

**Town of Kittery  
Planning Board Meeting  
November 16, 2023**

**ITEM 4 – 77 Bartlett Road – Conservation Subdivision Plan – Preliminary Review**

Action: Hold public hearing. Approve plan or continue review. Michael Tadema-Wielandt, on behalf of owner/applicant Geoff Bowley, is proposing to divide a 19.11-acre parcel into a conservation subdivision of 9 single-family residential building lots, a private street system, and an open space plot around identified wetlands, vernal pools, and a pre-existing cemetery. The proposed subdivision is located on the property of 77 Bartlett Road, Map 62 Lot 26, in the Residential-Rural (R-RL) and Resource Protection Overlay (OZ-RP) Zones.

**PROCESS SUMMARY**

REQ'D	ACTION	COMMENTS	STATUS
YES	Sketch Plan Acceptance/Approval	5/11/23	Accepted
YES	Planning board determination of completeness	8/24/23	Accepted
NO	Site Visit	8/21/23	Held
YES	Public Hearing	Scheduled for 9/28/23 Continued to 10/26/23 Rescheduled to 11/16/23	Pending
YES	Preliminary Plan Approval		TBD
YES	Final Plan Review and Decision		TBD
<p style="text-align: center;"><b>Applicant: Prior to the signing of the approved Plan any Conditions of Approval related to the Findings of Fact along with waivers and variances (by the BOA) must be placed on the Final Plan and, when applicable, recorded at the York County Registry of Deeds. PLACE THE MAP AND LOT NUMBER IN 1/4" HIGH LETTERS AT LOWER RIGHT BORDER OF ALL PLAN SHEETS. <u>As per Section 16.4.4.L - Grading/Construction Final Plan Required. - Grading or construction of roads, grading of land or lots, or construction of buildings is prohibited until the original copy of the approved final plan endorsed has been duly recorded in the York County registry of deeds when applicable.</u></b></p>			

**PROJECT INTRODUCTION**

This is the third preliminary review for a proposed 9-lot conservation subdivision located at 77 Bartlett Road in the R-RL (Residential-Rural) zoning district and partially within the OZ-RP Resource Protection Overlay Zone. The lots are proposed to be accessed from Bartlett Road through a private street system ending in one cul-de-sac, designed to meet the standards of a Class II private street with a 3-foot widened shoulder and a painted strip on the west side for pedestrian movement. Nine proposed lots will all be accessed from the new road. Lot sizes range from approximately 21,000 square feet to 34,000 square feet. The property currently contains a single residential dwelling; the structure will remain on the lot after renovations, and the driveway currently providing access to Bartlett Road will be removed.

A private cemetery, located between proposed lots 1 and 2, will be maintained as open space with public access provided. Public water and sewage are unavailable to the property; the developer proposes installing private septic systems and wells for each individual lot. The site contains wetland areas around the proposed subdivision, including two vernal pools (that have not been deemed of significant size by the state) located

32 east of the proposed development, and an area containing a wetland of special significance as well as a  
33 floodplain abutting the proposed subdivision to the southwest.

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35 The planning board first reviewed this application on August 24<sup>th</sup>, where they accepted the application as  
36 complete, scheduled a site walk for September 21<sup>st</sup>, and scheduled a public hearing during the September  
37 28<sup>th</sup> planning board meeting. After plan acceptance, a third-party engineer review of the drainage analysis  
38 identified several concerns and deemed the stormwater management report would have to be resubmitted,  
39 noting that additional stormwater treatment would likely be required. During the planning board's second  
40 review on September 28<sup>th</sup>, the planning board moved to continue the public hearing to the meeting of  
41 October 26<sup>th</sup>. Prior to the second hearing, the applicant submitted a revised site plan and stormwater  
42 management report incorporating the peer review engineer's feedback.

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44 The peer review of the second stormwater management report found significant issues requiring a third  
45 submission. In response to this, the applicant requested the planning board move the hearing to November  
46 16<sup>th</sup> to allow them enough time to revise their application. Review of the third drainage analysis is  
47 expected to be completed on November 13<sup>th</sup>. Once the hearing has been completed, staff suggest the  
48 planning board advise the applicant based on the feedback provided by the public and peer review (if  
49 received in time).

#### 50 51 **WAIVERS REQUESTED**

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- 54 1. Sidewalk modification request: Sidewalks are required for all Class II private streets. The applicant  
55 is proposing a modification to allow a paved pedestrian travel way along one side of the road  
56 instead.

#### 57 58 **STAFF COMMENTS**

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- 61 1. Following feedback from the public hearing, the applicant has extended the vegetated buffer  
62 between Lot 9 and Bartlett Road.
  - 63 2. There were multiple comments during the public hearing about a water body within the wetlands  
64 of special significance referred to as "Ken's Pond." The setback area between Lots 7-9 and the  
65 abutting wetland is now designated a forested stormwater buffer area, and the applicant has stated  
66 they are providing further treatment to any runoff from the proposed right-of-way to reduce impact.
  - 67 3. Following feedback at the public hearing, the planning board requested revised calculations to  
68 determine whether the proposal meets the 1-acre threshold of disturbed soil to require a permit from  
69 Maine DEP. Because they were so close to the 1-acre threshold, the applicant has since submitted  
70 the required permit to DEP.
  - 71 4. At the first preliminary review, the planning board requested the applicant show proof that a  
72 community water system was too costly to provide instead of private wells for each individual lot.
  - 73 5. A 40-foot right-of-way is proposed, with a 5-foot grading and drainage easement along both sides  
74 of the ROW. The proposed road shall be private and maintained by a homeowner's association.
  - 75 6. Part of the cul-de-sac is within 100 feet of the wetland. §16.5.30 requires traveled ways greater than  
76 18 feet in width only maintain a 30-foot setback, or 10 feet from the toe of the slope, whichever is  
77 greater.
  - 78 7. The water report confirms the recharge capacity of the aquifer is greater than the anticipated water  
79 usage of the proposed wells, and the bedrock is a good site for wells to be dug.

- 80 8. The Maine Department of Inland Fisheries and Wildlife does not anticipate essential habitats to be  
 81 directly affected by the project. Endangered, threatened, and significant wildlife have not been  
 82 identified in the parcel area, and impact to nearby identified habitats is not anticipated.  
 83 9. Because the conservation subdivision ordinance strongly recommends all buildings within the  
 84 subdivision be designed for maximum energy efficiency per §16.10.6.A.(4), it is suggested that  
 85 buildings be designed as south-facing whenever possible in this subdivision.  
 86 10. The conservation subdivision requires low impact development wherever possible. The proposal  
 87 plans to reuse the materials from the portions of the stone wall to be dismantled and is proposing a  
 88 forested stormwater buffer adjacent to lots 4, 5, 7, 8, and 9. Staff believe these examples show the  
 89 applicant has met this requirement.  
 90

91 **PROJECT ANALYSIS**

Code Ref.	§16.4 Land Use Zone Standards	
	Standard	Determination
§16.4.10.B	Permitted/Special Exception Uses	The proposed subdivision is a permitted use
§16.4.10.E.(2).(a).	Minimum area per dwelling: 40,000 sq ft.	It appears the standard is satisfied.
§16.4.10.E.(2).(b).	Lot size: 40,000 sq ft minimum	Not all lots meet this standard. Requirements need not be met in a conservation subdivision
§16.4.10.E.(2).(c).	Street frontage: 150 ft minimum	Not all lots meet this standard. Requirements may be modified in a conservation subdivision.
§16.4.10.E.(2).(d).	Front setback: 40 ft minimum	Not all lots meet this standard. Requirements may be modified in a conservation subdivision.
§16.4.10.E.(2).(e).	Building coverage: 15% maximum	Not all lots meet this standard. Requirements may be modified in a conservation subdivision.
§16.4.10.E.(2).(f).	Rear and side setbacks: 20 ft minimum.	Not all lots meet this standard. Requirements may be modified in a conservation subdivision.
§16.4.10.E.(2).(g).	Building height: 35 ft maximum	It appears the standard is satisfied.

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§16.4.10.E.(2).(i).	Minimum water-body setbacks: up to 100 feet from high-water line of identified wetlands	The standard appears to be satisfied for all proposed building envelopes. If final plan approval is granted, Code Enforcement will require a subsurface wastewater permit to confirm shared septic systems are maintaining necessary setbacks before a building permit can be issued.
Code Ref.	§16.5 Performance Standards	
	Standard	Determination
§16.5.4	Affordable housing requirements	Not applicable, as the subdivision has less than 10 lots.
§16.5.9	Conservation of vernal pools	Identified vernal pools were not deemed significant. Standard setback applies determined by size.
§16.5.10	Essential services	Test pits and well locations have been notated. Underground utilities are proposed. Standards appear to be met
§16.5.11	Floodplain Management	The proposed development is outside of the indicated floodplain. Standards appear to be met.
§16.5.14.B	Lots	The flag-shaped lot proposed in the sketch review has been removed. Lot standards appear to be met, save for issues noted in the table above.
§16.5.18.	Net residential acreage	The standard appears to be satisfied.
§16.5.27	Street Standards	The proposed road appears to meet the standards of a class II private street. The proposed “pedestrian way” is a modification which will require planning board approval.

§16.5.30	All wetlands of 501 sq ft. or greater trigger setbacks for certain uses	Delineation was submitted, and wetlands of special significance have been identified. Standards appear to be met, save for the missing setback mentioned above.
Code Ref.	§16.10 Additional Requirements for Conservation Subdivision	
	Standard	Determination
§16.10.4.B	Indicate any proposed public open space and Town Council approval	Standard is not required. Public access is not proposed by applicant, and the cemetery on the property would not be considered a public park.
§16.10.5.C	Proposed private and water systems must show: <ul style="list-style-type: none"> <li>adequate groundwater is available.</li> <li>Proposed groundwater sources are safe from on-site and off-site contamination.</li> <li>Proposed individual septic systems will not endanger drinking water supply.</li> <li>The costs of a community water or wastewater system is prohibitively expensive</li> </ul>	Standards appear to be met.
§16.10.5.D	Designated open space to be permanently preserved	Appears to meet minimum open space standards. Proposed configuration requires planning board approval
§16.10.5.E	Minimum lot size with private water/wastewater: 20,000 sq ft	The standard appears to be met
§16.10.5.F	No individual lot may have direct vehicular access onto a public road	All proposed lots will access the proposed private way. The driveway of the existing dwelling currently connecting to Bartlett Road will be removed. Standard appears to be met.
§16.10.5.G	All areas designated as Resource Protection must be protected as open space	The standard appears to be met.

§16.10.5.I	Wetlands designated as open space to have a “no-cut, no disturb” buffer	Staff suggest adding a note in the site plan indicating the identified wetland setbacks will be “no cut, no disturbance” areas, as that is a code requirement.
§16.10.5.J	All utilities must be installed underground	The standard appears to be met.
§16.10.5.K	All subsurface wastewater disposal areas to be indicated on plan	The standard appears to be met
§16.10.6.F	Vegetated buffer located on front lot line, a minimum width of 40 feet	The standard appears to be met.
§16.10.6.H	Low-impact design must be incorporated into the plan whenever possible	The stormwater drainage plan proposes a forested stormwater buffer on Lot 4. The standard appears to be met.
§16.10.7.A	Open space minimum: 60% of lot, with 40% of that consisting of net residential acreage.  Example: in a parcel of 1,000,000 sq ft, 600,000 sq ft (60%) must be open space. Of that 600,000 sq ft, 240,000 (40% of open space, or 24% of total lot) must be included in the net residential acreage calculations.	The open space requirement calculations appear to be off. 40% of the required minimum open space would be 201,754 sq ft. 40% of the proposed open space provided would be 229,014 sq ft. The notes show neither of these numbers. The application appears to have enough land to meet requirements but should revise calculations.
§16.10.7.B	All wetlands, water bodies, and floodplains must be located within open space boundaries	This standard appears to be met.
§16.10.7.C	Significant natural resources or wildlife habitat areas must be designated as open space	This standard appears to be met.

§16.10.7.D	Open space must include any notable features	This standard appears to be met.
§16.10.7.E	All historic, cultural, or archaeological resources must be included as open space	The Payne Cemetery is designated as open space. The standard appears to be met.
§16.10.7.F	Open space areas must be made contiguous to the greatest extent possible	Staff believe this standard has been met, but open space configuration is up to the decision of the planning board.
§16.10.7.G	Open space may not be mowed unless part of a public park/trail	This standard will be met with the addition of the above mentioned “no cut” buffers.
§16.10.10	<p>The homeowner's association will be held responsible for:</p> <ul style="list-style-type: none"> <li>• Maintenance of open space</li> <li>• Maintenance public facilities such as road and stormwater systems</li> <li>• An initial capital fund required to cover expenses</li> <li>• Maintenance and replacement of plantings, including additional plantings required by the planning board</li> </ul>	The plan indicates the subdivision will be maintained by a Homeowner’s Association
§16.10.11	<p>Prior to the beginning of any site work, the applicant must:</p> <ul style="list-style-type: none"> <li>• Define the limits of any proposed clearings.</li> <li>• File all required performance guarantees and inspection escrows in forms acceptable to the Town Manager</li> </ul>	Not applicable at preliminary stage
Code Ref.	§16.8.9.C Preliminary Subdivision Plan Requirements	
	Standard	Determination

§16.8.9.C.(5).(a-i).	<ul style="list-style-type: none"> <li>* Paper plan sheets no smaller than 11” x 17”</li> <li>* Scale of drawing no greater than 1 inch = 30 feet</li> <li>* Code block in right-hand corner</li> <li>* Standard boundary survey of existing conditions</li> <li>* Compass with arrow pointing true north</li> <li>* Locus map of property</li> <li>* Vicinity map and aerial photograph</li> <li>* Surveyed acreage of parcel(s), rights-of-way, wetlands, and amount of street frontage</li> <li>* Names and addresses of owners of record abutting property</li> </ul>	Provided
§16.8.9.C.(5).(j).	Existing conditions survey including all identified structures, natural resources, rights-of-way, and utilities located on and within 100 feet of the property	Provided
§16.8.9.C.(5).(k).	<p>Proposed development area including:</p> <ul style="list-style-type: none"> <li>* Location and detail of proposed structures and signs</li> <li>* Proposed utilities including power, water, and sewer</li> <li>* Sewage facilities type and placement</li> <li>* Domestic water source</li> <li>* Lot lines, rights-of-way, and street alignments</li> <li>* Road and other paved area plans</li> <li>* Existing and proposed setbacks</li> <li>* Storage areas for waste or hazardous materials</li> <li>* Topographic contours of existing contours and finished grade elevations</li> <li>* Locations and dimensions of artificial features such as pedestrian ways, sidewalks, curb cuts, driveways, fences, retaining walls,</li> </ul>	Provided
§16.8.9.C.(6).(a).	Documents showing legal interest in the property	Provided
§16.8.9.C.(6).(b).	Identified property encumbrances	Provided
§16.8.9.C.(6).(c).	Kittery Water District approval letter	Private water proposed: hydrogeologist letter has been provided.
§16.8.9.C.(6).(d).	Erosion and sedimentation control plan	Provided
§16.8.9.C.(6).(e).	Stormwater management plan and drainage analysis	Provided
§16.8.9.C.(6).(f).	Soil survey	Provided



§16.8.9.C.(6).(g).	Vehicular traffic report	Provided
§16.8.9.C.(6).(h).	Traffic impact analysis	Not deemed applicable due to low traffic volume
§16.8.9.C.(6).(i).	Test pit analysis for proposed septic systems	Provided
§16.8.9.C.(6).(j).	Town sewage department confirmation	Not applicable.
§16.8.10.C.(6).(k).	Evaluation of development by Police, Fire, and Public Works department heads	Provided
§16.8.10.C.(6).(l).	Additional submissions as required	None proposed at this time

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**DISCUSSION, NEXT STEPS, AND RECOMMENDATIONS**

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100 The purpose of a public hearing is to gather feedback from abutters, residents, and interested parties that  
101 may identify potential conflicts or suggestions to the proposed development. The applicant has revised their  
102 application, and a peer review is pending. If the engineer review concludes there are no significant issues  
103 with the revised stormwater management report, staff consider the application ready for preliminary  
104 approval on the condition that all identified minor issues be resolved as a part of the final plan application.  
105 After holding the hearing, staff suggest the planning board discuss the feedback gathered by the public and  
106 advise the applicant on next steps.

107 **RECOMMENDED MOTIONS**

108 Below are recommended motions for the Board's use and consideration:  
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110 ***Motion to conditionally approve the application***

111 Move to approve the site plan (with conditions listed above) by Michael Tadema-Wielandt, on behalf of  
112 owner/applicant Geoff Bowley, proposing to divide a 19.11-acre parcel into a conservation subdivision of  
113 9 single-family residential building lots, a private street system, and an open space plot around identified  
114 wetlands, vernal pools, and a pre-existing cemetery on the property of 77 Bartlett Road, Map 62 Lot 26,  
115 in the Residential-Rural (R-RL) and Resource Protection Overlay (OZ-RP) Zones.

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117 ***Motion to continue the application***

118 Move to continue review of the site plan by Michael Tadema-Wielandt, on behalf of owner/applicant  
119 Geoff Bowley, proposing to divide a 19.11-acre parcel into a conservation subdivision of 9 single-family  
120 residential building lots, a private street system, and an open space plot around identified wetlands, vernal  
121 pools, and a pre-existing cemetery on the property of 77 Bartlett Road, Map 62 Lot 26, in the Residential-  
122 Rural (R-RL) and Resource Protection Overlay (OZ-RP) Zones.



November 13, 2023

Maxim Zakian, Town Planner  
Town of Kittery  
200 Rogers Road  
Kittery, Maine 03904

**RE: Town of Kittery, Planning Board Services  
Bartlett Road Conservation Subdivision Review #3  
77 Bartlett Road, Tax Map 62, Lot 26  
CMA #591.161**

Dear Max:

CMA Engineers has received the following information for Assignment #161, review #3 of the Bartlett Subdivision at 77 Bartlett Road (Tax Map 62, Lot 26).

- 1) Stormwater Management Report prepared by Terradyn Consultants LLC Revised October 27, 2023.

The project is proposed as a 9-lot conservation subdivision with access off Bartlett Road. The project is located in the residential-rural district (R-RL) zone with a small area in the resource protection overlay zone. The proposed development is located on a 19.3-acre lot and includes single family residences (including one existing home) and a roadway ending in a cul-de-sac. Lots are proposed between 21,000 square feet and 29,000 square feet. 13 acres are proposed to be preserved as open space. The lots will be served by individual septic systems and wells. There are wetlands, potential vernal pools, and a cemetery on the property. There are no wetland impacts associated with the project.

Stormwater modelling has been modified from the previous submission.

Stormwater has been modeled to be attenuated through the use of vegetated swales, level spreaders and forested woodland/wetland buffers. Peak flows are decreased in the post construction condition.

We have the following minor comments on the revised stormwater management report:

1. Please provide additional information on the culvert sizing calculation. The culverts should be designed to handle a 25-year storm event, but it is unclear what parameters were used in its design.  
**Unaddressed from previous comment letter.**

*Pre-development Watershed Map*

1. Show flow path C-D for watershed 4.

*Post Development Watershed Map*

2. Show flow path C-D for watershed 31.
3. Show flow path C-D for watershed 40.
4. Show time of concentration data for watershed 32.

Maxim Zakian, Town Planner

November 13, 2023


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Should you have any questions, please do not hesitate to call.

Very truly yours,

CMA ENGINEERS, INC.



Jodie Bray Strickland, P.E.

Project Manager

cc: Michael Tedema-Wielandt, P.E., Terradyn Consultants, LLC



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**BARTLETT ROAD SUBDIVISION**  
77 BARTLETT ROAD, KITTERY, MAINE

# **STORMWATER MANAGEMENT REPORT**

**PREPARED FOR:**

BEACHWOOD DEVELOPMENT FUND LP  
P.O. BOX 261  
KENNEBUNK, MAINE 04043

**PREPARED BY:**

TERRADYN CONSULTANTS LLC  
565 CONGRESS STREET, SUITE 201  
PORTLAND, MAINE 04101



Revised October 27, 2023

**Pineland**  
41 Campus Drive, Suite 301  
New Gloucester, ME 04260

**Portland**  
565 Congress Street, Suite 201  
Portland, ME 04101

**Auburn**  
95 Main Street, 2<sup>nd</sup> Floor  
Auburn, ME 04210

## **Introduction**

The following Stormwater Management Plan has been prepared for Bartlett Road Subdivision to evaluate stormwater runoff and erosion control for the proposed 9-lot subdivision.

## **Site Calculations**

Below is a summary of existing and proposed impervious and developed areas on the project site.

Total Property Area	19.30 Ac (+/-)
Existing Impervious Area	0.18 Ac
Existing Developed Area	0.44 Ac
Proposed New Impervious	0.43 Ac
Proposed New Developed	0.93 Ac
Total Impervious Area	0.56 Ac
Total Developed Area	1.19 Ac

## **Existing Conditions**

The project site is approximately 19.30 acres in size and is identified as Lot 26 on Kittery Tax Map 62. The site is located in the Residential-Rural District with a small area in the Resource Protection Overlay Zone.

The parcel contains an existing single-family home with a paved driveway connecting to Bartlett Road and a small cemetery in the eastern part of the site. Most of the parcel is undeveloped woodland with pockets of freshwater wetlands. Several stone walls are located throughout the site.

A wetland and vernal pool study was conducted on the site by Longview Partners in the summer of 2022. There are approximately 2 acres of forested freshwater wetlands on the site. A wetland on the southern site boundary meets the Maine DEP's criteria for a "Wetland of Special Significance". This wetland also has a mapped flood zone associated with it.

Two potential vernal pools were identified on the site and studied in the spring of 2023 to determine if they have characteristics to be considered significant wildlife habitat by the Maine Department of Environmental Protection. The vernal pools were determined to be not significant and are regulated as freshwater wetlands.

Longview Partners also conducted a High Intensity Soil Survey of the site. Native soils are primarily loamy glacial till and bedrock outcrops in upland areas with wetland soils in low-lying areas. A copy of the High Intensity Soil Survey is attached herein.

The site is generally bisected by two ridgelines, sloping gradually at approximately 2%. Stormwater from the site is split by the ridges and flows in four directions toward the on-site wetlands.

The following existing conditions figures are provided in Appendix 1:

Figure 1	USGS Topographic Map
Figure 2	Aerial Photograph
Figure 3	NRCS Medium Intensity Soil Survey
Figure 4	Federal Insurance Rate Map
Figure 5	Aquifer Map

### **Proposed Project**

The proposed project includes of a 808' long dead-end road with 9 proposed house lots. The project will have 13.14 acres of open space surrounding the development. Each proposed lot ranges in size from 0.49 acres to 0.79 acres and meets all dimensional standards of the town's zoning ordinance. Lots will be served by individual wells and subsurface wastewater disposal systems. The existing house will occupy Lot 8 and will be accessed from the proposed road. The existing driveway from Bartlett Road will be removed and the area re-vegetated.

Runoff from the road will be collected in a roadside ditch, designed to convey stormwater to stable discharge locations.

Approximately 500 linear feet of the proposed road and three lots (Lots 7, 8, 9) will drain to two wooded stormwater buffers, designed in accordance with the Maine Department of Environmental Protection BMP Design Manual. The use of vegetated buffers is an effective way to trap particulate pollutants and allow time for runoff to infiltrate. The irregular surface micro-topography of a vegetated buffer will provide small areas within which runoff can pool and infiltrate and runoff volumes can be reduced. Further, vegetated buffers require minimal maintenance, making them more effective than alternative BMPs.

The remaining 300 linear feet of road will be directed to the roadside ditch on the north side of Bartlett Road, which conveys runoff to the wetland located west of the project site.

### **Applicable Design Standards**

The Town of Kittery's Ordinance Title 16, Part E, Section 4-a Stormwater runoff requires: *All components of the stormwater management system must be designed to limit peak discharge to predevelopment levels for the two-year and twenty-five-year, twenty-four-hour duration, frequencies, based on the rainfall data for Portsmouth, NH.*

The project includes 0.43 Ac. of new impervious area and 0.93 Ac. of new developed area. Road construction and associated work will result in greater than 1-acre of disturbed area. A Stormwater Permit-by-Rule will be filed with the Maine Department of Environmental Protection to show compliance with the Chapter 500 Basic Standard.

### **Stormwater Quantity Control**

Stormwater Quantity control is required as part of the town's performance standards and approval criteria for the project. The proposed development has been designed to minimize stormwater runoff from the site in excess of the natural pre-development conditions. A hydrologic analysis of pre-development and post-development conditions was conducted based upon the methodology contained in the USDA Soil Conservation Service's Technical Releases No. 20 and 55 (SCS TR-20 and TR-55). For Portsmouth, New Hampshire a 24-hour SCS Type III Storm distribution was used for the analysis using the following storm frequencies and rainfall amounts.

<b>Storm Event</b>	<b>24-Hour Rainfall</b>
2-Year Storm	3.3 inches
10-Year Storm	4.9 inches
25-Year Storm	6.2 inches

Runoff curve numbers, time of concentration, and travel time data were established based on methods outlined in the USDA TR-55 manual.

A minimum time of concentration of 5 minutes and a maximum sheet flow distance of 150 linear feet was used in the models.

#### Pre-Development Conditions

The pre-development HydroCAD model includes five (5) subcatchments and five (5) study points. Below is a summary of the study points:

Study Point SP1 – Study Point 1 is the eastern parcel boundary where on site flow travels through culvert under the southern section of Lynch Lane and to Brave Boat Harbor.

Study Point SP2 – Study Point 2 is the southern parcel boundary outletting through a culvert under Bartlett Road, to Smith Brook and to Brave Boat Harbor.

Study Point SP3 – Study Point 3 is the southern boundary where on site flow collects in a wetland and travels through a culvert under Bartlett Road and to Brave Boat Harbor.

