MAJOR SUBDIVISION
PRELIMINARY PLAN APPLICATION
TO TOWN OF WINDHAM

FOR

HIGHLAND WOODS SUBDIVISION

HIGHLAND CLIFF ROAD
WINDHAM, MAINE

PREPARED FOR

MTR DEVELOPMENT, LLC
PO BOX 1028
WESTBROOK, MAINE 04098

PREPARED BY

DM ROMA
CONSULTING ENGINEERS

PO BOX 1116
WINDHAM, ME 04062

NOVEMBER 5, 2018

Project Name: HIGHLAND WOODS SUBDIVISION

Tax Map: 7 **Lot:** 36

Number of lots/dwelling units: 22 LOTS **Estimated road length:** 2,200 LF

Is the total disturbance proposed > 1 acre? ☒ **Yes** □ **No**

Contact Information

1. Applicant

Name: MTR DEVELOPMENT, LLC

Mailing Address: PO BOX 1028, WESTBROOK, ME 04098

Telephone: 207-854-4583 Fax: _____ E-mail: CHRISDIGSDIRT@GMAIL.COM

2. Record owner of property

☒ (Check here if same as applicant)

Name: _____

Mailing Address: _____

Telephone: _____ Fax: _____ Email: _____

3. Contact Person/Agent (if completed and signed by applicant's agent, provide written documentation of authority to act on behalf of applicant)

Name: DUSTIN ROMA, PE

Company Name: DM ROMA CONSULTING ENGINEERS

Mailing Address: PO BOX 1116, WINDHAM, ME 04062

Telephone: 207-310-0506 Fax: _____ E-mail: DUSTIN@DMROMA.COM

I certify all the information in this application form and accompanying materials is true and accurate to the best of my knowledge.

_____

Signature Date

Preliminary Plan - Major Subdivision: Submission Requirements

A.	Mandatory Written Information	Applicant	Staff
1	A fully executed and signed application form	X	
2	Evidence of payment of the application and escrow fees	X	
3	Proposed name of the subdivision	X	
4	Verification of right, title, or interest in the property, and any abutting property, by deed, purchase and sales agreement, option to purchase, or some other proof of interest.	X	
5	Copy of the most recently recorded deed for the parcel, along with a copy of all existing deed restrictions, easements, rights-of-way, or some other proof of interest	X	
6	Copy of any existing or proposed covenants or deed restrictions intended to cover all or part of the lots or dwellings in the subdivision	X	
7	Copy of any existing or proposed easements on the property	X	
8	Name, registration number and seal of the Maine Licensed Professional Land Surveyor who conducted the survey	X	
9	Name, registration number and seal of any other licensed professional of the state who prepared the plan (if applicable)	X	
10	An indication of the type of sewage disposal to be used in the subdivision	X	
	i. If connecting to public sewer, provide a letter from Portland Water District stating the District has the capacity to collect and treat the waste water	N/A	
	ii. If using subsurface waste water disposal systems (septic), submit test pit analyses prepared by a Maine Licensed Site Evaluator or Certified Soil Scientist. Test pit locations must be shown on a map.	X	
11	Indicate type of water supply system(s) to be used in the subdivision.	X	
12	If connecting to public water, submit a written statement from the Portland Water District indicating there is adequate supply and pressure for the subdivision.	N/A	
13	Names and addresses of the record owner, applicant, and adjoining property owners	X	
14	An acceptable title opinion proving right of access to the proposed subdivision or site for any property proposed for development on or off of a private way or private road.	N/A	
15	The name and contact information for the road association who's private way or road is used to access the subdivision.	N/A	

Applicant Staff

16	Financial Capacity.	X	
	i. Estimated costs of development, and itemization of major costs	X	
	ii. Financing - provide one of the following:		
	a. Letter of commitment to fund from financial institution, governmental agency, or other funding agency		
	b. Annual corporate report with explanatory material showing availability of liquid assets to finance development		
	c. Bank statement showing availability of funds if personally financing development		
	d. Cash equity commitment		
	e. Financial plan for remaining financing		
	f. Letter from financial institution indicating an intention to finance	X	
	iii. If a corporation, Certificate of Good Standing from the Secretary of State	X	
17	Technical Capacity	X	
	i. A statement of the applicant's experience and training related to the nature of the development, including developments receiving permits from the Town.	X	
	ii. Resumes or similar documents showing experience and qualifications of full-time, permanent or temporary staff contracted with or employed by the applicant who will design the development.	X	

