

**STORMWATER MANAGEMENT  
&  
SEDIMENT AND EROSION  
CONTROL PLAN**

Prepared for:

**THIBODEAU FAMILY REV. TRUST  
76 YOUNG RD., BARRINGTON, NH 03885  
(603) 767-3552  
ROUTE 9 MIXED USE DEVELOPMENT**

Prepared by:

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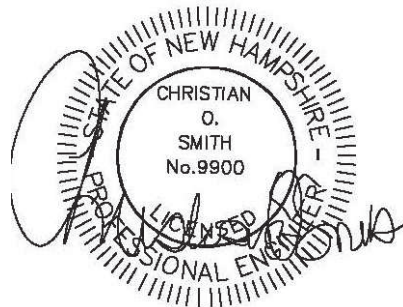
Project Number:

NH-1387

NH Route 9

Barrington, New Hampshire

**August 24, 2022**



## DESIGN METHOD OBJECTIVES

The Thibodeau Family Rev. Trust proposes a 6-unit mixed use development on approximately 3.42-acres of land located off NH Route 9 in Barrington, NH. A drainage analysis of the proposed development was conducted for the purpose of estimating the peak rate of stormwater run-off and to subsequently design adequate drainage structures. Two models were compiled, one for the area in its existing (pre-construction) condition, and a second for its proposed (post-construction) condition. The analysis was conducted using data for the 2, 10, 25 and 50Yr – 24 Hr storm events using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. The purpose of this analysis is to estimate the peak rates of run-off from the site for swale adequacy purposes, and to compare the peak rate of run-off between the existing and proposed conditions. Rainfall data utilized is as provided in the Extreme Precipitation tables by Cornell University. Infiltration rates, for the ponds that are design to recharge stormwater, have been taken from the Ksat values provided in the Society of Soil Scientists of Northern New England SSSNNE Special Publication No. 5 September, 2009. The published values were then divided by 2 as a factor of safety as required by the NH Stormwater Manual.

ANALYSIS	<u>COMPONENT PEAK RATE of DISCHARGE (CFS)</u>							
	2 YR		10 YR		25 YR		50 YR	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Reach #100	0.52	0.52	2.01	1.75	3.28	2.83	4.08	3.67
Reach #200	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Reach #300	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.08

### STORMWATER VOLUME COMPARISON (2-YR STORM IN AF)

	Existing	Proposed
Reach #100	0.148	0.134
Reach #200	0.00	0.00
Reach #300	0.00	0.00

The existing property is located on a parcel consisting of forest, a woods road, wetlands and an open area utilized as a landing for historic logging activity. The existing topography is such that the site analysis is divided into three subcatchments. The reaches flow offsite; westerly (to an abutting driveway culvert parallel to Route 9), Northerly to the abutting parcel and south easterly to an abutting parcel. Directions as can be seen on the existing conditions watershed plan (Sheet W1).

The proposed 6-unit mixed use development includes a private access drive that intersects NH Route 9 in a single location. This drive provides the required frontage for the residential and 4-proposed commercial lots. The proposed layout will divide the parcel into sixteen different subcatchments. The peak rate of run-off from the proposed development is equal to or decreased (though the 50-YR storm shows a 0.06 cfs increase for Reach 3, this is negligible) from that of the existing conditions under all design storms evaluated. The addition of swales, culverts, infiltration/filtration areas direct the treated run off to recharge it back into the ground water matrix. Driveway and parking area runoff receive treatment through filtration (bioretention) ponds prior to infiltration to the groundwater matrix. Some paved area and the unit roofs are infiltrated through stone drip edges and is also infiltrated. The potential for increased erosion and sedimentation is handled by way of stone check dams, siltfence and/or erosion control berms. The use of Best Management Practices per the New Hampshire Stormwater Manual has been applied to the design of these structures and will be observed during all stages of construction.

All land disturbed during construction will be permanently stabilized within 60 days of groundbreaking, and existing wetlands and abutters will suffer no adversity resulting from this development.

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## Appendix I - Existing Conditions Analysis

Summary 2 YR - 24 HR rainfall = 3.08"

Complete 10 YR - 24 HR rainfall = 4.64"

Summary 25 YR - 24 HR rainfall = 5.86"

Summary 50 YR - 24 HR rainfall = 7.00"

Sheet W-1 Existing Conditions Watershed Plan

## Appendix II - Proposed Conditions Analysis

Summary 2 YR - 24 HR rainfall = 3.08"

Complete 10 YR - 24 HR rainfall = 4.64"

Summary 25 YR - 24 HR rainfall = 5.86"

Summary 50 YR - 24 HR rainfall = 7.00"

Sheet W-2 Proposed Conditions Watershed Plan

## Appendix III - Charts, Graphs, and Calculations

### 1.0 RAINFALL CHARACTERISTICS

This stormwater management plan includes an existing conditions analysis of the area involved in the proposed development, as well as proposed conditions, or post-construction analysis of the same location. These analyses were accomplished using the USDA SCS TR-20 Method within the HydroCAD Stormwater Modeling System. The curve numbers were developed using the SCS TR-55 Runoff Curve numbers for Urban Areas. A Type III SCS 24-hour rainfall distribution was utilized in analyzing the data for the 2, 10, 25 and 50Yr – 24 Hr storm events using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment.

ANALYSIS	<u>COMPONENT PEAK RATE of DISCHARGE (CFS)</u>							
	2 YR		10 YR		25 YR		50 YR	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Reach #100	0.52	0.52	2.01	1.75	3.28	2.83	4.08	3.67
Reach #200	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Reach #300	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.08

### STORMWATER VOLUME COMPARISON (2-YR STORM IN AF)

	Existing	Proposed
Reach #100	0.148	0.134
Reach #200	0.00	0.00
Reach #300	0.00	0.00

### 2.0 EXISTING CONDITIONS

Reference: Sheet W-1, Existing Conditions Watershed Plan (Enclosed)  
 Existing Conditions Plans

The existing property is located on a parcel consisting of forest, a woods road, wetlands and an open area utilized as a landing for historic logging activity. The existing topography is such that the site analysis is divided into three subcatchments. The reaches flow offsite; westerly (to an abutting driveway culvert parallel to Route 9), Northerly to the abutting parcel and south easterly to an abutting parcel. Directions as can be seen on the existing conditions watershed plan (Sheet W1). Classified by Site Specific Soil Mapping, the land within the drainage analysis is composed of slopes ranging from 3% to 25%, and soils categorized into the Hydrologic Soil Groups (HSG) A, B, and C. No flood hazard zone exists on the parcel.

### 3.0 PROPOSED CONDITIONS

Reference: W-Sheets Proposed Conditions Watershed Plan (Enclosed)  
 C Sheets Proposed Conditions Plans

The addition of the impervious area from the 22' wide paved drive, parking areas and the 6 proposed units cause an increase in the curve number (Cn) and a decrease in the time of concentration (Tc), the net result being a potential increase in peak rates of run-off from the site. The proposed development divides the site into sixteen different post-construction subcatchments. Impervious

area take-offs were calculated digitally from the proposed road pavement and roof areas. Seasonal high-water tables for the treatment ponds and infiltration areas were modeled based on actual test pits logged on the parcel. The run-off is treated and infiltrated modeled as HydroCAD “reaches” and “ponds”. These consist of constructed swales, existing flow paths through larger subcatchments, driveway culverts, infiltration/filtration basins and level spreaders. Required groundwater recharge will be exceeded by a single 1” storm (947 c.f. required and 3,920 c.f. provided by a 1-year storm).

In an effort to prevent the sedimentation of adjacent wetlands or abutting property, the driveway is equipped with roadside swales that terminate into culverts, or directly into sediment forebays or the mentioned BMP treatment ponds. Ksat values were utilized based on published data in SSSNNE Special Publication No. 5 (copy in appendices). The peak rate of run-off from the proposed development is equal to or decreased (though the 50-YR storm shows a 0.06 cfs increase for Reach 3, this is negligible) from that of the existing conditions under all design storms evaluated. The addition of swales, culverts, infiltration/filtration areas direct the treated run off to recharge it back into the ground water matrix. Driveway and parking area runoff receive treatment through filtration (bioretention) ponds prior to infiltration to the groundwater matrix. Some paved area and the unit roofs are infiltrated through stone drip edges and is also infiltrated. The potential for increased erosion and sedimentation is handled by way of stone check dams, silt fence and/or erosion control berms. The use of Best Management Practices per the New Hampshire Stormwater Manual has been applied to the design of these structures and will be observed during all stages of construction. All land disturbed during construction will be permanently stabilized within 60 days of groundbreaking, and existing wetlands and abutters will suffer no adversity resulting from this development. During construction, appropriate temporary and/or permanent BMP's will be applied so as to negate the potential for sediment-laden run-off to discharge into wetlands prior to the final stabilization of the proposed grading. The structures outlined in this proposal provide for compliant treatment of stormwater run-off and for sediment control.

#### 4.0 SEDIMENT & EROSION CONTROL PLANS BEST MANAGEMENT PRACTICES (BMP's)

Reference: C Sheets Proposed Conditions Plan  
E Sheet Erosion & Sediment Control Details

The proposed site development is protected from erosion and the driveways and abutting properties are protected from sediment by the use of Best Management Practices as outlined in the New Hampshire Stormwater Manual. Any area disturbed by construction will be permanently re-stabilized within 60 days and abutting properties and wetlands will not be adversely affected by this development. All swales and drainage structures will be constructed and stabilized prior to having run-off directed to them.

#### 4.1 Silt Fence / Erosion Control Berm and Construction Fence

The plan set demonstrates the location of silt fence or Erosion Control Berm for sediment control. In areas where the limits of construction need to be emphasized to operators, construction fence for added visibility will be installed. Sheet E-1, Erosion and Sediment Control Details, has the

specifications for installation and maintenance of the silt fence. Orange construction fence will be VISI Perimeter Fence by Conwed Plastic Fencing, or equal. The four-foot fencing to be installed using six-foot posts at least two feet in the ground with spacing of six to eight feet.

#### 4.2 Drainage Swales / Stormwater Conveyance Channels

Drainage swales will be stabilized with vegetation for long term cover as outlined below, and on Sheet E-1 using seed mixture C. As a general rule, velocities in the swale should not exceed 3.0 feet per second for a vegetated swale although velocities as high as 4.5 FPS are allowed under certain soil conditions.

#### 4.3 Vegetated Stabilization

All areas that are disturbed during construction will be stabilized with vegetated material within 60 days of breaking ground. Construction will be managed in such a manner that erosion is prevented and that no abutter's property will be subjected to any siltation, unless otherwise permitted. All areas to be planted with grass for long-term cover will follow the specification and on Sheet E-1 using seeding mixture C, as follows:

<b>Mixture</b>	<b>Pounds per Acre</b>	<b>Pounds per 1,000 Sq. Ft.</b>
Tall Fescue	20	0.45
<u>Creeping Red Fescue</u>	<u>28</u>	<u>0.65</u>
Total	48	1.10

#### 4.4 Stabilized Construction Entrance

A temporary gravel construction entrance provides an area where mud can be dislodged from tires before the vehicle leaves the construction site to reduce the amount of mud and sediment transported onto paved municipal and state roads. The stone size for the pad should be between 1 and 2-inch coarse aggregate, and the pad itself constructed to a minimum length of 50' for the full width of the access road. The aggregate should be placed at least six inches thick. A plan view and profile are shown on Sheet E1 - Sediment and Erosion Control Detail Plan.

#### 4.5 Level Spreaders

As mentioned above, the proposed site plan includes stone level spreaders above a vegetated buffer. Level spreaders must be more than six feet in width per the "New Hampshire Stormwater Manual." Stone Level spreaders enable any run-off directed towards them to be spread evenly into sheet flow prior to discharge into wetlands or treatment by a vegetated buffer, thus allowing for better buffer efficiency and a lesser potential for erosion.

#### 4.6 Vegetated Buffers

Vegetated buffers are areas of land with natural or planted vegetation designed to receive sheet run-off from upgradient development. These natural areas, preferably wooded, are effective in removing sediment and sediment-laden pollutants from such run-off, although their effectiveness is severely diminished when forced to deal with concentrated flow and must therefore be equipped with a level-spreading device. Vegetated buffers should not have a slope exceeding fifteen percent and have a minimum length of seventy-five feet.

#### 4.7 Environmental Dust Control

Dust will be controlled on the site by the use of multiple Best Management Practices. Mulching and temporary seeding will be the first line of protection to be utilized where problems occur. If dust problems are not solved by these applications, the use of water and calcium chloride can be applied. Calcium chloride will be applied at a rate that will keep the surface moist but not cause pollution.

#### 4.8 Construction Sequence

1. Construct and/or install temporary and permanent sediment erosion and detention control facilities (silt fence/erosion control berm, vegetated swales, level spreaders, and constructed Vegetated buffers), as required. Erosion, sediment and facilities shall be installed and stabilized prior to any earth moving operation, and prior to directing run-off to them.
2. Clear, cut, grub, and dispose of debris in approved facilities.
3. Excavate and stockpile topsoil / loam. All disturbed areas shall be stabilized immediately after grading.
4. Construct the driveway and its associated drainage structures.
5. Begin permanent and temporary seeding and mulching. All cut and fill slopes and disturbed areas shall be seeded and mulched as required, or directed.
6. Daily, or as required, construct temporary berms, drainage ditches, sediment traps, etc. to prevent erosion on the site and prevent any siltation of abutting waters or property.
7. Inspect and maintain all erosion and sediment control measures during construction every two weeks and after every storm event with 0.5" or more rain.
9. Complete permanent seeding and landscaping.
9. Remove temporary erosion control measures after seeding areas have established themselves and site improvements are complete. Smooth and re-vegetate all disturbed areas.



10. All swales and all drainage ponds and structures will be constructed and fully stabilized prior to having run-off being directed to them.
11. Finish graveling all driveways/parking.

#### 4.9 Temporary Erosion Control Measures

1. The smallest practical area of open soil shall be exposed at any one time.
2. Erosion, sediment control measures shall be installed as shown on the plans and at locations as required, or directed by the engineer.
3. All disturbed areas shall be returned to original grades and elevations. Disturbed areas shall be loamed with a minimum of 4" of loam and seeded with not less than 1.10 pound of seed per 1,000 square feet (48 pounds per acre) of area.
4. Silt fences and other barriers shall be inspected periodically and after every rainstorm during the life of the project. All damaged areas shall be repaired; sediment deposits shall periodically be removed and properly disposed of.
5. After all disturbed areas have been stabilized, the temporary erosion control measures are to be removed and the area disturbed by the removal smoothed and revegetated.
6. Areas must be seeded and mulched within 5 days of final grading, permanently stabilized within 15 days of final grading, or temporarily stabilized within 30 days of initial disturbance of soil.

#### 4.10 Inspection and Maintenance Schedule

Fencing/Erosion Control Berm will be inspected during and after storm events to ensure that the fence still has integrity and is not allowing sediment to pass. Sediment build-up in swales and level spreaders will be removed if it is deeper than six inches.

#### 5.0 CONCLUSION

This proposed development off of NH Route 9 in Barrington, NH will have no adverse effect on abutting property owners by way of storm water run-off or siltation. The post-construction peak rate of run-off for the site has been decreased from that of the existing conditions for the analyzed design storms and driveway run-off will treatment by either constructed or natural methods. Appropriate steps will be taken to eliminate erosion and sedimentation; these will be accomplished through the construction of a drainage system consisting of swales, driveway culverts, bioretention areas, and infiltration trenches/drip edges. The Best Management Practices developed by the State of New Hampshire have been utilized in the design of this system and these applications will be enforced throughout the construction process.

A Terrain Alteration Permit (RSA 485: A-17) is not required for this project due to the area of disturbance being less than 100,000 square feet.

Respectfully Submitted,

BEALS ASSOCIATES, *PLLC*.

