 0.063 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 297.56' @ 12.20 hrs
Flood Elev= 299.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	297.00'	8.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 297.00' / 296.80' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Primary OutFlow Max=0.75 cfs @ 12.20 hrs HW=297.55' TW=296.74' (Dynamic Tailwater)
↑1=Culvert (Barrel Controls 0.75 cfs @ 3.27 fps)

Summary for Pond 18D: DMH1

Inflow Area = 4.073 ac, 30.43% Impervious, Inflow Depth > 2.59" for 10-Year event
Inflow = 7.08 cfs @ 12.35 hrs, Volume= 0.878 af
Outflow = 7.08 cfs @ 12.40 hrs, Volume= 0.878 af, Atten= 0%, Lag= 3.0 min
Primary = 7.08 cfs @ 12.40 hrs, Volume= 0.878 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 296.66' @ 12.61 hrs
Flood Elev= 300.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	295.12'	24.0" Round Culvert L= 187.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 295.12' / 294.19' S= 0.0050 '/' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=6.41 cfs @ 12.40 hrs HW=296.57' TW=295.98' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 6.41 cfs @ 3.68 fps)

Summary for Pond 19P: POND

Inflow Area = 7.660 ac, 18.97% Impervious, Inflow Depth > 2.28" for 10-Year event
 Inflow = 10.87 cfs @ 12.39 hrs, Volume= 1.457 af
 Outflow = 5.39 cfs @ 12.82 hrs, Volume= 1.321 af, Atten= 50%, Lag= 26.1 min
 Primary = 5.39 cfs @ 12.82 hrs, Volume= 1.321 af

Routing by Sim-Route method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Starting Elev= 294.00' Surf.Area= 14,379 sf Storage= 7,134 cf
 Peak Elev= 296.31' @ 12.82 hrs Surf.Area= 24,130 sf Storage= 30,584 cf (23,450 cf above start)

Plug-Flow detention time= 186.8 min calculated for 1.157 af (79% of inflow)
 Center-of-Mass det. time= 81.6 min (924.6 - 843.0)

Volume	Invert	Avail.Storage	Storage Description
#1	291.50'	2,667 cf	Permanent Pool (Prismatic) Listed below (Recalc)
#2	291.50'	2,013 cf	Forebay (Prismatic) Listed below (Recalc)
#3	293.50'	2,454 cf	Permanant Pool Above 293.5 (Prismatic) Listed below (Recalc)
#4	294.00'	63,354 cf	Extended Detention (Prismatic) Listed below (Recalc)
		70,487 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
291.50	558	0	0
292.00	909	367	367
293.50	2,158	2,300	2,667

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
291.50	478	0	0
292.00	706	296	296
293.50	1,583	1,717	2,013

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.50	4,497	0	0
294.00	5,319	2,454	2,454

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
294.00	5,319	0	0
295.00	9,203	7,261	7,261
296.00	14,199	11,701	18,962
298.00	19,881	34,080	53,042
298.50	21,365	10,312	63,354

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=5.38 cfs @ 12.82 hrs HW=296.31' TW=290.44' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 5.38 cfs of 14.31 cfs potential flow)
 ↑ **2=Custom Weir/Orifice** (Weir Controls 5.38 cfs @ 3.73 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 20D: DMH2

Inflow Area = 7.660 ac, 18.97% Impervious, Inflow Depth > 2.07" for 10-Year event
 Inflow = 5.39 cfs @ 12.82 hrs, Volume= 1.319 af
 Outflow = 5.39 cfs @ 12.87 hrs, Volume= 1.319 af, Atten= 0%, Lag= 3.0 min
 Primary = 5.39 cfs @ 12.87 hrs, Volume= 1.319 af

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

Peak Elev= 290.46' @ 12.87 hrs

Flood Elev= 299.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	289.00'	15.0" Round Culvert L= 241.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 289.00' / 285.90' S= 0.0129' /' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=5.38 cfs @ 12.87 hrs HW=290.45' TW=287.42' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 5.38 cfs @ 4.38 fps)

Summary for Pond 21C: CB9

Inflow Area = 0.393 ac, 24.92% Impervious, Inflow Depth > 2.36" for 10-Year event
 Inflow = 0.73 cfs @ 12.12 hrs, Volume= 0.077 af
 Outflow = 0.73 cfs @ 12.17 hrs, Volume= 0.077 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.73 cfs @ 12.17 hrs, Volume= 0.077 af

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

Peak Elev= 287.43' @ 12.96 hrs

Flood Elev= 289.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	286.10'	15.0" Round Culvert L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 286.10' / 285.90' S= 0.0091' /' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=0.59 cfs @ 12.17 hrs HW=286.66' TW=286.58' (Dynamic Tailwater)

↑ **1=Culvert** (Outlet Controls 0.59 cfs @ 1.61 fps)

Summary for Pond 22C: CB10

Inflow Area = 8.226 ac, 20.06% Impervious, Inflow Depth > 2.10" for 10-Year event
 Inflow = 5.59 cfs @ 12.86 hrs, Volume= 1.442 af
 Outflow = 5.59 cfs @ 12.91 hrs, Volume= 1.442 af, Atten= 0%, Lag= 3.0 min
 Primary = 5.59 cfs @ 12.91 hrs, Volume= 1.442 af