B.	**Mandatory Plan Information**		
1	Name of subdivision, date and scale	X	
2	Stamp of the Maine License Professional Land Surveyor that conducted the survey, including at least one copy of original stamped seal that is embossed and signed	X	
3	Stamp with date and signature of the Maine Licensed Professional Engineer that prepared the plans.	X	
4	North arrow identifying all of the following: Grid North, Magnetic North, declination between Grid and Magnetic, and whether Magnetic or Grid bearings were used in the plan design	X	
5	Location map showing the subdivision within the municipality	X	
6	Vicinity plan showing the area within 250 feet, to include:	X	
	i. approximate location of all property lines and acreage of parcels	X	
	ii. locations, widths, and names of existing, filed, or proposed streets, easements or building footprints	X	
	iii. location and designations of any public spaces	X	
	iv. outline of proposed subdivision, together with its street system and indication of future probably street system, if the proposed subdivision encompasses only part of the applicants entire property.	X	
7	Standard boundary survey of parcel, including all contiguous land in common ownership within the last 5 years	X	
8	Proposed lot lines with approximate dimensions and area of each lot.	X	
9	Contour lines at 2-foot intervals, or at intervals required by the Board, showing elevations in relation to the required datum.	X	

		Applicant	Staff
10	Typical cross sections of the proposed grading for roadways, sidewalks, etc., including width, type of pavement, elevations, and grades.	X	
11	Wetland areas shall be delineated on the survey. If none, please note.	X	
12	Number of acres within the proposed subdivision, location of property lines, existing buildings, vegetative cover type, specimen trees, if present, and other essential existing physical features.	X	
13	Rivers, streams, and brooks within or adjacent to the proposed subdivision. If any portion of the proposed subdivision is located in the direct watershed of a great pond, note which great pond.	X	
14	Zoning district in which the proposed subdivision is located, and the location of any zoning boundaries affecting the subdivision.	X	
15	Location & size of existing and proposed sewers, water mains, culverts, bridges, and drainage ways on or adjacent to the property to be subdivided. The Board may require this information to be depicted via cross-section, plan or profile views.	X	
16	Location, names, and present width of existing streets, highways, easements, building lines, parks, and other open spaces on or adjacent to the subdivision	X	
17	Location and widths of any streets, public improvements, or open space within the subdivision (if any) shown on the official map and the comprehensive plan	X	
18	All parcels of land proposed to be dedicated to public use and the conditions of such dedication.	X	
19	Location of any open space to be preserved or common areas to be created, and general description of proposed ownership, improvement, and management	X	
20	Approximate location of treeline after development	X	
21	Delineate boundaries of any flood hazard areas and the 100-year flood elevation as depicted on the Town's Flood Insurance Rate Map	X	
22	Show any areas within or adjacent to the proposed subdivision which have been identified by the Maine Department of Inland Fisheries and Wildlife "Beginning with Habitat project maps or within the Comprehensive Plan..	N/A	
23	Show areas within or adjacent to the proposed subdivision which are either listed on or eligible for the National Register of Historic Places, or have been identified in the comprehensive plan or by the Maine Historic Preservation Commission as sensitive or likely to contain such sites	N/A	
24	Erosion & Sedimentation control plan, prepared in accordance with MDEP Stormwater Law Chapter 500 Basic Standards, and the MDEP Maine Erosion and Sediment Control Best Management Practices, published March 2003.	X	
25	Stormwater management plan, prepared by a Maine Licensed Professional Engineer in accordance with the most recent edition of Stormwater Management for Maine: BMPS Technical Design Manual, published by the MDEP 2006.	X	

C.	Submission information for which a waiver may be granted.	Applicant	Staff
1	High-intensity soil survey by a Certified Soil Scientist	X	
2	Landscape Plan	X	
3	Hydrogeologic assessment - required if i) subdivision is not served by public sewer and either any part of the subdivision is over a sand and gravel aquifer or has an average density of more than one dwelling unit per 100,000 square feet, or ii) where site considerations or development design indicate greater potential of adverse impacts on groundwater quality.	X	
	a) map showing basic soil types		
	b) depth to the water table at representative points		
	c) Drainage conditions throughout the subdivision		
	d) data on existing ground water quality		
	e) analysis and evaluation of the effect of the subdivision on groundwater		
	f) map showing location of any subsurface wastewater disposal systems and drinking water wells within the subdivision & within 200 feet of the subdivision boundaries.		
4	Estimate of the amount and type of vehicular traffic to be generated on a daily basis and at peak hours	X	
5	Traffic Impact Analysis for subdivisions involving 28 or more parking spaces or projected to generate more than 140 vehicle trips per day.	X	
6	If any portion of the subdivision is in the direct watershed of a great pond,	N/A	
	i) phosphorous impact analysis and control plan		
	ii) long term maintenance plan for all phosphorous control measures		
	iii) contour lines at an interval of 2 feet		
	iv) delineate areas with sustained slopes greater than 25% covering more than one acre		

Electronic Submission	X	

TOWN OF WINDHAM
SUBDIVISION & SITE PLAN APPLICATION

Performance and Design Standards Waiver Request Form

(Section 808 – Site Plan Review, Waivers)
(Section 908 – Subdivision Review, Waivers)

For each waiver request from the Performance and Design Standards detailed in Section 811 or Section 911 of the Town of Windham Land Use Ordinance, as applicable, please submit a separate completed copy of this waiver request form.

