

DRAINAGE ANALYSIS

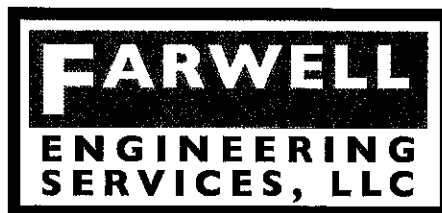
Prepared for

BARRINGTON SHORES, LLC:

**Tax map 121
Lot 28
7 Barrington Shores Dr
Barrington, NH 03825**

**Submitted
January, 2020**

Prepared by



**265 Wadleigh Falls Road
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PROJECT DESCRIPTION

The proposed project is to expand the Barrington Shores seasonal campground, including new campsites and septic system. There is an existing gravel access road that is intended to be upgraded and expanded to access the camp sites. In total there will be 1,120 lf of new or improved gravel road. We are proposing to detain the increase in flow from the additional gravel surface by building a detention pond with an outlet control structure.

CALCULATION METHODS

The drainage study was completed using HydroCAD. The program generates runoff hydrographs for specified storm distributions, and performs reservoir routing using the storage indication method. The criteria used for this drainage analysis is the 2, 5, and 50 24-hour Type III frequency storm events. Flow depths are based on extreme precipitation data.

The accuracy of stormwater management modeling is limited. The peak flow rates and flood elevations provided herein should not be considered absolute due to the number of variables involved in their determination. Surface roughness coefficient (n), entrance loss coefficients (k_e), velocity factors (k_v), time of concentration (T_c) and tail water conditions are subjective to field observation and engineering judgment. Curve Numbers (CN) describes the average conditions useful for design purposes. Modeling to simulate an actual storm event requires additional knowledge of antecedent runoff conditions (ARC). Curve numbers will vary from storm to storm dependent on the ARC.

SUMMARY

Site Soils

Soils on site are based on NRCS soil mapping. GsB- Gloucester 3-8% slopes – Hydrologic Group A. GsC- Gloucester 8-15% slopes Hydrologic group A. GtD- Gloucester 8-25% slopes Hydrologic Group A. Wa – Whitman Hydrologic group C/D.

Pre- and Post-Development

All runoff from the developed area of the site flows to Swain Lake. This project abuts tax map 121 Lot 37 on 2 sides. We have provided a swale to intercept runoff to this site and routed the runoff to the detention pond.

Study Point 1: Study point 1 is the area closest to the lake.

Study Point 2: Study point 2 is the common property line of lot 37 on the north east side.

Drainage Analysis

A complete summary of the flow conditions is included in Appendix A. The following compares pre- and post-development peak flow rates of runoff leaving the site.

2-year Storm Event (3.07 inches)

	Pre- Development	Post Development	
Point of Analysis	Peak Flow(cfs)	Peak Flow(cfs)	Difference (cfs)
SP-1	0.00	0.04	+0.04
SP-2	0	0	0

5-year Storm Event (4.63 inches)

	Pre- Development	Post Development	
Point of Analysis	Peak Flow(cfs)	Peak Flow(cfs)	Difference (cfs)
SP-1	0.18	0.04	-0.14
SP-2	0	0	0

50-year Storm Event (6.99 inches)

