

DRAINAGE REPORT

Prepared for:

Michael and Marti Mulhern

93 Bagdad Road

Durham, NH 03824

Tax Map 10 Lot 8-6

Prepared on:

December 9, 2020



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B	Pre-development drainage analysis
C	Post-development drainage analysis
D	Cornell Extreme Precipitation Table
E	Ksat Table for Soils
F	Soils Report

1 Project background

Michael and Marti Mulhern, the owners, have proposed a new residential development on their property in Durham and Madbury, NH. The property is located at 93 Bagdad Road, Durham, NH and identified on Durham Tax Map 10 as Lot 8-6. The subject parcel is 16 acres and the development will impact 4.5 acres.

2 Methodology

The watershed areas have been determined via inspection by our office and a topographical survey. This analysis utilizes HydroCAD modeling software which models the runoff based on the SCS TR-20 method and the time of concentration based on the SCS TR-55 method. This analysis compares the runoff rates for the 1-inch, 2, 10, and 25-year NRCC D Type 24-hour extreme storm events. The rainfall data used in the model is referenced from the Cornell extreme precipitation rainfall table found in Appendix D of this report.

3 Soils

The soils on site consist of fine-grained marine sediments and some well drained glacial till, the Hydrologic Soil Groups determined to be predominantly C and D. The soils on site have been identified by Highland Soil Services in accordance with SSSNNE Standards for a High Intensity Soil Pap and offsite soils in this analysis have been identified in accordance with the NRCS Web Soil Survey.

For more detailed information, please see the Appendix E and F.

4 Pre-development conditions

The enclosed Pre-Development portion of the Drainage Plan (Appendix 1) depicts the contributing runoff area of the property. The watershed areas have been determined via inspection by our office as well as a topographical survey. The watershed boundary only encompasses areas that are directly impacted by the development of the site.

The subject parcel is 15.9 acres. The property is mostly undeveloped, except for a walking path and a single-family home that is accessed by a shared driveway off Bagdad Road. The property slopes from Bagdad Road in the south down to the property line in the north. A narrow strip of property also extends to the east to N.H. Route 108. In the center of the property is a wetland that continues to the northern edge of the property.

Two unnamed tributaries run through the wetland in the center of the property and drain the majority of the parcel and discharge into Unnamed Tributary #1 (Unt1) in the northwest corner of the property. Prior to discharging, the two small tributaries combine, approximately at the location where the proposed crossing will be located. Approximately 20 acres drain into the central wetland area (2S)

Approximately 15 acres of the adjacent subdivision (1S), located west of the subject property, drains towards the northwest corner of the subject property. It is routed to a nearby wetland in the existing town right-of-way and routed downhill where it discharges into Unt1.

Multiple small catchment areas drain directly to the north of the property, when they discharge into Unt1 (Subcatchment 3S, 4S, and 5S). Subcatchment 7S (0.2 Acre) drains towards the eastern property line.

Two points of analysis have been selected for this site. The first (POA1) is located at the final discharge point of Unnamed Tributary #1 and the second (POA2) is located at the eastern property line, where subcatchment 6 discharges. The hydrologic analysis of the existing runoff conditions is provided in Appendix B.

5 Post-development conditions

The proposal includes the construction of 15 new residential units (7 single-family and 4 duplexes). A looped private access road will also be constructed to give access to the buildings. The road will start on the existing Gerrish Drive and connect to the cluster of houses. The road will have two wetland crossings.

The location of the POA used in the Pre-Development Analysis has been maintained for the Post-Development Analysis. The hydrologic evaluation of the proposed runoff conditions is provided in the enclosed 17-044 POST HydroCAD output (Appendix C). The subcatchment areas have changed to reflect the proposed grading of the site. The overall outer boundary has been maintained. The cover types are the same as in the Pre-Development.

Subcatchment 1 is the offsite drainage from the existing Gerrish subdivision which drains to the first wetland crossing. Subcatchment 8 is the additional offsite drainage from the existing Gerrish subdivision which drains to the north of the proposed road, meeting up with the drainage from Subcatchment 1 after the wetland crossing.

Subcatchment 2 is the area upgradient of the second wetland crossing. This includes the majority of the property south of the crossing, as well as some offsite area further upgradient.

Subcatchments 3, 4 and 5 drain to the north and are relatively unchanged from the pre-development conditions. Subcatchment 6 drains towards the eastern property line.

Subcatchment 7, 9 are the areas inside of the new loop. 7S is the catchment for the southern portion of the loop interior and 9S is the northern portion of the loop interior. Subcatchment 10 is the catchment area for the stormwater BMPs.

Two points of analysis have been selected for this site. The first (POA1) is located at the final discharge point of Unnamed Tributary #1 and the second (POA2) is located at the eastern property line, where subcatchment 6 discharges.

The stormwater from the new development is mitigated using multiple BMP's. Due to the poor soils, a gravel wetland was selected as the main method of treating the runoff from this project. There are multiple sediment forebays and detention areas upstream of the gravel wetlands to improve sediment removal and give additional buffering of peak runoff flows during large storms.

6 Comparison of pre- and post-development conditions

The following tables quantify the peak rate of discharge and discharge volume leaving the parcel at POA 1 as shown on the Pre- and Post-Development Drainage Plan. The analysis has been modeled using the extreme rainfall quantities.

Table 1: Summary of peak flow at POA 1

<u>Storm</u>	<u>Pre-Development (cfs)</u>	<u>Post-Development (cfs)</u>	<u>Difference</u>
1-Inch	0.14	0.13	-0.01
2-Year	28.98	26.78	-2.20
10-Year	65.51	61.49	-4.02
25-Year	97.20	91.38	-5.82

Table 2: Summary of discharge volume at POA 1

<u>Storm</u>	<u>Pre-Development (cf)</u>	<u>Post-Development (cf)</u>	<u>Difference</u>
1-Inch	5 190	5 069	-121
2-Year	174 230	173 052	-1 178
10-Year	373 649	375 194	+1 545
25-Year	549 728	553 144	+3 416

The following tables quantify the peak rate of discharge and discharge volume leaving the parcel at POA 2 as shown on the Pre- and Post-Development Drainage Plan. The analysis has been modeled using the extreme rainfall quantities.

Table 3: Summary of peak flow at POA 2

<u>Storm</u>	<u>Pre-Development (cfs)</u>	<u>Post-Development (cfs)</u>	<u>Difference</u>
1-Inch	0.00	0.00	0.00
2-Year	0.30	0.18	-0.12
10-Year	0.75	0.39	-0.36
25-Year	1.15	0.58	-0.57

Table 4: Summary of discharge volume at POA 2

<u>Storm</u>	<u>Pre-Development (cf)</u>	<u>Post-Development (cf)</u>	<u>Difference</u>
1-Inch	6	14	+8
2-Year	1 049	587	-462
10-Year	2 449	1 275	-1 174
25-Year	3 729	1 884	-1 845

The peak rate of runoff is reduced or equal to the pre-development conditions during all the design storm events at POA 1 and 2. The reduction in peak rate of discharge is attributed to storage in the detention basin and gravel wetlands which provides peak flow attenuation reduction. There is an increase in the runoff volume due to the limited infiltration capacity of the native soils. The spillway of the gravel wetland system has been designed for the 100-year storm (See Appendix C).

7 Stormwater treatment and pretreatment practices

Stormwater pre-treatment will be provided by sediment forebays. Stormwater treatment will be provided by a gravel wetland system.

8 Groundwater recharge

There are limited opportunities for infiltration due to the presence of fine-grained marine soils and a shallow ledge in many places. Due to this, drip edges will be installed near the proposed houses. The exact location and size of the drip strips will be determined in the field when earthworks are ongoing so that the most suitable areas are selected.

A factor of 0.1 and 0.0 is applied to HSG C and D soils, respectively that are replaced by impervious area. The required volume to be infiltrated for this project is as follows;

$$(4\ 101\ \text{sf} \times 0.1) \times (1'/12'') = 341\ \text{cf}$$

9 Erosion & Sediment Control

Temporary and permanent practices are used to prevent and minimize erosion and sedimentation on site. The installation of Silt Sox at the perimeter of construction areas will provide sediment retention during the construction phase of the development. Erosion control matting is proposed on all spillways to prevent erosion prior to the establishment of permanent vegetation.

10 Conclusion

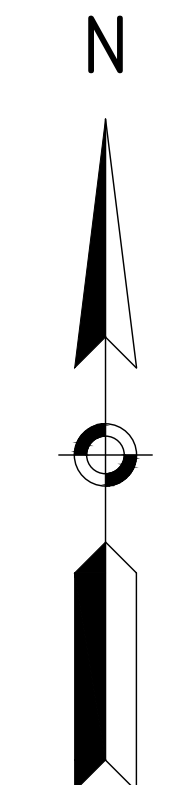
The enclosed comparative hydrologic model provides sufficient evidence that the stormwater design will mitigate the typical increase in peak rate of stormwater discharge resulting from the proposed development of the site. Stormwater treatment practices will provide treatment of runoff from proposed paved surfaces. The use of erosion and sediment controls and proper construction practices will minimize the impact of this project to downstream surface waters.

APPENDIX A

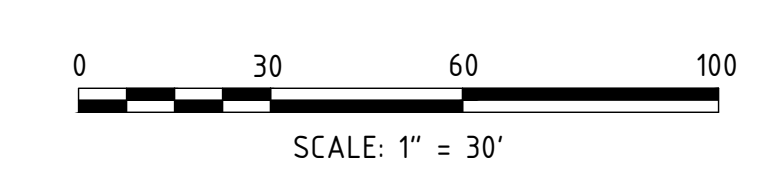


LEGEND

- ## SUBCATCHMENT
- ## POND / CATCH BASIN
- ## REACH
- POA# POINT OF ANALYSIS
- TIME OF CONCENTRATION TRAVEL PATH

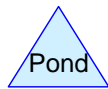
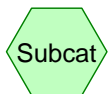
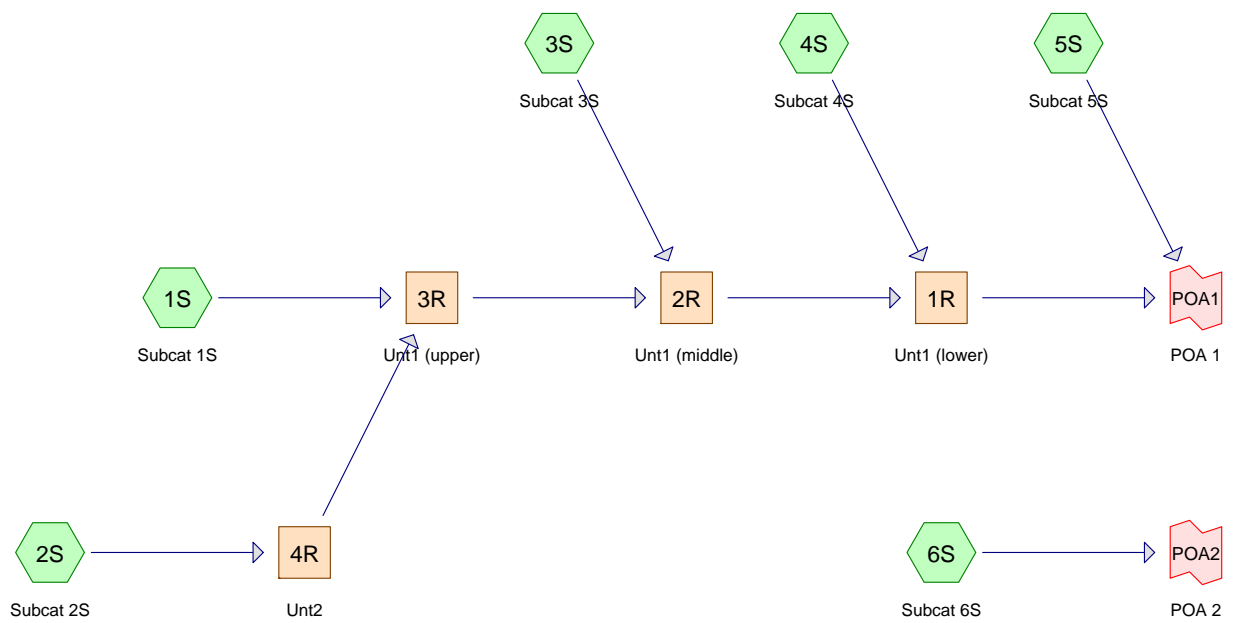