Subdivision or Project Name: HIGHLAND WOODS SUBDIVISION

Tax Map: 7 **Lot:** 36

Waivers are requested from the following Performance and Design Standards (add rows as necessary):

	Ordinance Section	Standard	Mark which waiver this form is for
1.	911-M-5-b-6-ii	SIDEWALKS OR EXPANDED SHOULDER REQUIRED	X
2.	911-K-4-b-ii	50% NET AREA IN COMMON OPEN SPACE	X
3.	911-K-4-g	CONTIGUOUS OPEN SPACE	X

a. Describe how a waiver from the standard indicated above will improve the ability of the project to take the property's pre-development natural features into consideration. Natural features include, but are not limited to, topography, location of water bodies, location of unique or valuable natural resources, relation to abutting properties or land uses. Attach a separate sheet if necessary.

1. THE PROPOSED 26 FOOT WIDE PAVED SURFACE WITH 1 FT GRAVEL SHOULDERS WILL CREATE A 28 FOOT WIDE ROADWAY SURFACE THAT IS SUITABLE FOR VEHICLE AND PEDESTRIAN TRAFFIC ON THE PROPOSED TRAVELWAY.

2. THE PROJECT HAS BEEN DESIGNED SO THAT 48.6% OF THE NET DEVELOPABLE AREA IS LOCATED WITHIN THE OPEN SPACE AREA, WHICH IS SLIGHTLY BELOW THE REQUIRED 50%. THE OPEN SPACE CONTAINS 12.46 ACRES OF DEVELOPABLE AREA AS DEFINED BY THE TOWN.

3. THE SMALL AREAS OF NON-CONTIGUOUS OPEN SPACE DOES NOT NEGATIVELY IMPACT THE INTENT OF THE ORDINANCE TO PROVIDE LARGE TRACTS OF CONNECTED OPEN SPACE.

(continued next page)

Ordinance Section: _____

b. Will the waiver have an impact on any of the following criteria?

	Yes	No
Water or air pollution		X
Light pollution or glare		X
Water supply		X
Soil erosion		X
Traffic congestion or safety		X
Pedestrian safety or access		X
Supply of parking		X
Sewage disposal capacity		X
Solid waste disposal capacity		X
Scenic or natural beauty, aesthetics, historic sites, or rare or irreplaceable natural areas		X
Flooding or drainage issues on abutting properties		X
The Town's ability to provide the subdivision with public safety services (if subdivision)		X

If granting the waiver will result in an impact on any of the criteria above, please provide more detail below.

PROJECT NARRATIVE

SECTION 1 – PROPOSED USE NARRATIVE

The proposed 22-lot residential subdivision is located off Highland Cliff Road on a 38-acre parcel depicted as Lot 36 on Tax Map 7. The project will include the construction of a 2,200-foot long roadway identified as Maysens Way and designed in accordance with the Minor Local Street standards, and is intended for public acceptance. The project will be developed utilizing the Cluster Subdivision standards, with 50% of the gross land area reserved and dedicated as Open Space.

The lots have been designed to accommodate suitable building windows and space for both potable wells and on-site wastewater disposal systems. Electric utilities will enter the property underground to serve the proposed residential lots.

SECTION 2 – RECORD OWNER INFORMATION

The property is currently owned by the applicant, MTR Development, LLC by deed recorded in Cumberland County Registry of Deeds Book 35054 page 326 (see attached deed).

SECTION 3 – ABUTTING PROPERTY OWNERS

The names of abutting property owners are listed on the Subdivision Plan.

SECTION 4 – TITLE, RIGHT, OR INTEREST

See attached deed to MTR Development, LLC recorded in CCRD 35054/326

As illustrated on the Subdivision Plan, the project design incorporates a pending land swap with the abutting neighbor (N/F Heirs of Leonard Sanborn (Deed book 4617, page 205 and Tax Map 7 Lot 29). The intent of the land swap is to limit the proposed property to coincide with the end of proposed subdivision road right of way to provide opportunity for future development by others.

SECTION 5 – COVENANTS OR DEED RESTRICTIONS

The lot owners will be required to maintain the roadway, open space and stormwater infrastructure under a Homeowners Association Agreement Document (HOA Document). There will be language in the HOA Document that will identify a method to transfer ownership and maintenance responsibilities of the open space and roadway to the Town. We will provide the draft HOA Documents for review as part of the final subdivision plan application. Certain individual lots will contain stormwater management easements and drainage easements, as necessary.

SECTION 6 – EASEMENTS

There are no known existing easements on the property. Stormwater easements will be dedicated on certain lots to benefit the Homeowners Association and the Town.

SECTION 7 – LICENSED PROFESSIONALS

The plans and applications were prepared by DM Roma Consulting Engineers. Dustin Roma is a Maine Licensed Professional Engineer PE#12131. The surveyor of record is Bill Shippen with Survey, Inc, who will review and seal the final Subdivision Plan prior to issuance for Planning Board signature. Soils analysis and wetland delineation was performed by Mainely Soils, LLC. The High Intensity Soils Survey was prepared by Longview Partners, LLC and the Nitrate Assessment was prepared by Summit Geoengineering Services.