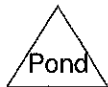
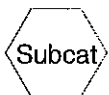
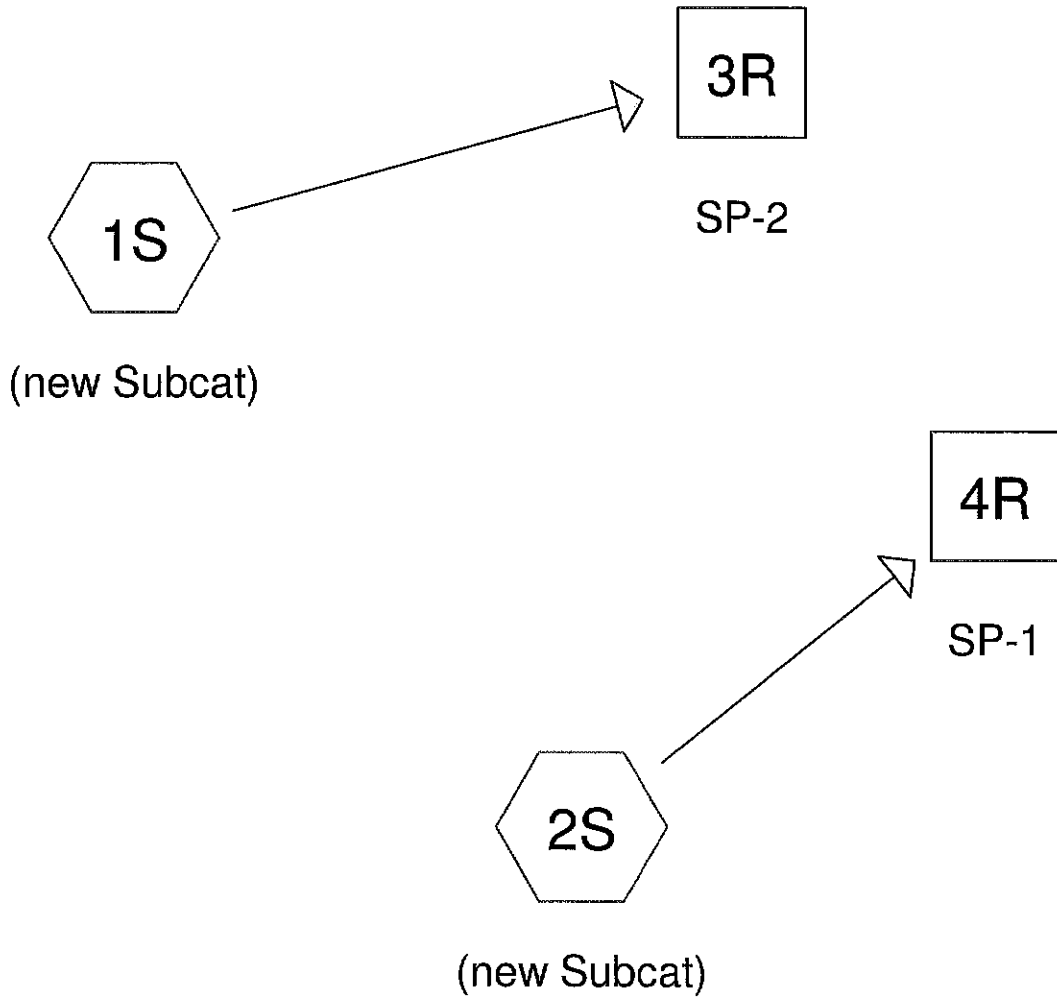
	Pre- Development	Post Development	
Point of Analysis	Peak Flow(cfs)	Peak Flow(cfs)	Difference (cfs)
SP-1	2.76	1.48	-1.28
SP-2	0.02	0.01	-0.01

Conclusion

Given the soil types and ground cover there is very little flow from this site. There is a very small increase in the 2 year event. This is a flow from a 2" orifice and is a very small increase. The peak rate of runoff from the 50 year event is reduced.

APPENDIX A:
SUPPORTING CALCULATIONS

**PRE-DEVELOPMENT
ANALYSIS**



1958-BARRINGTON SHORE-PRE

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.447	30	Woods, Good, HSG A (1S, 2S)
0.931	39	>75% Grass cover, Good, HSG A (2S)
0.091	70	Woods, Good, HSG C (2S)
0.097	74	>75% Grass cover, Good, HSG C (2S)
0.592	96	Gravel surface, HSG A (2S)
0.054	96	Gravel surface, HSG C (2S)
0.012	98	Paved parking, HSG A (2S)
0.068	98	Unconnected roofs, HSG A (2S)

1958-BARRINGTON SHORE-PRE

Type III 24-hr 2 YR Rainfall=3.07"

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Summary for Subcatchment 1S: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

Area (sf)	CN	Description
34,917	30	Woods, Good, HSG A
34,917		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	25	0.1500	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
2.0	179	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.2	204	Total			

Summary for Subcatchment 2S: (new Subcat)

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

Area (sf)	CN	Description
25,794	96	Gravel surface, HSG A
2,952	98	Unconnected roofs, HSG A
505	98	Paved parking, HSG A
40,548	39	>75% Grass cover, Good, HSG A
158,777	30	Woods, Good, HSG A
2,344	96	Gravel surface, HSG C
3,948	70	Woods, Good, HSG C
4,204	74	>75% Grass cover, Good, HSG C
239,072	42	Weighted Average, UI Adjusted CN = 41
235,615		98.55% Pervious Area
3,457		1.45% Impervious Area
2,952		85.39% Unconnected

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Type III 24-hr 2 YR Rainfall=3.07"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	25	0.0400	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
7.8	623	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.3	648	Total			

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Type III 24-hr 5 YR Rainfall=4.63"