FINAL APPROVAL BY DURHAM PLANNING BOARD.
 CERTIFIED BY MICHAEL BEHRENDT, TOWN PLANNER
 CERTIFIED _____
 DATE _____



POST-DEVELOPMENT CONDITIONS PLAN <i>prepared for</i> MULHERN TAX MAP 10, LOT 8-6 93 BAGDAD ROAD, DURHAM, NH 03824		DATE ISSUED: 10/28/20	SCALE: 1"=30'	DESIGNED BY: MCS	DRAWN BY: MCS	APPROVED BY: MJS	DWG FILE: 19063_CivilZF.dwg
 MJS ENGINEERING, P.C. CIVIL • STRUCTURAL • ENVIRONMENTAL 5 Railroad St., P.O. Box 359 Newmarket, NH 03857 Phone: (603) 659-4979 Fax: (603) 659-4427 E-mail: mjs@mjsengineering.com		JOB: 19-063		POST			
		SEAL NO. _____ DATE _____ INITIAL SUBMISSION TO THE DURHAM PLANNING BOARD NO. _____ DATE _____ REVISIONS					

APPENDIX B



19063 PreE

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
351,265	74	>75% Grass cover, Good, HSG C (1S, 2S, 4S, 5S)
120,569	80	>75% Grass cover, Good, HSG D (1S, 2S, 5S)
80,603	98	Paved parking, HSG C (1S, 2S, 5S)
30,448	98	Paved parking, HSG D (1S, 2S)
43,152	98	Roofs, HSG C (1S, 2S, 4S, 5S)
8,712	98	Roofs, HSG D (1S, 2S)
14,059	30	Woods, Good, HSG A (3S, 4S, 5S)
1,110,786	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 5S, 6S)
286,998	77	Woods, Good, HSG D (1S, 2S, 3S)
2,046,593	74	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
14,059	HSG A	3S, 4S, 5S
0	HSG B	
1,585,806	HSG C	1S, 2S, 3S, 4S, 5S, 6S
446,727	HSG D	1S, 2S, 3S, 5S
0	Other	
2,046,593		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	0	351,265	120,569	0	471,834	>75% Grass cover, Good	
0	0	80,603	30,448	0	111,052	Paved parking	
0	0	43,152	8,712	0	51,864	Roofs	
14,059	0	1,110,786	286,998	0	1,411,843	Woods, Good	
14,059	0	1,585,806	446,727	0	2,046,593	TOTAL AREA	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S Runoff Area=15.233 ac 15.67% Impervious Runoff Depth=0.06"
Flow Length=1,020' Tc=17.1 min CN=78 Runoff=0.13 cfs 3,226 cf

Subcatchment 2S: Subcat 2S Runoff Area=20.909 ac 5.14% Impervious Runoff Depth=0.02"
Flow Length=1,517' Tc=25.2 min CN=74 Runoff=0.05 cfs 1,760 cf

Subcatchment 3S: Subcat 3S Runoff Area=2.969 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=450' Tc=13.6 min CN=70 Runoff=0.00 cfs 50 cf

Subcatchment 4S: Subcat 4S Runoff Area=2.958 ac 2.26% Impervious Runoff Depth=0.00"
Flow Length=350' Tc=7.1 min CN=69 Runoff=0.00 cfs 24 cf

Subcatchment 5S: Subcat 5S Runoff Area=4.551 ac 4.64% Impervious Runoff Depth=0.01"
Flow Length=600' Tc=16.2 min CN=71 Runoff=0.01 cfs 130 cf

Subcatchment 6S: Subcat 6S Runoff Area=0.364 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=70 Runoff=0.00 cfs 6 cf

Reach 1R: Unt1 (lower) Avg. Flow Depth=0.01' Max Vel=0.92 fps Inflow=0.14 cfs 5,061 cf
n=0.013 L=596.0' S=0.0070 '/ Capacity=858.75 cfs Outflow=0.14 cfs 5,061 cf

Reach 2R: Unt1 (middle) Avg. Flow Depth=0.01' Max Vel=0.91 fps Inflow=0.14 cfs 5,036 cf
n=0.013 L=594.0' S=0.0069 '/ Capacity=849.89 cfs Outflow=0.14 cfs 5,036 cf

Reach 3R: Unt1 (upper) Avg. Flow Depth=0.01' Max Vel=1.03 fps Inflow=0.14 cfs 4,987 cf
n=0.013 L=430.0' S=0.0088 '/ Capacity=961.66 cfs Outflow=0.14 cfs 4,987 cf

Reach 4R: Unt2 Avg. Flow Depth=0.04' Max Vel=1.25 fps Inflow=0.05 cfs 1,760 cf
n=0.025 L=228.0' S=0.0539 '/ Capacity=209.49 cfs Outflow=0.05 cfs 1,760 cf

Link POA1: POA 1 Inflow=0.14 cfs 5,190 cf
Primary=0.14 cfs 5,190 cf

Link POA2: POA 2 Inflow=0.00 cfs 6 cf
Primary=0.00 cfs 6 cf

Total Runoff Area = 2,046,593 sf Runoff Volume = 5,196 cf Average Runoff Depth = 0.03"
92.04% Pervious = 1,883,677 sf 7.96% Impervious = 162,916 sf

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S Runoff Area=15.233 ac 15.67% Impervious Runoff Depth=1.23"
Flow Length=1,020' Tc=17.1 min CN=78 Runoff=13.92 cfs 67,990 cf

Subcatchment 2S: Subcat 2S Runoff Area=20.909 ac 5.14% Impervious Runoff Depth=1.00"
Flow Length=1,517' Tc=25.2 min CN=74 Runoff=12.35 cfs 75,767 cf

Subcatchment 3S: Subcat 3S Runoff Area=2.969 ac 0.00% Impervious Runoff Depth=0.79"
Flow Length=450' Tc=13.6 min CN=70 Runoff=1.78 cfs 8,549 cf

Subcatchment 4S: Subcat 4S Runoff Area=2.958 ac 2.26% Impervious Runoff Depth=0.75"
Flow Length=350' Tc=7.1 min CN=69 Runoff=2.13 cfs 8,011 cf

Subcatchment 5S: Subcat 5S Runoff Area=4.551 ac 4.64% Impervious Runoff Depth=0.84"
Flow Length=600' Tc=16.2 min CN=71 Runoff=2.72 cfs 13,913 cf

Subcatchment 6S: Subcat 6S Runoff Area=0.364 ac 0.00% Impervious Runoff Depth=0.79"
Tc=6.0 min CN=70 Runoff=0.30 cfs 1,049 cf

Reach 1R: Unt1 (lower) Avg. Flow Depth=0.45' Max Vel=5.20 fps Inflow=26.87 cfs 160,317 cf
n=0.013 L=596.0' S=0.0070 '/' Capacity=858.75 cfs Outflow=26.69 cfs 160,317 cf

Reach 2R: Unt1 (middle) Avg. Flow Depth=0.45' Max Vel=5.12 fps Inflow=26.23 cfs 152,306 cf
n=0.013 L=594.0' S=0.0069 '/' Capacity=849.89 cfs Outflow=26.04 cfs 152,306 cf

Reach 3R: Unt1 (upper) Avg. Flow Depth=0.40' Max Vel=5.46 fps Inflow=24.88 cfs 143,757 cf
n=0.013 L=430.0' S=0.0088 '/' Capacity=961.66 cfs Outflow=24.79 cfs 143,757 cf

Reach 4R: Unt2 Avg. Flow Depth=0.53' Max Vel=6.78 fps Inflow=12.35 cfs 75,767 cf
n=0.025 L=228.0' S=0.0539 '/' Capacity=209.49 cfs Outflow=12.34 cfs 75,767 cf

Link POA1: POA 1 Inflow=28.98 cfs 174,230 cf
Primary=28.98 cfs 174,230 cf

Link POA2: POA 2 Inflow=0.30 cfs 1,049 cf
Primary=0.30 cfs 1,049 cf

Total Runoff Area = 2,046,593 sf Runoff Volume = 175,279 cf Average Runoff Depth = 1.03"
92.04% Pervious = 1,883,677 sf 7.96% Impervious = 162,916 sf

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NRCC 24-hr D 10-YR (NRCC D) Rainfall=4.75"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S	Runoff Area=15.233 ac 15.67% Impervious Runoff Depth=2.50" Flow Length=1,020' Tc=17.1 min CN=78 Runoff=28.92 cfs 138,285 cf
Subcatchment 2S: Subcat 2S	Runoff Area=20.909 ac 5.14% Impervious Runoff Depth=2.17" Flow Length=1,517' Tc=25.2 min CN=74 Runoff=28.31 cfs 164,438 cf
Subcatchment 3S: Subcat 3S	Runoff Area=2.969 ac 0.00% Impervious Runoff Depth=1.85" Flow Length=450' Tc=13.6 min CN=70 Runoff=4.54 cfs 19,967 cf
Subcatchment 4S: Subcat 4S	Runoff Area=2.958 ac 2.26% Impervious Runoff Depth=1.78" Flow Length=350' Tc=7.1 min CN=69 Runoff=5.55 cfs 19,088 cf
Subcatchment 5S: Subcat 5S	Runoff Area=4.551 ac 4.64% Impervious Runoff Depth=1.93" Flow Length=600' Tc=16.2 min CN=71 Runoff=6.73 cfs 31,872 cf
Subcatchment 6S: Subcat 6S	Runoff Area=0.364 ac 0.00% Impervious Runoff Depth=1.85" Tc=6.0 min CN=70 Runoff=0.75 cfs 2,449 cf
Reach 1R: Unt1 (lower)	Avg. Flow Depth=0.72' Max Vel=6.83 fps Inflow=59.86 cfs 341,778 cf n=0.013 L=596.0' S=0.0070 '/' Capacity=858.75 cfs Outflow=59.62 cfs 341,778 cf
Reach 2R: Unt1 (middle)	Avg. Flow Depth=0.71' Max Vel=6.71 fps Inflow=58.04 cfs 322,689 cf n=0.013 L=594.0' S=0.0069 '/' Capacity=849.89 cfs Outflow=57.77 cfs 322,689 cf
Reach 3R: Unt1 (upper)	Avg. Flow Depth=0.64' Max Vel=7.14 fps Inflow=54.50 cfs 302,722 cf n=0.013 L=430.0' S=0.0088 '/' Capacity=961.66 cfs Outflow=54.37 cfs 302,722 cf
Reach 4R: Unt2	Avg. Flow Depth=0.78' Max Vel=8.70 fps Inflow=28.31 cfs 164,438 cf n=0.025 L=228.0' S=0.0539 '/' Capacity=209.49 cfs Outflow=28.29 cfs 164,438 cf
Link POA1: POA 1	Inflow=65.51 cfs 373,649 cf Primary=65.51 cfs 373,649 cf
Link POA2: POA 2	Inflow=0.75 cfs 2,449 cf Primary=0.75 cfs 2,449 cf

