

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

Prepared for:

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**BENDING BROOK RESIDENTIAL DEVELOPMENT**

Prepared by:

**BEALS ASSOCIATES, *PLLC***

**70 PORTSMOUTH AVENUE**

**STRATHAM, NH 03885**

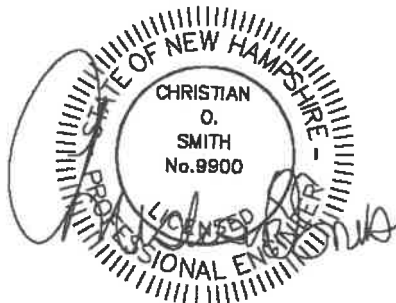
Project Number:

NH-1443

Mallego Road

Barrington, New Hampshire

**November 14, 2022**



## DESIGN METHOD OBJECTIVES

Joseph Falzone proposes a 15-lot single family open-space development on approximately 43-acres of land located off Mallego Road in Barrington, NH that includes 2-conventional lots with frontage on Mallego Road. 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 published SSSNNE Ksat values for the soils delineated. The published values were then divided by 2 as a factor of safety as required by the NH Stormwater Manual.

### ANALYSIS COMPONENT PEAK RATE of DISCHARGE (CFS)

	2 YR		10 YR		25 YR		50 YR	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
	Reach #100	0.56	0.36	6.51	5.51	15.27	14.30	25.63
Subcat #2	4.23	0.75	21.21	6.37	38.39	13.38	56.37	20.99

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

	Existing	Proposed
Reach #100	0.326	0.226

The existing property is located on a parcel consisting of forest, woods roads, , wetlands and an open area utilized as a landing for historic mineral excavation activity. The existing topography is such that the site analysis is divided into two subcatchments. Reach 100 flows offsite to a large wetland complex, northerly to Mallego Brook. Subcatchment #2 consists of the gravel pit area with stockpiles, gravel roads and terminates onsite through infiltration within the very porous soils. Directions as can be seen on the existing conditions watershed plan (Sheet W1).

The proposed Lot development includes a proposed public roadway that is in a cul-de-sac terminus configuration and intersects Mallego Road. This road provides the required frontage for the residential conservation lots. The proposed layout will divide the parcel into eight different subcatchments. The peak rate of run-off from the proposed development is equal to or decreased from that of the existing conditions under all design storms evaluated. The addition of swales, culverts, a filtration pond, and level spreaders direct the treated run off overland to the wetlands or recharge it back into the ground water matrix. All roadway runoff receives treatment through the bioretention filtration pond prior to discharge into overland areas or infiltration. All ponds have been designed with pretreatment sediment fore bays as a portion of the runoff is generated from paved roads/drives. In addition, the potential for increased erosion and sedimentation is handled by way of stone check dams, erosion matting int he swales and/or erosion control berms. The proposed bioretention pond is well oversized to provide for future municipal connection to mitigate existing drainage issues along Mallego Road. The developer will be constructing a system of manholes that extend from Mallego Road (the town tie-in point) to sediment forebays. It is anticipated this tie-in would not take place for several years. 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

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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 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	0.56	0.36	6.51	5.51	15.27	14.30	25.63	25.05
Subcat #2	4.23	0.75	21.21	6.37	38.39	13.38	56.37	20.99

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

	Existing	Proposed
Reach #100	0.326	0.226

### 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, woods roads, , wetlands and an open area utilized as a landing for historic mineral excavation activity. The existing topography is such that the site analysis is divided into two subcatchments. Reach 100 flows offsite to a large wetland complex, northerly to Mallego Brook. Subcatchment #2 consists of the gravel pit area with stockpiles, gravel roads and terminates onsite through infiltration within the very porous soils. 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, C and D. No flood hazard zone exists on the parcel, though the parcel is within the Towns aquifer protection district..

### 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 roadway, and the proposed house lots 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 includes a proposed public roadway that is in a cul-de-sac terminus configuration and intersects Mallego Road. This road provides the required frontage for the residential conservation lots. The

proposed layout will divide the parcel into eight different subcatchments. The peak rate of run-off from the proposed development is equal to or decreased from that of the existing conditions under all design storms evaluated. The addition of swales, culverts, a filtration pond, and level spreaders direct the treated run off overland to the wetlands or recharge it back into the ground water matrix. All roadway runoff receives treatment through the bioretention filtration pond prior to discharge into overland areas or infiltration. All ponds have been designed with pretreatment sediment fore bays as a portion of the runoff is generated from paved roads/drives. In addition, the potential for increased erosion and sedimentation is handled by way of stone check dams, erosion matting in the swales and/or erosion control berms. The proposed bioretention pond is well oversized to provide for future municipal connection to mitigate existing drainage issues along Mallego Road. The developer will be constructing a system of manholes that extend from Mallego Road (the town tie-in point) to sediment forebays. It is anticipated this tie-in would not take place for several years. 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.

Impervious area take-offs were calculated digitally from the proposed road pavement and utilizing HydroCAD's "1/2-acre, 25% impervious" designation for the developed lots. Seasonal high-water tables for the treatment ponds and infiltration areas were modeled based on actual test pits logged within the proposed BMP areas. The run-off is treated and infiltrated or outletted toward wetlands areas modeled as HydroCAD "reaches" and "ponds". These consist of constructed swales, existing flow paths through larger subcatchments, roadway culverts, and a bioretention basin. Required groundwater recharge will be exceeded by a single 1" storm (2,976 c.f. required and 5,619 c.f. provided by a 1-year storm).

In an effort to prevent the sedimentation of adjacent wetlands or abutting property, the roadway is equipped with roadside swales that terminate into culverts, catch basins or directly into sediment forebays for the mentioned BMP treatment ponds. Ksat values were utilized based on published data in SSSNNE Special Publication No. 5 (copy in appendices) with the requisite factor of safety applied. Post development stormwater flows reduced from existing for the 2YR through the 50YR storm events, and the pond safely passes the 50YR storm event as required by NHDES AoT. It should also be noted that the stormwater volume to each analysis point is equal or reduced compared to the existing conditions under the 2-YR frequency storm event. All BMP's have been designed per the New Hampshire Stormwater Manual and design worksheets appear in the appendices. 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 roadways 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 roadway 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 roadways/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 Mallego Road 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 roadway 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, pre-treatment areas, and an oversized filtration basin. 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 required for this project due to the area of disturbance being more 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

100

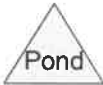
North Analysis point

2

Pit area (Terminates onsite)

1

Subcatchment to Wetland/Brook



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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
4.932	51	1 acre lots, 20% imp, HSG A (1)
1.564	54	1/2 acre lots, 25% imp, HSG A (1)
0.020	72	Dirt roads, HSG A (1)
0.365	82	Dirt roads, HSG B (1)
1.987	77	Fallow, bare soil, HSG A (1, 2)
7.344	86	Fallow, bare soil, HSG B (1, 2)
0.176	96	Gravel surface, HSG A (2)
1.260	96	Gravel surface, HSG B (1, 2)
1.261	83	Paved roads w/open ditches, 50% imp, HSG A (1)
0.013	98	Roofs, HSG A (2)
19.538	30	Woods, Good, HSG A (1, 2)
6.508	55	Woods, Good, HSG B (1, 2)
4.634	70	Woods, Good, HSG C (1, 2)
0.850	77	Woods, Good, HSG D (1, 2)
<b>50.452</b>	<b>54</b>	<b>TOTAL AREA</b>

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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
29.490	HSG A	1, 2
15.477	HSG B	1, 2
4.634	HSG C	1, 2
0.850	HSG D	1, 2
0.000	Other	
<b>50.452</b>		<b>TOTAL AREA</b>

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Mallego Road, 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** Runoff Area=1,369,164 sf 6.39% Impervious Runoff Depth=0.12"  
Flow Length=1,061' Tc=47.9 min CN=51 Runoff=0.56 cfs 0.326 af

**Subcatchment 2: Pit area (Terminates** Runoff Area=828,514 sf 0.07% Impervious Runoff Depth=0.36"  
Tc=6.0 min CN=60 Runoff=4.23 cfs 0.575 af

**Reach 100: North Analysis point** Inflow=0.56 cfs 0.326 af  
Outflow=0.56 cfs 0.326 af

**Total Runoff Area = 50.452 ac Runoff Volume = 0.901 af Average Runoff Depth = 0.21"**  
**96.00% Pervious = 48.431 ac 4.00% Impervious = 2.021 ac**

100

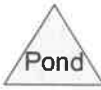
North Analysis point

2

Pit area (Terminates onsite)

1

Subcatchment to Wetland/Brook





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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** Runoff Area=1,369,164 sf 6.39% Impervious Runoff Depth=0.60"  
Flow Length=1,061' Tc=47.9 min CN=51 Runoff=6.51 cfs 1.570 af

**Subcatchment 2: Pit area (Terminates** Runoff Area=828,514 sf 0.07% Impervious Runoff Depth=1.10"  
Tc=6.0 min CN=60 Runoff=21.21 cfs 1.738 af

**Reach 100: North Analysis point** Inflow=6.51 cfs 1.570 af  
Outflow=6.51 cfs 1.570 af

**Total Runoff Area = 50.452 ac Runoff Volume = 3.308 af Average Runoff Depth = 0.79"**  
**96.00% Pervious = 48.431 ac 4.00% Impervious = 2.021 ac**

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**Summary for Subcatchment 1: Subcatchment to Wetland/Brook**

Runoff = 6.51 cfs @ 12.83 hrs, Volume= 1.570 af, Depth= 0.60"  
 Routed to Reach 100 : North 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
509,268	30	Woods, Good, HSG A
202,224	55	Woods, Good, HSG B
196,129	70	Woods, Good, HSG C
15,891	77	Woods, Good, HSG D
50,701	77	Fallow, bare soil, HSG A
38,446	86	Fallow, bare soil, HSG B
15,886	82	Dirt roads, HSG B
884	72	Dirt roads, HSG A
214,824	51	1 acre lots, 20% imp, HSG A
68,117	54	1/2 acre lots, 25% imp, HSG A
1,875	96	Gravel surface, HSG B
54,919	83	Paved roads w/open ditches, 50% imp, HSG A
1,369,164	51	Weighted Average
1,281,710		93.61% Pervious Area
87,454		6.39% 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"
36.9	906	0.0067	0.41		<b>Shallow Concentrated Flow, Sheet to slope</b> Woodland Kv= 5.0 fps
1.3	105	0.0700	1.32		<b>Shallow Concentrated Flow, slope to wetland</b> Woodland Kv= 5.0 fps
47.9	1,061	Total			

**Summary for Subcatchment 2: Pit area (Terminates onsite)**

Runoff = 21.21 cfs @ 12.10 hrs, Volume= 1.738 af, Depth= 1.10"  
 Routed to nonexistent node 200

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
562	98	Roofs, HSG A
7,664	96	Gravel surface, HSG A
52,991	96	Gravel surface, HSG B
281,464	86	Fallow, bare soil, HSG B
35,836	77	Fallow, bare soil, HSG A
341,827	30	Woods, Good, HSG A
81,273	55	Woods, Good, HSG B
5,746	70	Woods, Good, HSG C
21,151	77	Woods, Good, HSG D
828,514	60	Weighted Average
827,952		99.93% Pervious Area
562		0.07% Impervious Area

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

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

Inflow Area = 31.432 ac, 6.39% Impervious, Inflow Depth = 0.60" for 10 YR event  
 Inflow = 6.51 cfs @ 12.83 hrs, Volume= 1.570 af  
 Outflow = 6.51 cfs @ 12.83 hrs, Volume= 1.570 af, Atten= 0%, Lag= 0.0 min

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

100

North Analysis point

2

Pit area (Terminates onsite)

1

Subcatchment to Wetland/Brook



**NH-1443-Existing**

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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**

Runoff Area=1,369,164 sf 6.39% Impervious Runoff Depth=1.15"  
Flow Length=1,061' Tc=47.9 min CN=51 Runoff=15.27 cfs 2.999 af

**Subcatchment 2: Pit area (Terminates**

Runoff Area=828,514 sf 0.07% Impervious Runoff Depth=1.83"  
Tc=6.0 min CN=60 Runoff=38.39 cfs 2.902 af

**Reach 100: North Analysis point**

Inflow=15.27 cfs 2.999 af  
Outflow=15.27 cfs 2.999 af

**Total Runoff Area = 50.452 ac Runoff Volume = 5.901 af Average Runoff Depth = 1.40"**  
**96.00% Pervious = 48.431 ac 4.00% Impervious = 2.021 ac**

100

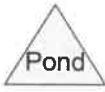
North Analysis point

2

Pit area (Terminates onsite)

1

Subcatchment to Wetland/Brook



**NH-1443-Existing**

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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**

Runoff Area=1,369,164 sf 6.39% Impervious Runoff Depth=1.76"  
Flow Length=1,061' Tc=47.9 min CN=51 Runoff=25.63 cfs 4.600 af

**Subcatchment 2: Pit area (Terminates**

Runoff Area=828,514 sf 0.07% Impervious Runoff Depth=2.60"  
Tc=6.0 min CN=60 Runoff=56.37 cfs 4.127 af

**Reach 100: North Analysis point**

Inflow=25.63 cfs 4.600 af  
Outflow=25.63 cfs 4.600 af

**Total Runoff Area = 50.452 ac Runoff Volume = 8.726 af Average Runoff Depth = 2.08"**  
**96.00% Pervious = 48.431 ac 4.00% Impervious = 2.021 ac**

## APPENDIX II

### Proposed Conditions Drainage Analysis

Summary 2 YR - 24 HR rainfall = 3.08"

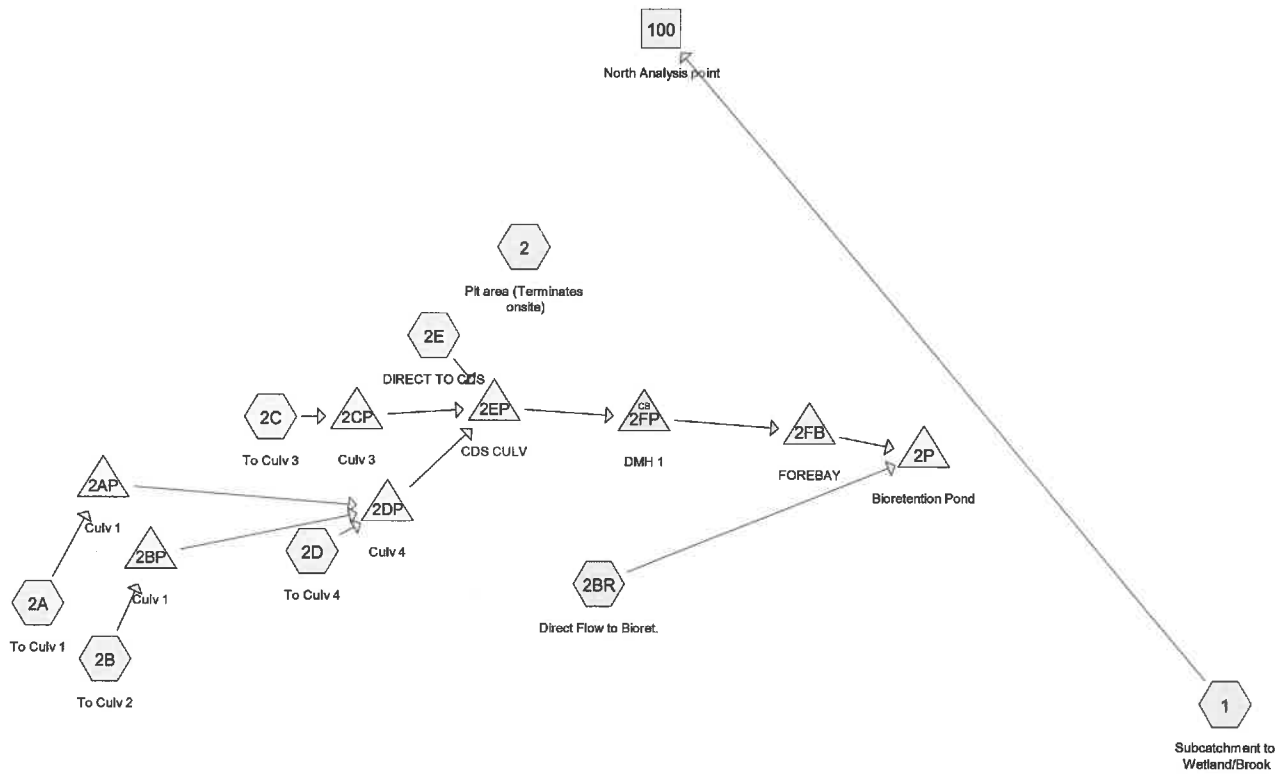
Complete 10 YR - 24 HR rainfall = 4.64"

Summary 25 YR - 24 HR rainfall = 5.86"

Summary 50 YR - 24 HR rainfall = 7.00"

Sheet W-2 Proposed Conditions Watershed Plan





Subcat



Reach



Pond



Link

**Routing Diagram for NH-1443-Proposed 11-22**  
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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
4.932	51	1 acre lots, 20% imp, HSG A (1)
2.029	54	1/2 acre lots, 25% imp, HSG A (1)
5.824	70	1/2 acre lots, 25% imp, HSG B (1, 2, 2BR)
2.845	46	2 acre lots, 12% imp, HSG A (1)
2.677	39	>75% Grass cover, Good, HSG A (1, 2, 2A, 2B, 2BR)
4.302	61	>75% Grass cover, Good, HSG B (1, 2, 2A, 2B, 2BR, 2C, 2D, 2E)
0.365	82	Dirt roads, HSG B (1)
0.137	96	Gravel surface, HSG A (2BR)
0.116	96	Gravel surface, HSG B (1, 2, 2BR)
0.052	98	Paved parking, HSG B (2C, 2D)
0.192	98	Paved roads w/curbs & sewers, HSG A (2A, 2B)
0.785	98	Paved roads w/curbs & sewers, HSG B (2A, 2B, 2C, 2D, 2E)
1.261	83	Paved roads w/open ditches, 50% imp, HSG A (1)
15.646	30	Woods, Good, HSG A (1, 2, 2BR)
4.033	55	Woods, Good, HSG B (1, 2, 2BR)
4.634	70	Woods, Good, HSG C (1, 2)
0.850	77	Woods, Good, HSG D (1, 2)
<b>50.680</b>	<b>51</b>	<b>TOTAL AREA</b>

