**DRAINAGE ANALYSIS**
**&**
**SEDIMENT AND EROSION CONTROL PLAN**

Prepared for:

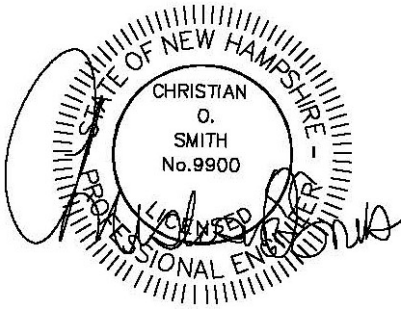
**DR LEMIEUX BUILDERS, INC.**
**76 EXETER ROAD**
**NEWMARKET, NH 03857**

Prepared by:

**BEALS ASSOCIATES, *PLLC***
**70 PORTSMOUTH AVENUE**
**STRATHAM, NH 03885**

Project Number:
NH-1449
242 South Main Street
Newmarket, New Hampshire

**May 23, 2023**
**Revised 10-17-23**



# DESIGN METHOD OBJECTIVES

DR Lemieux Builders is proposing a 32-unit age-restricted multi-family residential development on approximately 7.22-acres of land located at 242 So. Main St.in Newmarket, NH. The existing property is located on a parcel (Tax Map U4, Lot 69) consisting of forest, a single-family house and mowed fields. The development will include: on-site underground electric, telephone & cable; municipal water and sewer; and Low Impact Development/BMP storm water management and treatment. Proper erosion controls will be proposed where construction could result in sediment transport for the development. A drainage analysis of the proposed development including a proposed subdivided lot from the parent parcel 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 1", 2Yr, 10Yr, 25Yr and 50Yr – 24 Hr storm (100Yr storm for pond evaluation) events using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. As Newmarket is in the defined coastal region by NHDES, a factor of 15% Has been added to the 24 Hr rainfall values as provided by the Northeast Regional Climate Center at Cornell University. 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.

ANALYSIS POINT COMPONENT PEAK RATE of DISCHARGE (CFS)

Reach 100

| 2 YR | | 10 YR | | 25 YR | | 50YR | | 100YR | |
|---|---|---|---|---|---|---|---|---|---|
| Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| 7.59 | 6.90 | 16.32 | 15.25 | 23.87 | 23.29 | 31.01 | 30.56 | 39.65 | 39.34 |

Stormwater Volume (AF)

Analysis Point

Reach 100

| 2 YR | | 10 YR | | 25 YR | | 50YR | | 100YR | |
|---|---|---|---|---|---|---|---|---|---|
| Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| 0.929 | 0.832 | 1.934 | 1.776 | 2.812 | 2.630 | 3.675 | 3.467 | 4.732 | 4.512 |

The existing property is located on a parcel (Tax Map U4, Lot 69) consisting of wetlands, forest, a single-family house and mowed fields. The existing topography is such that the site analysis is a single analysis point reach. The reach flows offsite to the north-northwest through the parcel and ultimately flows into a large wetland system that ultimately drains toward the Piscassic River.

The proposed 32-unit development includes 220'+/- of proposed private driveway that intersects So Main Street. The proposed layout will divide the parcel into 4 different subcatchments. The peak rate of run-off from the proposed development is slightly decreased from that of the existing conditions. The addition of culverts, bioretention ponds, and stone roof infiltration trenches infiltrate and/or direct the cleaned run off overland to the analysis points. All roadway runoff receives treatment through a bioretention ponds and the natural buffer prior to discharge. In addition, the potential for increased erosion and sedimentation is handled by way of riprap outlet protection and erosion control fencing/berm. The use of Best Management Practices per the NH Stormwater Manual have 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.

# Table of Contents

## 1.0 RAINFALL CHARACTERISTICS

This drainage report 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, & 50 Yr – 24 Hr storm events using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment.

ANALYSIS POINT COMPONENT PEAK RATE of DISCHARGE (CFS)
Reach 100

| 2 YR | | 10 YR | | 25 YR | | 50YR | | 100YR | |
|---|---|---|---|---|---|---|---|---|---|
| Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| 7.59 | 6.90 | 16.32 | 15.25 | 23.87 | 23.29 | 31.01 | 30.56 | 39.65 | 39.34 |

Stormwater Volume (AF)
Analysis Point
Reach 100

| 2 YR | | 10 YR | | 25 YR | | 50YR | | 100YR | |
|---|---|---|---|---|---|---|---|---|---|
| Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| 0.929 | 0.832 | 1.934 | 1.776 | 2.812 | 2.630 | 3.675 | 3.467 | 4.732 | 4.512 |

## 2.0 EXISTING CONDITIONS

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

The existing property is located on a parcel (Tax Map U4, Lot 69) consisting of wetlands, forest, a single-family house and mowed fields. The existing topography is such that the site analysis is a single analysis point reach. The reach flows offsite to the north-northwest through the parcel and ultimately flows into a large wetland system that ultimately drains toward the Piscassic River.

Classified by NRCS Mapping, the land within the drainage analysis is composed of slopes ranging from 0% to 8% +, and soils categorized into the Hydrologic Soil Groups (HSG) C & D.

## 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 paved roadways, and the 32 unit building for the residential units cause an increase in the curve number (Cn) and a decrease in the time of concentration (Tc), the net result being a potential increase in peak rates of run-off from the site. The proposed 32-unit development includes 220'+/- of proposed private driveway that intersects So Main Street. The proposed layout will divide the parcel into 4 different subcatchments. The peak rate of run-off from the proposed development is slightly decreased from that of the existing conditions. The addition of culverts, bioretention ponds, and stone roof infiltration

trenches infiltrate and/or direct the cleaned run off overland to the analysis points. All driveway runoff receives treatment through a bioretention ponds and the natural buffer prior to discharge. Ksat values for the infiltration rates were from SSSNNE published values with a safety factor of 2. Based on these design features and the sequencing of pretreatment and treatment BMP's, the required 80% removal of TSS and 40% removal of TN & TP will be exceeded as required by Newmarket regulations (see removal efficiency summary table in appendices). In addition, the potential for increased erosion and sedimentation is handled by way of riprap outlet protection and erosion control fencing/berm. The use of Best Management Practices per the NH Stormwater Manual have 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.

In an effort to prevent the sedimentation of abutting property, the driveway and parking areas will convey stormwater to the bioretention ponds and overflow discharges to the natural buffer to the wetlands. During construction, appropriate 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 adequate treatment of stormwater run-off for sediment control.

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

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 NH 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 / Construction Fence

The plan set demonstrates the location of silt fence for sediment control. In areas where the limits of construction need to be emphasized to operators, construction fence for added visibility will be installed. Erosion and Sediment Control Details have 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 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 30 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 as follows:

| **Mixture** | **Pounds** per Acre | **Pounds per** 1,000 Sq. Ft. |
|---|---|---|
| Tall Fescue | 20 | 0.45 |
| Creeping Red Fescue | 28 | 0.65 |
| 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.

4.5 Level Spreaders

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 filter strip, thus allowing for better filter strip efficiency and a lesser potential for erosion.

4.6 Filter Strips

Filter strips 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. Filter strips 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, vegetated swales, level spreaders, and constructed

filter strips), 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 0.25" 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 drainage structures will be constructed and 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 land 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.

4.11 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 at 242 So. Main St. in Newmarket, NH will have no adverse effect on the 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 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 culverts, bioretention ponds, stone drip edges for roof infiltration, and riprap outlet protection. 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 Site Specific, Terrain Alteration Permit (RSA 485: A-17) is not required for this project due to the area of disturbance being less than 100,000 square feet.

Respectfully Submitted,

BEALS ASSOCIATES, *PLLC*.

Chrisitan O. Smith

Christian O. Smith, PE
Principal

# APPENDIX I

## Existing Conditions Drainage Analysis

Summary 2 YR - 24 HR rainfall = 3.62"
Complete 10 YR – 24 HR rainfall = 5.50”
Summary 25 YR – 24 HR rainfall = 6.99”
Summary 50 YR - 24 HR rainfall = 8.38"
Summary 100 YR – 24 HR rainfall = 10.06”

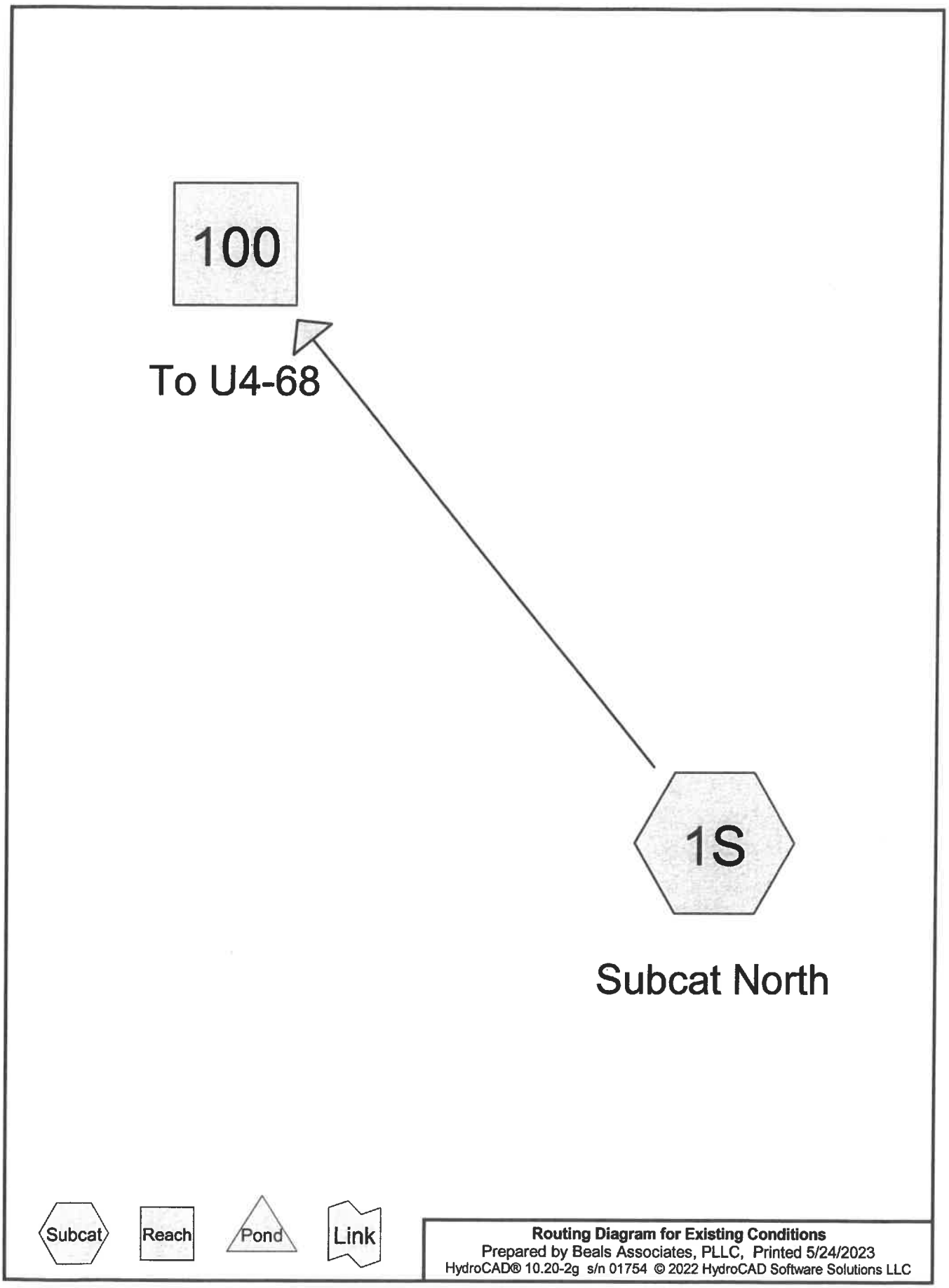
# APPENDIX II

## Proposed Conditions Drainage Analysis

Summary 2 YR - 24 HR rainfall = 3.62"
Complete 10 YR – 24 HR rainfall = 5.50”
Summary 25 YR – 24 HR rainfall = 6.99”
Summary 50 YR - 24 HR rainfall = 8.38"
Summary 100 YR – 24 HR rainfall = 10.06”

# APPENDIX III

## Charts, Graphs, and Calculations




**Routing Diagram for Existing Conditions**
Prepared by Beals Associates, PLLC, Printed 5/24/2023

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 2.470 | 74 | >75% Grass cover, Good, HSG C (1S) |
| 0.256 | 98 | Paved roads w/curbs & sewers, HSG C (1S) |
| 0.039 | 98 | Roofs, HSG C (1S) |
| 3.296 | 70 | Woods, Good, HSG C (1S) |
| 2.270 | 77 | Woods, Good, HSG D (1S) |
| **8.331** | **74** | **TOTAL AREA** |

## Soil Listing (all nodes)

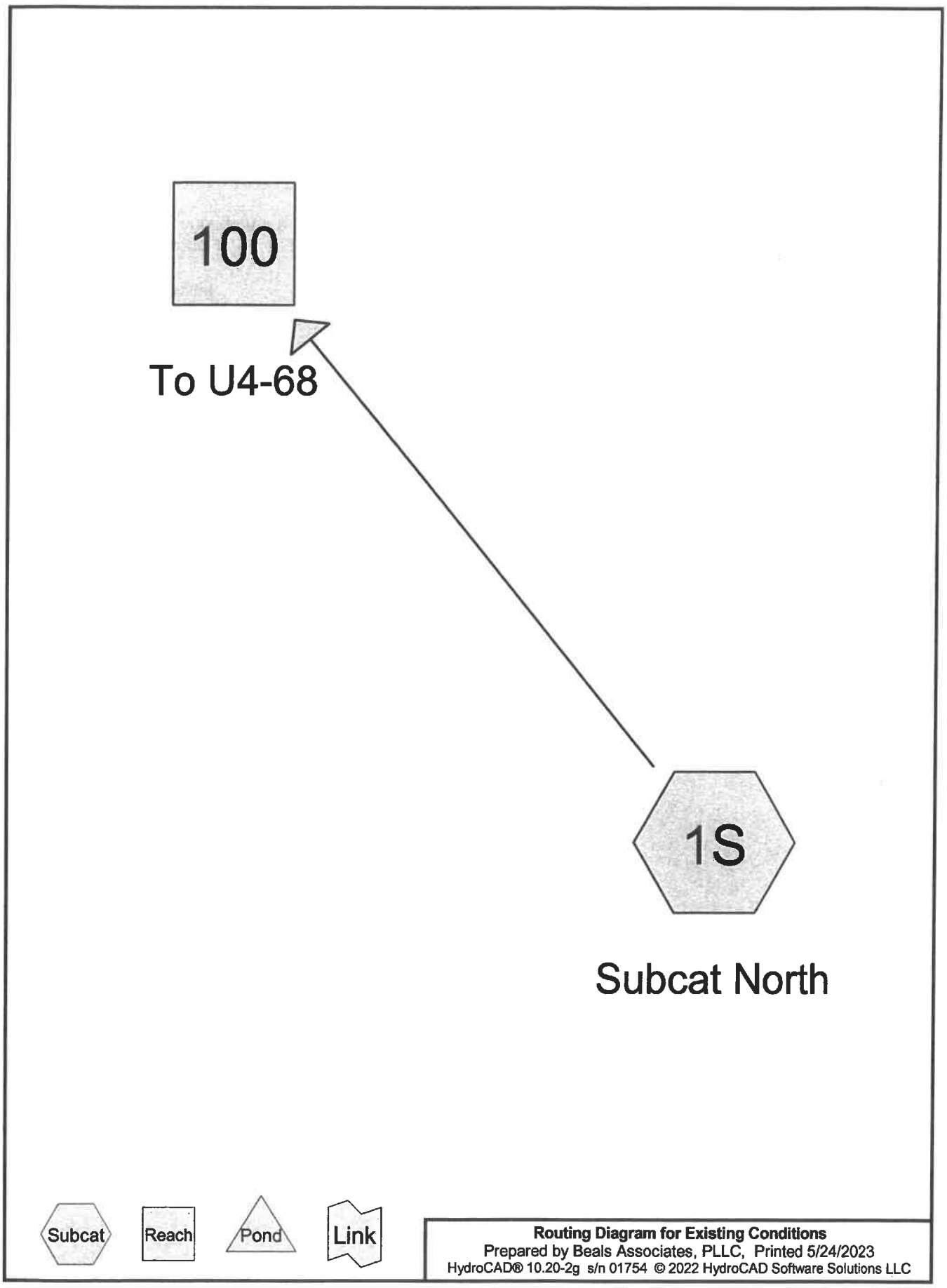
| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.000 | HSG A | |
| 0.000 | HSG B | |
| 6.061 | HSG C | 1S |
| 2.270 | HSG D | 1S |
| 0.000 | Other | |
| **8.331** | | **TOTAL AREA** |