Total Runoff Area = 2,046,593 sf Runoff Volume = 376,098 cf Average Runoff Depth = 2.21"
92.04% Pervious = 1,883,677 sf 7.96% Impervious = 162,916 sf

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NRCC 24-hr D 25-YR (NRCC D) Rainfall=6.02"

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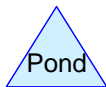
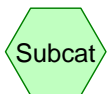
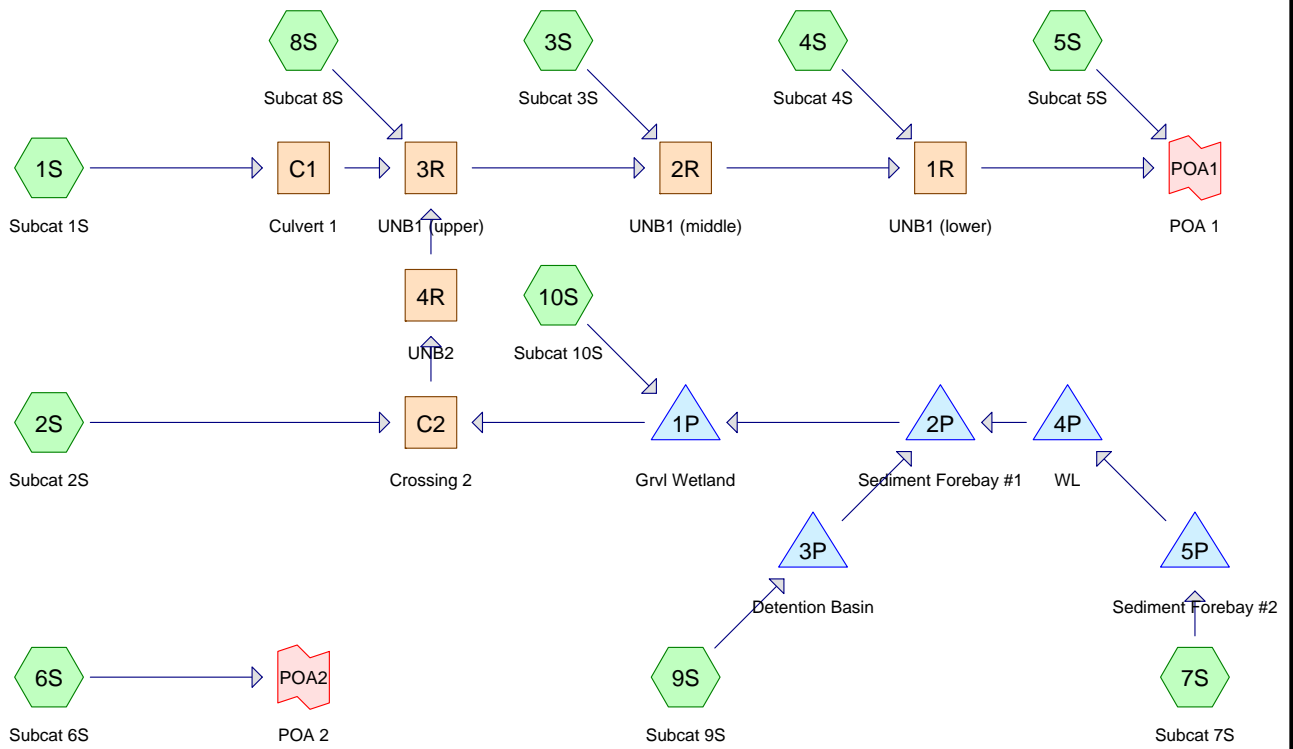
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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S	Runoff Area=15.233 ac 15.67% Impervious Runoff Depth=3.60" Flow Length=1,020' Tc=17.1 min CN=78 Runoff=41.52 cfs 198,876 cf
Subcatchment 2S: Subcat 2S	Runoff Area=20.909 ac 5.14% Impervious Runoff Depth=3.20" Flow Length=1,517' Tc=25.2 min CN=74 Runoff=42.21 cfs 243,008 cf
Subcatchment 3S: Subcat 3S	Runoff Area=2.969 ac 0.00% Impervious Runoff Depth=2.82" Flow Length=450' Tc=13.6 min CN=70 Runoff=7.01 cfs 30,399 cf
Subcatchment 4S: Subcat 4S	Runoff Area=2.958 ac 2.26% Impervious Runoff Depth=2.73" Flow Length=350' Tc=7.1 min CN=69 Runoff=8.62 cfs 29,294 cf
Subcatchment 5S: Subcat 5S	Runoff Area=4.551 ac 4.64% Impervious Runoff Depth=2.91" Flow Length=600' Tc=16.2 min CN=71 Runoff=10.30 cfs 48,150 cf
Subcatchment 6S: Subcat 6S	Runoff Area=0.364 ac 0.00% Impervious Runoff Depth=2.82" Tc=6.0 min CN=70 Runoff=1.15 cfs 3,729 cf
Reach 1R: Unt1 (lower)	Avg. Flow Depth=0.90' Max Vel=7.75 fps Inflow=88.32 cfs 501,578 cf n=0.013 L=596.0' S=0.0070 '/' Capacity=858.75 cfs Outflow=88.03 cfs 501,578 cf
Reach 2R: Unt1 (middle)	Avg. Flow Depth=0.88' Max Vel=7.61 fps Inflow=85.40 cfs 472,284 cf n=0.013 L=594.0' S=0.0069 '/' Capacity=849.89 cfs Outflow=85.08 cfs 472,284 cf
Reach 3R: Unt1 (upper)	Avg. Flow Depth=0.79' Max Vel=8.10 fps Inflow=79.87 cfs 441,884 cf n=0.013 L=430.0' S=0.0088 '/' Capacity=961.66 cfs Outflow=79.71 cfs 441,884 cf
Reach 4R: Unt2	Avg. Flow Depth=0.94' Max Vel=9.80 fps Inflow=42.21 cfs 243,008 cf n=0.025 L=228.0' S=0.0539 '/' Capacity=209.49 cfs Outflow=42.17 cfs 243,008 cf
Link POA1: POA 1	Inflow=97.20 cfs 549,728 cf Primary=97.20 cfs 549,728 cf
Link POA2: POA 2	Inflow=1.15 cfs 3,729 cf Primary=1.15 cfs 3,729 cf

Total Runoff Area = 2,046,593 sf Runoff Volume = 553,457 cf Average Runoff Depth = 3.25"
92.04% Pervious = 1,883,677 sf 7.96% Impervious = 162,916 sf

APPENDIX C



Routing Diagram for 19063 PostF
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
351,302	74	>75% Grass cover, Good, HSG C (1S, 2S, 4S, 5S, 8S)
119,013	80	>75% Grass cover, Good, HSG D (1S, 2S, 5S, 8S)
106,084	98	Paved parking, HSG C (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
39,754	98	Paved parking, HSG D (1S, 2S, 3S, 8S, 9S, 10S)
58,688	98	Roofs, HSG C (1S, 2S, 4S, 5S, 6S, 7S, 8S, 9S)
8,688	98	Roofs, HSG D (1S, 2S, 8S)
14,059	30	Woods, Good, HSG A (3S, 4S, 5S)
1,069,718	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
279,101	77	Woods, Good, HSG D (1S, 2S, 3S, 8S, 9S, 10S)
2,046,407	75	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
14,059	HSG A	3S, 4S, 5S
0	HSG B	
1,585,792	HSG C	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
446,556	HSG D	1S, 2S, 3S, 5S, 8S, 9S, 10S
0	Other	
2,046,407		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	0	351,302	119,013	0	470,314	>75% Grass cover, Good	
0	0	106,084	39,754	0	145,838	Paved parking	
0	0	58,688	8,688	0	67,376	Roofs	
14,059	0	1,069,718	279,101	0	1,362,879	Woods, Good	
14,059	0	1,585,792	446,556	0	2,046,407	TOTAL AREA	

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NRCC 24-hr D 1" (NRCC D) Rainfall=1.00"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S	Runoff Area=10.803 ac 19.65% Impervious Runoff Depth=0.06" Flow Length=1,506' Tc=17.8 min CN=78 Runoff=0.09 cfs 2,288 cf
Subcatchment 2S: Subcat 2S	Runoff Area=19.098 ac 6.19% Impervious Runoff Depth=0.02" Flow Length=1,517' Tc=25.2 min CN=74 Runoff=0.04 cfs 1,608 cf
Subcatchment 3S: Subcat 3S	Runoff Area=1.781 ac 0.31% Impervious Runoff Depth=0.00" Flow Length=450' Tc=13.6 min CN=69 Runoff=0.00 cfs 14 cf
Subcatchment 4S: Subcat 4S	Runoff Area=2.905 ac 2.35% Impervious Runoff Depth=0.00" Flow Length=350' Tc=7.1 min CN=69 Runoff=0.00 cfs 24 cf
Subcatchment 5S: Subcat 5S	Runoff Area=4.520 ac 5.39% Impervious Runoff Depth=0.01" Flow Length=600' Tc=16.2 min CN=72 Runoff=0.01 cfs 197 cf
Subcatchment 6S: Subcat 6S	Runoff Area=0.162 ac 12.98% Impervious Runoff Depth=0.02" Tc=6.0 min CN=74 Runoff=0.00 cfs 14 cf
Subcatchment 7S: Subcat 7S	Runoff Area=64,817 sf 21.00% Impervious Runoff Depth=0.04" Tc=10.0 min CN=76 Runoff=0.01 cfs 208 cf
Subcatchment 8S: Subcat 8S	Runoff Area=192,806 sf 8.92% Impervious Runoff Depth=0.06" Tc=10.0 min CN=78 Runoff=0.04 cfs 937 cf
Subcatchment 9S: Subcat 9S	Runoff Area=61,661 sf 33.56% Impervious Runoff Depth=0.07" Tc=10.0 min CN=79 Runoff=0.02 cfs 361 cf
Subcatchment 10S: Subcat 10S	Runoff Area=16,553 sf 18.20% Impervious Runoff Depth=0.07" Tc=6.0 min CN=79 Runoff=0.01 cfs 97 cf
Reach 1R: UNB1 (lower)	Avg. Flow Depth=0.01' Max Vel=0.92 fps Inflow=0.13 cfs 4,872 cf n=0.013 L=596.0' S=0.0070 '/ Capacity=858.75 cfs Outflow=0.13 cfs 4,872 cf
Reach 2R: UNB1 (middle)	Avg. Flow Depth=0.01' Max Vel=0.91 fps Inflow=0.13 cfs 4,848 cf n=0.013 L=594.0' S=0.0069 '/ Capacity=849.89 cfs Outflow=0.13 cfs 4,848 cf
Reach 3R: UNB1 (upper)	Avg. Flow Depth=0.01' Max Vel=1.03 fps Inflow=0.13 cfs 4,834 cf n=0.013 L=430.0' S=0.0088 '/ Capacity=961.66 cfs Outflow=0.13 cfs 4,834 cf
Reach 4R: UNB2	Avg. Flow Depth=0.04' Max Vel=1.22 fps Inflow=0.04 cfs 1,608 cf n=0.025 L=228.0' S=0.0539 '/ Capacity=209.49 cfs Outflow=0.04 cfs 1,608 cf
Reach C1: Culvert 1	Avg. Flow Depth=0.02' Max Vel=0.89 fps Inflow=0.09 cfs 2,288 cf 60.0" x 24.0" Box Pipe n=0.013 L=20.0' S=0.0100 '/ Capacity=91.34 cfs Outflow=0.09 cfs 2,288 cf
Reach C2: Crossing 2	Avg. Flow Depth=0.00' Max Vel=1.67 fps Inflow=0.04 cfs 1,608 cf 8.0" x 144.0" Ellipse Pipe w/ 72.0" inside fill n=0.030 L=20.0' S=0.0200 '/ Capacity=416.21 cfs Outflow=0.04 cfs 1,608 cf