*Christian O. Smith*

Christian O. Smith, PE  
Principal

## APPENDIX I

### Existing Conditions Drainage Analysis

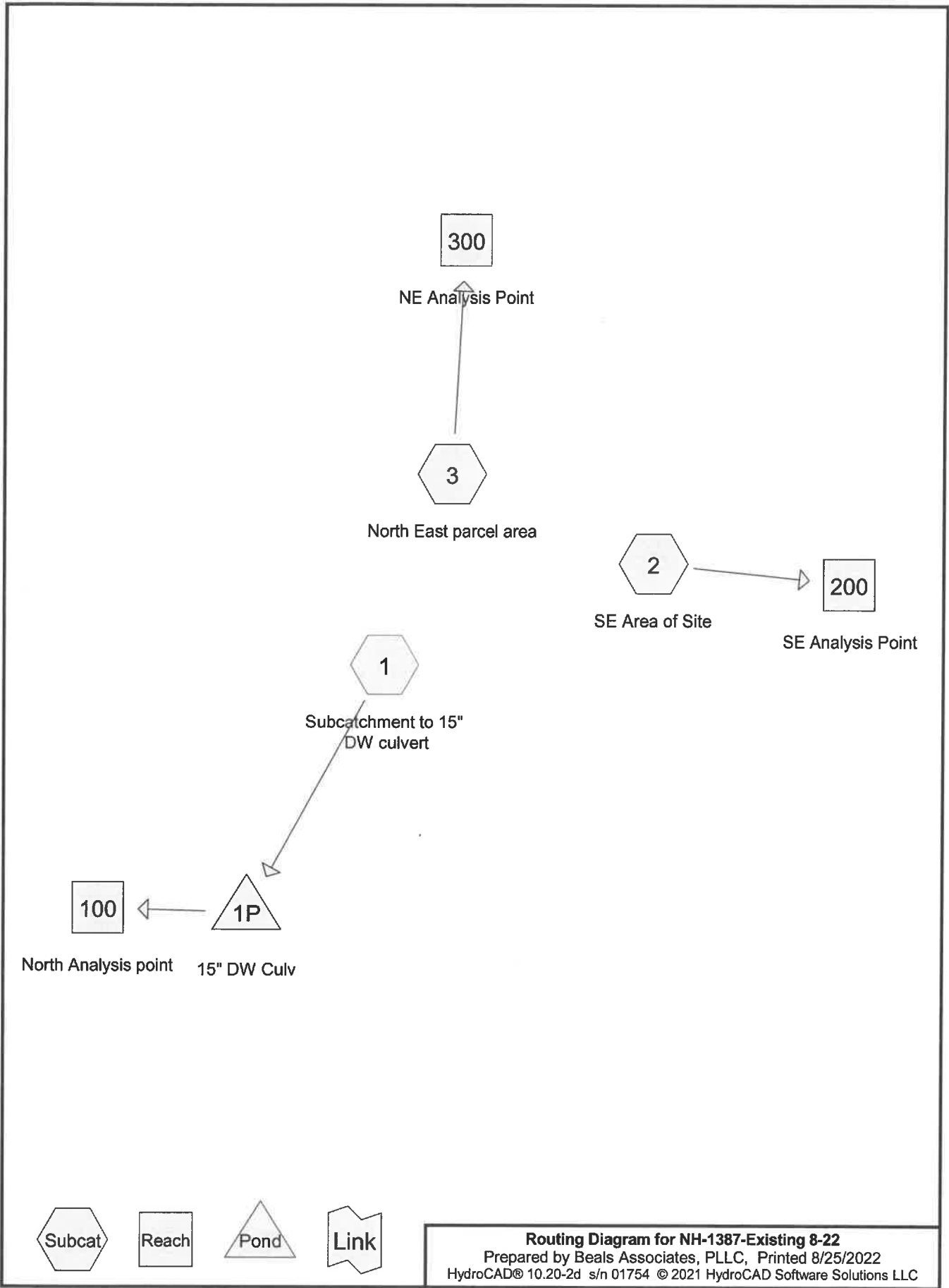
Summary 2 YR - 24 HR rainfall = 3.08"

Complete 10 YR - 24 HR rainfall = 4.64"

Summary 25 YR - 24 HR rainfall = 5.86"

Summary 50 YR - 24 HR rainfall = 7.00"

Sheet W-1 Existing Conditions Watershed Plan



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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.108	74	>75% Grass cover, Good, HSG C (1)
0.385	89	Paved roads w/open ditches, 50% imp, HSG B (1)
0.103	92	Paved roads w/open ditches, 50% imp, HSG C (1)
0.019	98	Roofs, HSG C (1)
0.082	98	Water Surface, HSG C (1)
1.830	30	Woods, Good, HSG A (1, 2, 3)
1.245	55	Woods, Good, HSG B (1)
1.478	70	Woods, Good, HSG C (1)
<b>5.250</b>	<b>55</b>	<b>TOTAL AREA</b>

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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
1.830	HSG A	1, 2, 3
1.630	HSG B	1
1.790	HSG C	1
0.000	HSG D	
0.000	Other	
<b>5.250</b>		<b>TOTAL AREA</b>

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Route 9 Barrington  
Type III 24-hr 2 YR Rainfall=3.08"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: Subcatchment to 15" DW** Runoff Area=179,510 sf 8.38% Impervious Runoff Depth=0.43"  
Flow Length=594' Tc=20.6 min CN=62 Runoff=0.92 cfs 0.148 af

**Subcatchment 2: SE Area of Site** Runoff Area=14,767 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=146' Tc=7.7 min CN=30 Runoff=0.00 cfs 0.000 af

**Subcatchment 3: North East parcel area** Runoff Area=34,414 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=147' Tc=8.4 min CN=30 Runoff=0.00 cfs 0.000 af

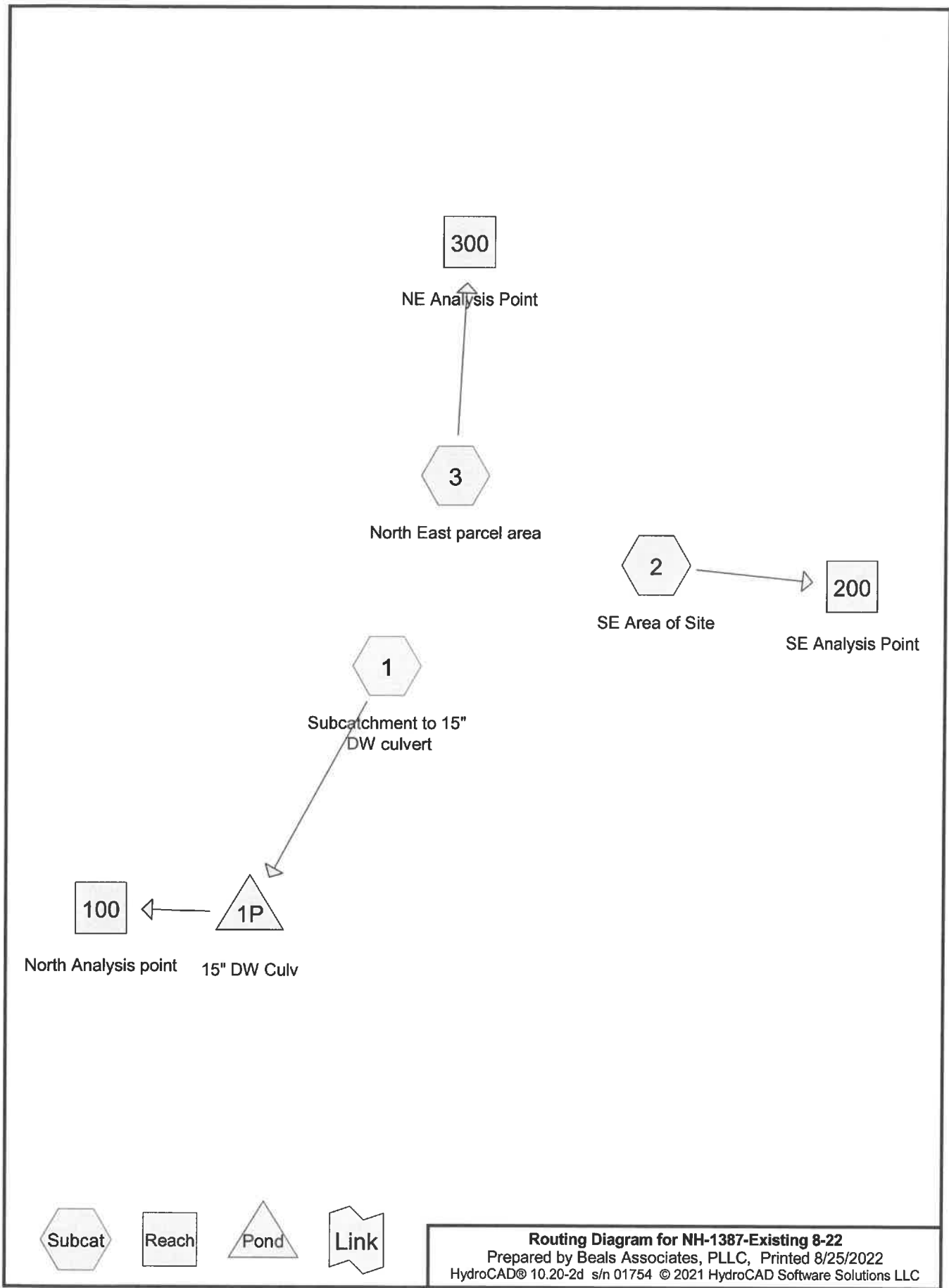
**Reach 100: North Analysis point** Inflow=0.52 cfs 0.148 af  
Outflow=0.52 cfs 0.148 af

**Reach 200: SE Analysis Point** Inflow=0.00 cfs 0.000 af  
Outflow=0.00 cfs 0.000 af

**Reach 300: NE Analysis Point** Inflow=0.00 cfs 0.000 af  
Outflow=0.00 cfs 0.000 af

**Pond 1P: 15" DW Culv** Peak Elev=204.50' Storage=1,051 cf Inflow=0.92 cfs 0.148 af  
15.0" Round Culvert n=0.025 L=21.0' S=0.0052 '/' Outflow=0.52 cfs 0.148 af

**Total Runoff Area = 5.250 ac Runoff Volume = 0.148 af Average Runoff Depth = 0.34"**  
**93.42% Pervious = 4.905 ac 6.58% Impervious = 0.345 ac**



**Routing Diagram for NH-1387-Existing 8-22**  
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Route 9 Barrington  
Type III 24-hr 10 YR Rainfall=4.64"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: Subcatchment to 15" DW** Runoff Area=179,510 sf 8.38% Impervious Runoff Depth=1.22"  
Flow Length=594' Tc=20.6 min CN=62 Runoff=3.51 cfs 0.419 af

**Subcatchment 2: SE Area of Site** Runoff Area=14,767 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=146' Tc=7.7 min CN=30 Runoff=0.00 cfs 0.000 af

**Subcatchment 3: North East parcel area** Runoff Area=34,414 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=147' Tc=8.4 min CN=30 Runoff=0.00 cfs 0.000 af

**Reach 100: North Analysis point** Inflow=2.01 cfs 0.419 af  
Outflow=2.01 cfs 0.419 af

**Reach 200: SE Analysis Point** Inflow=0.00 cfs 0.000 af  
Outflow=0.00 cfs 0.000 af

**Reach 300: NE Analysis Point** Inflow=0.00 cfs 0.000 af  
Outflow=0.00 cfs 0.000 af

**Pond 1P: 15" DW Culv** Peak Elev=205.02' Storage=3,608 cf Inflow=3.51 cfs 0.419 af  
15.0" Round Culvert n=0.025 L=21.0' S=0.0052 '/' Outflow=2.01 cfs 0.419 af

**Total Runoff Area = 5.250 ac Runoff Volume = 0.419 af Average Runoff Depth = 0.96"**  
**93.42% Pervious = 4.905 ac 6.58% Impervious = 0.345 ac**

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Route 9 Barrington  
Type III 24-hr 10 YR Rainfall=4.64"

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**Summary for Subcatchment 1: Subcatchment to 15" DW culvert**

Runoff = 3.51 cfs @ 12.32 hrs, Volume= 0.419 af, Depth= 1.22"  
 Routed to Pond 1P : 15" DW Culv

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
30,531	30	Woods, Good, HSG A
54,239	55	Woods, Good, HSG B
64,384	70	Woods, Good, HSG C
4,691	74	>75% Grass cover, Good, HSG C
841	98	Roofs, HSG C
3,582	98	Water Surface, HSG C
16,759	89	Paved roads w/open ditches, 50% imp, HSG B
4,483	92	Paved roads w/open ditches, 50% imp, HSG C
179,510	62	Weighted Average
164,466		91.62% Pervious Area
15,044		8.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.5	327	0.0210	0.72		<b>Shallow Concentrated Flow, Sheet to RS swale</b> Woodland Kv= 5.0 fps
3.4	217	0.0050	1.06		<b>Shallow Concentrated Flow, SC to Culv</b> Grassed Waterway Kv= 15.0 fps
20.6	594	Total			

**Summary for Subcatchment 2: SE Area of Site**

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"  
 Routed to Reach 200 : SE Analysis Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
14,767	30	Woods, Good, HSG A
14,767		100.00% Pervious Area

**NH-1387-Existing 8-22**

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Route 9 Barrington  
Type III 24-hr 10 YR Rainfall=4.64"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.1000	0.12		<b>Sheet Flow, Sheet</b>
1.0	96	0.0938	1.53		Woods: Light underbrush n= 0.400 P2= 3.00" <b>Shallow Concentrated Flow, Sc to analysis point</b>
7.7	146	Total			Woodland Kv= 5.0 fps

**Summary for Subcatchment 3: North East parcel area**

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"  
Routed to Reach 300 : NE Analysis Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
34,414	30	Woods, Good, HSG A
34,414		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0790	0.11		<b>Sheet Flow, Sheet</b>
1.0	97	0.1130	1.68		Woods: Light underbrush n= 0.400 P2= 3.00" <b>Shallow Concentrated Flow, SC to analysis point</b>
8.4	147	Total			Woodland Kv= 5.0 fps

**Summary for Reach 100: North Analysis point**

Inflow Area = 4.121 ac, 8.38% Impervious, Inflow Depth = 1.22" for 10 YR event  
Inflow = 2.01 cfs @ 12.66 hrs, Volume= 0.419 af  
Outflow = 2.01 cfs @ 12.66 hrs, Volume= 0.419 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

**Summary for Reach 200: SE Analysis Point**

Inflow Area = 0.339 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10 YR event  
Inflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

**NH-1387-Existing 8-22**

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Route 9 Barrington  
Type III 24-hr 10 YR Rainfall=4.64"

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**Summary for Reach 300: NE Analysis Point**

Inflow Area = 0.790 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10 YR event  
Inflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond 1P: 15" DW Culv**

Inflow Area = 4.121 ac, 8.38% Impervious, Inflow Depth = 1.22" for 10 YR event  
Inflow = 3.51 cfs @ 12.32 hrs, Volume= 0.419 af  
Outflow = 2.01 cfs @ 12.66 hrs, Volume= 0.419 af, Atten= 43%, Lag= 20.2 min  
Primary = 2.01 cfs @ 12.66 hrs, Volume= 0.419 af  
Routed to Reach 100 : North Analysis point

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 205.02' @ 12.66 hrs Surf.Area= 6,360 sf Storage= 3,608 cf

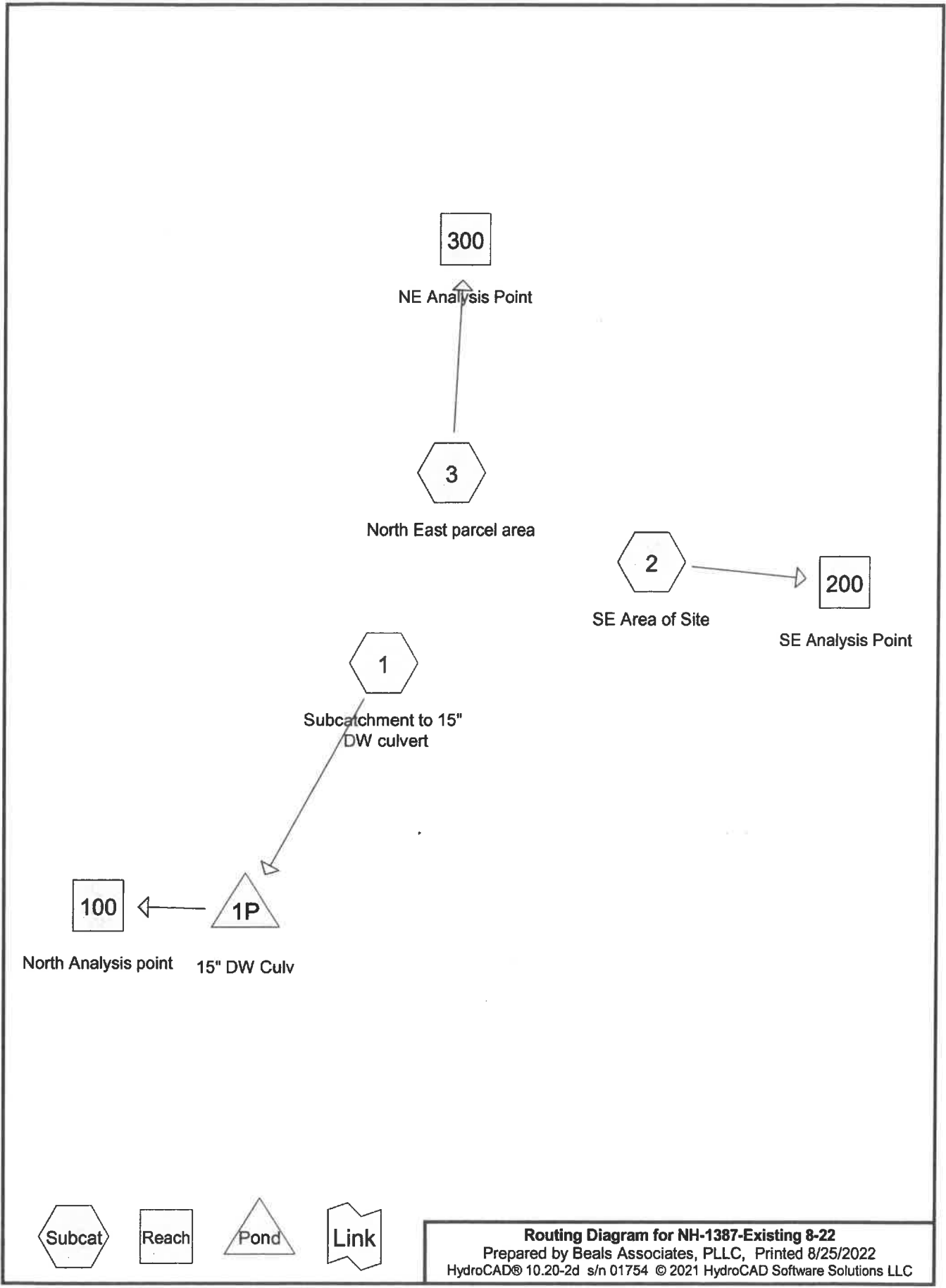
Plug-Flow detention time= 36.7 min calculated for 0.419 af (100% of inflow)  
Center-of-Mass det. time= 36.4 min ( 924.6 - 888.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	204.00'	12,535 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.00	738	0	0
206.00	11,797	12,535	12,535