Study Point SP4 – Study Point 4 is the western site boundary where on site flow collects in a wetland and travels to Spruce Creek.

Study Point SP5 – Study Point 5 is the eastern parcel boundary where on site flow travels through culvert under the northern section of Lynch Lane and to Brave Boat Harbor.

A Pre-Development Watershed Map, showing sub-watershed boundaries, time of concentration flow paths, and Study Points is provided in Appendix 5. The Pre-development HydroCAD model is attached in Appendix 6.

The pre-development peak rates of runoff are a baseline used for comparison to the post-development condition.

#### Post-Development Conditions

Stormwater runoff from the roadway will be managed with open ditches and vegetated buffers. The project was designed to meet the stormwater performance standards of the Town of Kittery Subdivision Regulations. Runoff from approximately 500 linear feet of the new road will be conveyed to level spreaders and vegetated stormwater buffers for treatment and volume reduction.

The remainder of the proposed road will drain to vegetated swales located on either side of the road, which will provide an opportunity for sediment capture and runoff absorption.

The proposed post-development HydroCAD model includes eight (8) subcatchments and five (5) study points. The study points remain the same from the pre-development model. A Post-development Watershed Map showing sub-watershed boundaries, time of concentration flow

paths, and Study Points is provided in Appendix 5. The Post-development HydroCAD model is attached in Appendix 7.

**Peak Flow Analysis**

The results of the pre-development and post-development models were analyzed at the defined Study Points described above. The direct comparison of the pre-development and post-development conditions at the Study Points are as follows:

<b>Peak Runoff Flow Rates Comparison</b>		
<b>Storm Event</b>	<b>Pre-Development (cfs)</b>	<b>Post-Development (cfs)</b>
<b>Study Point SP1</b>		
2-Year	1.98	1.76
10-Year	4.21	3.74
25-Year	5.60	4.97
<b>Study Point SP2</b>		
2-Year	2.52	2.41
10-Year	5.48	5.25
25-Year	7.34	7.03
<b>Study Point SP3</b>		
2-Year	8.49	8.32
10-Year	18.54	17.83
25-Year	24.82	23.75
<b>Study Point SP4</b>		
2-Year	5.15	5.12
10-Year	11.27	11.21
25-Year	15.09	15.01
<b>Study Point SP5</b>		
2-Year	6.12	5.83
10-Year	13.00	12.57
25-Year	17.26	16.78

The peak rates of runoff at all five study points are expected to decrease slightly in the 2, 10 & 25-year storm events. The reduction in peak flow rates is the result of shrinking tributary areas (SP1, SP2, SP4, SP5) due to changes in runoff patterns and the use of vegetated buffers to treat, slow, and infiltrate runoff from developed areas (SP3, SP5).

**Summary**

Based upon the results of this evaluation, the proposed project is not expected to cause flooding, erosion, or other significant adverse effects downstream of the site.

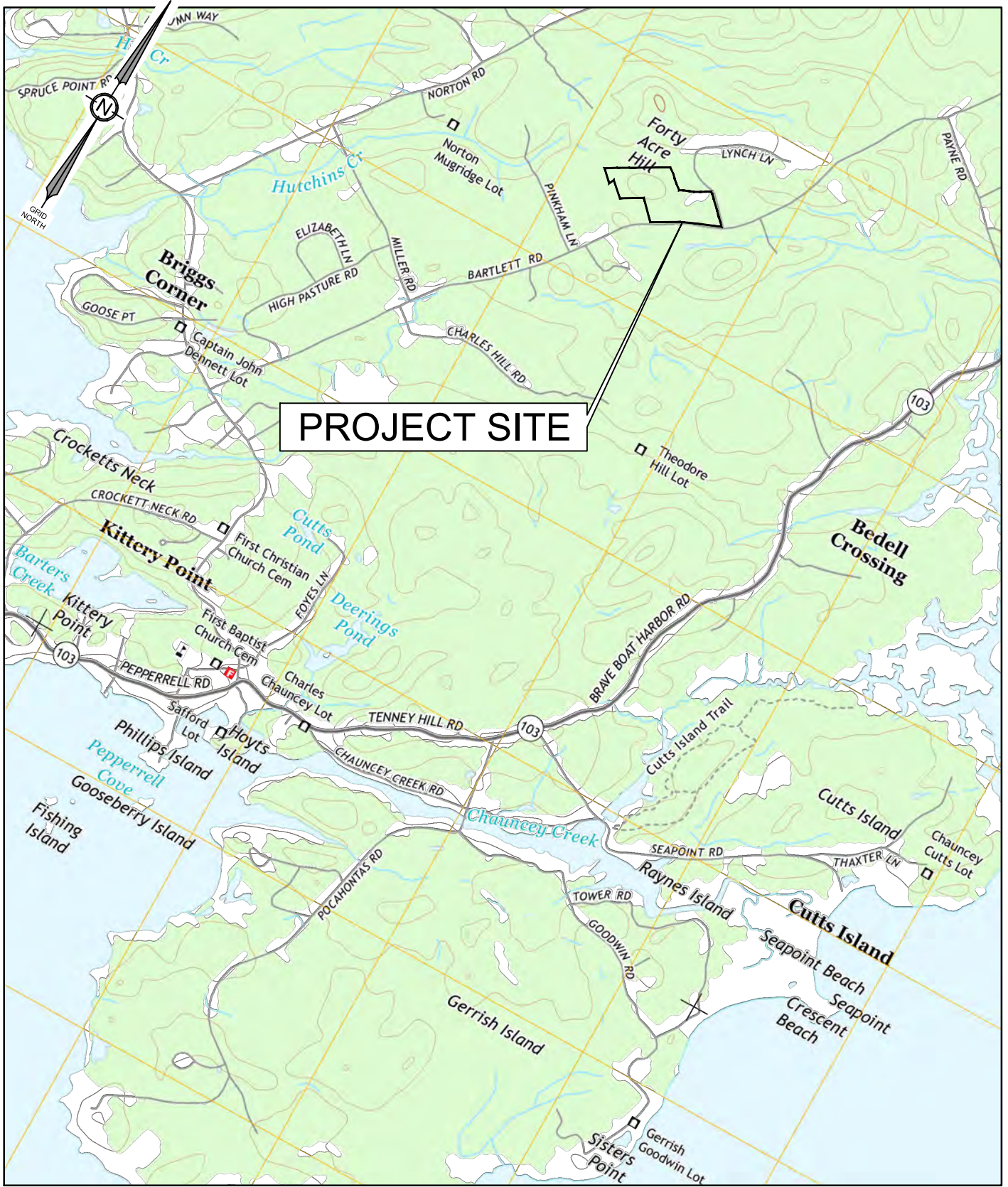
**Appendices**

- 1 – Existing Conditions Figures
- 2 – Watershed Maps
- 3 – Pre-Development HydroCAD Model
- 4 – Post-Development HydroCAD Model
- 5 – Cross Culvert Sizing Calculations
- 6 – Housekeeping
- 7 – Inspection and Maintenance Manual



**APPENDIX 1**

**EXISTING CONDITIONS FIGURES**



**PROJECT SITE**

**USGS KITTERY QUADRANGLE**

**PROJECT:**  
 BARTLETT ROAD SUBDIVISION  
 77 BARTLETT ROAD, KITTERY, MAINE

**PREPARED FOR:**  
 BEACHWOOD DEVELOPMENT FUND LP  
 PO BOX 260  
 KENNEBUNK, MAINE 04043



**ADDRESS:**  
 41 CAMPUS DRIVE, SUITE 301  
 NEW GLOUCESTER, ME 04260

**PHONE:**  
 (207) 926-5111

**WEB SITE:**  
[www.terradynconsultants.com](http://www.terradynconsultants.com)

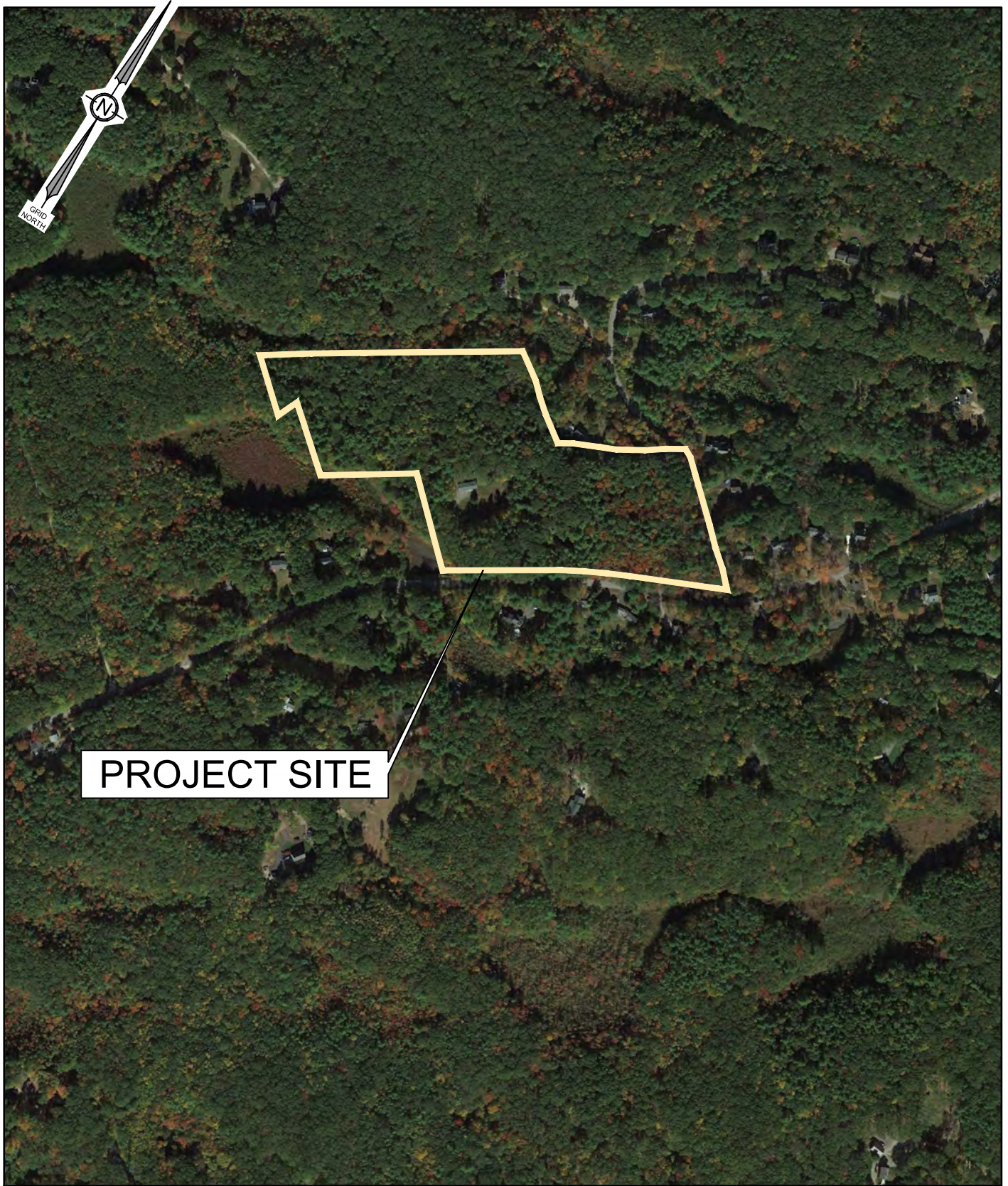
**PROJECT NO.**  
 22-145

**DATE**  
 3/20/2023


**SCALE**  
 1" = 2,000'

**SHEET**  
 1  
 OF  
 5

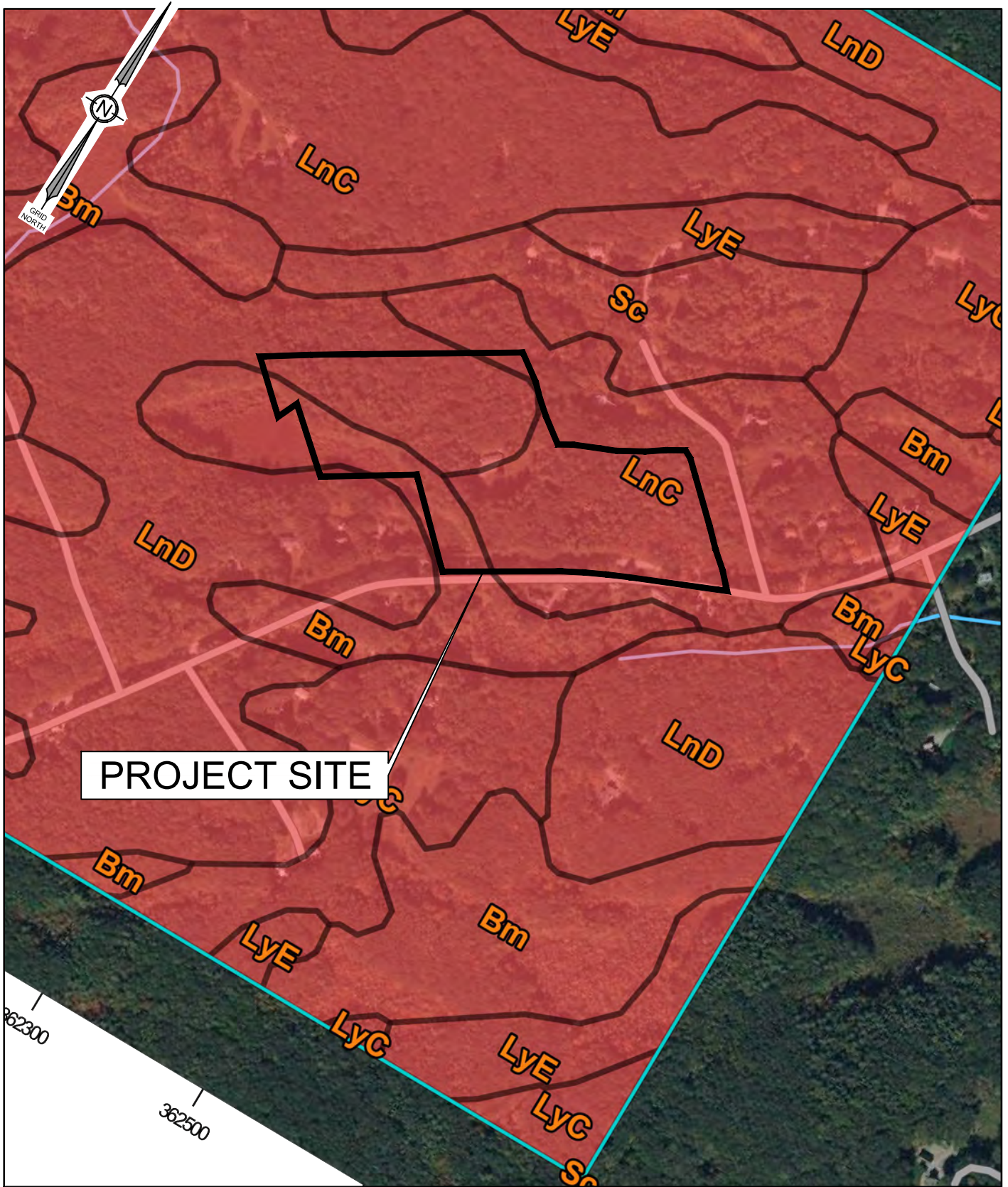




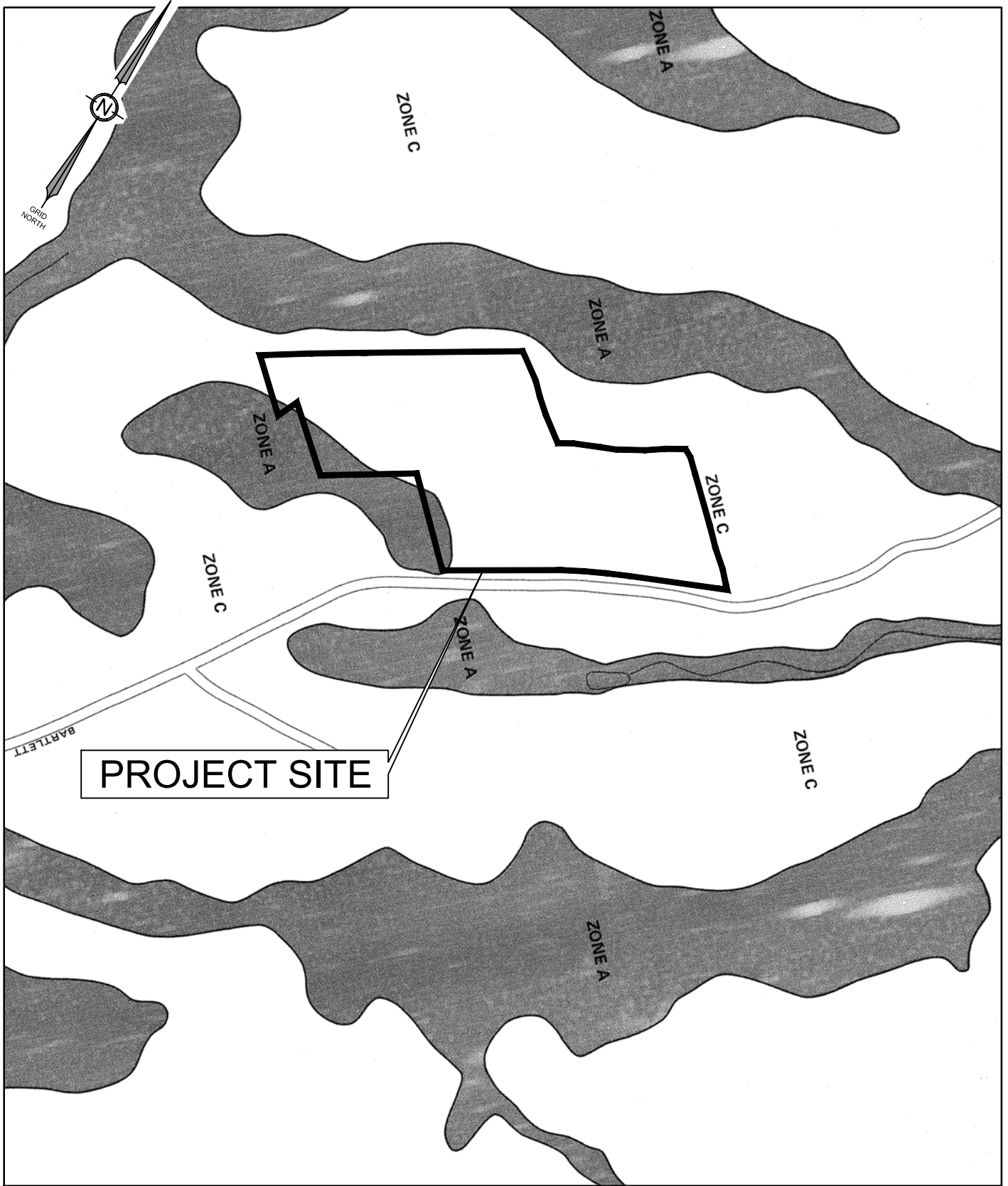
**PROJECT SITE**

<b>AERIAL MAP</b>		<b>ADDRESS:</b> 41 CAMPUS DRIVE, SUITE 301 NEW GLOUCESTER, ME 04260	<b>PROJECT NO.</b> 22-145	<b>SHEET</b> 2
<b>PROJECT:</b> BARTLETT ROAD SUBDIVISION 77 BARTLETT ROAD, KITTERY, MAINE		<b>PHONE:</b> (207) 926-5111	<b>DATE</b> 3/20/2023	
<b>PREPARED FOR:</b> BEACHWOOD DEVELOPMENT FUND LP PO BOX 260 KENNEBUNK, MAINE 04043		Civil Engineering   Land Surveying   Geomatics Stormwater Design   Land Planning   Environmental Permitting	<b>WEB SITE:</b> <a href="http://www.terradync consultants.com">www.terradync consultants.com</a>	<b>SCALE</b> 1" = 500'



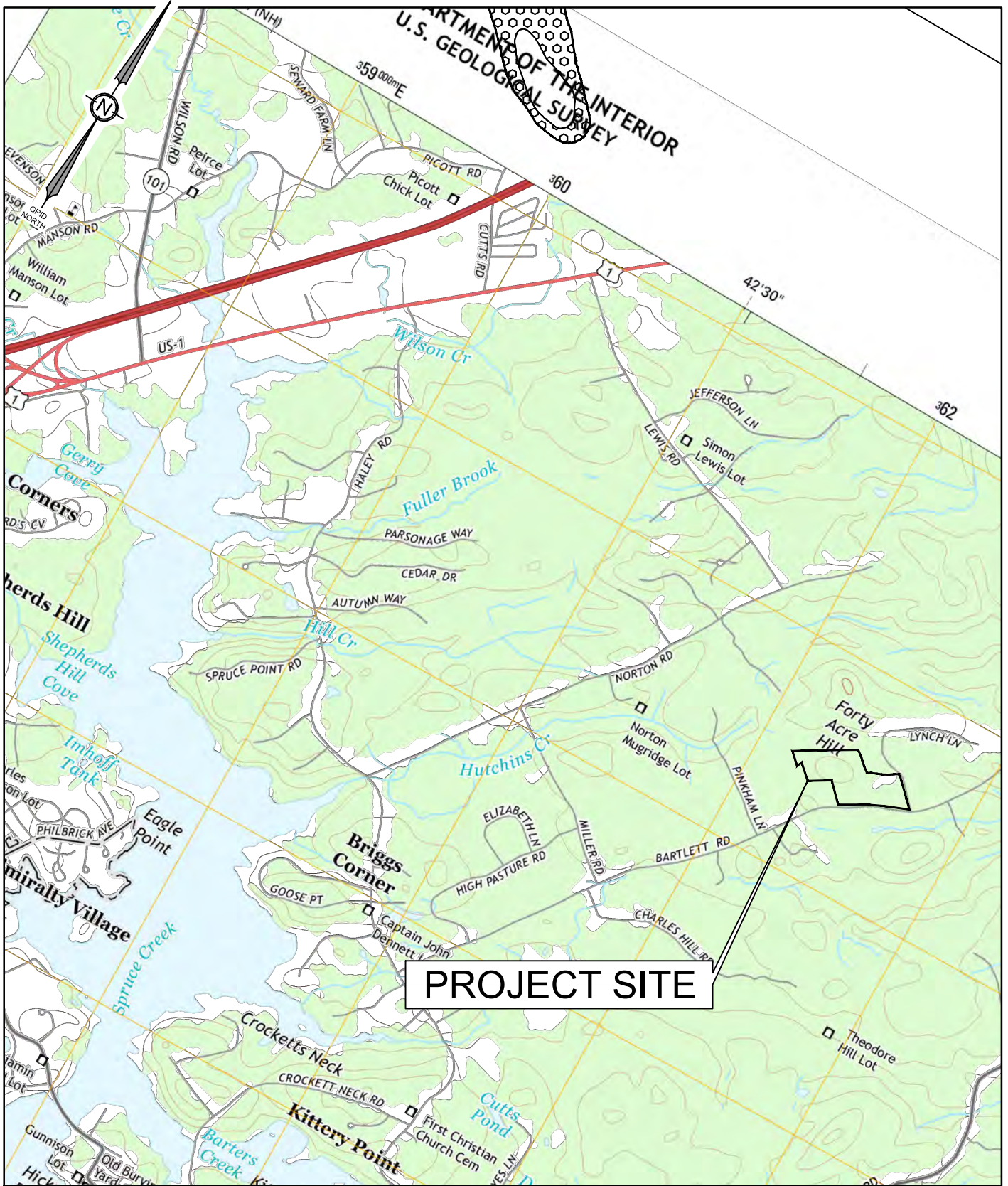


<p>MEDIUM INTENSITY SOIL SURVEY</p>	 <p><b>TERRADYN</b> CONSULTANTS, LLC</p>	<p>ADDRESS: 41 CAMPUS DRIVE, SUITE 301 NEW GLOUCESTER, ME 04260 PHONE: (207) 926-5111 WEB SITE: www.terradyconsultants.com</p>	<p>PROJECT NO. 22-145</p>	<p>SHEET 3</p>
<p>PROJECT: BARTLETT ROAD SUBDIVISION 77 BARTLETT ROAD, KITTERY, MAINE</p>		<p>DATE 3/20/2023</p>	<p>OF 5</p>	
<p>PREPARED FOR: BEACHWOOD DEVELOPMENT FUND LP PO BOX 260 KENNEBUNK, MAINE 04043</p>		<p>SCALE 1" = 500'</p>		
<p>Civil Engineering   Land Surveying   Geomatics Stormwater Design   Land Planning   Environmental Permitting</p>				



<p>FLOOD INSURANCE RATE MAP</p>	 <p><b>TERRADYN</b> CONSULTANTS, LLC</p> <p>Civil Engineering   Land Surveying   Geomatics Stormwater Design   Land Planning   Environmental Permitting</p>	<p>ADDRESS: 41 CAMPUS DRIVE, SUITE 301 NEW GLOUCESTER, ME 04260 PHONE: (207) 926-5111 WEB SITE: <a href="http://www.terradynconsultants.com">www.terradynconsultants.com</a></p>	<p>PROJECT NO. 22-145 DATE 3/20/2023 SCALE 1" = 500'</p>	<p>SHEET 4 OF 5</p>
<p>PROJECT: BARTLETT ROAD SUBDIVISION 77 BARTLETT ROAD, KITTERY, MAINE</p>				
<p>PREPARED FOR: BEACHWOOD DEVELOPMENT FUND LP PO BOX 260 KENNEBUNK, MAINE 04043</p>				