SECTION 8 – TECHNICAL ABILITY

The design professionals at DM Roma Consulting Engineers, Survey, Inc., Mainely Soils, LLC, Longview Partners, LLC and Summit Geoengineering Services have been performing similar consulting and design work in Southern Maine for many years, including many projects in Windham and the surrounding communities.

SECTION 9 – UTILITIES

The project will be served by private on-site wells, private on-site wastewater disposal systems and underground electrical & data utilities.

SECTION 10 –WATER SUPPLY AND SEWAGE DISPOSAL

The lots have been designed so that each can accommodate an on-site well and on-site septic disposal field. Included in the design plan set as Sheet 4 of 11 is the Plan of Wastewater Disposal Systems including well exclusion zones to demonstrate that each lot can effectively support a well and septic system.

A Nitrate-Nitrogen Assessment, dated October 26, 2018, has been prepared by Summit Geoengineering Services for the proposed project. The Nitrate-Nitrogen Assessment is included as part of this application.

SECTION 11 – SOLID WASTES

The residential lots will utilize the Town's curbside trash collection program to dispose of solid wastes.

SECTION 12 – VEHICLE TRAFFIC

Vehicle sight distance at the proposed roadway intersection exceeds 500 feet looking left and exceeds 700 feet looking right, which is adequate for the posted speed limit of 35 mph. According to the Institute of Transportation Engineers Trip Generation Manual, 9th edition, the proposed 22 residential lots are expected to generate 22 peak hour trip-ends, and 209 total daily trips. The proposed roadway has access from existing paved Town roads. See attached Traffic Assessment from Traffic Solutions.

SECTION 13 – UNIQUE NATURAL AREAS

There are no known unique natural areas within the project vicinity.

SECTION 14 – STORMWATER MANAGEMENT

The stormwater management report with the stormwater maintenance plan is included as an attachment.

Additionally, a high-intensity soil survey has been prepared by has been prepared by Longview Partners, LLC. for the proposed project. The Class A High-Intensity Soil Survey is included with the project plan set and Soil Narrative is included as part of the stormwater management report.

SECTION 15 – FINANCIAL CAPACITY

The expected construction costs to complete the project are as follows:

• Clear and grub roadway areas	$50,000
• Construct gravel roadways	$105,000
• Bituminous Pavement	$95,000
• Electrical Conduit & Risers	$40,000
• Stormwater BMPs	$25,000
• Roadway Monuments	$4,500
Total Construction Costs	$319,500

The applicant already owns the land, so land costs were not included in the project budget. A letter indicating dated June 7th, 2018 from People's United Bank states that MTR Development "has the financial ability" to complete the proposed project.

QUITCLAIM DEED
(Maine Statutory Short Form)

DLN: 1001840034853

KNOW ALL PERSONS BY THESE PRESENTS THAT, I, Michael A. Atkinson, (hereinafter "Grantor"), with a mailing address of 59 Highland Cliff Road, Windham, Maine 04062, for valuable consideration paid, GRANTS to **MTR Development, LLC, a Maine Limited Liability Company,** (hereinafter "Grantee") with a mailing address of PO Box 1028, Westbrook, Maine 04092, with **Quitclaim Covenants,** the following described real property, with any buildings located thereon, in the Town of Windham, County of Cumberland, State of Maine:

MAINE REAL ESTATE TAX PAID

PROPERTY DESCRIBED IN "EXHIBIT A" ATTACHED HERETO AND MADE A PART HEREOF AND "EXHIBIT B" FOR RESTRICTIONS

The premises are conveyed together with and subject to any and all easements or appurtenances of record, insofar as the same are in force and applicable.

Witness my hand and seal this 7th day of August, 2018.

WITNESS

Michael A. Atkinson

STATE OF MAINE
COUNTY OF Cumberland, ss.

Personally appeared before me on this 7th day of August, 2018 the above named **Michael A. Atkinson** and acknowledged the foregoing instrument to be his free act and deed.

Notary Public/Attorney At Law
Print name: Carly S. Joyce
Exp: _____

Carly S. Joyce
State of Maine
Attorney At Law
Bar #9659

EXHIBIT A

PARCEL ONE:

A certain lot or parcel of land, with the buildings thereon, situated in the Town of Windham, County of Cumberland and State of Maine, containing twenty-five (25) acres, more or less, and being the homestead farm of Charlotte L. Leighton and being the same premises conveyed by Andrew A. Leighton to Benjamin T. Leighton by deed dated May 18, 1874 and recorded in Cumberland County Registry of Deeds in Book 510, Page 13.

Being the first parcel described in a deed from Allen P. Leighton to Leonard B. Leighton dated December 29, 1933 recorded in said Registry in Book 2020, Page 375.