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 1S: Subcat North** Runoff Area=362,906 sf 3.54% Impervious Runoff Depth=1.34"
Flow Length=860' Tc=26.1 min CN=74 Runoff=7.59 cfs 0.929 af

**Reach 100: To U4-68** Inflow=7.59 cfs 0.929 af
Outflow=7.59 cfs 0.929 af

**Total Runoff Area = 8.331 ac Runoff Volume = 0.929 af Average Runoff Depth = 1.34"**
**96.46% Pervious = 8.036 ac 3.54% Impervious = 0.295 ac**




**Routing Diagram for Existing Conditions**
Prepared by Beals Associates, PLLC, Printed 5/24/2023

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 1S: Subcat North** Runoff Area=362,906 sf 3.54% Impervious Runoff Depth=2.79"
Flow Length=860' Tc=26.1 min CN=74 Runoff=16.32 cfs 1.934 af

**Reach 100: To U4-68** Inflow=16.32 cfs 1.934 af
Outflow=16.32 cfs 1.934 af

**Total Runoff Area = 8.331 ac Runoff Volume = 1.934 af Average Runoff Depth = 2.79"**
**96.46% Pervious = 8.036 ac 3.54% Impervious = 0.295 ac**

## Summary for Subcatchment 1S: Subcat North

Runoff = 16.32 cfs @ 12.38 hrs, Volume= 1.934 af, Depth= 2.79"
Routed to Reach 100 : To U4-68

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.52"

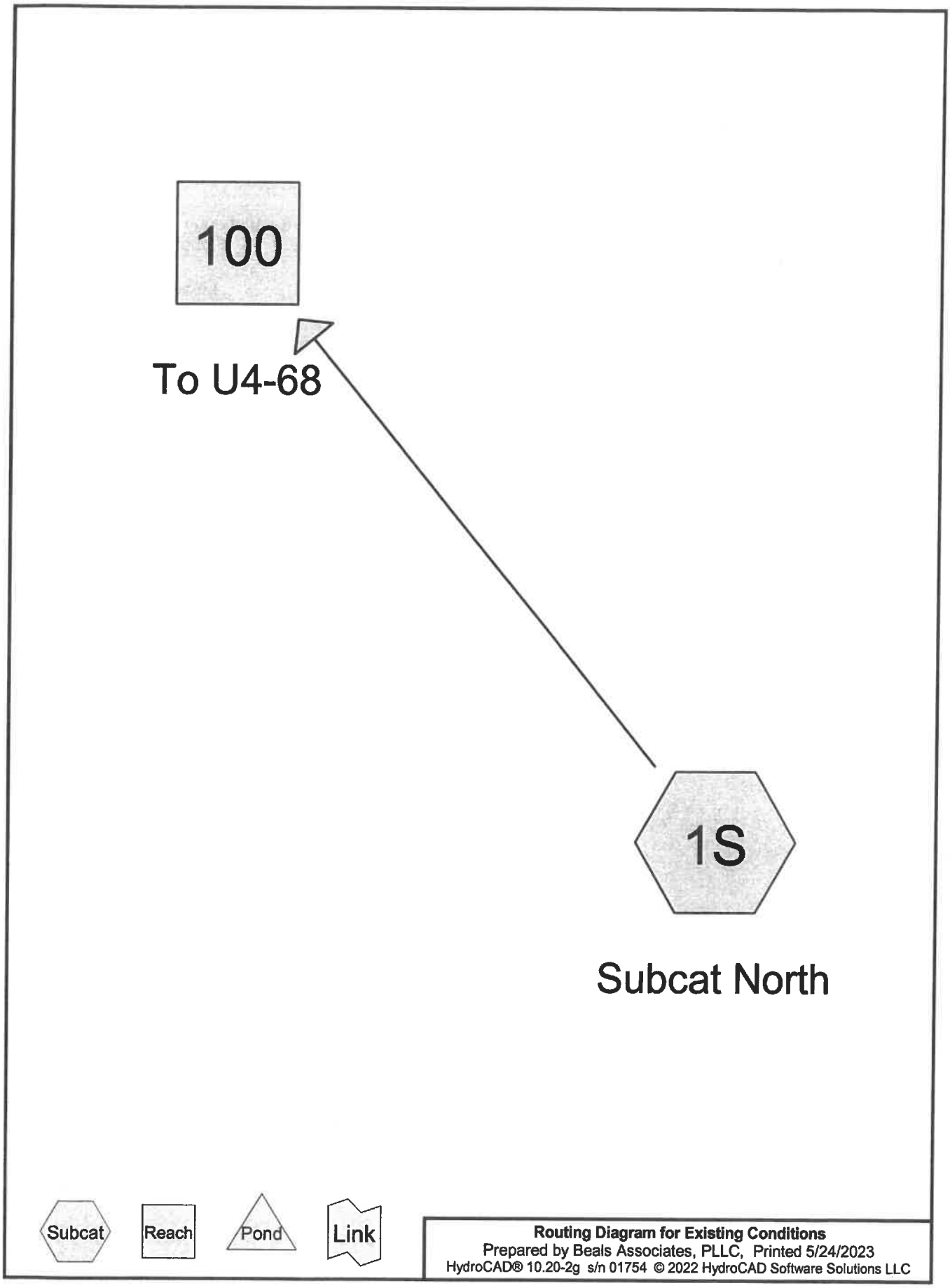
| Area (sf) | CN | Description |
|---|---|---|
| 11,149 | 98 | Paved roads w/curbs & sewers, HSG C |
| 1,703 | 98 | Roofs, HSG C |
| 107,605 | 74 | >75% Grass cover, Good, HSG C |
| 143,557 | 70 | Woods, Good, HSG C |
| 98,892 | 77 | Woods, Good, HSG D |
| 362,906 | 74 | Weighted Average |
| 350,054 | | 96.46% Pervious Area |
| 12,852 | | 3.54% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.2 | 50 | 0.0250 | 0.07 | | **Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.24" |
| 12.6 | 397 | 0.0110 | 0.52 | | **Shallow Concentrated Flow, SC to VPD** Woodland Kv= 5.0 fps |
| 2.3 | 413 | 0.0072 | 3.03 | 94.50 | **Channel Flow, To Anal. pnt** Area= 31.2 sf Perim= 51.0' r= 0.61' n= 0.030 Earth, grassed & winding |
| 26.1 | 860 | Total | | | |

## Summary for Reach 100: To U4-68

Inflow Area = 8.331 ac, 3.54% Impervious, Inflow Depth = 2.79" for 10-Yr event
Inflow = 16.32 cfs @ 12.38 hrs, Volume= 1.934 af
Outflow = 16.32 cfs @ 12.38 hrs, Volume= 1.934 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs



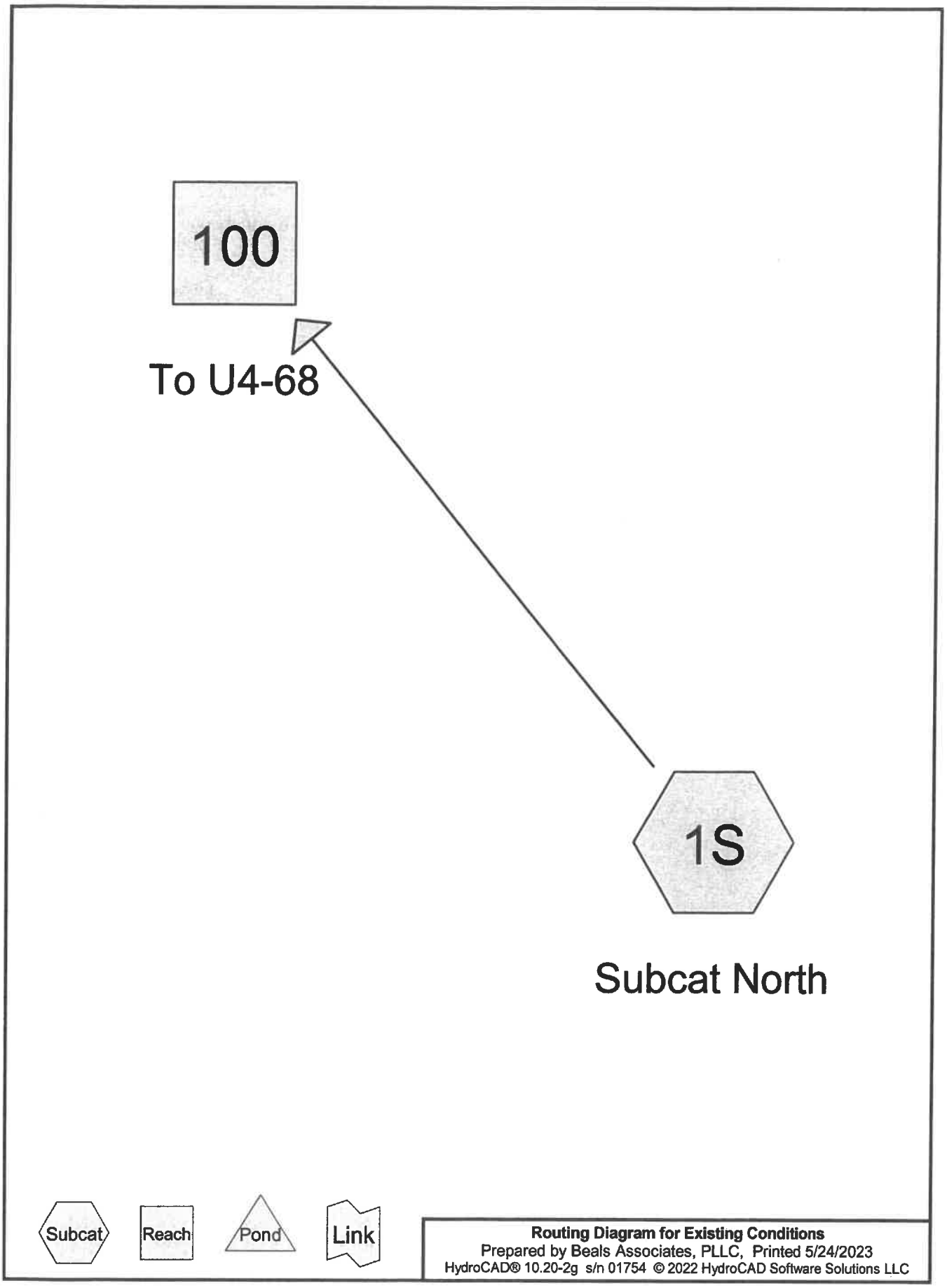

**Routing Diagram for Existing Conditions**
Prepared by Beals Associates, PLLC, Printed 5/24/2023
HydroCAD® 10.20-2g s/n 01754 © 2022 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 1S: Subcat North** Runoff Area=362,906 sf 3.54% Impervious Runoff Depth=4.05"
Flow Length=860' Tc=26.1 min CN=74 Runoff=23.78 cfs 2.812 af

**Reach 100: To U4-68** Inflow=23.78 cfs 2.812 af
Outflow=23.78 cfs 2.812 af

**Total Runoff Area = 8.331 ac Runoff Volume = 2.812 af Average Runoff Depth = 4.05"**
**96.46% Pervious = 8.036 ac 3.54% Impervious = 0.295 ac**



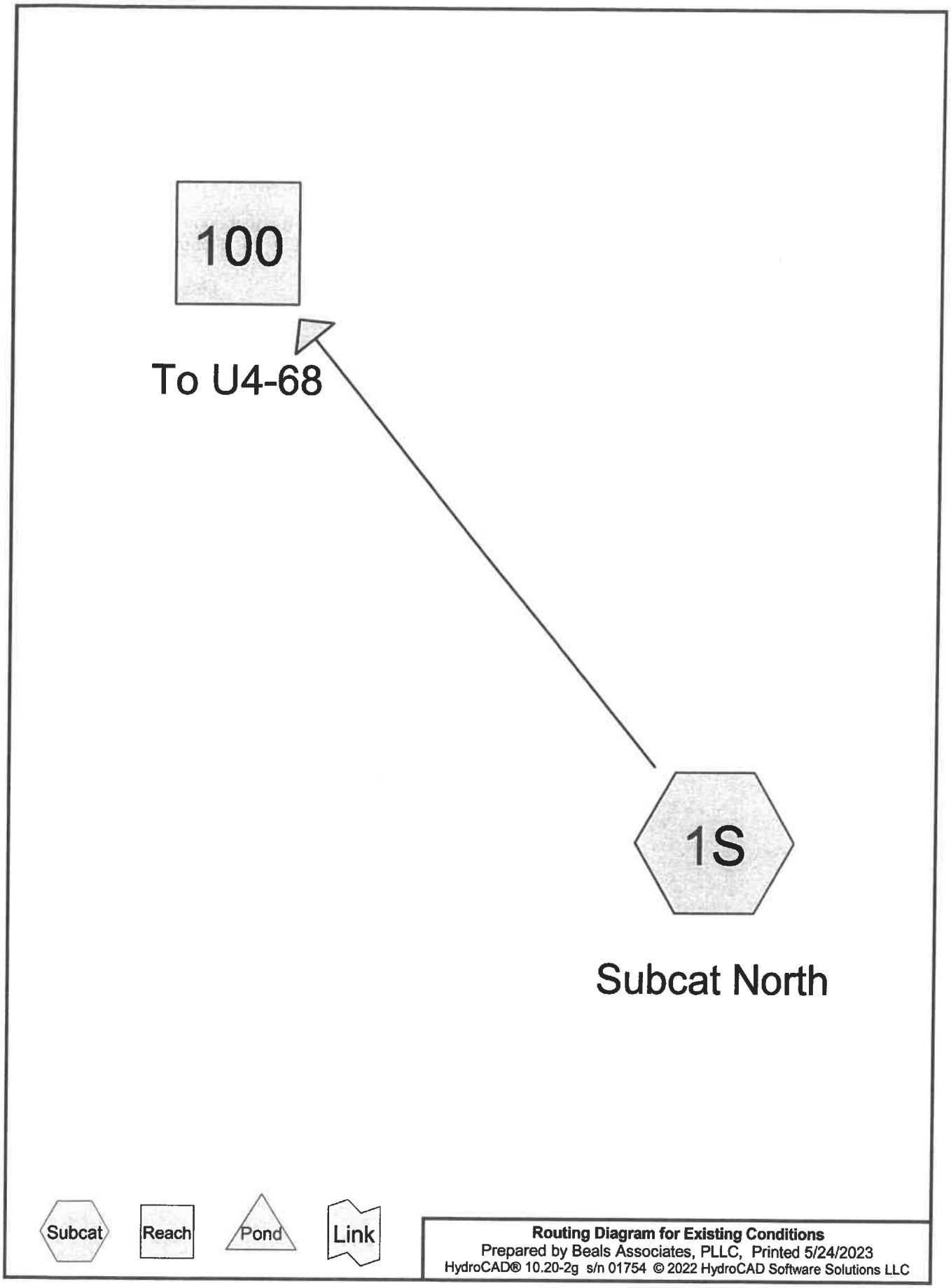

**Routing Diagram for Existing Conditions**
Prepared by Beals Associates, PLLC, Printed 5/24/2023

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 1S: Subcat North** Runoff Area=362,906 sf 3.54% Impervious Runoff Depth=5.29"
Flow Length=860' Tc=26.1 min CN=74 Runoff=31.01 cfs 3.675 af