Device	Routing	Invert	Outlet Devices
#1	Primary	204.01'	<b>15.0" Round Culvert</b> L= 21.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.01' / 203.90' S= 0.0052 ' S= 0.0052 ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf

**Primary OutFlow** Max=2.01 cfs @ 12.66 hrs HW=205.02' (Free Discharge)  
↑1=Culvert (Barrel Controls 2.01 cfs @ 2.59 fps)



**NH-1387-Existing 8-22**

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Route 9 Barrington  
Type III 24-hr 25 YR Rainfall=5.86"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: Subcatchment to 15" DW** Runoff Area=179,510 sf 8.38% Impervious Runoff Depth=2.00"  
Flow Length=594' Tc=20.6 min CN=62 Runoff=6.10 cfs 0.685 af

**Subcatchment 2: SE Area of Site** Runoff Area=14,767 sf 0.00% Impervious Runoff Depth=0.06"  
Flow Length=146' Tc=7.7 min CN=30 Runoff=0.00 cfs 0.002 af

**Subcatchment 3: North East parcel area** Runoff Area=34,414 sf 0.00% Impervious Runoff Depth=0.06"  
Flow Length=147' Tc=8.4 min CN=30 Runoff=0.01 cfs 0.004 af

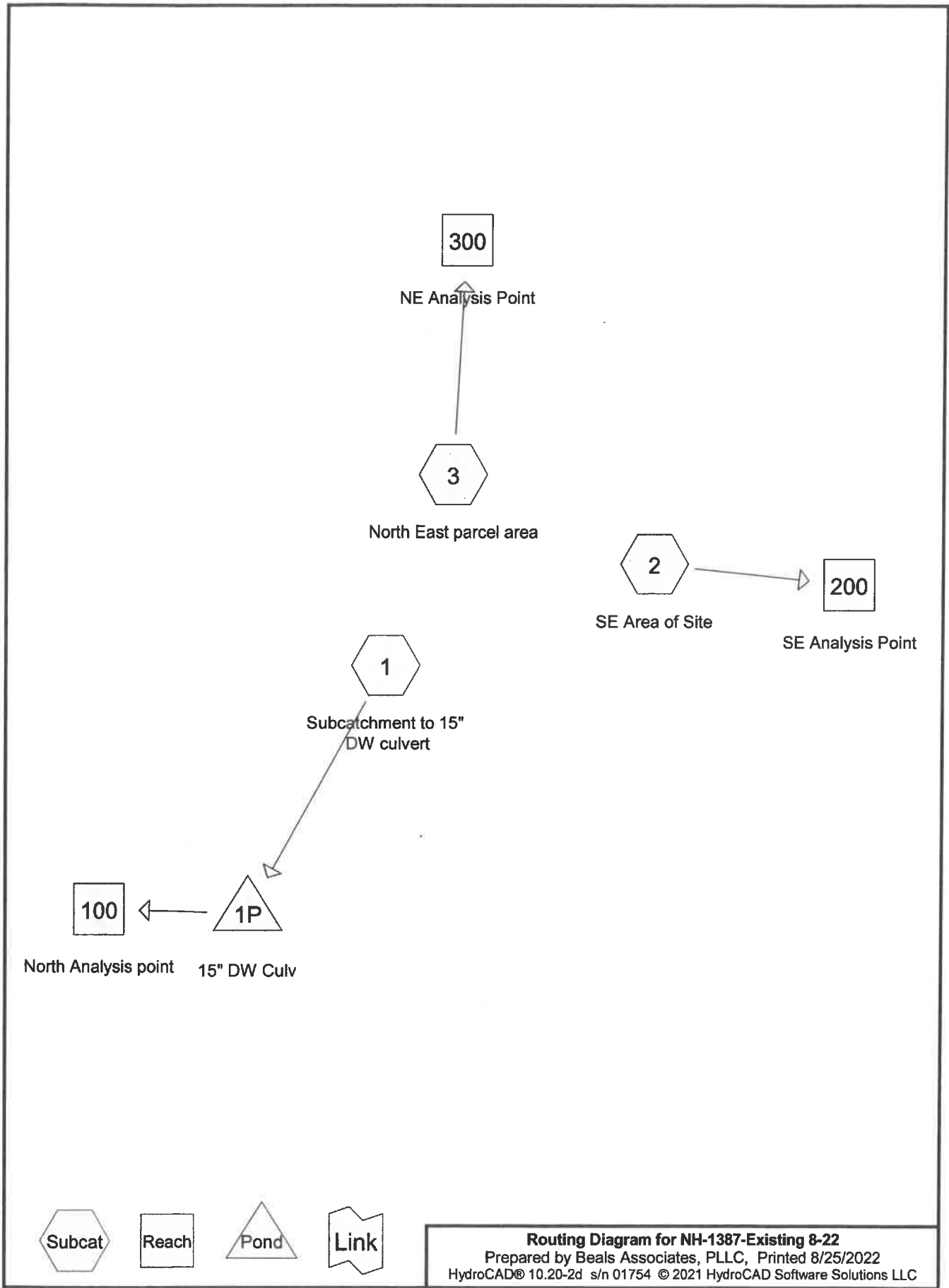
**Reach 100: North Analysis point** Inflow=3.28 cfs 0.685 af  
Outflow=3.28 cfs 0.685 af

**Reach 200: SE Analysis Point** Inflow=0.00 cfs 0.002 af  
Outflow=0.00 cfs 0.002 af

**Reach 300: NE Analysis Point** Inflow=0.01 cfs 0.004 af  
Outflow=0.01 cfs 0.004 af

**Pond 1P: 15" DW Culv** Peak Elev=205.40' Storage=6,479 cf Inflow=6.10 cfs 0.685 af  
15.0" Round Culvert n=0.025 L=21.0' S=0.0052 ' / ' Outflow=3.28 cfs 0.685 af

**Total Runoff Area = 5.250 ac Runoff Volume = 0.691 af Average Runoff Depth = 1.58"**  
**93.42% Pervious = 4.905 ac 6.58% Impervious = 0.345 ac**



**NH-1387-Existing 8-22**

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Route 9 Barrington  
Type III 24-hr 50 YR Rainfall=7.00"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: Subcatchment to 15" DW** Runoff Area=179,510 sf 8.38% Impervious Runoff Depth=2.80"  
Flow Length=594' Tc=20.6 min CN=62 Runoff=8.80 cfs 0.962 af

**Subcatchment 2: SE Area of Site** Runoff Area=14,767 sf 0.00% Impervious Runoff Depth=0.21"  
Flow Length=146' Tc=7.7 min CN=30 Runoff=0.01 cfs 0.006 af

**Subcatchment 3: North East parcel area** Runoff Area=34,414 sf 0.00% Impervious Runoff Depth=0.21"  
Flow Length=147' Tc=8.4 min CN=30 Runoff=0.02 cfs 0.014 af

**Reach 100: North Analysis point** Inflow=4.08 cfs 0.962 af  
Outflow=4.08 cfs 0.962 af

**Reach 200: SE Analysis Point** Inflow=0.01 cfs 0.006 af  
Outflow=0.01 cfs 0.006 af

**Reach 300: NE Analysis Point** Inflow=0.02 cfs 0.014 af  
Outflow=0.02 cfs 0.014 af

**Pond 1P: 15" DW Culv** Peak Elev=205.79' Storage=10,148 cf Inflow=8.80 cfs 0.962 af  
15.0" Round Culvert n=0.025 L=21.0' S=0.0052 '/' Outflow=4.08 cfs 0.962 af

**Total Runoff Area = 5.250 ac Runoff Volume = 0.982 af Average Runoff Depth = 2.24"**  
**93.42% Pervious = 4.905 ac 6.58% Impervious = 0.345 ac**



## APPENDIX II

### Proposed Conditions Drainage Analysis

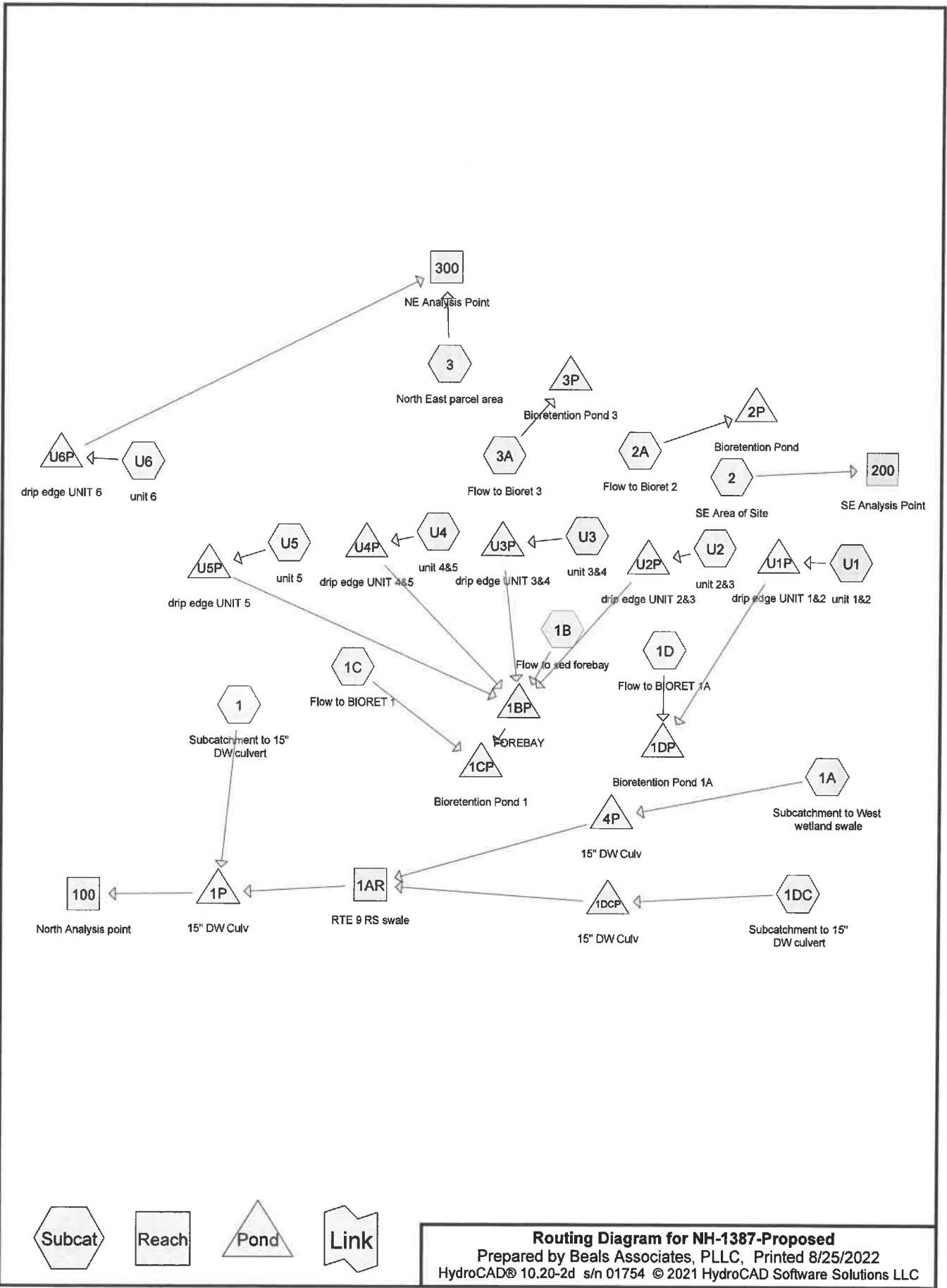
Summary 2 YR - 24 HR rainfall = 3.08"

Complete 10 YR - 24 HR rainfall = 4.64"

Summary 25 YR - 24 HR rainfall = 5.86"

Summary 50 YR - 24 HR rainfall = 7.00"

Sheet W-2 Proposed Conditions Watershed Plan



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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.555	39	>75% Grass cover, Good, HSG A (1, 1A, 1B, 1C, 1D, 2, 2A, 3, 3A, U1, U2, U3, U4, U5, U6)
0.286	61	>75% Grass cover, Good, HSG B (1, 1A, 1B, 1C, 1D, 1DC)
0.290	74	>75% Grass cover, Good, HSG C (1A, 1C)
0.371	98	Paved parking, HSG A (1B, 1C, 1D, 2A, 3, 3A, U1, U2, U3, U4, U5, U6)
0.253	98	Paved parking, HSG B (1, 1B, 1C, 1D, 1DC)
0.086	98	Paved parking, HSG C (1, 1C, 1DC)
0.354	89	Paved roads w/open ditches, 50% imp, HSG B (1)
0.103	92	Paved roads w/open ditches, 50% imp, HSG C (1)
0.167	98	Roofs, HSG A (1, 1D, 2A, 3, U1, U2, U3, U4, U5, U6)
0.039	98	Roofs, HSG C (1)
0.082	98	Water Surface, HSG C (1A)
0.737	30	Woods, Good, HSG A (1, 1A, 1D, 2, 3)
0.736	55	Woods, Good, HSG B (1A, 1DC)
1.190	70	Woods, Good, HSG C (1, 1A)
<b>5.250</b>	<b>63</b>	<b>TOTAL AREA</b>

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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
1.830	HSG A	1, 1A, 1B, 1C, 1D, 2, 2A, 3, 3A, U1, U2, U3, U4, U5, U6
1.630	HSG B	1, 1A, 1B, 1C, 1D, 1DC
1.790	HSG C	1, 1A, 1C, 1DC
0.000	HSG D	
0.000	Other	
<b>5.250</b>		<b>TOTAL AREA</b>