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Summary for Subcatchment 1S: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5 YR Rainfall=4.63"

Area (sf)	CN	Description
34,917	30	Woods, Good, HSG A
34,917		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	25	0.1500	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
2.0	179	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.2	204	Total			

Summary for Subcatchment 2S: (new Subcat)

Runoff = 0.18 cfs @ 12.59 hrs, Volume= 0.068 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5 YR Rainfall=4.63"

Area (sf)	CN	Description
25,794	96	Gravel surface, HSG A
2,952	98	Unconnected roofs, HSG A
505	98	Paved parking, HSG A
40,548	39	>75% Grass cover, Good, HSG A
158,777	30	Woods, Good, HSG A
2,344	96	Gravel surface, HSG C
3,948	70	Woods, Good, HSG C
4,204	74	>75% Grass cover, Good, HSG C
239,072	42	Weighted Average, UI Adjusted CN = 41
235,615		98.55% Pervious Area
3,457		1.45% Impervious Area
2,952		85.39% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	25	0.0400	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
7.8	623	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.3	648	Total			

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Type III 24-hr 50 YR Rainfall=6.99"

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Summary for Subcatchment 1S: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.02 cfs @ 13.76 hrs, Volume= 0.011 af, Depth> 0.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.99"

Area (sf)	CN	Description
34,917	30	Woods, Good, HSG A
34,917		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	25	0.1500	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
2.0	179	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.2	204	Total			

Summary for Subcatchment 2S: (new Subcat)

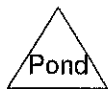
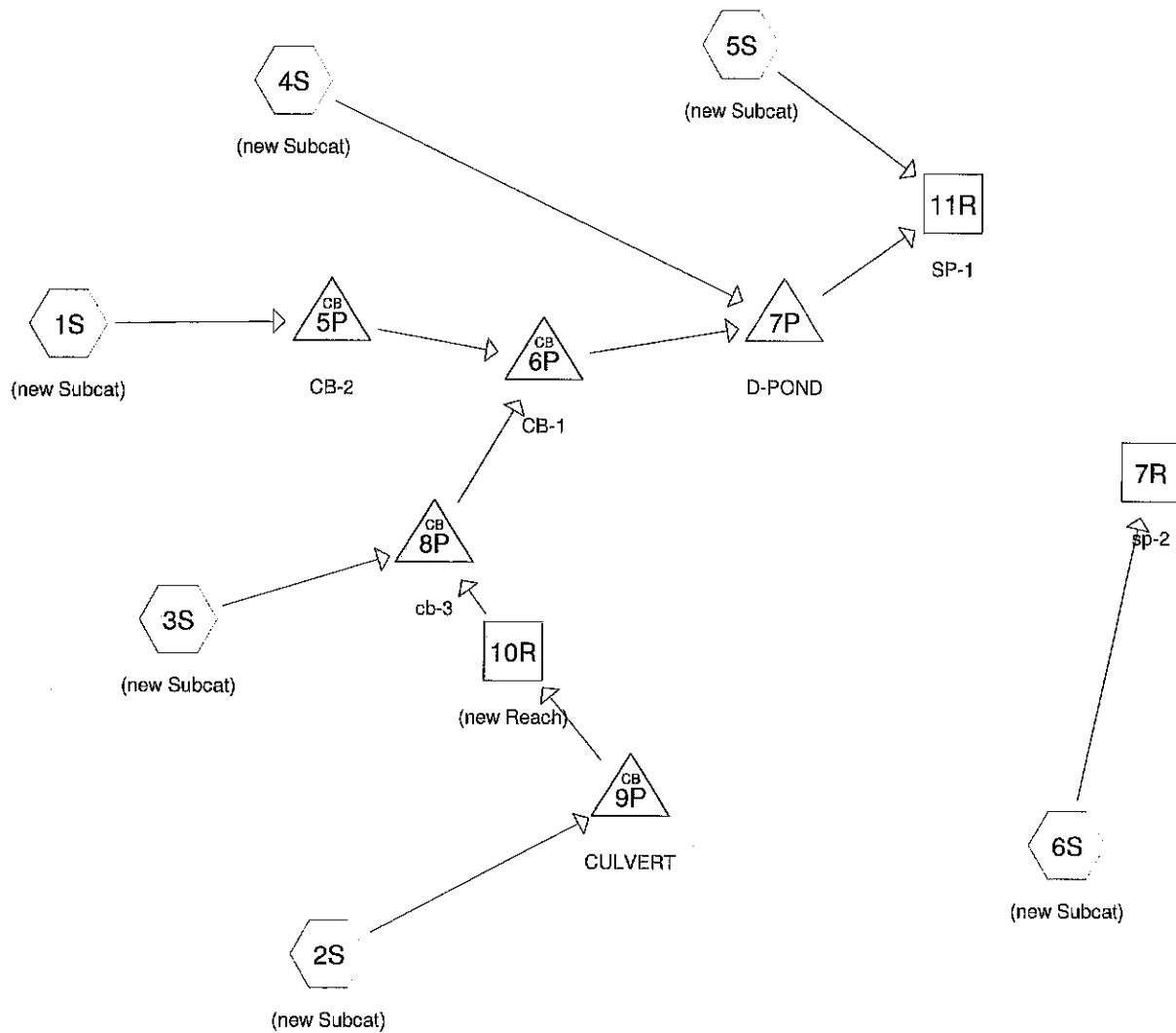
Runoff = 2.76 cfs @ 12.28 hrs, Volume= 0.362 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.99"