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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
29.718	HSG A	1, 2, 2A, 2B, 2BR
15.477	HSG B	1, 2, 2A, 2B, 2BR, 2C, 2D, 2E
4.634	HSG C	1, 2
0.850	HSG D	1, 2
0.000	Other	
<b>50.680</b>		<b>TOTAL AREA</b>

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Mallego Road, 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</b>	Runoff Area=1,353,019 sf 8.39% Impervious Runoff Depth=0.09" Flow Length=709' Tc=37.5 min CN=49 Runoff=0.36 cfs 0.226 af
<b>Subcatchment 2: Pit area (Terminates</b>	Runoff Area=392,981 sf 9.23% Impervious Runoff Depth=0.22" Tc=6.0 min CN=55 Runoff=0.75 cfs 0.163 af
<b>Subcatchment 2A: To Culv 1</b>	Runoff Area=15,983 sf 24.93% Impervious Runoff Depth=0.33" Tc=6.0 min CN=59 Runoff=0.07 cfs 0.010 af
<b>Subcatchment 2B: To Culv 2</b>	Runoff Area=17,622 sf 39.51% Impervious Runoff Depth=0.50" Tc=6.0 min CN=64 Runoff=0.17 cfs 0.017 af
<b>Subcatchment 2BR: Direct Flow to Bioret.</b>	Runoff Area=377,608 sf 5.56% Impervious Runoff Depth=0.11" Tc=6.0 min CN=50 Runoff=0.13 cfs 0.076 af
<b>Subcatchment 2C: To Culv 3</b>	Runoff Area=17,422 sf 70.46% Impervious Runoff Depth=1.81" Tc=6.0 min CN=87 Runoff=0.85 cfs 0.060 af
<b>Subcatchment 2D: To Culv 4</b>	Runoff Area=14,908 sf 86.26% Impervious Runoff Depth=2.33" Tc=6.0 min CN=93 Runoff=0.91 cfs 0.066 af
<b>Subcatchment 2E: DIRECT TO CDS</b>	Runoff Area=18,075 sf 48.36% Impervious Runoff Depth=1.25" Tc=6.0 min CN=79 Runoff=0.60 cfs 0.043 af
<b>Reach 100: North Analysis point</b>	Inflow=0.36 cfs 0.226 af Outflow=0.36 cfs 0.226 af
<b>Pond 2AP: Culv 1</b>	Peak Elev=181.12' Storage=1 cf Inflow=0.07 cfs 0.010 af 15.0" Round Culvert n=0.013 L=49.0' S=0.0100 '/' Outflow=0.07 cfs 0.010 af
<b>Pond 2BP: Culv 1</b>	Peak Elev=182.19' Storage=2 cf Inflow=0.17 cfs 0.017 af 15.0" Round Culvert n=0.013 L=26.0' S=0.0573 '/' Outflow=0.17 cfs 0.017 af
<b>Pond 2CP: Culv 3</b>	Peak Elev=177.17' Storage=122 cf Inflow=0.85 cfs 0.060 af 15.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=0.76 cfs 0.060 af
<b>Pond 2DP: Culv 4</b>	Peak Elev=177.09' Storage=21 cf Inflow=1.12 cfs 0.094 af 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 '/' Outflow=1.12 cfs 0.093 af
<b>Pond 2EP: CDS CULV</b>	Peak Elev=176.70' Storage=310 cf Inflow=2.45 cfs 0.197 af 18.0" Round Culvert n=0.013 L=200.0' S=0.0100 '/' Outflow=2.33 cfs 0.197 af
<b>Pond 2FB: FOREBAY</b>	Peak Elev=174.76' Storage=1,828 cf Inflow=2.33 cfs 0.197 af Outflow=2.26 cfs 0.161 af
<b>Pond 2FP: DMH 1</b>	Peak Elev=174.71' Inflow=2.33 cfs 0.197 af 18.0" Round Culvert n=0.013 L=137.0' S=0.0050 '/' Outflow=2.33 cfs 0.197 af

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Mallego Road, Barrington  
*Type III 24-hr 2 YR Rainfall=3.08"*

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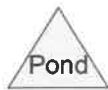
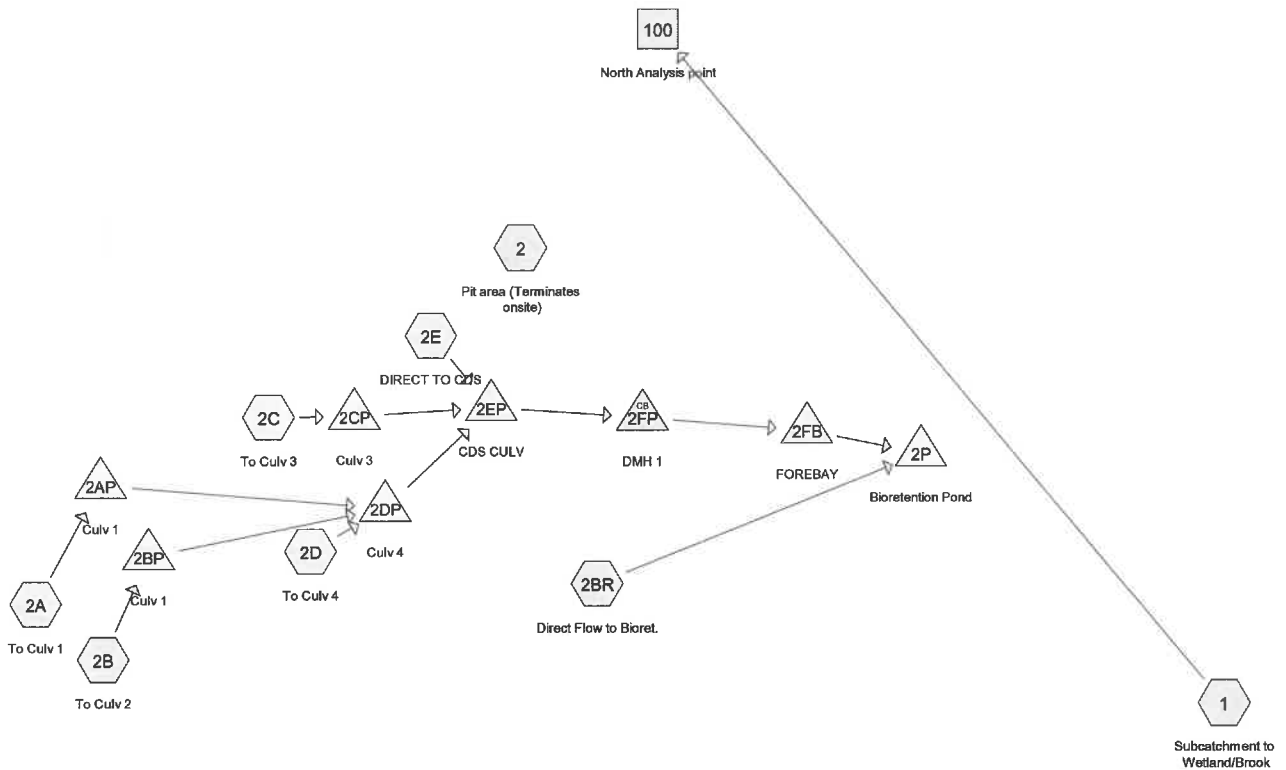
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**Pond 2P: Bioretention Pond**

Peak Elev=171.02' Storage=171 cf Inflow=2.26 cfs 0.237 af

Outflow=2.20 cfs 0.237 af

**Total Runoff Area = 50.680 ac Runoff Volume = 0.662 af Average Runoff Depth = 0.16"**  
**90.23% Pervious = 45.730 ac 9.77% Impervious = 4.950 ac**



**Routing Diagram for NH-1443-Proposed 11-22**  
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Mallego Road, 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

<b>Subcatchment 1: Subcatchment to</b>	Runoff Area=1,353,019 sf 8.39% Impervious Runoff Depth=0.50" Flow Length=709' Tc=37.5 min CN=49 Runoff=5.51 cfs 1.307 af
<b>Subcatchment 2: Pit area (Terminates</b>	Runoff Area=392,981 sf 9.23% Impervious Runoff Depth=0.81" Tc=6.0 min CN=55 Runoff=6.37 cfs 0.606 af
<b>Subcatchment 2A: To Culv 1</b>	Runoff Area=15,983 sf 24.93% Impervious Runoff Depth=1.04" Tc=6.0 min CN=59 Runoff=0.38 cfs 0.032 af
<b>Subcatchment 2B: To Culv 2</b>	Runoff Area=17,622 sf 39.51% Impervious Runoff Depth=1.35" Tc=6.0 min CN=64 Runoff=0.59 cfs 0.046 af
<b>Subcatchment 2BR: Direct Flow to Bioret.</b>	Runoff Area=377,608 sf 5.56% Impervious Runoff Depth=0.55" Tc=6.0 min CN=50 Runoff=2.96 cfs 0.398 af
<b>Subcatchment 2C: To Culv 3</b>	Runoff Area=17,422 sf 70.46% Impervious Runoff Depth=3.23" Tc=6.0 min CN=87 Runoff=1.49 cfs 0.108 af
<b>Subcatchment 2D: To Culv 4</b>	Runoff Area=14,908 sf 86.26% Impervious Runoff Depth=3.84" Tc=6.0 min CN=93 Runoff=1.46 cfs 0.110 af
<b>Subcatchment 2E: DIRECT TO CDS</b>	Runoff Area=18,075 sf 48.36% Impervious Runoff Depth=2.49" Tc=6.0 min CN=79 Runoff=1.21 cfs 0.086 af
<b>Reach 100: North Analysis point</b>	Inflow=5.51 cfs 1.307 af Outflow=5.51 cfs 1.307 af
<b>Pond 2AP: Culv 1</b>	Peak Elev=181.29' Storage=2 cf Inflow=0.38 cfs 0.032 af 15.0" Round Culvert n=0.013 L=49.0' S=0.0100 '/' Outflow=0.38 cfs 0.032 af
<b>Pond 2BP: Culv 1</b>	Peak Elev=182.36' Storage=5 cf Inflow=0.59 cfs 0.046 af 15.0" Round Culvert n=0.013 L=26.0' S=0.0573 '/' Outflow=0.59 cfs 0.046 af
<b>Pond 2CP: Culv 3</b>	Peak Elev=177.33' Storage=226 cf Inflow=1.49 cfs 0.108 af 15.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=1.33 cfs 0.108 af
<b>Pond 2DP: Culv 4</b>	Peak Elev=177.39' Storage=33 cf Inflow=2.42 cfs 0.187 af 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 '/' Outflow=2.41 cfs 0.187 af
<b>Pond 2EP: CDS CULV</b>	Peak Elev=177.05' Storage=564 cf Inflow=4.89 cfs 0.381 af 18.0" Round Culvert n=0.013 L=200.0' S=0.0100 '/' Outflow=4.64 cfs 0.381 af
<b>Pond 2FB: FOREBAY</b>	Peak Elev=174.91' Storage=1,991 cf Inflow=4.64 cfs 0.381 af Outflow=4.57 cfs 0.345 af
<b>Pond 2FP: DMH 1</b>	Peak Elev=175.13' Inflow=4.64 cfs 0.381 af 18.0" Round Culvert n=0.013 L=137.0' S=0.0050 '/' Outflow=4.64 cfs 0.381 af

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**Pond 2P: Bioretention Pond**

Peak Elev=171.22' Storage=1,814 cf Inflow=7.51 cfs 0.743 af

Outflow=4.78 cfs 0.743 af

**Total Runoff Area = 50.680 ac Runoff Volume = 2.692 af Average Runoff Depth = 0.64"**

**90.23% Pervious = 45.730 ac 9.77% Impervious = 4.950 ac**



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**Summary for Subcatchment 1: Subcatchment to Wetland/Brook**

Runoff = 5.51 cfs @ 12.71 hrs, Volume= 1.307 af, Depth= 0.50"  
 Routed to Reach 100 : North 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
431,940	30	Woods, Good, HSG A
99,318	55	Woods, Good, HSG B
196,129	70	Woods, Good, HSG C
15,891	77	Woods, Good, HSG D
49,382	39	>75% Grass cover, Good, HSG A
35,915	61	>75% Grass cover, Good, HSG B
15,886	82	Dirt roads, HSG B
123,916	46	2 acre lots, 12% imp, HSG A
214,824	51	1 acre lots, 20% imp, HSG A
88,394	54	1/2 acre lots, 25% imp, HSG A
24,630	70	1/2 acre lots, 25% imp, HSG B
1,875	96	Gravel surface, HSG B
54,919	83	Paved roads w/open ditches, 50% imp, HSG A
1,353,019	49	Weighted Average
1,239,469		91.61% Pervious Area
113,550		8.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	50	0.0120	0.05		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.00"
20.6	554	0.0080	0.45		<b>Shallow Concentrated Flow, Sheet to slope</b> Woodland Kv= 5.0 fps
1.3	105	0.0700	1.32		<b>Shallow Concentrated Flow, slope to wetland</b> Woodland Kv= 5.0 fps
37.5	709	Total			

**Summary for Subcatchment 2: Pit area (Terminates onsite)**

Runoff = 6.37 cfs @ 12.11 hrs, Volume= 0.606 af, Depth= 0.81"  
 Routed to nonexistent node 200

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
2,034	96	Gravel surface, HSG B
145,144	70	1/2 acre lots, 25% imp, HSG B
12,736	39	>75% Grass cover, Good, HSG A
42,379	61	>75% Grass cover, Good, HSG B
107,990	30	Woods, Good, HSG A
55,801	55	Woods, Good, HSG B
5,746	70	Woods, Good, HSG C
21,151	77	Woods, Good, HSG D
392,981	55	Weighted Average
356,695		90.77% Pervious Area
36,286		9.23% Impervious Area

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

**Summary for Subcatchment 2A: To Culv 1**

Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.032 af, Depth= 1.04"  
 Routed to Pond 2AP : Culv 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"

Area (sf)	CN	Description
2,645	98	Paved roads w/curbs & sewers, HSG A
1,339	98	Paved roads w/curbs & sewers, HSG B
8,475	39	>75% Grass cover, Good, HSG A
3,524	61	>75% Grass cover, Good, HSG B
15,983	59	Weighted Average
11,999		75.07% Pervious Area
3,984		24.93% Impervious Area

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

**Summary for Subcatchment 2B: To Culv 2**

Runoff = 0.59 cfs @ 12.10 hrs, Volume= 0.046 af, Depth= 1.35"  
 Routed to Pond 2BP : Culv 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
5,700	98	Paved roads w/curbs & sewers, HSG A
1,262	98	Paved roads w/curbs & sewers, HSG B
8,925	39	>75% Grass cover, Good, HSG A
1,735	61	>75% Grass cover, Good, HSG B
17,622	64	Weighted Average
10,660		60.49% Pervious Area
6,962		39.51% Impervious Area

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

**Summary for Subcatchment 2BR: Direct Flow to Bioret.**

Runoff = 2.96 cfs @ 12.13 hrs, Volume= 0.398 af, Depth= 0.55"  
 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"

Area (sf)	CN	Description
83,910	70	1/2 acre lots, 25% imp, HSG B
5,946	96	Gravel surface, HSG A
1,146	96	Gravel surface, HSG B
87,320	61	>75% Grass cover, Good, HSG B
37,110	39	>75% Grass cover, Good, HSG A
141,620	30	Woods, Good, HSG A
20,556	55	Woods, Good, HSG B
377,608	50	Weighted Average
356,631		94.44% Pervious Area
20,978		5.56% Impervious Area

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

**Summary for Subcatchment 2C: To Culv 3**

Runoff = 1.49 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 3.23"  
 Routed to Pond 2CP : Culv 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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Mallego Road, Barrington  
Type III 24-hr 10 YR Rainfall=4.64"

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Area (sf)	CN	Description
11,015	98	Paved roads w/curbs & sewers, HSG B
1,261	98	Paved parking, HSG B
5,146	61	>75% Grass cover, Good, HSG B
17,422	87	Weighted Average
5,146		29.54% Pervious Area
12,276		70.46% Impervious Area

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

**Summary for Subcatchment 2D: To Culv 4**

Runoff = 1.46 cfs @ 12.08 hrs, Volume= 0.110 af, Depth= 3.84"  
Routed to Pond 2DP : Culv 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
11,852	98	Paved roads w/curbs & sewers, HSG B
1,008	98	Paved parking, HSG B
2,048	61	>75% Grass cover, Good, HSG B
14,908	93	Weighted Average
2,048		13.74% Pervious Area
12,860		86.26% Impervious Area

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

**Summary for Subcatchment 2E: DIRECT TO CDS**

Runoff = 1.21 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 2.49"  
Routed to Pond 2EP : CDS 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
8,741	98	Paved roads w/curbs & sewers, HSG B
9,334	61	>75% Grass cover, Good, HSG B
18,075	79	Weighted Average
9,334		51.64% Pervious Area
8,741		48.36% Impervious Area