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NRCC 24-hr D 1" (NRCC D) Rainfall=1.00"

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Pond 1P: Grvl Wetland

Peak Elev=43.16' Storage=97 cf Inflow=0.01 cfs 97 cf
Outflow=0.00 cfs 0 cf

Pond 2P: Sediment Forebay #1

Peak Elev=46.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Pond 3P: Detention Basin

Peak Elev=46.49' Storage=361 cf Inflow=0.02 cfs 361 cf
15.0" Round Culvert n=0.013 L=50.0' S=0.0100 '/' Outflow=0.00 cfs 0 cf

Pond 4P: WL

Peak Elev=51.00' Storage=0 cf Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.013 L=44.0' S=0.0205 '/' Outflow=0.00 cfs 0 cf

Pond 5P: Sediment Forebay #2

Peak Elev=52.45' Storage=208 cf Inflow=0.01 cfs 208 cf
Outflow=0.00 cfs 0 cf

Link POA1: POA 1

Inflow=0.13 cfs 5,069 cf
Primary=0.13 cfs 5,069 cf

Link POA2: POA 2

Inflow=0.00 cfs 14 cf
Primary=0.00 cfs 14 cf

Total Runoff Area = 2,046,407 sf Runoff Volume = 5,748 cf Average Runoff Depth = 0.03"
89.58% Pervious = 1,833,193 sf 10.42% Impervious = 213,214 sf

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NRCC 24-hr D 2-YR (NRCC D) Rainfall=3.14"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S	Runoff Area=10.803 ac 19.65% Impervious Runoff Depth=1.23" Flow Length=1,506' Tc=17.8 min CN=78 Runoff=9.71 cfs 48,217 cf
Subcatchment 2S: Subcat 2S	Runoff Area=19.098 ac 6.19% Impervious Runoff Depth=1.00" Flow Length=1,517' Tc=25.2 min CN=74 Runoff=11.28 cfs 69,206 cf
Subcatchment 3S: Subcat 3S	Runoff Area=1.781 ac 0.31% Impervious Runoff Depth=0.75" Flow Length=450' Tc=13.6 min CN=69 Runoff=0.98 cfs 4,825 cf
Subcatchment 4S: Subcat 4S	Runoff Area=2.905 ac 2.35% Impervious Runoff Depth=0.75" Flow Length=350' Tc=7.1 min CN=69 Runoff=2.10 cfs 7,867 cf
Subcatchment 5S: Subcat 5S	Runoff Area=4.520 ac 5.39% Impervious Runoff Depth=0.89" Flow Length=600' Tc=16.2 min CN=72 Runoff=2.91 cfs 14,645 cf
Subcatchment 6S: Subcat 6S	Runoff Area=0.162 ac 12.98% Impervious Runoff Depth=1.00" Tc=6.0 min CN=74 Runoff=0.18 cfs 587 cf
Subcatchment 7S: Subcat 7S	Runoff Area=64,817 sf 21.00% Impervious Runoff Depth=1.11" Tc=10.0 min CN=76 Runoff=1.53 cfs 5,998 cf
Subcatchment 8S: Subcat 8S	Runoff Area=192,806 sf 8.92% Impervious Runoff Depth=1.23" Tc=10.0 min CN=78 Runoff=5.11 cfs 19,756 cf
Subcatchment 9S: Subcat 9S	Runoff Area=61,661 sf 33.56% Impervious Runoff Depth=1.29" Tc=10.0 min CN=79 Runoff=1.72 cfs 6,638 cf
Subcatchment 10S: Subcat 10S	Runoff Area=16,553 sf 18.20% Impervious Runoff Depth=1.29" Tc=6.0 min CN=79 Runoff=0.55 cfs 1,782 cf
Reach 1R: UNB1 (lower)	Avg. Flow Depth=0.43' Max Vel=5.03 fps Inflow=24.37 cfs 158,407 cf n=0.013 L=596.0' S=0.0070 '/' Capacity=858.75 cfs Outflow=24.24 cfs 158,407 cf
Reach 2R: UNB1 (middle)	Avg. Flow Depth=0.42' Max Vel=4.94 fps Inflow=23.66 cfs 150,541 cf n=0.013 L=594.0' S=0.0069 '/' Capacity=849.89 cfs Outflow=23.52 cfs 150,541 cf
Reach 3R: UNB1 (upper)	Avg. Flow Depth=0.39' Max Vel=5.30 fps Inflow=22.88 cfs 145,717 cf n=0.013 L=430.0' S=0.0088 '/' Capacity=961.66 cfs Outflow=22.83 cfs 145,716 cf
Reach 4R: UNB2	Avg. Flow Depth=0.51' Max Vel=6.60 fps Inflow=11.28 cfs 77,745 cf n=0.025 L=228.0' S=0.0539 '/' Capacity=209.49 cfs Outflow=11.27 cfs 77,744 cf
Reach C1: Culvert 1	Avg. Flow Depth=0.36' Max Vel=5.33 fps Inflow=9.71 cfs 48,217 cf 60.0" x 24.0" Box Pipe n=0.013 L=20.0' S=0.0100 '/' Capacity=91.34 cfs Outflow=9.71 cfs 48,217 cf
Reach C2: Crossing 2	Avg. Flow Depth=0.37' Max Vel=3.41 fps Inflow=11.28 cfs 77,745 cf 0" x 144.0" Ellipse Pipe w/ 72.0" inside fill n=0.030 L=20.0' S=0.0200 '/' Capacity=416.21 cfs Outflow=11.28 cfs 77,745 cf

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NRCC 24-hr D 2-YR (NRCC D) Rainfall=3.14"

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Pond 1P: Grvl Wetland Peak Elev=45.66' Storage=1,697 cf Inflow=0.92 cfs 9,910 cf
Outflow=0.44 cfs 8,539 cf

Pond 2P: Sediment Forebay #1 Peak Elev=46.82' Storage=379 cf Inflow=0.93 cfs 8,337 cf
Outflow=0.80 cfs 8,128 cf

Pond 3P: Detention Basin Peak Elev=48.78' Storage=3,696 cf Inflow=1.72 cfs 6,638 cf
15.0" Round Culvert n=0.013 L=50.0' S=0.0100 '/' Outflow=0.14 cfs 3,289 cf

Pond 4P: WL Peak Elev=51.80' Storage=534 cf Inflow=1.45 cfs 5,152 cf
12.0" Round Culvert n=0.013 L=44.0' S=0.0205 '/' Outflow=0.93 cfs 5,048 cf

Pond 5P: Sediment Forebay #2 Peak Elev=53.48' Storage=1,032 cf Inflow=1.53 cfs 5,998 cf
Outflow=1.45 cfs 5,152 cf

Link POA1: POA 1 Inflow=26.78 cfs 173,052 cf
Primary=26.78 cfs 173,052 cf

Link POA2: POA 2 Inflow=0.18 cfs 587 cf
Primary=0.18 cfs 587 cf

Total Runoff Area = 2,046,407 sf Runoff Volume = 179,520 cf Average Runoff Depth = 1.05"
89.58% Pervious = 1,833,193 sf 10.42% Impervious = 213,214 sf

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NRCC 24-hr D 10-YR (NRCC D) Rainfall=4.75"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S	Runoff Area=10.803 ac 19.65% Impervious Runoff Depth=2.50" Flow Length=1,506' Tc=17.8 min CN=78 Runoff=20.17 cfs 98,068 cf
Subcatchment 2S: Subcat 2S	Runoff Area=19.098 ac 6.19% Impervious Runoff Depth=2.17" Flow Length=1,517' Tc=25.2 min CN=74 Runoff=25.86 cfs 150,198 cf
Subcatchment 3S: Subcat 3S	Runoff Area=1.781 ac 0.31% Impervious Runoff Depth=1.78" Flow Length=450' Tc=13.6 min CN=69 Runoff=2.60 cfs 11,496 cf
Subcatchment 4S: Subcat 4S	Runoff Area=2.905 ac 2.35% Impervious Runoff Depth=1.78" Flow Length=350' Tc=7.1 min CN=69 Runoff=5.45 cfs 18,745 cf
Subcatchment 5S: Subcat 5S	Runoff Area=4.520 ac 5.39% Impervious Runoff Depth=2.01" Flow Length=600' Tc=16.2 min CN=72 Runoff=6.98 cfs 32,930 cf
Subcatchment 6S: Subcat 6S	Runoff Area=0.162 ac 12.98% Impervious Runoff Depth=2.17" Tc=6.0 min CN=74 Runoff=0.39 cfs 1,275 cf
Subcatchment 7S: Subcat 7S	Runoff Area=64,817 sf 21.00% Impervious Runoff Depth=2.33" Tc=10.0 min CN=76 Runoff=3.30 cfs 12,591 cf
Subcatchment 8S: Subcat 8S	Runoff Area=192,806 sf 8.92% Impervious Runoff Depth=2.50" Tc=10.0 min CN=78 Runoff=10.54 cfs 40,181 cf
Subcatchment 9S: Subcat 9S	Runoff Area=61,661 sf 33.56% Impervious Runoff Depth=2.59" Tc=10.0 min CN=79 Runoff=3.49 cfs 13,297 cf
Subcatchment 10S: Subcat 10S	Runoff Area=16,553 sf 18.20% Impervious Runoff Depth=2.59" Tc=6.0 min CN=79 Runoff=1.10 cfs 3,570 cf
Reach 1R: UNB1 (lower)	Avg. Flow Depth=0.69' Max Vel=6.66 fps Inflow=55.32 cfs 342,264 cf n=0.013 L=596.0' S=0.0070 '/' Capacity=858.75 cfs Outflow=55.16 cfs 342,264 cf
Reach 2R: UNB1 (middle)	Avg. Flow Depth=0.68' Max Vel=6.53 fps Inflow=53.37 cfs 323,520 cf n=0.013 L=594.0' S=0.0069 '/' Capacity=849.89 cfs Outflow=53.19 cfs 323,519 cf
Reach 3R: UNB1 (upper)	Avg. Flow Depth=0.62' Max Vel=7.00 fps Inflow=51.27 cfs 312,024 cf n=0.013 L=430.0' S=0.0088 '/' Capacity=961.66 cfs Outflow=51.19 cfs 312,023 cf
Reach 4R: UNB2	Avg. Flow Depth=0.77' Max Vel=8.60 fps Inflow=27.24 cfs 173,775 cf n=0.025 L=228.0' S=0.0539 '/' Capacity=209.49 cfs Outflow=27.24 cfs 173,775 cf
Reach C1: Culvert 1	Avg. Flow Depth=0.58' Max Vel=6.93 fps Inflow=20.17 cfs 98,068 cf 60.0" x 24.0" Box Pipe n=0.013 L=20.0' S=0.0100 '/' Capacity=91.34 cfs Outflow=20.16 cfs 98,068 cf
Reach C2: Crossing 2	Avg. Flow Depth=0.64' Max Vel=4.75 fps Inflow=27.24 cfs 173,775 cf x 144.0" Ellipse Pipe w/ 72.0" inside fill n=0.030 L=20.0' S=0.0200 '/' Capacity=416.21 cfs Outflow=27.24 cfs 173,775 cf