Area (sf)	CN	Description
25,794	96	Gravel surface, HSG A
2,952	98	Unconnected roofs, HSG A
505	98	Paved parking, HSG A
40,548	39	>75% Grass cover, Good, HSG A
158,777	30	Woods, Good, HSG A
2,344	96	Gravel surface, HSG C
3,948	70	Woods, Good, HSG C
4,204	74	>75% Grass cover, Good, HSG C
239,072	42	Weighted Average, UI Adjusted CN = 41
235,615		98.55% Pervious Area
3,457		1.45% Impervious Area
2,952		85.39% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	25	0.0400	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
7.8	623	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.3	648	Total			

**POST-DEVELOPMENT
ANALYSIS**



Routing Diagram for 1958-BARRINGTON SHORE-POST
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Type III 24-hr 2 YR Rainfall=3.07"

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Summary for Subcatchment 1S: (new Subcat)

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

Area (sf)	CN	Description
3,167	96	Gravel surface, HSG A
2,580	39	>75% Grass cover, Good, HSG A
37,560	30	Woods, Good, HSG A
43,307	35	Weighted Average
43,307		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	25	0.3300	0.18		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
2.7	480	0.0400	3.00		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
1.4	150	0.0150	1.84		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
6.5	655	Total			

Summary for Subcatchment 2S: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.13 cfs @ 12.12 hrs, Volume= 0.015 af, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

Area (sf)	CN	Description
7,676	96	Gravel surface, HSG A
2,400	98	Unconnected roofs, HSG A
2,400	72	Dirt roads, HSG A
4,008	39	>75% Grass cover, Good, HSG A
8,677	30	Woods, Good, HSG A
25,161	62	Weighted Average, UI Adjusted CN = 60
22,761		90.46% Pervious Area
2,400		9.54% Impervious Area
2,400		100.00% Unconnected

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Type III 24-hr 2 YR Rainfall=3.07"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	25	0.1600	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
1.8	140	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	165	Total			

Summary for Subcatchment 3S: (new Subcat)

Runoff = 0.01 cfs @ 15.41 hrs, Volume= 0.005 af, Depth> 0.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

Area (sf)	CN	Description
7,404	96	Gravel surface, HSG A
2,800	72	Dirt roads, HSG A
1,400	98	Unconnected roofs, HSG A
41,834	39	>75% Grass cover, Good, HSG A
32,700	30	Woods, Good, HSG A
2,344	96	Gravel surface, HSG C
3,948	70	Woods, Good, HSG C
4,204	74	>75% Grass cover, Good, HSG C
96,634	46	Weighted Average
95,234		98.55% Pervious Area
1,400		1.45% Impervious Area
1,400		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0800	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
1.5	145	0.1000	1.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.5	383	0.0150	1.84		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
9.2	553	Total			

Summary for Subcatchment 4S: (new Subcat)

Runoff = 0.04 cfs @ 12.50 hrs, Volume= 0.016 af, Depth> 0.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

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Type III 24-hr 2 YR Rainfall=3.07"

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Area (sf)	CN	Description
3,802	98	Unconnected roofs, HSG A
18,807	96	Gravel surface, HSG A
25,127	30	Woods, Good, HSG A
37,024	39	>75% Grass cover, Good, HSG A
84,760	52	Weighted Average, UI Adjusted CN = 51
80,958		95.51% Pervious Area
3,802		4.49% Impervious Area
3,802		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	25	0.1200	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
2.4	175	0.0600	1.22		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.5	176	0.0400	1.99		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.07"
7.4	376	Total			