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Route 9 Barrington  
Type III 24-hr 2 YR Rainfall=3.08"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1: Subcatchment to 15" DW</b>	Runoff Area=88,850 sf 10.46% Impervious Runoff Depth=0.47" Flow Length=594' Tc=20.6 min CN=68 Runoff=0.52 cfs 0.079 af
<b>Subcatchment 1A: Subcatchment to West</b>	Runoff Area=36,139 sf 9.91% Impervious Runoff Depth=0.33" Flow Length=197' Tc=17.4 min CN=64 Runoff=0.12 cfs 0.023 af
<b>Subcatchment 1B: Flow to sed forebay</b>	Runoff Area=10,220 sf 52.58% Impervious Runoff Depth=1.25" Tc=6.0 min CN=79 Runoff=0.34 cfs 0.024 af
<b>Subcatchment 1C: Flow to BIORET 1</b>	Runoff Area=12,144 sf 59.56% Impervious Runoff Depth=1.51" Tc=6.0 min CN=83 Runoff=0.49 cfs 0.035 af
<b>Subcatchment 1D: Flow to BIORET 1A</b>	Runoff Area=7,611 sf 58.88% Impervious Runoff Depth=1.38" Tc=6.0 min CN=81 Runoff=0.28 cfs 0.020 af
<b>Subcatchment 1DC: Subcatchment to 15"</b>	Runoff Area=13,411 sf 49.44% Impervious Runoff Depth=1.25" Flow Length=248' Tc=15.2 min CN=86 Runoff=0.33 cfs 0.032 af
<b>Subcatchment 2: SE Area of Site</b>	Runoff Area=5,549 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=33 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 2A: Flow to Bioret 2</b>	Runoff Area=4,389 sf 29.64% Impervious Runoff Depth=0.24" Tc=6.0 min CN=56 Runoff=0.01 cfs 0.002 af
<b>Subcatchment 3: North East parcel area</b>	Runoff Area=24,131 sf 2.91% Impervious Runoff Depth=0.00" Flow Length=107' Tc=8.0 min CN=34 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 3A: Flow to Bioret 3</b>	Runoff Area=3,667 sf 33.08% Impervious Runoff Depth=0.33" Tc=6.0 min CN=59 Runoff=0.02 cfs 0.002 af
<b>Subcatchment U1: unit 1&amp;2</b>	Runoff Area=4,634 sf 71.41% Impervious Runoff Depth=1.38" Tc=6.0 min CN=81 Runoff=0.17 cfs 0.012 af
<b>Subcatchment U2: unit 2&amp;3</b>	Runoff Area=3,165 sf 44.71% Impervious Runoff Depth=0.54" Tc=6.0 min CN=65 Runoff=0.03 cfs 0.003 af
<b>Subcatchment U3: unit 3&amp;4</b>	Runoff Area=3,633 sf 54.78% Impervious Runoff Depth=0.81" Tc=6.0 min CN=71 Runoff=0.07 cfs 0.006 af
<b>Subcatchment U4: unit 4&amp;5</b>	Runoff Area=4,112 sf 70.67% Impervious Runoff Depth=1.38" Tc=6.0 min CN=81 Runoff=0.15 cfs 0.011 af
<b>Subcatchment U5: unit 5</b>	Runoff Area=1,722 sf 60.34% Impervious Runoff Depth=1.01" Tc=6.0 min CN=75 Runoff=0.04 cfs 0.003 af
<b>Subcatchment U6: unit 6</b>	Runoff Area=5,298 sf 56.06% Impervious Runoff Depth=0.86" Tc=6.0 min CN=72 Runoff=0.11 cfs 0.009 af

**NH-1387-Proposed**

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Route 9 Barrington  
Type III 24-hr 2 YR Rainfall=3.08"

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<b>Reach 1AR: RTE 9 RS swale</b>	Avg. Flow Depth=0.35' Max Vel=1.04 fps Inflow=0.41 cfs 0.055 af n=0.022 L=304.0' S=0.0025 '/' Capacity=39.39 cfs Outflow=0.39 cfs 0.055 af
<b>Reach 100: North Analysis point</b>	Inflow=0.52 cfs 0.134 af Outflow=0.52 cfs 0.134 af
<b>Reach 200: SE Analysis Point</b>	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
<b>Reach 300: NE Analysis Point</b>	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
<b>Pond 1BP: FOREBAY</b>	Peak Elev=209.70' Storage=15 cf Inflow=0.34 cfs 0.024 af 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 '/' Outflow=0.33 cfs 0.024 af
<b>Pond 1CP: Bioretention Pond 1</b>	Peak Elev=206.39' Storage=418 cf Inflow=0.82 cfs 0.059 af Outflow=0.27 cfs 0.059 af
<b>Pond 1DCP: 15" DW Culv</b>	Peak Elev=205.32' Storage=7 cf Inflow=0.33 cfs 0.032 af 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 '/' Outflow=0.33 cfs 0.032 af
<b>Pond 1DP: Bioretention Pond 1A</b>	Peak Elev=205.51' Storage=102 cf Inflow=0.28 cfs 0.020 af Outflow=0.12 cfs 0.020 af
<b>Pond 1P: 15" DW Culv</b>	Peak Elev=204.50' Storage=1,054 cf Inflow=0.90 cfs 0.134 af 15.0" Round Culvert n=0.025 L=21.0' S=0.0052 '/' Outflow=0.52 cfs 0.134 af
<b>Pond 2P: Bioretention Pond</b>	Peak Elev=218.01' Storage=2 cf Inflow=0.01 cfs 0.002 af Outflow=0.01 cfs 0.002 af
<b>Pond 3P: Bioretention Pond 3</b>	Peak Elev=223.01' Storage=2 cf Inflow=0.02 cfs 0.002 af Outflow=0.01 cfs 0.002 af
<b>Pond 4P: 15" DW Culv</b>	Peak Elev=205.19' Storage=3 cf Inflow=0.12 cfs 0.023 af 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 '/' Outflow=0.12 cfs 0.023 af
<b>Pond U1P: drip edge UNIT 1&amp;2</b>	Peak Elev=120.33' Storage=98 cf Inflow=0.17 cfs 0.012 af Discarded=0.05 cfs 0.012 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.012 af
<b>Pond U2P: drip edge UNIT 2&amp;3</b>	Peak Elev=120.52' Storage=4 cf Inflow=0.03 cfs 0.003 af Discarded=0.03 cfs 0.003 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.003 af
<b>Pond U3P: drip edge UNIT 3&amp;4</b>	Peak Elev=120.12' Storage=24 cf Inflow=0.07 cfs 0.006 af Discarded=0.03 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.006 af
<b>Pond U4P: drip edge UNIT 4&amp;5</b>	Peak Elev=120.37' Storage=91 cf Inflow=0.15 cfs 0.011 af Discarded=0.04 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.011 af
<b>Pond U5P: drip edge UNIT 5</b>	Peak Elev=120.13' Storage=15 cf Inflow=0.04 cfs 0.003 af Discarded=0.02 cfs 0.003 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.003 af

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Route 9 Barrington

Type III 24-hr 2 YR Rainfall=3.08"

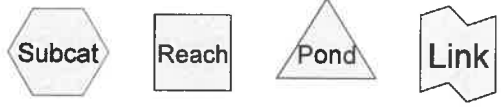
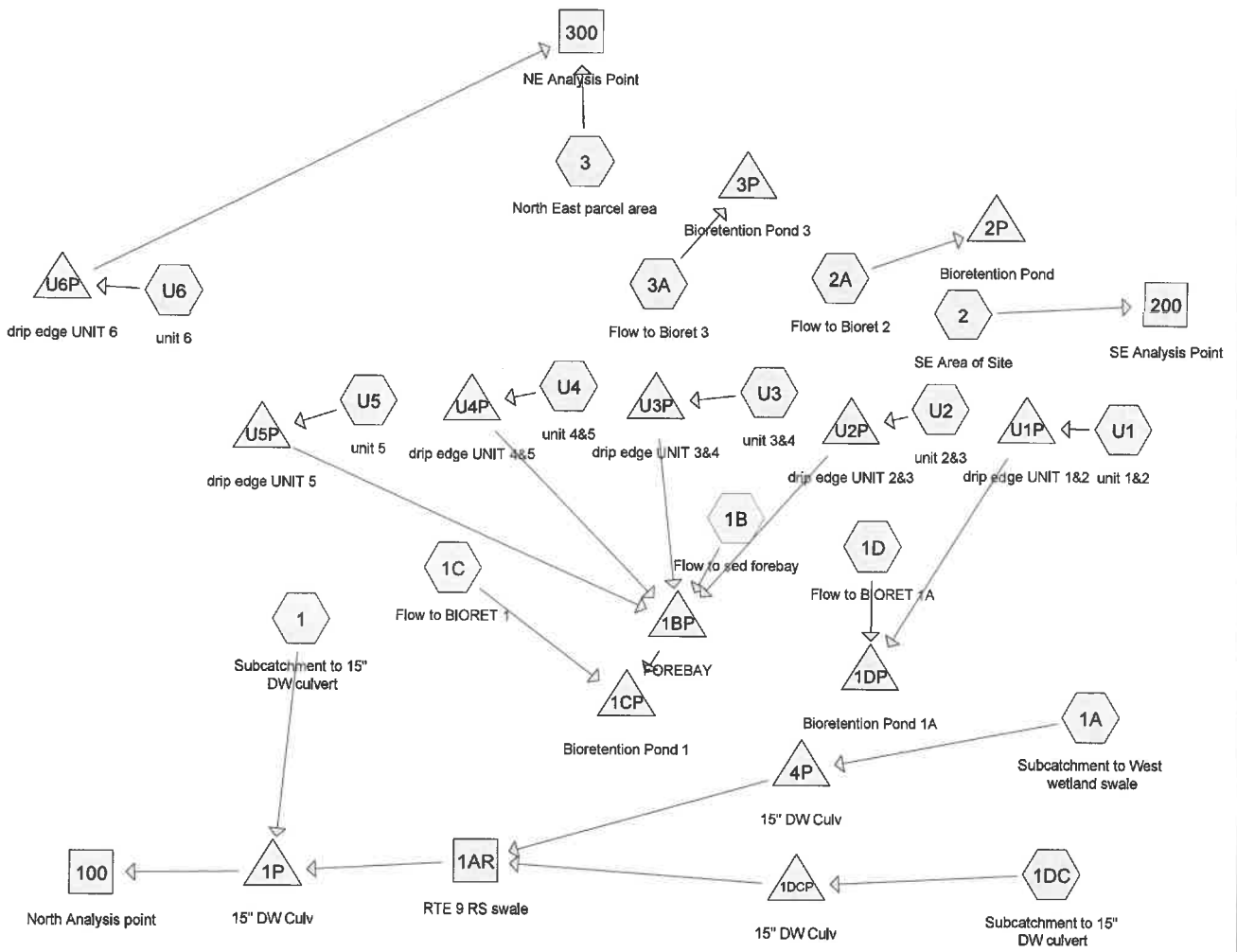
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**Pond U6P: drip edge UNIT 6**

Peak Elev=121.63' Storage=39 cf Inflow=0.11 cfs 0.009 af  
Discarded=0.05 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.009 af

**Total Runoff Area = 5.250 ac Runoff Volume = 0.262 af Average Runoff Depth = 0.60"**  
**76.63% Pervious = 4.023 ac 23.37% Impervious = 1.227 ac**



**Routing Diagram for NH-1387-Proposed**  
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Type III 24-hr 10 YR Rainfall=4.64"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1: Subcatchment to 15" DW</b>	Runoff Area=88,850 sf 10.46% Impervious Runoff Depth=1.29" Flow Length=594' Tc=20.6 min CN=68 Runoff=1.85 cfs 0.219 af
<b>Subcatchment 1A: Subcatchment to West</b>	Runoff Area=36,139 sf 9.91% Impervious Runoff Depth=1.04" Flow Length=197' Tc=17.4 min CN=64 Runoff=0.60 cfs 0.072 af
<b>Subcatchment 1B: Flow to sed forebay</b>	Runoff Area=10,220 sf 52.58% Impervious Runoff Depth=2.49" Tc=6.0 min CN=79 Runoff=0.69 cfs 0.049 af
<b>Subcatchment 1C: Flow to BIORET 1</b>	Runoff Area=12,144 sf 59.56% Impervious Runoff Depth=2.85" Tc=6.0 min CN=83 Runoff=0.93 cfs 0.066 af
<b>Subcatchment 1D: Flow to BIORET 1A</b>	Runoff Area=7,611 sf 58.88% Impervious Runoff Depth=2.67" Tc=6.0 min CN=81 Runoff=0.55 cfs 0.039 af
<b>Subcatchment 1DC: Subcatchment to 15"</b>	Runoff Area=13,411 sf 49.44% Impervious Runoff Depth=2.49" Flow Length=248' Tc=15.2 min CN=86 Runoff=0.68 cfs 0.064 af
<b>Subcatchment 2: SE Area of Site</b>	Runoff Area=5,549 sf 0.00% Impervious Runoff Depth=0.02" Tc=6.0 min CN=33 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 2A: Flow to Bioret 2</b>	Runoff Area=4,389 sf 29.64% Impervious Runoff Depth=0.86" Tc=6.0 min CN=56 Runoff=0.08 cfs 0.007 af
<b>Subcatchment 3: North East parcel area</b>	Runoff Area=24,131 sf 2.91% Impervious Runoff Depth=0.03" Flow Length=107' Tc=8.0 min CN=34 Runoff=0.00 cfs 0.001 af
<b>Subcatchment 3A: Flow to Bioret 3</b>	Runoff Area=3,667 sf 33.08% Impervious Runoff Depth=1.04" Tc=6.0 min CN=59 Runoff=0.09 cfs 0.007 af
<b>Subcatchment U1: unit 1&amp;2</b>	Runoff Area=4,634 sf 71.41% Impervious Runoff Depth=2.67" Tc=6.0 min CN=81 Runoff=0.33 cfs 0.024 af
<b>Subcatchment U2: unit 2&amp;3</b>	Runoff Area=3,165 sf 44.71% Impervious Runoff Depth=1.42" Tc=6.0 min CN=65 Runoff=0.11 cfs 0.009 af
<b>Subcatchment U3: unit 3&amp;4</b>	Runoff Area=3,633 sf 54.78% Impervious Runoff Depth=1.85" Tc=6.0 min CN=71 Runoff=0.18 cfs 0.013 af
<b>Subcatchment U4: unit 4&amp;5</b>	Runoff Area=4,112 sf 70.67% Impervious Runoff Depth=2.67" Tc=6.0 min CN=81 Runoff=0.30 cfs 0.021 af
<b>Subcatchment U5: unit 5</b>	Runoff Area=1,722 sf 60.34% Impervious Runoff Depth=2.16" Tc=6.0 min CN=75 Runoff=0.10 cfs 0.007 af
<b>Subcatchment U6: unit 6</b>	Runoff Area=5,298 sf 56.06% Impervious Runoff Depth=1.92" Tc=6.0 min CN=72 Runoff=0.27 cfs 0.020 af

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Route 9 Barrington  
Type III 24-hr 10 YR Rainfall=4.64"

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<b>Reach 1AR: RTE 9 RS swale</b>	Avg. Flow Depth=0.54' Max Vel=1.37 fps n=0.022 L=304.0' S=0.0025 ' /' Capacity=39.39 cfs	Inflow=1.25 cfs 0.136 af Outflow=1.20 cfs 0.136 af
<b>Reach 100: North Analysis point</b>		Inflow=1.75 cfs 0.354 af Outflow=1.75 cfs 0.354 af
<b>Reach 200: SE Analysis Point</b>		Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
<b>Reach 300: NE Analysis Point</b>		Inflow=0.00 cfs 0.001 af Outflow=0.00 cfs 0.001 af
<b>Pond 1BP: FOREBAY</b>	Peak Elev=209.83' Storage=31 cf 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 ' /'	Inflow=0.69 cfs 0.049 af Outflow=0.68 cfs 0.049 af
<b>Pond 1CP: Bioretention Pond 1</b>	Peak Elev=208.32' Storage=1,389 cf	Inflow=1.60 cfs 0.115 af Outflow=0.30 cfs 0.115 af
<b>Pond 1DCP: 15" DW Culv</b>	Peak Elev=205.47' Storage=13 cf 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 ' /'	Inflow=0.68 cfs 0.064 af Outflow=0.68 cfs 0.064 af
<b>Pond 1DP: Bioretention Pond 1A</b>	Peak Elev=207.39' Storage=410 cf	Inflow=0.55 cfs 0.039 af Outflow=0.12 cfs 0.039 af
<b>Pond 1P: 15" DW Culv</b>	Peak Elev=204.94' Storage=3,132 cf 15.0" Round Culvert n=0.025 L=21.0' S=0.0052 ' /'	Inflow=3.04 cfs 0.354 af Outflow=1.75 cfs 0.354 af
<b>Pond 2P: Bioretention Pond</b>	Peak Elev=218.10' Storage=25 cf	Inflow=0.08 cfs 0.007 af Outflow=0.04 cfs 0.007 af
<b>Pond 3P: Bioretention Pond 3</b>	Peak Elev=223.04' Storage=15 cf	Inflow=0.09 cfs 0.007 af Outflow=0.07 cfs 0.007 af
<b>Pond 4P: 15" DW Culv</b>	Peak Elev=205.44' Storage=12 cf 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 ' /'	Inflow=0.60 cfs 0.072 af Outflow=0.60 cfs 0.072 af
<b>Pond U1P: drip edge UNIT 1&amp;2</b>	Peak Elev=121.06' Storage=311 cf Discarded=0.05 cfs 0.024 af Primary=0.00 cfs 0.000 af	Inflow=0.33 cfs 0.024 af Outflow=0.05 cfs 0.024 af
<b>Pond U2P: drip edge UNIT 2&amp;3</b>	Peak Elev=120.76' Storage=58 cf Discarded=0.04 cfs 0.009 af Primary=0.00 cfs 0.000 af	Inflow=0.11 cfs 0.009 af Outflow=0.04 cfs 0.009 af
<b>Pond U3P: drip edge UNIT 3&amp;4</b>	Peak Elev=120.74' Storage=145 cf Discarded=0.03 cfs 0.013 af Primary=0.00 cfs 0.000 af	Inflow=0.18 cfs 0.013 af Outflow=0.03 cfs 0.013 af
<b>Pond U4P: drip edge UNIT 4&amp;5</b>	Peak Elev=121.14' Storage=283 cf Discarded=0.04 cfs 0.021 af Primary=0.00 cfs 0.000 af	Inflow=0.30 cfs 0.021 af Outflow=0.04 cfs 0.021 af
<b>Pond U5P: drip edge UNIT 5</b>	Peak Elev=120.65' Storage=78 cf Discarded=0.02 cfs 0.007 af Primary=0.00 cfs 0.000 af	Inflow=0.10 cfs 0.007 af Outflow=0.02 cfs 0.007 af