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NRCC 24-hr D 10-YR (NRCC D) Rainfall=4.75"

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Pond 1P: Grvl Wetland	Peak Elev=47.32'	Storage=4,947 cf	Inflow=3.54 cfs	24,948 cf	Outflow=1.93 cfs	23,577 cf
Pond 2P: Sediment Forebay #1	Peak Elev=48.03'	Storage=1,330 cf	Inflow=3.98 cfs	21,588 cf	Outflow=3.31 cfs	21,379 cf
Pond 3P: Detention Basin	Peak Elev=49.24'	Storage=4,777 cf	Inflow=3.49 cfs	13,297 cf	Outflow=1.62 cfs	9,948 cf
	15.0" Round Culvert	n=0.013	L=50.0'	S=0.0100	'	
Pond 4P: WL	Peak Elev=52.20'	Storage=1,227 cf	Inflow=3.23 cfs	11,745 cf	Outflow=2.41 cfs	11,641 cf
	12.0" Round Culvert	n=0.013	L=44.0'	S=0.0205	'	
Pond 5P: Sediment Forebay #2	Peak Elev=53.60'	Storage=1,167 cf	Inflow=3.30 cfs	12,591 cf	Outflow=3.23 cfs	11,745 cf
Link POA1: POA 1			Inflow=61.49 cfs	375,194 cf	Primary=61.49 cfs	375,194 cf
Link POA2: POA 2			Inflow=0.39 cfs	1,275 cf	Primary=0.39 cfs	1,275 cf

Total Runoff Area = 2,046,407 sf Runoff Volume = 382,351 cf Average Runoff Depth = 2.24"
89.58% Pervious = 1,833,193 sf 10.42% Impervious = 213,214 sf

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NRCC 24-hr D 25-YR (NRCC D) Rainfall=6.02"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcat 1S	Runoff Area=10.803 ac 19.65% Impervious Runoff Depth=3.60" Flow Length=1,506' Tc=17.8 min CN=78 Runoff=28.96 cfs 141,038 cf
Subcatchment 2S: Subcat 2S	Runoff Area=19.098 ac 6.19% Impervious Runoff Depth=3.20" Flow Length=1,517' Tc=25.2 min CN=74 Runoff=38.56 cfs 221,964 cf
Subcatchment 3S: Subcat 3S	Runoff Area=1.781 ac 0.31% Impervious Runoff Depth=2.73" Flow Length=450' Tc=13.6 min CN=69 Runoff=4.06 cfs 17,643 cf
Subcatchment 4S: Subcat 4S	Runoff Area=2.905 ac 2.35% Impervious Runoff Depth=2.73" Flow Length=350' Tc=7.1 min CN=69 Runoff=8.47 cfs 28,767 cf
Subcatchment 5S: Subcat 5S	Runoff Area=4.520 ac 5.39% Impervious Runoff Depth=3.01" Flow Length=600' Tc=16.2 min CN=72 Runoff=10.58 cfs 49,376 cf
Subcatchment 6S: Subcat 6S	Runoff Area=0.162 ac 12.98% Impervious Runoff Depth=3.20" Tc=6.0 min CN=74 Runoff=0.58 cfs 1,884 cf
Subcatchment 7S: Subcat 7S	Runoff Area=64,817 sf 21.00% Impervious Runoff Depth=3.40" Tc=10.0 min CN=76 Runoff=4.81 cfs 18,351 cf
Subcatchment 8S: Subcat 8S	Runoff Area=192,806 sf 8.92% Impervious Runoff Depth=3.60" Tc=10.0 min CN=78 Runoff=15.09 cfs 57,787 cf
Subcatchment 9S: Subcat 9S	Runoff Area=61,661 sf 33.56% Impervious Runoff Depth=3.70" Tc=10.0 min CN=79 Runoff=4.95 cfs 18,999 cf
Subcatchment 10S: Subcat 10S	Runoff Area=16,553 sf 18.20% Impervious Runoff Depth=3.70" Tc=6.0 min CN=79 Runoff=1.55 cfs 5,100 cf
Reach 1R: UNB1 (lower)	Avg. Flow Depth=0.86' Max Vel=7.56 fps Inflow=81.76 cfs 503,768 cf n=0.013 L=596.0' S=0.0070 '/' Capacity=858.75 cfs Outflow=81.57 cfs 503,768 cf
Reach 2R: UNB1 (middle)	Avg. Flow Depth=0.84' Max Vel=7.41 fps Inflow=78.62 cfs 475,001 cf n=0.013 L=594.0' S=0.0069 '/' Capacity=849.89 cfs Outflow=78.40 cfs 475,001 cf
Reach 3R: UNB1 (upper)	Avg. Flow Depth=0.77' Max Vel=7.95 fps Inflow=75.27 cfs 457,359 cf n=0.013 L=430.0' S=0.0088 '/' Capacity=961.66 cfs Outflow=75.18 cfs 457,359 cf
Reach 4R: UNB2	Avg. Flow Depth=0.92' Max Vel=9.69 fps Inflow=40.64 cfs 258,534 cf n=0.025 L=228.0' S=0.0539 '/' Capacity=209.49 cfs Outflow=40.61 cfs 258,534 cf
Reach C1: Culvert 1	Avg. Flow Depth=0.74' Max Vel=7.85 fps Inflow=28.96 cfs 141,038 cf 60.0" x 24.0" Box Pipe n=0.013 L=20.0' S=0.0100 '/' Capacity=91.34 cfs Outflow=28.95 cfs 141,038 cf
Reach C2: Crossing 2	Avg. Flow Depth=0.83' Max Vel=5.49 fps Inflow=40.64 cfs 258,534 cf x 144.0" Ellipse Pipe w/ 72.0" inside fill n=0.030 L=20.0' S=0.0200 '/' Capacity=416.21 cfs Outflow=40.64 cfs 258,534 cf

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NRCC 24-hr D 25-YR (NRCC D) Rainfall=6.02"

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Pond 1P: Grvl Wetland	Peak Elev=48.25'	Storage=7,408 cf	Inflow=6.23 cfs	37,942 cf
			Outflow=4.20 cfs	36,570 cf
Pond 2P: Sediment Forebay #1	Peak Elev=48.89'	Storage=2,362 cf	Inflow=6.52 cfs	33,051 cf
			Outflow=5.80 cfs	32,841 cf
Pond 3P: Detention Basin	Peak Elev=49.60'	Storage=5,740 cf	Inflow=4.95 cfs	18,999 cf
15.0" Round Culvert n=0.013 L=50.0' S=0.0100 '/'			Outflow=3.37 cfs	15,650 cf
Pond 4P: WL	Peak Elev=52.50'	Storage=1,900 cf	Inflow=4.73 cfs	17,504 cf
12.0" Round Culvert n=0.013 L=44.0' S=0.0205 '/'			Outflow=3.17 cfs	17,401 cf
Pond 5P: Sediment Forebay #2	Peak Elev=53.68'	Storage=1,261 cf	Inflow=4.81 cfs	18,351 cf
			Outflow=4.73 cfs	17,504 cf
Link POA1: POA 1			Inflow=91.38 cfs	553,144 cf
			Primary=91.38 cfs	553,144 cf
Link POA2: POA 2			Inflow=0.58 cfs	1,884 cf
			Primary=0.58 cfs	1,884 cf

Total Runoff Area = 2,046,407 sf Runoff Volume = 560,910 cf Average Runoff Depth = 3.29"
89.58% Pervious = 1,833,193 sf 10.42% Impervious = 213,214 sf

APPENDIX D

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	70.909 degrees West
Latitude	43.149 degrees North
Elevation	0 feet
Date/Time	Tue, 17 Dec 2019 11:01:15 -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	1yr	0.70	0.98	1.20	1.55	2.00	2.61	2.85	1yr	2.31	2.74	3.14	3.86	4.44	1yr
2yr	0.32	0.49	0.61	0.81	1.01	1.29	2yr	0.88	1.17	1.50	1.91	2.44	3.14	3.48	2yr	2.78	3.35	3.84	4.57	5.21	2yr
5yr	0.37	0.57	0.72	0.96	1.23	1.58	5yr	1.06	1.44	1.85	2.38	3.07	3.97	4.46	5yr	3.52	4.29	4.90	5.79	6.55	5yr
10yr	0.40	0.63	0.80	1.09	1.42	1.84	10yr	1.22	1.69	2.18	2.82	3.66	4.75	5.38	10yr	4.20	5.18	5.90	6.92	7.79	10yr
25yr	0.46	0.74	0.94	1.29	1.72	2.26	25yr	1.48	2.09	2.69	3.52	4.61	6.02	6.91	25yr	5.32	6.65	7.53	8.76	9.81	25yr
50yr	0.51	0.83	1.06	1.48	1.99	2.66	50yr	1.72	2.46	3.17	4.18	5.50	7.20	8.35	50yr	6.37	8.03	9.07	10.48	11.68	50yr
100yr	0.58	0.93	1.20	1.70	2.31	3.11	100yr	1.99	2.89	3.74	4.95	6.54	8.62	10.10	100yr	7.63	9.71	10.92	12.54	13.92	100yr
200yr	0.64	1.04	1.35	1.94	2.69	3.66	200yr	2.32	3.40	4.41	5.89	7.81	10.32	12.21	200yr	9.13	11.74	13.15	15.02	16.59	200yr
500yr	0.75	1.24	1.61	2.34	3.28	4.52	500yr	2.83	4.21	5.48	7.37	9.85	13.11	15.70	500yr	11.60	15.10	16.83	19.06	20.94	500yr