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

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

Inflow Area = 31.061 ac, 8.39% Impervious, Inflow Depth = 0.50" for 10 YR event  
 Inflow = 5.51 cfs @ 12.71 hrs, Volume= 1.307 af  
 Outflow = 5.51 cfs @ 12.71 hrs, Volume= 1.307 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 2AP: Culv 1**

Inflow Area = 0.367 ac, 24.93% Impervious, Inflow Depth = 1.04" for 10 YR event  
 Inflow = 0.38 cfs @ 12.10 hrs, Volume= 0.032 af  
 Outflow = 0.38 cfs @ 12.10 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.1 min  
 Primary = 0.38 cfs @ 12.10 hrs, Volume= 0.032 af  
 Routed to Pond 2DP : Culv 4

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 181.29' @ 12.10 hrs Surf.Area= 13 sf Storage= 2 cf

Plug-Flow detention time= 0.2 min calculated for 0.032 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 884.9 - 884.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	150 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.00	4	0	0
184.00	96	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	181.00'	<b>15.0" Round Culvert</b> L= 49.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.00' / 180.51' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.38 cfs @ 12.10 hrs HW=181.29' (Free Discharge)  
 ↑1=Culvert (Barrel Controls 0.38 cfs @ 2.66 fps)

**Summary for Pond 2BP: Culv 1**

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Inflow Area = 0.405 ac, 39.51% Impervious, Inflow Depth = 1.35" for 10 YR event  
 Inflow = 0.59 cfs @ 12.10 hrs, Volume= 0.046 af  
 Outflow = 0.59 cfs @ 12.10 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.1 min  
 Primary = 0.59 cfs @ 12.10 hrs, Volume= 0.046 af  
 Routed to Pond 2DP : Culv 4

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 182.36' @ 12.10 hrs Surf.Area= 18 sf Storage= 5 cf

Plug-Flow detention time= 0.3 min calculated for 0.046 af (100% of inflow)  
 Center-of-Mass det. time= 0.3 min ( 868.9 - 868.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	72 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	8	0	0
184.00	64	72	72

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	<b>15.0" Round Culvert</b> L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 182.00' / 180.51' S= 0.0573 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.59 cfs @ 12.10 hrs HW=182.36' (Free Discharge)  
 1=Culvert (Inlet Controls 0.59 cfs @ 2.04 fps)

**Summary for Pond 2CP: Culv 3**

Inflow Area = 0.400 ac, 70.46% Impervious, Inflow Depth = 3.23" for 10 YR event  
 Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.108 af  
 Outflow = 1.33 cfs @ 12.13 hrs, Volume= 0.108 af, Atten= 11%, Lag= 2.5 min  
 Primary = 1.33 cfs @ 12.13 hrs, Volume= 0.108 af  
 Routed to Pond 2EP : CDS CULV

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 177.33' @ 12.13 hrs Surf.Area= 780 sf Storage= 226 cf

Plug-Flow detention time= 2.7 min calculated for 0.108 af (100% of inflow)  
 Center-of-Mass det. time= 2.7 min ( 806.7 - 804.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	176.75'	3,650 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)
176.75	4	0	0
178.00	1,685	1,056	1,056
179.00	3,504	2,595	3,650

Device	Routing	Invert	Outlet Devices
#1	Primary	176.75'	<b>15.0" Round Culvert</b> L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 176.75' / 176.35' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.33 cfs @ 12.13 hrs HW=177.33' (Free Discharge)

↑1=Culvert (Barrel Controls 1.33 cfs @ 3.52 fps)

**Summary for Pond 2DP: Culv 4**

Inflow Area = 1.114 ac, 49.07% Impervious, Inflow Depth = 2.01" for 10 YR event  
 Inflow = 2.42 cfs @ 12.09 hrs, Volume= 0.187 af  
 Outflow = 2.41 cfs @ 12.09 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.2 min  
 Primary = 2.41 cfs @ 12.09 hrs, Volume= 0.187 af  
 Routed to Pond 2EP : CDS CULV

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 177.39' @ 12.09 hrs Surf.Area= 46 sf Storage= 33 cf

Plug-Flow detention time= 1.4 min calculated for 0.187 af (100% of inflow)  
 Center-of-Mass det. time= 0.9 min ( 820.7 - 819.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	176.15'	67 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
176.15	8	0	0
178.00	64	67	67

Device	Routing	Invert	Outlet Devices
#1	Primary	176.57'	<b>15.0" Round Culvert</b> L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 176.57' / 176.15' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=2.41 cfs @ 12.09 hrs HW=177.39' (Free Discharge)

↑1=Culvert (Barrel Controls 2.41 cfs @ 4.02 fps)

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**Summary for Pond 2EP: CDS CULV**

Inflow Area = 1.929 ac, 53.35% Impervious, Inflow Depth = 2.37" for 10 YR event  
 Inflow = 4.89 cfs @ 12.10 hrs, Volume= 0.381 af  
 Outflow = 4.64 cfs @ 12.13 hrs, Volume= 0.381 af, Atten= 5%, Lag= 1.8 min  
 Primary = 4.64 cfs @ 12.13 hrs, Volume= 0.381 af  
 Routed to Pond 2FP : DMH 1

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 177.05' @ 12.13 hrs Surf.Area= 821 sf Storage= 564 cf

Plug-Flow detention time= 3.9 min calculated for 0.381 af (100% of inflow)  
 Center-of-Mass det. time= 3.9 min ( 822.3 - 818.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	176.00'	4,737 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>
<b>Elevation</b> (feet)	<b>Surf.Area</b> (sq-ft)	<b>Inc.Store</b> (cubic-feet)	<b>Cum.Store</b> (cubic-feet)
176.00	248	0	0
178.00	1,334	1,582	1,582
179.50	2,872	3,155	4,737

Device	Routing	Invert	Outlet Devices
#1	Primary	176.00'	<b>18.0" Round Culvert</b> L= 200.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 176.00' / 174.00' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

**Primary OutFlow** Max=4.64 cfs @ 12.13 hrs HW=177.05' (Free Discharge)  
 ←1=Culvert (Inlet Controls 4.64 cfs @ 3.50 fps)

**Summary for Pond 2FB: FOREBAY**

Inflow Area = 1.929 ac, 53.35% Impervious, Inflow Depth = 2.37" for 10 YR event  
 Inflow = 4.64 cfs @ 12.13 hrs, Volume= 0.381 af  
 Outflow = 4.57 cfs @ 12.15 hrs, Volume= 0.345 af, Atten= 2%, Lag= 1.1 min  
 Primary = 4.57 cfs @ 12.15 hrs, Volume= 0.345 af  
 Routed to Pond 2P : Bioretention Pond

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 174.91' @ 12.15 hrs Surf.Area= 1,152 sf Storage= 1,991 cf  
 Flood Elev= 175.50' Surf.Area= 1,387 sf Storage= 2,744 cf

Plug-Flow detention time= 73.9 min calculated for 0.345 af (91% of inflow)  
 Center-of-Mass det. time= 26.6 min ( 848.9 - 822.3 )



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Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	2,744 cf	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
172.00	302	0	0	302
174.00	836	1,094	1,094	861
175.50	1,387	1,650	2,744	1,439

Device	Routing	Invert	Outlet Devices
#1	Primary	174.50'	<b>7.0' long x 6.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

**Primary OutFlow** Max=4.56 cfs @ 12.15 hrs HW=174.91' (Free Discharge)

↑1=Broad-Crested Rectangular Weir (Weir Controls 4.56 cfs @ 1.60 fps)

**Summary for Pond 2FP: DMH 1**

Inflow Area = 1.929 ac, 53.35% Impervious, Inflow Depth = 2.37" for 10 YR event  
 Inflow = 4.64 cfs @ 12.13 hrs, Volume= 0.381 af  
 Outflow = 4.64 cfs @ 12.13 hrs, Volume= 0.381 af, Atten= 0%, Lag= 0.0 min  
 Primary = 4.64 cfs @ 12.13 hrs, Volume= 0.381 af  
 Routed to Pond 2FB : FOREBAY

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 175.13' @ 12.13 hrs  
 Flood Elev= 177.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	173.90'	<b>18.0" Round Culvert</b> L= 137.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 173.90' / 173.22' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

**Primary OutFlow** Max=4.64 cfs @ 12.13 hrs HW=175.13' (Free Discharge)

↑1=Culvert (Barrel Controls 4.64 cfs @ 4.07 fps)

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

Inflow Area = 10.597 ac, 14.25% Impervious, Inflow Depth = 0.84" for 10 YR event  
 Inflow = 7.51 cfs @ 12.14 hrs, Volume= 0.743 af  
 Outflow = 4.78 cfs @ 12.09 hrs, Volume= 0.743 af, Atten= 36%, Lag= 0.0 min  
 Discarded = 4.78 cfs @ 12.09 hrs, Volume= 0.743 af

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

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Peak Elev= 171.22' @ 12.35 hrs Surf.Area= 20,671 sf Storage= 1,814 cf

Flood Elev= 175.00' Surf.Area= 23,113 sf Storage= 50,392 cf

Plug-Flow detention time= 2.3 min calculated for 0.743 af (100% of inflow)

Center-of-Mass det. time= 2.3 min ( 892.1 - 889.8 )

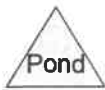
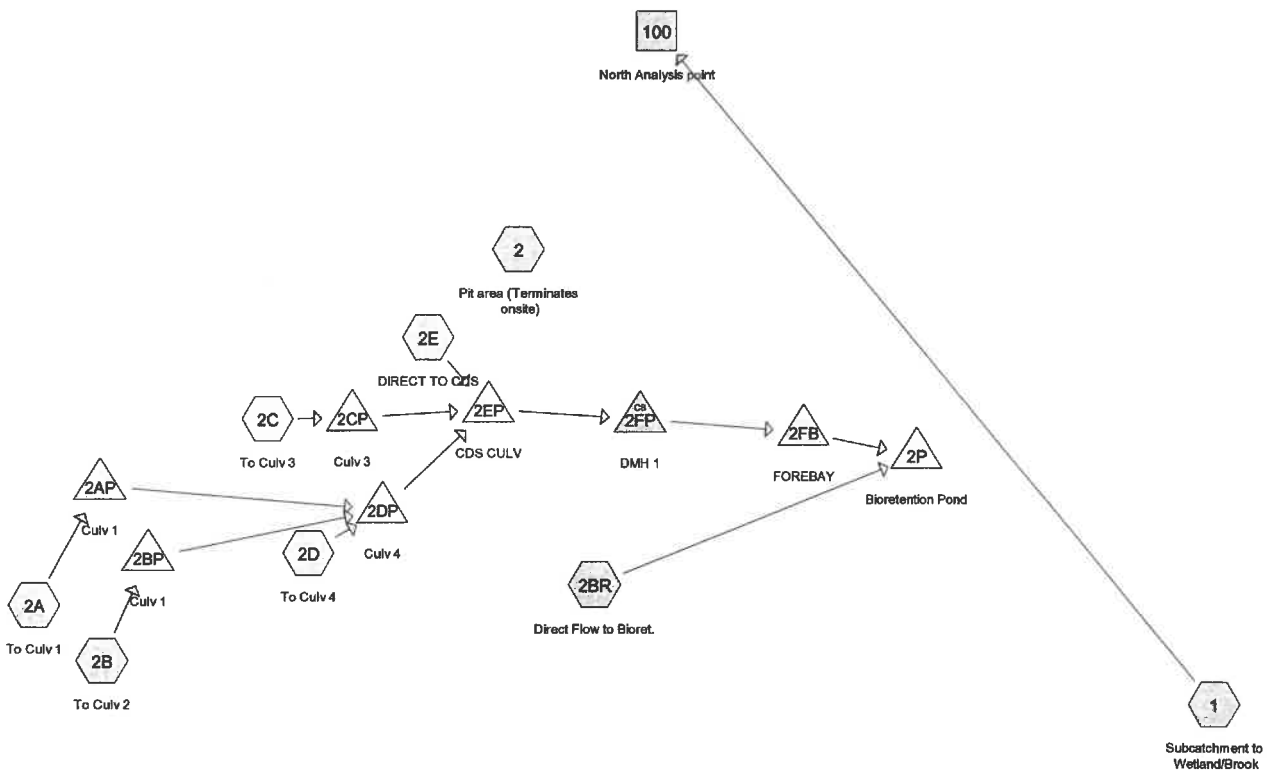
Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	62,158 cf	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
171.00	20,671	0.0	0	0	20,671
172.00	20,671	40.0	8,268	8,268	21,181
173.50	20,671	30.0	9,302	17,570	21,945
174.00	21,471	100.0	10,535	28,105	22,786
175.50	23,956	100.0	34,053	62,158	25,396

Device	Routing	Invert	Outlet Devices
#1	Discarded	171.00'	<b>10.000 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'

**Discarded OutFlow** Max=4.78 cfs @ 12.09 hrs HW=171.05' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 4.78 cfs)



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Mallego Road, 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</b>	Runoff Area=1,353,019 sf 8.39% Impervious Runoff Depth=1.01" Flow Length=709' Tc=37.5 min CN=49 Runoff=14.30 cfs 2.605 af
<b>Subcatchment 2: Pit area (Terminates</b>	Runoff Area=392,981 sf 9.23% Impervious Runoff Depth=1.44" Tc=6.0 min CN=55 Runoff=13.38 cfs 1.081 af
<b>Subcatchment 2A: To Culv 1</b>	Runoff Area=15,983 sf 24.93% Impervious Runoff Depth=1.75" Tc=6.0 min CN=59 Runoff=0.70 cfs 0.054 af
<b>Subcatchment 2B: To Culv 2</b>	Runoff Area=17,622 sf 39.51% Impervious Runoff Depth=2.16" Tc=6.0 min CN=64 Runoff=1.00 cfs 0.073 af
<b>Subcatchment 2BR: Direct Flow to Bioret.</b>	Runoff Area=377,608 sf 5.56% Impervious Runoff Depth=1.08" Tc=6.0 min CN=50 Runoff=8.42 cfs 0.777 af
<b>Subcatchment 2C: To Culv 3</b>	Runoff Area=17,422 sf 70.46% Impervious Runoff Depth=4.38" Tc=6.0 min CN=87 Runoff=2.00 cfs 0.146 af
<b>Subcatchment 2D: To Culv 4</b>	Runoff Area=14,908 sf 86.26% Impervious Runoff Depth=5.04" Tc=6.0 min CN=93 Runoff=1.88 cfs 0.144 af
<b>Subcatchment 2E: DIRECT TO CDS</b>	Runoff Area=18,075 sf 48.36% Impervious Runoff Depth=3.55" Tc=6.0 min CN=79 Runoff=1.73 cfs 0.123 af
<b>Reach 100: North Analysis point</b>	Inflow=14.30 cfs 2.605 af Outflow=14.30 cfs 2.605 af
<b>Pond 2AP: Culv 1</b>	Peak Elev=181.40' Storage=4 cf Inflow=0.70 cfs 0.054 af 15.0" Round Culvert n=0.013 L=49.0' S=0.0100 ' Outflow=0.70 cfs 0.054 af
<b>Pond 2BP: Culv 1</b>	Peak Elev=182.47' Storage=7 cf Inflow=1.00 cfs 0.073 af 15.0" Round Culvert n=0.013 L=26.0' S=0.0573 ' Outflow=1.00 cfs 0.073 af
<b>Pond 2CP: Culv 3</b>	Peak Elev=177.43' Storage=314 cf Inflow=2.00 cfs 0.146 af 15.0" Round Culvert n=0.013 L=40.0' S=0.0100 ' Outflow=1.76 cfs 0.146 af
<b>Pond 2DP: Culv 4</b>	Peak Elev=177.62' Storage=45 cf Inflow=3.57 cfs 0.270 af 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 ' Outflow=3.56 cfs 0.270 af
<b>Pond 2EP: CDS CULV</b>	Peak Elev=177.33' Storage=810 cf Inflow=6.96 cfs 0.539 af 18.0" Round Culvert n=0.013 L=200.0' S=0.0100 ' Outflow=6.51 cfs 0.539 af
<b>Pond 2FB: FOREBAY</b>	Peak Elev=175.00' Storage=2,100 cf Inflow=6.51 cfs 0.539 af Outflow=6.44 cfs 0.504 af
<b>Pond 2FP: DMH 1</b>	Peak Elev=175.47' Inflow=6.51 cfs 0.539 af 18.0" Round Culvert n=0.013 L=137.0' S=0.0050 ' Outflow=6.51 cfs 0.539 af

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Mallego Road, Barrington  
*Type III 24-hr 25 YR Rainfall=5.86"*