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**Pond U6P: drip edge UNIT 6**

Peak Elev=122.23' Storage=220 cf Inflow=0.27 cfs 0.020 af  
Discarded=0.05 cfs 0.020 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.020 af

**Total Runoff Area = 5.250 ac Runoff Volume = 0.617 af Average Runoff Depth = 1.41"**  
**76.63% Pervious = 4.023 ac 23.37% Impervious = 1.227 ac**

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**Summary for Subcatchment 1: Subcatchment to 15" DW culvert**

Runoff = 1.85 cfs @ 12.32 hrs, Volume= 0.219 af, Depth= 1.29"  
 Routed to Pond 1P : 15" DW Culv

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
4,665	30	Woods, Good, HSG A
22,429	55	Woods, Good, HSG B
34,210	70	Woods, Good, HSG C
1,411	39	>75% Grass cover, Good, HSG A
718	61	>75% Grass cover, Good, HSG B
11,355	74	>75% Grass cover, Good, HSG C
339	98	Roofs, HSG A
1,682	98	Roofs, HSG C
1,481	98	Paved parking, HSG B
1,019	98	Paved parking, HSG C
5,058	89	Paved roads w/open ditches, 50% imp, HSG B
4,483	92	Paved roads w/open ditches, 50% imp, HSG C
88,850	68	Weighted Average
79,559		89.54% Pervious Area
9,292		10.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.00"
7.5	327	0.0210	0.72		<b>Shallow Concentrated Flow, Flow to RS swale</b> Woodland Kv= 5.0 fps
3.4	217	0.0050	1.06		<b>Shallow Concentrated Flow, SC to Culv</b> Grassed Waterway Kv= 15.0 fps
20.6	594	Total			

**Summary for Subcatchment 1A: Subcatchment to West wetland swale**

Runoff = 0.60 cfs @ 12.28 hrs, Volume= 0.072 af, Depth= 1.04"  
 Routed to Pond 4P : 15" DW Culv

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10 YR Rainfall=4.64"

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Area (sf)	CN	Description
4,824	30	Woods, Good, HSG A
8,718	55	Woods, Good, HSG B
17,663	70	Woods, Good, HSG C
129	39	>75% Grass cover, Good, HSG A
585	61	>75% Grass cover, Good, HSG B
638	74	>75% Grass cover, Good, HSG C
3,582	98	Water Surface, HSG C
36,139	64	Weighted Average
32,557		90.09% Pervious Area
3,582		9.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0200	0.07		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.00"
4.7	147	0.0110	0.52		<b>Shallow Concentrated Flow, SC to CULV</b> Woodland Kv= 5.0 fps
17.4	197	Total			

**Summary for Subcatchment 1B: Flow to sed forebay**

Runoff = 0.69 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 2.49"  
Routed to Pond 1BP : FOREBAY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
645	39	>75% Grass cover, Good, HSG A
4,201	61	>75% Grass cover, Good, HSG B
725	98	Paved parking, HSG A
4,649	98	Paved parking, HSG B
10,220	79	Weighted Average
4,846		47.42% Pervious Area
5,374		52.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Direct</b>

**Summary for Subcatchment 1C: Flow to BIORET 1**

Runoff = 0.93 cfs @ 12.09 hrs, Volume= 0.066 af, Depth= 2.85"  
Routed to Pond 1CP : Bioretention Pond 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

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Area (sf)	CN	Description
626	39	>75% Grass cover, Good, HSG A
3,661	61	>75% Grass cover, Good, HSG B
624	74	>75% Grass cover, Good, HSG C
2,376	98	Paved parking, HSG A
3,026	98	Paved parking, HSG B
1,831	98	Paved parking, HSG C
12,144	83	Weighted Average
4,911		40.44% Pervious Area
7,233		59.56% Impervious Area

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

**Summary for Subcatchment 1D: Flow to BIORET 1A**

Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.039 af, Depth= 2.67"  
Routed to Pond 1DP : Bioretention Pond 1A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
38	30	Woods, Good, HSG A
464	39	>75% Grass cover, Good, HSG A
2,628	61	>75% Grass cover, Good, HSG B
244	98	Roofs, HSG A
2,915	98	Paved parking, HSG A
1,322	98	Paved parking, HSG B
7,611	81	Weighted Average
3,130		41.12% Pervious Area
4,481		58.88% Impervious Area

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

**Summary for Subcatchment 1DC: Subcatchment to 15" DW culvert**

Runoff = 0.68 cfs @ 12.21 hrs, Volume= 0.064 af, Depth= 2.49"  
Routed to Pond 1DCP : 15" DW Culv

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

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Area (sf)	CN	Description
907	55	Woods, Good, HSG B
684	61	>75% Grass cover, Good, HSG B
10,379	89	Paved roads w/open ditches, 50% imp, HSG B
561	98	Paved parking, HSG B
880	98	Paved parking, HSG C
13,411	86	Weighted Average
6,781		50.56% Pervious Area
6,631		49.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	50	0.0030	0.07		<b>Sheet Flow, Sheet</b> Grass: Short n= 0.150 P2= 3.00"
2.8	198	0.0060	1.16		<b>Shallow Concentrated Flow, SC to Culv</b> Grassed Waterway Kv= 15.0 fps
15.2	248	Total			

**Summary for Subcatchment 2: SE Area of Site**

Runoff = 0.00 cfs @ 21.90 hrs, Volume= 0.000 af, Depth= 0.02"  
Routed to Reach 200 : SE Analysis Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
3,897	30	Woods, Good, HSG A
1,652	39	>75% Grass cover, Good, HSG A
5,549	33	Weighted Average
5,549		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Direct</b>

**Summary for Subcatchment 2A: Flow to Bioret 2**

Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af, Depth= 0.86"  
Routed to Pond 2P : Bioretention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

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Type III 24-hr 10 YR Rainfall=4.64"

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Area (sf)	CN	Description
3,088	39	>75% Grass cover, Good, HSG A
218	98	Roofs, HSG A
1,083	98	Paved parking, HSG A
4,389	56	Weighted Average
3,088		70.36% Pervious Area
1,301		29.64% Impervious Area

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

**Summary for Subcatchment 3: North East parcel area**

Runoff = 0.00 cfs @ 20.72 hrs, Volume= 0.001 af, Depth= 0.03"  
Routed to Reach 300 : NE Analysis Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
18,675	30	Woods, Good, HSG A
4,753	39	>75% Grass cover, Good, HSG A
96	98	Roofs, HSG A
607	98	Paved parking, HSG A
24,131	34	Weighted Average
23,428		97.09% Pervious Area
703		2.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0785	0.11		Sheet Flow, Sheet
0.6	57	0.1050	1.62		Woods: Light underbrush n= 0.400 P2= 3.00" Shallow Concentrated Flow, SC to analysis point Woodland Kv= 5.0 fps
8.0	107	Total			

**Summary for Subcatchment 3A: Flow to Bioret 3**

Runoff = 0.09 cfs @ 12.10 hrs, Volume= 0.007 af, Depth= 1.04"  
Routed to Pond 3P : Bioretention Pond 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"



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Area (sf)	CN	Description
2,454	39	>75% Grass cover, Good, HSG A
1,213	98	Paved parking, HSG A
3,667	59	Weighted Average
2,454		66.92% Pervious Area
1,213		33.08% Impervious Area

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

**Summary for Subcatchment U1: unit 1&2**

Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.024 af, Depth= 2.67"  
Routed to Pond U1P : drip edge UNIT 1&2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
1,325	39	>75% Grass cover, Good, HSG A
1,410	98	Roofs, HSG A
1,899	98	Paved parking, HSG A
4,634	81	Weighted Average
1,325		28.59% Pervious Area
3,309		71.41% Impervious Area

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

**Summary for Subcatchment U2: unit 2&3**

Runoff = 0.11 cfs @ 12.10 hrs, Volume= 0.009 af, Depth= 1.42"  
Routed to Pond U2P : drip edge UNIT 2&3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
1,750	39	>75% Grass cover, Good, HSG A
1,128	98	Roofs, HSG A
287	98	Paved parking, HSG A
3,165	65	Weighted Average
1,750		55.29% Pervious Area
1,415		44.71% Impervious Area

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

**Summary for Subcatchment U3: unit 3&4**

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.013 af, Depth= 1.85"  
Routed to Pond U3P : drip edge UNIT 3&4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
1,643	39	>75% Grass cover, Good, HSG A
993	98	Roofs, HSG A
997	98	Paved parking, HSG A
3,633	71	Weighted Average
1,643		45.22% Pervious Area
1,990		54.78% Impervious Area

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

**Summary for Subcatchment U4: unit 4&5**

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.021 af, Depth= 2.67"  
Routed to Pond U4P : drip edge UNIT 4&5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
1,206	39	>75% Grass cover, Good, HSG A
1,444	98	Roofs, HSG A
1,462	98	Paved parking, HSG A
4,112	81	Weighted Average
1,206		29.33% Pervious Area
2,906		70.67% Impervious Area

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

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**Summary for Subcatchment U5: unit 5**

Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af, Depth= 2.16"  
 Routed to Pond U5P : drip edge UNIT 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
683	39	>75% Grass cover, Good, HSG A
587	98	Roofs, HSG A
452	98	Paved parking, HSG A
1,722	75	Weighted Average
683		39.66% Pervious Area
1,039		60.34% Impervious Area

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

**Summary for Subcatchment U6: unit 6**

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.020 af, Depth= 1.92"  
 Routed to Pond U6P : drip edge UNIT 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10 YR Rainfall=4.64"

Area (sf)	CN	Description
2,328	39	>75% Grass cover, Good, HSG A
821	98	Roofs, HSG A
2,149	98	Paved parking, HSG A
5,298	72	Weighted Average
2,328		43.94% Pervious Area
2,970		56.06% Impervious Area

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

**Summary for Reach 1AR: RTE 9 RS swale**

Inflow Area = 1.138 ac, 20.61% Impervious, Inflow Depth = 1.43" for 10 YR event  
 Inflow = 1.25 cfs @ 12.25 hrs, Volume= 0.136 af  
 Outflow = 1.20 cfs @ 12.36 hrs, Volume= 0.136 af, Atten= 4%, Lag= 6.9 min  
 Routed to Pond 1P : 15" DW Culv

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Routing by Stor-Ind+Trans method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.37 fps, Min. Travel Time= 3.7 min

Avg. Velocity = 0.58 fps, Avg. Travel Time= 8.7 min

Peak Storage= 266 cf @ 12.30 hrs

Average Depth at Peak Storage= 0.54' , Surface Width= 3.24'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 39.39 cfs

0.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight

Side Slope Z-value= 3.0 ' / ' Top Width= 12.00'

Length= 304.0' Slope= 0.0025 ' / '

Inlet Invert= 204.78', Outlet Invert= 204.01'



### Summary for Reach 100: North Analysis point

Inflow Area = 3.177 ac, 14.09% Impervious, Inflow Depth = 1.34" for 10 YR event  
Inflow = 1.75 cfs @ 12.66 hrs, Volume= 0.354 af  
Outflow = 1.75 cfs @ 12.66 hrs, Volume= 0.354 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

### Summary for Reach 200: SE Analysis Point

Inflow Area = 0.127 ac, 0.00% Impervious, Inflow Depth = 0.02" for 10 YR event  
Inflow = 0.00 cfs @ 21.90 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 21.90 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

### Summary for Reach 300: NE Analysis Point

Inflow Area = 0.676 ac, 12.48% Impervious, Inflow Depth = 0.02" for 10 YR event  
Inflow = 0.00 cfs @ 20.72 hrs, Volume= 0.001 af  
Outflow = 0.00 cfs @ 20.72 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

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**Summary for Pond 1BP: FOREBAY**

Inflow Area = 0.525 ac, 55.68% Impervious, Inflow Depth = 1.12" for 10 YR event  
 Inflow = 0.69 cfs @ 12.09 hrs, Volume= 0.049 af  
 Outflow = 0.68 cfs @ 12.10 hrs, Volume= 0.049 af, Atten= 1%, Lag= 0.8 min  
 Primary = 0.68 cfs @ 12.10 hrs, Volume= 0.049 af  
 Routed to Pond 1CP : Bioretention Pond 1

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 209.83' @ 12.10 hrs Surf.Area= 144 sf Storage= 31 cf

Plug-Flow detention time= 0.9 min calculated for 0.049 af (100% of inflow)  
 Center-of-Mass det. time= 0.9 min ( 828.7 - 827.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	209.42'	505 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
209.42	6	0	0
210.00	201	60	60
211.00	689	445	505

Device	Routing	Invert	Outlet Devices
#1	Primary	209.42'	<b>15.0" Round Culvert</b> L= 42.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 209.42' / 209.00' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.68 cfs @ 12.10 hrs HW=209.83' (Free Discharge)  
 1=Culvert (Inlet Controls 0.68 cfs @ 1.93 fps)

**Summary for Pond 1CP: Bioretention Pond 1**

Inflow Area = 0.803 ac, 57.03% Impervious, Inflow Depth = 1.72" for 10 YR event  
 Inflow = 1.60 cfs @ 12.09 hrs, Volume= 0.115 af  
 Outflow = 0.30 cfs @ 12.55 hrs, Volume= 0.115 af, Atten= 81%, Lag= 27.6 min  
 Discarded = 0.30 cfs @ 12.55 hrs, Volume= 0.115 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 208.32' @ 12.55 hrs Surf.Area= 1,312 sf Storage= 1,389 cf  
 Flood Elev= 209.50' Surf.Area= 1,898 sf Storage= 3,280 cf

Plug-Flow detention time= 30.8 min calculated for 0.115 af (100% of inflow)  
 Center-of-Mass det. time= 30.8 min ( 852.5 - 821.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	205.50'	3,280 cf	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	1,172	0.0	0	0	1,172
206.50	1,172	40.0	469	469	1,293
208.00	1,172	30.0	527	996	1,475
209.00	1,641	100.0	1,400	2,396	1,963
209.50	1,898	100.0	884	3,280	2,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.50'	10.000 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.30 cfs @ 12.55 hrs HW=208.32' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 0.30 cfs)

**Summary for Pond 1DCP: 15" DW Culv**

Inflow Area = 0.308 ac, 49.44% Impervious, Inflow Depth = 2.49" for 10 YR event  
 Inflow = 0.68 cfs @ 12.21 hrs, Volume= 0.064 af  
 Outflow = 0.68 cfs @ 12.22 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.3 min  
 Primary = 0.68 cfs @ 12.22 hrs, Volume= 0.064 af  
 Routed to Reach 1AR : RTE 9 RS swale

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 205.47' @ 12.22 hrs Surf.Area= 50 sf Storage= 13 cf

Plug-Flow detention time= 0.5 min calculated for 0.064 af (100% of inflow)  
 Center-of-Mass det. time= 0.5 min ( 836.8 - 836.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	205.00'	317 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
205.00	6	0	0
206.00	101	54	54
207.00	425	263	317

Device	Routing	Invert	Outlet Devices
#1	Primary	205.00'	15.0" Round Culvert L= 43.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 205.00' / 204.78' S= 0.0051 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.68 cfs @ 12.22 hrs HW=205.47' (Free Discharge)

↳1=Culvert (Barrel Controls 0.68 cfs @ 2.42 fps)

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**Summary for Pond 1DP: Bioretention Pond 1A**

Inflow Area = 0.281 ac, 63.62% Impervious, Inflow Depth = 1.66" for 10 YR event  
 Inflow = 0.55 cfs @ 12.09 hrs, Volume= 0.039 af  
 Outflow = 0.12 cfs @ 11.78 hrs, Volume= 0.039 af, Atten= 79%, Lag= 0.0 min  
 Discarded = 0.12 cfs @ 11.78 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 207.39' @ 12.52 hrs Surf.Area= 502 sf Storage= 410 cf