**PROJECT SITE**

SIGNIFICANT SAND & GRAVEL AQUIFER MAP	 <p><b>TERRADYN</b> CONSULTANTS, LLC</p>	ADDRESS: 41 CAMPUS DRIVE, SUITE 301 NEW GLOUCESTER, ME 04260	PROJECT NO. 22-145	SHEET <b>5</b>
PROJECT: BARTLETT ROAD SUBDIVISION 77 BARTLETT ROAD, KITTERY, MAINE		PHONE: (207) 926-5111	DATE 3/20/2023	
PREPARED FOR: BEACHWOOD DEVELOPMENT FUND LP PO BOX 260 KENNEBUNK, MAINE 04043		WEB SITE: www.terradyngoconsultants.com	SCALE 1" = 500'	<b>5</b>
Civil Engineering   Land Surveying   Geomatics Stormwater Design   Land Planning   Environmental Permitting				

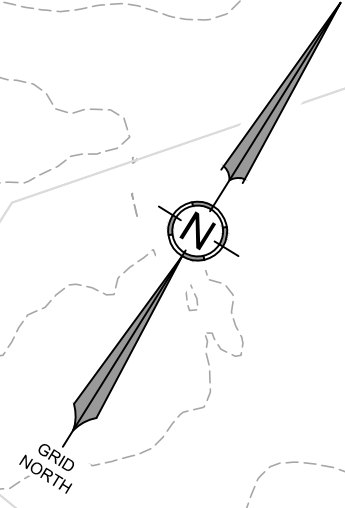
**APPENDIX 2**

**WATERSHED MAPS**

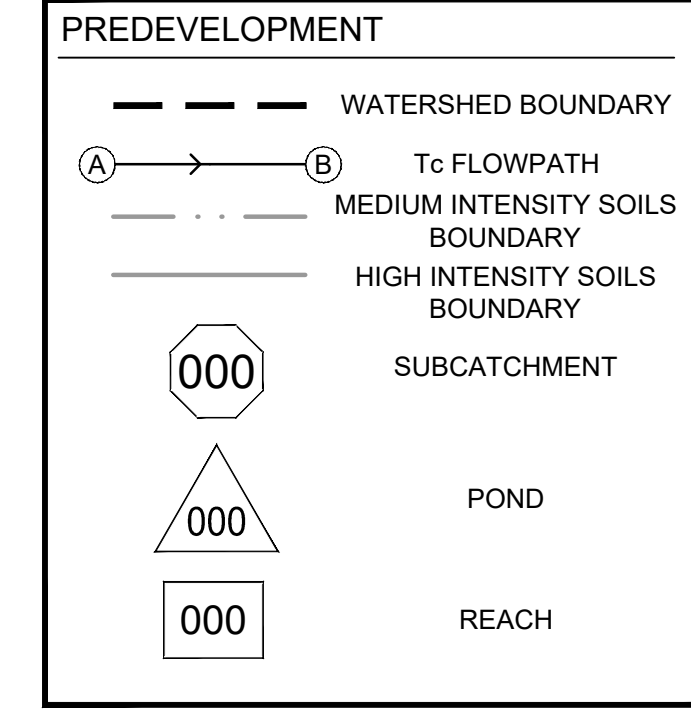


PRE DEVELOPMENT TIME OF CONCENTRATION

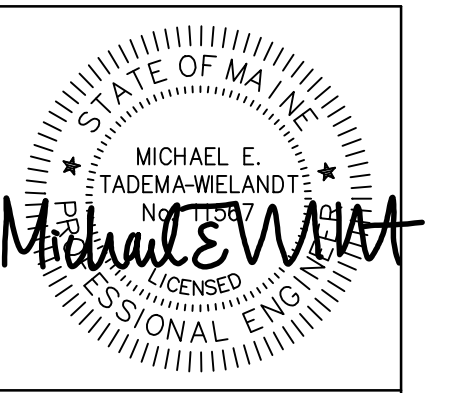
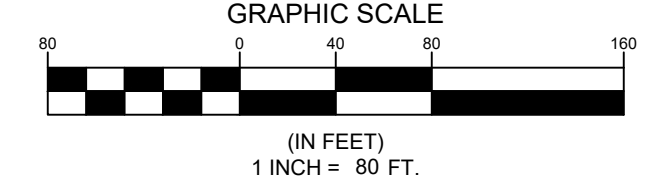
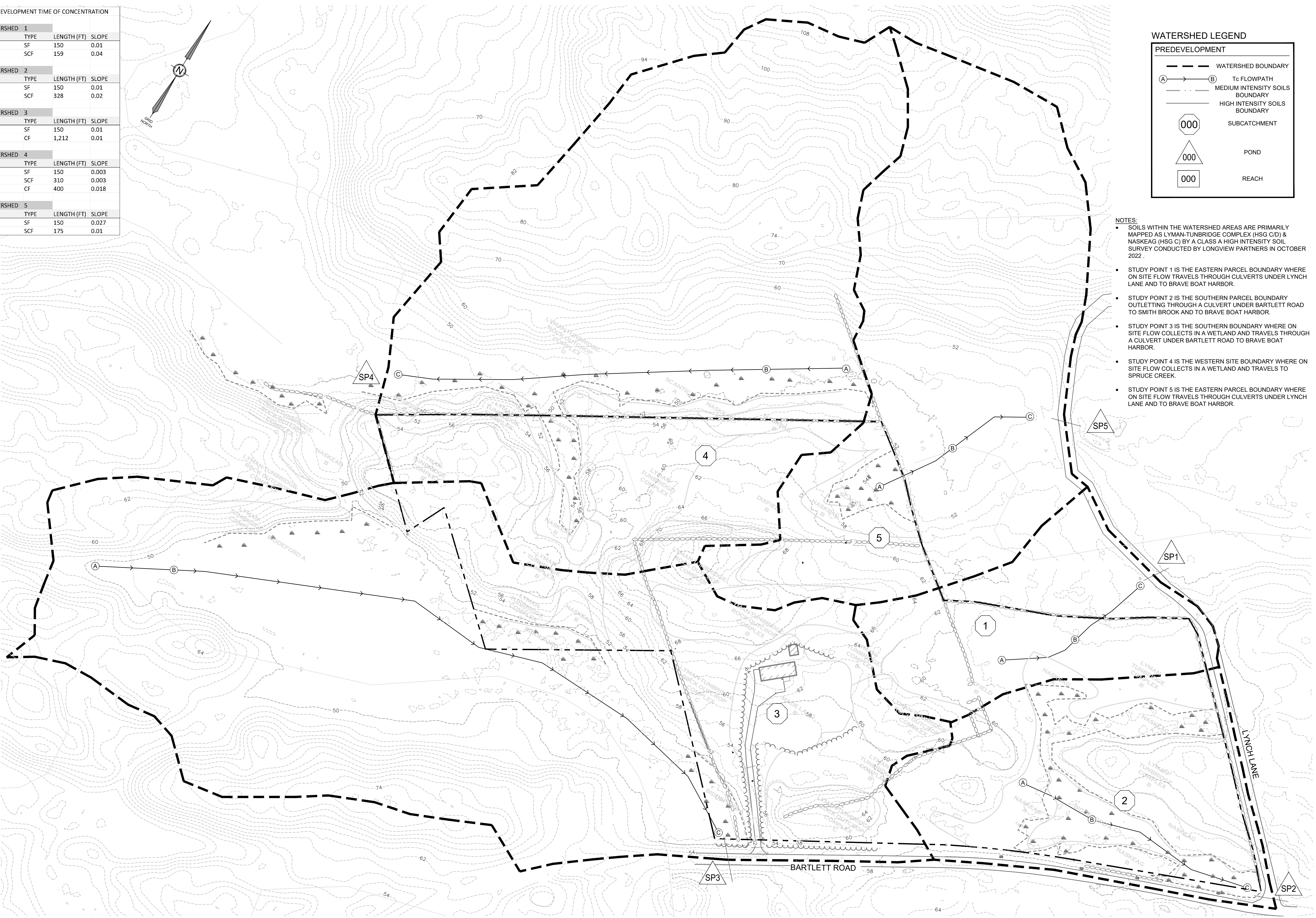
WATERSHED 1			
TYPE	LENGTH (FT)	SLOPE	
A-B	SF	150	0.01
B-C	SCF	159	0.04
WATERSHED 2			
TYPE	LENGTH (FT)	SLOPE	
A-B	SF	150	0.01
B-C	SCF	328	0.02
WATERSHED 3			
TYPE	LENGTH (FT)	SLOPE	
A-B	SF	150	0.01
B-C	CF	1,212	0.01
WATERSHED 4			
TYPE	LENGTH (FT)	SLOPE	
A-B	SF	150	0.003
B-C	SCF	310	0.003
C-D	CF	400	0.018
WATERSHED 5			
TYPE	LENGTH (FT)	SLOPE	
A-B	SF	150	0.027
B-C	SCF	175	0.01



WATERSHED LEGEND



- NOTES:
- SOILS WITHIN THE WATERSHED AREAS ARE PRIMARILY MAPPED AS LYMAN-TUNBRIDGE COMPLEX (HSG C/D) & NASKEAG (HSG C) BY A CLASS A HIGH INTENSITY SOIL SURVEY CONDUCTED BY LONGVIEW PARTNERS IN OCTOBER 2022.
  - STUDY POINT 1 IS THE EASTERN PARCEL BOUNDARY WHERE ON SITE FLOW TRAVELS THROUGH CULVERTS UNDER LYNCH LANE AND TO BRAVE BOAT HARBOR.
  - STUDY POINT 2 IS THE SOUTHERN PARCEL BOUNDARY OUTLETING THROUGH A CULVERT UNDER BARTLETT ROAD TO SMITH BROOK AND TO BRAVE BOAT HARBOR.
  - STUDY POINT 3 IS THE SOUTHERN BOUNDARY WHERE ON SITE FLOW COLLECTS IN A WETLAND AND TRAVELS THROUGH A CULVERT UNDER BARTLETT ROAD TO BRAVE BOAT HARBOR.
  - STUDY POINT 4 IS THE WESTERN SITE BOUNDARY WHERE ON SITE FLOW COLLECTS IN A WETLAND AND TRAVELS TO SPRUCE CREEK.
  - STUDY POINT 5 IS THE EASTERN PARCEL BOUNDARY WHERE ON SITE FLOW TRAVELS THROUGH CULVERTS UNDER LYNCH LANE AND TO BRAVE BOAT HARBOR.



DATE: 10/24/2023  
P.E.: MICHAEL TADEMA-WIELANDT

NO.	DATE	REVISIONS
1	8/3/2023	MTW APPD
2	10/10/2023	REVISSED BASED ON PEER REVIEW COMMENTS
3	10/24/2023	REVISSED BASED ON PEER REVIEW COMMENTS

41 CAMPUS DRIVE  
SUITE 301  
NEW GLOUCESTER, ME 04260  
OFFICE: (207) 926-5111 FAX: (207) 221-1317  
www.terradynconsultants.com



PERMIT DRAWING  
NOT FOR CONSTRUCTION

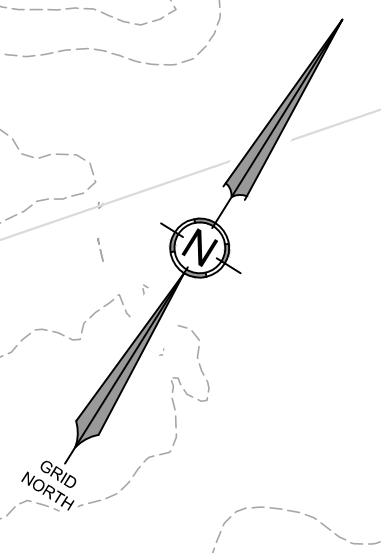
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KITTEBY, MAINE  
SHEET TITLE: PREDEVELOPMENT WATERSHED PLAN  
CLIENT: BEACHWOOD DEVELOPMENT FUND  
KENNEBUNK, MAINE 04043

DATE: 5/18/2023  
SCALE: 1" = 80'  
DESIGNED: MTW  
JOB NO.: 22-145  
SHEET: WS-1.0

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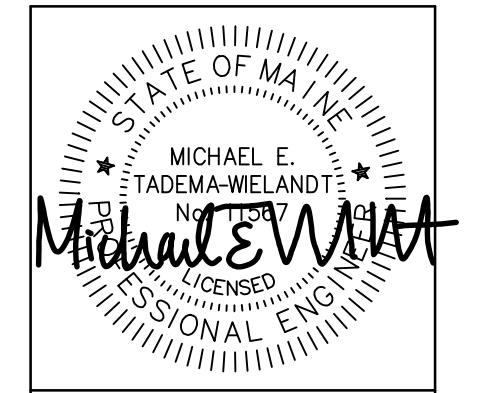
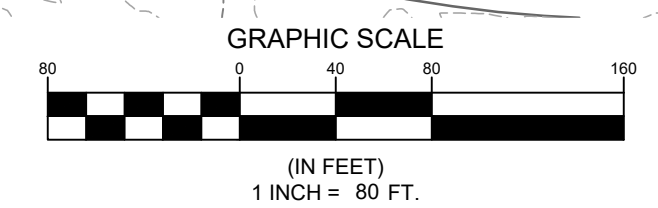


POST DEVELOPMENT TIME OF CONCENTRATION			
WATERSHED	TYPE	LENGTH (FT)	SLOPE
WATERSHED 10			
A-B	SF	150	1
B-C	SCF	159	0.04
WATERSHED 20			
A-B	SF	150	0.01
B-C	SCF	328	0.02
WATERSHED 30			
A-B	SF	150	0.01
B-C	CF	1,212	0.01
WATERSHED 31			
A-B	SF	75	0.08
B-C	SCF	178	0.06
C-D	CF	120	0.02
WATERSHED 40			
A-B	SF	150	0.003
B-C	SCF	310	0.003
C-D	CF	400	0.018
WATERSHED 50			
A-B	SF	150	0.027
B-C	SCF	175	0.01
WATERSHED 51			
MINIMUM 5 MINUTES)			



WATERSHED LEGEND	
POSTDEVELOPMENT	
	WATERSHED BOUNDARY
	T <sub>c</sub> FLOWPATH
	MEDIUM INTENSITY SOILS BOUNDARY
	HIGH INTENSITY SOILS BOUNDARY
	SUBCATCHMENT
	POND
	REACH

- NOTES:
- SOILS WITHIN THE WATERSHED AREAS ARE PRIMARILY MAPPED AS LYMAN-TUNBRIDGE COMPLEX (HSG C/D) & NASKEAG (HSG C) BY A CLASS A HIGH INTENSITY SOIL SURVEY CONDUCTED BY LONGVIEW PARTNERS IN OCTOBER 2022.
  - STUDY POINT 1 IS THE EASTERN PARCEL BOUNDARY WHERE ON SITE FLOW TRAVELS THROUGH CULVERTS UNDER LYNCH LANE AND TO BRAVE BOAT HARBOR.
  - STUDY POINT 2 IS THE SOUTHERN PARCEL BOUNDARY OUTLETTING THROUGH A CULVERT UNDER BARTLETT ROAD TO SMITH BROOK AND TO BRAVE BOAT HARBOR.
  - STUDY POINT 3 IS THE SOUTHERN BOUNDARY WHERE ON SITE FLOW COLLECTS IN A WETLAND AND TRAVELS THROUGH A CULVERT UNDER BARTLETT ROAD TO BRAVE BOAT HARBOR.
  - STUDY POINT 4 IS THE WESTERN SITE BOUNDARY WHERE ON SITE FLOW COLLECTS IN A WETLAND AND TRAVELS TO SPRUCE CREEK.
  - STUDY POINT 5 IS THE EASTERN PARCEL BOUNDARY WHERE ON SITE FLOW TRAVELS THROUGH CULVERTS UNDER LYNCH LANE AND TO BRAVE BOAT HARBOR.



DATE: 10/24/2023  
P.E.: MICHAEL TADEMA-WIELEMA

NO.	DATE	REVISIONS
1	8/3/2023	APPD
2	10/10/2023	MTW
3	10/24/2023	REVISED BASED ON PEER REVIEW COMMENTS

565 CONGRESS STREET  
SUITE 201  
PORTLAND, ME 04102

41 CAMPUS DRIVE  
SUITE 301  
NEW GLOUCESTER, ME 04260

OFFICE: (207) 926-5111 FAX: (207) 221-1317  
www.terradynconsultants.com

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CONSULTANTS, LLC

Civil Engineering | Land Planning | Stormwater Design | Environmental Permitting

PERMIT DRAWING  
NOT FOR CONSTRUCTION

PROJECT: BARTLETT ROAD SUBDIVISION  
KITTELY, MAINE

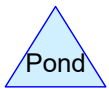
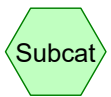
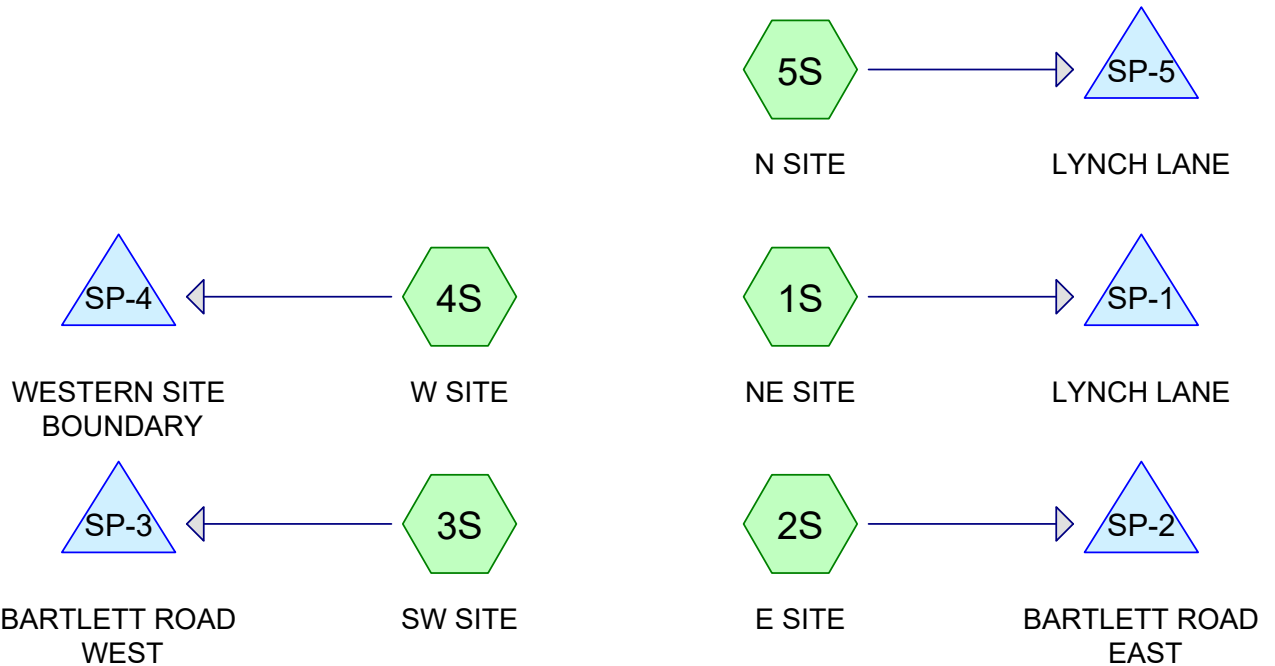
SHEET TITLE: POSTDEVELOPMENT WATERSHED MAP

CLIENT: BEACHWOOD DEVELOPMENT FUND  
P.O. BOX 281  
KENNEBUNK, MAINE 04043

DATE: 5/18/2023  
SCALE: 1" = 80'  
DESIGNED: MTW  
JOB NO.: 22-145  
SHEET: WS-2.0

**APPENDIX 3**

**PRE-DEVELOPMENT HYDROCAD MODEL**



**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.230	80	1/2 acre lots, 25% imp, HSG C (1S)
1.607	85	1/2 acre lots, 25% imp, HSG D (3S, 5S)
0.365	98	BARTLETT ROAD (2S, 3S)
0.052	98	EXISTING HOUSE (3S)
0.344	74	EXISTING LAWN (3S)
0.126	98	LOT DRIVEWAY (3S)
0.171	98	Lynch Ln (1S, 2S, 5S)
10.711	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 5S)
41.669	77	Woods, Good, HSG D (1S, 2S, 3S, 4S, 5S)
<b>55.275</b>	<b>76</b>	<b>TOTAL AREA</b>

**PRE**

Prepared by Terradyn Consultants

HydroCAD® 10.10-6a s/n 12055 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 2-YR Rainfall=2.90"

Printed 10/25/2023

Page 3

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: NE SITE** Runoff Area=158,935 sf 3.69% Impervious Runoff Depth>0.90"  
Flow Length=309' Tc=41.3 min CN=77 Runoff=1.98 cfs 0.274 af

**Subcatchment 2S: E SITE** Runoff Area=229,278 sf 3.81% Impervious Runoff Depth>0.85"  
Flow Length=478' Tc=46.3 min CN=76 Runoff=2.52 cfs 0.373 af

**Subcatchment 3S: SW SITE** Runoff Area=869,700 sf 3.03% Impervious Runoff Depth>0.84"  
Flow Length=1,362' Slope=0.0100 '/' Tc=56.8 min CN=76 Runoff=8.49 cfs 1.406 af

**Subcatchment 4S: W SITE** Runoff Area=718,114 sf 0.00% Impervious Runoff Depth>0.83"  
Flow Length=860' Tc=91.5 min CN=76 Runoff=5.15 cfs 1.140 af

**Subcatchment 5S: N SITE** Runoff Area=431,736 sf 2.34% Impervious Runoff Depth>0.91"  
Flow Length=325' Tc=31.9 min CN=77 Runoff=6.12 cfs 0.749 af

**Pond SP-1: LYNCH LANE** Inflow=1.98 cfs 0.274 af  
Primary=1.98 cfs 0.274 af

**Pond SP-2: BARTLETT ROAD EAST** Inflow=2.52 cfs 0.373 af  
Primary=2.52 cfs 0.373 af

**Pond SP-3: BARTLETT ROAD WEST** Inflow=8.49 cfs 1.406 af  
Primary=8.49 cfs 1.406 af

**Pond SP-4: WESTERN SITE BOUNDARY** Inflow=5.15 cfs 1.140 af  
Primary=5.15 cfs 1.140 af

**Pond SP-5: LYNCH LANE** Inflow=6.12 cfs 0.749 af  
Primary=6.12 cfs 0.749 af

**Total Runoff Area = 55.275 ac Runoff Volume = 3.941 af Average Runoff Depth = 0.86"**  
**97.88% Pervious = 54.102 ac 2.12% Impervious = 1.173 ac**



### Summary for Subcatchment 1S: NE SITE

Runoff = 1.98 cfs @ 12.61 hrs, Volume= 0.274 af, Depth> 0.90"  
 Routed to Pond SP-1 : LYNCH LANE

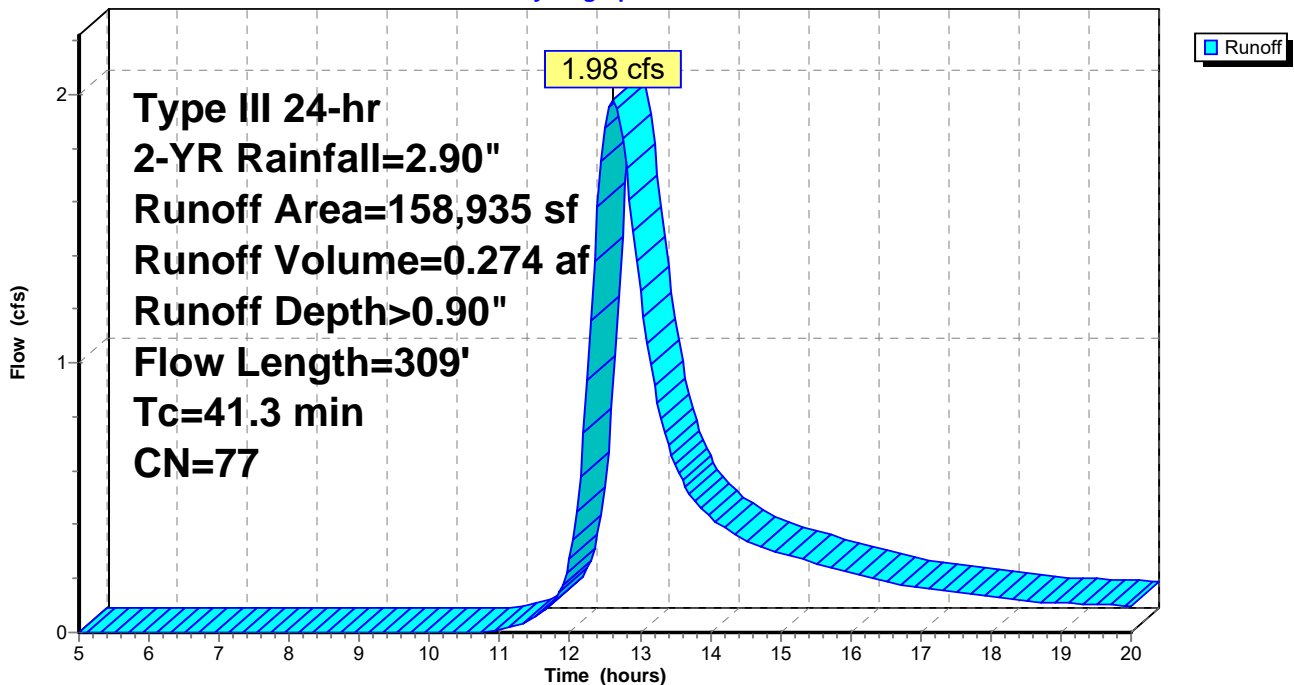
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
* 3,368	98	Lynch Ln
10,000	80	1/2 acre lots, 25% imp, HSG C
20,000	70	Woods, Good, HSG C
125,567	77	Woods, Good, HSG D
158,935	77	Weighted Average
153,067		96.31% Pervious Area
5,868		3.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.6	150	0.0100	0.06		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
2.6	159	0.0400	1.00		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
41.3	309	Total			