**Reach 100: To U4-68** Inflow=31.01 cfs 3.675 af
Outflow=31.01 cfs 3.675 af

**Total Runoff Area = 8.331 ac Runoff Volume = 3.675 af Average Runoff Depth = 5.29"**
**96.46% Pervious = 8.036 ac 3.54% Impervious = 0.295 ac**




**Routing Diagram for Existing Conditions**
Prepared by Beals Associates, PLLC, Printed 5/24/2023

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 1S: Subcat North** Runoff Area=362,906 sf 3.54% Impervious Runoff Depth=6.80"
Flow Length=860' Tc=26.1 min CN=74 Runoff=39.65 cfs 4.723 af

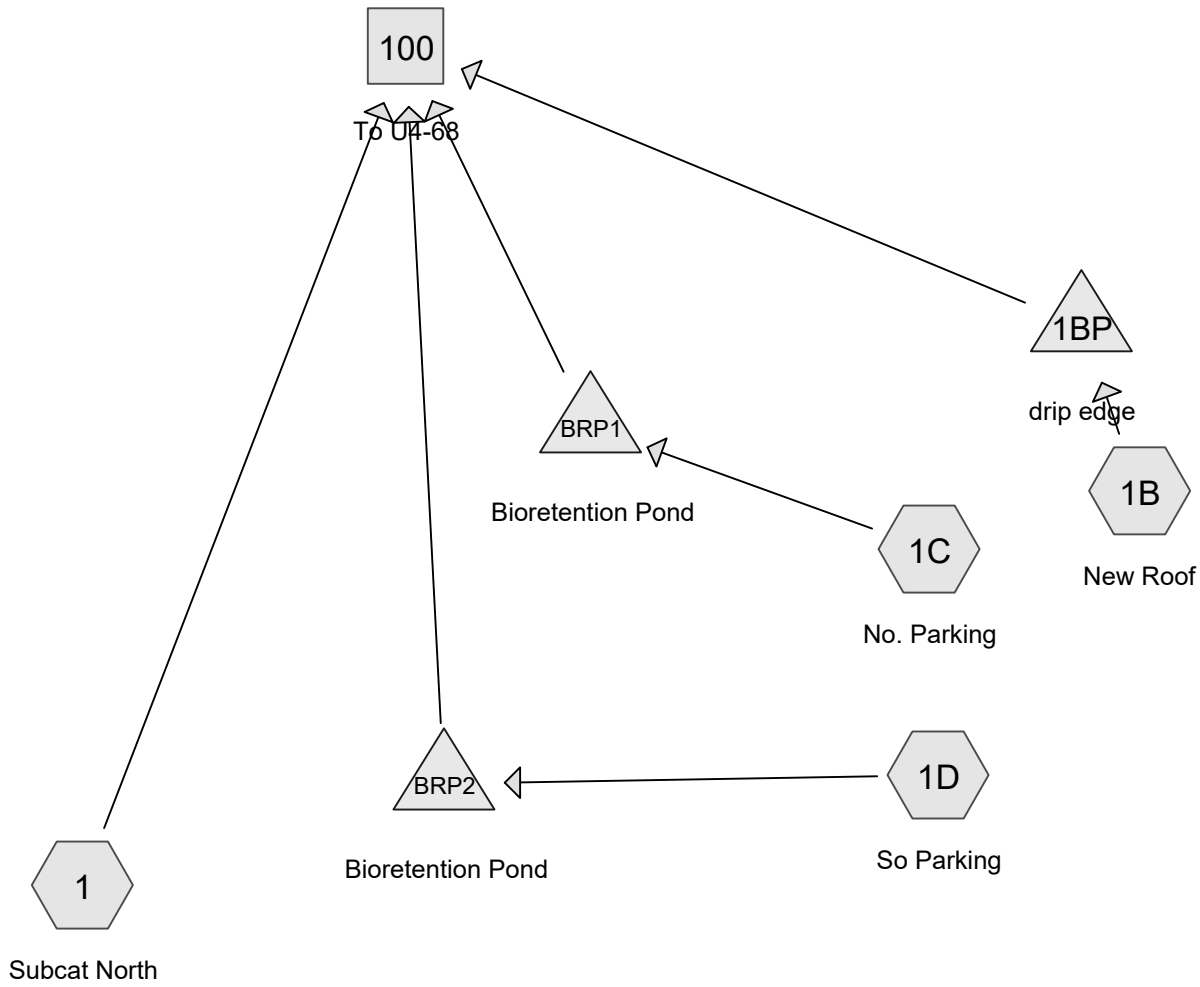
**Reach 100: To U4-68** Inflow=39.65 cfs 4.723 af
Outflow=39.65 cfs 4.723 af

**Total Runoff Area = 8.331 ac Runoff Volume = 4.723 af Average Runoff Depth = 6.80"**
**96.46% Pervious = 8.036 ac 3.54% Impervious = 0.295 ac**

# APPENDIX II

## Proposed Conditions Drainage Analysis

Summary 2 YR - 24 HR rainfall = 3.62"
Complete 10 YR – 24 HR rainfall = 5.50”
Summary 25 YR – 24 HR rainfall = 6.99”
Summary 50 YR - 24 HR rainfall = 8.38"
Summary 100 YR – 24 HR rainfall = 10.06”




Subcat Reach Pond Link

**Routing Diagram for Proposed Conditions - SED Combine**
Prepared by Beals Associates, PLLC, Printed 10/18/2023

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 1.986 | 74 | >75% Grass cover, Good, HSG C (1, 1B, 1C, 1D) |
| 0.319 | 98 | Paved parking, HSG C (1C, 1D) |
| 0.256 | 98 | Paved roads w/curbs & sewers, HSG C (1, 1D) |
| 0.233 | 98 | Roofs, HSG C (1, 1B) |
| 3.296 | 70 | Woods, Good, HSG C (1) |
| 2.270 | 77 | Woods, Good, HSG D (1) |
| **8.360** | **76** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.000 | HSG A | |
| 0.000 | HSG B | |
| 6.090 | HSG C | 1, 1B, 1C, 1D |
| 2.270 | HSG D | 1 |
| 0.000 | Other | |
| **8.360** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 1.986 | 0.000 | 0.000 | 1.986 | >75% Grass cover, Good | 1, 1B, 1C, 1D |
| 0.000 | 0.000 | 0.319 | 0.000 | 0.000 | 0.319 | Paved parking | 1C, 1D |
| 0.000 | 0.000 | 0.256 | 0.000 | 0.000 | 0.256 | Paved roads w/curbs & sewers | 1, 1D |
| 0.000 | 0.000 | 0.233 | 0.000 | 0.000 | 0.233 | Roofs | 1, 1B |
| 0.000 | 0.000 | 3.296 | 2.270 | 0.000 | 5.566 | Woods, Good | 1 |
| **0.000** | **0.000** | **6.090** | **2.270** | **0.000** | **8.360** | **TOTAL AREA** | |

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1: SubcatNorth** Runoff Area=325,014 sf 3.07% Impervious Runoff Depth=1.32"
Flow Length=860' Tc=26.1 min CN=74 Runoff=6.72 cfs 0.823 af

**Subcatchment1B: New Roof** Runoff Area=9,146 sf 92.37% Impervious Runoff Depth=3.16"
Tc=6.0 min CN=96 Runoff=0.72 cfs 0.055 af

**Subcatchment1C: No. Parking** Runoff Area=7,993 sf 74.58% Impervious Runoff Depth=2.75"
Tc=6.0 min CN=92 Runoff=0.57 cfs 0.042 af

**Subcatchment1D: So Parking** Runoff Area=22,018 sf 49.11% Impervious Runoff Depth=2.20"
Flow Length=61' Tc=11.4 min CN=86 Runoff=1.09 cfs 0.093 af

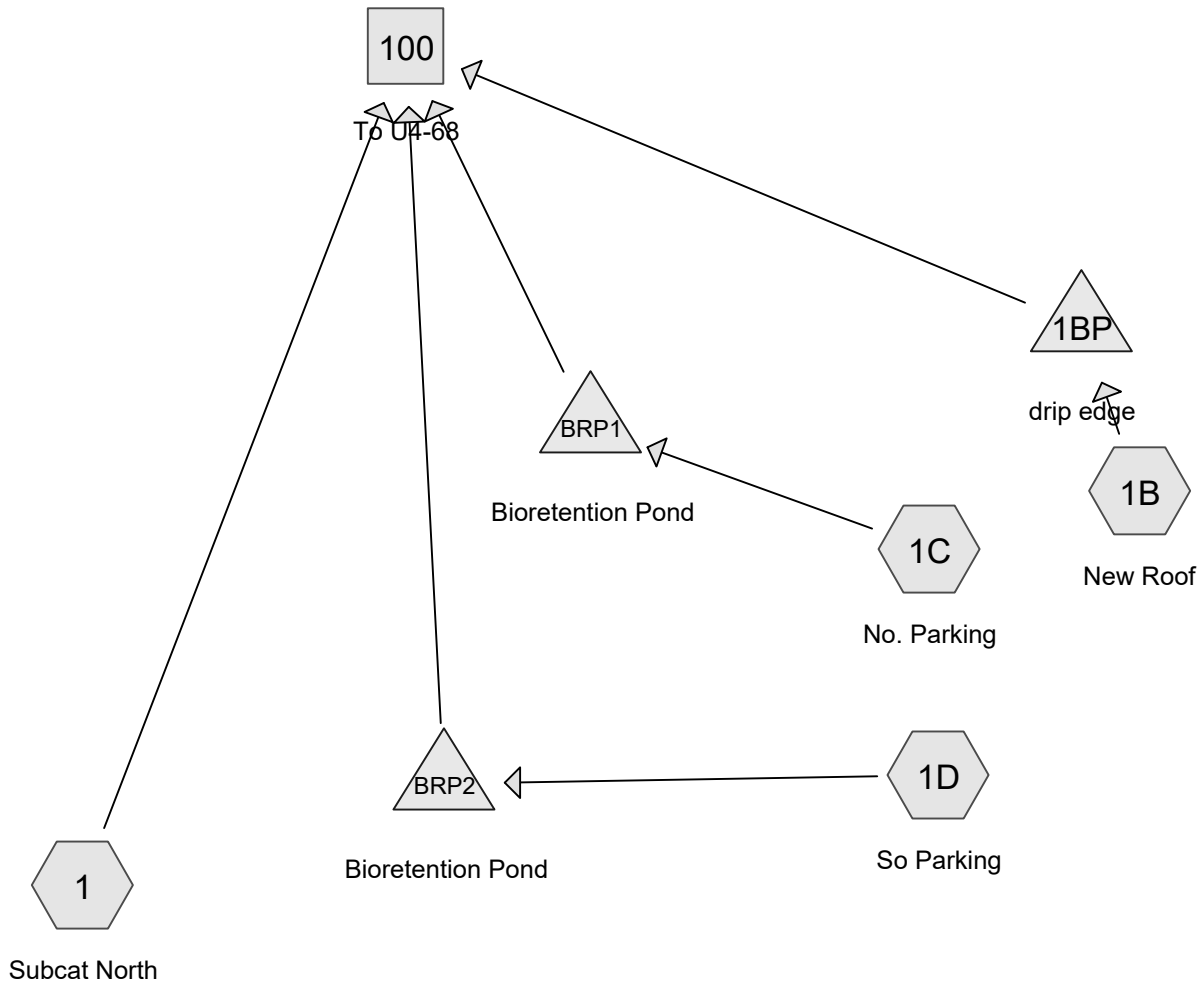
**Reach100: To U4-68** Inflow=6.90 cfs 0.832 af
Outflow=6.90 cfs 0.832 af

**Pond1BP: drip edge** Peak Elev=51.01' Storage=640 cf Inflow=0.72 cfs 0.055 af
Discarded=0.04 cfs 0.047 af Primary=0.66 cfs 0.009 af Outflow=0.71 cfs 0.055 af

**Pond BRP1: BioretentionPond** Peak Elev=50.36' Storage=821 cf Inflow=0.57 cfs 0.042 af
Discarded=0.06 cfs 0.042 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.042 af

**Pond BRP2: BioretentionPond** Peak Elev=50.72' Storage=1,495 cf Inflow=1.09 cfs 0.093 af
Discarded=0.14 cfs 0.093 af Primary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.093 af

**Total Runoff Area = 8.360 ac Runoff Volume = 1.013 af Average Runoff Depth = 1.45"**
**90.33% Pervious = 7.552 ac 9.67% Impervious = 0.808 ac**




Subcat Reach Pond Link

**Routing Diagram for Proposed Conditions - SED Combine**
Prepared by Beals Associates, PLLC, Printed 10/18/2023

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1: SubcatNorth** Runoff Area=325,014 sf 3.07% Impervious Runoff Depth=2.77"
Flow Length=860' Tc=26.1 min CN=74 Runoff=14.53 cfs 1.722 af

**Subcatchment1B: New Roof** Runoff Area=9,146 sf 92.37% Impervious Runoff Depth=5.03"
Tc=6.0 min CN=96 Runoff=1.12 cfs 0.088 af

**Subcatchment1C: No. Parking** Runoff Area=7,993 sf 74.58% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=92 Runoff=0.93 cfs 0.070 af

**Subcatchment1D: So Parking** Runoff Area=22,018 sf 49.11% Impervious Runoff Depth=3.94"
Flow Length=61' Tc=11.4 min CN=86 Runoff=1.92 cfs 0.166 af

**Reach100: To U4-68** Inflow=15.25 cfs 1.776 af
Outflow=15.25 cfs 1.776 af

**Pond1BP: drip edge** Peak Elev=51.01' Storage=641 cf Inflow=1.12 cfs 0.088 af
Discarded=0.04 cfs 0.058 af Primary=1.08 cfs 0.030 af Outflow=1.12 cfs 0.088 af

**Pond BRP1: BioretentionPond** Peak Elev=50.81' Storage=1,276 cf Inflow=0.93 cfs 0.070 af
Discarded=0.08 cfs 0.064 af Primary=0.23 cfs 0.006 af Outflow=0.31 cfs 0.070 af