Plug-Flow detention time= 20.1 min calculated for 0.039 af (100% of inflow)  
 Center-of-Mass det. time= 20.1 min ( 842.4 - 822.3 )

Volume	Invert	Avail.Storage	Storage Description			
#1	205.00'	1,116 cf	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
205.00	502	0.0	0	0	502	
206.00	502	40.0	201	201	581	
207.50	502	30.0	226	427	701	
208.00	687	100.0	296	723	891	
208.50	890	100.0	393	1,116	1,100	

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.00'	<b>10.000 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 11.78 hrs HW=205.04' (Free Discharge)  
 ↑-1=Exfiltration (Exfiltration Controls 0.12 cfs)

**Summary for Pond 1P: 15" DW Culv**

Inflow Area = 3.177 ac, 14.09% Impervious, Inflow Depth = 1.34" for 10 YR event  
 Inflow = 3.04 cfs @ 12.34 hrs, Volume= 0.354 af  
 Outflow = 1.75 cfs @ 12.66 hrs, Volume= 0.354 af, Atten= 42%, Lag= 19.6 min  
 Primary = 1.75 cfs @ 12.66 hrs, Volume= 0.354 af  
 Routed to Reach 100 : North Analysis point

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 204.94' @ 12.66 hrs Surf.Area= 5,931 sf Storage= 3,132 cf

Plug-Flow detention time= 38.1 min calculated for 0.354 af (100% of inflow)  
 Center-of-Mass det. time= 38.0 min ( 920.2 - 882.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	204.00'	12,535 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.00	738	0	0
206.00	11,797	12,535	12,535

Device	Routing	Invert	Outlet Devices
#1	Primary	204.01'	<b>15.0" Round Culvert</b> L= 21.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.01' / 203.90' S= 0.0052 ' / Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.75 cfs @ 12.66 hrs HW=204.94' (Free Discharge)

↑1=Culvert (Barrel Controls 1.75 cfs @ 2.49 fps)

**Summary for Pond 2P: Bioretention Pond**

Inflow Area =	0.101 ac, 29.64% Impervious, Inflow Depth = 0.86" for 10 YR event
Inflow =	0.08 cfs @ 12.11 hrs, Volume= 0.007 af
Outflow =	0.04 cfs @ 12.07 hrs, Volume= 0.007 af, Atten= 46%, Lag= 0.0 min
Discarded =	0.04 cfs @ 12.07 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 218.10' @ 12.37 hrs Surf.Area= 618 sf Storage= 25 cf  
 Flood Elev= 221.00' Surf.Area= 827 sf Storage= 885 cf

Plug-Flow detention time= 4.3 min calculated for 0.007 af (100% of inflow)  
 Center-of-Mass det. time= 4.3 min ( 900.3 - 896.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	218.00'	885 cf	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
218.00	618	0.0	0	0	618
219.00	618	40.0	247	247	706
220.50	618	30.0	278	525	838
221.00	827	100.0	360	885	1,053

Device	Routing	Invert	Outlet Devices
#1	Discarded	218.00'	<b>3.000 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'

**Discarded OutFlow** Max=0.04 cfs @ 12.07 hrs HW=218.03' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.04 cfs)



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**Summary for Pond 3P: Bioretention Pond 3**

Inflow Area = 0.084 ac, 33.08% Impervious, Inflow Depth = 1.04" for 10 YR event  
 Inflow = 0.09 cfs @ 12.10 hrs, Volume= 0.007 af  
 Outflow = 0.07 cfs @ 12.10 hrs, Volume= 0.007 af, Atten= 24%, Lag= 0.0 min  
 Discarded = 0.07 cfs @ 12.10 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 223.04' @ 12.18 hrs Surf.Area= 947 sf Storage= 15 cf  
 Flood Elev= 226.00' Surf.Area= 1,184 sf Storage= 1,337 cf

Plug-Flow detention time= 3.0 min calculated for 0.007 af (100% of inflow)  
 Center-of-Mass det. time= 3.0 min ( 887.7 - 884.7 )

Volume	Invert	Avail.Storage	Storage Description		
#1	223.00'	1,337 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
223.00	947	0.0	0	0	947
224.00	947	40.0	379	379	1,056
225.50	947	30.0	426	805	1,220
226.00	1,184	100.0	532	1,337	1,464

Device	Routing	Invert	Outlet Devices	
#1	Discarded	223.00'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'	

Discarded OutFlow Max=0.07 cfs @ 12.10 hrs HW=223.03' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.07 cfs)

**Summary for Pond 4P: 15" DW Culv**

Inflow Area = 0.830 ac, 9.91% Impervious, Inflow Depth = 1.04" for 10 YR event  
 Inflow = 0.60 cfs @ 12.28 hrs, Volume= 0.072 af  
 Outflow = 0.60 cfs @ 12.28 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.3 min  
 Primary = 0.60 cfs @ 12.28 hrs, Volume= 0.072 af  
 Routed to Reach 1AR : RTE 9 RS swale

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 205.44' @ 12.28 hrs Surf.Area= 48 sf Storage= 12 cf

Plug-Flow detention time= 0.4 min calculated for 0.072 af (100% of inflow)  
 Center-of-Mass det. time= 0.4 min ( 895.7 - 895.2 )

Volume	Invert	Avail.Storage	Storage Description	
#1	205.00'	317 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
205.00	6	0	0
206.00	101	54	54
207.00	425	263	317

Device	Routing	Invert	Outlet Devices
#1	Primary	205.00'	<b>15.0" Round Culvert</b> L= 43.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 205.00' / 204.78' S= 0.0051 ' S= 0.0051 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.60 cfs @ 12.28 hrs HW=205.44' (Free Discharge)

↳1=Culvert (Barrel Controls 0.60 cfs @ 2.35 fps)

**Summary for Pond U1P: drip edge UNIT 1&2**

Inflow Area = 0.106 ac, 71.41% Impervious, Inflow Depth = 2.67" for 10 YR event  
 Inflow = 0.33 cfs @ 12.09 hrs, Volume= 0.024 af  
 Outflow = 0.05 cfs @ 11.73 hrs, Volume= 0.024 af, Atten= 85%, Lag= 0.0 min  
 Discarded = 0.05 cfs @ 11.73 hrs, Volume= 0.024 af  
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
 Routed to Pond 1DP : Bioretention Pond 1A

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 121.06' @ 12.60 hrs Surf.Area= 735 sf Storage= 311 cf

Plug-Flow detention time= 41.5 min calculated for 0.024 af (100% of inflow)  
 Center-of-Mass det. time= 41.5 min ( 863.8 - 822.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	735 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	735	0.0	0	0
122.50	735	40.0	735	735

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	<b>3.000 in/hr Exfiltration over Surface area</b>
#2	Primary	122.45'	<b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b> Head (feet) 0.00 0.05 Width (feet) 8.00 8.00

Discarded OutFlow Max=0.05 cfs @ 11.73 hrs HW=120.03' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=120.00' (Free Discharge)  
 ↳2=Custom Weir/Orifice ( Controls 0.00 cfs)

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**Summary for Pond U2P: drip edge UNIT 2&3**

Inflow Area = 0.073 ac, 44.71% Impervious, Inflow Depth = 1.42" for 10 YR event  
 Inflow = 0.11 cfs @ 12.10 hrs, Volume= 0.009 af  
 Outflow = 0.04 cfs @ 11.99 hrs, Volume= 0.009 af, Atten= 66%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 11.99 hrs, Volume= 0.009 af  
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
 Routed to Pond 1BP : FOREBAY

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 120.76' @ 12.45 hrs Surf.Area= 560 sf Storage= 58 cf

Plug-Flow detention time= 8.3 min calculated for 0.009 af (100% of inflow)  
 Center-of-Mass det. time= 8.3 min ( 873.9 - 865.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	120.50'	448 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.50	560	0.0	0	0
122.50	560	40.0	448	448

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.50'	3.000 in/hr Exfiltration over Surface area
#2	Primary	122.45'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 0.05 Width (feet) 8.00 8.00

Discarded OutFlow Max=0.04 cfs @ 11.99 hrs HW=120.52' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=120.50' (Free Discharge)  
 ↑2=Custom Weir/Orifice ( Controls 0.00 cfs)

**Summary for Pond U3P: drip edge UNIT 3&4**

Inflow Area = 0.083 ac, 54.78% Impervious, Inflow Depth = 1.85" for 10 YR event  
 Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.013 af  
 Outflow = 0.03 cfs @ 11.84 hrs, Volume= 0.013 af, Atten= 81%, Lag= 0.0 min  
 Discarded = 0.03 cfs @ 11.84 hrs, Volume= 0.013 af  
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
 Routed to Pond 1BP : FOREBAY

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 120.74' @ 12.57 hrs Surf.Area= 493 sf Storage= 145 cf

Plug-Flow detention time= 27.5 min calculated for 0.013 af (100% of inflow)  
 Center-of-Mass det. time= 27.5 min ( 876.6 - 849.1 )

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Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	493 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	493	0.0	0	0
122.50	493	40.0	493	493

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	<b>3.000 in/hr Exfiltration over Surface area</b>
#2	Primary	122.45'	<b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b> Head (feet) 0.00 0.05 Width (feet) 8.00 8.00

**Discarded OutFlow** Max=0.03 cfs @ 11.84 hrs HW=120.03' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=120.00' (Free Discharge)  
 ↳2=Custom Weir/Orifice ( Controls 0.00 cfs)

**Summary for Pond U4P: drip edge UNIT 4&5**

Inflow Area = 0.094 ac, 70.67% Impervious, Inflow Depth = 2.67" for 10 YR event  
 Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.021 af  
 Outflow = 0.04 cfs @ 11.72 hrs, Volume= 0.021 af, Atten= 85%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 11.72 hrs, Volume= 0.021 af  
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
 Routed to Pond 1BP : FOREBAY

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 121.14' @ 12.62 hrs Surf.Area= 621 sf Storage= 283 cf

Plug-Flow detention time= 45.7 min calculated for 0.021 af (100% of inflow)  
 Center-of-Mass det. time= 45.7 min ( 868.0 - 822.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	621 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	621	0.0	0	0
122.50	621	40.0	621	621

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	<b>3.000 in/hr Exfiltration over Surface area</b>
#2	Primary	122.45'	<b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b> Head (feet) 0.00 0.05 Width (feet) 8.00 8.00

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**Discarded OutFlow** Max=0.04 cfs @ 11.72 hrs HW=120.03' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=120.00' (Free Discharge)

↑2=Custom Weir/Orifice ( Controls 0.00 cfs)

**Summary for Pond U5P: drip edge UNIT 5**

Inflow Area = 0.040 ac, 60.34% Impervious, Inflow Depth = 2.16" for 10 YR event  
 Inflow = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af  
 Outflow = 0.02 cfs @ 11.82 hrs, Volume= 0.007 af, Atten= 79%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 11.82 hrs, Volume= 0.007 af  
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
 Routed to Pond 1BP : FOREBAY

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 120.65' @ 12.54 hrs Surf.Area= 296 sf Storage= 78 cf

Plug-Flow detention time= 23.0 min calculated for 0.007 af (100% of inflow)  
 Center-of-Mass det. time= 23.0 min ( 861.5 - 838.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	237 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
120.00	296	0.0	0	0
122.00	296	40.0	237	237

Device	Routing	Invert	Outlet Devices
#1	Discarded	120.00'	<b>3.000 in/hr Exfiltration over Surface area</b>
#2	Primary	121.95'	<b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b> Head (feet) 0.00 0.05 Width (feet) 8.00 8.00

**Discarded OutFlow** Max=0.02 cfs @ 11.82 hrs HW=120.02' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=120.00' (Free Discharge)

↑2=Custom Weir/Orifice ( Controls 0.00 cfs)

**Summary for Pond U6P: drip edge UNIT 6**

Inflow Area = 0.122 ac, 56.06% Impervious, Inflow Depth = 1.92" for 10 YR event  
 Inflow = 0.27 cfs @ 12.09 hrs, Volume= 0.020 af  
 Outflow = 0.05 cfs @ 11.84 hrs, Volume= 0.020 af, Atten= 80%, Lag= 0.0 min  
 Discarded = 0.05 cfs @ 11.84 hrs, Volume= 0.020 af  
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af  
 Routed to Reach 300 : NE Analysis Point

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Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 122.23' @ 12.56 hrs Surf.Area= 759 sf Storage= 220 cf

Plug-Flow detention time= 26.9 min calculated for 0.020 af (100% of inflow)  
 Center-of-Mass det. time= 26.9 min ( 873.3 - 846.4 )

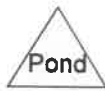
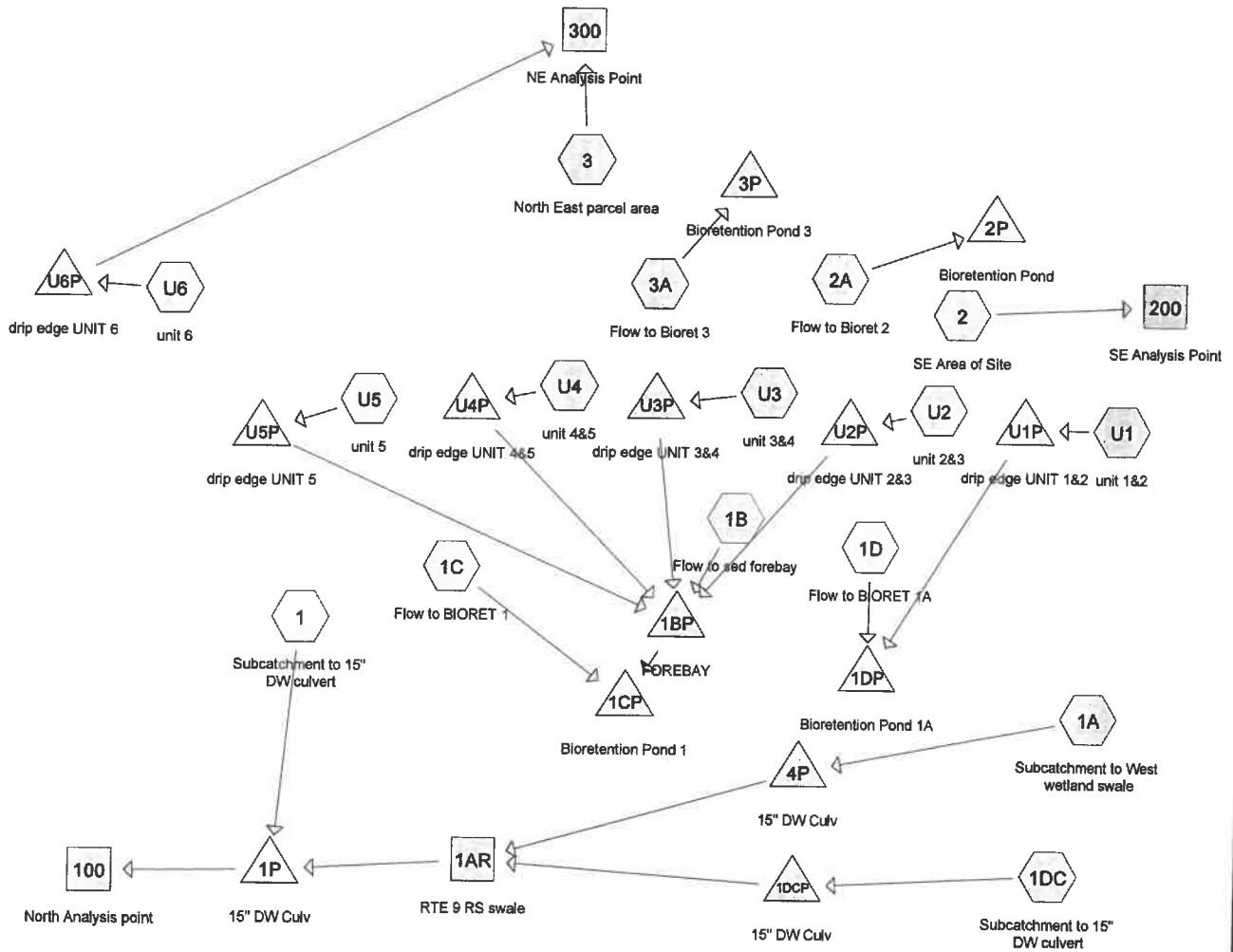
Volume	Invert	Avail.Storage	Storage Description
#1	121.50'	759 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
121.50	759	0.0	0	0
122.00	759	40.0	152	152
124.00	759	40.0	607	759