### Subcatchment 1S: NE SITE

Hydrograph



### Summary for Subcatchment 2S: E SITE

Runoff = 2.52 cfs @ 12.69 hrs, Volume= 0.373 af, Depth> 0.85"  
 Routed to Pond SP-2 : BARTLETT ROAD EAST

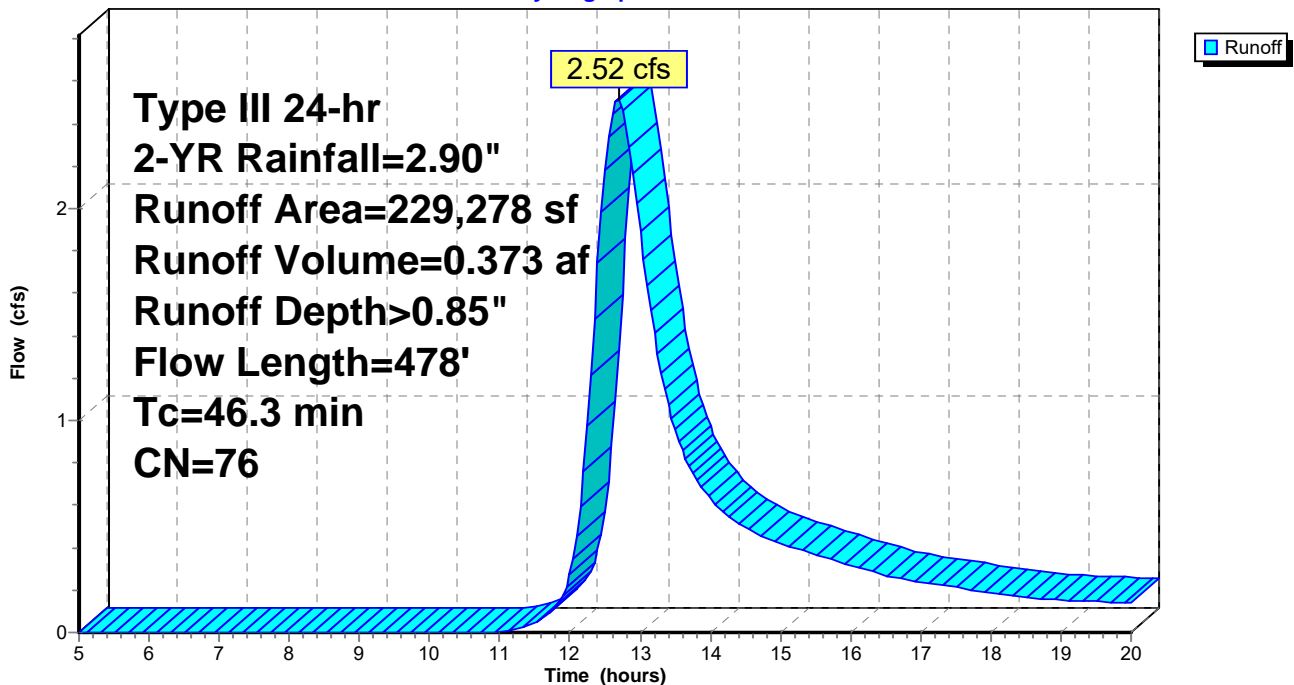
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
* 1,470	98	Lynch Ln
* 7,256	98	BARTLETT ROAD
52,000	70	Woods, Good, HSG C
168,552	77	Woods, Good, HSG D
229,278	76	Weighted Average
220,552		96.19% Pervious Area
8,726		3.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.6	150	0.0100	0.06		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
7.7	328	0.0200	0.71		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
46.3	478	Total			

### Subcatchment 2S: E SITE

Hydrograph



**Summary for Subcatchment 3S: SW SITE**

Runoff = 8.49 cfs @ 12.82 hrs, Volume= 1.406 af, Depth> 0.84"  
 Routed to Pond SP-3 : BARTLETT ROAD WEST

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

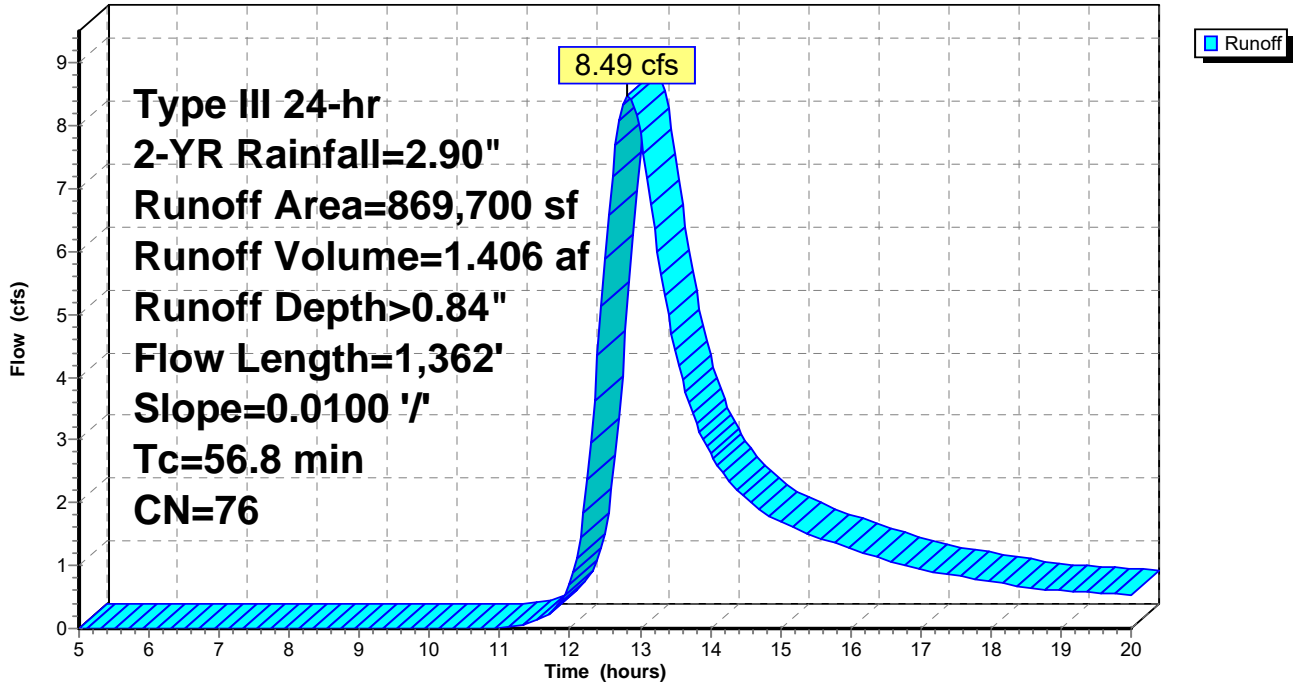
Area (sf)	CN	Description
569,691	77	Woods, Good, HSG D
228,626	70	Woods, Good, HSG C
* 5,490	98	LOT DRIVEWAY
* 8,628	98	BARTLETT ROAD
* 2,265	98	EXISTING HOUSE
40,000	85	1/2 acre lots, 25% imp, HSG D
* 15,000	74	EXISTING LAWN
869,700	76	Weighted Average
843,317		96.97% Pervious Area
26,383		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.6	150	0.0100	0.06		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
18.2	1,212	0.0100	1.11	18.06	<b>Trap/Vee/Rect Channel Flow, B-C</b> Bot.W=30.00' D=0.50' Z= 5.0 ' Top.W=35.00' n= 0.080 Earth, long dense weeds
56.8	1,362	Total			



### Subcatchment 3S: SW SITE

Hydrograph



### Summary for Subcatchment 4S: W SITE

Runoff = 5.15 cfs @ 13.31 hrs, Volume= 1.140 af, Depth> 0.83"  
 Routed to Pond SP-4 : WESTERN SITE BOUNDARY

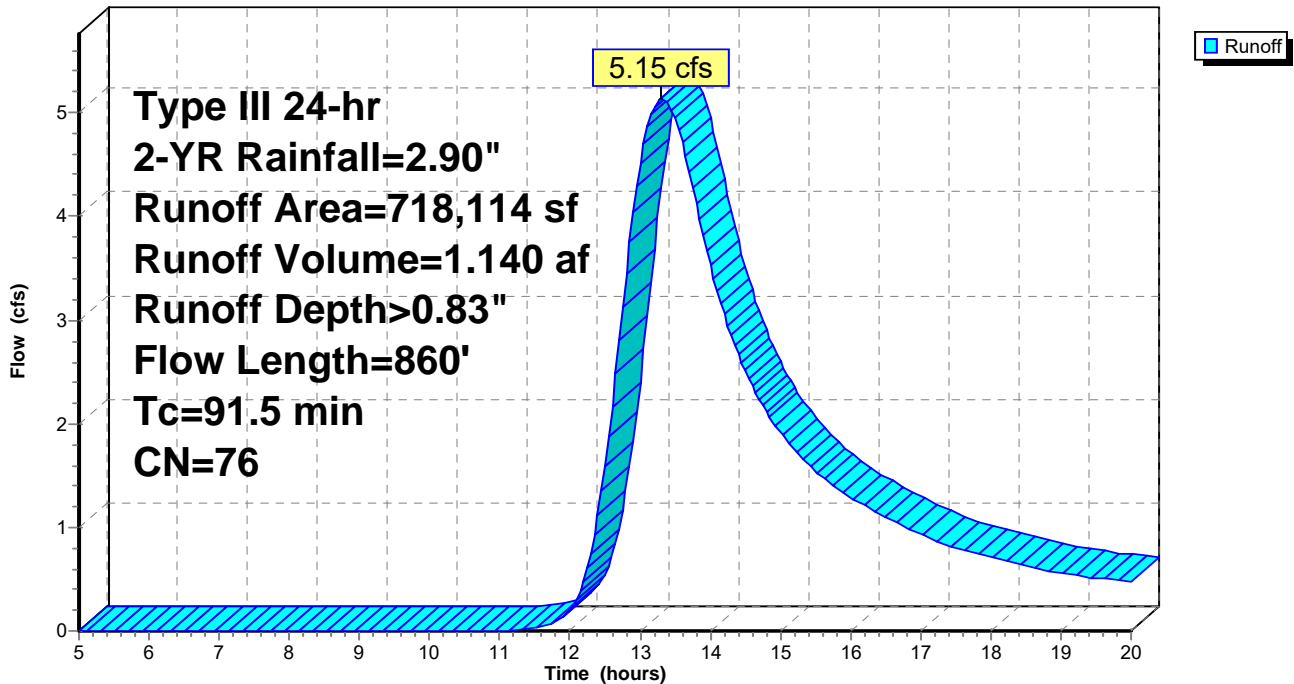
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
592,160	77	Woods, Good, HSG D
125,954	70	Woods, Good, HSG C
718,114	76	Weighted Average
718,114		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	150	0.0030	0.04		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
18.9	310	0.0030	0.27		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
10.1	400	0.0175	0.66		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
91.5	860	Total			

### Subcatchment 4S: W SITE

Hydrograph



PRE

Prepared by Terradyn Consultants

HydroCAD® 10.10-6a s/n 12055 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 2-YR Rainfall=2.90"

Printed 10/25/2023

Page 9

### Summary for Subcatchment 5S: N SITE

Runoff = 6.12 cfs @ 12.48 hrs, Volume= 0.749 af, Depth> 0.91"  
Routed to Pond SP-5 : LYNCH LANE

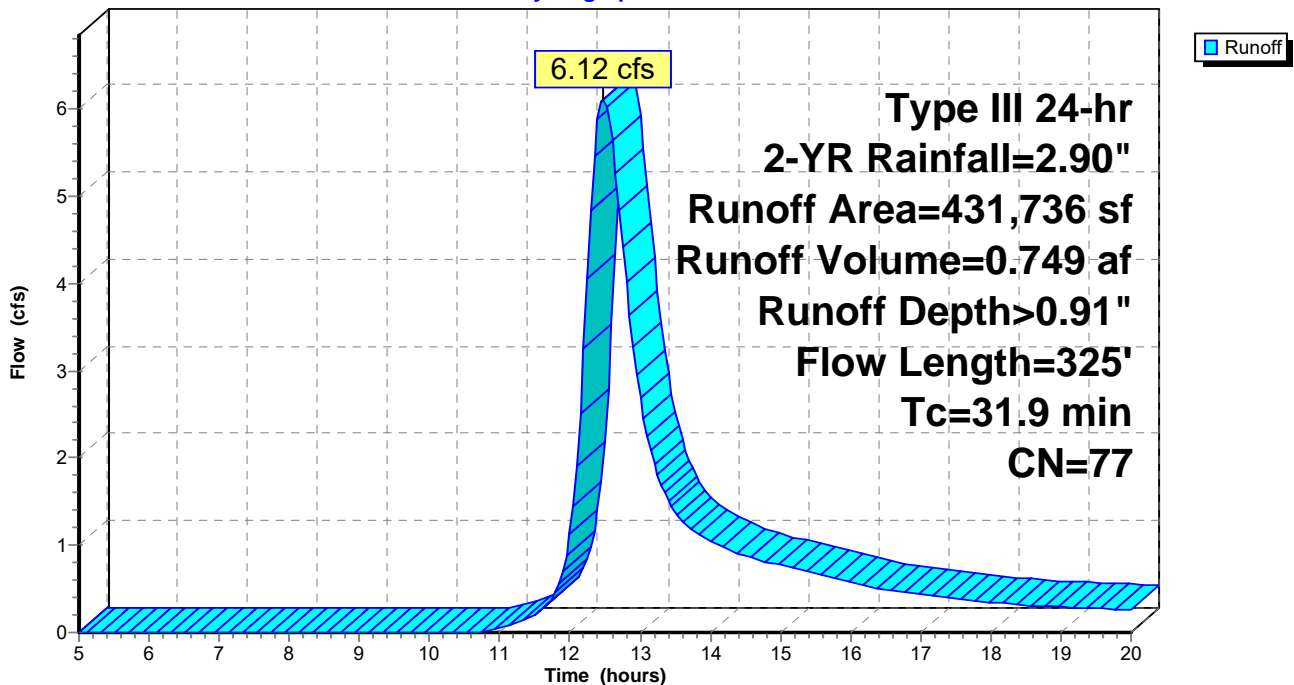
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
30,000	85	1/2 acre lots, 25% imp, HSG D
40,000	70	Woods, Good, HSG C
* 2,600	98	Lynch Ln
359,136	77	Woods, Good, HSG D
431,736	77	Weighted Average
421,636		97.66% Pervious Area
10,100		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0267	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
5.8	175	0.0100	0.50		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
31.9	325	Total			

### Subcatchment 5S: N SITE

Hydrograph



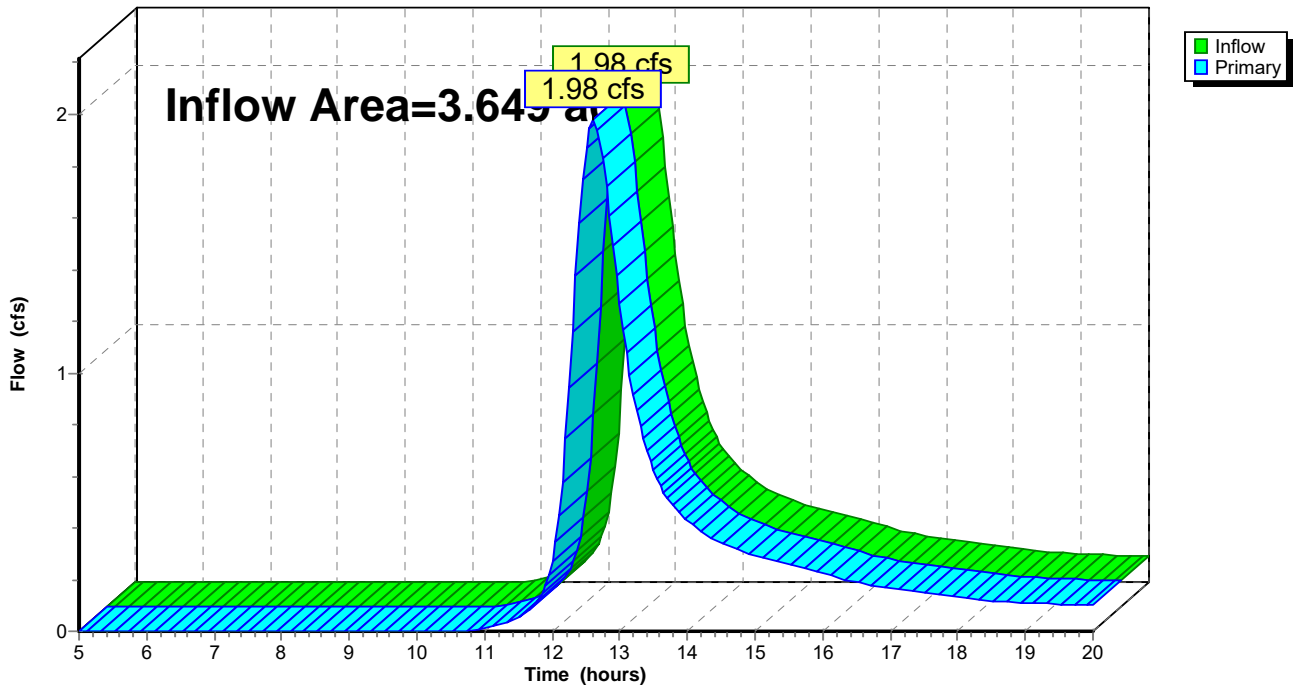
### Summary for Pond SP-1: LYNCH LANE

Inflow Area = 3.649 ac, 3.69% Impervious, Inflow Depth > 0.90" for 2-YR event  
Inflow = 1.98 cfs @ 12.61 hrs, Volume= 0.274 af  
Primary = 1.98 cfs @ 12.61 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-1: LYNCH LANE

Hydrograph

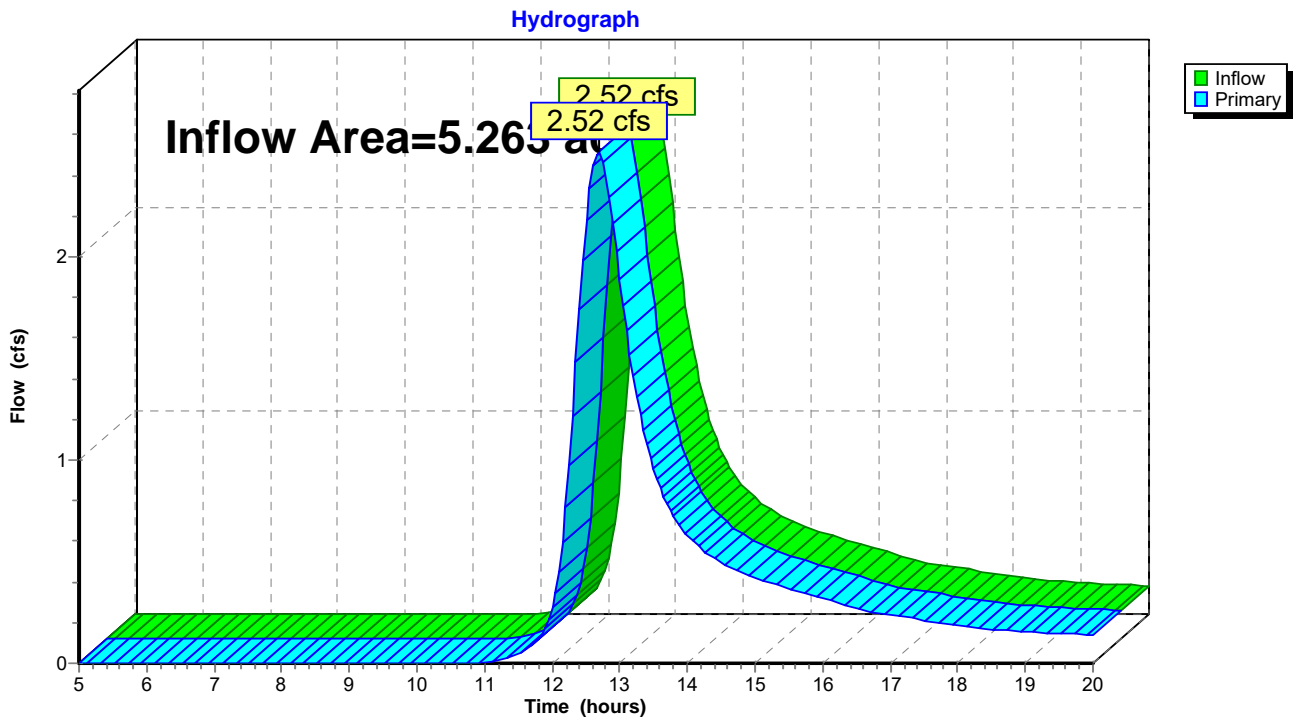


### Summary for Pond SP-2: BARTLETT ROAD EAST

Inflow Area = 5.263 ac, 3.81% Impervious, Inflow Depth > 0.85" for 2-YR event  
Inflow = 2.52 cfs @ 12.69 hrs, Volume= 0.373 af  
Primary = 2.52 cfs @ 12.69 hrs, Volume= 0.373 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-2: BARTLETT ROAD EAST



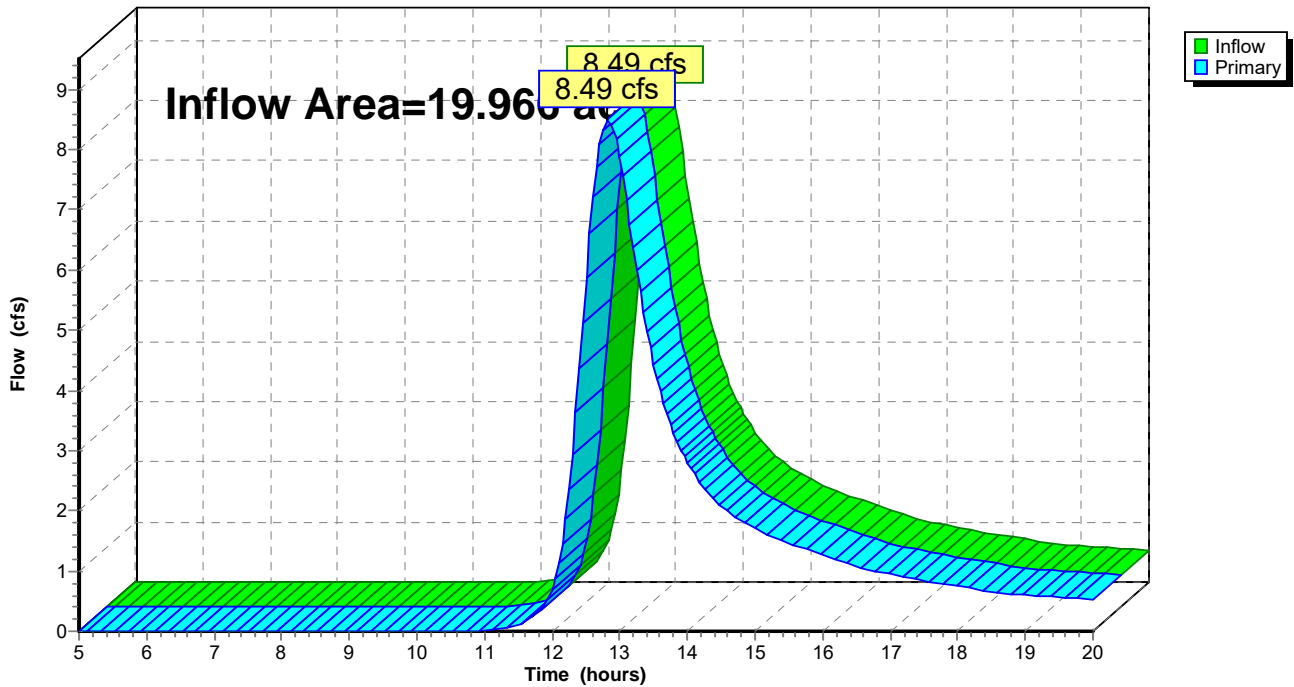
### Summary for Pond SP-3: BARTLETT ROAD WEST

Inflow Area = 19.966 ac, 3.03% Impervious, Inflow Depth > 0.84" for 2-YR event  
Inflow = 8.49 cfs @ 12.82 hrs, Volume= 1.406 af  
Primary = 8.49 cfs @ 12.82 hrs, Volume= 1.406 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-3: BARTLETT ROAD WEST

Hydrograph



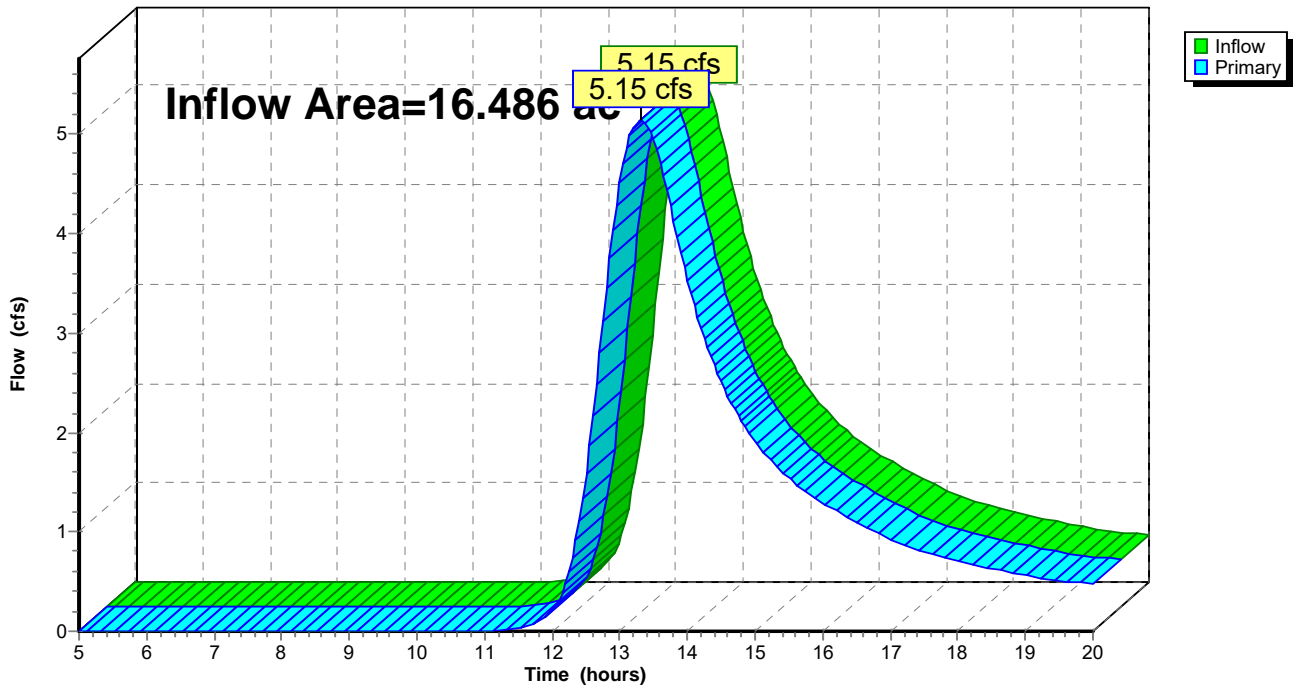
### Summary for Pond SP-4: WESTERN SITE BOUNDARY