**Pond BRP2: BioretentionPond** Peak Elev=51.51' Storage=2,597 cf Inflow=1.92 cfs 0.166 af
Discarded=0.19 cfs 0.148 af Primary=0.45 cfs 0.018 af Outflow=0.64 cfs 0.166 af

**Total Runoff Area = 8.360 ac Runoff Volume = 2.046 af Average Runoff Depth = 2.94"**
**90.33% Pervious = 7.552 ac 9.67% Impervious = 0.808 ac**

## Summary for Subcatchment 1: Subcat North

Runoff = 14.53 cfs @ 12.38 hrs, Volume= 1.722 af, Depth= 2.77"
Routed to Reach 100 : To U4-68

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 8,285 | 98 | Paved roads w/curbs & sewers, HSG C |
| 1,703 | 98 | Roofs, HSG C |
| 72,577 | 74 | >75% Grass cover, Good, HSG C |
| 143,557 | 70 | Woods, Good, HSG C |
| 98,892 | 77 | Woods, Good, HSG D |
| 325,014 | 74 | Weighted Average |
| 315,026 | | 96.93% Pervious Area |
| 9,988 | | 3.07% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.2 | 50 | 0.0250 | 0.07 | | **Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.24" |
| 12.6 | 397 | 0.0110 | 0.52 | | **Shallow Concentrated Flow, SC to VPD** Woodland Kv= 5.0 fps |
| 2.3 | 413 | 0.0072 | 3.03 | 94.50 | **Channel Flow, To Anal. pnt** Area= 31.2 sf Perim= 51.0' r= 0.61' n= 0.030 Earth, grassed & winding |
| 26.1 | 860 | Total | | | |

## Summary for Subcatchment 1B: New Roof

Runoff = 1.12 cfs @ 12.08 hrs, Volume= 0.088 af, Depth= 5.03"
Routed to Pond 1BP : drip edge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 8,448 | 98 | Roofs, HSG C |
| 698 | 74 | >75% Grass cover, Good, HSG C |
| 9,146 | 96 | Weighted Average |
| 698 | | 7.63% Pervious Area |
| 8,448 | | 92.37% Impervious Area |

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

## Summary for Subcatchment 1C: No. Parking

Runoff = 0.93 cfs @ 12.08 hrs, Volume= 0.070 af, Depth= 4.58"
Routed to Pond BRP1 : Bioretention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 5,961 | 98 | Paved parking, HSG C |
| 2,032 | 74 | >75% Grass cover, Good, HSG C |
| 7,993 | 92 | Weighted Average |
| 2,032 | | 25.42% Pervious Area |
| 5,961 | | 74.58% Impervious Area |

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

## Summary for Subcatchment 1D: So Parking

Runoff = 1.92 cfs @ 12.15 hrs, Volume= 0.166 af, Depth= 3.94"
Routed to Pond BRP2 : Bioretention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=5.50"

| Area (sf) | CN | Description |
|---|---|---|
| 2,864 | 98 | Paved roads w/curbs & sewers, HSG C |
| 7,950 | 98 | Paved parking, HSG C |
| 11,204 | 74 | >75% Grass cover, Good, HSG C |
| 22,018 | 86 | Weighted Average |
| 11,204 | | 50.89% Pervious Area |
| 10,814 | | 49.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.2 | 50 | 0.0090 | 0.07 | | **Sheet Flow, SHEET** Grass: Dense n= 0.240 P2= 3.24" |
| 0.2 | 11 | 0.0120 | 0.77 | | **Shallow Concentrated Flow, SC TO POND** Short Grass Pasture Kv= 7.0 fps |
| 11.4 | 61 | Total | | | |

## Summary for Reach 100: To U4-68

Inflow Area = 8.360 ac, 9.67% Impervious, Inflow Depth = 2.55" for 10-Yr event
Inflow = 15.25 cfs @ 12.38 hrs, Volume= 1.776 af
Outflow = 15.25 cfs @ 12.38 hrs, Volume= 1.776 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Summary for Pond 1BP: drip edge

Inflow Area = 0.210 ac, 92.37% Impervious, Inflow Depth = 5.03" for 10-Yr event
Inflow = 1.12 cfs @ 12.08 hrs, Volume= 0.088 af
Outflow = 1.12 cfs @ 12.09 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.04 cfs @ 9.61 hrs, Volume= 0.058 af
Primary = 1.08 cfs @ 12.09 hrs, Volume= 0.030 af
Routed to Reach 100 : To U4-68

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 51.01' @ 12.09 hrs Surf.Area= 638 sf Storage= 641 cf
Flood Elev= 51.10' Surf.Area= 638 sf Storage= 664 cf

Plug-Flow detention time=79.1 min calculated for 0.088 af (100% of inflow)
Center-of-Mass det. time=79.1 min ( 839.2 - 760.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 48.50' | 664 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 48.50 | 638 | 0.0 | 0 | 0 |
| 51.10 | 638 | 40.0 | 664 | 664 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 48.50' | **3.000 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 51.00' | **190.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.04 cfs @ 9.61 hrs HW=48.53' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.85 cfs @ 12.09 hrs HW=51.01' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.85 cfs @ 0.33 fps)

## Summary for Pond BRP1: Bioretention Pond

Inflow Area = 0.183 ac, 74.58% Impervious, Inflow Depth = 4.58" for 10-Yr event
Inflow = 0.93 cfs @ 12.08 hrs, Volume= 0.070 af
Outflow = 0.31 cfs @ 12.36 hrs, Volume= 0.070 af, Atten= 66%, Lag= 16.8 min
Discarded = 0.08 cfs @ 12.36 hrs, Volume= 0.064 af
Primary = 0.23 cfs @ 12.36 hrs, Volume= 0.006 af
Routed to Reach 100 : To U4-68

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 50.81' @ 12.36 hrs Surf.Area= 1,148 sf Storage= 1,276 cf
Flood Elev= 51.00' Surf.Area= 1,264 sf Storage= 1,507 cf

Plug-Flow detention time= 178.9 min calculated for 0.070 af (100% of inflow)
Center-of-Mass det. time= 178.9 min ( 958.7 - 779.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 46.75' | 1,083 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| #2 | 49.00' | 424 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| | | 1,507 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 46.75 | 219 | 0.0 | 0 | 0 |
| 47.75 | 219 | 40.0 | 88 | 88 |
| 49.25 | 219 | 30.0 | 99 | 186 |
| 51.00 | 806 | 100.0 | 897 | 1,083 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 49.00 | 13 | 0 | 0 |
| 50.00 | 188 | 101 | 101 |
| 51.00 | 458 | 323 | 424 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 50.75' | **6.0' long x 3.0' breadth Broad-Crested Rectangular Weir**<br>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<br>Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32 |
| #2 | Discarded | 46.75' | **3.000 in/hr Exfiltration over Surface area** Phase-In= 0.01' |

**Discarded OutFlow** Max=0.08 cfs @ 12.36 hrs HW=50.81' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

**Primary OutFlow** Max=0.21 cfs @ 12.36 hrs HW=50.81' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.21 cfs @ 0.59 fps)

## Summary for Pond BRP2: Bioretention Pond

Inflow Area = 0.505 ac, 49.11% Impervious, Inflow Depth = 3.94" for 10-Yr event
Inflow = 1.92 cfs @ 12.15 hrs, Volume= 0.166 af
Outflow = 0.64 cfs @ 12.52 hrs, Volume= 0.166 af, Atten= 67%, Lag= 22.3 min
Discarded = 0.19 cfs @ 12.52 hrs, Volume= 0.148 af
Primary = 0.45 cfs @ 12.52 hrs, Volume= 0.018 af
Routed to Reach 100 : To U4-68

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 51.51' @ 12.52 hrs Surf.Area= 2,763 sf Storage= 2,597 cf
Flood Elev= 51.90' Surf.Area= 4,617 sf Storage= 3,965 cf

Plug-Flow detention time= 120.8 min calculated for 0.166 af (100% of inflow)
Center-of-Mass det. time= 120.8 min ( 926.7 - 805.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 48.83' | 2,783 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| #2 | 49.00' | 1,182 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| | | 3,965 cf | Total Available Storage |

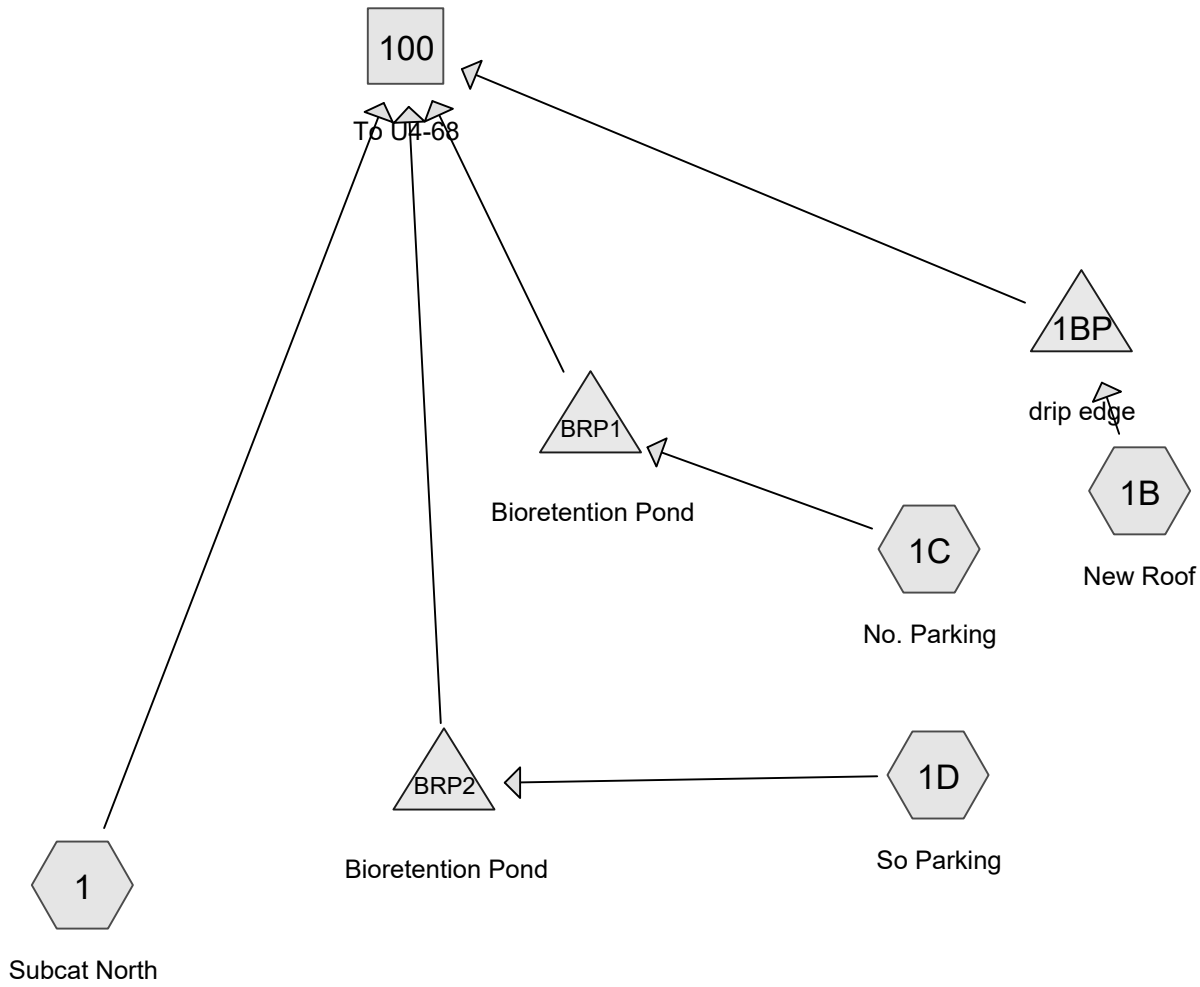
| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 48.83 | 1,583 | 0.0 | 0 | 0 |
| 49.83 | 1,583 | 40.0 | 633 | 633 |
| 51.33 | 1,583 | 30.0 | 712 | 1,346 |
| 51.50 | 1,986 | 100.0 | 303 | 1,649 |
| 51.90 | 3,682 | 100.0 | 1,134 | 2,783 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 49.00 | 53 | 0 | 0 |
| 50.00 | 276 | 165 | 165 |
| 51.50 | 745 | 766 | 930 |
| 51.80 | 935 | 252 | 1,182 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 50.00' | **15.0" Round Culvert**<br>L= 45.0' CPP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 50.00' / 49.77' S= 0.0051 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| #2 | Device 1 | 51.40' | **15.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Discarded | 48.83' | **3.000 in/hr Exfiltration over Surface area** Phase-In= 0.01' |

**Discarded OutFlow** Max=0.19 cfs @ 12.52 hrs HW=51.51' (Free Discharge)
↑—**3=Exfiltration** (Exfiltration Controls 0.19 cfs)

**Primary OutFlow** Max=0.45 cfs @ 12.52 hrs HW=51.51' (Free Discharge)
↑—**1=Culvert** (Passes 0.45 cfs of 4.58 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 0.45 cfs @ 1.07 fps)




Subcat Reach Pond Link

**Routing Diagram for Proposed Conditions - SED Combine**
Prepared by Beals Associates, PLLC, Printed 10/18/2023

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1: SubcatNorth** Runoff Area=325,014 sf 3.07% Impervious Runoff Depth=4.03"
Flow Length=860' Tc=26.1 min CN=74 Runoff=21.21 cfs 2.508 af

**Subcatchment1B: New Roof** Runoff Area=9,146 sf 92.37% Impervious Runoff Depth=6.51"
Tc=6.0 min CN=96 Runoff=1.43 cfs 0.114 af

**Subcatchment1C: No. Parking** Runoff Area=7,993 sf 74.58% Impervious Runoff Depth=6.04"
Tc=6.0 min CN=92 Runoff=1.21 cfs 0.092 af

**Subcatchment1D: So Parking** Runoff Area=22,018 sf 49.11% Impervious Runoff Depth=5.36"
Flow Length=61' Tc=11.4 min CN=86 Runoff=2.58 cfs 0.226 af