Summary for Subcatchment 5S: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

Area (sf)	CN	Description
1,200	96	Gravel surface, HSG A
500	98	Paved parking, HSG A
4,535	39	>75% Grass cover, Good, HSG A
9,067	30	Woods, Good, HSG A
15,302	40	Weighted Average
14,802		96.73% Pervious Area
500		3.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.2400	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
1.2	110	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.9	135	Total			

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Type III 24-hr 2 YR Rainfall=3.07"

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Summary for Subcatchment 6S: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.07"

Area (sf)	CN	Description
8,829	30	Woods, Good, HSG A
8,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0800	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
0.1	10	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.3	35	Total			

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Type III 24-hr 5 YR Rainfall=4.63"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: (new Subcat) Runoff Area=43,307 sf 0.00% Impervious Runoff Depth>0.03"
Flow Length=655' Tc=6.5 min CN=35 Runoff=0.01 cfs 0.002 af

Subcatchment 2S: (new Subcat) Runoff Area=25,161 sf 9.54% Impervious Runoff Depth>0.98"
Flow Length=165' Tc=4.9 min UI Adjusted CN=60 Runoff=0.65 cfs 0.047 af

Subcatchment 3S: (new Subcat) Runoff Area=96,634 sf 1.45% Impervious Runoff Depth>0.31"
Flow Length=553' Tc=9.2 min CN=46 Runoff=0.34 cfs 0.058 af

Subcatchment 4S: (new Subcat) Runoff Area=84,760 sf 4.49% Impervious Runoff Depth>0.52"
Flow Length=376' Tc=7.4 min UI Adjusted CN=51 Runoff=0.74 cfs 0.084 af

Subcatchment 5S: (new Subcat) Runoff Area=15,302 sf 3.27% Impervious Runoff Depth>0.12"
Flow Length=135' Tc=3.9 min CN=40 Runoff=0.01 cfs 0.004 af

Subcatchment 6S: (new Subcat) Runoff Area=8,829 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=0.0800 '/' Tc=4.3 min CN=30 Runoff=0.00 cfs 0.000 af

Reach 7R: sp-2 Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 10R: (new Reach) Avg. Flow Depth=0.12' Max Vel=2.23 fps Inflow=0.65 cfs 0.047 af
n=0.030 L=120.0' S=0.0408 '/' Capacity=35.63 cfs Outflow=0.62 cfs 0.047 af

Reach 11R: SP-1 Inflow=0.14 cfs 0.085 af
Outflow=0.14 cfs 0.085 af

Pond 5P: CB-2 Peak Elev=307.03' Inflow=0.01 cfs 0.002 af
12.0" Round Culvert n=0.010 L=140.0' S=0.0100 '/' Outflow=0.01 cfs 0.002 af

Pond 6P: CB-1 Peak Elev=305.99' Inflow=0.73 cfs 0.107 af
12.0" Round Culvert n=0.010 L=40.0' S=0.0200 '/' Outflow=0.73 cfs 0.107 af

Pond 7P: D-POND Peak Elev=296.83' Storage=0.113 af Inflow=1.47 cfs 0.191 af
Outflow=0.13 cfs 0.081 af

Pond 8P: cb-3 Peak Elev=306.93' Inflow=0.73 cfs 0.105 af
12.0" Round Culvert n=0.010 L=50.0' S=0.0200 '/' Outflow=0.73 cfs 0.105 af

Pond 9P: CULVERT Peak Elev=315.46' Inflow=0.65 cfs 0.047 af
12.0" Round Culvert n=0.010 L=60.0' S=0.0200 '/' Outflow=0.65 cfs 0.047 af

Total Runoff Area = 6.290 ac Runoff Volume = 0.195 af Average Runoff Depth = 0.37"
97.04% Pervious = 6.104 ac 2.96% Impervious = 0.186 ac

1958-BARRINGTON SHORE-POST

Type III 24-hr 50 YR Rainfall=6.99"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: (new Subcat) Runoff Area=43,307 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=655' Tc=6.5 min CN=35 Runoff=0.19 cfs 0.034 af

Subcatchment 2S: (new Subcat) Runoff Area=25,161 sf 9.54% Impervious Runoff Depth>2.38"
Flow Length=165' Tc=4.9 min UI Adjusted CN=60 Runoff=1.72 cfs 0.115 af

Subcatchment 3S: (new Subcat) Runoff Area=96,634 sf 1.45% Impervious Runoff Depth>1.17"
Flow Length=553' Tc=9.2 min CN=46 Runoff=2.36 cfs 0.216 af