Inflow Area = 16.486 ac, 0.00% Impervious, Inflow Depth > 0.83" for 2-YR event  
Inflow = 5.15 cfs @ 13.31 hrs, Volume= 1.140 af  
Primary = 5.15 cfs @ 13.31 hrs, Volume= 1.140 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-4: WESTERN SITE BOUNDARY

Hydrograph



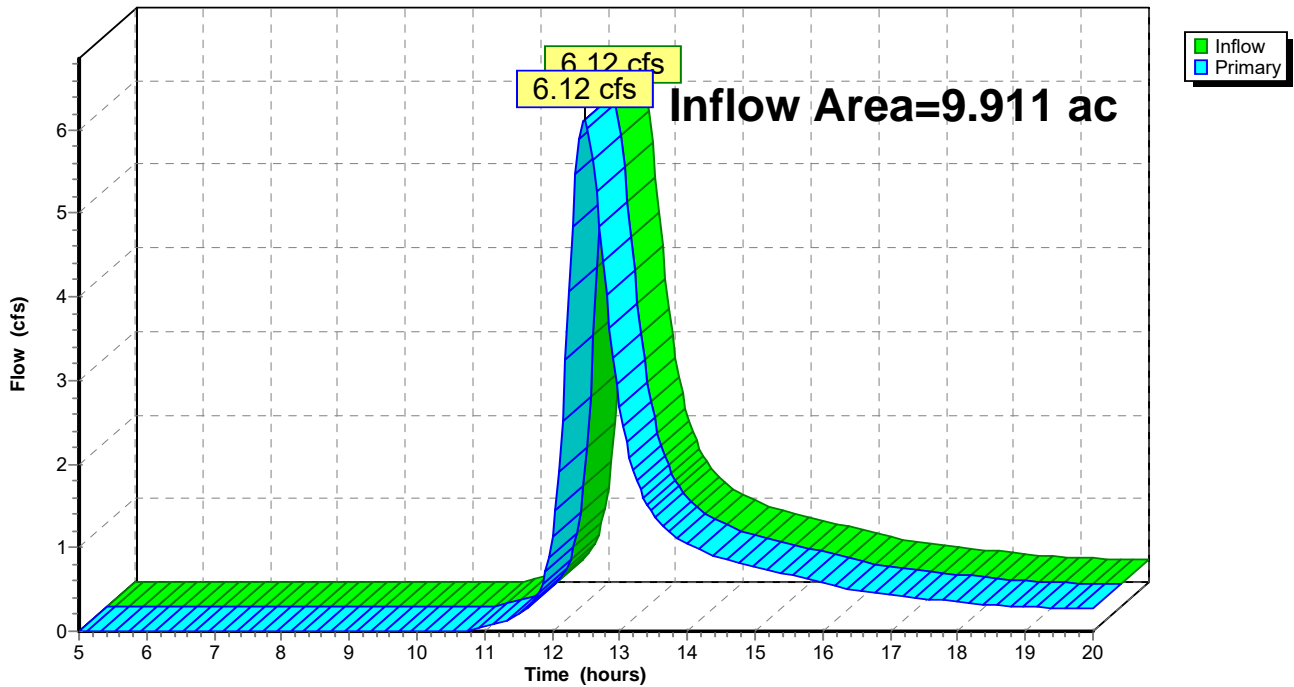
### Summary for Pond SP-5: LYNCH LANE

Inflow Area = 9.911 ac, 2.34% Impervious, Inflow Depth > 0.91" for 2-YR event  
Inflow = 6.12 cfs @ 12.48 hrs, Volume= 0.749 af  
Primary = 6.12 cfs @ 12.48 hrs, Volume= 0.749 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-5: LYNCH LANE

Hydrograph





Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: NE SITE** Runoff Area=158,935 sf 3.69% Impervious Runoff Depth>1.87"  
Flow Length=309' Tc=41.3 min CN=77 Runoff=4.21 cfs 0.570 af

**Subcatchment 2S: E SITE** Runoff Area=229,278 sf 3.81% Impervious Runoff Depth>1.80"  
Flow Length=478' Tc=46.3 min CN=76 Runoff=5.48 cfs 0.788 af

**Subcatchment 3S: SW SITE** Runoff Area=869,700 sf 3.03% Impervious Runoff Depth>1.79"  
Flow Length=1,362' Slope=0.0100 '/' Tc=56.8 min CN=76 Runoff=18.54 cfs 2.975 af

**Subcatchment 4S: W SITE** Runoff Area=718,114 sf 0.00% Impervious Runoff Depth>1.76"  
Flow Length=860' Tc=91.5 min CN=76 Runoff=11.27 cfs 2.419 af

**Subcatchment 5S: N SITE** Runoff Area=431,736 sf 2.34% Impervious Runoff Depth>1.88"  
Flow Length=325' Tc=31.9 min CN=77 Runoff=13.00 cfs 1.554 af

**Pond SP-1: LYNCH LANE** Inflow=4.21 cfs 0.570 af  
Primary=4.21 cfs 0.570 af

**Pond SP-2: BARTLETT ROAD EAST** Inflow=5.48 cfs 0.788 af  
Primary=5.48 cfs 0.788 af

**Pond SP-3: BARTLETT ROAD WEST** Inflow=18.54 cfs 2.975 af  
Primary=18.54 cfs 2.975 af

**Pond SP-4: WESTERN SITE BOUNDARY** Inflow=11.27 cfs 2.419 af  
Primary=11.27 cfs 2.419 af

**Pond SP-5: LYNCH LANE** Inflow=13.00 cfs 1.554 af  
Primary=13.00 cfs 1.554 af

**Total Runoff Area = 55.275 ac Runoff Volume = 8.305 af Average Runoff Depth = 1.80"**  
**97.88% Pervious = 54.102 ac 2.12% Impervious = 1.173 ac**

**PRE**

Prepared by Terradyn Consultants

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Type III 24-hr 25-YR Rainfall=5.10"

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Page 2

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: NE SITE**

Runoff Area=158,935 sf 3.69% Impervious Runoff Depth>2.49"  
Flow Length=309' Tc=41.3 min CN=77 Runoff=5.60 cfs 0.757 af

**Subcatchment 2S: E SITE**

Runoff Area=229,278 sf 3.81% Impervious Runoff Depth>2.40"  
Flow Length=478' Tc=46.3 min CN=76 Runoff=7.34 cfs 1.052 af

**Subcatchment 3S: SW SITE**

Runoff Area=869,700 sf 3.03% Impervious Runoff Depth>2.39"  
Flow Length=1,362' Slope=0.0100 '/' Tc=56.8 min CN=76 Runoff=24.82 cfs 3.974 af

**Subcatchment 4S: W SITE**

Runoff Area=718,114 sf 0.00% Impervious Runoff Depth>2.35"  
Flow Length=860' Tc=91.5 min CN=76 Runoff=15.09 cfs 3.234 af

**Subcatchment 5S: N SITE**

Runoff Area=431,736 sf 2.34% Impervious Runoff Depth>2.50"  
Flow Length=325' Tc=31.9 min CN=77 Runoff=17.26 cfs 2.062 af

**Pond SP-1: LYNCH LANE**

Inflow=5.60 cfs 0.757 af  
Primary=5.60 cfs 0.757 af

**Pond SP-2: BARTLETT ROAD EAST**

Inflow=7.34 cfs 1.052 af  
Primary=7.34 cfs 1.052 af

**Pond SP-3: BARTLETT ROAD WEST**

Inflow=24.82 cfs 3.974 af  
Primary=24.82 cfs 3.974 af

**Pond SP-4: WESTERN SITE BOUNDARY**

Inflow=15.09 cfs 3.234 af  
Primary=15.09 cfs 3.234 af

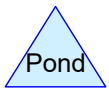
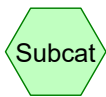
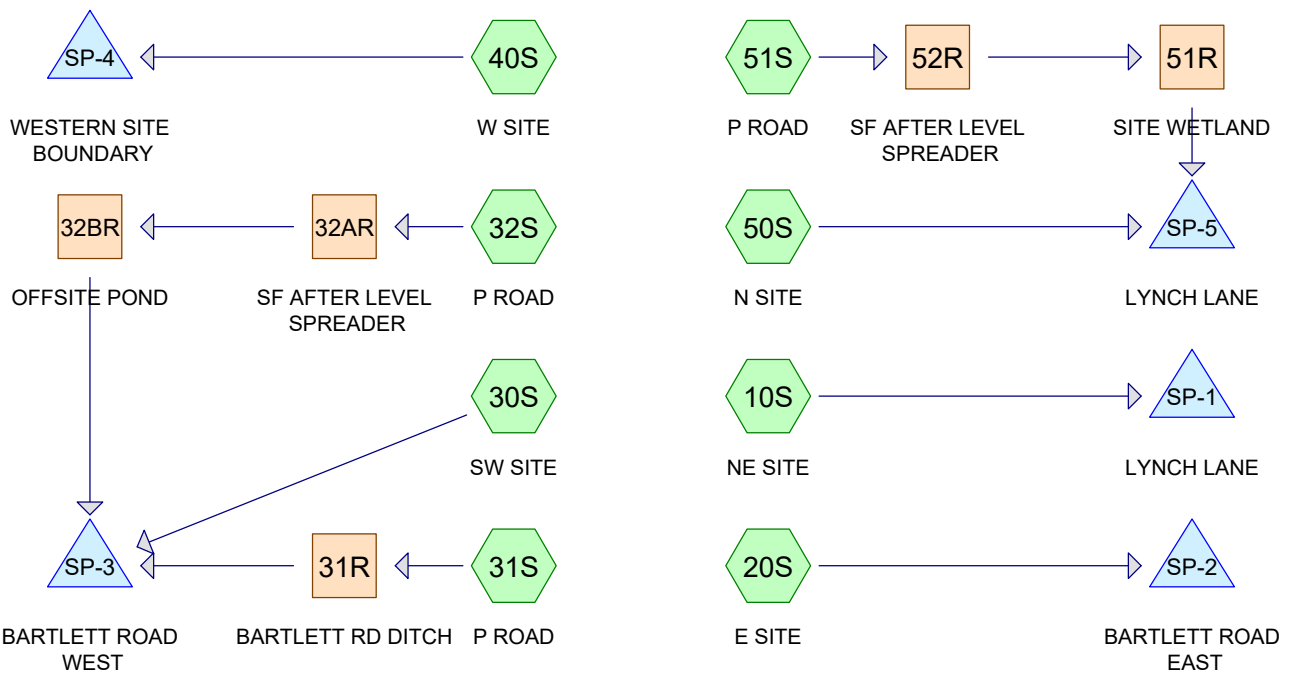
**Pond SP-5: LYNCH LANE**

Inflow=17.26 cfs 2.062 af  
Primary=17.26 cfs 2.062 af

**Total Runoff Area = 55.275 ac Runoff Volume = 11.079 af Average Runoff Depth = 2.41"**  
**97.88% Pervious = 54.102 ac 2.12% Impervious = 1.173 ac**

**APPENDIX 4**

**POST-DEVELOPMENT HYDROCAD MODEL**



**Routing Diagram for POST 2023.10.23**  
 Prepared by Terradyn Consultants, Printed 10/25/2023  
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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.230	80	1/2 acre lots, 25% imp, HSG C (10S)
1.607	85	1/2 acre lots, 25% imp, HSG D (30S, 50S)
0.365	98	BARTLETT ROAD (20S, 30S, 31S)
1.039	98	LOT IMP (10S, 20S, 30S, 31S, 32S, 40S, 50S)
3.077	74	LOT LS (10S, 20S, 30S, 31S, 32S, 40S, 50S)
0.172	98	Lynch Ln (10S, 20S, 50S)
0.440	98	PROPOSED ROAD IMP (31S, 32S, 51S)
0.486	74	PROPOSED ROAD LS (31S, 32S, 51S)
9.532	70	Woods, Good, HSG C (10S, 20S, 30S, 31S, 32S, 40S, 50S)
38.327	77	Woods, Good, HSG D (10S, 20S, 30S, 40S, 50S)
<b>55.275</b>	<b>77</b>	<b>TOTAL AREA</b>

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 10S: NE SITE</b>	Runoff Area=141,255 sf 6.86% Impervious Runoff Depth>0.90" Flow Length=309' Tc=41.3 min CN=77 Runoff=1.76 cfs 0.244 af
<b>Subcatchment 20S: E SITE</b>	Runoff Area=219,616 sf 5.68% Impervious Runoff Depth>0.85" Flow Length=478' Tc=46.3 min CN=76 Runoff=2.41 cfs 0.357 af
<b>Subcatchment 30S: SW SITE</b>	Runoff Area=771,905 sf 2.84% Impervious Runoff Depth>0.84" Flow Length=1,362' Slope=0.0100 '/' Tc=56.8 min CN=76 Runoff=7.54 cfs 1.248 af
<b>Subcatchment 31S: P ROAD</b>	Runoff Area=48,416 sf 22.99% Impervious Runoff Depth>0.97" Flow Length=373' Tc=6.3 min CN=78 Runoff=1.30 cfs 0.090 af
<b>Subcatchment 32S: P ROAD</b>	Runoff Area=94,227 sf 27.69% Impervious Runoff Depth>1.08" Flow Length=227' Tc=6.3 min CN=80 Runoff=2.85 cfs 0.195 af
<b>Subcatchment 40S: W SITE</b>	Runoff Area=714,111 sf 1.05% Impervious Runoff Depth>0.83" Flow Length=860' Tc=91.5 min CN=76 Runoff=5.12 cfs 1.133 af
<b>Subcatchment 50S: N SITE</b>	Runoff Area=405,878 sf 3.41% Impervious Runoff Depth>0.91" Flow Length=325' Tc=31.9 min CN=77 Runoff=5.75 cfs 0.704 af
<b>Subcatchment 51S: P ROAD</b>	Runoff Area=12,377 sf 41.45% Impervious Runoff Depth>1.33" Tc=5.0 min CN=84 Runoff=0.48 cfs 0.032 af
<b>Reach 31R: BARTLETT RD DITCH</b>	Avg. Flow Depth=0.20' Max Vel=2.39 fps Inflow=1.30 cfs 0.090 af n=0.035 L=268.0' S=0.0373 '/' Capacity=139.17 cfs Outflow=1.22 cfs 0.089 af
<b>Reach 32AR: SF AFTER LEVEL</b>	Avg. Flow Depth=0.21' Max Vel=0.27 fps Inflow=2.85 cfs 0.195 af n=0.400 L=80.0' S=0.0750 '/' Capacity=84.16 cfs Outflow=2.38 cfs 0.193 af
<b>Reach 32BR: OFFSITE POND</b>	Avg. Flow Depth=0.12' Max Vel=1.23 fps Inflow=2.38 cfs 0.193 af n=0.050 L=103.0' S=0.0291 '/' Capacity=25.49 cfs Outflow=2.32 cfs 0.193 af
<b>Reach 51R: SITE WETLAND</b>	Avg. Flow Depth=0.07' Max Vel=0.37 fps Inflow=0.36 cfs 0.031 af n=0.080 L=392.0' S=0.0153 '/' Capacity=28.27 cfs Outflow=0.25 cfs 0.030 af
<b>Reach 52R: SF AFTER LEVEL</b>	Avg. Flow Depth=0.09' Max Vel=0.16 fps Inflow=0.48 cfs 0.032 af n=0.400 L=83.0' S=0.0723 '/' Capacity=14.54 cfs Outflow=0.36 cfs 0.031 af
<b>Pond SP-1: LYNCH LANE</b>	Inflow=1.76 cfs 0.244 af Primary=1.76 cfs 0.244 af
<b>Pond SP-2: BARTLETT ROAD EAST</b>	Inflow=2.41 cfs 0.357 af Primary=2.41 cfs 0.357 af
<b>Pond SP-3: BARTLETT ROAD WEST</b>	Inflow=8.32 cfs 1.530 af Primary=8.32 cfs 1.530 af

**POST 2023.10.23**

Prepared by Terradyn Consultants

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*Type III 24-hr 2-YR Rainfall=2.90"*

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**Pond SP-4: WESTERN SITE BOUNDARY**

Inflow=5.12 cfs 1.133 af  
Primary=5.12 cfs 1.133 af

**Pond SP-5: LYNCH LANE**

Inflow=5.83 cfs 0.734 af  
Primary=5.83 cfs 0.734 af

**Total Runoff Area = 55.275 ac   Runoff Volume = 4.002 af   Average Runoff Depth = 0.87"**  
**95.52% Pervious = 52.800 ac   4.48% Impervious = 2.475 ac**

### Summary for Subcatchment 10S: NE SITE

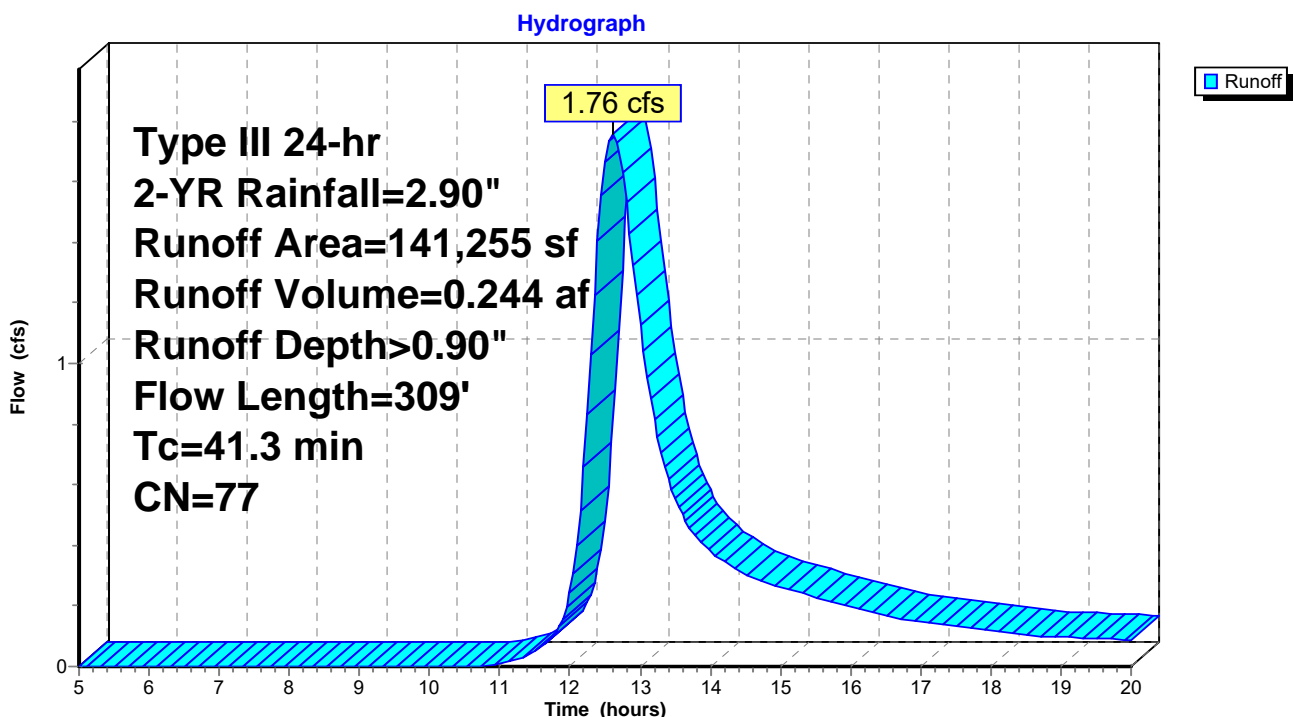
Runoff = 1.76 cfs @ 12.61 hrs, Volume= 0.244 af, Depth> 0.90"  
 Routed to Pond SP-1 : LYNCH LANE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
10,000	80	1/2 acre lots, 25% imp, HSG C
25,000	70	Woods, Good, HSG C
87,814	77	Woods, Good, HSG D
* 3,441	98	Lynch Ln
* 3,750	98	LOT IMP
* 11,250	74	LOT LS
141,255	77	Weighted Average
131,564		93.14% Pervious Area
9,691		6.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.6	150	0.0100	0.06		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
2.6	159	0.0400	1.00		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
41.3	309	Total			

### Subcatchment 10S: NE SITE





**Summary for Subcatchment 20S: E SITE**

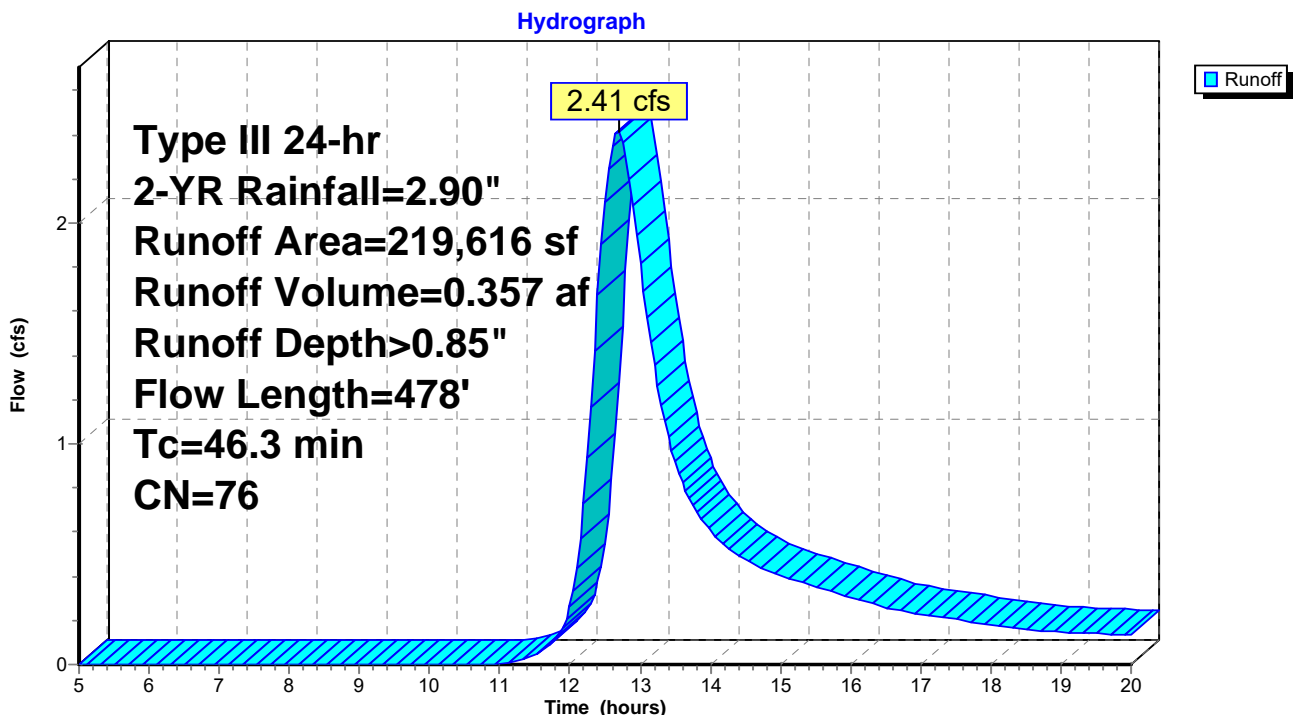
Runoff = 2.41 cfs @ 12.69 hrs, Volume= 0.357 af, Depth> 0.85"  
 Routed to Pond SP-2 : BARTLETT ROAD EAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
* 1,470	98	Lynch Ln
* 7,256	98	BARTLETT ROAD
57,243	70	Woods, Good, HSG C
139,625	77	Woods, Good, HSG D
* 3,750	98	LOT IMP
* 10,272	74	LOT LS
219,616	76	Weighted Average
207,140		94.32% Pervious Area
12,476		5.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.6	150	0.0100	0.06		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
7.7	328	0.0200	0.71		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
46.3	478	Total			

**Subcatchment 20S: E SITE**



**Summary for Subcatchment 30S: SW SITE**

Runoff = 7.54 cfs @ 12.82 hrs, Volume= 1.248 af, Depth> 0.84"  
 Routed to Pond SP-3 : BARTLETT ROAD WEST