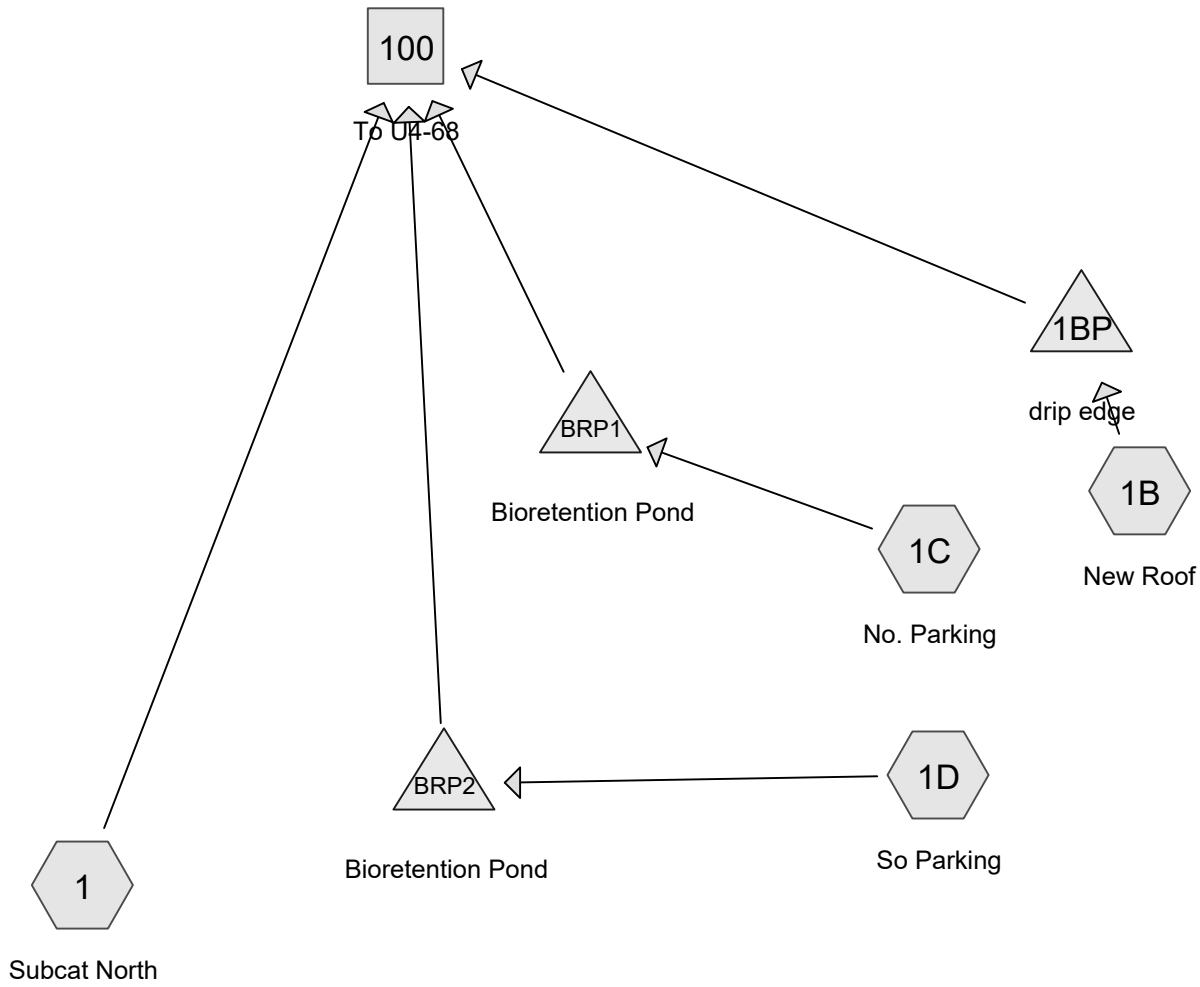
**Reach100: To U4-68** Inflow=23.29 cfs 2.630 af
Outflow=23.29 cfs 2.630 af

**Pond1BP: drip edge** Peak Elev=51.02' Storage=642 cf Inflow=1.43 cfs 0.114 af
Discarded=0.04 cfs 0.065 af Primary=1.38 cfs 0.049 af Outflow=1.43 cfs 0.114 af

**Pond BRP1: BioretentionPond** Peak Elev=50.88' Storage=1,363 cf Inflow=1.21 cfs 0.092 af
Discarded=0.08 cfs 0.072 af Primary=0.73 cfs 0.020 af Outflow=0.81 cfs 0.092 af

**Pond BRP2: BioretentionPond** Peak Elev=51.61' Storage=2,910 cf Inflow=2.58 cfs 0.226 af
Discarded=0.23 cfs 0.172 af Primary=1.24 cfs 0.053 af Outflow=1.47 cfs 0.226 af

**Total Runoff Area = 8.360 ac Runoff Volume = 2.940 af Average Runoff Depth = 4.22"**
**90.33% Pervious = 7.552 ac 9.67% Impervious = 0.808 ac**




Subcat Reach Pond Link

**Routing Diagram for Proposed Conditions - SED Combine**
Prepared by Beals Associates, PLLC, Printed 10/18/2023

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1: SubcatNorth** Runoff Area=325,014 sf 3.07% Impervious Runoff Depth=5.27"
Flow Length=860' Tc=26.1 min CN=74 Runoff=27.63 cfs 3.275 af

**Subcatchment1B: New Roof** Runoff Area=9,146 sf 92.37% Impervious Runoff Depth=7.90"
Tc=6.0 min CN=96 Runoff=1.72 cfs 0.138 af

**Subcatchment1C: No. Parking** Runoff Area=7,993 sf 74.58% Impervious Runoff Depth=7.42"
Tc=6.0 min CN=92 Runoff=1.46 cfs 0.113 af

**Subcatchment1D: So Parking** Runoff Area=22,018 sf 49.11% Impervious Runoff Depth=6.70"
Flow Length=61' Tc=11.4 min CN=86 Runoff=3.19 cfs 0.282 af

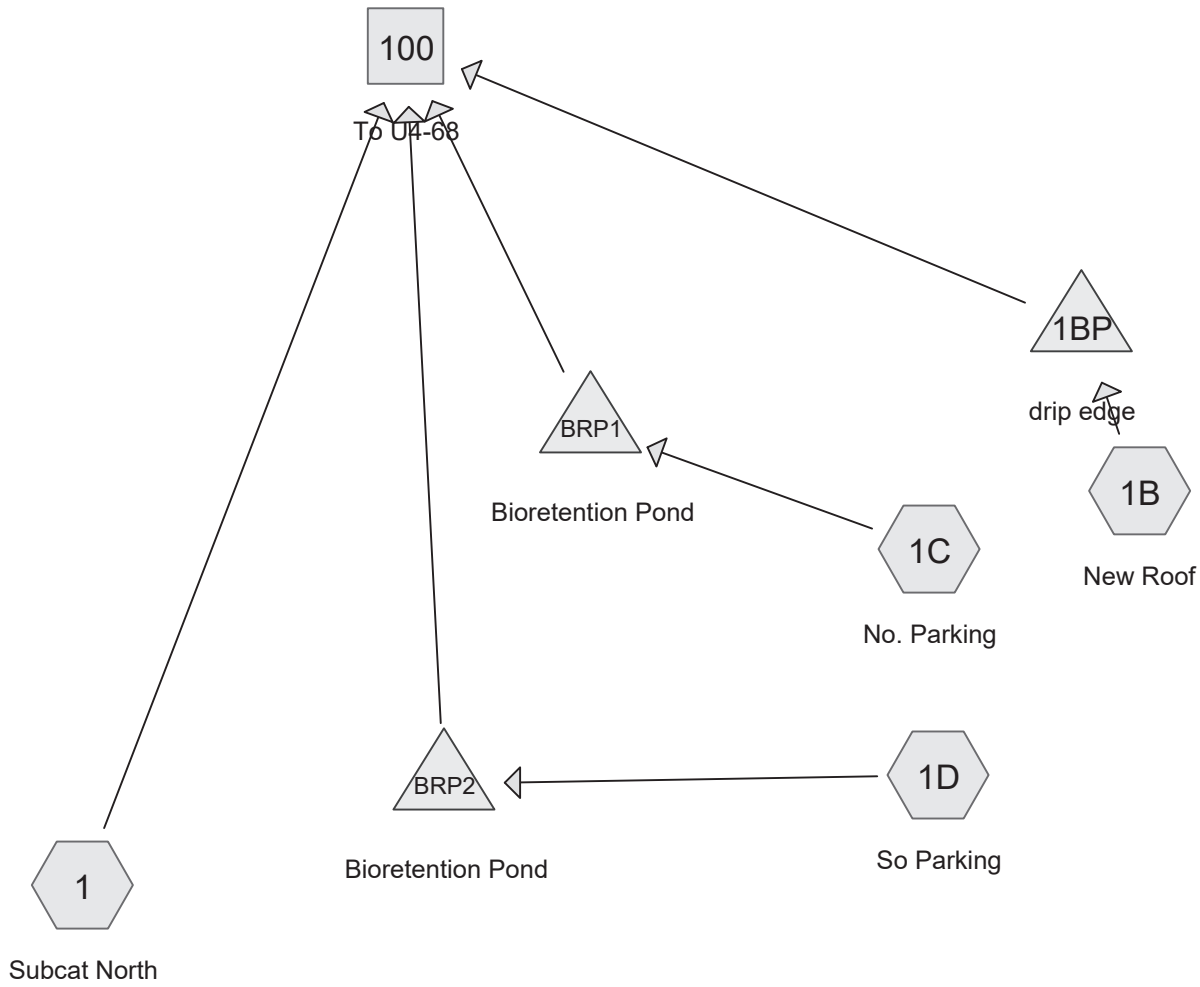
**Reach100: To U4-68** Inflow=30.56 cfs 3.467 af
Outflow=30.56 cfs 3.467 af

**Pond1BP: drip edge** Peak Elev=51.02' Storage=643 cf Inflow=1.72 cfs 0.138 af
Discarded=0.04 cfs 0.071 af Primary=1.67 cfs 0.067 af Outflow=1.72 cfs 0.138 af

**Pond BRP1: BioretentionPond** Peak Elev=50.94' Storage=1,430 cf Inflow=1.46 cfs 0.113 af
Discarded=0.09 cfs 0.079 af Primary=1.21 cfs 0.034 af Outflow=1.29 cfs 0.113 af

**Pond BRP2: BioretentionPond** Peak Elev=51.69' Storage=3,200 cf Inflow=3.19 cfs 0.282 af
Discarded=0.26 cfs 0.192 af Primary=2.05 cfs 0.091 af Outflow=2.30 cfs 0.282 af

**Total Runoff Area = 8.360 ac Runoff Volume = 3.809 af Average Runoff Depth = 5.47"**
**90.33% Pervious = 7.552 ac 9.67% Impervious = 0.808 ac**




Subcat Reach Pond Link

**Routing Diagram for Proposed Conditions - SED Combine**
Prepared by Beals Associates, PLLC, Printed 10/18/2023

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1: SubcatNorth** Runoff Area=325,014 sf 3.07% Impervious Runoff Depth=6.80"
Flow Length=860' Tc=26.1 min CN=74 Runoff=35.51 cfs 4.230 af

**Subcatchment1B: New Roof** Runoff Area=9,146 sf 92.37% Impervious Runoff Depth=9.58"
Tc=6.0 min CN=96 Runoff=2.07 cfs 0.168 af

**Subcatchment1C: No. Parking** Runoff Area=7,993 sf 74.58% Impervious Runoff Depth=9.09"
Tc=6.0 min CN=92 Runoff=1.77 cfs 0.139 af

**Subcatchment1D: So Parking** Runoff Area=22,018 sf 49.11% Impervious Runoff Depth=8.34"
Flow Length=61' Tc=11.4 min CN=86 Runoff=3.93 cfs 0.351 af

**Reach100: To U4-68** Inflow=39.34 cfs 4.512 af
Outflow=39.34 cfs 4.512 af

**Pond1BP: drip edge** Peak Elev=51.02' Storage=644 cf Inflow=2.07 cfs 0.168 af
Discarded=0.04 cfs 0.077 af Primary=2.02 cfs 0.091 af Outflow=2.06 cfs 0.168 af

**Pond BRP1: BioretentionPond** Peak Elev=50.97' Storage=1,473 cf Inflow=1.77 cfs 0.139 af
Discarded=0.09 cfs 0.087 af Primary=1.57 cfs 0.052 af Outflow=1.66 cfs 0.139 af

**Pond BRP2: BioretentionPond** Peak Elev=51.77' Storage=3,504 cf Inflow=3.93 cfs 0.351 af
Discarded=0.28 cfs 0.212 af Primary=2.92 cfs 0.139 af Outflow=3.20 cfs 0.351 af

**Total Runoff Area = 8.360 ac Runoff Volume = 4.888 af Average Runoff Depth = 7.02"**
**90.33% Pervious = 7.552 ac 9.67% Impervious = 0.808 ac**

# APPENDIX III

## Charts, Graphs, and Calculations

# RIP RAP CALCULATIONS

Age-Rstricted Development
DR Lemiuex Builders, Inc.
242 S Main St., Newmarket, 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 10 year storm event (5.5").

**TAILWATER < HALF THE Do**

La = (1.8 x Q) / Do 3/2 + (7 x Do) Q — Q = Peak Flow & Do is Diameter of Pipe
W = La + 3Do or defined channel width
d50 = (0.02 x Q4/3) / (Tw x Do) — Tw = Tailwater Depth
T = Largest stone size of d50 x 1.5 — T= Thickness of Apron
d50= Median Stone Size (0.25' Min.)

| Culvert or Catch Basin (Sta. No.) | Tail Water (Feet) Tw | Dischg. (C.F.S.) Q | Dia. of Pipe Do | Length of Rip Rap La (feet) | Width of Rip Rap W (feet) | Calculated Rip Rap **(0.25 Min)** | Actual Rip Rap (Feet) | Thickness of Apron (Feet) |
|---|---|---|---|---|---|---|---|---|
| 15" HDPE (Pond #BRP2) | 1.00 | 0.86 | 1.25 | 9.9 | 13.6 | 0.01 | 0.25 | 0.56 |

Table 7-24 -- Recommended Rip Rap Gradation Ranges

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

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

# GROUNDWATER RECHARGE VOLULME (GRV) CALCULATION (Env-Wq 1507.04)

| | | | |
|---|---|---|---|
| | ac | Area of HSG A soil that was replaced by impervious cover | 0.40" |
| | ac | Area of HSG B soil that was replaced by impervious cover | 0.25" |
| 0.51 | ac | Area of HSG C soil that was replaced by impervious cover | 0.10" |
| | ac | Area of HSG D soil or impervious cover that was replaced by impervious cover | 0.0" |
| 0.10 | inches | Rd = Weighted groundwater recharge depth | |
| 0.0513 | ac-in | GRV = AI * Rd | |
| 186 | cf | GRV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |

**Provide calculations below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):**

4,791 cf of stomrwater is infiltrated by the bioretention pond alone under a 2-YR storm event.