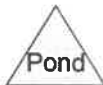
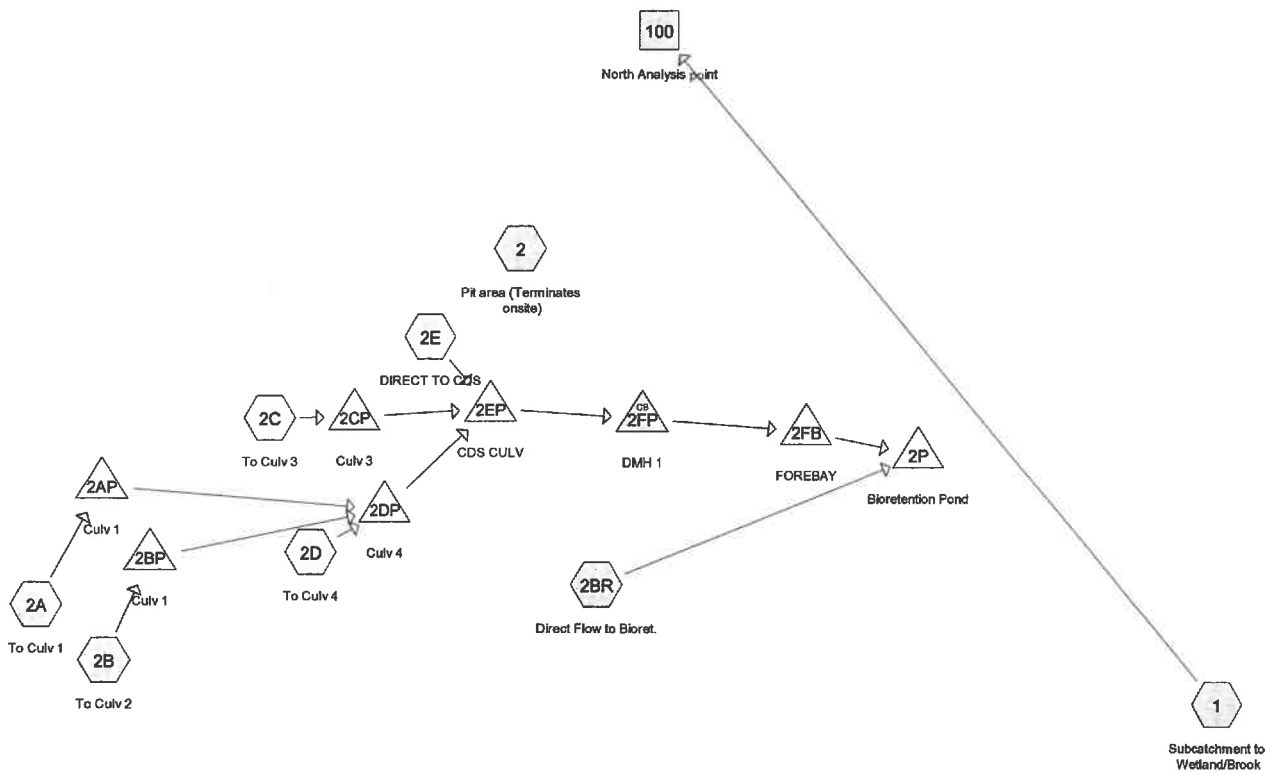
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**Pond 2P: Bioretention Pond**

Peak Elev=172.18' Storage=9,410 cf Inflow=14.58 cfs 1.280 af  
Outflow=4.78 cfs 1.280 af

**Total Runoff Area = 50.680 ac Runoff Volume = 5.002 af Average Runoff Depth = 1.18"**  
**90.23% Pervious = 45.730 ac 9.77% Impervious = 4.950 ac**



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Mallego Road, 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</b>	Runoff Area=1,353,019 sf 8.39% Impervious Runoff Depth=1.58" Flow Length=709' Tc=37.5 min CN=49 Runoff=25.05 cfs 4.085 af
<b>Subcatchment 2: Pit area (Terminates</b>	Runoff Area=392,981 sf 9.23% Impervious Runoff Depth=2.12" Tc=6.0 min CN=55 Runoff=20.99 cfs 1.597 af
<b>Subcatchment 2A: To Culv 1</b>	Runoff Area=15,983 sf 24.93% Impervious Runoff Depth=2.51" Tc=6.0 min CN=59 Runoff=1.04 cfs 0.077 af
<b>Subcatchment 2B: To Culv 2</b>	Runoff Area=17,622 sf 39.51% Impervious Runoff Depth=3.00" Tc=6.0 min CN=64 Runoff=1.41 cfs 0.101 af
<b>Subcatchment 2BR: Direct Flow to Bioret.</b>	Runoff Area=377,608 sf 5.56% Impervious Runoff Depth=1.67" Tc=6.0 min CN=50 Runoff=14.74 cfs 1.204 af
<b>Subcatchment 2C: To Culv 3</b>	Runoff Area=17,422 sf 70.46% Impervious Runoff Depth=5.48" Tc=6.0 min CN=87 Runoff=2.47 cfs 0.183 af
<b>Subcatchment 2D: To Culv 4</b>	Runoff Area=14,908 sf 86.26% Impervious Runoff Depth=6.17" Tc=6.0 min CN=93 Runoff=2.28 cfs 0.176 af
<b>Subcatchment 2E: DIRECT TO CDS</b>	Runoff Area=18,075 sf 48.36% Impervious Runoff Depth=4.58" Tc=6.0 min CN=79 Runoff=2.21 cfs 0.159 af
<b>Reach 100: North Analysis point</b>	Inflow=25.05 cfs 4.085 af Outflow=25.05 cfs 4.085 af
<b>Pond 2AP: Culv 1</b>	Peak Elev=181.50' Storage=6 cf Inflow=1.04 cfs 0.077 af 15.0" Round Culvert n=0.013 L=49.0' S=0.0100 '/' Outflow=1.04 cfs 0.077 af
<b>Pond 2BP: Culv 1</b>	Peak Elev=182.57' Storage=9 cf Inflow=1.41 cfs 0.101 af 15.0" Round Culvert n=0.013 L=26.0' S=0.0573 '/' Outflow=1.41 cfs 0.101 af
<b>Pond 2CP: Culv 3</b>	Peak Elev=177.52' Storage=401 cf Inflow=2.47 cfs 0.183 af 15.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=2.16 cfs 0.183 af
<b>Pond 2DP: Culv 4</b>	Peak Elev=177.86' Storage=58 cf Inflow=4.71 cfs 0.354 af 15.0" Round Culvert n=0.013 L=42.0' S=0.0100 '/' Outflow=4.71 cfs 0.354 af
<b>Pond 2EP: CDS CULV</b>	Peak Elev=177.64' Storage=1,140 cf Inflow=8.96 cfs 0.695 af 18.0" Round Culvert n=0.013 L=200.0' S=0.0100 '/' Outflow=8.04 cfs 0.695 af
<b>Pond 2FB: FOREBAY</b>	Peak Elev=175.07' Storage=2,181 cf Inflow=8.04 cfs 0.695 af Outflow=7.99 cfs 0.659 af
<b>Pond 2FP: DMH 1</b>	Peak Elev=176.07' Inflow=8.04 cfs 0.695 af 18.0" Round Culvert n=0.013 L=137.0' S=0.0050 '/' Outflow=8.04 cfs 0.695 af

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Mallego Road, Barrington  
*Type III 24-hr 50 YR Rainfall=7.00"*

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**Pond 2P: Bioretention Pond**

Peak Elev=173.60' Storage=19,621 cf Inflow=22.13 cfs 1.863 af  
Outflow=4.82 cfs 1.863 af

**Total Runoff Area = 50.680 ac Runoff Volume = 7.581 af Average Runoff Depth = 1.80"**  
**90.23% Pervious = 45.730 ac 9.77% Impervious = 4.950 ac**



## APPENDIX III

### Charts, Graphs, and Calculations

# Extreme Precipitation Tables

## Northeast Regional Climate Center

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

<b>Smoothing</b>	Yes
<b>State</b>	New Hampshire
<b>Location</b>	
<b>Longitude</b>	70.996 degrees West
<b>Latitude</b>	43.212 degrees North
<b>Elevation</b>	0 feet
<b>Date/Time</b>	Tue, 09 Nov 2021 10:24:23 -0500

### Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.26	0.40	0.49	0.65	0.81	1.02	<b>1yr</b>	0.70	0.98	1.19	1.53	1.97	2.56	2.81	<b>1yr</b>	2.27	2.71	3.12	3.84	4.41	<b>1yr</b>
<b>2yr</b>	0.32	0.49	0.61	0.80	1.01	1.28	<b>2yr</b>	0.87	1.16	1.49	1.89	2.41	3.08	3.43	<b>2yr</b>	2.73	3.30	3.80	4.52	5.15	<b>2yr</b>
<b>5yr</b>	0.37	0.57	0.72	0.96	1.23	1.57	<b>5yr</b>	1.06	1.44	1.84	2.36	3.03	3.89	4.38	<b>5yr</b>	3.44	4.22	4.84	5.70	6.45	<b>5yr</b>
<b>10yr</b>	0.40	0.63	0.80	1.09	1.42	1.84	<b>10yr</b>	1.22	1.69	2.17	2.80	3.60	4.64	5.28	<b>10yr</b>	4.11	5.08	5.81	6.79	7.64	<b>10yr</b>
<b>25yr</b>	0.46	0.74	0.94	1.30	1.72	2.27	<b>25yr</b>	1.49	2.08	2.69	3.49	4.53	5.86	6.77	<b>25yr</b>	5.19	6.51	7.41	8.57	9.58	<b>25yr</b>
<b>50yr</b>	0.52	0.83	1.06	1.49	2.01	2.67	<b>50yr</b>	1.73	2.45	3.17	4.15	5.40	7.00	8.16	<b>50yr</b>	6.20	7.85	8.91	10.23	11.37	<b>50yr</b>
<b>100yr</b>	0.58	0.94	1.21	1.71	2.33	3.13	<b>100yr</b>	2.01	2.88	3.74	4.92	6.43	8.37	9.85	<b>100yr</b>	7.41	9.47	10.72	12.21	13.50	<b>100yr</b>
<b>200yr</b>	0.65	1.05	1.37	1.96	2.71	3.68	<b>200yr</b>	2.34	3.39	4.42	5.85	7.67	10.01	11.89	<b>200yr</b>	8.85	11.43	12.90	14.58	16.03	<b>200yr</b>
<b>500yr</b>	0.76	1.25	1.63	2.37	3.33	4.55	<b>500yr</b>	2.87	4.21	5.50	7.32	9.66	12.68	15.25	<b>500yr</b>	11.22	14.66	16.48	18.45	20.15	<b>500yr</b>

### Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.24	0.36	0.44	0.60	0.73	0.90	<b>1yr</b>	0.63	0.88	0.91	1.24	1.52	1.94	2.49	<b>1yr</b>	1.72	2.39	2.93	3.28	3.96	<b>1yr</b>
<b>2yr</b>	0.31	0.48	0.60	0.81	0.99	1.18	<b>2yr</b>	0.86	1.15	1.36	1.82	2.34	2.99	3.34	<b>2yr</b>	2.65	3.21	3.69	4.41	5.03	<b>2yr</b>
<b>5yr</b>	0.35	0.54	0.67	0.92	1.16	1.40	<b>5yr</b>	1.01	1.37	1.61	2.14	2.77	3.61	4.05	<b>5yr</b>	3.19	3.89	4.50	5.35	6.03	<b>5yr</b>
<b>10yr</b>	0.38	0.59	0.73	1.02	1.32	1.60	<b>10yr</b>	1.14	1.56	1.82	2.43	3.12	4.14	4.69	<b>10yr</b>	3.66	4.51	5.23	6.18	6.90	<b>10yr</b>

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>25yr</b>	0.44	0.67	0.83	1.19	1.57	1.91	<b>25yr</b>	1.35	1.87	2.12	2.84	3.63	4.94	5.68	<b>25yr</b>	4.37	5.46	6.38	7.47	8.25	<b>25yr</b>
<b>50yr</b>	0.49	0.74	0.92	1.33	1.79	2.20	<b>50yr</b>	1.54	2.15	2.37	3.20	4.07	5.65	6.56	<b>50yr</b>	5.00	6.31	7.42	8.63	9.52	<b>50yr</b>
<b>100yr</b>	0.55	0.83	1.03	1.49	2.05	2.52	<b>100yr</b>	1.77	2.47	2.67	3.60	4.54	6.44	7.56	<b>100yr</b>	5.70	7.27	8.65	9.96	10.88	<b>100yr</b>
<b>200yr</b>	0.61	0.92	1.16	1.68	2.35	2.90	<b>200yr</b>	2.03	2.83	2.99	4.05	5.06	7.34	8.83	<b>200yr</b>	6.50	8.49	10.08	11.50	12.46	<b>200yr</b>
<b>500yr</b>	0.72	1.06	1.37	1.99	2.83	3.50	<b>500yr</b>	2.44	3.43	3.50	4.72	5.87	8.68	10.69	<b>500yr</b>	7.68	10.28	12.35	13.93	14.83	<b>500yr</b>

### Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.28	0.43	0.53	0.71	0.87	1.07	<b>1yr</b>	0.75	1.05	1.23	1.72	2.18	2.76	3.01	<b>1yr</b>	2.44	2.90	3.34	4.13	4.73	<b>1yr</b>
<b>2yr</b>	0.33	0.50	0.62	0.84	1.03	1.24	<b>2yr</b>	0.89	1.21	1.46	1.94	2.50	3.19	3.54	<b>2yr</b>	2.82	3.40	3.91	4.66	5.31	<b>2yr</b>
<b>5yr</b>	0.39	0.60	0.75	1.02	1.30	1.57	<b>5yr</b>	1.12	1.53	1.83	2.47	3.16	4.18	4.71	<b>5yr</b>	3.70	4.53	5.18	6.06	6.83	<b>5yr</b>
<b>10yr</b>	0.45	0.70	0.86	1.21	1.56	1.90	<b>10yr</b>	1.35	1.86	2.21	3.01	3.80	5.15	5.85	<b>10yr</b>	4.56	5.63	6.41	7.40	8.30	<b>10yr</b>
<b>25yr</b>	0.55	0.84	1.04	1.49	1.96	2.44	<b>25yr</b>	1.69	2.38	2.84	3.91	4.87	6.82	7.82	<b>25yr</b>	6.03	7.52	8.49	9.76	10.74	<b>25yr</b>
<b>50yr</b>	0.64	0.97	1.21	1.74	2.34	2.93	<b>50yr</b>	2.02	2.87	3.44	4.75	5.90	8.43	9.75	<b>50yr</b>	7.46	9.37	10.51	11.97	13.15	<b>50yr</b>
<b>100yr</b>	0.74	1.12	1.41	2.03	2.79	3.53	<b>100yr</b>	2.41	3.46	4.17	5.80	7.16	10.43	12.16	<b>100yr</b>	9.23	11.69	13.01	14.70	16.05	<b>100yr</b>
<b>200yr</b>	0.86	1.30	1.64	2.38	3.32	4.27	<b>200yr</b>	2.86	4.18	5.06	7.08	8.67	12.95	15.07	<b>200yr</b>	11.46	14.49	16.10	18.05	19.62	<b>200yr</b>
<b>500yr</b>	1.05	1.57	2.01	2.93	4.16	5.46	<b>500yr</b>	3.59	5.34	6.52	9.24	11.19	17.28	20.18	<b>500yr</b>	15.30	19.40	21.35	23.72	25.61	<b>500yr</b>



## RIP RAP CALCULATIONS

Conservation Subdivision  
Joseph Falzone  
Malleo Rd., Barrington, NH

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

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

Rip Rap was sized for the 25 year storm event (5.86").

### TAILWATER < HALF THE Do

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

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

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

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

$d50 = \text{Median Stone Size (0.25' Min.)}$

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)
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2x15" into Pond 2EP	1.00	6.96	1.25	17.7	21.5	0.21	0.50	1.12
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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	







**NH-1443-Proposed**

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Type III 24-hr 50 YR Rainfall=7.00"

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**Stage-Area-Storage for Pond 2FB: FOREBAY**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
172.00	302	0	174.60	1,040	1,655
172.05	312	15	174.65	1,058	1,708
172.10	322	31	174.70	1,076	1,761
172.15	333	48	174.75	1,094	1,815
172.20	343	64	174.80	1,113	1,870
172.25	354	82	174.85	1,131	1,927
172.30	365	100	174.90	1,150	1,984
172.35	376	118	174.95	1,169	2,042
172.40	388	138	175.00	1,188	2,100
172.45	399	157	175.05	1,207	2,160
172.50	411	177	175.10	1,227	2,221
172.55	422	198	175.15	1,246	2,283
172.60	434	220	175.20	1,266	2,346
172.65	446	242	175.25	1,286	2,410
172.70	459	264	175.30	1,306	2,474
172.75	471	288	175.35	1,326	2,540
172.80	484	311	175.40	1,346	2,607
172.85	496	336	175.45	1,366	2,675
172.90	509	361	175.50	<b>1,387</b>	<b>2,744</b>
172.95	522	387			
173.00	536	413			
173.05	549	440			
173.10	563	468			
173.15	577	497			
173.20	590	526			
173.25	605	556			
173.30	619	586			
173.35	633	618			
173.40	648	650			
173.45	663	682			
173.50	678	716			
173.55	693	750			
173.60	708	785			
173.65	723	821			
173.70	739	858			
173.75	755	895			
173.80	771	933			
173.85	787	972			
173.90	803	1,012			
173.95	819	1,052			
174.00	836	1,094			
174.05	852	1,136			
174.10	868	1,179			
174.15	885	1,223			
174.20	901	1,267			
174.25	918	1,313			
174.30	935	1,359			
174.35	952	1,406			
174.40	969	1,454			
174.45	987	1,503			
174.50	1,004	1,553			
174.55	1,022	1,604			



**NH-1443-Proposed**

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Type III 24-hr 50 YR Rainfall=7.00"