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>3.000 in/hr Exfiltration over Surface area</b>
#2	Primary	124.00'	<b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b>
			Head (feet) 0.05 0.10
			Width (feet) 8.00 8.00

**Discarded OutFlow** Max=0.05 cfs @ 11.84 hrs HW=121.53' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=121.50' (Free Discharge)  
 ↳2=Custom Weir/Orifice ( Controls 0.00 cfs)



**Routing Diagram for NH-1387-Proposed**  
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Route 9 Barrington  
Type III 24-hr 25 YR Rainfall=5.86"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1: Subcatchment to 15" DW</b>	Runoff Area=88,850 sf 10.46% Impervious Runoff Depth=2.08" Flow Length=594' Tc=20.6 min CN=68 Runoff=3.17 cfs 0.353 af
<b>Subcatchment 1A: Subcatchment to West</b>	Runoff Area=36,139 sf 9.91% Impervious Runoff Depth=1.75" Flow Length=197' Tc=17.4 min CN=64 Runoff=1.12 cfs 0.121 af
<b>Subcatchment 1B: Flow to sed forebay</b>	Runoff Area=10,220 sf 52.58% Impervious Runoff Depth=3.55" Tc=6.0 min CN=79 Runoff=0.98 cfs 0.070 af
<b>Subcatchment 1C: Flow to BIORET 1</b>	Runoff Area=12,144 sf 59.56% Impervious Runoff Depth=3.96" Tc=6.0 min CN=83 Runoff=1.28 cfs 0.092 af
<b>Subcatchment 1D: Flow to BIORET 1A</b>	Runoff Area=7,611 sf 58.88% Impervious Runoff Depth=3.76" Tc=6.0 min CN=81 Runoff=0.77 cfs 0.055 af
<b>Subcatchment 1DC: Subcatchment to 15"</b>	Runoff Area=13,411 sf 49.44% Impervious Runoff Depth=3.55" Flow Length=248' Tc=15.2 min CN=86 Runoff=0.97 cfs 0.091 af
<b>Subcatchment 2: SE Area of Site</b>	Runoff Area=5,549 sf 0.00% Impervious Runoff Depth=0.15" Tc=6.0 min CN=33 Runoff=0.00 cfs 0.002 af
<b>Subcatchment 2A: Flow to Bioret 2</b>	Runoff Area=4,389 sf 29.64% Impervious Runoff Depth=1.51" Tc=6.0 min CN=56 Runoff=0.16 cfs 0.013 af
<b>Subcatchment 3: North East parcel area</b>	Runoff Area=24,131 sf 2.91% Impervious Runoff Depth=0.18" Flow Length=107' Tc=8.0 min CN=34 Runoff=0.01 cfs 0.008 af
<b>Subcatchment 3A: Flow to Bioret 3</b>	Runoff Area=3,667 sf 33.08% Impervious Runoff Depth=1.75" Tc=6.0 min CN=59 Runoff=0.16 cfs 0.012 af
<b>Subcatchment U1: unit 1&amp;2</b>	Runoff Area=4,634 sf 71.41% Impervious Runoff Depth=3.76" Tc=6.0 min CN=81 Runoff=0.47 cfs 0.033 af
<b>Subcatchment U2: unit 2&amp;3</b>	Runoff Area=3,165 sf 44.71% Impervious Runoff Depth=2.25" Tc=6.0 min CN=65 Runoff=0.19 cfs 0.014 af
<b>Subcatchment U3: unit 3&amp;4</b>	Runoff Area=3,633 sf 54.78% Impervious Runoff Depth=2.79" Tc=6.0 min CN=71 Runoff=0.27 cfs 0.019 af
<b>Subcatchment U4: unit 4&amp;5</b>	Runoff Area=4,112 sf 70.67% Impervious Runoff Depth=3.76" Tc=6.0 min CN=81 Runoff=0.41 cfs 0.030 af
<b>Subcatchment U5: unit 5</b>	Runoff Area=1,722 sf 60.34% Impervious Runoff Depth=3.16" Tc=6.0 min CN=75 Runoff=0.15 cfs 0.010 af
<b>Subcatchment U6: unit 6</b>	Runoff Area=5,298 sf 56.06% Impervious Runoff Depth=2.88" Tc=6.0 min CN=72 Runoff=0.41 cfs 0.029 af



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Type III 24-hr 25 YR Rainfall=5.86"

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<b>Reach 1AR: RTE 9 RS swale</b>	Avg. Flow Depth=0.65' Max Vel=1.56 fps Inflow=2.05 cfs 0.212 af n=0.022 L=304.0' S=0.0025 '/' Capacity=39.39 cfs Outflow=1.99 cfs 0.212 af
<b>Reach 100: North Analysis point</b>	Inflow=2.83 cfs 0.565 af Outflow=2.83 cfs 0.565 af
<b>Reach 200: SE Analysis Point</b>	Inflow=0.00 cfs 0.002 af Outflow=0.00 cfs 0.002 af
<b>Reach 300: NE Analysis Point</b>	Inflow=0.01 cfs 0.008 af Outflow=0.01 cfs 0.008 af
<b>Pond 1BP: FOREBAY</b>	Peak Elev=209.92' Storage=45 cf Inflow=0.98 cfs 0.070 af 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 '/' Outflow=0.96 cfs 0.070 af
<b>Pond 1CP: Bioretention Pond 1</b>	Peak Elev=208.89' Storage=2,212 cf Inflow=2.24 cfs 0.162 af Outflow=0.37 cfs 0.162 af
<b>Pond 1DCP: 15" DW Culv</b>	Peak Elev=205.57' Storage=19 cf Inflow=0.97 cfs 0.091 af 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 '/' Outflow=0.97 cfs 0.091 af
<b>Pond 1DP: Bioretention Pond 1A</b>	Peak Elev=207.93' Storage=673 cf Inflow=0.77 cfs 0.055 af Outflow=0.15 cfs 0.055 af
<b>Pond 1P: 15" DW Culv</b>	Peak Elev=205.26' Storage=5,329 cf Inflow=5.13 cfs 0.566 af 15.0" Round Culvert n=0.025 L=21.0' S=0.0052 '/' Outflow=2.83 cfs 0.565 af
<b>Pond 2P: Bioretention Pond</b>	Peak Elev=218.45' Storage=110 cf Inflow=0.16 cfs 0.013 af Outflow=0.04 cfs 0.013 af
<b>Pond 3P: Bioretention Pond 3</b>	Peak Elev=223.19' Storage=70 cf Inflow=0.16 cfs 0.012 af Outflow=0.07 cfs 0.012 af
<b>Pond 4P: 15" DW Culv</b>	Peak Elev=205.61' Storage=22 cf Inflow=1.12 cfs 0.121 af 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 '/' Outflow=1.12 cfs 0.121 af
<b>Pond U1P: drip edge UNIT 1&amp;2</b>	Peak Elev=121.74' Storage=511 cf Inflow=0.47 cfs 0.033 af Discarded=0.05 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.033 af
<b>Pond U2P: drip edge UNIT 2&amp;3</b>	Peak Elev=121.15' Storage=146 cf Inflow=0.19 cfs 0.014 af Discarded=0.04 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.014 af
<b>Pond U3P: drip edge UNIT 3&amp;4</b>	Peak Elev=121.42' Storage=279 cf Inflow=0.27 cfs 0.019 af Discarded=0.03 cfs 0.019 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.019 af
<b>Pond U4P: drip edge UNIT 4&amp;5</b>	Peak Elev=121.86' Storage=463 cf Inflow=0.41 cfs 0.030 af Discarded=0.04 cfs 0.030 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.030 af
<b>Pond U5P: drip edge UNIT 5</b>	Peak Elev=121.21' Storage=143 cf Inflow=0.15 cfs 0.010 af Discarded=0.02 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.010 af

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Route 9 Barrington

Type III 24-hr 25 YR Rainfall=5.86"

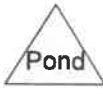
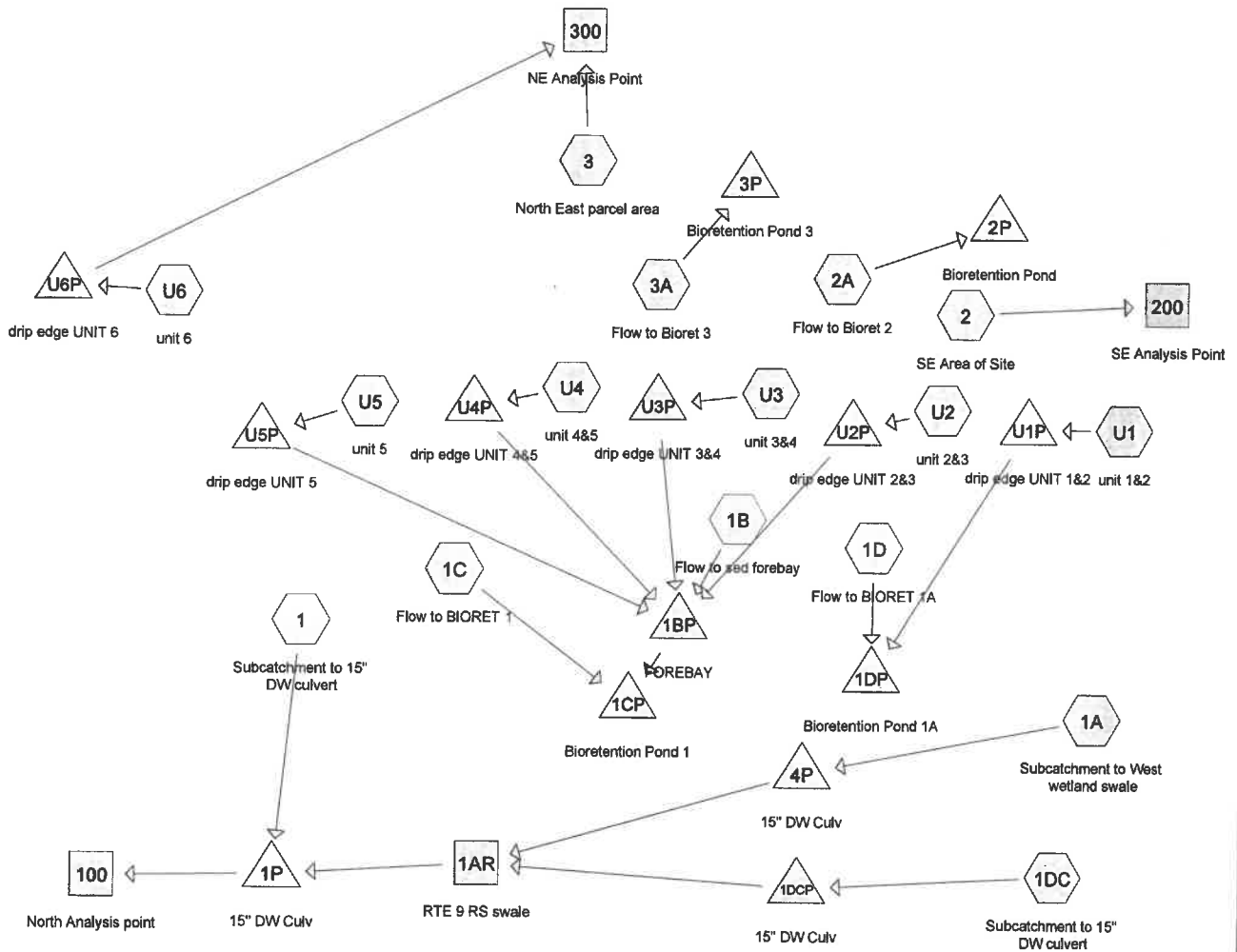
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**Pond U6P: drip edge UNIT 6**

Peak Elev=122.87' Storage=417 cf Inflow=0.41 cfs 0.029 af  
Discarded=0.05 cfs 0.029 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.029 af

**Total Runoff Area = 5.250 ac Runoff Volume = 0.952 af Average Runoff Depth = 2.18"**  
**76.63% Pervious = 4.023 ac 23.37% Impervious = 1.227 ac**



**Routing Diagram for NH-1387-Proposed**  
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Route 9 Barrington  
Type III 24-hr 50 YR Rainfall=7.00"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1: Subcatchment to 15" DW</b>	Runoff Area=88,850 sf 10.46% Impervious Runoff Depth=2.90" Flow Length=594' Tc=20.6 min CN=68 Runoff=4.53 cfs 0.493 af
<b>Subcatchment 1A: Subcatchment to West</b>	Runoff Area=36,139 sf 9.91% Impervious Runoff Depth=2.51" Flow Length=197' Tc=17.4 min CN=64 Runoff=1.67 cfs 0.173 af
<b>Subcatchment 1B: Flow to sed forebay</b>	Runoff Area=10,220 sf 52.58% Impervious Runoff Depth=4.58" Tc=6.0 min CN=79 Runoff=1.25 cfs 0.090 af
<b>Subcatchment 1C: Flow to BIORET 1</b>	Runoff Area=12,144 sf 59.56% Impervious Runoff Depth=5.03" Tc=6.0 min CN=83 Runoff=1.61 cfs 0.117 af
<b>Subcatchment 1D: Flow to BIORET 1A</b>	Runoff Area=7,611 sf 58.88% Impervious Runoff Depth=4.81" Tc=6.0 min CN=81 Runoff=0.97 cfs 0.070 af
<b>Subcatchment 1DC: Subcatchment to 15"</b>	Runoff Area=13,411 sf 49.44% Impervious Runoff Depth=4.58" Flow Length=248' Tc=15.2 min CN=86 Runoff=1.24 cfs 0.118 af
<b>Subcatchment 2: SE Area of Site</b>	Runoff Area=5,549 sf 0.00% Impervious Runoff Depth=0.37" Tc=6.0 min CN=33 Runoff=0.01 cfs 0.004 af
<b>Subcatchment 2A: Flow to Bioret 2</b>	Runoff Area=4,389 sf 29.64% Impervious Runoff Depth=2.22" Tc=6.0 min CN=56 Runoff=0.25 cfs 0.019 af
<b>Subcatchment 3: North East parcel area</b>	Runoff Area=24,131 sf 2.91% Impervious Runoff Depth=0.43" Flow Length=107' Tc=8.0 min CN=34 Runoff=0.08 cfs 0.020 af
<b>Subcatchment 3A: Flow to Bioret 3</b>	Runoff Area=3,667 sf 33.08% Impervious Runoff Depth=2.51" Tc=6.0 min CN=59 Runoff=0.24 cfs 0.018 af
<b>Subcatchment U1: unit 1&amp;2</b>	Runoff Area=4,634 sf 71.41% Impervious Runoff Depth=4.81" Tc=6.0 min CN=81 Runoff=0.59 cfs 0.043 af
<b>Subcatchment U2: unit 2&amp;3</b>	Runoff Area=3,165 sf 44.71% Impervious Runoff Depth=3.10" Tc=6.0 min CN=65 Runoff=0.26 cfs 0.019 af
<b>Subcatchment U3: unit 3&amp;4</b>	Runoff Area=3,633 sf 54.78% Impervious Runoff Depth=3.72" Tc=6.0 min CN=71 Runoff=0.36 cfs 0.026 af
<b>Subcatchment U4: unit 4&amp;5</b>	Runoff Area=4,112 sf 70.67% Impervious Runoff Depth=4.81" Tc=6.0 min CN=81 Runoff=0.53 cfs 0.038 af
<b>Subcatchment U5: unit 5</b>	Runoff Area=1,722 sf 60.34% Impervious Runoff Depth=4.15" Tc=6.0 min CN=75 Runoff=0.19 cfs 0.014 af
<b>Subcatchment U6: unit 6</b>	Runoff Area=5,298 sf 56.06% Impervious Runoff Depth=3.83" Tc=6.0 min CN=72 Runoff=0.55 cfs 0.039 af

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Route 9 Barrington  
Type III 24-hr 50 YR Rainfall=7.00"