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

# FILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.07)

**Type/Node Name:** **Bioretention pond/BRP1**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

| | | |
|---|---|---|
| yes | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.07(a). | |
| 0.18 ac | A = Area draining to the practice | |
| 0.14 ac | $A_I$ = Impervious area draining to the practice | |
| 0.74 decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.72 unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 0.13 ac-in | WQV= 1" x Rv x A | |
| 478 cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 119 cf | 25% x WQV (check calc for sediment forebay volume) | |
| 358 cf | 75% x WQV (check calc for surface sand filter volume) | |
| sed forebay | Method of Pretreatment? (not required for clean or roof runoff) | |
| 162 cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | **≥ 25%WQV** |
| Calculate time to drain if system IS NOT underdrained: | | |
| 219 sf | $A_{SA}$ = Surface area of the practice | |
| 3.00 iph | $Ksat_{DESIGN}$ = Design infiltration rate[1] | |
| | If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? | |
| Yes/No | (Use the calculations below) | |
| 8.7 hours | $T_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | **≤ 72-hrs** |
| Calculate time to drain if system IS underdrained: | | |
| ft | $E_{WQV}$ = Elevation of WQV (attach stage-storage table) | |
| cfs | $Q_{WQV}$ = Discharge at the $E_{WQV}$ (attach stage-discharge table) | |
| - hours | $T_{DRAIN}$ = Drain time = 2WQV/$Q_{WQV}$ | **≤ 72-hrs** |
| 47.75 feet | $E_{FC}$ = Elevation of the bottom of the filter course material[2] | |
| feet | $E_{UD}$ = Invert elevation of the underdrain (UD), if applicable | |
| 46.75 feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| 44.00 feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| 47.75 feet | $D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course | **≥ 1'** |
| 3.75 feet | $D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course | **≥ 1'** |
| 1.00 feet | $D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course | **≥ 1'** |
| 50.95 ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| 51.00 ft | Elevation of the top of the practice | |
| YES | 50 peak elevation ≤ Elevation of the top of the practice | **← yes** |
| **If a surface sand filter or underground sand filter is proposed:** | | |
| YES ac | Drainage Area check. | **< 10 ac** |
| cf | V = Volume of storage[3] (attach a stage-storage table) | **≥ 75%WQV** |
| inches | $D_{FC}$ = Filter course thickness | **18", or 24" if within GPA** |
| Sheet | Note what sheet in the plan set contains the filter course specification. | |
| Yes/No | Access grate provided? | **← yes** |

| | | | |
|---|---|---|---|
| **If a bioretention area is proposed:** | | | |
| YES | ac | Drainage Area no larger than 5 ac? | ← yes |
| 995 | cf | V = Volume of storage[3] (attach a stage-storage table) | ≥ WQV |
| 18.0 | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | 8 | Note what sheet in the plan set contains the filter course specification | |
| 3.0 | :1 | Pond side slopes | ≥ 3:1 |
| Sheet | 8 | Note what sheet in the plan set contains the planting plans and surface cover | |
| **If porous pavement is proposed:** | | | |
| | | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.) | |
| | acres | $A_{SA}$ = Surface area of the pervious pavement | |
| | :1 | Ratio of the contributing area to the pervious surface area | ≤ 5:1 |
| | inches | $D_{FC}$ = Filter course thickness | 12", or 18" if within GPA |
| Sheet | | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec) |

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

## Stage-Area-Storage for Pond 1CP: SED Pond

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 49.00 | 13 | 0 |
| 49.05 | 22 | 1 |
| 49.10 | 31 | 2 |
| 49.15 | 39 | 4 |
| 49.20 | 48 | 6 |
| 49.25 | 57 | 9 |
| 49.30 | 65 | 12 |
| 49.35 | 74 | 15 |
| 49.40 | 83 | 19 |
| 49.45 | 92 | 24 |
| 49.50 | 101 | 28 |
| 49.55 | 109 | 34 |
| 49.60 | 118 | 39 |
| 49.65 | 127 | 45 |
| 49.70 | 136 | 52 |
| 49.75 | 144 | 59 |
| 49.80 | 153 | 66 |
| 49.85 | 162 | 74 |
| 49.90 | 170 | 83 |
| 49.95 | 179 | 91 |
| 50.00 | 188 | 101 |
| 50.05 | 201 | 110 |
| 50.10 | 215 | 121 |
| 50.15 | 228 | 132 |
| 50.20 | 242 | 144 |
| 50.25 | 256 | 156 |
| 50.30 | 269 | 169 |
| 50.35 | 283 | 183 |
| 50.40 | 296 | 197 |
| 50.45 | 310 | 212 |
| 50.50 | 323 | 228 |
| 50.55 | 336 | 245 |
| 50.60 | 350 | 262 |
| 50.65 | 363 | 280 |
| 50.70 | 377 | 298 |
| 50.75 | 391 | 317 |
| 50.80 | 404 | 337 |
| 50.85 | 418 | 358 |
| 50.90 | 431 | 379 |
| 50.95 | 445 | 401 |
| 51.00 | **458** | **424** |
| 51.05 | 458 | 424 |
| 51.10 | 458 | 424 |
| 51.15 | 458 | 424 |
| 51.20 | 458 | 424 |
| 51.25 | 458 | 424 |
| 51.30 | 458 | 424 |
| 51.35 | 458 | 424 |
| 51.40 | 458 | 424 |
| 51.45 | 458 | 424 |
| 51.50 | 458 | 424 |

## Stage-Area-Storage for Pond BRP1: Bioretention Pond

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 46.75 | 219 | 0 |
| 46.80 | 219 | 4 |
| 46.85 | 219 | 9 |
| 46.90 | 219 | 13 |
| 46.95 | 219 | 18 |
| 47.00 | 219 | 22 |
| 47.05 | 219 | 26 |
| 47.10 | 219 | 31 |
| 47.15 | 219 | 35 |
| 47.20 | 219 | 39 |
| 47.25 | 219 | 44 |
| 47.30 | 219 | 48 |
| 47.35 | 219 | 53 |
| 47.40 | 219 | 57 |
| 47.45 | 219 | 61 |
| 47.50 | 219 | 66 |
| 47.55 | 219 | 70 |
| 47.60 | 219 | 74 |
| 47.65 | 219 | 79 |
| 47.70 | 219 | 83 |
| 47.75 | 219 | 88 |
| 47.80 | 219 | 91 |
| 47.85 | 219 | 94 |
| 47.90 | 219 | 97 |
| 47.95 | 219 | 101 |
| 48.00 | 219 | 104 |
| 48.05 | 219 | 107 |
| 48.10 | 219 | 111 |
| 48.15 | 219 | 114 |
| 48.20 | 219 | 117 |
| 48.25 | 219 | 120 |
| 48.30 | 219 | 124 |
| 48.35 | 219 | 127 |
| 48.40 | 219 | 130 |
| 48.45 | 219 | 134 |
| 48.50 | 219 | 137 |
| 48.55 | 219 | 140 |
| 48.60 | 219 | 143 |
| 48.65 | 219 | 147 |
| 48.70 | 219 | 150 |
| 48.75 | 219 | 153 |
| 48.80 | 219 | 157 |
| 48.85 | 219 | 160 |
| 48.90 | 219 | 163 |
| 48.95 | 219 | 166 |
| 49.00 | 219 | 170 |
| 49.05 | 219 | 173 |
| 49.10 | 219 | 176 |
| 49.15 | 219 | 180 |
| 49.20 | 219 | 183 |
| 49.25 | 219 | 186 |
| 49.30 | 236 | 198 |
| 49.35 | 253 | 210 |
| 49.40 | 269 | 223 |
| 49.45 | 286 | 237 |
| 49.50 | 303 | 251 |
| 49.55 | 320 | 267 |
| 49.60 | 336 | 283 |
| 49.65 | 353 | 301 |
| 49.70 | 370 | 319 |
| 49.75 | 387 | 338 |
| 49.80 | 403 | 357 |
| 49.85 | 420 | 378 |
| 49.90 | 437 | 399 |
| 49.95 | 454 | 422 |
| 50.00 | 471 | 445 |
| 50.05 | 487 | 469 |
| 50.10 | 504 | 493 |
| 50.15 | 521 | 519 |
| 50.20 | 538 | 546 |
| 50.25 | 554 | 573 |
| 50.30 | 571 | 601 |
| 50.35 | 588 | 630 |
| 50.40 | 605 | 660 |
| 50.45 | 622 | 690 |
| 50.50 | 638 | 722 |
| 50.55 | 655 | 754 |
| 50.60 | 672 | 787 |
| 50.65 | 689 | 821 |
| 50.70 | 705 | 856 |
| 50.75 | 722 | 892 |
| 50.80 | 739 | 929 |
| 50.85 | 756 | 966 |
| 50.90 | 772 | 1,004 |
| 50.95 | 789 | 1,043 |
| 51.00 | **806** | **1,083** |

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

# INFILTRATION PRACTICE CRITERIA (Env-Wq 1508.06)

**Type/Node Name:** stone drip edge/1BP

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

| | | | |
|---|---|---|---|
| *yes* | | Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed? | ← yes |
| 0.21 | ac | A = Area draining to the practice | |
| 0.19 | ac | $A_I$ = Impervious area draining to the practice | |
| 0.90 | decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.86 | unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 0.18 | ac-in | WQV= 1" x Rv x A | |
| 659 | cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 165 | cf | 25% x WQV (check calc for sediment forebay volume) | |
| n/a | | Method of pretreatment? (not required for clean or roof runoff) | |
| | cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | ≥ 25%WQV |
| 664 | cf | V = Volume[1] (attach a stage-storage table) | ≥ WQV |
| 638 | sf | $A_{SA}$ = Surface area of the bottom of the pond | |
| 3.00 | iph | $Ksat_{DESIGN}$ = Design infiltration rate[2] | |
| 4.1 | hours | $I_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | ≤ 72-hrs |
| 48.50 | feet | $E_{BTM}$ = Elevation of the bottom of the basin | |
| 47.50 | feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| 45.00 | feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| 1.00 | feet | $D_{SHWT}$ = Separation from SHWT | ≥ *[3] |
| 3.5 | feet | $D_{ROCK}$ = Separation from bedrock | ≥ *[3] |
| | ft | $D_{amend}$ = Depth of amended soil, if applicable due high infiltation rate | ≥ 24" |
| | ft | $D_T$ = Depth of trench, if trench proposed | 4 - 10 ft |
| | Yes/No | If a trench or underground system is proposed, has observation well been provided? | ←yes |
| | | If a trench is proposed, does materialmeet Env-Wq 1508.06(k)(2) requirements.[4] | ← yes |
| | Yes/No | If a basin is proposed, Is the perimeter curvilinear, and basin floor flat? | ← yes |
| | :1 | If a basin is proposed, pond side slopes. | ≥3:1 |
| 51.01 | ft | Peak elevation of the 10-year storm event (infiltration can be used in analysis) | |
| 51.02 | ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| 51.10 | ft | Elevation of the top of the practice (if a basin, this is the elevation of the berm) | |
| YES | | 10 peak elevation ≤ Elevation of the top of the trench?[5] | ← yes |
| YES | | If a basin is proposed, 50-year peak elevation ≤ Elevation of berm? | ← yes |

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. $Ksat_{DESIGN}$ includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

**Designer's Notes:**

## Stage-Area-Storage for Pond 1BP: drip edge

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 48.50 | **638** | 0 |
| 48.55 | 638 | 13 |
| 48.60 | 638 | 26 |
| 48.65 | 638 | 38 |
| 48.70 | 638 | 51 |
| 48.75 | 638 | 64 |
| 48.80 | 638 | 77 |
| 48.85 | 638 | 89 |
| 48.90 | 638 | 102 |
| 48.95 | 638 | 115 |
| 49.00 | 638 | 128 |
| 49.05 | 638 | 140 |
| 49.10 | 638 | 153 |
| 49.15 | 638 | 166 |
| 49.20 | 638 | 179 |
| 49.25 | 638 | 191 |
| 49.30 | 638 | 204 |
| 49.35 | 638 | 217 |
| 49.40 | 638 | 230 |
| 49.45 | 638 | 242 |
| 49.50 | 638 | 255 |
| 49.55 | 638 | 268 |
| 49.60 | 638 | 281 |
| 49.65 | 638 | 293 |
| 49.70 | 638 | 306 |
| 49.75 | 638 | 319 |
| 49.80 | 638 | 332 |
| 49.85 | 638 | 345 |
| 49.90 | 638 | 357 |
| 49.95 | 638 | 370 |
| 50.00 | 638 | 383 |
| 50.05 | 638 | 396 |
| 50.10 | 638 | 408 |
| 50.15 | 638 | 421 |
| 50.20 | 638 | 434 |
| 50.25 | 638 | 447 |
| 50.30 | 638 | 459 |
| 50.35 | 638 | 472 |
| 50.40 | 638 | 485 |
| 50.45 | 638 | 498 |
| 50.50 | 638 | 510 |
| 50.55 | 638 | 523 |
| 50.60 | 638 | 536 |
| 50.65 | 638 | 549 |
| 50.70 | 638 | 561 |
| 50.75 | 638 | 574 |
| 50.80 | 638 | 587 |
| 50.85 | 638 | 600 |
| 50.90 | 638 | 612 |
| 50.95 | 638 | 625 |
| 51.00 | 638 | 638 |
| 51.05 | 638 | 651 |
| 51.10 | 638 | **664** |

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

# FILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.07)

**Type/Node Name:** **Bioretention pond/BRP2**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

| | | | |
|---|---|---|---|
| yes | | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.07(a). | |
| 0.51 | ac | A = Area draining to the practice | |
| 0.24 | ac | $A_I$ = Impervious area draining to the practice | |
| 0.48 | decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.48 | unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 0.24 | ac-in | WQV= 1" x Rv x A | |
| 876 | cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 219 | cf | 25% x WQV (check calc for sediment forebay volume) | |
| 657 | cf | 75% x WQV (check calc for surface sand filter volume) | |
| sed forebay | | Method of Pretreatment? (not required for clean or roof runoff) | |
| 583 | cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | ≥ 25%WQV |
| Calculate time to drain if system IS NOT underdrained: | | | |
| 1,583 | sf | $A_{SA}$ = Surface area of the practice | |
| 3.00 | iph | $Ksat_{DESIGN}$ = Design infiltration rate[1] | |
| | Yes/No | If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? (Use the calculations below) | |
| 2.2 | hours | $T_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | ≤ 72-hrs |
| Calculate time to drain if system IS underdrained: | | | |
| | ft | $E_{WQV}$ = Elevation of WQV (attach stage-storage table) | |
| | cfs | $Q_{WQV}$ = Discharge at the $E_{WQV}$ (attach stage-discharge table) | |
| - | hours | $T_{DRAIN}$ = Drain time = 2WQV/$Q_{WQV}$ | ≤ 72-hrs |
| 49.83 | feet | $E_{FC}$ = Elevation of the bottom of the filter course material[2] | |
| | feet | $E_{UD}$ = Invert elevation of the underdrain (UD), if applicable | |
| 48.83 | feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| 46.00 | feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| 49.83 | feet | $D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course | ≥ 1' |
| 3.83 | feet | $D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course | ≥ 1' |
| 1.00 | feet | $D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course | ≥ 1' |
| 51.74 | ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| 51.90 | ft | Elevation of the top of the practice | |
| YES | | 50 peak elevation ≤ Elevation of the top of the practice | ← yes |
| **If a surface sand filter or underground sand filter is proposed:** | | | |
| YES | ac | Drainage Area check. | < 10 ac |
| | cf | V = Volume of storage[3] (attach a stage-storage table) | ≥ 75%WQV |
| | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | | Note what sheet in the plan set contains the filter course specification. | |
| | Yes/No | Access grate provided? | ← yes |

| | | | |
|---|---|---|---|
| **If a bioretention area is proposed:** | | | |
| YES | ac | Drainage Area no larger than 5 ac? | ← yes |
| 898 | cf | V = Volume of storage[3] (attach a stage-storage table) | ≥ WQV |
| 18.0 | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | 8 | Note what sheet in the plan set contains the filter course specification | |
| 3.0 | :1 | Pond side slopes | ≥ 3:1 |
| Sheet | 8 | Note what sheet in the plan set contains the planting plans and surface cover | |
| **If porous pavement is proposed:** | | | |
| | | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.) | |
| | acres | $A_{SA}$ = Surface area of the pervious pavement | |
| | :1 | Ratio of the contributing area to the pervious surface area | ≤ 5:1 |
| | inches | $D_{FC}$ = Filter course thickness | 12", or 18" if within GPA mod. 304.1 (see spec) |
| Sheet | | Note what sheet in the plan set contains the filter course spec. | |