Subcatchment 4S: (new Subcat) Runoff Area=84,760 sf 4.49% Impervious Runoff Depth>1.58"
Flow Length=376' Tc=7.4 min UI Adjusted CN=51 Runoff=3.31 cfs 0.256 af

Subcatchment 5S: (new Subcat) Runoff Area=15,302 sf 3.27% Impervious Runoff Depth>0.73"
Flow Length=135' Tc=3.9 min CN=40 Runoff=0.20 cfs 0.021 af

Subcatchment 6S: (new Subcat) Runoff Area=8,829 sf 0.00% Impervious Runoff Depth>0.16"
Flow Length=35' Slope=0.0800 '/' Tc=4.3 min CN=30 Runoff=0.01 cfs 0.003 af

Reach 7R: sp-2 Inflow=0.01 cfs 0.003 af
Outflow=0.01 cfs 0.003 af

Reach 10R: (new Reach) Avg. Flow Depth=0.21' Max Vel=3.05 fps Inflow=1.72 cfs 0.115 af
n=0.030 L=120.0' S=0.0408 '/' Capacity=35.63 cfs Outflow=1.68 cfs 0.115 af

Reach 11R: SP-1 Inflow=1.48 cfs 0.471 af
Outflow=1.48 cfs 0.471 af

Pond 5P: CB-2 Peak Elev=307.21' Inflow=0.19 cfs 0.034 af
12.0" Round Culvert n=0.010 L=140.0' S=0.0100 '/' Outflow=0.19 cfs 0.034 af

Pond 6P: CB-1 Peak Elev=307.69' Inflow=3.88 cfs 0.364 af
12.0" Round Culvert n=0.010 L=40.0' S=0.0200 '/' Outflow=3.88 cfs 0.364 af

Pond 7P: D-POND Peak Elev=298.56' Storage=0.255 af Inflow=7.12 cfs 0.620 af
Outflow=1.42 cfs 0.449 af

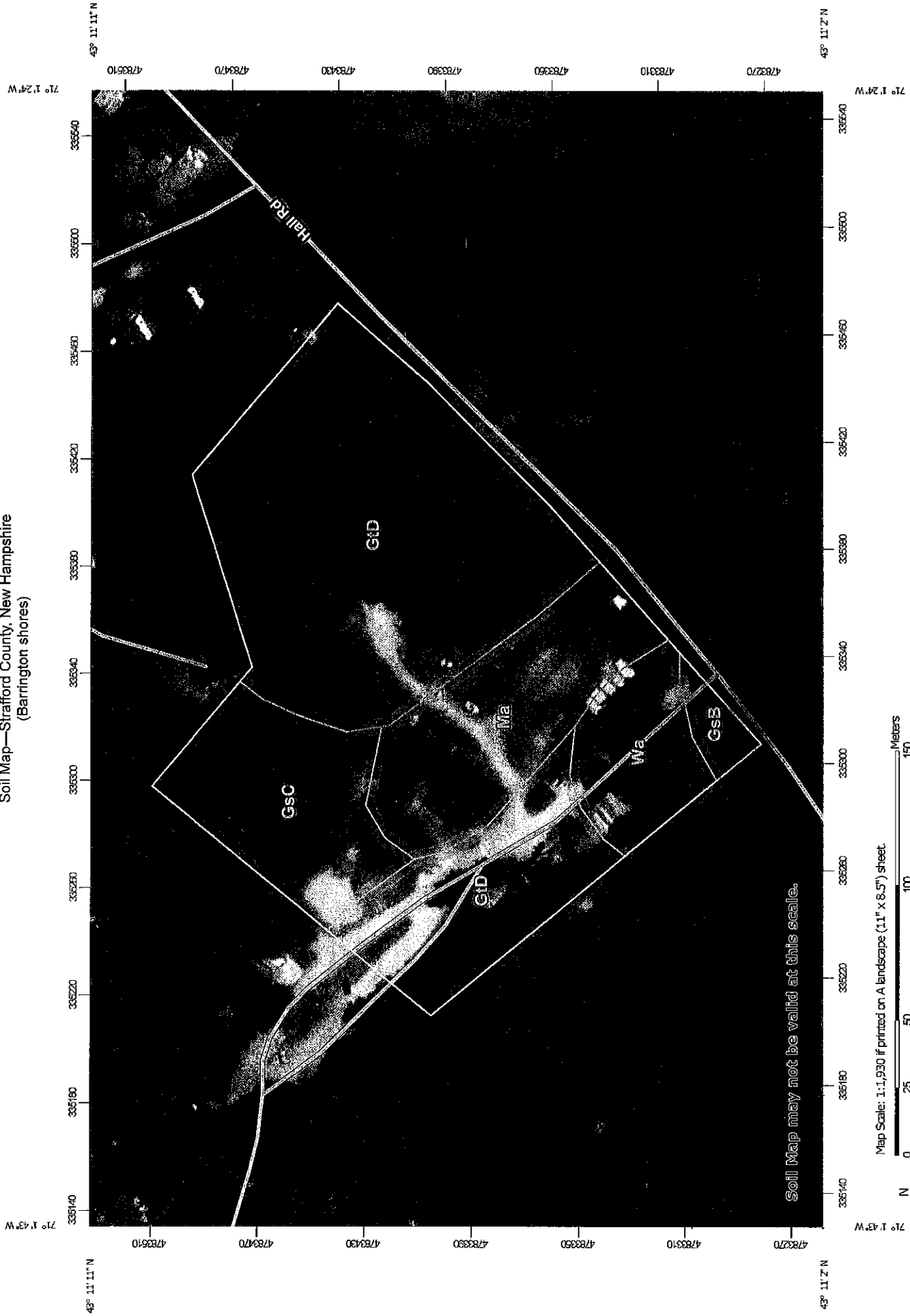
Pond 8P: cb-3 Peak Elev=308.02' Inflow=3.82 cfs 0.330 af
12.0" Round Culvert n=0.010 L=50.0' S=0.0200 '/' Outflow=3.82 cfs 0.330 af