PARCEL TWO:

A certain lot or parcel of land situated in the Town of Windham, County of Cumberland and State of Maine, bounded and described as follows: Viz., on the easterly side of the road leading past Mrs. B. T. Leighton's house and house of George R. Pendexter, which road is now called Highland Cliff Road, to the Pope Road, so-called. Beginning at the westerly corner of land now or formerly of George H. Stevens; southeasterly by said Stevens land and land now or formerly of George R. Pendexter and land now or formerly of Charles W. Hawkes to a fence running at right angles; thence southwesterly by said Charles W. Hawkes land to land now or formerly of Horatio Keeler heirs; thence northwesterly by land of said Keeler heirs and land of said Mrs. B. T. Leighton to the first mentioned road; thence northeasterly by said road to the point of beginning. Containing twenty-eight (28) acres, more or less.

Excepting and reserving from the above described premises conveyances dated October 7, 1946 and recorded in said Registry in Book 1841, Page 394 and Book 1841, Page 393, dated December 4, 1948 and recorded in said Registry in Book 1938, Page 266 and dated May 14, 1956 and recorded in said Registry, to Alta L. Woodis.

Being the same premises convoyed to Leonard B. Leighton by Milton O. Pendexter by deed dated May 14, 1956 and recorded in said Registry of Deeds in Book 2281, Page 236,

PARCEL THREE:

A certain lot or parcel of land situated in the Town of Windham, County of Cumberland and state of Maine, bounded and described as follows:

Beginning at an iron set in the ground on the line of the land now or formerly of Mabel G. Pendexter and running in a southwesterly direction and bounded by land now or formerly of said Pendexter a distance of two hundred eighty-seven (287) feet to another iron set in the ground; thence in a northwesterly direction a distance of two hundred seventy-two (272) feet and bounded by land now or formerly of B. F. Leighton; thence in a northeasterly direction along the line of the Highland Cliff Road fifty (50) feet to another iron set in the ground and bounded by said road; thence in an easterly direction a distance of two hundred sixty-six (266) feet and bounded by a brook to the point of beginning.

Being the same premises conveyed to Leonard B. Leighton by Alta L. Woodis by deed dated May 8, 1957 and recorded in said Registry in Book 2385. Page 485.

Being all of the remaining land and buildings described in a deed from Leonard B. Leighton to Leonard B. Leighton and Annie H. Leighton as joint tenants dated April 1, 1976, recorded in said Registry in Book 3825, Page 266, The grantor is the surviving joint tenant.

Excepting from the premises conveyed hereby the following parcels previously conveyed by the said Michael A. Atkinson:

1. The parcel conveyed by Michael A. Atkinson to Howard Tripp by instrument recorded in said Registry of Deeds at Book 10633, Page 55;

2. The parcel conveyed by Michael A. Atkinson to Hiram Atkinson by instrument recorded in said Registry of Deeds at Book 10633, Page 57;

3. The parcel conveyed by Michael A. Atkinson to William Cuddy by instrument recorded in said Registry of Deeds at Book 11904, Page 276;

4. The parcel conveyed by Michael A. Atkinson to Michael A. Atkinson and Deanna L. Atkinson by deed dated June 19, 1990 and recorded in the Cumberland County Registry of Deeds at Book 9224, Page 189.

5. The parcel conveyed by Michael A. Atkinson to John Parenteau and Vivian L. Parenteau dated September 21, 2007 and recorded in the Cumberland County registry of Deeds at Book 25490, Page 35.

Meaning and intending to convey a portion of the premises conveyed to Michael A. Atkinson by virtue of a release deed from Deanna L. Atkinson dated June 23, 1999 and recorded in the Cumberland County Registry of Deeds at Book 14889, Page 98 and Michael A. Atkinson by virtue of a deed from Leonard B. Leighton dated August 3, 1989 and recorded in the Cumberland County Registry of Deeds at Book 8853, Page 209.

EXHIBIT B

The above referenced property is subject to the following restrictions:

1. Subdivision Approval from the Town of Windham and Department of Environmental Protection will be obtained within one (1) year from the date of this deed.

2. Within one (1) year of the date of this deed two (2) approved lots (either Lots 8 and 9 or Lots 15 and 16 as set forth in approved Subdivision Plan to be recorded) will be conveyed by Grantee to the Grantor. A copy of the proposed plan is attached hereto.

3. No portion of this premises can be financed or conveyed to anyone by the Grantee until two (2) approved lots have been conveyed to the Grantor.