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.60	0.74	0.90	1yr	0.64	0.88	0.91	1.26	1.57	2.04	2.50	1yr	1.80	2.40	2.92	3.29	4.02	1yr
2yr	0.31	0.49	0.60	0.81	1.00	1.18	2yr	0.86	1.16	1.37	1.83	2.36	3.04	3.39	2yr	2.69	3.26	3.74	4.46	5.05	2yr
5yr	0.35	0.54	0.67	0.92	1.16	1.40	5yr	1.01	1.37	1.61	2.15	2.78	3.72	4.13	5yr	3.29	3.97	4.59	5.42	6.13	5yr
10yr	0.38	0.59	0.73	1.02	1.32	1.60	10yr	1.14	1.56	1.82	2.45	3.13	4.28	4.80	10yr	3.79	4.62	5.33	6.28	7.05	10yr
25yr	0.44	0.67	0.83	1.18	1.55	1.91	25yr	1.34	1.87	2.11	2.85	3.66	5.01	5.84	25yr	4.44	5.61	6.51	7.63	8.51	25yr
50yr	0.48	0.73	0.91	1.31	1.77	2.19	50yr	1.52	2.14	2.36	3.21	4.12	5.74	6.76	50yr	5.08	6.50	7.59	8.84	9.80	50yr
100yr	0.54	0.81	1.02	1.47	2.02	2.51	100yr	1.74	2.45	2.64	3.59	4.60	6.57	7.82	100yr	5.81	7.52	8.84	10.25	11.25	100yr
200yr	0.60	0.90	1.14	1.65	2.30	2.87	200yr	1.99	2.80	2.94	4.02	5.14	7.51	9.05	200yr	6.65	8.71	10.31	11.88	12.95	200yr
500yr	0.70	1.04	1.34	1.94	2.76	3.45	500yr	2.38	3.37	3.41	4.66	5.98	8.93	10.98	500yr	7.90	10.55	12.63	14.46	15.54	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	1.08	1yr	0.75	1.05	1.24	1.74	2.22	2.84	3.04	1yr	2.52	2.92	3.38	4.18	4.78	1yr
2yr	0.33	0.51	0.62	0.84	1.04	1.25	2yr	0.90	1.22	1.48	1.95	2.51	3.26	3.58	2yr	2.89	3.45	3.95	4.71	5.40	2yr
5yr	0.39	0.60	0.75	1.03	1.31	1.58	5yr	1.13	1.55	1.85	2.50	3.20	4.23	4.78	5yr	3.74	4.60	5.23	6.17	6.94	5yr
10yr	0.46	0.70	0.87	1.21	1.57	1.92	10yr	1.35	1.88	2.23	3.05	3.85	5.21	5.96	10yr	4.61	5.73	6.51	7.57	8.46	10yr
25yr	0.55	0.84	1.05	1.49	1.97	2.47	25yr	1.70	2.42	2.87	3.96	4.94	7.04	7.98	25yr	6.23	7.68	8.65	9.95	11.02	25yr
50yr	0.64	0.97	1.21	1.74	2.34	2.99	50yr	2.02	2.92	3.48	4.83	5.99	8.71	9.98	50yr	7.71	9.59	10.75	12.23	13.48	50yr
100yr	0.74	1.12	1.40	2.03	2.78	3.61	100yr	2.40	3.53	4.23	5.91	7.28	10.77	12.47	100yr	9.53	11.99	13.33	15.05	16.49	100yr
200yr	0.86	1.29	1.64	2.37	3.31	4.38	200yr	2.85	4.28	5.14	7.24	8.83	13.37	15.61	200yr	11.83	15.01	16.55	18.51	20.21	200yr
500yr	1.05	1.56	2.01	2.91	4.14	5.62	500yr	3.58	5.49	6.63	9.47	11.42	17.82	20.99	500yr	15.77	20.18	22.03	24.37	26.46	500yr



Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravely sand	no	loamy cap
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravely coarse sand
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravely surface
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravely sand	no	
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Madawaska, aquatic	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravely sandy loam in Cd
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	gravelly loamy sand in C
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrodept
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Chichester	442	0.6	2.0	2.00	6.0	B	3	Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over loam
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravely sandy loam in Cd
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Ricker	674	2.0	6.0	2.00	6.0	A	4	Organic over bedrock (up to 4" of mineral)	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep

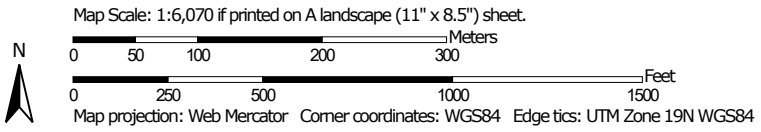


no longer recognized
 organic materials

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

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

Background

 Aerial Photography

MAP INFORMATION

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

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: Dec 31, 2009—Sep 9, 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
BzB	Buxton silt loam, 3 to 8 percent slopes	53.3	32.7%
EaA	Elmwood fine sandy loam, 0 to 3 percent slopes	0.7	0.5%
GsB	Gloucester very stony fine sandy loam, 3 to 8 percent slopes	3.6	2.2%
GsD	Gloucester very stony fine sandy loam, 15 to 25 percent slopes	3.0	1.9%
HcB	Hollis-Charlton fine sandy loams, 3 to 8 percent slopes	2.3	1.4%
HdB	Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes	20.9	12.8%
HdC	Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes	33.4	20.5%
LrA	Leicester-Ridgebury fine sandy loams, 0 to 3 percent slopes, very stony	3.5	2.2%
MI	Mixed alluvial land, wet	3.6	2.2%
ScA	Scantic silt loam, 0 to 3 percent slopes	12.6	7.7%
ScB	Scantic silt loam, 3 to 8 percent slopes	5.8	3.6%
SfC	Suffield silt loam, 8 to 15 percent slopes	8.5	5.2%
SwA	Swanton fine sandy loam, 0 to 3 percent slopes	1.8	1.1%
WfB	Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes	2.7	1.7%
WfC	Windsor loamy fine sand, clay subsoil variant, 8 to 15 percent slopes	7.4	4.5%
Totals for Area of Interest		163.2	100.0%

Map Unit Descriptions

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

APPENDIX E

SOIL REPORT

May 14, 2018

Mulhern
93 Bagdad Rd., Durham NH

Location: In Durham NH - 93 Bagdad Rd; Map 10 Lot 8-6: +/-14 acres
In Madbury NH - 121 Route 108; Map 9 Lot 32: +/-2 acres

The property is nearly bounded on the north by the Durham/Madbury town line and a small unnamed stream, on the east by backyards of properties on Route 108, on the south by a 500-foot long right-of-way to Bagdad Road, and on the east by backyards of properties on Ambler Way.

Landscape: A few knolls on the eastern half of the lot slope to the north and west to a wetland parallel to the westerly property line. A stream cuts across the NW corner in Madbury

Wetlands: A large wetland parallels the westerly property line and varies in width from about 25' in the NW corner just south of the stream to nearly 150' at its widest point. The wetland is classified as Palustrine Forested (PFO).

Wetlands were identified in accordance with the 1987 US Army Corps of Engineers Wetland Delineation Manual and the 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, Version 2.0. Hydric soils were identified by Field Indicators for Identifying Hydric Soils in New England, version 4, May 2017. A routine determination, as described in the manual, was followed. The wetland boundary was flagged in pink and numbered for future location by Trittech Engineering, Dover NH

Soils: Soils consist of moderately well drained glacial till on a few knolls at the highest elevations but dominated by moderately well drained silty marine sediments over most of the remainder of the property. Poorly drained silty to clayey marine sediments occupy the wetlands with a narrow band of somewhat poorly drained soil around the perimeter. Several bedrock outcrops were observed and located, but they drop off quickly leaving few areas of soils with bedrock at depths less than 40"

Purpose: The high intensity soil map was prepared for a proposed residential subdivision with city water and on-site subsurface wastewater disposal.

Methodology: The soil map was prepared in accordance with the Standards for a High Intensity Soil Map, New Hampshire, December 2017 by the Society of Soil Scientists of Northern New England and standards established by the National Cooperative Soil Survey. The soil survey was prepared by Michael Mariano, NH Certified Soil Scientist #076.

A plan provided by Trittech Engineering, Dover NH at 1" = 100' with 2' contours was used as a base map. Existing monumentation, survey transects, and topographic features were used as control. Pits were dug by an excavator to classify soils at the series level. Pits were located by Trittech Engineering.

Soil boundaries were observed throughout their length and their placement corresponds to changes in soil properties or landform. Boundary line placement is accurate within 20 feet. The

identification of soils is based on the connotative legend used for high intensity soil maps in NH (see attachment).

Map unit purity:

- Map units contain 75 percent or more of pedons that fit within the range of the taxon that provides the name for the map unit, or are in similar taxa.
- No one dissimilar soil is greater than the named taxa
- Individual dissimilar inclusions are less than 2,000 square feet in area. Dissimilar inclusions may total no more than 25% per map unit delineation in the aggregate, if not continuous.

Drainage Classes: (slope designation and high intensity classifier not included. Soil series name added for those familiar with that nomenclature)

Very Poorly Drained: There are no very poorly drained soils mapped on this property. Small areas less than 2,000 square feet that may be present are treated as inclusions in poorly drained mapping units.

Poorly Drained: Poorly drained soils occupy the areas delineated as wetlands. In these soils, water is removed so slowly that the soil is wet at shallow depths periodically during the growing season or remains wet for long periods. The occurrence of free water is shallow or very shallow and common or persistent.

553 These soils are found in the wetlands and adjacent to the stream in the NW corner (Scitico)

Somewhat Poorly Drained: Water is removed slowly enough to keep the soil wet for significant periods of time, but not the entire year. A seasonal high water table ranges from 7-15 inches in depth from October to May, but may recede to over 30 inches in depth during the summer. These soils may be classified as hydric soils in depressions. Subsurface wastewater disposal is not permitted in somewhat poorly drained soil in Durham.

453 These soils occupy narrow bands at the toe slopes just above poorly drained soils. (Boxford somewhat poorly drained)

Moderately Well Drained: Water is removed from the soil somewhat slowly. There is a seasonal high water table at 15-40 inches from November through May. The 353 soils contain a hardpan in the subsoil. There are few limitations that can't be overcome. In Durham, subsurface wastewater disposal is permitted only in areas where the depth to the hardpan or to the water table is greater than 24".

353 These are the dominant soils on the landscape and occupy most of the land between the poorly drained wetlands and the glacial till on the highest knolls. Mapping units include small areas with similar soils that are somewhat poorly drained. (Boxford)

321 These soils occupy the few knolls on the property. Subsurface wastewater disposal is permitted where the depth to the seasonal water table is greater than 24". (Sutton)

324 This is a soil shallow to bedrock. The only area large enough to be separated into a mapping unit is a flat table between outcrops at the center east of the property. (Hollis)

Well Drained: Water is removed from the soil readily but not rapidly and the soil does not have a water table at less than 40 inches of the surface throughout the year. Subsurface wastewater disposal is allowed, but individual test pits at each disposal area are required

221 This soil is limited to the top of the small knoll near the center of the property above elevation 66. (Charlton)

Excessively Drained: There are no excessively drained soils on the property

Soil Map Legend

See attachment.

This map product is within the technical standards of the National Cooperative Soil Survey and produced in accordance with the Society of Soil Scientists of Northern New England Publication *Standards for a High Intensity Soil Map, New Hampshire*. It was produced by a professional soil scientist, and is not a product of the USDA Natural Resources Conservation Service. There is a map that accompanies this report.

KEY TO SOIL TYPES

This key is used in determining soil types that are utilized in high intensity soil surveys. The soil types are defined as soils having the same soil characteristics of drainage class, parent material, restrictive features, and slope; and are designated by a five-part symbol, the parts being A, B, C, D and E.