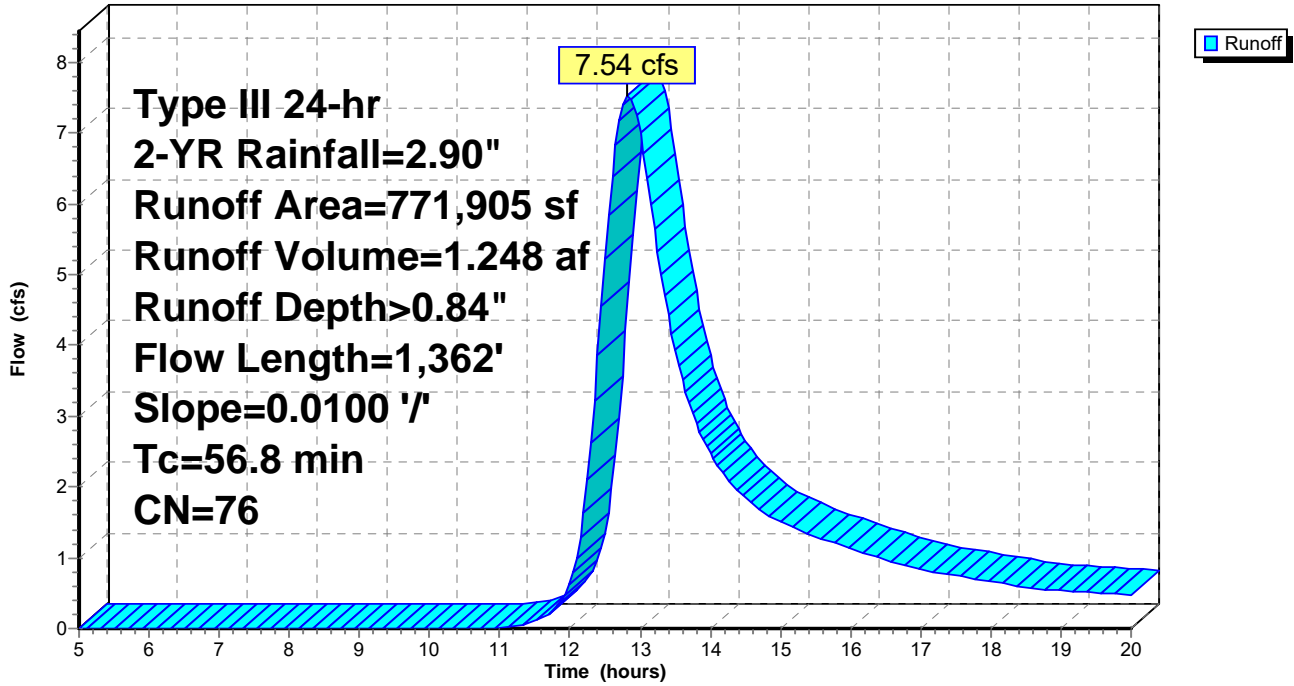
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
553,893	77	Woods, Good, HSG D
144,871	70	Woods, Good, HSG C
* 7,956	98	BARTLETT ROAD
40,000	85	1/2 acre lots, 25% imp, HSG D
* 4,000	98	LOT IMP
* 13,750	74	LOT LS
7,435	70	Woods, Good, HSG C
771,905	76	Weighted Average
749,949		97.16% Pervious Area
21,956		2.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.6	150	0.0100	0.06		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
18.2	1,212	0.0100	1.11	18.06	<b>Trap/Vee/Rect Channel Flow, B-C</b> Bot.W=30.00' D=0.50' Z= 5.0 ' Top.W=35.00' n= 0.080 Earth, long dense weeds
56.8	1,362	Total			

### Subcatchment 30S: SW SITE

Hydrograph



**Summary for Subcatchment 31S: P ROAD**

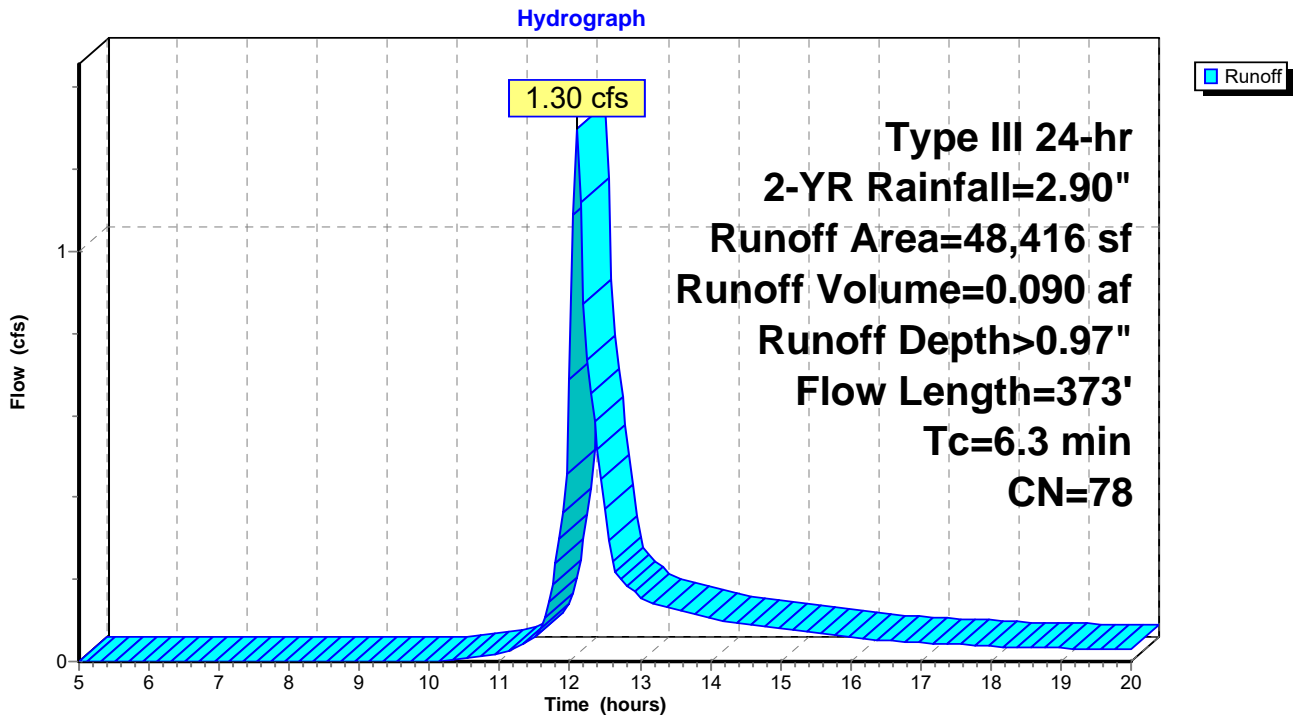
Runoff = 1.30 cfs @ 12.10 hrs, Volume= 0.090 af, Depth> 0.97"  
 Routed to Reach 31R : BARTLETT RD DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
* 683	98	BARTLETT ROAD
* 7,948	98	PROPOSED ROAD IMP
* 10,365	74	PROPOSED ROAD LS
* 2,500	98	LOT IMP
* 7,500	74	LOT LS
19,420	70	Woods, Good, HSG C
48,416	78	Weighted Average
37,285		77.01% Pervious Area
11,131		22.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	75	0.0800	0.28		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.30"
1.7	178	0.0600	1.71		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
0.2	120	0.0200	9.72	136.02	<b>Trap/Vee/Rect Channel Flow, B-C</b> Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.022 Earth, clean & straight
6.3	373	Total			

### Subcatchment 31S: P ROAD



**Summary for Subcatchment 32S: P ROAD**

Runoff = 2.85 cfs @ 12.10 hrs, Volume= 0.195 af, Depth> 1.08"

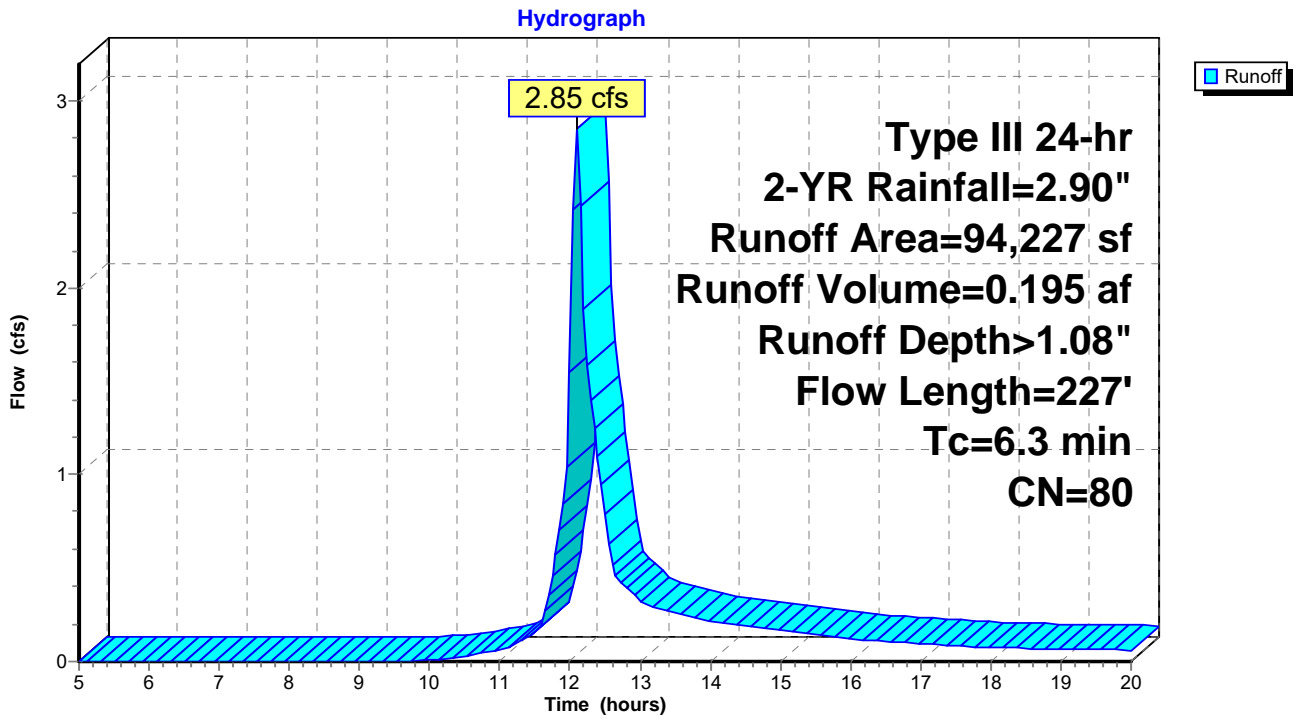
Routed to Reach 32AR : SF AFTER LEVEL SPREADER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

Area (sf)	CN	Description
* 6,095	98	PROPOSED ROAD IMP
* 3,563	74	PROPOSED ROAD LS
* 12,500	98	LOT IMP
* 37,500	74	LOT LS
7,069	70	Woods, Good, HSG C
* 7,500	98	LOT IMP
* 20,000	74	LOT LS
94,227	80	Weighted Average
68,132		72.31% Pervious Area
26,095		27.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	80	0.0400	0.22		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.30"
0.2	147	0.0200	10.13	162.10	<b>Trap/Vee/Rect Channel Flow, B-C</b> Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.022 Earth, clean & straight
6.3	227	Total			

### Subcatchment 32S: P ROAD



**Summary for Subcatchment 40S: W SITE**

Runoff = 5.12 cfs @ 13.31 hrs, Volume= 1.133 af, Depth> 0.83"  
 Routed to Pond SP-4 : WESTERN SITE BOUNDARY

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

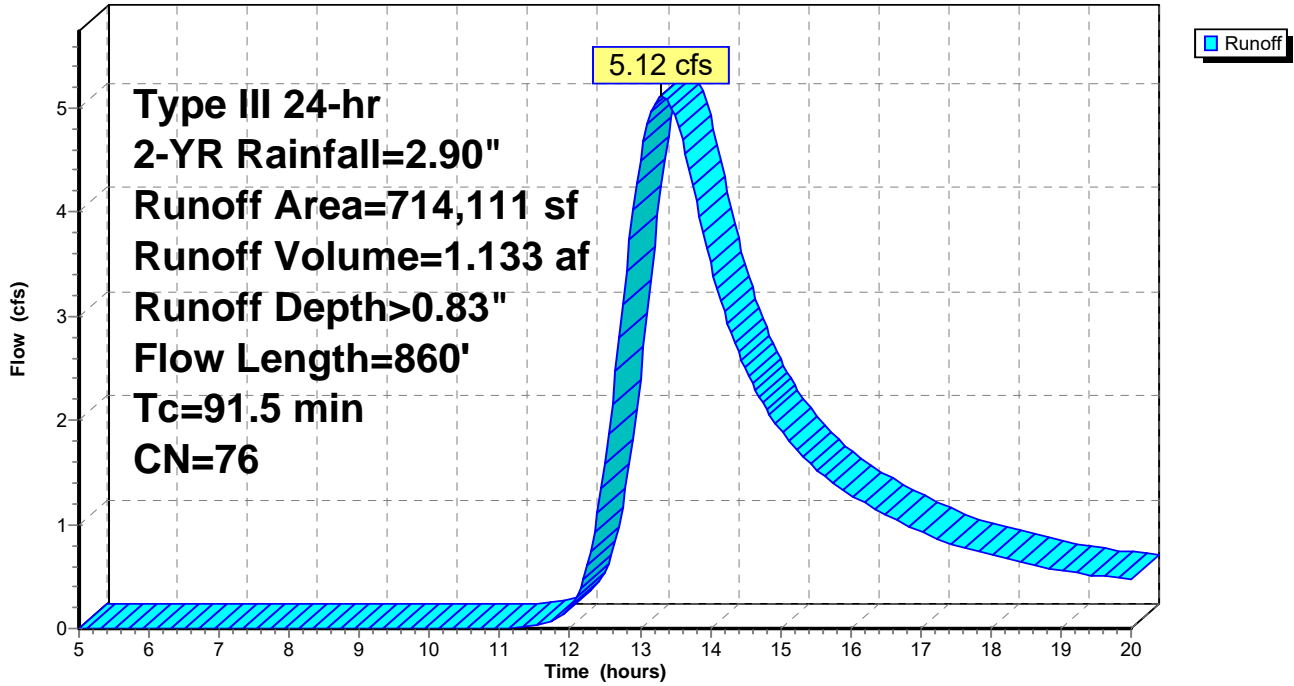
Area (sf)	CN	Description
560,943	77	Woods, Good, HSG D
115,954	70	Woods, Good, HSG C
* 7,500	98	LOT IMP
* 22,500	74	LOT LS
7,214	70	Woods, Good, HSG C
714,111	76	Weighted Average
706,611		98.95% Pervious Area
7,500		1.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.5	150	0.0030	0.04		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
18.9	310	0.0030	0.27		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
10.1	400	0.0175	0.66		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
91.5	860	Total			



### Subcatchment 40S: W SITE

Hydrograph



**Summary for Subcatchment 50S: N SITE**

Runoff = 5.75 cfs @ 12.48 hrs, Volume= 0.704 af, Depth> 0.91"  
 Routed to Pond SP-5 : LYNCH LANE

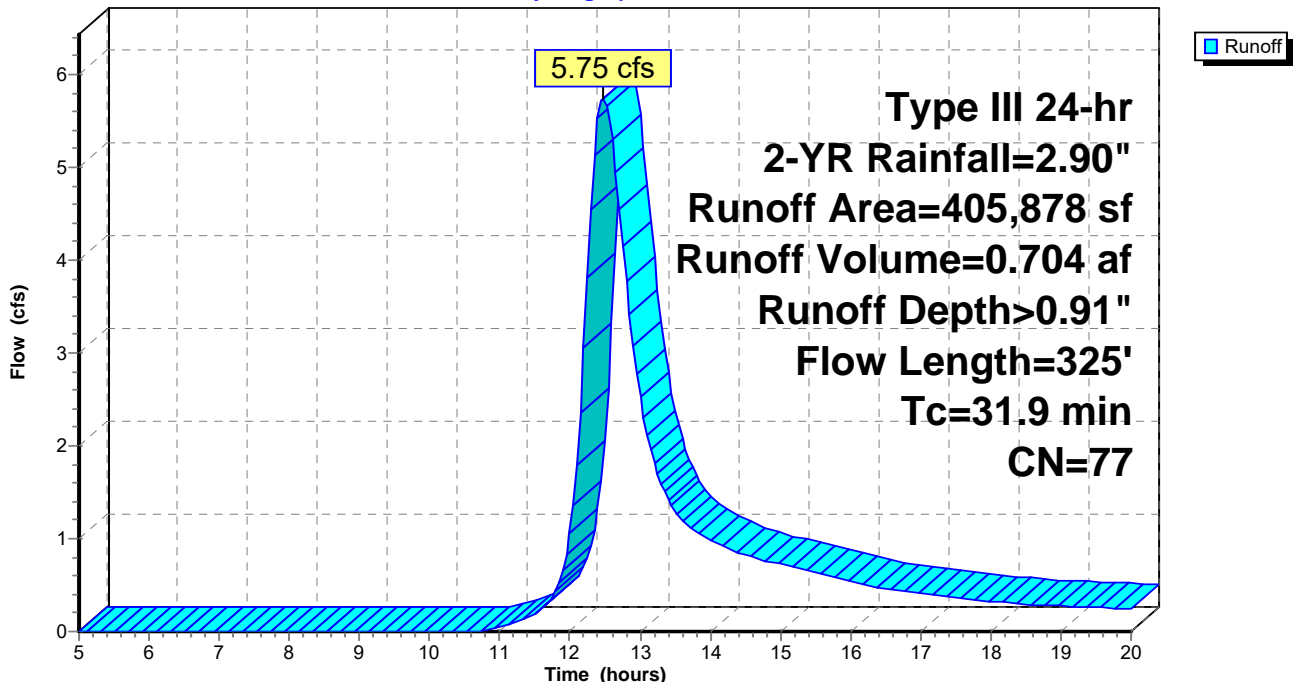
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

	Area (sf)	CN	Description
*	2,600	98	Lynch Ln
	30,000	85	1/2 acre lots, 25% imp, HSG D
	31,012	70	Woods, Good, HSG C
	327,266	77	Woods, Good, HSG D
*	3,750	98	LOT IMP
*	11,250	74	LOT LS
	405,878	77	Weighted Average
	392,028		96.59% Pervious Area
	13,850		3.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0267	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.30"
5.8	175	0.0100	0.50		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
31.9	325	Total			

**Subcatchment 50S: N SITE**

Hydrograph



**Summary for Subcatchment 51S: P ROAD**

Runoff = 0.48 cfs @ 12.08 hrs, Volume= 0.032 af, Depth> 1.33"

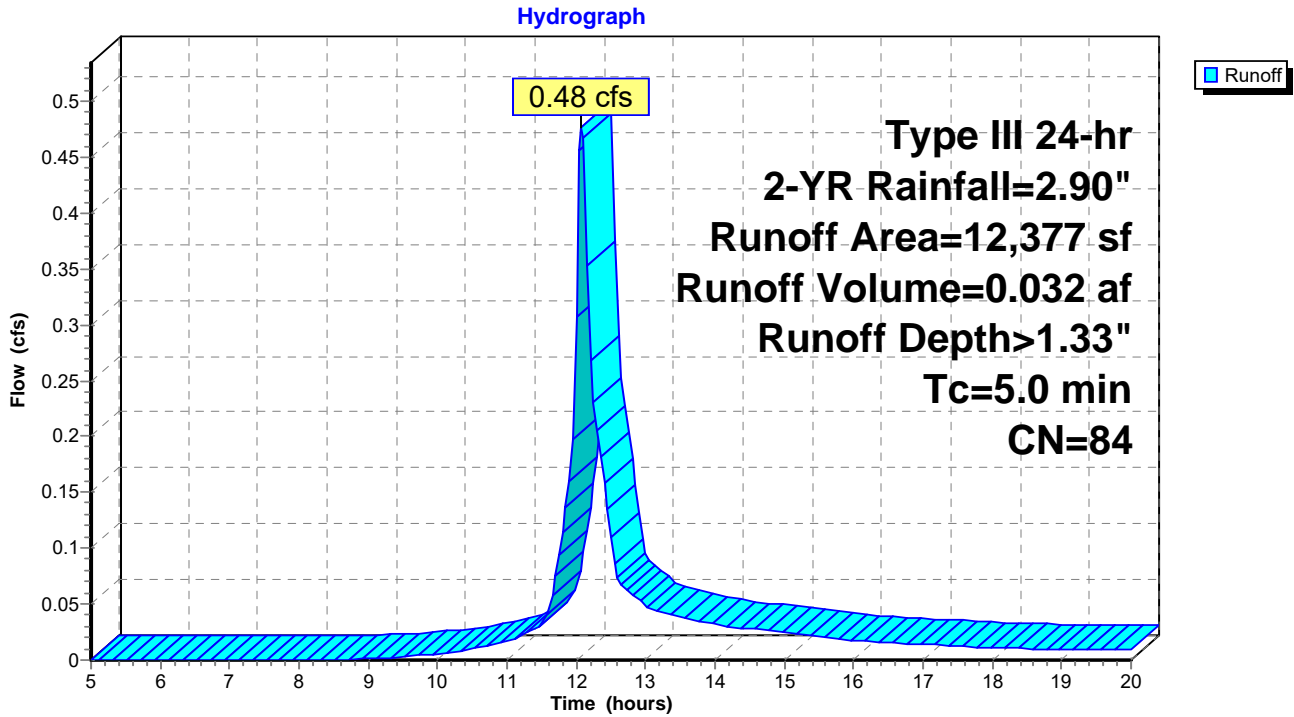
Routed to Reach 52R : SF AFTER LEVEL SPREADER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-YR Rainfall=2.90"

	Area (sf)	CN	Description
*	5,130	98	PROPOSED ROAD IMP
*	7,247	74	PROPOSED ROAD LS
	12,377	84	Weighted Average
	7,247		58.55% Pervious Area
	5,130		41.45% Impervious Area

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

**Subcatchment 51S: P ROAD**



### Summary for Reach 31R: BARTLETT RD DITCH

Inflow Area = 1.111 ac, 22.99% Impervious, Inflow Depth > 0.97" for 2-YR event  
 Inflow = 1.30 cfs @ 12.10 hrs, Volume= 0.090 af  
 Outflow = 1.22 cfs @ 12.16 hrs, Volume= 0.089 af, Atten= 6%, Lag= 3.5 min  
 Routed to Pond SP-3 : BARTLETT ROAD WEST

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.39 fps, Min. Travel Time= 1.9 min  
 Avg. Velocity = 0.93 fps, Avg. Travel Time= 4.8 min

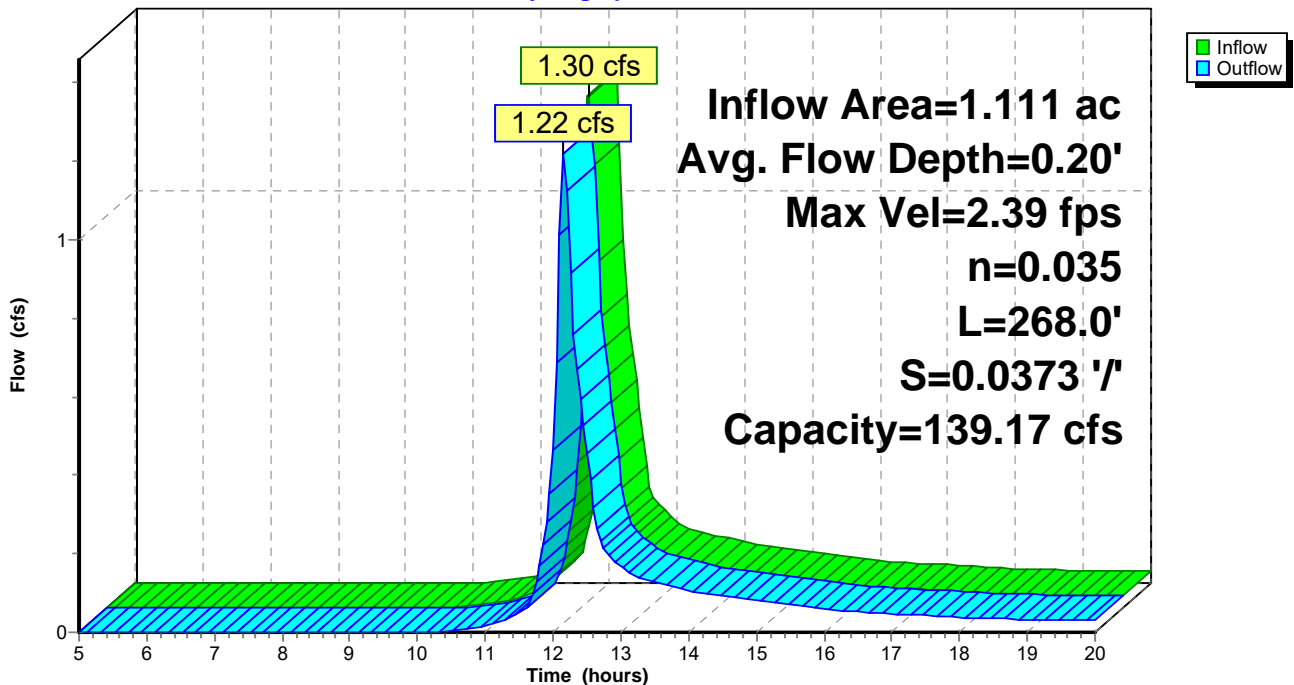
Peak Storage= 139 cf @ 12.12 hrs  
 Average Depth at Peak Storage= 0.20' , Surface Width= 3.20'  
 Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 139.17 cfs

2.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds  
 Side Slope Z-value= 3.0 '/' Top Width= 14.00'  
 Length= 268.0' Slope= 0.0373 '/'  
 Inlet Invert= 58.00', Outlet Invert= 48.00'