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**Stage-Area-Storage for Pond 2P: Bioretention Pond**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
171.00	20,671	0	173.60	20,830	19,645
171.05	20,671	413	173.65	20,909	20,689
171.10	20,671	827	173.70	20,989	21,736
171.15	20,671	1,240	173.75	21,069	22,788
171.20	20,671	1,654	173.80	21,149	23,843
171.25	20,671	2,067	173.85	21,229	24,903
171.30	20,671	2,481	173.90	21,310	25,966
171.35	20,671	2,894	173.95	21,390	27,034
171.40	20,671	3,307	174.00	21,471	28,105
171.45	20,671	3,721	174.05	21,552	29,181
171.50	20,671	4,134	174.10	21,632	30,260
171.55	20,671	4,548	174.15	21,713	31,344
171.60	20,671	4,961	174.20	21,794	32,432
171.65	20,671	5,374	174.25	21,876	33,523
171.70	20,671	5,788	174.30	21,957	34,619
171.75	20,671	6,201	174.35	22,039	35,719
171.80	20,671	6,615	174.40	22,120	36,823
171.85	20,671	7,028	174.45	22,202	37,931
171.90	20,671	7,442	174.50	22,284	39,043
171.95	20,671	7,855	174.55	22,366	40,160
172.00	20,671	8,268	174.60	22,449	41,280
172.05	20,671	8,578	174.65	22,531	42,405
172.10	20,671	8,889	174.70	22,614	43,533
172.15	20,671	9,199	174.75	22,696	44,666
172.20	20,671	9,509	174.80	22,779	45,803
172.25	20,671	9,819	174.85	22,862	46,944
172.30	20,671	10,129	174.90	22,946	48,089
172.35	20,671	10,439	174.95	23,029	49,238
172.40	20,671	10,749	175.00	23,113	50,392
172.45	20,671	11,059	175.05	23,196	51,550
172.50	20,671	11,369	175.10	23,280	52,712
172.55	20,671	11,679	175.15	23,364	53,878
172.60	20,671	11,989	175.20	23,448	55,048
172.65	20,671	12,299	175.25	23,532	56,222
172.70	20,671	12,609	175.30	23,617	57,401
172.75	20,671	12,919	175.35	23,701	58,584
172.80	20,671	13,229	175.40	23,786	59,771
172.85	20,671	13,540	175.45	23,871	60,963
172.90	20,671	13,850	175.50	<b>23,956</b>	<b>62,158</b>
172.95	20,671	14,160			
173.00	20,671	14,470			
173.05	20,671	14,780			
173.10	20,671	15,090			
173.15	20,671	15,400			
173.20	20,671	15,710			
173.25	20,671	16,020			
173.30	20,671	16,330			
173.35	20,671	16,640			
173.40	20,671	16,950			
173.45	20,671	17,260			
173.50	20,671	17,570			
173.55	20,750	18,606			

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



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**SITE-SPECIFIC SOIL MAPPING REPORT  
MALLEGO ROAD  
Tax Map 239, Lot 34 & 35  
Barrington, New Hampshire**

November 2022  
File No. 04.0191442.00



**PREPARED FOR:**  
Mr. Joseph Falzone  
Stratham, New Hampshire

**GZA GeoEnvironmental, Inc.**  
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VIA EMAIL

November 10, 2022  
File No. 04.0191442.00

Mr. Joseph Falzone  
7B Emery Lane  
Stratham, New Hampshire 03885

Re: Site-Specific Soil Mapping Report  
Mallego Road  
Tax Map 239, Lot 34 and 35  
Barrington, New Hampshire

Dear Mr. Falzone:

This report presents the findings of Site-Specific Soil Survey and High Intensity Soil Survey for the parcels identified as Tax Map 239, Lots 34 and 35 located on Mallego Road in Barrington, New Hampshire ("Site"). This report summarizes the results of the field work completed in June, July, and August 2022 to identify Site soils and develop mapping.

Should you have any questions, please feel free to contact Lindsey White at 603-232-8753 or lindsey.white@gza.com.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Lindsey White, CPSS  
Project Manager

Deborah M. Zarta Gier, CNRP  
Consultant/Reviewer

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LEW/DMZ/TLT/JHL:pca

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Attachment: Site-Specific Soil Mapping Report



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## 1.0 INTRODUCTION

This report presents the findings of Site-Specific Soil and High Intensity Site Survey Mapping field work conducted by GZA GeoEnvironmental, Inc. (GZA) on Mallego Road in Barrington, New Hampshire (Tax Map 239, Lots 34 & 35) (i.e. the Site) during June, July, and August, 2022. Based on assessing data, the Site is approximately 45-acres in size. The Site is bordered to the east by undeveloped forested property, to the south by Mallego Road, to the west by developed private property, and to the north by Mallego Brook in the Town of Barrington. Based on site review, the Site is predominately a developed sand and gravel pit and borders a portion of the Mallego Brook.

GZA understands the Site is currently owned by Paul Guptill and that you are seeking to obtain state and local permits to subdivide the Site into 15 residential lots. GZA also understands a Site-Specific Soil Map is required to support New Hampshire Department of Environmental Services Alteration of Terrain Permitting Applications, to be completed by others (see **Figure 1 – Site Specific Soil Map**). This report is subject to the Limitations in **Appendix A**.

## 2.0 METHODOLOGY

The soil mapping of the Site was conducted in accordance with the standards set forth in the Society of Soil Scientists of Northern New England (SSSNE) Publication No. 3 "Site-Specific Soil Mapping Standards for New Hampshire and Vermont, Version 7.0" dated July 2021 by New Hampshire Certified Soil Scientist (CSS) James H. Long (CSS #15). The Site-Specific Soil Mapping Standards are based on a universally recognized taxonomic system of soil classification and are supported by national soil mapping standards established by the USDA National Cooperative Soil Survey.

This investigation has been completed based on a combination of publicly available databases and site-specific data collected by on-site observations. This report provides soil information including soil drainage classification, physical characteristics, and depth to bedrock (if encountered). GZA assessed soil characteristics through the evaluation of hand-dug test pits conducted during field investigations on June 7 & 10, July 29, and August 1 & 5, 2022. In addition, soil characteristics were assessed through evaluation of 21 machine excavated test pits on July 29, 2022, and through an additional 36 machine excavated test pits on September 21, 2022. Hand-dug soil evaluation units were completed with a tile spade and soil auger. Machine excavated test pits were dug by a separate operator to a minimum depth of 40 inches for the purpose of evaluating and identifying the soils' characteristics. Locations were selected when changes in slope, vegetation or soil surface were observed. When changes were noted from one hole to the next involving soil drainage or parent material, a soil boundary was placed on the map between the holes to reflect the transition between the soils as it occurs on the landscape. The slopes of the soil map units were measured in the field using a clinometer and augmented by the topography shown on the Existing Conditions Plan prepared by Doucet Survey, LLC dated July 21, 2022 (see **Figure 1 – Site Specific Soil Map**). For purposes of this report, GZA considered the minimum size delineation area of a Site-Specific Soil Survey map unit as 2,000 square feet, with the exception being poorly or very poorly drained soil areas that are jurisdictional wetlands, as derived from the *High Intensity Soil Mapping Standards for New Hampshire*, July 2021 by the Society of Soil Scientists of Northern New England. Wetland delineation on the Site were previously conducted by GZA in June 2022.



GZA used the following resources during data collection to supplement on-site observations:

- Natural Resource Conservation Service (NRCS) Web Soil Survey;<sup>1</sup> and
- New Hampshire Statewide Geographic Information System Clearinghouse (NH GRANIT)<sup>2</sup> LiDAR- Based Bare Earth Hillshade of the Site.

The Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. The WSS data was used to gather information prior to field work to use as a baseline of soil units that may be observed during field investigations. Use of the online resource NH GRANIT LiDAR- Based Bare Earth Hillshade of the project area provided imagery to assist in soil unit delineation, to identify changes in topography to help identify ideal locations to dig auger holes and identify potential disturbed units.

The on-site investigation was conducted using a base plan with a 1:50 scale and 2-foot topographic contours. In accordance with the Site-Specific Soil Mapping standards, the identified individual soil map units were correlated to the New Hampshire State-Wide Numerical Soils Legend maintained by the New Hampshire State office of the NRCS. Soil characteristics for each of the units comply with the Range in Characteristics described in the Official Series Descriptions for each map unit. The human disturbed soil map units were labelled in accordance with the "Site-Specific Soil Mapping Standards for New Hampshire and Vermont, Version 7.0" dated July 2021- *Disturbed Soil Mapping Unit Supplement for New Hampshire DES AoT Site Specific Soil Maps*. The disturbed soil map unit Denominators provide additional information on Drainage Class, Parent Material, Restrictive/Impervious Layers, Estimated Ksat, and Hydrologic Soil Group. In addition, GZA has provided High Intensity Soil Survey (HISS) soil unit correlations in the event local or state agencies request this data.

### 3.0 RESULTS

#### 3.1 SITE DESCRIPTION

Based on field observations, the majority of the Site is a developed sand and gravel pit bordered by undeveloped forested areas. The interior portion of the Site is predominantly a mix of Udipsamment (Soil Unit #350) and Hinckley soils (Soil Unit #12) with various fill piles located across the Site. The northeastern portion adjacent to Mallego Brook consists of predominantly Sudbury soils (Soil Unit #118). The Site also contains fill piles ranging from cobbles, sand, gravel, loam, and unconsolidated debris. In GZA's opinion, if the Soil Unit 199 fill piles were removed, the underlying soil map units are expected to be the same as the surrounding soils (see Figure 1 – Site-Specific Soil Map).

#### 3.2 SOIL MAP UNIT DESCRIPTIONS

Individual soil map units are summarized in **Table 1 – Soil Map Units** below:

---

<sup>1</sup> [www.websoilsurvey.sc.egov.usda.gov/App/HomePage.htm](http://www.websoilsurvey.sc.egov.usda.gov/App/HomePage.htm)

<sup>2</sup> <https://granitview.unh.edu/>





Soil ID (SSSM)	Soil Type	Soil ID (HISS)
12	Hinckley, excessively drained, fine sandy loam	111
115	Scarboro	681
118	Sudbury, moderately well drained	311
199/haade	Dumps, bark chips, organic materials, rock, cement, pavement	766
300/abaaa	Udipsamments, nearly level	161 (E)
350/dbaab	Udipsamments, wet substratum	361 (E)
546	Walpole	511
900/fbaac	Endoaquents, sandy	561 (E)
913	Sudbury (somewhat poorly drained)	411

Slope designations differ slightly between **SSSM Standards** and **HISS Standards** and are itemized below for conversion purposes in **Table 2**.

Slope Class	SSSM	HISS
A	0-3%	-
B	3-8%	0-8%
C	8-15%	8-15%
D	15-25%	15-25%
E	25-50%	25-35%
F	>50%	>35%

The individual soil map unit descriptions of the soils identified on the Site and summarized in **Table 1** are as follows:

**12A – Hinckley, excessively drained, fine sandy loam, 0 to 3 percent slopes**

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown fine sandy loam about 4 inches thick. The subsoil may be dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand, and gravelly coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown gravelly sand and gravelly coarse sand.

Inclusions with this map unit are small areas of slopes greater than 3 percent; and Sudbury, moderately well drained soils and Udipsamments, nearly level soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**12B – Hinckley, excessively drained, fine sandy loam, 3 to 8 percent slopes**

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown fine sandy loam about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and gravelly coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown gravelly sand and gravelly coarse sand.

Inclusions with this map unit are small areas of slopes less than 3 percent and greater than 8 percent and Sudbury, moderately well drained soils and Udipsamments, nearly level soil inclusions. These inclusions make up as much as 10 percent of the map unit.



**12C – Hinckley, excessively drained, fine sandy loam, 8 to 15 percent slopes**

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown fine sandy loam about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and gravelly coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown gravelly sand and gravelly coarse sand.

Inclusions with this map unit are small areas of slopes less than 8 percent and greater than 15 percent and Sudbury, moderately well drained soils and Udipsamments, nearly level soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**12D – Hinckley, excessively drained, fine sandy loam, 15 to 25 percent slopes**

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown fine sandy loam about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and gravelly coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown gravelly sand and gravelly coarse sand.

Inclusions with this map unit are small areas of slopes less than 15 percent and greater than 25 percent and Sudbury, moderately well drained soils and Udipsamments, nearly level soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**12E - Hinckley, excessively drained, fine sandy loam, 25 to 50 percent slopes**

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown fine sandy loam about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and gravelly coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown gravelly sand and gravelly coarse sand.

Inclusions with this map unit are small areas of slopes less than 25 percent and greater than 50 percent; and Sudbury, moderately well drained soils and Udipsamments, nearly level soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**115A – Scarborough, 0 to 3 percent slopes**

This map unit consists of very deep, very poorly drained soils in sandy glaciofluvial deposits on outwash plains, deltas, and terraces. They are nearly level soils in depressions.

Typically, the surface layer is dark brown mucky peat greater than 16 inches thick. The subsoil is black mucky fine sandy loam. The substratum, to a depth of 40 inches or more, is grayish brown loamy sand.

Inclusions with this map unit are small areas of slopes greater than 3 percent; and may contain Walpole soils and Hinckley, excessively drained, fine sandy loam soil inclusions. These inclusions make up as much as 5 percent of the map unit.



**118A – Sudbury, moderately well drained, 0 to 3 percent slopes**

This map unit consists of very deep, moderately well and somewhat poorly drained soils on outwash plains. They are nearly level through strongly sloping soils in slight depressions and on terraces and foot slopes in areas of outwash or glaciofluvial deposits.

Typically, the surface layer is very dark grayish brown fine sandy loam about 14 inches thick. The subsoil is yellowish brown sandy loam up to 20 inches deep. The substratum, to a depth of 20 inches or more, is yellowish brown gravelly coarse sand.

Inclusions with this map unit are small areas of slopes greater than 3 percent; and may contain Walpole soil and wet substratum Udipsamment soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**118B – Sudbury, moderately well drained, 3 to 8 percent slopes**

This map unit consists of very deep, moderately well and somewhat poorly drained soils on outwash plains. They are nearly level through strongly sloping soils in slight depressions and on terraces and foot slopes in areas of outwash or glaciofluvial deposits.

Typically, the surface layer is very dark grayish brown fine sandy loam about 14 inches thick. The subsoil is yellowish brown sandy loam up to 20 inches deep. The substratum, to a depth of 20 inches or more, is yellowish brown gravelly coarse sand.

Inclusions with this map unit are small areas of slopes less than 3 percent and greater than 8 percent; and may contain Walpole soil and wet substratum Udipsamment soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**118C – Sudbury, moderately well drained, 8 to 15 percent slopes**

This map unit consists of very deep, moderately well and somewhat poorly drained soils on outwash plains. They are nearly level through strongly sloping soils in slight depressions and on terraces and foot slopes in areas of outwash or glaciofluvial deposits.

Typically, the surface layer is very dark grayish brown fine sandy loam about 14 inches thick. The subsoil is yellowish brown sandy loam up to 20 inches deep. The substratum, to a depth of 20 inches or more, is yellowish brown gravelly coarse sand.

Inclusions with this map unit are small areas of slopes less than 8 percent and greater than 15 percent; and may contain Walpole soil and wet substratum Udipsamment soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**118D – Sudbury, moderately well drained, 15 to 25 percent slopes**

This map unit consists of very deep, moderately well and somewhat poorly drained soils on outwash plains. They are nearly level through strongly sloping soils in slight depressions and on terraces and foot slopes in areas of outwash or glaciofluvial deposits.

Typically, the surface layer is very dark grayish brown fine sandy loam about 14 inches thick. The subsoil is yellowish brown sandy loam up to 20 inches deep. The substratum, to a depth of 20 inches or more, is yellowish brown gravelly coarse sand.

Inclusions with this map unit are small areas of slopes less than 15 percent and greater than 25 percent; and may contain Walpole soil and wet substratum Udipsamment soil inclusions. These inclusions make up as much as 10 percent of the map unit.



**199B - Dumps, bark chips, and organic matter, 3 to 8 percent slopes**

This map unit consists of sandy loam materials with stumps and woody debris. Undisturbed material is at a depth of more than 40 inches. Also included are the various fill pile on site, consisting of loamy fill, rocks, cement, and old pavement. There are no identifiable diagnostic horizons at a depth within 40 inches. If the fill piles were removed the soil map unit should be the same as the surrounding soils.

Included with this mapping are small areas of slopes less than 3 percent and greater than 8 percent. These inclusions make up as much as 10 percent of the map unit.

**199C - Dumps, bark chips, and organic matter, 8 to 15 percent slopes**

This map unit consists of sandy loam materials with stumps and woody debris. Undisturbed material is at a depth of more than 40 inches. Also included are the various fill pile on site, consisting of loamy fill, rocks, cement, and old pavement. There are no identifiable diagnostic horizons at a depth within 40 inches. If the fill piles were removed the soil map unit should be the same as the surrounding soils.

Included with this mapping are small areas of slopes less than 8 percent and greater than 15 percent. These inclusions make up as much as 10 percent of the map unit.

**199D - Dumps, bark chips, and organic matter, 15 to 25 percent slopes**

This map unit consists of sandy loam materials with stumps and woody debris. Undisturbed material is at a depth of more than 40 inches. Also included are the various fill pile on site, consisting of loamy fill, rocks, cement, and old pavement. There are no identifiable diagnostic horizons at a depth within 40 inches. If the fill piles were removed the soil map unit should be the same as the surrounding soils.

Included with this mapping are small areas of slopes less than 15 percent and greater than 25 percent. These inclusions make up as much as 10 percent of the map unit.

**199E - Dumps, bark chips, and organic matter, 25 to 50 percent slopes**

This map unit consists of sandy loam materials with stumps and woody debris. Undisturbed material is at a depth of more than 40 inches. Also included are the various fill pile on site, consisting of loamy fill, rocks, cement, and old pavement. There are no identifiable diagnostic horizons at a depth within 40 inches. If the fill piles were removed the soil map unit should be the same as the surrounding soils.

Included with this mapping are small areas of slopes less than 25 percent and greater than 50 percent. These inclusions make up as much as 10 percent of the map unit.

**199F - Dumps, bark chips, and organic matter, 50 percent or greater slopes**

This map unit consists of sandy loam materials with stumps and woody debris. Undisturbed material is at a depth of more than 40 inches. Also included are the various fill pile on site, consisting of loamy fill, rocks, cement, and old pavement. There are no identifiable diagnostic horizons at a depth within 40 inches. If the fill piles were removed the soil map unit should be the same as the surrounding soils.