Pond 9P: CULVERT Peak Elev=315.83' Inflow=1.72 cfs 0.115 af
12.0" Round Culvert n=0.010 L=60.0' S=0.0200 '/' Outflow=1.72 cfs 0.115 af

Total Runoff Area = 6.290 ac Runoff Volume = 0.644 af Average Runoff Depth = 1.23"
97.04% Pervious = 6.104 ac 2.96% Impervious = 0.186 ac

APPENDIX B:
Supporting Data

Soil Map—Strafford County, New Hampshire
(Barrington shores)



Soil Map may not be valid at this scale.

Map Scale: 1:1,930 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

- 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
- Water Features**
 - Streams and Canals
- Transportation**
 - Rails
 - Interstate Highways
 - US Routes
 - Major Roads
 - Local Roads
- Background**
 - Aerial Photography
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Strafford County, New Hampshire
Survey Area Data: Version 19, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 28, 2015—May 15, 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
GsB	Gloucester very stony fine sandy loam, 3 to 8 percent slopes	0.2	1.9%
GsC	Gloucester very stony fine sandy loam, 8 to 15 percent slopes	1.2	14.7%
GtD	Gloucester extremely stony fine sandy loam, 8 to 25 percent slopes	4.6	58.3%
Ma	Made land	1.3	16.7%
Wa	Whitman very stony fine sandy loam	0.7	8.3%
Totals for Area of Interest		8.0	100.0%

Extreme Precipitation Tables

Northeast Regional Climate Center

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

Smoothing	Yes
State	New Hampshire
Location	
Longitude	71.026 degrees West
Latitude	43.185 degrees North
Elevation	0 feet
Date/Time	Thu, 07 Nov 2019 14:38:54 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min	1hr	2hr	3hr	6hr	12hr	24hr	48hr	1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.81	1.03	0.70	0.98	1.20	1.53	1.97	2.55	2.80	2.26	2.69	3.10	3.82	4.39	1yr
2yr	0.32	0.49	0.61	0.80	1.01	1.28	0.87	1.16	1.49	1.89	2.40	3.07	3.41	2.71	3.28	3.78	4.50	5.13	2yr
5yr	0.37	0.57	0.72	0.96	1.23	1.58	1.06	1.44	1.84	2.36	3.02	3.87	4.36	3.43	4.19	4.81	5.68	6.42	5yr
10yr	0.40	0.63	0.80	1.09	1.42	1.84	1.23	1.69	2.17	2.80	3.60	4.62	5.25	4.09	5.05	5.77	6.77	7.62	10yr
25yr	0.47	0.74	0.94	1.30	1.73	2.27	1.49	2.09	2.69	3.50	4.53	5.85	6.73	5.18	6.47	7.36	8.55	9.56	25yr
50yr	0.52	0.83	1.07	1.49	2.01	2.67	1.74	2.46	3.18	4.16	5.40	6.99	8.12	6.18	7.81	8.84	10.20	11.35	50yr
100yr	0.59	0.95	1.22	1.73	2.34	3.14	2.02	2.89	3.75	4.93	6.43	8.35	9.80	7.39	9.42	10.63	12.19	13.48	100yr
200yr	0.65	1.06	1.38	1.98	2.73	3.70	2.36	3.41	4.44	5.86	7.67	9.99	11.82	8.84	11.37	12.78	14.56	16.03	200yr
500yr	0.77	1.26	1.65	2.39	3.35	4.58	2.89	4.23	5.53	7.35	9.68	12.67	15.18	11.21	14.59	16.31	18.44	20.16	500yr