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

## Stage-Area-Storage for Pond 1DP: SED Pond

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 49.00 | 53 | 0 |
| 49.05 | 64 | 3 |
| 49.10 | 75 | 6 |
| 49.15 | 86 | 10 |
| 49.20 | 98 | 15 |
| 49.25 | 109 | 20 |
| 49.30 | 120 | 26 |
| 49.35 | 131 | 32 |
| 49.40 | 142 | 39 |
| 49.45 | 153 | 46 |
| 49.50 | 165 | 54 |
| 49.55 | 176 | 63 |
| 49.60 | 187 | 72 |
| 49.65 | 198 | 82 |
| 49.70 | 209 | 92 |
| 49.75 | 220 | 102 |
| 49.80 | 231 | 114 |
| 49.85 | 243 | 126 |
| 49.90 | 254 | 138 |
| 49.95 | 265 | 151 |
| 50.00 | 276 | 165 |
| 50.05 | 292 | 179 |
| 50.10 | 307 | 194 |
| 50.15 | 323 | 209 |
| 50.20 | 339 | 226 |
| 50.25 | 354 | 243 |
| 50.30 | 370 | 261 |
| 50.35 | 385 | 280 |
| 50.40 | 401 | 300 |
| 50.45 | 417 | 320 |
| 50.50 | 432 | 342 |
| 50.55 | 448 | 364 |
| 50.60 | 464 | 386 |
| 50.65 | 479 | 410 |
| 50.70 | 495 | 434 |
| 50.75 | 511 | 459 |
| 50.80 | 526 | 485 |
| 50.85 | 542 | 512 |
| 50.90 | 557 | 540 |
| 50.95 | 573 | 568 |
| 51.00 | 589 | 597 |
| 51.05 | 604 | 627 |
| 51.10 | 620 | 657 |
| 51.15 | 636 | 689 |
| 51.20 | 651 | 721 |
| 51.25 | 667 | 754 |
| 51.30 | 682 | 788 |
| 51.35 | 698 | 822 |
| 51.40 | 714 | 857 |
| 51.45 | 729 | 893 |
| 51.50 | 745 | 930 |
| 51.55 | 777 | 968 |
| 51.60 | 808 | 1,008 |
| 51.65 | 840 | 1,049 |
| 51.70 | 872 | 1,092 |
| 51.75 | 903 | 1,136 |
| 51.80 | **935** | **1,182** |

## Stage-Area-Storage for Pond BRP2: Bioretention Pond

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 48.83 | 1,583 | 0 |
| 48.88 | 1,583 | 32 |
| 48.93 | 1,583 | 63 |
| 48.98 | 1,583 | 95 |
| 49.03 | 1,583 | 127 |
| 49.08 | 1,583 | 158 |
| 49.13 | 1,583 | 190 |
| 49.18 | 1,583 | 222 |
| 49.23 | 1,583 | 253 |
| 49.28 | 1,583 | 285 |
| 49.33 | 1,583 | 317 |
| 49.38 | 1,583 | 348 |
| 49.43 | 1,583 | 380 |
| 49.48 | 1,583 | 412 |
| 49.53 | 1,583 | 443 |
| 49.58 | 1,583 | 475 |
| 49.63 | 1,583 | 507 |
| 49.68 | 1,583 | 538 |
| 49.73 | 1,583 | 570 |
| 49.78 | 1,583 | 602 |
| 49.83 | 1,583 | 633 |
| 49.88 | 1,583 | 657 |
| 49.93 | 1,583 | 681 |
| 49.98 | 1,583 | 704 |
| 50.03 | 1,583 | 728 |
| 50.08 | 1,583 | 752 |
| 50.13 | 1,583 | 776 |
| 50.18 | 1,583 | 799 |
| 50.23 | 1,583 | 823 |
| 50.28 | 1,583 | 847 |
| 50.33 | 1,583 | 871 |
| 50.38 | 1,583 | 894 |
| 50.43 | 1,583 | 918 |
| 50.48 | 1,583 | 942 |
| 50.53 | 1,583 | 966 |
| 50.58 | 1,583 | 989 |
| 50.63 | 1,583 | 1,013 |
| 50.68 | 1,583 | 1,037 |
| 50.73 | 1,583 | 1,061 |
| 50.78 | 1,583 | 1,084 |
| 50.83 | 1,583 | 1,108 |
| 50.88 | 1,583 | 1,132 |
| 50.93 | 1,583 | 1,156 |
| 50.98 | 1,583 | 1,179 |
| 51.03 | 1,583 | 1,203 |
| 51.08 | 1,583 | 1,227 |
| 51.13 | 1,583 | 1,251 |
| 51.18 | 1,583 | 1,274 |
| 51.23 | 1,583 | 1,298 |
| 51.28 | 1,583 | 1,322 |
| 51.33 | 1,583 | 1,346 |
| 51.38 | 1,702 | 1,428 |
| 51.43 | 1,820 | 1,516 |
| 51.48 | 1,939 | 1,610 |
| 51.53 | 2,113 | 1,710 |
| 51.58 | 2,325 | 1,821 |
| 51.63 | 2,537 | 1,943 |
| 51.68 | 2,749 | 2,075 |
| 51.73 | 2,961 | 2,218 |
| 51.78 | 3,173 | 2,371 |
| 51.83 | 3,385 | 2,535 |
| 51.88 | **3,597** | **2,710** |

# Extreme Precipitation Tables

## Northeast Regional Climate Center

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

**Metadata for Point**

| | |
|---|---|
| **Smoothing** | Yes |
| **State** | |
| **Location** | |
| **Latitude** | 43.074 degrees North |
| **Longitude** | 70.951 degrees West |
| **Elevation** | 10 feet |
| **Date/Time** | Thu May 18 2023 09:06:35 GMT-0400 (Eastern Daylight Time) |

## Extreme Precipitation Estimates

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1yr** | 0.26 | 0.40 | 0.50 | 0.65 | 0.82 | 1.04 | **1yr** | 0.70 | 0.98 | 1.21 | 1.56 | 2.01 | 2.63 | 2.85 | **1yr** | 2.33 | 2.74 | 3.14 | 3.86 | 4.46 | **1yr** |
| **2yr** | 0.32 | 0.49 | 0.61 | 0.81 | 1.02 | 1.29 | **2yr** | 0.88 | 1.17 | 1.50 | 1.92 | 2.45 | 3.15 | 3.49 | **2yr** | 2.79 | 3.36 | 3.86 | 4.59 | 5.23 | **2yr** |
| **5yr** | 0.37 | 0.58 | 0.72 | 0.97 | 1.23 | 1.59 | **5yr** | 1.07 | 1.45 | 1.86 | 2.40 | 3.09 | 4.00 | 4.48 | **5yr** | 3.54 | 4.31 | 4.92 | 5.83 | 6.60 | **5yr** |
| **10yr** | 0.41 | 0.64 | 0.81 | 1.10 | 1.43 | 1.86 | **10yr** | 1.23 | 1.70 | 2.20 | 2.85 | 3.69 | 4.79 | 5.42 | **10yr** | 4.24 | 5.21 | 5.93 | 6.99 | 7.87 | **10yr** |
| **25yr** | 0.47 | 0.75 | 0.95 | 1.31 | 1.74 | 2.29 | **25yr** | 1.50 | 2.11 | 2.73 | 3.57 | 4.66 | 6.08 | 6.96 | **25yr** | 5.38 | 6.70 | 7.57 | 8.90 | 9.95 | **25yr** |
| **50yr** | 0.52 | 0.84 | 1.08 | 1.50 | 2.03 | 2.70 | **50yr** | 1.75 | 2.48 | 3.22 | 4.24 | 5.57 | 7.29 | 8.43 | **50yr** | 6.46 | 8.10 | 9.11 | 10.68 | 11.88 | **50yr** |
| **100yr** | 0.59 | 0.95 | 1.23 | 1.73 | 2.36 | 3.17 | **100yr** | 2.03 | 2.92 | 3.81 | 5.04 | 6.65 | 8.75 | 10.20 | **100yr** | 7.74 | 9.81 | 10.97 | 12.82 | 14.20 | **100yr** |
| **200yr** | 0.65 | 1.07 | 1.39 | 1.99 | 2.75 | 3.74 | **200yr** | 2.37 | 3.44 | 4.51 | 6.01 | 7.95 | 10.49 | 12.35 | **200yr** | 9.29 | 11.87 | 13.21 | 15.41 | 16.98 | **200yr** |
| **500yr** | 0.77 | 1.27 | 1.66 | 2.40 | 3.37 | 4.63 | **500yr** | 2.91 | 4.28 | 5.61 | 7.54 | 10.06 | 13.35 | 15.90 | **500yr** | 11.82 | 15.29 | 16.90 | 19.65 | 21.52 | **500yr** |

## Lower Confidence Limits

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1yr** | 0.24 | 0.37 | 0.45 | 0.61 | 0.74 | 0.90 | **1yr** | 0.64 | 0.88 | 0.93 | 1.25 | 1.54 | 2.08 | 2.51 | **1yr** | 1.84 | 2.42 | 2.89 | 3.32 | 3.95 | **1yr** |
| **2yr** | 0.32 | 0.49 | 0.60 | 0.81 | 1.00 | 1.18 | **2yr** | 0.87 | 1.16 | 1.37 | 1.82 | 2.35 | 3.04 | 3.41 | **2yr** | 2.69 | 3.28 | 3.76 | 4.47 | 5.02 | **2yr** |
| **5yr** | 0.35 | 0.54 | 0.67 | 0.92 | 1.17 | 1.40 | **5yr** | 1.01 | 1.37 | 1.62 | 2.14 | 2.77 | 3.73 | 4.16 | **5yr** | 3.30 | 4.00 | 4.59 | 5.48 | 6.17 | **5yr** |
| **10yr** | 0.39 | 0.59 | 0.74 | 1.03 | 1.33 | 1.61 | **10yr** | 1.15 | 1.57 | 1.82 | 2.44 | 3.12 | 4.30 | 4.83 | **10yr** | 3.81 | 4.64 | 5.33 | 6.37 | 7.09 | **10yr** |
| **25yr** | 0.44 | 0.68 | 0.84 | 1.20 | 1.58 | 1.93 | **25yr** | 1.36 | 1.88 | 2.11 | 2.83 | 3.64 | 4.87 | 5.87 | **25yr** | 4.31 | 5.64 | 6.49 | 7.76 | 8.66 | **25yr** |
| **50yr** | 0.49 | 0.75 | 0.93 | 1.34 | 1.80 | 2.21 | **50yr** | 1.55 | 2.16 | 2.36 | 3.19 | 4.09 | 5.53 | 6.78 | **50yr** | 4.90 | 6.52 | 7.53 | 9.01 | 9.99 | **50yr** |
| **100yr** | 0.55 | 0.83 | 1.04 | 1.50 | 2.06 | 2.53 | **100yr** | 1.78 | 2.48 | 2.64 | 3.57 | 4.58 | 6.27 | 7.84 | **100yr** | 5.55 | 7.54 | 8.74 | 10.46 | 11.50 | **100yr** |
| **200yr** | 0.61 | 0.92 | 1.17 | 1.69 | 2.36 | 2.90 | **200yr** | 2.03 | 2.84 | 2.94 | 4.00 | 5.13 | 7.09 | 9.35 | **200yr** | 6.27 | 8.99 | 10.15 | 12.14 | 13.27 | **200yr** |
| **500yr** | 0.72 | 1.07 | 1.37 | 1.99 | 2.83 | 3.50 | **500yr** | 2.45 | 3.42 | 3.40 | 4.64 | 5.99 | 8.31 | 11.40 | **500yr** | 7.35 | 10.96 | 12.38 | 14.79 | 15.97 | **500yr** |

## Upper Confidence Limits

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1yr** | 0.28 | 0.43 | 0.53 | 0.71 | 0.88 | 1.08 | **1yr** | 0.76 | 1.05 | 1.25 | 1.73 | 2.19 | 2.88 | 3.05 | **1yr** | 2.55 | 2.93 | 3.46 | 4.20 | 4.88 | **1yr** |
| **2yr** | 0.33 | 0.51 | 0.63 | 0.85 | 1.04 | 1.25 | **2yr** | 0.90 | 1.22 | 1.48 | 1.95 | 2.49 | 3.32 | 3.59 | **2yr** | 2.93 | 3.45 | 3.97 | 4.74 | 5.49 | **2yr** |
| **5yr** | 0.39 | 0.61 | 0.76 | 1.04 | 1.32 | 1.59 | **5yr** | 1.14 | 1.55 | 1.86 | 2.48 | 3.17 | 4.27 | 4.81 | **5yr** | 3.78 | 4.63 | 5.28 | 6.20 | 7.02 | **5yr** |
| **10yr** | 0.46 | 0.71 | 0.88 | 1.23 | 1.59 | 1.93 | **10yr** | 1.37 | 1.89 | 2.24 | 3.03 | 3.81 | 5.29 | 6.02 | **10yr** | 4.69 | 5.79 | 6.57 | 7.64 | 8.61 | **10yr** |
| **25yr** | 0.56 | 0.86 | 1.07 | 1.53 | 2.01 | 2.50 | **25yr** | 1.73 | 2.44 | 2.88 | 3.93 | 4.88 | 7.32 | 8.10 | **25yr** | 6.48 | 7.79 | 8.76 | 10.10 | 11.16 | **25yr** |
| **50yr** | 0.65 | 1.00 | 1.24 | 1.78 | 2.40 | 3.02 | **50yr** | 2.07 | 2.95 | 3.50 | 4.78 | 5.90 | 9.12 | 10.17 | **50yr** | 8.07 | 9.78 | 10.91 | 12.48 | 13.69 | **50yr** |
| **100yr** | 0.77 | 1.16 | 1.45 | 2.09 | 2.87 | 3.65 | **100yr** | 2.48 | 3.57 | 4.25 | 5.85 | 7.15 | 11.36 | 12.76 | **100yr** | 10.06 | 12.27 | 13.58 | 15.43 | 16.80 | **100yr** |
| **200yr** | 0.89 | 1.34 | 1.70 | 2.46 | 3.43 | 4.44 | **200yr** | 2.96 | 4.34 | 5.18 | 7.14 | 8.65 | 14.21 | 15.60 | **200yr** | 12.57 | 15.00 | 16.91 | 19.08 | 20.64 | **200yr** |
| **500yr** | 1.09 | 1.63 | 2.09 | 3.04 | 4.33 | 5.71 | **500yr** | 3.73 | 5.58 | 6.70 | 9.33 | 11.14 | 19.10 | 20.98 | **500yr** | 16.91 | 20.17 | 22.60 | 25.31 | 27.14 | **500yr** |