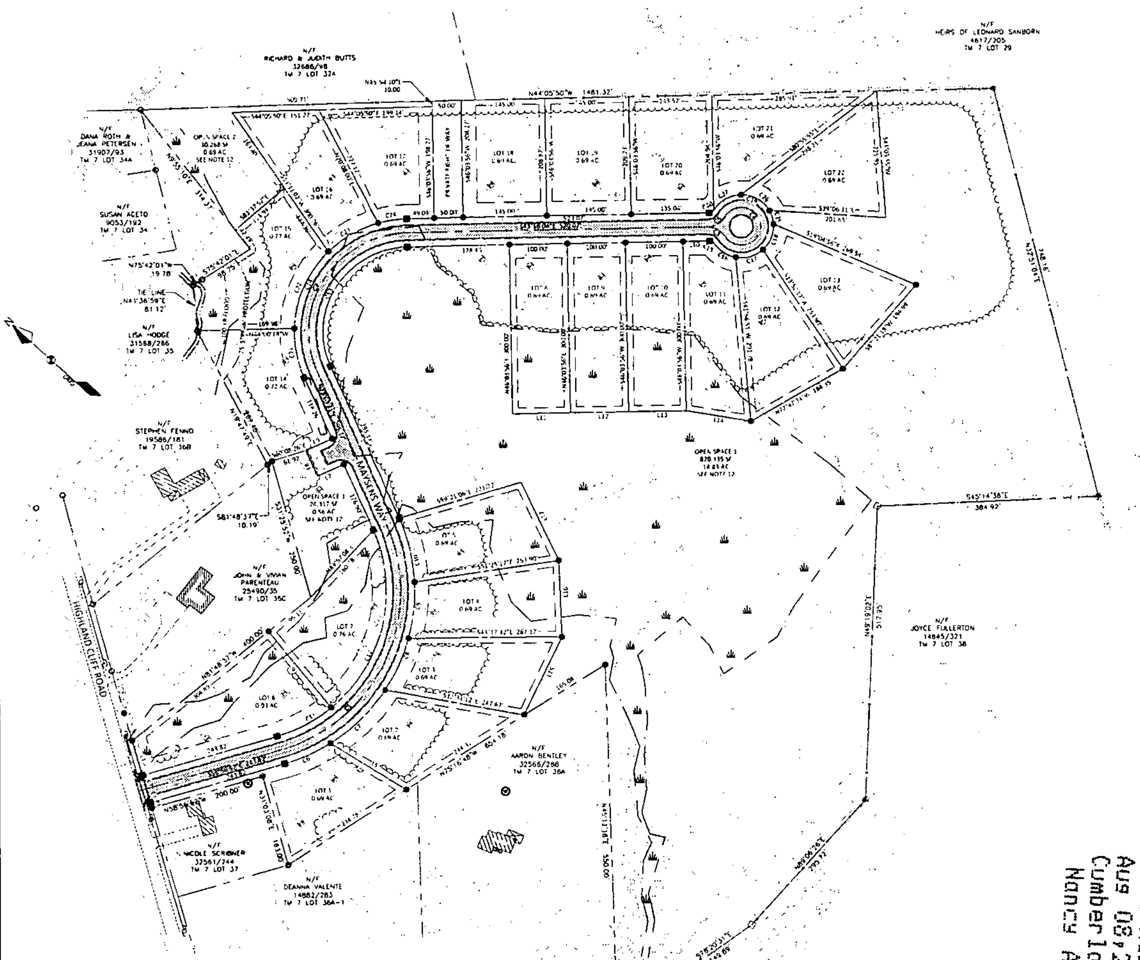
4. If the Department of Environmental Protection substantially changes Lots 8 and 9 or Lots 15 and 16 on the attached plan dated July 23, 2018, both Grantor and Grantee must agree on the changes made to the lots or alternative lots must be agreed upon.

5. Les Wilson & Sons must be the excavator on all lots and must have a competitive bid for excavation services.

6. If there are any delays in obtaining the final approval for the Subdivision from the Town of Windham or Department of Environmental Protection beyond the one (1) year deadline, then Grantor and Grantee agree to reach an alternative agreement.

7. Grantee must post a bond for the cost of the road with the Town of Windham and the road must be completed to the point necessary for Grantor to access the lots conveyed to Grantor, once approval is given by the Town of Windham and Department of Environmental Protection. Grantor must also obtain a building permit and once construction is completed a certificate of occupancy from the Town of Windham.

8. Upon conveyance of the two (2) lots the Grantor will sign a release of these restrictions, excluding number 5 as that restriction will not be released, and a release of Right of First Refusal.



LEGEND

EXISTING		PROPOSED
	PROPERTY LINE/R.O.W.	
	ABUTTER PROPERTY LINE	
	TIE LINE	
	SETBACK	
	GRANITE MONUMENT	
	IRON PIN/DRILL HOLE	
	CENTERLINE	
	BUILDING	
	EDGE OF PAVEMENT/CURB	
	EDGE OF GRAVEL	
	EDGE OF WETLANDS	
	STREAM	
	CONTOUR LINE	
	CULVERT/STORMDRAIN	
	POTABLE WELL	
	UTILITY POLE	
	OVERHEAD UTILITIES	
	TEST PIT	

GRAPHIC SCALE

Received
Recorded Register of Deeds
Aug 08,2018 09:39:01A
Cumberland County
Nancy A. Lane