SYMBOL: A Drainage Class

- 1- Excessively drained
- 2- Well drained
- 3- Moderately well drained
- 4- Somewhat poorly drained
- 5- Poorly drained
- 6- Very poorly drained
- 7- Not determinable (to be used only with Symbol B-6)

SYMBOL: B Parent Material

- 1- Glaciofluvial Deposits (outwash/terraces of sand or sand and gravel).
- 2- Glacial Till Material (active ice)
Marine or Glaciolacustrine Deposits (3, 4 or 5)
- 3- Very fine sand and silt deposits (glacial lakes)
- 4- Loamy/sandy over silt/clay deposits
- 5- Silt and clay deposits (ocean waters)
- 6- Excavated, Regraded or Human Transported Material (see Connotative Soil Legend)
- 7- Alluvial Deposits (flood plains)
- 8- Organic Materials - Fresh Water Wetlands
- 9- Organic Materials - Tidal Wetlands

SYMBOL: C Restrictive Features (if more than one applies, list the most restrictive)

- 1- None
- 2- Bouldery, with more than 15% of the surface covered with boulders (larger than 24 inches in diameter).
- 3- Mineral restrictive layer(s) are present in the soil profile less than 40 inches below the soil surface - such as "hard pan", densic material, platy structure or clayey texture with consistence of at least firm, i.e. more than 20 newtons. For other examples of soil characteristics that qualify for restrictive layer, see Soil Manual for Site Evaluations in New Hampshire, 2nd Ed., page 3-17, figure 3-14.
(continued)
- 4- Bedrock present in the soil profile 0-20 inches below the mineral soil

surface (Bedrock is either a lithic or paralithic contact - See *User Note: Soil Taxonomy*. Paralithic references bedrock that can be removed by an excavator, backhoe or by hand shovel with difficulty. Bedrock fractures are spaced more than 4 inches.

- 5- Subject to flooding.
- 6- Does not meet fill standards (see addendum - Standards for Human Transported Material) (only to be used with Symbol B-6).
- 7- Bedrock present in the soil profile 20 to 40 inches below the mineral soil surface. (Bedrock is either lithic or paralithic contact; see *Soil Taxonomy*).
- 8- Areas where depth to bedrock is so variable that a single soil type cannot be applied, will be mapped as a complex of soil types and will have a symbol C of 8.

SYMBOL: D Slope Class

- B- 0% to 8%
- C- 8% to 15%
- D- 15% to 25%
- E- 25% to 35%
- F- 35%+

SYMBOL: E -High Intensity Soil Map Identifier - H. (see addendum)

Boxford Silt Loam
3 to >25 Percent Slopes

High Intensity Map Symbol: 353, moderately well drained
453, somewhat poorly drained

Setting

Parent Material: Silty marine sediments
Landform: Convex plains, broad drainageways
Position on Landscape: Uplands at lower elevations or in drainageways
Slope Range: 3 to >25 percent

Composition and Soil Characteristics

Drainage Class: Moderately well drained; seasonal high water table at 15 to 40 inches. OR..somewhat poorly drained with seasonal high water table at 7-15"
Hydrologic Group: C/D
Surface Runoff: Rapid
Permeability: Slow. Very slow in subsoil
Depth to Bedrock: > 40 inches
Hydric conditions: Possible in somewhat poorly drained areas

Inclusions within Mapping Unit

Similar: Scitico silt loam – poorly drained
Contrasting: None

Use and Management

With improvements and engineering practices, this soil is fairly well suited to development. Slow permeability and a seasonal high water table are the limiting factors. Position on the landscape allows engineering practices to overcome the limitations. Subsurface wastewater disposal is permitted. See Test Pit 6 for a typical description.

Charlton Fine Sandy Loam
3-8 Percent Slopes

High Intensity Map Symbol: 221, well drained

Setting

Parent Material: Glacial till
Landform: Glaciated uplands
Position on Landscape: Ridgetops and upper side slopes
Slope Range: 3 to 8 percent

Composition and Soil Characteristics

Drainage Class: Well drained; seasonal high water table at >40 inches.
Hydrologic Group: A
Surface Runoff: Slow
Permeability: Rapid
Depth to Bedrock: > 40 inches
Hydric conditions: No

Inclusions within Mapping Unit

Similar: Sutton – moderately well drained
Contrasting: None

Use and Management

This soil is well suited to development. There are few limitations. See test pit 5 for a typical description

Hollis Fine Sandy Loam
0 - 8 Percent Slopes

High Intensity Map Symbol: 324, moderately well drained

Setting

Parent Material: Glacial till
Landform: Glaciated uplands
Position on Landscape: bedrock controlled ridges
Slope Range: 0 to 8 percent

Composition and Soil Characteristics

Drainage Class: Moderately well drained; usually no seasonal water table above bedrock
Hydrologic Group: D
Surface Runoff: Moderate
Permeability: Moderate
Depth to Bedrock: 0 to 20 inches
Hydric conditions: No

Inclusions within Mapping Unit

Similar: Tunbridge - > 20" to bedrock
Contrasting: Boxford - silty marine sediments
Sutton - Bedrock at >40"

Use and Management

This soil is poorly to most development. Depth to bedrock is the limiting factor. See test pit 17 for a typical description

Scitico Silt Loam
0-8 Percent Slopes

High Intensity Map Symbol: 553, poorly drained

Setting

Parent Material: Silty marine sediments
Landform: Lowlands
Position on Landscape: Depressions, drainageways, wetlands
Slope Range: 0 to 8 percent

Composition and Soil Characteristics

Drainage Class: Poorly drained; seasonal high water table at 0 to 7 inches.
Hydrologic Group: D
Surface Runoff: Slow
Permeability: Slow. Very slow in subsoil
Depth to Bedrock: > 40 inches
Hydric conditions: Yes

Inclusions within Mapping Unit

Similar: Boxford - somewhat poorly drained
Contrasting: None

Use and Management

This soil is poorly suited to development. Areas mapped as Scitico are classified as wetlands and permitting is required for any activity in those wetlands. Wetness is the limiting factor with a water table at or near the surface during most months of the year. Subsurface wastewater disposal is not permitted. See test pit 3 for a typical description

Sutton Fine Sandy Loam
3 - >25 Percent Slopes

High Intensity Map Symbol: 321, moderately well drained

Setting

Parent Material: Glacial till
Landform: Glaciated uplands
Position on Landscape: Ridgetops and upper side slopes
Slope Range: 3 to >25 percent

Composition and Soil Characteristics

Drainage Class: Moderately well drained; seasonal high water table at 15 to 40 inches
Hydrologic Group: B
Surface Runoff: Moderate
Permeability: Moderate
Depth to Bedrock: > 40 inches
Hydric conditions: No

Inclusions within Mapping Unit

Similar: Charlton – well drained
Contrasting: Boxford – silty marine sediments
Tunbridge – Bedrock at <40”

Use and Management

This soil is well suited to development. A seasonal high water table is present during seasonally wet periods. See test pit 12 for a typical description.

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 1

- 00 – 06” Dark brown (10YR4/3) sandy loam; weak fine granular structure; moist, friable.
- 06 – 13” Strong brown (7.5Y5/8) sandy loam; weak medium granular structure; moist, friable.
- 13 – 24” Yellowish brown (10YR5/6) loamy sand; moderate medium granular structure; moist, friable
- 24 – 48” Olive brown (2.5Y5/3) loamy sand; moderate medium granular structure; moist, friable.

Series: Charlton
Estimated seasonal high water table: None to 48”
Observed water: none
Restrictive layer: None
Soil Hydrologic Group: A

Test Pit 2

- 00 – 04” Dark brown (10YR4/3) sandy loam; weak fine granular structure; moist, friable.
- 04 – 16” Yellowish brown (10YR5/6) sandy loam; weak medium granular structure; moist, friable.
- 16 – 37” Light olive brown (2.5Y5/4) loamy sand; moderate medium granular structure; moist, friable
- 37 – 54” Olive brown (2.5Y5/3) loamy sand; few redox features in 10YR6/1 and 10YR5/6; moderate medium granular structure; moist, friable.

Series: Sutton
Estimated seasonal high water table 37”
Observed water: None
Restrictive layer: none
Soil Hydrologic Group: A

Test Pit Descriptions

Durham NH

Mulhern – Bagdad Rd

May 12, 2018

Test pits described on 02-15-18 & 04-09-18

Test Pit 3

- 00 – 06” Dark brownish gray (10YR4/2) very fine sandy loam; weak fine granular structure; moist, friable.
- 06 – 20” Light olive brown (2.5Y5/4) silt loam; many redox features in 10YR6/1 and 7.5YR5/8; massive structure; moist, friable.
- 20” + Olive gray (2.5Y5/2) silty clay loam; many redox features in 10YR6/1 and 10YR4/4; strong medium subangular blocky structure; moist, friable.

Series: Scitico

Estimated seasonal high water table: 0”

Observed water: 12”

Restrictive layer: 20”

Soil Hydrologic Group: D

Test Pit 4

- 00 – 06” Dark brown (10YR4/3) fine sandy loam; weak fine granular structure; moist, friable.
- 06 – 17” Light olive brown (2.5Y5/4) fine sandy loam; weak fine granular structure; moist, friable.
- 17 – 32” Light olive brown (2.5Y5/4) loamy sand; few fine redox features in 10YR6/1 and 7.5YR5/8; weak medium granular structure; moist, friable.
- 32 – 48” Yellowish brown (10YR5/6) sandy loam; many medium redox features in 10YR6/1 and 7.5YR5/8; moderate medium granular structure; moist, friable.

Series: Sutton

Estimated seasonal high water table: 17”

Observed water: none

Restrictive layer: none

Soil Hydrologic Group: D

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 5

- 00 – 05” Dark brown (10YR4/3) fine sandy loam; weak fine granular structure; moist, friable.
05 – 15” Strong brown (7.5Y5/8) sandy loam; weak medium granular structure; moist, friable.
15 – 34” Yellowish brown (10YR5/6) sandy loam; moderate medium granular structure; moist, friable
34 – 50” Light olive brown (2.5Y5/6) loamy sand; moderate medium granular structure; moist, friable.

Series: Charlton
Estimated seasonal high water table: None to 50”
Observed water: none
Restrictive layer: None
Soil Hydrologic Group: A

Test Pit 6

- 00 – 05” Dark brown (10YR4/4) very fine sandy loam; weak fine granular structure; moist, friable.
05 – 11” Dark brown (10YR4/4) very fine sandy loam; massive structure; moist, friable.
11 – 18” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
18 – 25” Light olive brown (2.5Y5/4) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); strong medium subangular blocky structure; moist, firm.
25 – 50” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); strong medium subangular blocky structure; moist, firm.

Series: Boxford
Estimated seasonal high water table: 18”
Observed water: none
Restrictive layer: 18”
Soil Hydrologic Group: D

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 7

- 00 – 06” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
- 06 – 21” Light olive brown (2.5Y5/6) silt loam; massive structure; moist, friable.
- 21 – 33” Light olive brown (2.5Y5/6) very fine sandy loam; few redox features in 10YR6/1 and 10YR5/6); massive structure; moist, friable.
- 33 – 48” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); strong medium subangular blocky structure; moist, firm.