Powered by ACIS Northeast Regional Climate Center

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abenaki | 501 | 0.6 | 2.0 | 6.00 | 99.0 | B | 2 | Outwash and Stream Terraces | frigid | loamy over sandy-skeletal | no | loamy over gravelly |
| Acton | 146 | 2.0 | 20.0 | 2.00 | 20.0 | B | 3 | Loose till, sandy textures | mesic | sandy-skeletal | no | cobbly loamy sand |
| Adams | 36 | 6.0 | 20.0 | 20.00 | 99.0 | A | 1 | Outwash and Stream Terraces | frigid | sandy | yes | |
| Agawam | 24 | 6.0 | 20.0 | 20.00 | 100.0 | B | 2 | Outwash and Stream Terraces | mesic | loamy over sandy | no | loamy over sand/gravel |
| Allagash | 127 | 0.6 | 2.0 | 6.00 | 20.0 | B | 2 | Outwash and Stream Terraces | frigid | loamy over sandy | yes | loamy over sandy |
| Au Gres | 516 | | | | | B | 5 | Outwash and Stream Terraces | frigid | sandy | yes | single grain, loose |
| Bangor | 572 | 0.6 | 2.0 | 0.60 | 2.0 | B | 2 | Friable till, silty, schist & phyllite | frigid | loamy | yes | silt loam |
| Becket | 56 | 0.6 | 2.0 | 0.06 | 0.6 | C | 3 | Firm, platy, sandy till | frigid | loamy | yes | gravelly sandy loam in Cd |
| Belgrade | 532 | 0.6 | 2.0 | 0.06 | 2.0 | B | 3 | Terraces and glacial lake plains | mesic | silty | no | strata of fine sand |
| Bemis | 224 | 0.6 | 0.2 | 0.00 | 0.2 | C | 5 | Firm, platy, loamy till | cryic | loamy | no | |
| Berkshire | 72 | 0.6 | 6.0 | 0.60 | 6.0 | B | 2 | Loose till, loamy textures | frigid | loamy | yes | fine sandy loam |
| Bernardston | 330 | 0.6 | 2.0 | 0.06 | 0.2 | C | 3 | Firm, platy, silty till, schist & phyllite | mesic | loamy | no | channery silt loam in Cd |
| Bice | 226 | 0.6 | 6.0 | 0.60 | 6.0 | B | 2 | Loose till, loamy textures | frigid | loamy | no | sandy loam |
| Biddeford | 234 | 0.0 | 0.2 | 0.00 | 0.2 | D | 6 | Silt and Clay Deposits | frigid | fine | no | organic over clay |
| Binghamville | 534 | 0.2 | 2.0 | 0.06 | 0.2 | D | 5 | Terraces and glacial lake plains | mesic | silty | no | |
| Boscawen | 220 | 6.0 | 20.0 | 20.00 | 100.0 | A | 1 | Outwash and Stream Terraces | frigid | sandy-skeletal | no | loamy cap |
| Boxford | 32 | 0.1 | 0.2 | 0.00 | 0.2 | C | 3 | Silt and Clay Deposits | mesic | fine | no | silty clay loam |
| Brayton | 240 | 0.6 | 2.0 | 0.06 | 0.6 | C | 5 | Firm, platy, silty till, schist & phyllite | frigid | loamy | no | |
| Buckland | 237 | 0.6 | 2.0 | 0.06 | 0.2 | C | 3 | Firm, platy, loamy till | frigid | loamy | no | loam in Cd |
| Bucksport | 895 | | | | | D | 6 | Organic Materials - Freshwater | frigid | sapric | no | deep organic |
| Burnham | 131 | 0.2 | 6.0 | 0.02 | 0.2 | D | 6 | Firm, platy, silty till, schist & phylitte | frigid | loamy | no | organic over silt |
| Buxton | 232 | 0.1 | 0.6 | 0.00 | 0.2 | C | 3 | Silt and Clay Deposits | frigid | fine | no | silty clay |
| Cabot | 589 | 0.6 | 2.0 | 0.06 | 0.2 | D | 5 | Firm, platy, silty till, schist & phyllite | frigid | loamy | no | |
| Caesar | 526 | 20.0 | 100.0 | 20.00 | 100.0 | A | 1 | Outwash and Stream Terraces | mesic | coarse sand | no | |
| Canaan | 663 | 2.0 | 20.0 | 2.00 | 20.0 | C | 4 | Weathered Bedrock Till | frigid | loamy-skeletal | yes | less than 20 in. deep |
| Canterbury | 166 | 0.6 | 2.0 | 0.06 | 0.6 | C | 3 | Firm, platy, loamy till | frigid | loamy | no | loam in Cd |
| Canton | 42 | 2.0 | 6.0 | 6.00 | 20.0 | B | 2 | Loose till, sandy textures | mesic | loamy over sandy | no | loamy over loamy sand |
| Cardigan | 357 | 0.6 | 2.0 | 0.60 | 2.0 | B | 4 | Friable till, silty, schist & phyllite | mesic | loamy | no | 20 to 40 in. deep |
| Catden | 296 | | | | | A/D | 6 | Organic Materials - Freshwater | mesic | sapric | no | deep organic |
| Champlain | 35 | 6.0 | 20.0 | 20.00 | 100.0 | A | 1 | Outwash and Stream Terraces | frigid | gravelly sand | no | |
| Charles | 209 | 0.6 | 100.0 | 0.60 | 100.0 | C | 5 | Flood Plain (Bottom Land) | frigid | silty | no | |
| Charlton | 62 | 0.6 | 6.0 | 0.60 | 6.0 | B | 2 | Loose till, loamy textures | mesic | loamy | no | fine sandy loam |
| Chatfield | 89 | 0.6 | 6.0 | 0.60 | 6.0 | B | 4 | Loose till, bedrock | mesic | loamy | no | 20 to 40 in. deep |
| Chatfield Var. | 289 | 0.6 | 6.0 | 0.60 | 6.0 | B | 3 | Loose till, bedrock | mesic | loamy | no | mwd to swpd |
| Chesuncook | 126 | 0.6 | 2.0 | 0.02 | 0.2 | C | 3 | Firm, platy, silty till, schist & phyllite | frigid | loamy | yes | channery silt loam in Cd |
| Chichester | 442 | 0.6 | 2.0 | 2.00 | 6.0 | B | | Loose till, sandy textures | frigid | loamy over sandy | no | loamy over loamy sand |
| Chocorua | 395 | | | 6.00 | 20.0 | D | 6 | Organic Materials - Freshwater | frigid | sandy or sandy-skeletal | no | organic over sand |
| Cohas | 505 | 0.6 | 2.0 | 0.60 | 100.0 | C | 5 | Flood Plain (Bottom Land) | frigid | co. loamy over sandy (skeletal) | no | |
| Colonel | 927 | 0.6 | 2.0 | 0.06 | 0.6 | C | 3 | Firm, platy, loamy till | frigid | loamy | yes | loam in Cd |
| Colton | 22 | 6.0 | 20.0 | 20.00 | 100.0 | A | 1 | Outwash and Stream Terraces | frigid | sandy-skeletal | yes | |
| Colton, gravelly | 21 | 6.0 | 20.0 | 20.00 | 100.0 | A | 1 | Outwash and Stream Terraces | frigid | sandy-skeletal | yes | gravelly surface |
| Croghan | 613 | 20.0 | 100.0 | 20.00 | 100.0 | B | 3 | Outwash and Stream Terraces | frigid | sandy | yes | single grain in C |
| Dartmouth | 132 | 0.6 | 2.0 | 0.06 | 0.6 | B | 3 | Terraces and glacial lake plains | mesic | silty | no | thin strata silty clay loam |
| Deerfield | 313 | 6.0 | 20.0 | 20.00 | 100.0 | B | 3 | Outwash and Stream Terraces | mesic | sandy | no | single grain in C |
| Dixfield | 378 | 0.6 | 2.0 | 0.06 | 0.6 | C | 3 | Firm, platy, loamy till | frigid | loamy | yes | fine sandy loam in Cd |
| Dixmont | 578 | 0.6 | 2.0 | 0.60 | 2.0 | C | 3 | Friable till, silty, schist & phyllite | frigid | loamy | yes | silt loam, platy in C |
| Duane | 413 | 6.0 | 20.0 | 6.00 | 20.0 | B | 3 | Outwash and Stream Terraces | frigid | sandy-skeletal | yes | cemented (ortstein) |
| Dutchess | 366 | 0.6 | 2.0 | 0.60 | 2.0 | B | 2 | Friable till, silty, schist & phyllite | mesic | loamy | no | very channery |
| Eldridge | 38 | 6.0 | 20.0 | 0.06 | 0.6 | C | 3 | Sandy/loamy over silt/clay | mesic | sandy over loamy | no | |
| Elliottsville | 128 | 0.6 | 2.0 | 0.60 | 2.0 | B | 4 | Friable till, silty, schist & phyllite | frigid | loamy | yes | 20 to 40 in. deep |
| Elmridge | 238 | 2.0 | 6.0 | 0.00 | 0.2 | C | 3 | Sandy/loamy over silt/clay | mesic | loamy over clayey | no | |
| Elmwood | 338 | 2.0 | 6.0 | 0.00 | 0.2 | C | 3 | Sandy/loamy over silt/clay | frigid | loamy over clayey | no | |
| Finch | 116 | | | | | C | 3 | Outwash and Stream Terraces | frigid | sandy | yes | cemented (ortstein) |

GOVE ENVIRONMENTAL SERVICES, INC.

# TEST PIT DATA

Project 242 South Main Street, Newmarket, NH
Client D.R. Lemeiux Builders, LLC
GES Project No. 2022280
MM/DD/YY Staff 04-10-2023 James Gove, CSS#004

| | | | |
|---|---|---|---|
| **Test Pit No.** | **1** | Soils Series: | Eldridge |
| ESHWT:: | 26" | Landscape: | Flat |
| Termination @ | 60" | Slope: | A |
| Refusal: | None | Parent Material: | Sand over silt |
| Obs. Water: | None | Ksat (above ESHWT): | 6 in/hr. |

| Horizon | Color (Munsell) | Texture | Structure-Consistence-Redox |
|---|---|---|---|
| A 0-10" | 10YR3/2 | loamy sand | granular-friable-none |
| Bw 10-26" | 10YR4/4 | loamy sand | granular-friable-none |
| B/C 26-48" | 10YR4/3 | loamy fine sand | massive-friable-2.5Y5/3 |
| Cd 48-60" | 2.5Y5/2 | silty clay loam | blocky-firm-7.5YR5/8 |

Hydrologic Soil Group of this Eldridge soil test pit is C.

| | | | |
|---|---|---|---|
| **Test Pit No.** | **2** | Soils Series: | Eldridge |
| ESHWT:: | 24" | Landscape: | Flat |
| Termination @ | 60" | Slope: | A |
| Refusal: | None | Parent Material: | Sand over silt |
| Obs. Water: | 59" | Ksat (above ESHWT): | 6 in/hr. |

| Horizon | Color (Munsell) | Texture | Structure-Consistence-Redox |
|---|---|---|---|
| A 0-13" | 10YR3/2 | loamy sand | granular-friable-none |
| Bw 13-24" | 10YR4/4 | loamy sand | granular-friable-none |
| B/C 24-31" | 10YR4/3 | loamy fine sand | massive-friable-2.5Y5/3 |
| Cd 31-60" | 2.5Y5/2 | silty clay loam | blocky-firm-7.5YR5/8 |

Hydrologic Soil Group of this Eldridge soil test pit is C.

8 Continental Dr Bldg 2 Unit H, Exeter, NH 03833-7526
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*info@gesinc.biz*
*www.gesinc.biz*

| | | | |
|---|---|---|---|
| **Test Pit No.** | **3** | Soils Series: | Eldridge |
| ESHWT:: | 15" | Landscape: | Flat |
| Termination @ | 60" | Slope: | A |
| Refusal: | None | Parent Material: | Sand over silt |
| Obs. Water: | 46" | Ksat (above ESHWT): | 6 in/hr. |

| Horizon | Color (Munsell) | Texture | Structure-Consistence-Redox |
|---|---|---|---|
| A 0-8" | 10YR3/2 | loamy sand | granular-friable-none |
| Bw 8-15" | 10YR4/6 | loamy sand | granular-friable-none |
| B/C 15-30" | 10YR4/6 | loamy fine sand | massive-friable-2.5Y5/3 |
| Cd 30-60" | 2.5Y5/2 | silty clay loam | blocky-firm-7.5YR5/8 |

Hydrologic Soil Group of this Eldridge soil test pit is C.

| | | | |
|---|---|---|---|
| **Test Pit No.** | **4** | Soils Series: | Eldridge |
| ESHWT:: | 30" | Landscape: | Flat |
| Termination @ | 60" | Slope: | A |
| Refusal: | None | Parent Material: | Sand over silt |
| Obs. Water: | 30" | Ksat (above ESHWT): | 6 in/hr. |

| Horizon | Color (Munsell) | Texture | Structure-Consistence-Redox |
|---|---|---|---|
| A 0-12" | 10YR3/2 | loamy sand | granular-friable-none |
| E 12-24" | 2.5Y7/2 | loamy sand | granular-friable-none |
| Bhs 24-30" | 7.5YR4/6 | loamy fine sand | massive-friable-none |
| Cd 30-60" | 2.5Y5/2 | silty clay loam | blocky-firm-7.5YR5/8 |

Hydrologic Soil Group of this Eldridge soil test pit is C.

| BMP Type | BMP [1,2,3,4,5,6,7] | Notes | Lit. Ref. | Values accepted for Loading Analyses | | |
|---|---|---|---|---|---|---|
| | | | | TSS | TN | TP |
| Stormwater Ponds | Wet Pond | | B,F | 70% | 35% | 45% |
| | Wet Extended Detention Pond | | A,B | 80% | 55% | 68% |
| | Micropool Extended Detention Pond | TBA | | | | |
| | Multiple Pond System | TBA | | | | |
| | Pocket Pond | TBA | | | | |
| Stormwater Wetlands | Shallow Wetland | | A,B,F,I | 80% | 55% | 45% |
| | Extended Detention Wetland | | A,B,F,I | 80% | 55% | 45% |
| | Pond/Wetland System | TBA | | | | |
| | Gravel Wetland | | H | 95% | 85% | 64% |
| Infiltration Practices | Infiltration Trench (≥75 ft from surface water) | | B,D,I | 90% | 55% | 60% |
| | Infiltration Trench (<75 ft from surface water) | | B,D,I | 90% | 10% | 60% |
| | Infiltration Basin (≥75 ft from surface water) | | A,F,B,D,I | 90% | 60% | 65% |
| | Infiltration Basin (<75 ft from surface water) | | A,F,B,D,I | 90% | 10% | 65% |
| | Dry Wells | | | 90% | 55% | 60% |
| | Drip Edges | | | 90% | 55% | 60% |
| Filtering Practices | Aboveground or Underground Sand Filter that infiltrates WQV (≥75 ft from surface water) | | A,F,B,D,I | 90% | 60% | 65% |
| | Aboveground or Underground Sand Filter that infiltrates WQV (<75 ft from surface water) | | A,F,B,D,I | 90% | 10% | 65% |
| | Aboveground or Underground Sand Filter with underdrain | | A,I,F,G,H | 85% | 10% | 45% |
| | Tree Box Filter | TBA | | | | |
| | Bioretention System | | I,G,H | 90% | 65% | 65% |
| | Permeable Pavement that infiltrates WQV (≥75 ft from surface water) | | A,F,B,D,I | 90% | 60% | 65% |
| | Permeable Pavement that infiltrates WQV (<75 ft from surface water) | | A,F,B,D,I | 90% | 10% | 65% |
| | Permeable Pavement with underdrain | | Use TN and TP values for sand filter w/ underdrain and outlet pipe | 90% | 10% | 45% |
| Treatment Swales | Flow Through Treatment Swale | TBA | | | | |
| Vegetated Buffers | Vegetated Buffers | | A,B,I | 73% | 40% | 45% |
| Pre-Treatment Practices | Sediment Forebay | TBA | | | | |
| | Vegetated Filter Strip[8] | | A,B,I | 73% | 40% | 45% |
| | Vegetated Swale | | A,B,C,F,H,I | 65% | 20% | 25% |
| | Flow-Through Device - Hydrodynamic Separator | | A,B,G,H | 35% | 10% | 5% |
| | Flow-Through device - ADS Underground Multichamber Water Quality Unit (WQU) | | G,H | 72% | 10% | 9% |
| | Other Flow-Through Devices | TBA | | | | |
| | Off-line Deep Sump Catch Basin | | J,K,L,M | 15% | 5% | 5% |