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<b>Reach 1AR: RTE 9 RS swale</b>	Avg. Flow Depth=0.74' Max Vel=1.69 fps Inflow=2.87 cfs 0.291 af n=0.022 L=304.0' S=0.0025 '/' Capacity=39.39 cfs Outflow=2.79 cfs 0.291 af
<b>Reach 100: North Analysis point</b>	Inflow=3.67 cfs 0.784 af Outflow=3.67 cfs 0.784 af
<b>Reach 200: SE Analysis Point</b>	Inflow=0.01 cfs 0.004 af Outflow=0.01 cfs 0.004 af
<b>Reach 300: NE Analysis Point</b>	Inflow=0.08 cfs 0.020 af Outflow=0.08 cfs 0.020 af
<b>Pond 1BP: FOREBAY</b>	Peak Elev=209.99' Storage=58 cf Inflow=1.25 cfs 0.091 af 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 '/' Outflow=1.23 cfs 0.091 af
<b>Pond 1CP: Bioretention Pond 1</b>	Peak Elev=209.36' Storage=3,028 cf Inflow=2.84 cfs 0.207 af Outflow=0.42 cfs 0.207 af
<b>Pond 1DCP: 15" DW Culv</b>	Peak Elev=205.65' Storage=24 cf Inflow=1.24 cfs 0.118 af 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 '/' Outflow=1.24 cfs 0.118 af
<b>Pond 1DP: Bioretention Pond 1A</b>	Peak Elev=208.27' Storage=921 cf Inflow=0.97 cfs 0.070 af Outflow=0.18 cfs 0.070 af
<b>Pond 1P: 15" DW Culv</b>	Peak Elev=205.56' Storage=7,894 cf Inflow=7.29 cfs 0.784 af 15.0" Round Culvert n=0.025 L=21.0' S=0.0052 '/' Outflow=3.67 cfs 0.784 af
<b>Pond 2P: Bioretention Pond</b>	Peak Elev=218.89' Storage=220 cf Inflow=0.25 cfs 0.019 af Outflow=0.04 cfs 0.019 af
<b>Pond 3P: Bioretention Pond 3</b>	Peak Elev=223.41' Storage=154 cf Inflow=0.24 cfs 0.018 af Outflow=0.07 cfs 0.018 af
<b>Pond 4P: 15" DW Culv</b>	Peak Elev=205.77' Storage=33 cf Inflow=1.67 cfs 0.173 af 15.0" Round Culvert n=0.013 L=43.0' S=0.0051 '/' Outflow=1.66 cfs 0.173 af
<b>Pond U1P: drip edge UNIT 1&amp;2</b>	Peak Elev=122.44' Storage=717 cf Inflow=0.59 cfs 0.043 af Discarded=0.05 cfs 0.043 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.043 af
<b>Pond U2P: drip edge UNIT 2&amp;3</b>	Peak Elev=121.61' Storage=248 cf Inflow=0.26 cfs 0.019 af Discarded=0.04 cfs 0.019 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.019 af
<b>Pond U3P: drip edge UNIT 3&amp;4</b>	Peak Elev=122.16' Storage=427 cf Inflow=0.36 cfs 0.026 af Discarded=0.03 cfs 0.026 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.026 af
<b>Pond U4P: drip edge UNIT 4&amp;5</b>	Peak Elev=122.46' Storage=612 cf Inflow=0.53 cfs 0.038 af Discarded=0.04 cfs 0.037 af Primary=0.05 cfs 0.001 af Outflow=0.09 cfs 0.038 af
<b>Pond U5P: drip edge UNIT 5</b>	Peak Elev=121.79' Storage=212 cf Inflow=0.19 cfs 0.014 af Discarded=0.02 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.014 af

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Route 9 Barrington

Type III 24-hr 50 YR Rainfall=7.00"

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**Pond U6P: drip edge UNIT 6**

Peak Elev=123.58' Storage=633 cf Inflow=0.55 cfs 0.039 af  
Discarded=0.05 cfs 0.039 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.039 af

**Total Runoff Area = 5.250 ac Runoff Volume = 1.298 af Average Runoff Depth = 2.97"**  
**76.63% Pervious = 4.023 ac 23.37% Impervious = 1.227 ac**

## APPENDIX III

### Charts, Graphs, and Calculations





**RIP RAP CALCULATIONS**

Mixed use Development  
Thibodeau Family Rev. trust  
Barrington, NH

**Beals Associates, PLLC**  
70 Portsmouth Ave  
Stratham, NH

Rip Rap equations were obtained from the NH *Stormwater Manual*

Rip Rap was sized for the 10 year storm event (4.64").

**TAILWATER < HALF THE Do**

$La = (1.8 \times Q) / Do^{3/2} + (7 \times Do)$        $Q =$  Peak Flow &  $Do$  is Diameter of Pipe

$W = La + 3Do$  or defined channel width

$d50 = (0.02 \times Q^{4/3}) / (Tw \times Do)$        $Tw =$  Tailwater Depth

$T =$  Largest stone size of  $d50 \times 1.5$        $T =$  Thickness of Apron

$d50 =$  Median Stone Size (0.25' Min.)

Culvert or Catch Basin (Sta. No.)	Tail Water (Feet) Tw	Dischg. (C.F.S.) Q	Dia. of Pipe Do	Length of Rip Rap La (feet)	Width of Rip Rap W (feet)	Calculated Rip Rap (0.25 Min)	Actual Rip Rap (Feet)	Thickness of Apron (Feet)
15" HDPE (Pond #1DCP)	0.52	0.84	1.25	9.8	13.6	0.02	0.25	0.56
15" HDPE (Pond #1BP)	0.34	0.48	1.25	9.4	13.1	0.02	0.25	0.56
End of curb (STA 3+00)	0.40	0.49	2.00	14.3	20.3	0.01	0.25	0.56

Table 7-24 -- Recommended Rip Rap Gradation Ranges

d50 Size =	0.25	Feet	3	Inches	0.5	Feet	6	Inches
% of Weight Smaller Than the Given d50 Size	Size of Stone (Inches)				Size of Stone (Inches)			
	From		To		From		To	
100%	5		6		9		12	
85%	4		5		8		11	
50%	3		5		6		9	
15%	1		2		2		3	

**John P. Hayes III CSS, CWS,  
7 Limestone Way  
North Hampton, NH 03862  
603-205-4396  
johnphayes@comcast.net**

**2/15/22**

**Paul Tibodeau  
76 Young Road  
Barrington, NH**

**Job # 22-002**

**2/9/22  
Site Specific Soil Survey  
Map 234 Lot 77  
Route 9 Barrington, NH**

Dear Paul,

This letter report presents the findings of a Site Specific Soil Survey conducted on the referenced properties by John P. Hayes III on February 9, 2022. The soil survey was conducted in accordance with the New Hampshire Supplement of the Site-Specific Soil Mapping Standard For New Hampshire and Vermont, Version 5.0, December 2017, Special Publication # 3, published by the Society of Soil Scientist of Northern New England.

The properties that are subject of the soil survey is located northeast side of Route 9, and southeast of Oak Hill Road in Barrington, NH. The mapped area of the parcel is 3.42 acres in size. The plans used for these soil maps are a 40 scale plan, where 1 inch equals 40 feet, with two foot contours.

The purpose of the soil survey is to provide the client with soils information for urban and suburban or rural land planning. Soil characteristics on the property were evaluated through observation of numerous hand auger probes conducted throughout the property. Slope phases were determined with the use of the topography provided on the plan. The Site-specific Soil Map Units identified are taken from the New Hampshire State-Wide Numerical Soils Legend, Issue #10 January 2011, and are briefly described below. Official Series Descriptions (OSD) for each of these soil series are enclosed with this report. The soil map units comply with the Range In Characteristics described in the OSD. Any limiting inclusions on the site, do not exceed 15 percent of any of the soil map units. Dissimilar inclusions, if any, will be noted in the report. Limits of the Site Specific mapping units are highlighted on the plan. The Hydrological Soil Groups for each of the soil series was determined using SSSNNE Publication No. 5 Ksat Values for New Hampshire Soils September 2009. Limits of the Site Specific mapping units are highlighted on the plan.

The Strafford County Soil Survey recognises the soil series Saugatuck as both somewhat poorly drained and poorly drained. The soil map units of the Saugatuck soil with the map unit denominator P, contain the poorly drained component of the soil series.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
<b>De</b> (State No. 313)	<b>Deerfield</b>	<b>A B C</b>	<b>B</b>	The Deerfield series consists of very deep, moderately well drained soils formed in glaciofluvial deposits. These soils are found on the southeast portion of the lot, at the toe of the slope. These soils are deep to bedrock. Saturated hydraulic conductivity is high or very high. Some inclusions of somewhat poorly drained Saugatuck, and somewhat poorly drained Deerfield Variant soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils range from 16 to 36 inches.
<b>Gs</b> (State No. 111)	<b>Gloucester (Very Stony)</b>	<b>B C D E</b>	<b>A</b>	The Gloucester series consists of very deep, somewhat excessively drained soils formed in sandy till. These soils are found on the hill on the northeastern portion of the lot. These soils are deep to bedrock. Saturated hydraulic conductivity is high or very high. Some inclusions of well drained Charlton soils, and moderately well drained Deerfield soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils range from 38 to 60 inches.
<b>Sb</b> (State No. 16)	<b>Saugatuck (Somewhat Poorly Drained)</b>	<b>A</b>	<b>C</b>	The Saugatuck series consists of very deep, somewhat poorly drained soils with cemented subsoil. These soils formed in sandy glaciofluvial deposits on lake plains, till plains, and outwash plains. These soils are found in the southeast and northwest portion of the property, and the front portion of the property, near the road. These soils are deep to bedrock. Estimated seasonal high water tables is 10 to 14 inches.
<b>Sb P</b> (State No. 16)	<b>Saugatuck (Poorly Drained)</b>	<b>A</b>	<b>C</b>	The Saugatuck series consists of very deep, poorly drained soils with cemented subsoil. These soils formed in sandy glaciofluvial deposits on lake plains, till plains, and outwash plains. These soils are found in the southwest side of the lot and the front portion of the property, near the road. These soils are deep to bedrock. Estimated seasonal high water tables is less than 10 inches.

## Slope Phases

<u>Alpha Slope Symbol</u>	<u>Range</u>
A	0 - 3%
B	3 - 8%
C	8 - 15%
D	15 - 25%
E	25 - 50%
F	> 50%

I trust that this Soil Survey and report meet your current planning needs. Please do not hesitate to contact me if you have any questions.

Sincerely:

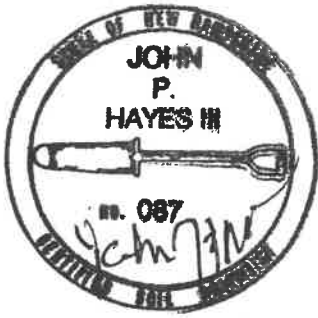
*John P. Hayes III*



John P. Hayes III CSS, CWS

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. Gtp.	Group	Land Form	Temp.	Soil Textures	Spodosol	Other
Abenaki	501	0.6	2.0	6.00	98.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Acton	148	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly, loamy sand
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
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
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy, loam in Cd
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	chylc	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channeery silt loam in Cd
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Biddleford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	sandy-skeletal	no	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Caesar	526	2.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	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
Canterbury	168	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam 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
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
Caton	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Chaffield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Chaffield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channeery silt loam in Cd
Chichester	442	0.6	2.0	2.00	6.0	B	6	Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Choconua	385					D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
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
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
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
Duane	413	6.0	20.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented / ortstein
Dutchess	366	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	mesic	loamy	no	very channeery
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
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
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)

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
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Glimanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	chyle	loamy	yes	20 to 40 in. deep loamy cap
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Grange	433	0.6	2.0	0.60	2.0	C	5	Organic Materials - Freshwater	frigid	co. loamy over sandy (skeletal)	no	deep organic
Greenwood	285					A/D	6	Organic Materials - Freshwater	frigid	hermic	no	loamy over sandy
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	strata of fine sand
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	silty
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
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
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
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Herron	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	silt loam to silt in C
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	less than 20 in. deep
Hopback	91	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	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	slate, loamy cap
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	cobbly fine sandy loam
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	silt loam, platy in Cd
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	deep organic
Ipswich	397					D	6	Tidal Flat	mesic	hermic/sapric	no	less than 20 in. deep
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Lovewell	307	0.6	2.0	0.60	2.0	C	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
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
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
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
Madawaska, aqua	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	organic over sand
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	silt over clay
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	deep organic
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	organic over silt
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	silty clay loam in C
Meirose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	loamy cap
Menimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravely sand	no	loamy sand in Cd
Metacomt	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	sandy or sandy-skeletal
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	loamy sand in Cd
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	sandy or sandy-skeletal
Millisite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	loamy sand in Cd
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	20 to 40 in. deep
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	gravely loamy sand in C
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
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	



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**Job# 22-002**

**Test Pit Logs**  
 Map 234 Lot 77  
 Route 9 Barrington NH

**Test Pit 1**

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistence
0-5	10YR 3/3 Dark Brown	Fine Sandy Loam	Granular	Friable
5-14	7.5YR 5/6 Strong Brown	Fine Sandy Loam	Granular	Friable
14-22	10YR 5/6 Yellowish Brown	Fine Sandy Loam	Granular	Friable
22-38	2.5Y 5/4 Light Olive Brown	Gravelly Sandy Loam	Massive	Friable
38-68	2.5Y 5/2 Grayish Brown	Gravelly Sandy Loam with Redoximorphic features present	Massive	Friable

**ESHWT: 38 in. Restrictive Layer: None Observed H2O: None Refusal: None**

**Test Pit 2**

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistence
0-5	10YR 3/3 Dark Brown	Fine Sandy Loam	Granular	Friable
5-16	7.5YR 5/6 Strong Brown	Fine Sandy Loam	Granular	Friable
16-30	10YR 5/6 Yellowish Brown	Fine Sandy Loam	Granular	Friable
30-40	2.5Y 5/4 Light Olive Brown	Gravelly Sandy Loam	Massive	Friable
40-68	2.5Y 5/2 Grayish Brown	Gravelly Sandy Loam with Redoximorphic features present	Massive	Friable

**ESHWT: 40 in. Restrictive Layer: None Observed H2O: None Refusal: None**

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**Test Pit Logs**  
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**Test Pit 3**

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-5	10YR 3/3 Dark Brown	Fine Sandy Loam	Granular	Friable
5-16	7.5YR 5/6 Strong Brown	Fine Sandy Loam	Granular	Friable
16-32	10YR 5/6 Yellowish Brown	Fine Sandy Loam	Granular	Friable
32-42	2.5Y 5/4 Light Olive Brown	Gravelly Sandy Loam	Massive	Friable
42-70	2.5Y 5/2 Grayish Brown	Gravelly Sandy Loam with Redoximorphic features present	Massive	Friable

**ESHWT: 42 in. Restrictive Layer: None Observed H2O: None Refusal: None**

**Test Pit 4**

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-5	10YR 3/3 Dark Brown	Fine Sandy Loam	Granular	Friable
5-16	7.5YR 5/6 Strong Brown	Fine Sandy Loam	Granular	Friable
16-30	10YR 5/6 Yellowish Brown	Fine Sandy Loam	Granular	Friable
30-42	2.5Y 5/4 Light Olive Brown	Gravelly Sandy Loam	Massive	Friable
42-68	2.5Y 5/2 Grayish Brown	Gravelly Sandy Loam with Redoximorphic features present	Massive	Friable

**ESHWT: 42 in. Restrictive Layer: None Observed H2O: None Refusal: None**





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**Test Pit Logs**  
**Map 234 Lot 77**  
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**Test Pit 5**

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-5	10YR 3/3 Dark Brown	Fine Sandy Loam	Granular	Friable
5-16	7.5YR 5/6 Strong Brown	Fine Sandy Loam	Granular	Friable
16-32	10YR 5/6 Yellowish Brown	Fine Sandy Loam	Granular	Friable
32-42	2.5Y 5/4 Light Olive Brown	Gravelly Sandy Loam	Massive	Friable
42-68	2.5Y 5/2 Grayish Brown	Gravelly Sandy Loam with Redoximorphic features present	Massive	Friable

**ESHWT: 42 in. Restrictive Layer: None Observed H2O: None Refusal: None**

**Test Pit 6**

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-5	10YR 3/3 Dark Brown	Fine Sandy Loam	Granular	Friable
5-16	10YR 5/6 Yellowish Brown	Fine Sandy Loam	Granular	Friable
16-30	2.5Y 5/4 Light Olive Brown	Gravelly Fine Sandy Loam	Massive	Friable
30-64	2.5Y 5/2 Grayish Brown	Gravelly Fine Sandy Loam with Redoximorphic features present	Massive	Firm

**ESHWT: 30 in. Restrictive Layer: 30 in. Observed H2O: None Refusal: None**

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**Test Pit Logs**  
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**Test Pit 7**

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-5	10YR 3/3 Dark Brown	Fine Sandy Loam	Granular	Friable
5-14	10YR 5/6 Yellowish Brown	Fine Sandy Loam	Granular	Friable
14-26	2.5Y 5/4 Light Olive Brown	Gravelly Fine Sandy Loam	Massive	Friable
26-66	2.5Y 5/2 Grayish Brown	Gravelly Fine Sandy Loam with Redoximorphic features present	Massive	Firm

**ESHWT: 26 in. Restrictive Layer: 26 in. Observed H2O: None Refusal: None**