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min	1hr	2hr	3hr	6hr	12hr	24hr	48hr	1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.73	0.90	0.63	0.88	0.93	1.26	1.53	1.97	2.48	1.74	2.38	2.89	3.32	3.90	1yr
2yr	0.31	0.48	0.60	0.81	0.99	1.18	0.86	1.15	1.36	1.81	2.33	2.97	3.30	2.63	3.17	3.66	4.39	5.01	2yr

	5min	10min	15min	30min	60min	120min	1hr	2hr	3hr	6hr	12hr	24hr	48hr	1day	2day	4day	7day	10day	
5yr	0.35	0.54	0.67	0.92	1.16	1.40	1.01	1.37	1.61	2.13	2.76	3.56	3.97	3.15	3.82	4.42	5.33	5.94	5yr
10yr	0.38	0.59	0.73	1.02	1.32	1.60	1.14	1.56	1.81	2.43	3.11	4.05	4.57	3.59	4.40	5.09	6.16	6.74	10yr
25yr	0.44	0.67	0.83	1.19	1.56	1.91	1.35	1.86	2.12	2.83	3.63	4.80	5.48	4.25	5.27	6.15	7.49	8.30	25yr
50yr	0.49	0.74	0.92	1.33	1.78	2.18	1.54	2.13	2.37	3.19	4.08	5.45	6.26	4.82	6.02	7.09	8.66	9.57	50yr
100yr	0.55	0.82	1.03	1.49	2.05	2.51	1.77	2.45	2.67	3.59	4.57	6.17	7.15	5.46	6.87	8.18	10.02	10.96	100yr
200yr	0.61	0.91	1.16	1.68	2.34	2.87	2.02	2.80	2.99	4.03	5.12	6.97	8.86	6.17	8.52	9.46	11.60	12.58	200yr
500yr	0.71	1.06	1.36	1.98	2.82	3.46	2.43	3.38	3.50	4.70	5.97	8.15	10.75	7.21	10.33	11.45	14.09	15.03	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min	1hr	2hr	3hr	6hr	12hr	24hr	48hr	1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.71	0.87	1.07	0.75	1.05	1.23	1.72	2.17	2.77	3.06	2.45	2.94	3.37	4.11	4.76	1yr
2yr	0.33	0.50	0.62	0.84	1.03	1.24	0.89	1.21	1.46	1.93	2.49	3.20	3.55	2.83	3.41	3.92	4.63	5.28	2yr
5yr	0.39	0.60	0.75	1.03	1.31	1.57	1.13	1.54	1.84	2.46	3.15	4.20	4.75	3.72	4.56	5.22	6.03	6.89	5yr
10yr	0.46	0.70	0.87	1.22	1.57	1.90	1.36	1.86	2.21	2.99	3.78	5.20	5.94	4.60	5.71	6.49	7.37	8.43	10yr
25yr	0.56	0.85	1.06	1.51	1.98	2.45	1.71	2.40	2.84	3.87	4.84	6.91	8.01	6.12	7.70	8.64	9.67	10.71	25yr
50yr	0.65	0.98	1.22	1.76	2.37	2.96	2.04	2.89	3.44	4.70	5.85	8.58	10.06	7.59	9.68	10.76	11.86	13.06	50yr
100yr	0.75	1.14	1.43	2.06	2.83	3.57	2.44	3.49	4.17	5.73	7.08	10.65	12.64	9.43	12.16	13.39	14.56	15.93	100yr
200yr	0.88	1.32	1.67	2.42	3.37	4.32	2.91	4.22	5.06	6.98	8.56	13.28	14.98	11.75	14.41	16.65	17.86	19.48	200yr
500yr	1.07	1.60	2.06	2.99	4.25	5.54	3.67	5.42	6.52	9.09	11.02	17.80	20.07	15.76	19.30	22.23	23.45	25.42	500yr

APPENDIX C:
DRAINAGE PLANS