Series: Boxford
Estimated seasonal high water table: 21”
Observed water: none
Restrictive layer: 21”
Soil Hydrologic Group: D

Test Pit 8

- 00 – 05” Dark brown (10YR4/3) fine sandy loam; weak fine granular structure; moist, friable.
- 05 – 15” Yellowish brown (10YR5/6) fine sandy loam; weak fine granular structure; moist, friable.
- 15 – 26” Light olive brown (2.5Y5/4) fine sandy loam; moderate medium granular structure; moist, friable.
- 26 – 45” Light olive brown (2.5Y5/4) fine sandy loam; common fine and medium redox features in 10YR6/1 and 10YR5/6); moderate medium granular structure; moist, friable.
- @45” Bedrock

Series: Sutton
Estimated seasonal high water table: 26”
Observed water: none
Restrictive layer: none
Bedrock at 45”
Soil Hydrologic Group: C

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 9

- 00 – 05” Dark brownish gray (10YR4/2) silt loam; weak fine granular structure; wet, slightly sticky, slightly plastic
- 05 – 09” Olive gray (2.5Y5/2) silt loam; massive structure; wet, slightly sticky, slightly plastic
- 09 – 18” Light olive brown (2.5Y5/4) silt loam; many redox features in 10YR6/1 and 10YR4/4; strong medium subangular blocky structure; moist, friable.
- 18 – 36” Olive gray (2.5Y5/2) silty clay loam; strong medium subangular blocky structure; moist, very firm

Series: Scitico

Estimated seasonal high water table: 0”

Observed water: 14”

Restrictive layer: 18”

Soil Hydrologic Group: D

Test Pit 10

- 00 – 04” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
- 04 – 08” Strong brown (7.5YR5/8) silt loam; massive structure; moist, friable.
- 08 – 17” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
- 17 – 24” Light olive brown (2.5Y5/4) silt loam; common fine and medium redox features in 10YR6/1 and 10YR5/6; massive structure; moist, friable.
- 24 – 42” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); strong medium subangular blocky structure; moist, firm.

Series: Boxford

Estimated seasonal high water table: 17”

Observed water: none

Restrictive layer: 24”

Soil Hydrologic Group: D

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 11

- 00 – 06” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
- 06 – 11” Yellowish brown (10YR5/6) silt loam; massive structure; moist, friable.
- 11 – 20” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
- 20 – 48” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); strong medium subangular blocky structure; moist, firm.

Series: Boxford
Estimated seasonal high water table: 20”
Observed water: none
Restrictive layer: 20”
Soil Hydrologic Group: D

Test Pit 12

- 00 – 06” Dark brown (10YR4/3) fine sandy loam; weak fine granular structure; moist, friable.
- 06 – 15” Strong brown (7.5YR5/6) fine sandy loam; weak fine granular structure; moist, friable.
- 15 – 32” Light olive brown (2.5Y5/4) sandy loam; moderate medium granular structure; moist, friable.
- 32 – 60” Light olive brown (2.5Y5/4) loamy sand; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); moderate medium granular structure; moist, friable.
- @50” Bedrock

Series: Sutton
Estimated seasonal high water table: 32”
Observed water: none
Restrictive layer: none
Bedrock at 50”
Soil Hydrologic Group: B

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 13

00 – 06” Dark brown (10YR4/3) fine sandy loam; weak fine granular structure; moist, friable.
06 – 12” Strong brown (7.5YR5/8) fine sandy loam; weak fine granular structure; moist, friable.
12 – 30” Light olive brown (2.5Y5/4) sandy loam; moderate medium granular structure; moist, friable.
30 – 38” Light olive brown (2.5Y5/4) loamy sand; moderate medium granular structure; moist, friable.
@38” Refusal - boulder

Series: Sutton (depth not reached for Charlton classification)
Estimated seasonal high water table: none
Observed water: none
Restrictive layer: none
Refusla at 38”
Soil Hydrologic Group: C

Test Pit 14

00 – 04” Dark brown (10YR4/4) fine sandy loam; weak fine granular structure; moist, friable.
04 – 12” Yellowish brown (10YR5/6) fine sandy loam; weak fine granular structure; moist, friable.
12 – 18” Light olive brown (2.5Y5/4) very fine sandy loam; massive structure; moist, friable.
18 – 42” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); strong medium subangular blocky structure; moist, firm.

Series: Boxford
Estimated seasonal high water table: 18”
Observed water: none
Restrictive layer: 18”
Soil Hydrologic Group: D

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 15

- 00 – 06” Dark brown (10YR4/4) fine sandy loam; weak fine granular structure; moist, friable.
06 – 16” Yellowish brown (10YR5/6) silt loam; weak fine granular structure; moist, friable.
16 – 21” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
21 – 42” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8); strong medium subangular blocky structure; moist, firm.

Series: Boxford
Estimated seasonal high water table: 18”
Observed water: none
Restrictive layer: 18”
Soil Hydrologic Group: D

Test Pit 16

- 00 – 09” Dark brown (10YR4/3) sandy loam; weak fine granular structure; moist, friable.
09 – 15” Yellowish brown (10YR5/6) fine sandy loam; weak fine granular structure; moist, friable.
15 – 36” Light olive brown (2.5Y5/4) sandy loam; moderate medium granular structure; moist, friable.
36 – 42” Light olive brown (2.5Y5/4) sandy loam; common fine and medium redox features in 10YR6/1 and 10YR5/6); moderate medium granular structure; moist, friable.
@42” Refusal – small machine; assumed boulders

Series: Sutton
Estimated seasonal high water table: 36”
Observed water: none
Restrictive layer: none
Refusal at 42”
Soil Hydrologic Group: C

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 17

00 – 06” Dark Brown (10YR4/3) fine sandy loam; weak fine granular structure; moist, friable

At 6” Bedrock

Series: Hollis
Estimated seasonal high water table: none
Observed water: none
Restrictive layer: none
Bedrock at 6”
Soil Hydrologic Group: D

Test Pit 18

- 00 – 03” Dark brown (10YR4/4) very fine sandy loam; weak fine granular structure; moist, friable.
- 03 – 12” Light olive brown (2.5Y5/6) very fine sandy loam; massive structure; moist, friable.
- 12 – 18” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
- 18 – 32” Light olive brown (2.5Y5/4) silty clay loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8; strong medium subangular blocky structure; moist, firm.
- 32 – 50” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 7.5YR5/8; strong medium subangular blocky structure; moist, very firm.

Series: Boxford
Estimated seasonal high water table: 18”
Observed water: none
Restrictive layer: 18”
Soil Hydrologic Group: D

Test Pit 19

There is no test pit 19; number skipped in field

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 20

- 00 – 06” Dark brown (10YR4/4) very fine sandy loam; weak fine granular structure; moist, friable.
- 06 – 11” Light olive brown (2.5Y5/6) very fine sandy loam; massive structure; moist, friable.
- 11 – 26” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
- 26 – 35” Light olive brown (2.5Y5/4) silt loam; few fine redox features in 10YR6/1; moderate medium subangular blocky structure; moist, friable.
- 35 – 54” Light olive brown (2.5Y5/6) silty clay loam; common fine and medium redox features in 7.5YR5/8; strong medium subangular blocky structure; moist, very firm.

Series: Boxford
Estimated seasonal high water table: 26”
Observed water: none
Restrictive layer: 35”
Soil Hydrologic Group: C

Test Pit 21

- 00 – 04” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
- 04 – 16” Olive brown (2.5Y5/3) silt loam; massive structure; moist, friable.
- 16 – 22” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
- 22 – 32” Light olive brown (2.5Y5/4) silt loam; few fine redox features in 10YR6/1 and 7.5YR5/8; moderate medium subangular blocky structure; moist, friable.
- 32 – 50” Light olive brown (2.5Y5/6) silty clay loam; common fine and medium redox features in 7.5YR5/8; strong medium subangular blocky structure; moist, very firm.

Series: Boxford
Estimated seasonal high water table: 22”
Observed water: none
Restrictive layer: 32”
Soil Hydrologic Group: D

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 22

- 00 – 07” Dark brown (10YR4/3) sandy loam; weak fine granular structure; moist, friable.
07 – 19” Yellowish brown (10YR5/6) fine sandy loam; weak fine granular structure; moist, friable.
19 – 24” Yellowish brown (10YR5/6) sandy loam; moderate medium granular structure; moist, friable.
24 – 32” Light olive brown (2.5Y5/4) sandy loam; moderate medium granular structure; moist, friable.
32 – 50” Light olive brown (2.5Y5/4) loamy sand; strong medium platy structure; moist, firm.

Series: Scituate
Estimated seasonal high water table: 32”
Observed water: none
Restrictive layer: 32”
Soil Hydrologic Group: C

Test Pit 23

- 00 – 06” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
06 – 12” Yellowish brown (10YR5/6) silt loam; massive structure; moist, friable.
12 – 17” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
17 – 42” Olive gray (2.5Y5/2) silty clay loam; common fine and medium redox features in 7.5YR5/8; strong medium subangular blocky structure; moist, very firm.

Series: Boxford
Estimated seasonal high water table: 17”
Observed water: none
Restrictive layer: 17”
Soil Hydrologic Group: D

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 24

- 00 – 03” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
- 03 – 17” Yellowish brown (10YR5/6) silt loam; massive structure; moist, friable.
- 17 – 30” Light olive brown (2.5Y5/4) silt loam; few redox features in 10YR6/1; strong medium subangular blocky structure; moist, very firm
- 30 – 42” Light olive brown (2.5Y5/4) silt loam; many fine and medium redox features in 7.5YR5/8 and 10YR6/1; strong medium subangular blocky structure; moist, very firm.

Series: Boxford
Estimated seasonal high water table: 17”
Observed water: none
Restrictive layer: 17”
Soil Hydrologic Group: D

Test Pit 25

- 00 – 05” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
- 05 – 20” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
- 20 – 42” Olive gray (2.5Y5/2) silty clay loam; few fine and medium redox depletions in 10YR6/1; strong medium subangular blocky structure; moist, firm.

Series: Boxford
Estimated seasonal high water table: 20”
Observed water: none
Restrictive layer: 20”
Soil Hydrologic Group: D

Test Pit Descriptions

Durham NH
Mulhern – Bagdad Rd
May 12, 2018
Test pits described on 02-15-18 & 04-09-18

Test Pit 26

- 00 – 05” Dark brown (10YR4/4) silt loam; weak fine granular structure; moist, friable.
- 02 – 17” Light olive brown (2.5Y5/4) silt loam; massive structure; moist, friable.
- 17 – 42” Olive gray (2.5Y5/2) silty clay loam; few fine and medium redox depletions in 10YR6/1; strong medium subangular blocky structure; moist, firm.

Series: Boxford
Estimated seasonal high water table: 20”
Observed water: none
Restrictive layer: 20”
Soil Hydrologic Group: D

Test Pit 27

- 00 – 07” Dark brown (10YR4/3) fine sandy loam; weak fine granular structure; moist, friable.
- 07 – 15” Yellowish brown (10YR5/6) fine sandy loam; weak medium granular structure; moist, friable.
- 15 – 25” Light olive brown (2.5Y5/4) fine sandy loam; few redox features in 10YR6/1; moderate medium granular structure; moist, friable
- 25 – 32” Light olive brown (2.5Y5/4) fine sandy loam; few fine and medium redox features in 7.5YR5/8 and 10YR6/1; moderate medium granular structure; moist, friable.
- 32 – 48” Light olive brown (2.5Y5/4) silt loam; common fine and medium redox features in 10YR6/1 and 7.5YR5/8; strong medium subangular blocky structure; moist, firm

Series: Boxford
Estimated seasonal high water table: 25”
Observed water: none
Restrictive layer: 32”
Soil Hydrologic Group: D