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

Peak Elev= 287.43' @ 12.91 hrs

Flood Elev= 289.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.90'	15.0" Round Culvert L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.90' / 285.70' S= 0.0133 '/' Cc= 0.900 n= 0.010, Flow Area= 1.23 sf

Primary OutFlow Max=5.58 cfs @ 12.91 hrs HW=287.43' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 5.58 cfs @ 4.74 fps)

Summary for Pond 24P: DMH1A

Inflow Area = 4.073 ac, 30.43% Impervious, Inflow Depth > 2.58" for 10-Year event
 Inflow = 7.08 cfs @ 12.40 hrs, Volume= 0.877 af
 Outflow = 7.08 cfs @ 12.45 hrs, Volume= 0.877 af, Atten= 0%, Lag= 3.0 min
 Primary = 7.08 cfs @ 12.45 hrs, Volume= 0.877 af

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

Peak Elev= 296.37' @ 12.75 hrs

Flood Elev= 301.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	294.19'	24.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 294.19' / 294.00' S= 0.0090 '/' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf

Primary OutFlow Max=5.19 cfs @ 12.45 hrs HW=296.09' TW=295.97' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 5.19 cfs @ 1.69 fps)

Summary for Pond 25P: YD9

Inflow Area = 0.295 ac, 0.00% Impervious, Inflow Depth > 1.57" for 10-Year event
 Inflow = 0.44 cfs @ 12.16 hrs, Volume= 0.039 af
 Outflow = 0.44 cfs @ 12.21 hrs, Volume= 0.039 af, Atten= 0%, Lag= 3.0 min
 Primary = 0.44 cfs @ 12.21 hrs, Volume= 0.039 af

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

Peak Elev= 287.43' @ 13.01 hrs

Flood Elev= 289.00'

2019-022 Mannarino Maskel Rd Rev1

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

Prepared by J.R. Russo & Associates, LLC

Printed 4/7/2020

HydroCAD® 10.00-25 s/n 05524 © 2019 HydroCAD Software Solutions LLC

Page 32

Device	Routing	Invert	Outlet Devices
#1	Primary	286.30'	12.0" Round Culvert L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 286.30' / 286.10' S= 0.1000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.21 hrs HW=286.74' TW=286.69' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 0.34 cfs @ 1.52 fps)**Summary for Link 23P: POST**

Inflow Area = 8.226 ac, 20.06% Impervious, Inflow Depth > 2.10" for 10-Year event
Inflow = 5.59 cfs @ 12.91 hrs, Volume= 1.440 af
Primary = 5.59 cfs @ 12.96 hrs, Volume= 1.440 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

PIPE SIZING CHART															
Kilkenney Heights II - Open Space Subdivision (13-Lots), Maskel Road, South Windsor, CT															
STRUCTURE		AREA (S.F.)			AxC		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	19	1.05	7.2	5.9
CB1	CB2		2,152	7,624	0.175	0.175	5.0	0.1	7.43	1.3	15	21	0.95	6.8	5.6
CB2	T5		1,215	8,376	0.183	0.980	11.0	0.2	5.02	4.9	15	88	2.73	11.6	9.4
YD5	T5		12,782	1,760	0.139	0.139	10.0	0.1	5.26	0.7	8	20	1.00	1.3	3.8
T5	CB4				0.000	1.119	11.2	0.2	4.99	5.6	15	88	2.73	11.6	9.4
CB3	CB4		1,513	5,003	0.116	0.116	5.0	0.1	7.43	0.9	15	21	0.95	6.8	5.6
YD6	CB4		10,505	1,760	0.121	0.121	10.0	0.1	5.26	0.6	8	20	1.00	1.3	3.8
CB4	CB5		822	5,636	0.123	1.478	11.4	0.2	4.67	6.9	15	83	1.08	7.3	5.9
YD7	CB5		8,464	1,183	0.092	0.092	10.0	0.1	5.26	0.5	8	23	0.87	1.2	3.5
CB5	CB7		449	3,345	0.073	1.643	11.6	0.7	4.90	8.0	18	216	0.56	8.5	4.8
CB6	CB7			4,327	0.089	0.089	5.0	0.1	6.40	0.6	18	21	0.95	11.1	6.3
YD8	CB7	966	14,933	1,063	0.145	0.145	10.0	0.1	5.26	0.8	8	20	1.00	1.3	3.8
CB7	DMH1		2,334	6,861	0.161	2.039	12.3	0.3	4.73	9.6	24	96	0.50	17.4	5.5
DMH1	DMH1A				0.000	2.039	12.3	0.6	4.73	9.6	24	187	0.50	17.4	5.5
DMH1A	CB8				0.000	2.039	12.3	0.0	4.73	9.6	24	21	0.90	23.3	7.4
CB8	DMH2	53,633	87,899	14,695	1.195	3.233	60.0	0.1	1.76	5.7	15	33	1.52	8.6	7.0
DMH2	CB10				0.000	3.233	60.1	0.6	1.76	5.7	15	241	1.19	7.6	6.2
YD9	CB9	5,533	7,309		0.078	0.078	10.0	0.0	5.26	0.4	12	2	4.99	8.6	11.0
CB9	CB10			4,263	0.088	0.166	10.0	0.1	5.26	0.9	15	22	0.77	6.2	5.0
CB10	Abbe	690	2,558	4,323	0.112	3.511	60.7	0.0	1.75	6.2	15	15	1.17	7.6	6.2
		14,989	108,457	53,993	2.039										