### Reach 31R: BARTLETT RD DITCH

Hydrograph



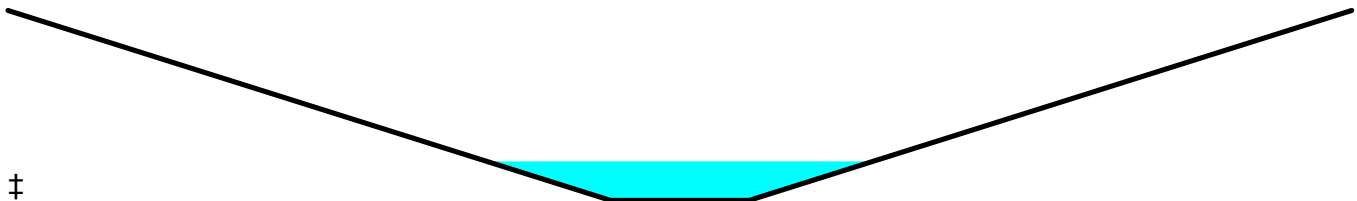
### Summary for Reach 32AR: SF AFTER LEVEL SPREADER

Inflow Area = 2.163 ac, 27.69% Impervious, Inflow Depth > 1.08" for 2-YR event  
 Inflow = 2.85 cfs @ 12.10 hrs, Volume= 0.195 af  
 Outflow = 2.38 cfs @ 12.24 hrs, Volume= 0.193 af, Atten= 16%, Lag= 8.5 min  
 Routed to Reach 32BR : OFFSITE POND

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.27 fps, Min. Travel Time= 4.9 min  
 Avg. Velocity = 0.12 fps, Avg. Travel Time= 11.6 min

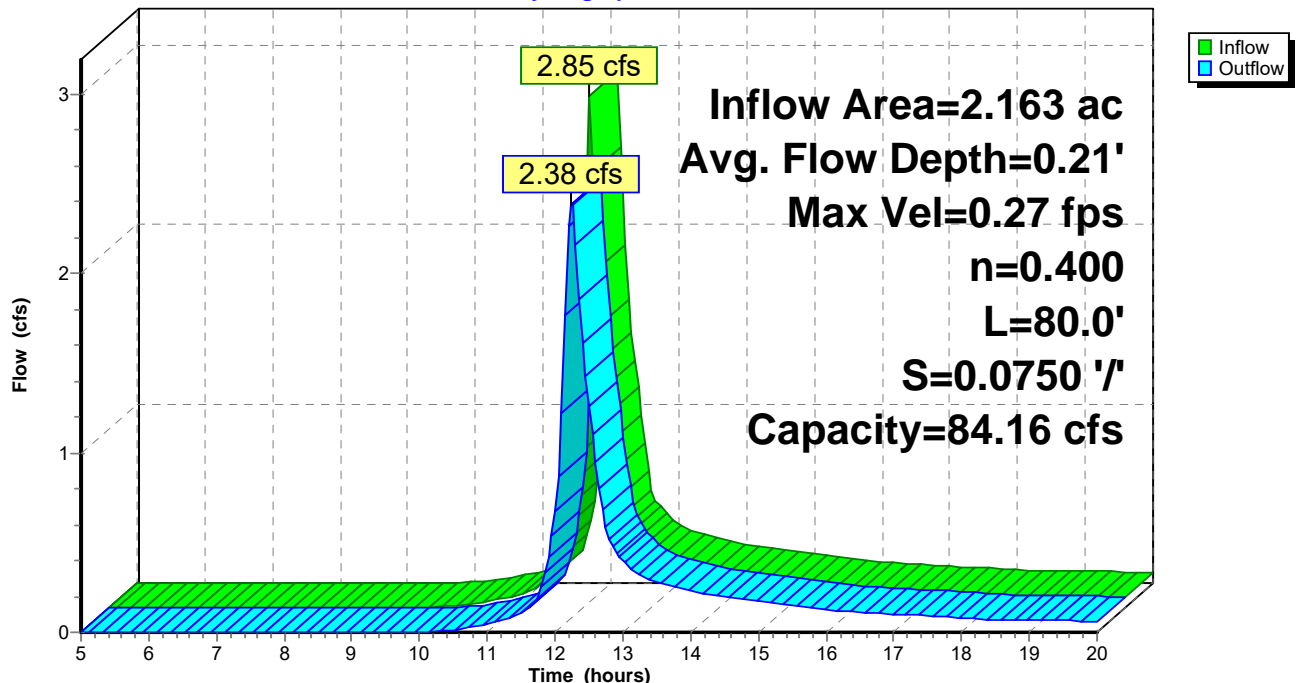
Peak Storage= 715 cf @ 12.16 hrs  
 Average Depth at Peak Storage= 0.21' , Surface Width= 64.06'  
 Bank-Full Depth= 1.00' Flow Area= 123.0 sf, Capacity= 84.16 cfs

23.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush  
 Side Slope Z-value= 100.0 '/' Top Width= 223.00'  
 Length= 80.0' Slope= 0.0750 '/'  
 Inlet Invert= 56.00', Outlet Invert= 50.00'



### Reach 32AR: SF AFTER LEVEL SPREADER

Hydrograph



### Summary for Reach 32BR: OFFSITE POND

Inflow Area = 2.163 ac, 27.69% Impervious, Inflow Depth > 1.07" for 2-YR event  
 Inflow = 2.38 cfs @ 12.24 hrs, Volume= 0.193 af  
 Outflow = 2.32 cfs @ 12.28 hrs, Volume= 0.193 af, Atten= 3%, Lag= 2.5 min  
 Routed to Pond SP-3 : BARTLETT ROAD WEST

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 1.23 fps, Min. Travel Time= 1.4 min  
 Avg. Velocity = 0.42 fps, Avg. Travel Time= 4.1 min

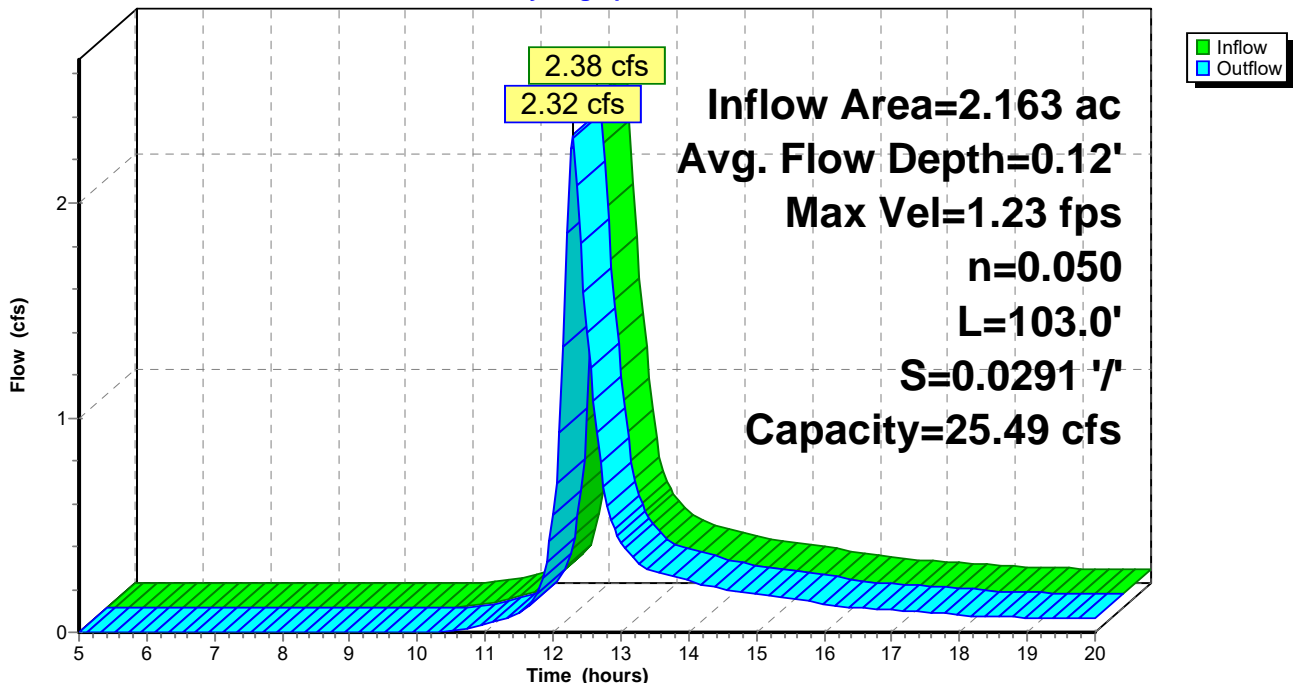
Peak Storage= 200 cf @ 12.26 hrs  
 Average Depth at Peak Storage= 0.12' , Surface Width= 16.24'  
 Bank-Full Depth= 0.50' Flow Area= 8.8 sf, Capacity= 25.49 cfs

15.00' x 0.50' deep channel, n= 0.050 Scattered brush, heavy weeds  
 Side Slope Z-value= 5.0 ' / ' Top Width= 20.00'  
 Length= 103.0' Slope= 0.0291 ' / '  
 Inlet Invert= 50.00', Outlet Invert= 47.00'



### Reach 32BR: OFFSITE POND

Hydrograph



### Summary for Reach 51R: SITE WETLAND

Inflow Area = 0.284 ac, 41.45% Impervious, Inflow Depth > 1.31" for 2-YR event  
 Inflow = 0.36 cfs @ 12.30 hrs, Volume= 0.031 af  
 Outflow = 0.25 cfs @ 12.79 hrs, Volume= 0.030 af, Atten= 31%, Lag= 29.2 min  
 Routed to Pond SP-5 : LYNCH LANE

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.37 fps, Min. Travel Time= 17.9 min  
 Avg. Velocity = 0.15 fps, Avg. Travel Time= 42.9 min

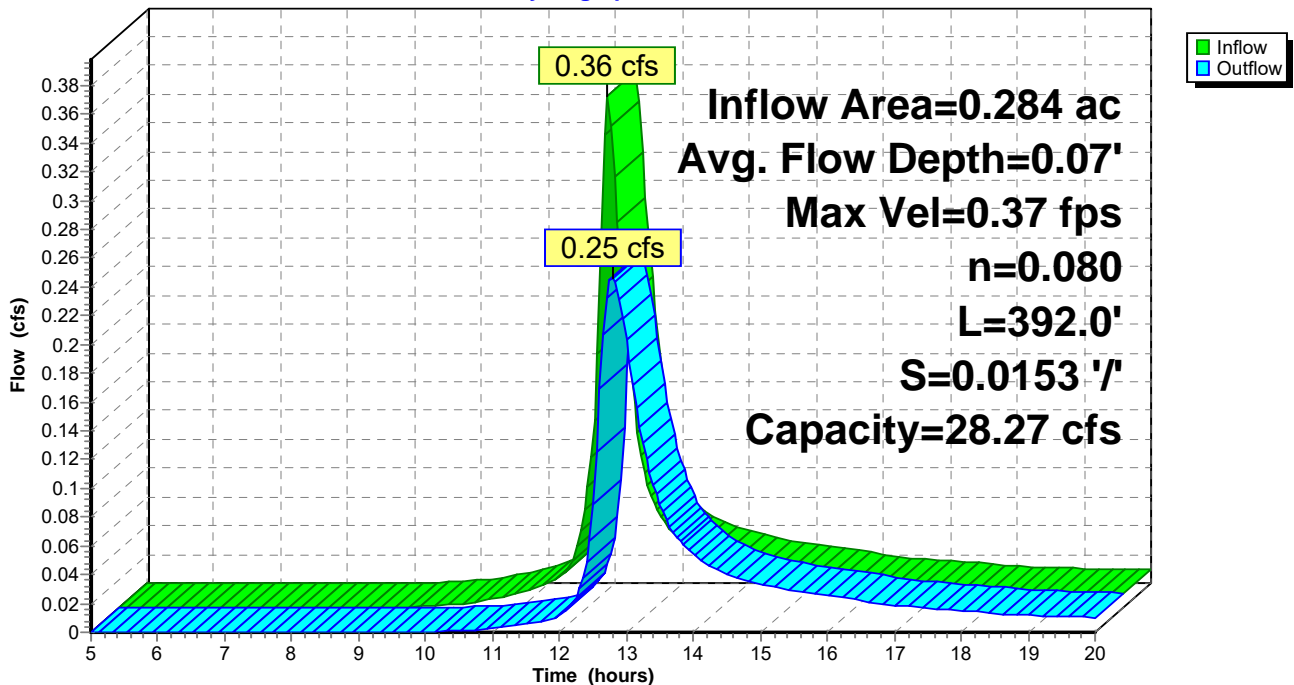
Peak Storage= 264 cf @ 12.49 hrs  
 Average Depth at Peak Storage= 0.07' , Surface Width= 10.65'  
 Bank-Full Depth= 1.00' Flow Area= 15.0 sf, Capacity= 28.27 cfs

10.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds  
 Side Slope Z-value= 5.0 '/' Top Width= 20.00'  
 Length= 392.0' Slope= 0.0153 '/'  
 Inlet Invert= 56.00', Outlet Invert= 50.00'



### Reach 51R: SITE WETLAND

Hydrograph



### Summary for Reach 52R: SF AFTER LEVEL SPREADER

Inflow Area = 0.284 ac, 41.45% Impervious, Inflow Depth > 1.33" for 2-YR event  
 Inflow = 0.48 cfs @ 12.08 hrs, Volume= 0.032 af  
 Outflow = 0.36 cfs @ 12.30 hrs, Volume= 0.031 af, Atten= 26%, Lag= 13.4 min  
 Routed to Reach 51R : SITE WETLAND

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.16 fps, Min. Travel Time= 8.6 min  
 Avg. Velocity = 0.06 fps, Avg. Travel Time= 22.0 min

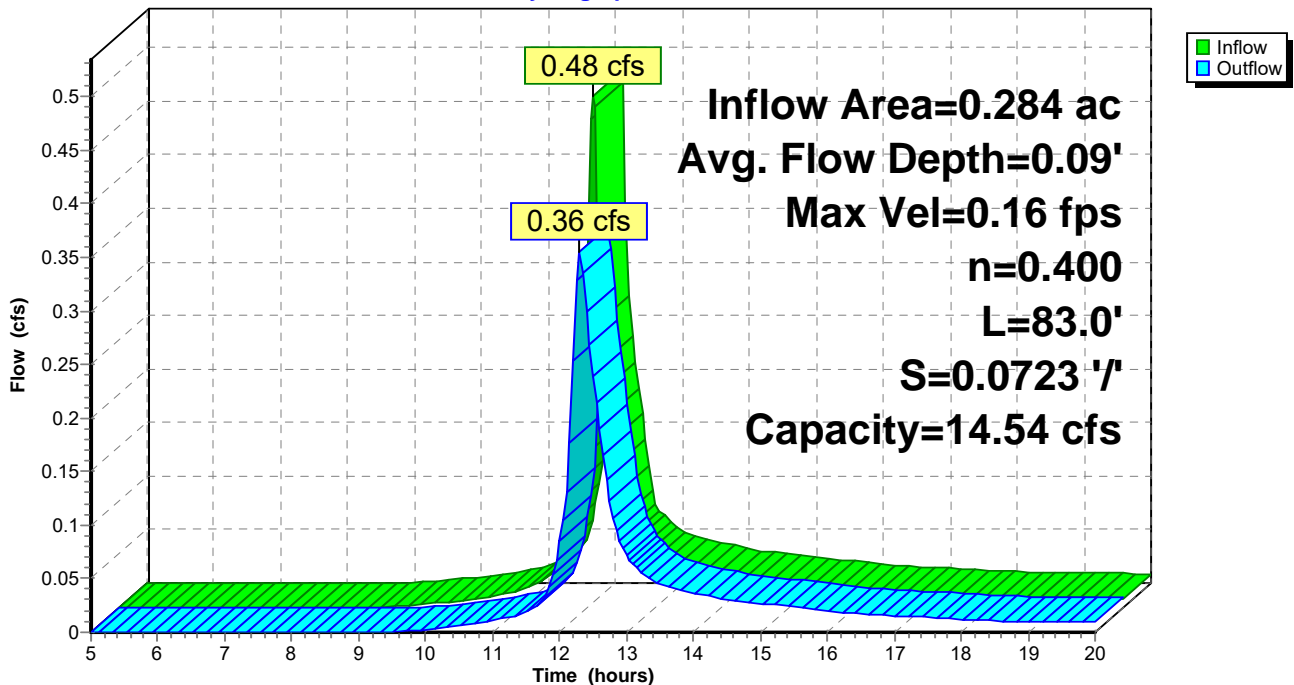
Peak Storage= 185 cf @ 12.16 hrs  
 Average Depth at Peak Storage= 0.09' , Surface Width= 34.33'  
 Bank-Full Depth= 0.50' Flow Area= 33.5 sf, Capacity= 14.54 cfs

17.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush  
 Side Slope Z-value= 100.0 ' / ' Top Width= 117.00'  
 Length= 83.0' Slope= 0.0723 ' / '  
 Inlet Invert= 62.00', Outlet Invert= 56.00'



### Reach 52R: SF AFTER LEVEL SPREADER

Hydrograph



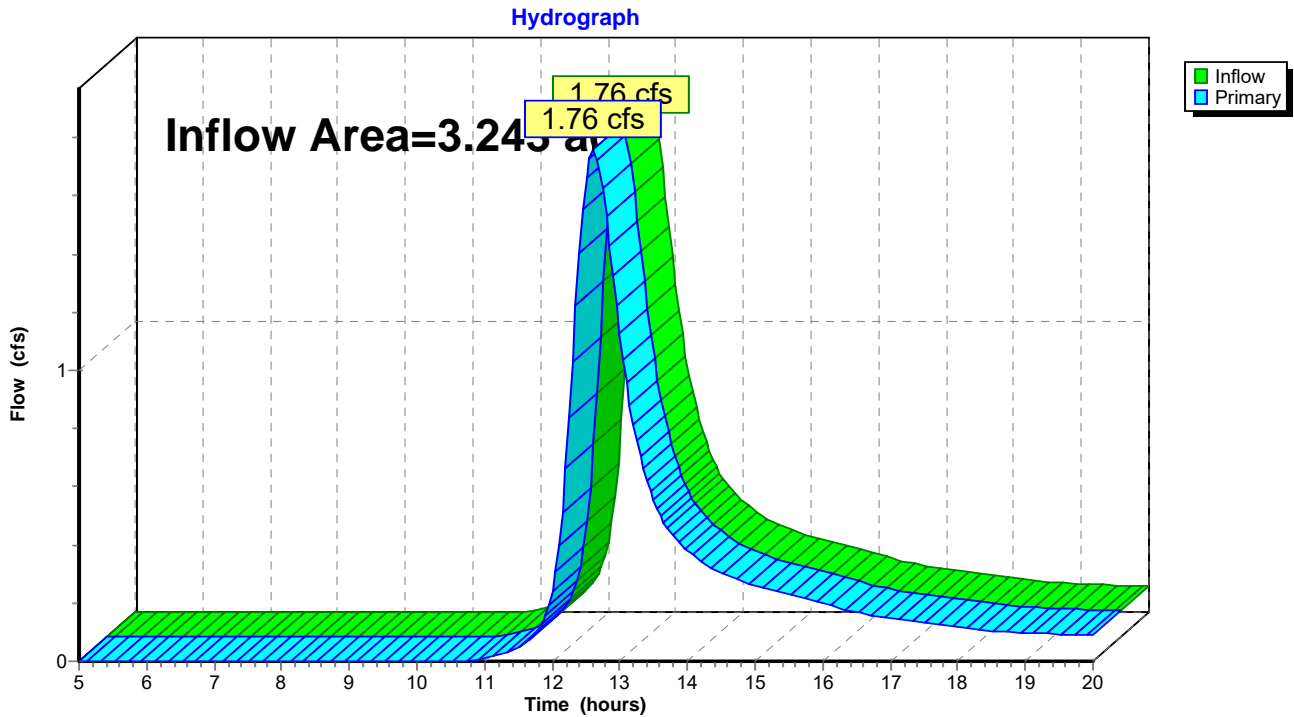


### Summary for Pond SP-1: LYNCH LANE

Inflow Area = 3.243 ac, 6.86% Impervious, Inflow Depth > 0.90" for 2-YR event  
Inflow = 1.76 cfs @ 12.61 hrs, Volume= 0.244 af  
Primary = 1.76 cfs @ 12.61 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-1: LYNCH LANE

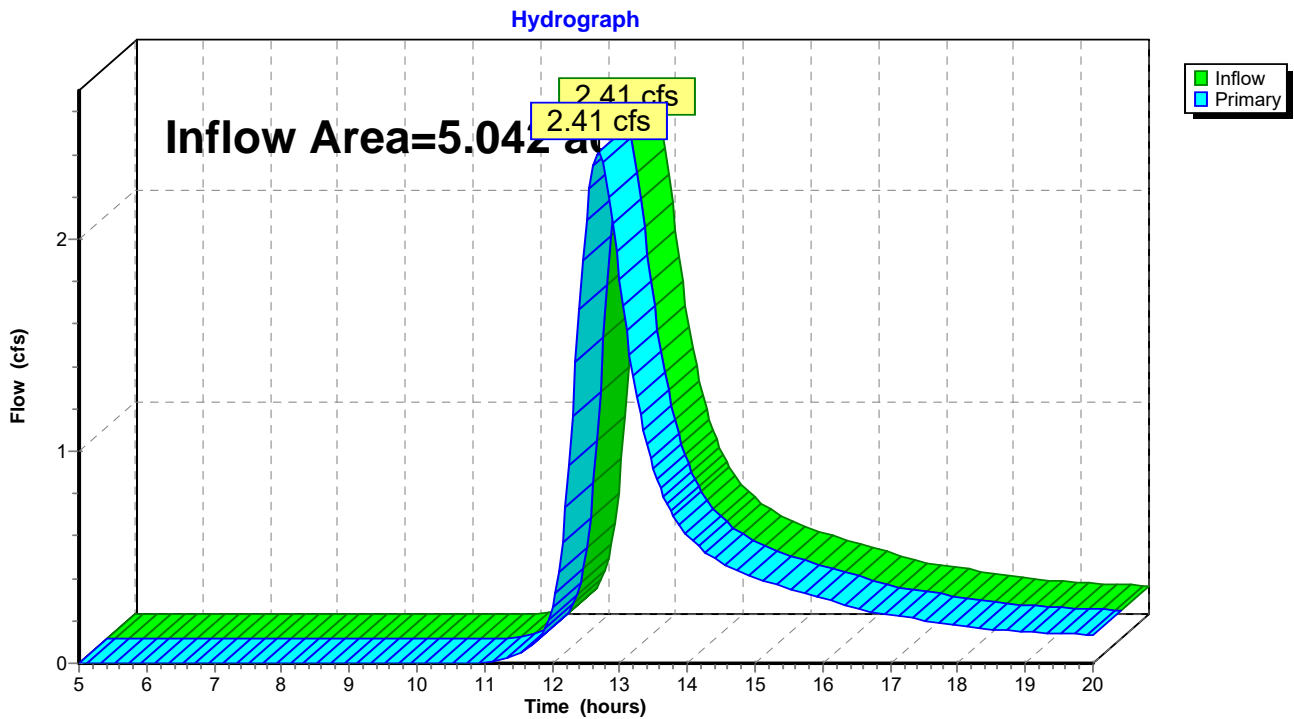


### Summary for Pond SP-2: BARTLETT ROAD EAST

Inflow Area = 5.042 ac, 5.68% Impervious, Inflow Depth > 0.85" for 2-YR event  
Inflow = 2.41 cfs @ 12.69 hrs, Volume= 0.357 af  
Primary = 2.41 cfs @ 12.69 hrs, Volume= 0.357 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-2: BARTLETT ROAD EAST



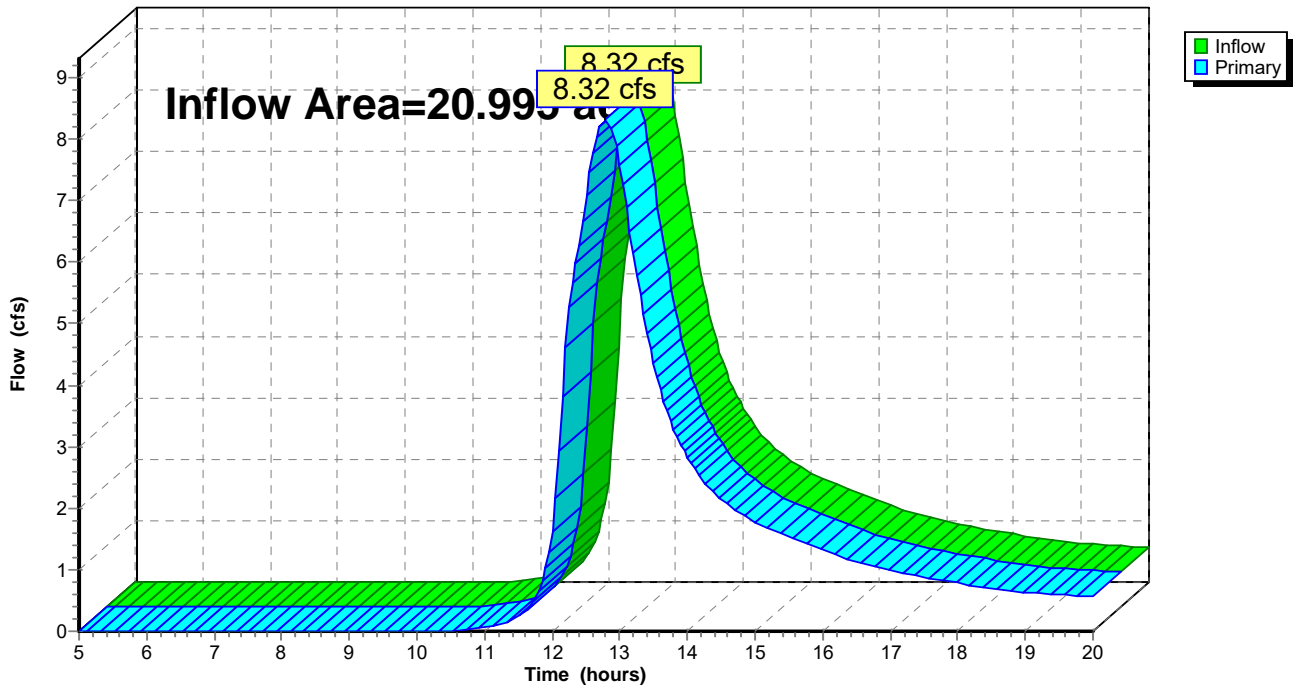
### Summary for Pond SP-3: BARTLETT ROAD WEST