Included with this mapping are small areas of slopes less than 50 percent. These inclusions make up as much as 10 percent of the map unit.



**300B - Udipsamments, nearly level, 3 to 8 percent slopes**

This map unit consists of somewhat excessively drained soils that formed in sandy glaciofluvial deposits excavated for the extraction of sand and gravel. Undisturbed material is typically at the surface. The soils range from fine sand, sand, and their gravelly analogs. If not for the excavation these soils are the same as the Hinkley previously described.

Included with this mapping are small areas of slopes less than 3 percent and greater than 8 percent. These inclusions make up as much as 10 percent of the map unit.

**300C- Udipsamments, nearly level, 8 to 15 percent slopes**

This map unit consists of somewhat excessively drained soils that formed in sandy glaciofluvial deposits excavated for the extraction of sand and gravel. Undisturbed material is typically at the surface. The soils range from fine sand, sand, and their gravelly analogs. If not for the excavation these soils are the same as the Hinkley previously described.

Included with this mapping are small areas of slopes less than 8 percent and greater than 15 percent. These inclusions make up as much as 10 percent of the map unit.

**300D - Udipsamments, nearly level, 15 to 25 percent slopes**

This map unit consists of somewhat excessively drained soils that formed in sandy glaciofluvial deposits excavated for the extraction of sand and gravel. Undisturbed material is typically at the surface. The soils range from fine sand, sand, and their gravelly analogs. If not for the excavation these soils are the same as the Hinkley previously described.

Included with this mapping are small areas of slopes less than 15 percent and greater than 25 percent. These inclusions make up as much as 10 percent of the map unit.

**300E - Udipsamments, nearly level, 25 to 50 percent slopes**

This map unit consists of somewhat excessively drained soils that formed in sandy glaciofluvial deposits excavated for the extraction of sand and gravel. Undisturbed material is typically at the surface. The soils range from fine sand, sand, and their gravelly analogs. If not for the excavation these soils are the same as the Hinkley previously described.

Included with this mapping are small areas of slopes less than 25 percent and greater than 50 percent. These inclusions make up as much as 10 percent of the map unit.

**300F - Udipsamments, nearly level, greater than 50 percent slopes**

This map unit consists of somewhat excessively drained soils that formed in sandy glaciofluvial deposits excavated for the extraction of sand and gravel. Undisturbed material is typically at the surface. The soils range from fine sand, sand, and their gravelly analogs. If not for the excavation these soils are the same as the Hinkley previously described.

Included with this mapping are small areas of slopes greater than 50 percent. These inclusions make up as much as 10 percent of the map unit.



**350A - Udipsamments, wet substratum, 0 to 3 percent slopes**

This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the particle size that have been excavated and regraded. Drainage class ranges from moderately well drained to somewhat poorly drained. If not for the excavation these soils would be similar to the Sudbury described above.

Included with this mapping are small areas of slope greater than 3 percent; and may contain moderately well drained Sudbury soil and Walpole soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**350D - Udipsamments, wet substratum, 15 to 25 percent slopes**

This map unit is located within the central portion of the Site located adjacent to existing buildings and development. This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the particle size that have been excavated or regraded. Drainage class ranges from moderately well drained to somewhat poorly drained. If not for the excavation these soils would be similar to the Sudbury described above.

Included with this mapping are small areas of slope less than 15 percent greater than 25 percent; and may contain moderately well drained Sudbury soil and Walpole soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**546A - Walpole, 0 to 3 percent slopes**

This map unit consists of very deep, poorly drained sandy soils formed in outwash and stratified drift. They are nearly level to gently sloping soils in low-lying positions on terraces and plains.

Typically, the surface layer is dark brown sandy loam about 7 inches thick. The subsoil is dark grayish brown sandy loam up to 21 inches deep. The substratum, to a depth of 21 inches or more, is light yellowish brown gravelly sandy loam.

Inclusions with this map unit are small areas of slopes greater than 3 percent; and may contain Hinckley, excessively drained, fine sandy loam and moderately well drained Sudbury soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**546B - Walpole, 3 to 8 percent slopes**

This map unit consists of very deep, poorly drained sandy soils formed in outwash and stratified drift. They are nearly level to gently sloping soils in low-lying positions on terraces and plains.

Typically, the surface layer is dark brown sandy loam about 7 inches thick. The subsoil is dark grayish brown sandy loam up to 21 inches deep. The substratum, to a depth of 21 inches or more, is light yellowish brown gravelly sandy loam.

Inclusions with this map unit are small areas of slopes less than 3 percent and greater than 8 percent; and may contain Hinckley, excessively drained, fine sandy loam and moderately well drained Sudbury soil inclusions. These inclusions make up as much as 10 percent of the map unit.

**900A – Endoaquents, sandy, 0 to 3 percent slopes**

This map unit consists of poorly drained soils that formed in excavated sandy glaciofluvial deposits. The soils range from fine sand to sand and their gravelly analogs. These soils have similar characteristics as the Walpole described above.

Included with this mapping are small areas of slopes greater than 3 percent. These inclusions make up as much as 10 percent of the map unit.



### **913A – Sudbury, somewhat poorly drained, 0 to 3 percent slopes**

This map unit consists of very deep, moderately well and somewhat poorly drained soils on outwash plains. They are nearly level through strongly sloping soils in slight depressions and on terraces and foot slopes in areas of outwash or glaciofluvial deposits.

Typically, the surface layer is very dark grayish brown fine sandy loam about 13 inches thick. The subsoil is yellowish brown sandy loam up to 19 inches deep. The substratum, to a depth of 19 inches or more, is yellowish brown gravelly coarse sand.

Inclusions with this map unit are small areas of slopes greater than 3 percent; and may contain wet substratum Udipsamment soil inclusions. These inclusions make up as much as 10 percent of the map unit.

### **3.3 HYDROLOGIC SOIL GROUP CORRELATION**

In order to correlate the soil map units identified, as part of this soil survey, to the appropriate hydrologic soil group, we referenced the Society of Soil Scientists of Northern New England “Ksat Values for New Hampshire Soils, Special Publication No. 5, September 2009.”<sup>3</sup> Table 2 – Hydrologic Soil Group Correlation provides the correlation of the identified soil map units to the appropriate hydrologic soil group. Identification of correlating hydrologic soil group provides context for infiltration rates for stormwater management planning.

Soil ID (SSSM)	Soil Type	Soil ID (HISS)	Hydrologic Soil Group	Ksat Value (low C) Inch/Hour
12	Hinckley, excessively drained, fine sandy loam	111	A	20.0 in/hr
115	Scarboro	681	D	6.00 in/hr
118	Sudbury, moderately well drained	311	B	2.00 in/hr
199/haade	Dumps, bark chips, and organic materials	766	No Group	N/A
300/abaaa	Udipsamments, nearly level	161	A	20.0 in/hr
350/dbaab	Udipsamments, wet substratum	361	B	2.00 in/hr
546	Walpole	511	C	6.00 in/hr
900/fbaac	Endoaquents, sandy	561	C	6.00 in/hr
913	Sudbury, somewhat poorly drained	411	D	2.00 in/hr

<sup>3</sup> [www.sssnne.org/publications.html](http://www.sssnne.org/publications.html)



#### 4.0 FINDINGS AND CONCLUSIONS

GZA has completed Site-Specific Soil Mapping of the Site in support of the proposed residential subdivision project permitting being prepared by others. The following is a summary of our findings and conclusions:

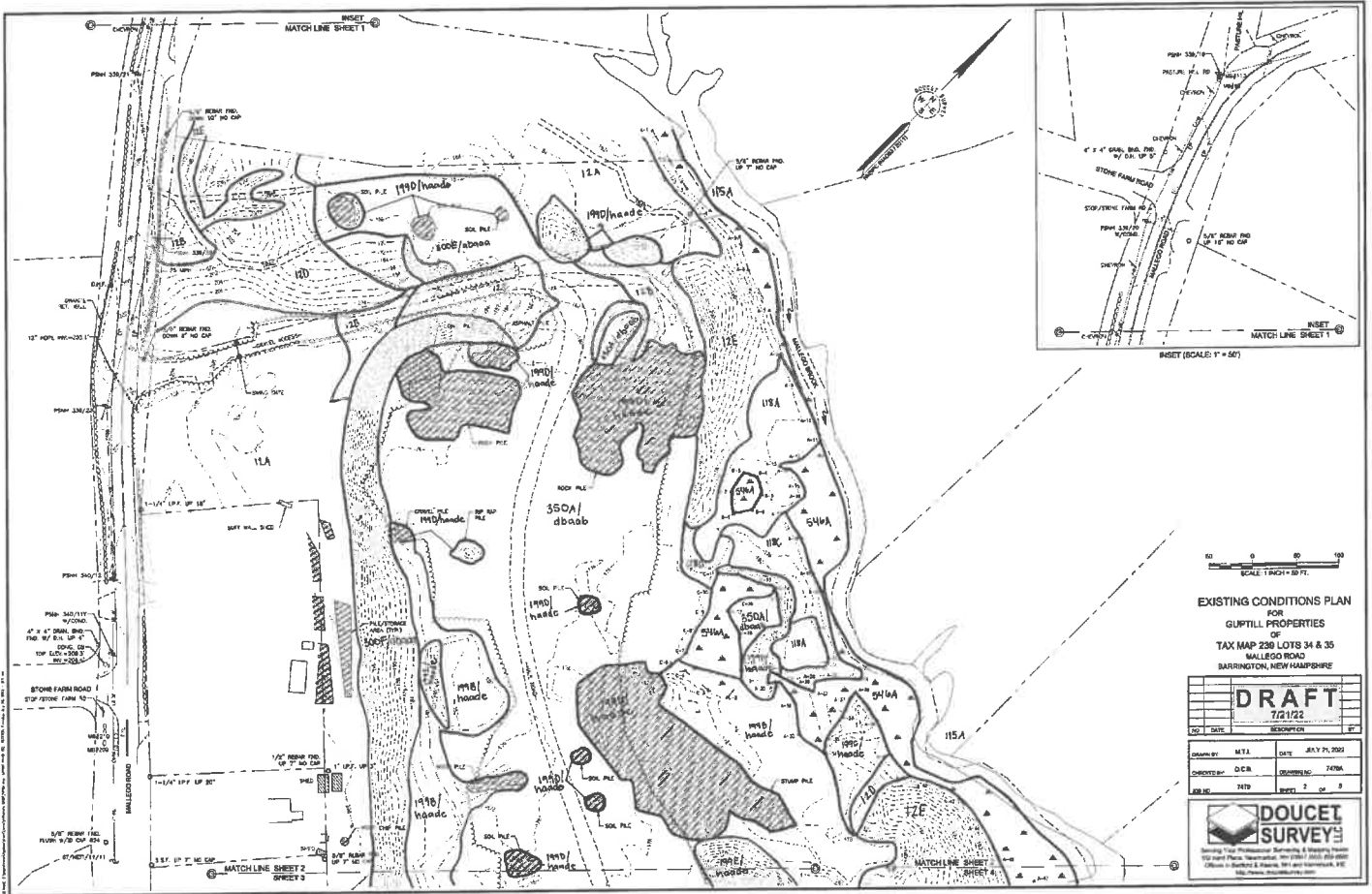
- The Site is predominantly a developed sand and gravel pit, and the interior portion of the Site is predominantly a mix of Udipsamment (Soil Unit #350) and Hinckley soils (Soil Unit #12) with various fill piles located across the Site.
- The various fill piles on site consist of loamy fill, rocks, cement, and old pavement placed on the surface of the Site.
- The northeastern portion adjacent to Mallego Brook consists of predominantly Sudbury soils (Soil Unit #118).





## Figures





SCALE: 1" = 50 FT.

EXISTING CONDITIONS PLAN  
FOR  
GUPTILL PROPERTIES  
OF  
TAX MAP 236 LOTS 34 & 35  
WALLEGO ROAD  
BARRINGTON, NEW HAMPSHIRE

**DRAFT**  
7/21/22

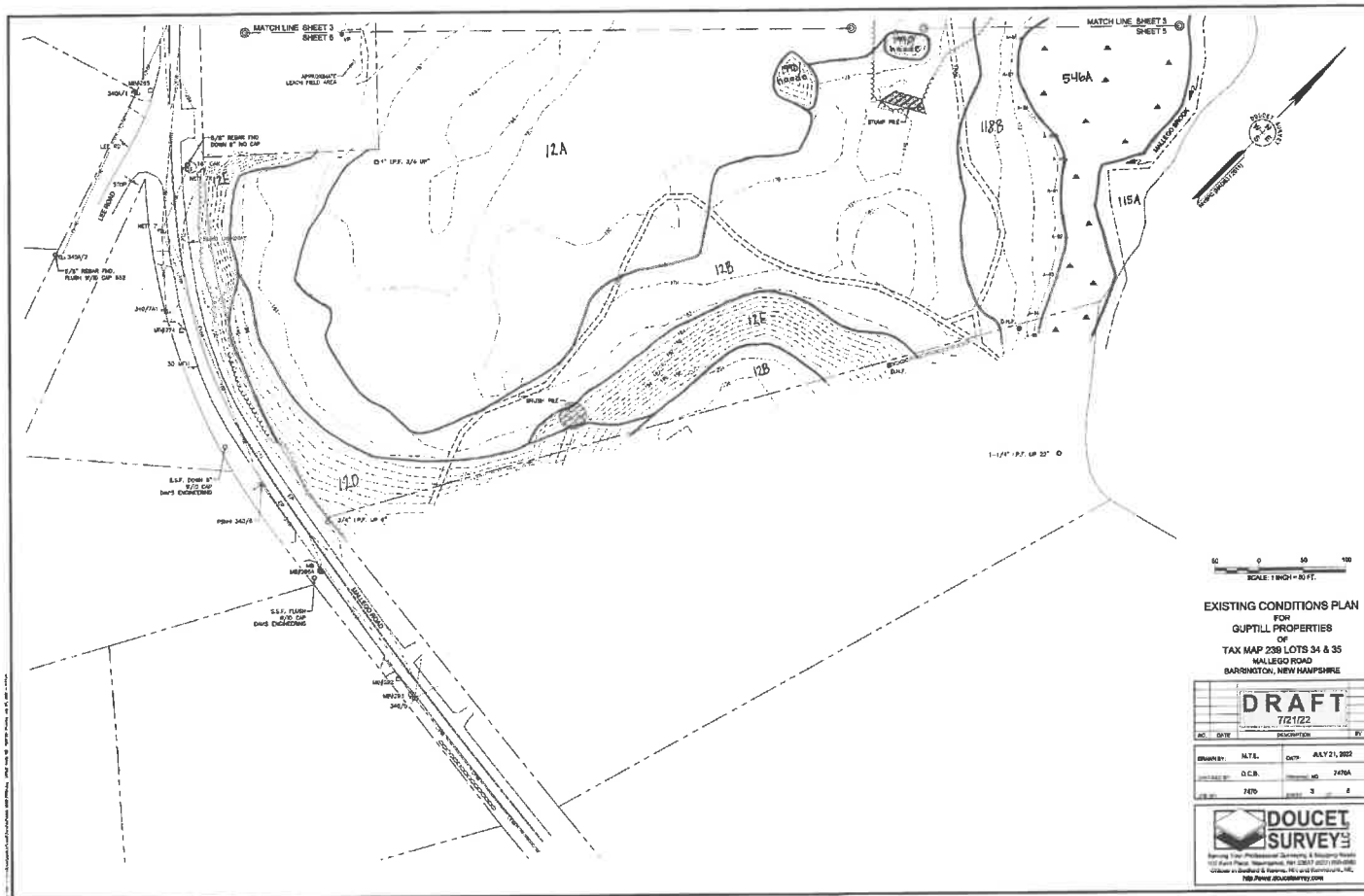
NO.	DATE	DESCRIPTION

DRAWN BY	MTA	DATE	JULY 21, 2022
CHECKED BY	DCR	DRAWING NO.	7470A
FILE NO.	747P	SHEET	2 OF 3

**DOUCET SURVEY**  
Surveying, Mapping, Professional Surveying, & Mapping  
100 North Main Street, Barrington, NH 03825  
Office: 603-863-8888, Fax: 603-863-8889  
www.doucetsurvey.com







EXISTING CONDITIONS PLAN  
 FOR  
 GUPTILL PROPERTIES  
 OF  
 TAX MAP 230 LOTS 34 & 35  
 MALLEGO ROAD  
 BARRINGTON, NEW HAMPSHIRE

**DRAFT**  
 7/21/22

NO.	DATE	DESCRIPTION	BY

DESIGNED BY	M.T.L.	DATE	July 21, 2022
CHECKED BY	D.C.B.	PROJECT NO.	2476A
DATE PLOTTED	7/27	SHEET NO.	3
		TOTAL SHEETS	4

**DOUCET SURVEYERS**  
 Providing Topographical, Boundary, & Mapping Services  
 101 West Park, Barrington, NH 03025 (603) 875-8888  
 10000 Highway 101, Suite 100, Barrington, NH  
 NH.Planet@DOUCETSURVEY.COM



## **Appendix A - Natural Resource Limitations**



## USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) has prepared this report on behalf of, and for the exclusive use of Mr. Joseph Falzone ("Client") for the stated purpose(s) and location(s) identified in the report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's risk, and without any liability to GZA.

## STANDARD OF CARE

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the data gathered and observations made during the course of our work. Conditions other than described in this report may be found at the subject location(s).
3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

## LIMITS TO OBSERVATIONS

4. Natural resource characteristics are inherently variable. Biological community composition and diversity can be affected by seasonal, annual or anthropogenic influences. In addition, soil conditions are reflective of subsurface geologic materials, the composition and distribution of which vary spatially.
5. The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by GZA reflect the conditions that could be reasonably observed based upon the visual observations of surface conditions and/or a limited observation of subsurface conditions at the specific time of observation. Such conditions are subject to environmental and circumstantial alteration and may not reflect conditions observable at another time.
6. The conclusions and recommendations contained in this report are based upon the data obtained from a limited number of surveys performed during the course of our work on the site, as described in the Report. There may be variations between these surveys and other past or future surveys due to inherent environmental and circumstantial variability.