Inflow Area = 20.995 ac, 6.47% Impervious, Inflow Depth > 0.87" for 2-YR event  
Inflow = 8.32 cfs @ 12.79 hrs, Volume= 1.530 af  
Primary = 8.32 cfs @ 12.79 hrs, Volume= 1.530 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-3: BARTLETT ROAD WEST

Hydrograph



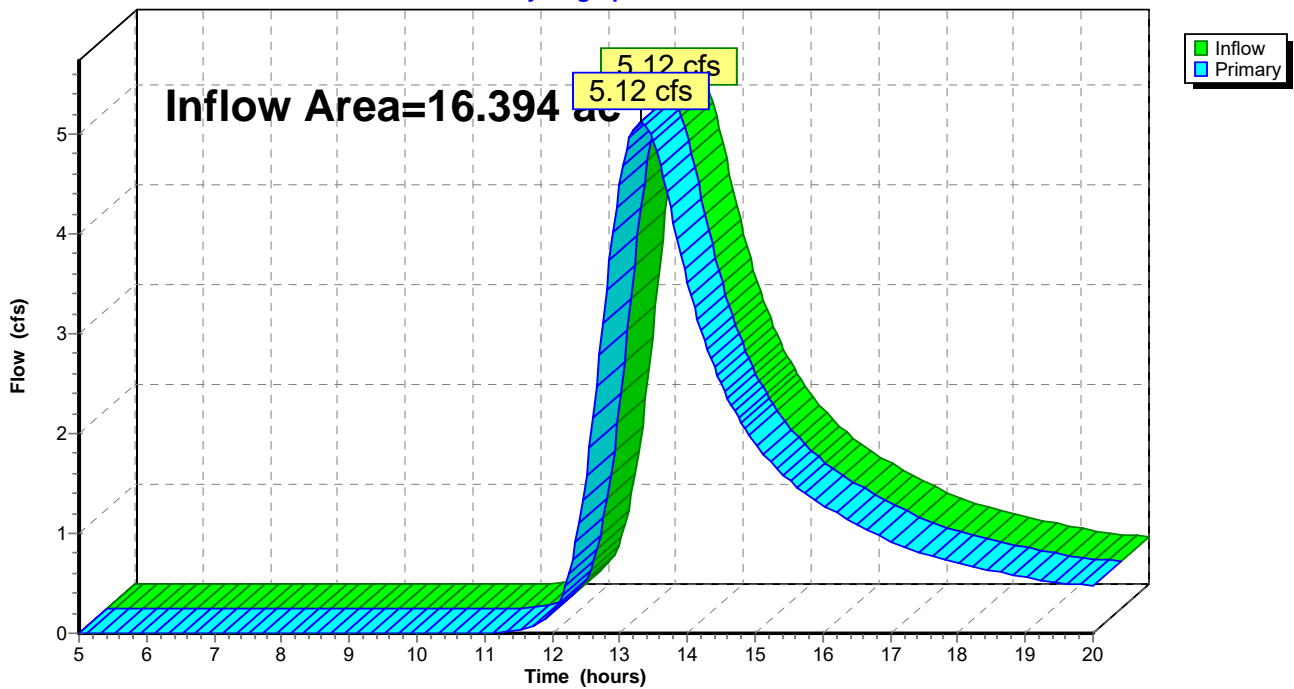
### Summary for Pond SP-4: WESTERN SITE BOUNDARY

Inflow Area = 16.394 ac, 1.05% Impervious, Inflow Depth > 0.83" for 2-YR event  
Inflow = 5.12 cfs @ 13.31 hrs, Volume= 1.133 af  
Primary = 5.12 cfs @ 13.31 hrs, Volume= 1.133 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-4: WESTERN SITE BOUNDARY

Hydrograph



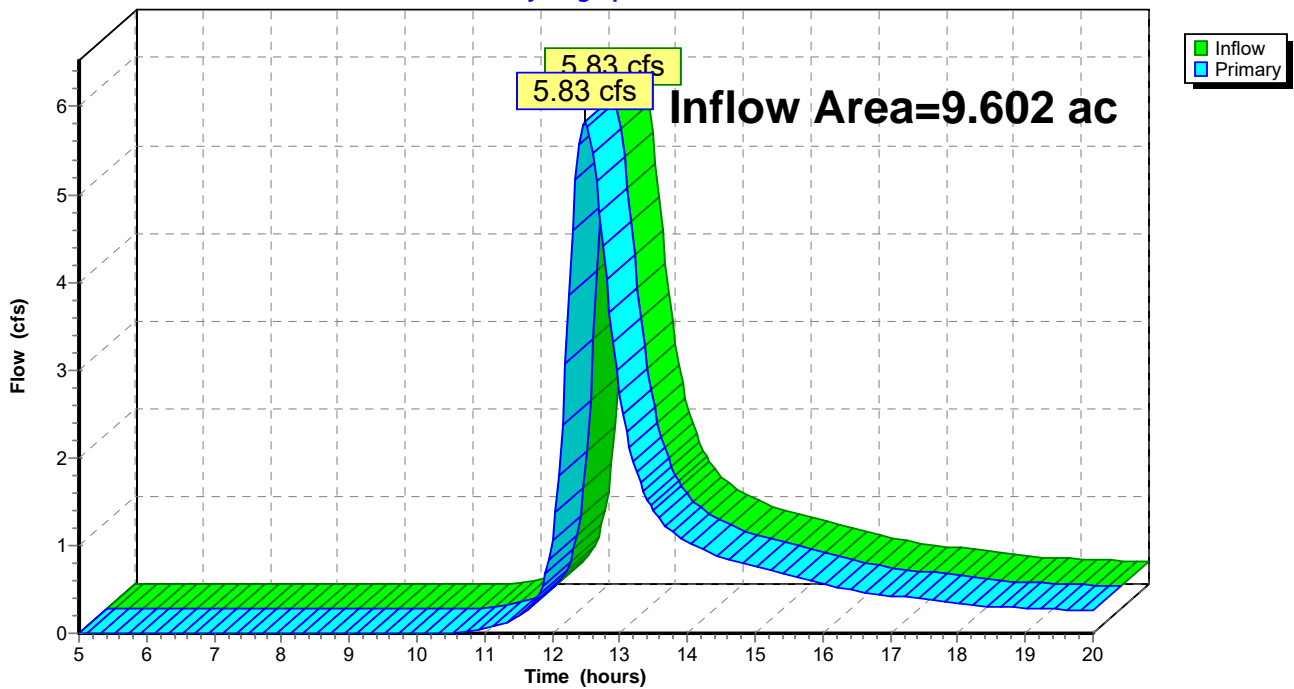
### Summary for Pond SP-5: LYNCH LANE

Inflow Area = 9.602 ac, 4.54% Impervious, Inflow Depth > 0.92" for 2-YR event  
Inflow = 5.83 cfs @ 12.49 hrs, Volume= 0.734 af  
Primary = 5.83 cfs @ 12.49 hrs, Volume= 0.734 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 1P

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Pond SP-5: LYNCH LANE

Hydrograph



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 10S: NE SITE</b>	Runoff Area=141,255 sf 8.63% Impervious Runoff Depth>1.95" Flow Length=309' Tc=41.3 min CN=78 Runoff=3.90 cfs 0.527 af
<b>Subcatchment 20S: E SITE</b>	Runoff Area=219,616 sf 5.68% Impervious Runoff Depth>1.80" Flow Length=478' Tc=46.3 min CN=76 Runoff=5.25 cfs 0.755 af
<b>Subcatchment 30S: SW SITE</b>	Runoff Area=771,905 sf 2.84% Impervious Runoff Depth>1.79" Flow Length=1,362' Slope=0.0100 '/' Tc=56.8 min CN=76 Runoff=16.46 cfs 2.640 af
<b>Subcatchment 31S: P ROAD</b>	Runoff Area=48,417 sf 23.89% Impervious Runoff Depth>1.98" Flow Length=373' Tc=6.3 min CN=78 Runoff=2.70 cfs 0.183 af
<b>Subcatchment 32S: P ROAD</b>	Runoff Area=94,227 sf 27.69% Impervious Runoff Depth>2.13" Flow Length=227' Tc=6.3 min CN=80 Runoff=5.66 cfs 0.385 af
<b>Subcatchment 40S: W SITE</b>	Runoff Area=714,111 sf 1.05% Impervious Runoff Depth>1.76" Flow Length=860' Tc=91.5 min CN=76 Runoff=11.21 cfs 2.406 af
<b>Subcatchment 50S: N SITE</b>	Runoff Area=405,878 sf 3.41% Impervious Runoff Depth>1.88" Flow Length=325' Tc=31.9 min CN=77 Runoff=12.22 cfs 1.461 af
<b>Subcatchment 51S: P ROAD</b>	Runoff Area=12,377 sf 41.45% Impervious Runoff Depth>2.47" Tc=5.0 min CN=84 Runoff=0.88 cfs 0.058 af
<b>Reach 31R: BARTLETT RD DITCH</b>	Avg. Flow Depth=0.30' Max Vel=3.01 fps Inflow=2.70 cfs 0.183 af n=0.035 L=268.0' S=0.0373 '/' Capacity=139.17 cfs Outflow=2.53 cfs 0.183 af
<b>Reach 32AR: SF AFTER LEVEL</b>	Avg. Flow Depth=0.29' Max Vel=0.33 fps Inflow=5.66 cfs 0.385 af n=0.400 L=80.0' S=0.0750 '/' Capacity=84.16 cfs Outflow=4.91 cfs 0.382 af
<b>Reach 32BR: OFFSITE POND</b>	Avg. Flow Depth=0.19' Max Vel=1.60 fps Inflow=4.91 cfs 0.382 af n=0.050 L=103.0' S=0.0291 '/' Capacity=25.49 cfs Outflow=4.77 cfs 0.381 af
<b>Reach 51R: SITE WETLAND</b>	Avg. Flow Depth=0.10' Max Vel=0.48 fps Inflow=0.68 cfs 0.058 af n=0.080 L=392.0' S=0.0153 '/' Capacity=28.27 cfs Outflow=0.51 cfs 0.056 af
<b>Reach 52R: SF AFTER LEVEL</b>	Avg. Flow Depth=0.12' Max Vel=0.19 fps Inflow=0.88 cfs 0.058 af n=0.400 L=83.0' S=0.0723 '/' Capacity=14.54 cfs Outflow=0.68 cfs 0.058 af
<b>Pond SP-1: LYNCH LANE</b>	Inflow=3.90 cfs 0.527 af Primary=3.90 cfs 0.527 af
<b>Pond SP-2: BARTLETT ROAD EAST</b>	Inflow=5.25 cfs 0.755 af Primary=5.25 cfs 0.755 af
<b>Pond SP-3: BARTLETT ROAD WEST</b>	Inflow=17.83 cfs 3.204 af Primary=17.83 cfs 3.204 af

**POST 2023.10.23**

Prepared by Terradyn Consultants

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*Type III 24-hr 10-YR Rainfall=4.30"*

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**Pond SP-4: WESTERN SITE BOUNDARY**

Inflow=11.21 cfs 2.406 af  
Primary=11.21 cfs 2.406 af

**Pond SP-5: LYNCH LANE**

Inflow=12.57 cfs 1.517 af  
Primary=12.57 cfs 1.517 af

**Total Runoff Area = 55.275 ac   Runoff Volume = 8.414 af   Average Runoff Depth = 1.83"**  
**95.40% Pervious = 52.732 ac   4.60% Impervious = 2.543 ac**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 10S: NE SITE</b>	Runoff Area=141,255 sf 8.63% Impervious Runoff Depth>2.57" Flow Length=309' Tc=41.3 min CN=78 Runoff=5.14 cfs 0.696 af
<b>Subcatchment 20S: E SITE</b>	Runoff Area=219,616 sf 5.68% Impervious Runoff Depth>2.40" Flow Length=478' Tc=46.3 min CN=76 Runoff=7.03 cfs 1.008 af
<b>Subcatchment 30S: SW SITE</b>	Runoff Area=771,905 sf 2.84% Impervious Runoff Depth>2.39" Flow Length=1,362' Slope=0.0100 '/' Tc=56.8 min CN=76 Runoff=22.03 cfs 3.527 af
<b>Subcatchment 31S: P ROAD</b>	Runoff Area=48,417 sf 23.89% Impervious Runoff Depth>2.61" Flow Length=373' Tc=6.3 min CN=78 Runoff=3.55 cfs 0.241 af
<b>Subcatchment 32S: P ROAD</b>	Runoff Area=94,227 sf 27.69% Impervious Runoff Depth>2.78" Flow Length=227' Tc=6.3 min CN=80 Runoff=7.35 cfs 0.502 af
<b>Subcatchment 40S: W SITE</b>	Runoff Area=714,111 sf 1.05% Impervious Runoff Depth>2.35" Flow Length=860' Tc=91.5 min CN=76 Runoff=15.01 cfs 3.216 af
<b>Subcatchment 50S: N SITE</b>	Runoff Area=405,878 sf 3.41% Impervious Runoff Depth>2.50" Flow Length=325' Tc=31.9 min CN=77 Runoff=16.23 cfs 1.939 af
<b>Subcatchment 51S: P ROAD</b>	Runoff Area=12,377 sf 41.45% Impervious Runoff Depth>3.16" Tc=5.0 min CN=84 Runoff=1.12 cfs 0.075 af
<b>Reach 31R: BARTLETT RD DITCH</b>	Avg. Flow Depth=0.35' Max Vel=3.27 fps Inflow=3.55 cfs 0.241 af n=0.035 L=268.0' S=0.0373 '/' Capacity=139.17 cfs Outflow=3.33 cfs 0.241 af
<b>Reach 32AR: SF AFTER LEVEL</b>	Avg. Flow Depth=0.33' Max Vel=0.36 fps Inflow=7.35 cfs 0.502 af n=0.400 L=80.0' S=0.0750 '/' Capacity=84.16 cfs Outflow=6.46 cfs 0.499 af
<b>Reach 32BR: OFFSITE POND</b>	Avg. Flow Depth=0.22' Max Vel=1.78 fps Inflow=6.46 cfs 0.499 af n=0.050 L=103.0' S=0.0291 '/' Capacity=25.49 cfs Outflow=6.26 cfs 0.498 af
<b>Reach 51R: SITE WETLAND</b>	Avg. Flow Depth=0.12' Max Vel=0.54 fps Inflow=0.88 cfs 0.074 af n=0.080 L=392.0' S=0.0153 '/' Capacity=28.27 cfs Outflow=0.68 cfs 0.072 af
<b>Reach 52R: SF AFTER LEVEL</b>	Avg. Flow Depth=0.14' Max Vel=0.21 fps Inflow=1.12 cfs 0.075 af n=0.400 L=83.0' S=0.0723 '/' Capacity=14.54 cfs Outflow=0.88 cfs 0.074 af
<b>Pond SP-1: LYNCH LANE</b>	Inflow=5.14 cfs 0.696 af Primary=5.14 cfs 0.696 af
<b>Pond SP-2: BARTLETT ROAD EAST</b>	Inflow=7.03 cfs 1.008 af Primary=7.03 cfs 1.008 af
<b>Pond SP-3: BARTLETT ROAD WEST</b>	Inflow=23.75 cfs 4.266 af Primary=23.75 cfs 4.266 af



**POST 2023.10.23**

Prepared by Terradyn Consultants

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*Type III 24-hr 25-YR Rainfall=5.10"*

Printed 10/25/2023

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**Pond SP-4: WESTERN SITE BOUNDARY**

Inflow=15.01 cfs 3.216 af

Primary=15.01 cfs 3.216 af

**Pond SP-5: LYNCH LANE**

Inflow=16.78 cfs 2.011 af

Primary=16.78 cfs 2.011 af

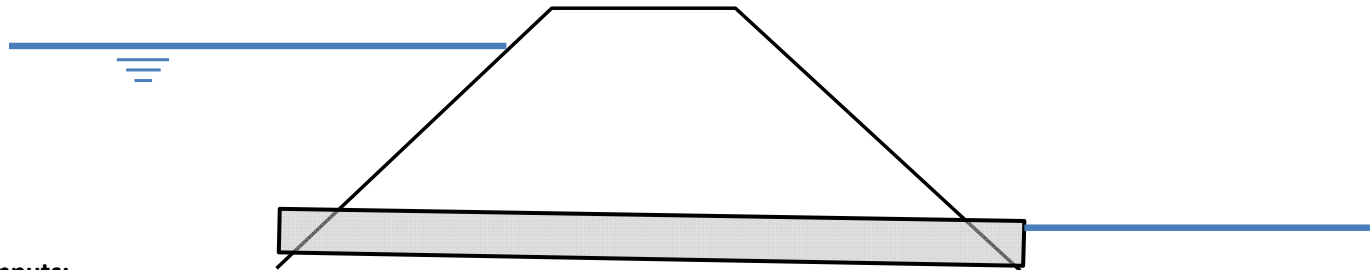
**Total Runoff Area = 55.275 ac   Runoff Volume = 11.204 af   Average Runoff Depth = 2.43"**  
**95.40% Pervious = 52.732 ac   4.60% Impervious = 2.543 ac**

**APPENDIX 5**

**CULVERT SIZING WORKSHEET**

## Culvert Analysis Spreadsheet

Landowner: *****	Project: BARTLETT ROAD	
County: *****	State: MAINE	Tract / Field ID: SD-1
Designed: GW	Date: 10/24/2023	
Checked: *****	Date: _____	



### Inputs:

Headwater (Upstream Water Surface) Elevation:	61.75	Feet
Culvert Inlet Invert Elevation:	60.50	Feet
Culvert Diameter:	15.00	Inches
Length of Culvert:	50.00	Feet
Culvert Outlet Invert Elevation:	60.00	Feet
Tailwater (Downstream) Elevation:	60.50	Feet

Select Culvert Material: Smooth\_HDPE  
 Select Culvert Inlet Type: Projecting - Thin Edge

### Outputs:

**CAPACITY = 8.5 cfs**

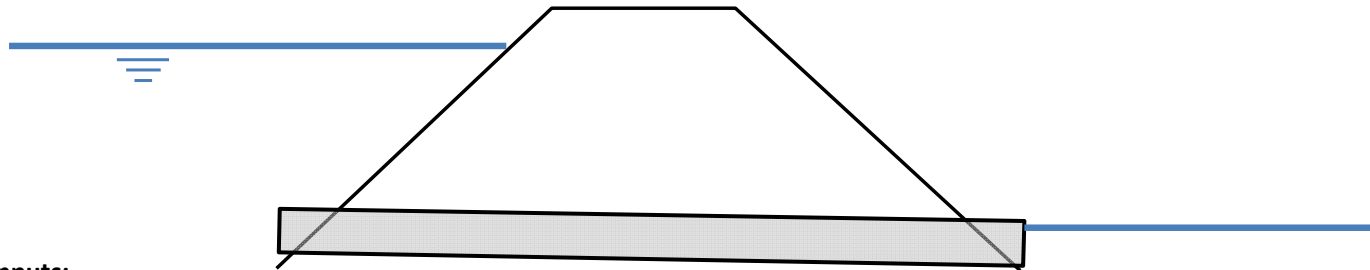
**INLET CONTROLS (Between Submerged and Unsubmer**

Manning's n value: 0.012  
 Entrance Coefficient, Ke: 0.9

Smooth\_HDPE  
 Projecting - Thin Edge

## Culvert Analysis Spreadsheet

Landowner: *****	Project: BARTLETT ROAD	
County: *****	State: MAINE	Tract / Field ID: SD-2
Designed: GW	Date: 10/24/2023	
Checked: *****	Date: _____	



### Inputs:

Headwater (Upstream Water Surface) Elevation:	57.75	Feet
Culvert Inlet Invert Elevation:	56.50	Feet
Culvert Diameter:	15.00	Inches
Length of Culvert:	64.00	Feet
Culvert Outlet Invert Elevation:	56.00	Feet
Tailwater (Downstream) Elevation:	56.50	Feet

Select Culvert Material: Smooth\_HDPE  
 Select Culvert Inlet Type: Projecting - Thin Edge

### Outputs:

**CAPACITY = 8.5 cfs**

**INLET CONTROLS (Between Submerged and Unsubmer**

Manning's n value: 0.012  
 Entrance Coefficient, Ke: 0.9

Smooth\_HDPE  
 Projecting - Thin Edge

**APPENDIX 6**

**HOUSEKEEPING**

# HOUSEKEEPING PERFORMANCE STANDARDS

FOR:

**Bartlett Road Subdivision  
Kittery, MAINE**

**Project Developer:** Beachwood Development Fund  
P.O. Box 261  
Kennebunk, ME 04043

**Responsible Party:** Beachwood Development Fund  
P.O. Box 261  
Kennebunk, ME 04043

## **Introduction:**

The contractor shall be responsible for maintaining proper housekeeping standards throughout the construction phase of the project. After the construction phase has been completed, the owner or operator of the project will be responsible.

## **Standards:**

In accordance with the housekeeping performance standards required by MDEP chapter 500 stormwater regulations, the following standards shall be met:

- 1. Spill prevention.** Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
- 2. Groundwater protection.** During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.
- 3. Fugitive sediment and dust.** Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

Operations during wet months that experience tracking of mud off the site onto public roads should provide for sweeping of road areas at least once a week and prior to significant storm events. Where chronic mud tracking occurs, a stabilized construction entrance should be provided. Operations during dry months, that experience fugitive dust problems, should wet down the access roads once a week or more frequently as needed.

- 4. Debris and other materials.** Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

To prevent these materials from becoming a source of pollutants, construction and post-construction activities related to a project may be required to comply with applicable

provision of rules related to solid, universal, and hazardous waste, including, but not limited to, the Maine solid waste and hazardous waste management rules; Maine hazardous waste management rules; Maine oil conveyance and storage rules; and Maine pesticide requirements.

- 5. Trench or foundation de-watering.** Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.
- 6. Non-stormwater discharges.** Identify and prevent contamination by non-stormwater discharges.

**APPENDIX 7**

**STORMWATER INSPECTION & MAINTENENACE**





# **BARTLETT ROAD SUBDIVISION KITTERY, MAINE**

## **STORMWATER MANAGEMENT SYSTEM INSPECTION & MAINTENANCE PLAN**

**Project Owner/Developer:** Beachwood Development Fund  
P.O. Box 261  
Kennebunk, Maine 04043  
(207) 985-3646

**Responsible Party:** Owner or Homeowners Association

**Prepared By:** Terradyn Consultants, LLC  
565 Congress Street, Suite 201  
Portland, ME 04101  
(207) 926-5111

### **INTRODUCTION:**

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Regular inspection and maintenance of the entire stormwater management system is crucial to the long-term effectiveness of the system. The responsible party must provide regular inspection and maintenance of all permanent erosion control measures and stormwater management structures, establish any contract services required to implement the program, and keep records and a maintenance log book of inspection and maintenance activities. At a minimum, the inspection and maintenance activities outlined herein should be performed at the recommended intervals. A rainfall event of 1" in a 24 hour period would trigger a wet weather post-construction inspection.

All measures must be maintained in effective operating condition. A person with knowledge of erosion and sedimentation practices, stormwater management, and the standards and conditions of all local, state and federal permits for the project shall conduct the inspections. The following areas, facilities, and measures must be inspected and identified deficiencies must be corrected.

## INSPECTION TASKS

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1. Inspect **vegetated areas**, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.
2. Inspect **ditches, swales and other open stormwater channels** in the spring, late fall and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, control vegetated growth that could obstruct flow and repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable. If the ditch has a riprap lining, replace riprap on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged. The channel must receive routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or sideslopes.
3. Inspect **culverts** in the spring, in late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris at the inlet, the outlet and within the culvert. Repair any erosion damage at the culvert's inlet and outlet.
4. Clear accumulations of winter sand **along roadways** at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder.
5. Inspect **resource and treatment buffers** once a year for evidence of erosion, concentrating flow, and encroachment by development. If flows are concentrating within a buffer, site grading, level spreaders, or ditch turn-outs must be used to ensure a more even distribution of flow into a buffer. Check down slope of all spreaders and turn-outs for erosion. If erosion is present, adjust or modify the spreader or turnout lip to ensure a better distribution of flow into a buffer. Clean-out any accumulation of sediment within the spreader bays or turn-out pools.

## DOCUMENTATION

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Keep a log (report) summarizing inspections, maintenance, and any corrective actions taken. The log must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal. The permittee shall retain a copy of the log for a period of at least five years from the completion of permanent stabilization.

The log attached at the end of this plan is from the *Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual for Designers and Engineers (May 2016)*. The log may be used or adapted for this project.

**ATTACHMENTS:**

Stormwater Management Facilities Inspection & Maintenance Log

**Stormwater Management Facilities  
 Post Construction Inspection & Maintenance Log  
 Bartlett Road Subdivision, Kittery, Maine**

**General Information:**

Inspected by:	Date:	Weather:
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Reason for Inspection: (Regular Inspection) (Major Rain Event, 1" in 24 hours)

<b>BMP</b>	<b>Conditions Observed</b>	<b>Repairs Needed?</b>
1. Vegetated Areas		
2. Ditches, Swales, Open Channels		
3. Culverts		
4. Stormwater Buffers		

**Detailed Repair Notes:**

<b>BMP Type</b>	<b>Date</b>	<b>Description of Repairs &amp; Sediment Disposal</b>

Notes:  
 If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal. A copy of this log shall be retained for a period of at least five years from the completion of permanent stabilization.