## RELIANCE ON INFORMATION FROM OTHERS

7. Preparation of this Report may have relied upon information made available by Federal, state and local authorities; and/or work products prepared by other professionals as specified in the report. Unless specifically stated, GZA did not attempt to independently verify the accuracy or completeness of that information.

## COMPLIANCE WITH REGULATIONS AND CODES

8. GZA's services were performed to render an opinion on the presence and/or condition of natural resources as described in the Report. Standards used to identify or assess these resources as well as regulatory jurisdiction, if any, are stated in the Report. Standards for identification of jurisdictional resources and regulatory control over them may vary between governmental agencies at Federal, state and local levels and are subject to change over time which may affect the conclusions and findings of this report.





**NEW INFORMATION**

9. In the event that the Client or others authorized to use this report obtain information on environmental regulatory compliance issues at the site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this work, may modify the conclusions stated in this report.

**ADDITIONAL SERVICES**

10. GZA recommends that we be retained to provide further investigation, if necessary, which would allow GZA to (1) observe compliance with the concepts and recommendations contained herein; (2) evaluate whether the manner of implementation creates a potential new finding; and (3) evaluate whether the manner of implementation affects or changes the conditions on which our opinions were made.



## **Appendix B - Disturbed Soil Mapping Unit Supplement for DES AOT**

## **Supplemental Symbols**

The five components of the Disturbed Soil Mapping Unit Supplement are as follows:

### **Symbol 1: Drainage Class**

- a - Excessively Drained
- b - Somewhat Excessively Drained
- c - Well Drained
- d - Moderately Well Drained
- e - Somewhat Poorly Drained
- f - Poorly Drained
- g - Very Poorly Drained
- h - Not Determined

### **Symbol 2: Parent Material (of naturally formed soil only, if present)**

- a - No natural soil within 60"
- b - Glaciofluvial Deposits (outwash/terraces of sand or sand and gravel)
- c - Glacial Till Material (active ice)
- d - Glaciolacustrine very fine sand and silt deposits (glacial lakes)
- e - Loamy/sandy over Silt/Clay deposits
- f - Marine Silt and Clay deposits (ocean waters)
- g - Alluvial Deposits (floodplains)
- h - Organic Materials-Fresh water Bogs, etc.
- j - Organic Materials-Tidal Marsh

### **Symbol 3: Restrictive/Impervious Layers**

- a - None
- b - Boulderly surface with more than 15% of the surface covered with boulders
- c - Mineral restrictive layer(s) are present in the soil profile less than 40 inches below the soil surface such as hard pan, platy structure or clayey texture with consistence of at least firm ( i.e. more than 20 newtons). For other examples of soil characteristics that qualify for restrictive layers, see "Soil Manual for Site evaluations in NH" 2nd Ed., (page 3-17, figure 3-14)
- d - Bedrock in the soil profile; 0-20 inches
- e - Bedrock in the soil profile; 20-60 inches
- f - Areas where depth to bedrock is so variable that a single soil type cannot be applied, will be mapped as a complex of soil types
- g - Subject to Flooding
- h - Man-made impervious surface including pavement, concrete, or built-up surfaces (i.e. buildings) with no morphological restrictive layer within control section

### **Symbol 4: Estimated Ksat\* (most limiting layer excluding symbol 3h above).**

- a - High.
- b - Moderate
- c - Low
- d - Not determined

\*See "Guidelines for Ksat Class Placement" in Chapter 3 of the Soil Survey Manual, USDA

### **Symbol 5: Hydrologic Soil Group\***

- a - Group A
- b - Group B
- c - Group C
- d - Group D
- e - Not determined

\*excluding man-made surface impervious/restrictive layers



## **Appendix C - Photo Log**

**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



**Photograph No. 1: Looking easterly across the Site from the center portion of the Site.**



**Photograph No. 2: Looking westerly across the Site from the central southern portion of the Site.**

**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



**Photograph No. 3: Looking across the Site from Test Pit 7.**



**Photograph No. 4: Looking across the Site from Test Pit 13.**

**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



**Photograph No. 5: Looking southerly across the Site from the eastern portion of the Site.**



**Photograph No. 6: Looking across the Site from the northeastern portion of the Site.**

**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



Photograph No. 7: View of Test Pit 4, showing Udipsamments soil with a wet substratum.



Photograph No. 8: View of Test Pit 7, showing Udipsamments soil with a wet substratum.



**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



Photograph No. 9: View of Test Pit 10, showing Udipsamments soil with a wet substratum.



Photograph No. 10: View of Test Pit 11 showing Udipsamments soil with a wet substratum.

**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



Photograph No. 11: View of Test Pit 12 showing Udipsamments soil with a wet substratum.



Photograph No. 12: View of Test Pit 12A showing Udipsamments soil with a wet substratum.

**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



**Photograph No. 13: View of Test Pit 13 showing Udipsamments soil with a wet substratum.**



**Photograph No. 14: View of Test Pit 17 showing Udipsamments soil with a wet substratum.**

**PHOTO LOG**  
**Mallego Road**  
**Barrington, New Hampshire**  
**Photos Taken: June 7, 10, July 29, August 1, and 5, 2022**



Photograph No. 15: View of Test Pit 20 showing Udipsamments soil with a wet substratum.



Photograph No. 16: View of Test Pit 21 showing dumbs, bark chips, and organic matter.



GEOTECHNICAL

ENVIRONMENTAL

ECOLOGICAL

WATER

CONSTRUCTION  
MANAGEMENT

GZA GeoEnvironmental, Inc.



**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

File No. 04.0191442.00

Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. 1A NOTES: Lot 1

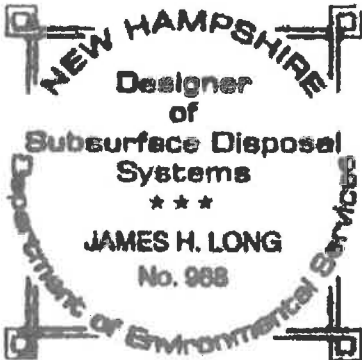
Depth (inches)	Description
^0-12	10YR4/3 Brown, gravelly loamy sand, granular, friable
12-24	10YR5/4 Yellowish brown, sand, single grain, loose
24-60	2.5Y4/3 Olive brown, coarse sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	24	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

Test Pit No. 1B NOTES: Lot 1

Depth (inches)	Description
^0-14	10YR4/3 Brown, gravelly loamy sand, granular, friable
14-28	10YR5/4 Yellowish brown, cobbly gravelly coarse sand, single grain, loose
28-60	2.5Y4/3 Olive brown, cobbly gravelly coarse sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	28	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	12	inches			
Percolation Rate =	2	Minutes / Inch @ 30			





**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

File No. 04.0191442.00

Evaluated by: James H. Long, CSS      Designer: 988

Date: 9/21/22

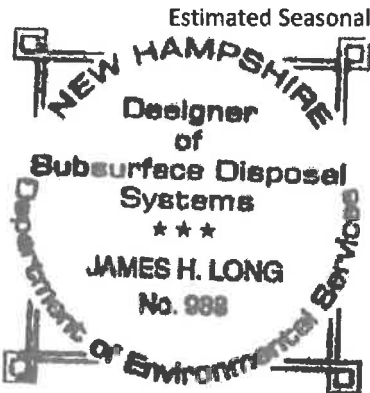
Test Pit No. 2A                                      **NOTES: Lot 2**

Depth (inches)	Description		
^0-14	10YR4/3 Brown, gravelly loamy sand, granular, friable		
14-22	2.5Y5/4 Light olive brown, cobbly gravelly course sand, single grain, loose		
22-60	2.5Y5/3 Light olive brown, cobbly gravelly course sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features		
Estimated Seasonal High Water Table @	22 inches	Observed Water Table @	56 inches
Restrictive @	none inches	Roots @	16 inches
Refusal @	none inches		
Percolation Rate =	2 Minutes / Inch @ 30		

Test Pit No. 2B                                      **NOTES: Lot 2**

Depth (inches)	Description
^0-14	10YR4/3 Brown, gravelly loamy sand, granular, friable
14-22	2.5Y5/4 Light olive brown, cobbly gravelly course sand, single grain, loose
22-60	2.5Y5/3 Light olive brown, cobbly gravelly course sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	22 inches	Observed Water Table @	56 inches
Restrictive @	none inches	Roots @	16 inches
Refusal @	none inches		
Percolation Rate =	2 Minutes / Inch @ 32		





**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

File No. 04.0191442.00

Evaluated by: James H. Long, CSS      Designer: 988

Date: 9/21/22

Test Pit No. 4A

NOTES: Lot 4

Depth (inches)	Description
^0-10	10YR4/3 Brown, loamy fine sand, granular, friable
10-24	10YR5/4 Yellowish brown, gravelly sand, single grain, loose
24-30	10YR5/3 Brown, cobbly gravelly coarse sand, single grain, loose
30-66	2.5Y5/3 Light olive brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

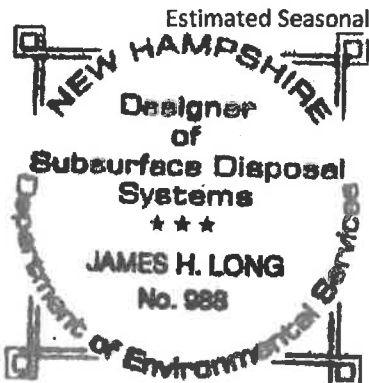
Estimated Seasonal High Water Table @	30	inches	Observed Water Table @	64	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

Test Pit No. 4B

NOTES: Lot 4

Depth (inches)	Description
^0-8	10YR4/3 Brown, loamy fine sand, granular, friable
8-32	10YR4/4 Dark yellowish brown, gravelly coarse sand, single grain, loose
32-60	2.5Y5/3 Light olive brown, gravelly coarse sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	32	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 32			







**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

File No. 04.0191442.00

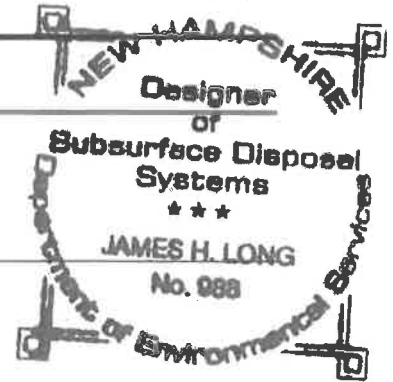
Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. 6 NOTES: Lot 15, 7/29/22

Depth (inches)	Description
^0-8	2.5Y3/3 Dark olive brown, gravelly loamy sand, granular, friable
8-24	2.5Y4/4 Olive brown, cobbly gravelly loamy sand, single grain, loose
24-36	2.5Y5/4 Light olive brown, cobbly gravelly loamy sand, single grain, loose
36-60	2.5Y5/3 Light olive brown, cobbly gravelly loamy sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	36	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 32			



Test Pit No. 6A NOTES: Lot 15

Depth (inches)	Description
^0-8	10YR3/3 Dark brown, gravelly sandy loam, granular, friable
8-32	10YR5/4 Yellowish brown, gravelly coarse sand, single grain, loose
32-62	2.5Y5/3 Light olive brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	32	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 32			





**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

File No. 04.0191442.00

Evaluated by: James H. Long, CSS      Designer: 988

Date: 9/21/22

Test Pit No. 6C                                      **NOTES: Lot 6**

**Depth (Inches)                      Description**

0-6                      10YR3/3 Dark brown, loamy fine sand, granular, friable  
 6-38                      10YR5/6 Yellowish brown, cobbly gravelly coarse sand, single grain, loose  
 38-60                      2.5Y5/4 Light olive brown, cobbly gravelly coarse sand, single grain, loose

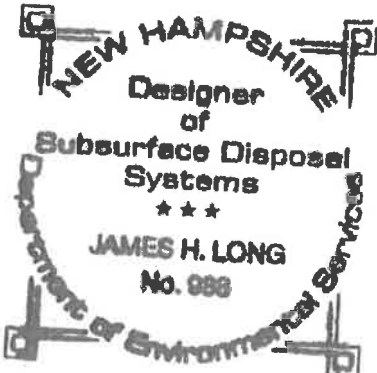
Estimated Seasonal High Water Table @	none	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	30	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

Test Pit No. 6D                                      **NOTES: Lot 6**

**Depth (inches)                      Description**

0-32                      10YR3/3 Dark brown, loamy fine sand, granular, friable  
 32-96                      10YR5/4 Yellowish brown, cobbly gravelly coarse sand, single grain, loose

Estimated Seasonal High Water Table @	None to	inches	Observed Water Table @	none	inches
	60'				
Restrictive @	none	inches	Roots @	26	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			





**TEST PIT EVALUATION REPORT**  
 Mallego Road, Tax Map 239, Lot 34&35  
 Barrington, New Hampshire

File No. 04.0191442.00

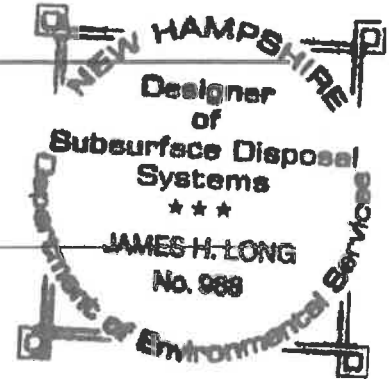
Evaluated by: James H. Long, CSS

Designer: 988

Date: 9/21/22

Test Pit No. 7

NOTES: Lot 3, 7/29/22



Depth (inches)	Description
^0-4	2.5Y3/3 Dark olive brown, gravelly loamy sand, granular, friable
4-16	10YR4/4 Dark yellowish brown, gravelly sand, single grain, loose
16-32	10YR5/3 Brown, gravelly sand, single grain, loose with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features
32-60	2.5Y5/3 Light olive brown, coarse sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	16	inches	Observed Water Table @	54	inches
Restrictive @	none	inches	Roots @	20	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 32			

Test Pit No. 7A

NOTES: Lot 3



Depth (inches)	Description
^0-16	10YR4/3 Brown, gravelly loamy sand, single grain, loose
16-24	10YR5/4 Yellowish brown, coarse gravelly sand, single grain, loose
24-64	2.5Y4/3 Olive brown, cobbly gravelly coarse sand, single grain, loose with 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	24	inches	Observed Water Table @	62	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



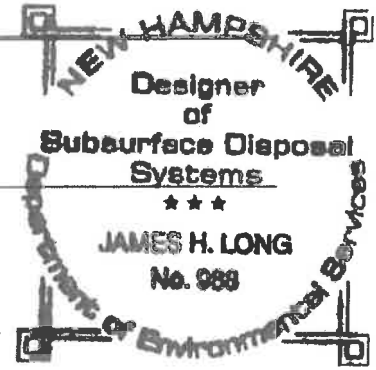
**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

File No. 04.0191442.00

Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No.	8A	NOTES: Lot 12
Depth (inches)	Description	
^0-4	10YR4/3 Dark olive brown, loamy fine sand, granular, friable	
4-28	10YR5/4 Light olive brown, gravelly loamy sand, single grain, loose	
28-30	10YR5/6 Light yellowish brown, gravelly loamy sand, single grain, loose	
30-96	2.5Y6/3 Light yellowish brown, coarse sand, single grain, loose with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features	



Estimated Seasonal High Water Table @	30	inches	Observed Water Table @	72	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

Test Pit No.	8B	NOTES: Lot 12
Depth (inches)	Description	
^0-6	10YR5/4 Yellowish brown, loamy fine sand, granular, friable	
6-30	10YR5/6 Yellowish brown, sand, single grain, loose	
30-60	2.5Y6/3 Light yellowish brown, sand, single grain, loose with 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features	



Estimated Seasonal High Water Table @	30	inches	Observed Water Table @	None	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

File No. 04.0191442.00

Evaluated by: James H. Long, CSS      Designer: 988

Date: 9/21/22

Test Pit No.	9A	NOTES: Lot 9	
Depth (Inches)	Description		
^0-16	10YR4/3 Brown, loamy sand, granular, friable		
16-32	10YR5/4 Yellowish brown, sand, single grain, loose		
32-60	2.5Y5/4 Light olive brown, sand, single grain, loose		

Estimated Seasonal High Water Table @	none	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

Test Pit No.	9B	NOTES: Lot 9	
Depth (inches)	Description		
^0-6	10YR4/3 Brown, loamy sand, granular, friable		
6-30	10YR5/4 Yellowish brown, sand, single grain, loose		
30-58	2.5Y5/4 Light olive brown, sand, single grain, loose		
58-66	2.5Y6/3 Light yellowish brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features		

Estimated Seasonal High Water Table @	58	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	20	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



**TEST PIT EVALUATION REPORT**  
**Mallego Road, Tax Map 239, Lot 34&35**  
**Barrington, New Hampshire**

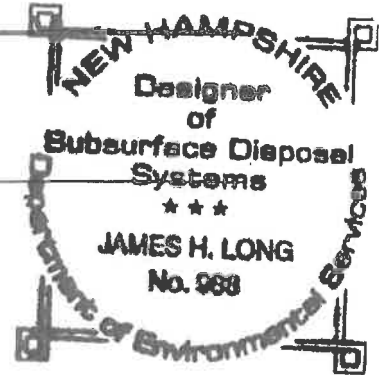
File No. 04.0191442.00

Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No.	Description
10B	10YR4/3 Brown, gravelly loamy sand, granular, friable
	10YR5/4 Yellowish brown, cobbly gravelly coarse sand, single grain, loose

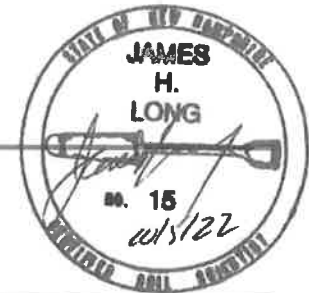
NOTES: Lot 7



Estimated Seasonal High Water Table @	None to 60' inches	Observed Water Table @	none inches
Restrictive @	none inches	Roots @	24 inches
Refusal @	none inches		
Percolation Rate =	2 Minutes / Inch @ 30		

Test Pit No.	Description
10C	10YR3/3 Dark brown, loamy fine sand, granular, friable
	10YR5/4 Yellowish brown, cobbly gravelly coarse sand, single grain, loose, with
	2.5Y5/4 Light olive brown, coarse sand, single grain, loose, with,
	7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

NOTES: Lot 7



Estimated Seasonal High Water Table @	None to 60' inches	Observed Water Table @	62 inches
Restrictive @	none inches	Roots @	20 inches
Refusal @	none inches		
Percolation Rate =	2 Minutes / Inch @ 30		



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Evaluated by: James H. Long, CSS      Designer: 988

Date: 9/21/22

Test Pit No. 11A                                      **NOTES: Lot 11**

Depth (inches)	Description
^0-10	10YR3/3 Dark brown, fine sandy loam, granular, friable
10-20	10YR5/4 Yellowish brown, sand, single grain, loose
20-60	2.5Y5/3 Light olive brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

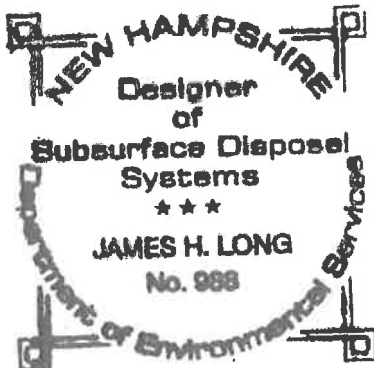
  

Estimated Seasonal High Water Table @	20	inches	Observed Water Table @	52	inches
Restrictive @	none	inches	Roots @	24	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

Test Pit No. 11B                                      **NOTES: Lot 11**

Depth (inches)	Description
^0-10	10YR3/3 Dark brown, fine sandy loam, granular, friable
10-16	10YR5/4 Yellowish brown, sand, single grain, loose
16-60	2.5Y5/3 Light olive brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	16	inches	Observed Water Table @	48	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			





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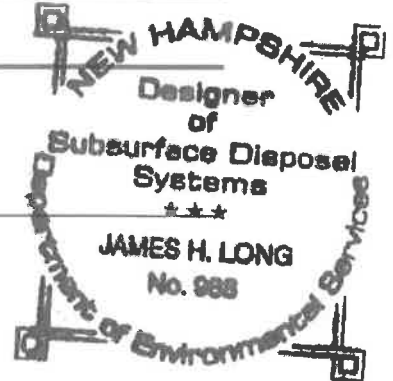
Date: 9/21/22

Test Pit No. 13A NOTES: Lot 13

Depth (inches) Description

^0-10 10YR3/3 Dark brown, gravelly loamy sand, granular, friable  
 10-24 10YR45/4 Yellowish brown, cobbly gravelly coarse sand, single grain, loose  
 54-60 2.5Y5/3 Yellowish brown, sand, single grain, loose, with,  
 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	24	inches	Observed Water Table @	54	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



Test Pit No. 13B NOTES: Lot 13

Depth (inches) Description

^0-8 10YR3/3 Dark brown, gravelly loamy sand, granular, friable  
 8-24 10YR5/4 Yellowish brown, sand, single grain, loose  
 24-64 2.5Y5/3 Light olive brown, sand, single grain, loose, with,  
 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	24	inches	Observed Water Table @	60	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			







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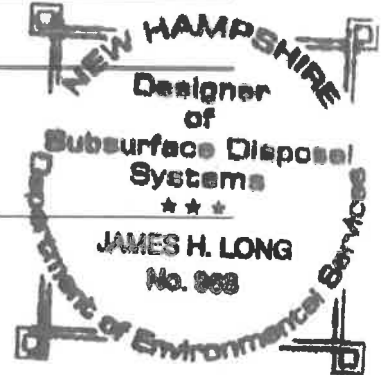
Date: 9/21/22

Test Pit No. 14A NOTES: Lot 14

Depth (inches) Description

^0-18 10YR3/3 Dark brown, gravelly loamy sand, granular, friable  
 18-30 10YR5/4 Yellowish brown, cobbly gravelly coarse sand, single grain, loose  
 30-62 2.5Y5/3 Light olive brown, coarse sand, single grain, loose, with,  
 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	30	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 32			

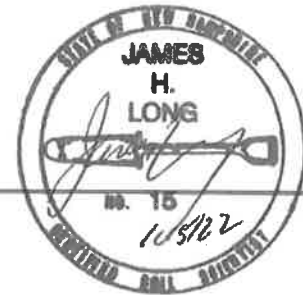


Test Pit No. 14B NOTES: Lot 14

Depth (inches) Description

^0-12 10YR3/3 Dark brown, gravelly loamy sand, granular, friable  
 12-28 7.5YR4/4 Brown, coarse sand, single grain, loose  
 28-60 2.5Y5/3 Light olive brown, sand, single grain, loose, with,  
 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	28	inches	Observed Water Table @	58	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			





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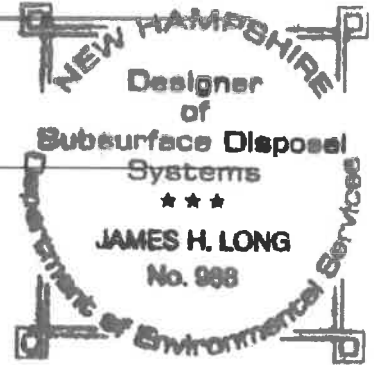
Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. 16A NOTES: Lot 16

Depth (inches) Description

2-0 Forest mat  
 0-10 10YR3/3 Dark brown, fine sandy loam, granular, friable  
 10-22 10YR4/6 Dark yellowish brown, fine sandy loam, granular, friable  
 22-32 10YR5/4 Yellowish brown, fine sandy loam, granular, friable  
 32-62 10YR5/4 Yellowish brown, coarse sand, single grain, loose, with,  
 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features



Estimated Seasonal High Water Table @ none inches Observed Water Table @ none inches  
 Restrictive @ none inches Roots @ none inches  
 Refusal @ none inches  
 Percolation Rate = 4 Minutes / Inch @ 30

Test Pit No. 16B NOTES: Lot 16

Depth (inches) Description

2-0 Forest mat  
 0-8 10YR3/3 Dark brown, fine sandy loam, granular, friable  
 8-26 10YR4/4 Dark yellowish brown, fine sandy loam, granular, friable  
 26-40 10YR5/6 Yellowish brown, sand, single grain, loose  
 40-64 10YR5/4 Yellowish brown, coarse sand, single grain, loose



Estimated Seasonal High Water Table @ none inches Observed Water Table @ none inches  
 Restrictive @ none inches Roots @ 26 inches  
 Refusal @ none inches  
 Percolation Rate = 4 Minutes / Inch @ 30



**TEST PIT EVALUATION REPORT**  
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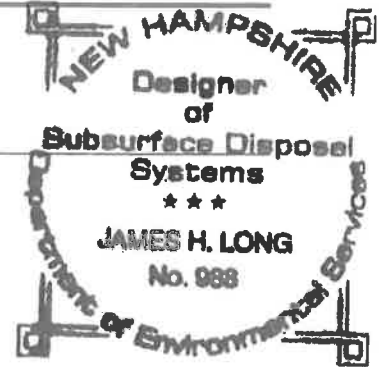
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Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. 17A NOTES: Lot 17

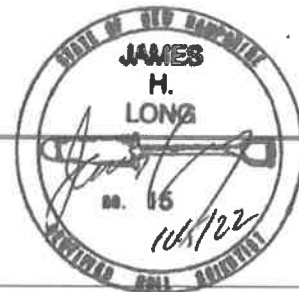
Depth (Inches)	Description
2-0	Forest mat
0-8	10YR3/3 Dark brown, fine sandy loam, granular, friable
8-22	10YR5/4 Yellowish brown, loamy fine sand, granular, friable
22-44	10YR5/4 Yellowish brown, gravelly coarse sand, single grain, loose
44-62	2.5Y5/3 Light olive brown, fine sand, granular, friable



Estimated Seasonal High Water Table @	none	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	30	inches
Refusal @	none	inches			
Percolation Rate =	4	Minutes / Inch @ 30			

Test Pit No. 17B NOTES: Lot 17

Depth (inches)	Description
2-0	Forest mat
0-14	10YR3/3 Dark brown, fine sandy loam, granular, friable
14-32	10YR5/4 Yellowish brown, loamy fine sand, granular, friable
32-68	10YR5/4 Yellowish brown, gravelly coarse sand, single grain, loose



Estimated Seasonal High Water Table @	none	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	22	inches
Refusal @	none	inches			
Percolation Rate =	4	Minutes / Inch @ 30			



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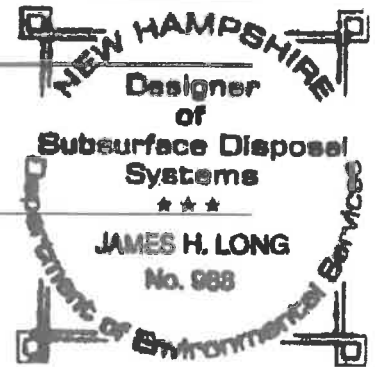
Date: 9/21/22

Test Pit No. 19A      NOTES: Lot 10

Depth (inches)      Description

^0-34      10YR4/3 Brown, gravelly sandy loam, granular, friable  
 34-48      10YR5/4 Yellowish brown, sand, single grain, loose  
 48-64      2.5Y6/4 Light yellowish brown, sand, single grain, loose, with,  
             7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	48	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =		Minutes / Inch @ 30			

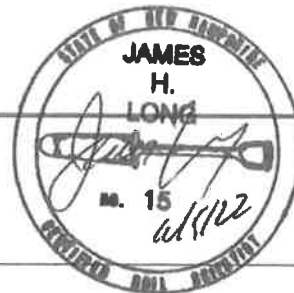


Test Pit No. 19B      NOTES: Lot 10

Depth (inches)      Description

^0-10      10YR4/3 Brown, sandy loam, granular, friable  
 10-44      10YR4/4 Dark yellowish brown, sand, single grain, loose  
 44-60      2.5Y6/4 Light yellowish brown, sand, single grain, loose  
 60-112      2.5Y6/3 Light yellowish brown, sand, single grain, loose, with,  
             7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	44	inches	Observed Water Table @	112	inches
Restrictive @	none	inches	Roots @	24	inches
Refusal @	none	inches			
Percolation Rate =		Minutes / Inch @ 30			





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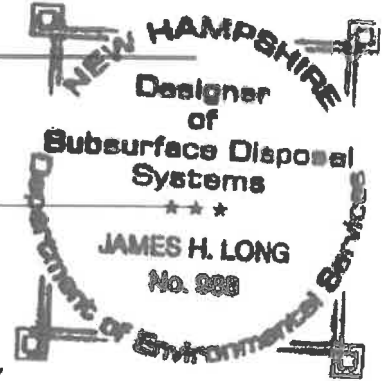
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Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. 21 NOTES: Lot 5, 7/29/22

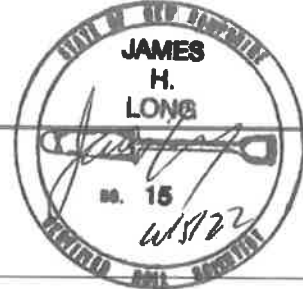
Depth (Inches)	Description
^0-10	2.5Y3/3 Dark olive brown, gravelly loamy sand, granular, friable
10-24	2.5Y5/4 Light olive brown, cobbly gravelly coarse sand, single grain, loose
24-62	2.5Y5/3 Light olive brown, cobbly gravelly coarse sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features



Estimated Seasonal High Water Table @	24	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	20	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

Test Pit No. 21A NOTES: Lot 5

Depth (inches)	Description
^0-10	10YR3/3 Dark brown, loamy fine sand, granular, friable
10-32	10YR5/4 Yellowish brown, gravelly coarse sand, single grain, loose
32-62	10YR5/4 Yellowish brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features



Estimated Seasonal High Water Table @	32	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	16	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



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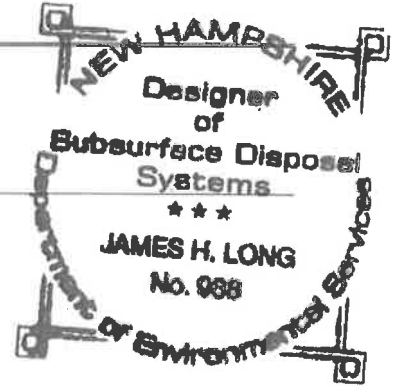
File No. 04.0191442.00

Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. 22A NOTES: Lot 8

Depth (inches)	Description
^0-8	10YR4/3 Brown, loamy fine sand, granular, friable
8-24	10YR5/6 Yellowish brown, sand, single grain, loose
24-50	10YR5/4 Yellowish brown, sand, single grain, loose
50-62	2.5Y5/2 Grayish brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features



Estimated Seasonal High Water Table @	50	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	22	inches
Refusal @	none	inches			
Percolation Rate =		Minutes / Inch @ 30			

Test Pit No. 22B NOTES: Lot 8

Depth (inches)	Description
^0-4	10YR4/3 Brown, loamy fine sand, granular, friable
4-22	10YR5/6 Yellowish brown, sand, single grain, loose
22-48	10YR5/4 Yellowish brown, sand, single grain, loose
48-	2.5Y5/2 Grayish brown, sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features



Estimated Seasonal High Water Table @	48	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	30	inches
Refusal @	none	inches			
Percolation Rate =		Minutes / Inch @ 30			



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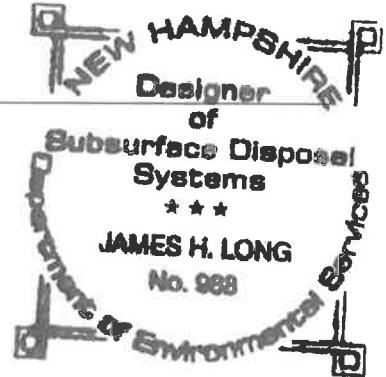
File No. 04.0191442.00

Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. D-4 NOTES: Stormwater detention area

Depth (Inches)	Description
0-12	10YR/3 Brown, gravelly loamy sand, granular, friable
12-26	7.5YR5/6 Strong brown, cobbly gravel sand, single grain, loose
26-48	10YR5/6 Yellowish brown, sand, single grain, loose
48-60	2.5Y6/2 Light brownish gray, very fine sand, granular, friable



Estimated Seasonal High Water Table @	48	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	24	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



Test Pit No. D-5 NOTES: Stormwater detention area

Depth (inches)	Description
0-12	10YR4/3 Brown, loamy sand, granular, friable
12-24	10YR5/6 Yellowish brown, sand, single grain, loose
24-62	10YR5/4 Yellowish brown, gravelly coarse sand, single grain, loose, with, 7.5YR4/6 Strong brown and 2.5Y 6/2 Light brownish gray redoximorphic features

Estimated Seasonal High Water Table @	24	inches	Observed Water Table @	58	inches
Restrictive @	none	inches	Roots @	14	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



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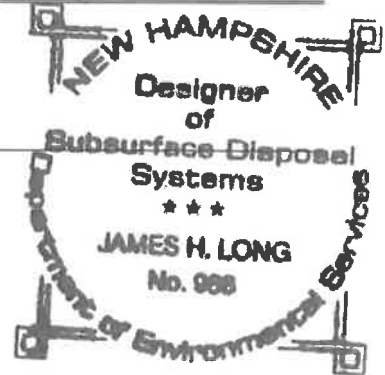
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Evaluated by: James H. Long, CSS Designer: 988

Date: 9/21/22

Test Pit No. D-6 NOTES: Stormwater detention area

Depth (Inches)	Description
0-12	10YR4/3 Brown, loamy sand, granular, friable
12-28	10YR5/6 Yellowish brown, sand, single grain, loose
28-64	10YR5/4 Yellowish brown, gravelly coarse sand, single grain, loose



Estimated Seasonal High Water Table @	28	inches	Observed Water Table @	64	inches
Restrictive @	none	inches	Roots @	14	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			



Test Pit No. D-7 NOTES:

Depth (inches)	Description
0-4	10YR4/3 Brown, loamy sand, granular, friable
4-32	10YR5/4 Yellowish brown, sand, single grain, loose
32-60	10YR5/6 Yellowish brown, cobbly gravelly coarse sand, single grain, loose

Estimated Seasonal High Water Table @	none	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	24	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			





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Evaluated by: James H. Long, CSS      Designer: 988

Date: 9/21/22

Test Pit No. D-8                                      **NOTES:**

**Depth (Inches)                      Description**

2-0	Forest mat
0-4	10YR3/3 Dark brown, loamy fine sand, granular, friable
4-40	10YR5/6 Yellowish brown, cobbly gravelly coarse sand, single grain, loose
40-62	2.5Y5/3 Light olive brown, fine sand, granular, friable

Estimated Seasonal High Water Table @	40	inches	Observed Water Table @	none	inches
Restrictive @	none	inches	Roots @	24	inches
Refusal @	none	inches			
Percolation Rate =	2	Minutes / Inch @ 30			