CURVE TABLE

CURVE #	LENGTH	RADIUS	CHORD BRNG	CHORD LENGTH
C1	495.99'	290.00'	N72°04'20"E	437.71'
C2	345.16'	175.00	N79°33'43"E	291.87'
C3	37.68'	37.00'	S11°45'46"E	36.07'
C4	173.47	33.50'	N46°03'56"E	35.16'
C5	37.68'	37.00'	N73°06'23"W	36.07'
C6	86.89'	315.00'	S66°51'01"E	86.62'
C7	134.68	315.00'	S87°00'04"E	133.66'
C8	100.42	315.00'	N71°17'02"E	100.00'
C9	100.42	315.00'	N51°21'03"E	100.00'
C10	116.34	475.00'	N44°48'17"E	115.47'
C11	107.61	265.00'	N70°45'00"W	106.89'
C12	345.60'	265.00'	N50°25'12"E	321.67
C13	295.85'	150.00	S79°33'43"W	250.18'
C14	394.47'	200.00'	S79°33'43"W	333.57
C15	10.12	10.00	N14°56'52"W	9.69'
C16	45.91	56.00'	N9°26'52"W	44.64'
C17	50.61'	56.00'	S58°49'31"E	48.90'
C18	50.64'	56.00'	N69°22'45"E	48.93'
C19	142.09	56.00'	N29°13'03"W	106.93'
C20	10.12	10.00	S72°55'17"E	9.69'
C21	80.20'	200.00'	N15°58'45"E	80.44
C22	151.88	200.00'	N70°39'17"E	148.25'
C23	101.07	200.00'	S74°06'45"E	100.00'
C24	51.32'	200.00'	S51°17'06"E	51.17
C25	25.37'	56.00'	N30°29'36"E	25.16'
C26	59.79'	56.00'	N13°04'37"W	56.99'
C27	56.93	56.00'	N72°17'12"W	54.51'

LINE TABLE

LINE#	LENGTH	DIRECTION
L1	63.33	S31°03'08"W
L2	25.00	S31°03'08"W
L3	25.00	S31°03'08"W
L4	30.00'	S31°03'08"W
L5	156.71	S13°09'25"E
L6	173.96	N08°21'23"E
L7	50.00	N66°56'29"W
L8	50.00	N23°03'31"E
L9	50.00	S66°56'29"E
L10	15.62'	S13°56'04"E
L11	100.00	S43°56'04"E
L12	100.00	S43°56'04"E
L13	100.00	S43°56'04"E
L14	113.80	S33°17'59"E
L15	152.05	S72°25'34"W
L16	135.30	S44°51'29"W
L17	152.40	S21°41'43"W

GENERAL NOTES:

1. THE OWNER OF RECORD OF THE PROPERTY IS MICHAEL ATKINSON BY DEED RECORDED IN THE CUMBERLAND COUNTY REGISTRY OF DEEDS BOOK 14889 PAGE 98
2. TOTAL AREA OF THE PARCEL IS APPROXIMATELY 38.43 ACRES
3. PARCEL TAX MAP REFERENCE: TOWN OF WINDHAM ASSESSORS MAP 7 LOT 16
4. PLAN REFERENCES
   A) "PLAN OF PROPERTY, HIGHLAND CLIFF ROAD, WINDHAM, MAINE FOR MICHAEL A ATKINSON" DATED MAY 2004 BY SURVEY, INC
5. HORIZONTAL DATUM: MAGNETIC NORTH 1993 AS SHOWN ON PLAN REFERENCE 4A
6. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
7. THE PROPERTY IS LOCATED IN THE FARM ZONING DISTRICT
8. SPACE AND BULK REQUIREMENTS: FARM ZONE (CLUSTER SUBDIVISION)

MIN LOT SIZE	30,000 SF
MAX LOT SIZE	50,000 SF (1 LOT @ 60,000 SF)
NET RESIDENTIAL DENSITY	1 LOT PER 60,000 SF NET AREA
MIN FRONTAGE	100 FT (50 FT ON CUL-DE-SAC)
MIN FRONT YARD	25 FT
MIN SIDE/REAR YARD	10 FT
MAX BUILDING HEIGHT	35 FT
MAX BUILDING COVERAGE	25%

9. WETLANDS DELINEATION AND SOIL TEST PIT EVALUATION PERFORMED BY SWEET ASSOCIATES. THERE WILL BE APPROXIMATELY 14,365 S.F. OF TOTAL WETLAND IMPACT ASSOCIATED WITH THE PROPOSED DEVELOPMENT
10. ALL BUILDINGS WILL REQUIRE THE INSTALLATION OF A ROOF DROP EDGE FILTER FOR STORMWATER TREATMENT
11. THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE MAINTAINED FOR A PERIOD OF FIVE (5) YEARS FROM THE DATE OF PLANNING BOARD APPROVAL AND IN ACCORDANCE WITH SECTION 911.E.1.A OF THE LAND USE ORDINANCE
12. COMMON OPEN SPACE IS TO BE RESERVED FOR RECREATION AND/OR CONSERVATION PURPOSES
13. ALL DWELLINGS WITHIN THE SUBDIVISION SHALL INCLUDE SPRINKLER SYSTEMS MEETING NFPA STANDARDS

NET RESIDENTIAL DENSITY CALCULATIONS:

GROSS LAND AREA	1,674,187 S.F.
DEDUCTIONS	
1. RIGHT-OF-WAY	
PROPOSED PUBLIC ROW	107,667 S.F.
PROPOSED PRIVATE ROW	10,413 S.F.
2. STEEP SLOPES (OVER 25%)	12,783 S.F.
3. 100-YEAR FLOOD PLAIN	0 S.F. (LOCATED WITHIN #5)
4. RESOURCE PROTECTION DISTRICT	0 S.F.
5. VERY POORLY DRAINED SOILS	433,926 S.F. (EXCLUDING AREAS IN #1)
6. SURFACE WATERBODIES	0 S.F.
7. SIGNIFICANT WILDLIFE HABITAT	0 S.F.
8. ENDANGERED BOTANICAL RESOURCES	0 S.F.
TOTAL NET AREA	1,109,398 S.F.
REQUIRED NET AREA PER DWELLING	60,000 S.F.
MAXIMUM ALLOWABLE LOTS/DWELLINGS	18.49
MAXIMUM ALLOWABLE LOTS WITH 20% BONUS	22.18
NUMBER OF LOTS PROPOSED	22

OPEN SPACE CALCULATIONS FOR CLUSTER SUBDIVISION IN FARM ZONE:

	ACRES
TOTAL PARCEL AREA	38.43
NET RESIDENTIAL AREA	25.47
MINIMUM REQUIRED OPEN SPACE (50% GROSS)	19.22
TOTAL OPEN SPACE AREA PROVIDED	20.08
MINIMUM REQUIRED NET AREA IN OPEN SPACE	12.74
NET AREA PROVIDED IN OPEN SPACE	12.45

APPROVED - WINDHAM PLANNING BOARD:

CHAIRPERSON DATE

DM ROMA
CONSULTING ENGINEERS
PO BOX 1116
WINDHAM, ME 04062
(207) 310-0506

REV	DATE	BY	DESCRIPTION
A	[illegible]	[illegible]	REVISE PER TOWN REVIEW COMMENTS

AMENDED SUBDIVISION PLAN - PHASE 2
HIGHLAND WOODS SUBDIVISION
HIGHLAND CLIFF ROAD
WINDHAM, MAINE
FOR
CHRIS WILSON
PO BOX 1028
WESTBROOK, ME 04098

17001
JOB NUMBER
1" = 100'
SCALE
7-23-2018
DATE
SHEET 1 OF 1
ASB-1

Corporate Name Search

Information Summary

Subscriber activity report

This record contains information from the CEC database and is accurate as of: Thu Oct 25 2018 13:22:20. Please print or save for your records.

Legal Name	Charter Number	Filing Type	Status
MTR DEVELOPMENT, LLC	20081166DC	LIMITED LIABILITY COMPANY (DOMESTIC)	GOOD STANDING

Filing Date	Expiration Date	Jurisdiction
10/12/2007	N/A	MAINE

Other Names **(A=Assumed ; F=Former)**

NONE

Clerk/Registered Agent

ANDREW L. BROADDUS
P.O. BOX 368
WESTBROOK, ME 04098

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Click on a link to obtain additional information.

List of Filings	View list of filings	
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Certificate of Existence (more info)	Short Form without amendments ($30.00)	Long Form with amendments ($30.00)

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October 26, 2018

Summit #18243

Dustin Roma, P.E.
DM Roma Consulting Engineers
PO Box 1116
Windham, ME 04062

Reference: Nitrate-Nitrogen Assessment Revision
Proposed Highland Woods Subdivision
Highland Cliff Road, Windham, Maine

Dear Dustin:

Summit Geoengineering Services (SGS) performed this nitrate-nitrogen assessment to estimate the groundwater quality impact caused by the proposed subsurface wastewater disposal systems for the Highland Wood Subdivision. The proposed residential cluster subdivision consists of twenty-two lots on approximately 40-acres of forestland located on the east side of Highland Cliff Road in Windham, Maine. A site location map showing the site and vicinity is provided as Attachment 1.

This report revision was prepared to address a revised lot layout and revised disposal field locations on Lots 10, 11, 12, 13, 14, 15 and 16. This report supersedes the original nitrate-nitrogen assessment prepared by SGS dated July 23, 2018.

Information used for our evaluation includes a subdivision plan provided by DM Roma Consulting Engineers (DM Roma), soils test pit logs, and published geologic maps and literature. The subdivision plan includes the location of property lines, nearby off-site drinking water wells, wetlands, existing grade contours, and soil test pits. Soil test pit logs by Alex A. Finamore (LSE #391) are provided as Attachment 2.

Disposal Fields and Water Wells

Each of the house lots will be developed with a 3-bedroom home served by an individual on-site drilled bedrock well and a subsurface wastewater disposal field (septic system). The septic system and well on each lot will be permitted and constructed in accordance with the State of Maine Subsurface Wastewater Disposal Rules (10-144 CMR 241) and the Well Drillers and Pump Installer Rules (10-144A CMR 232).

Proposed disposal fields shown on the subdivision plan include conventional stone bed and plastic chamber disposal fields with a design flow of 270 gallons per day. Stone bed disposal fields measuring approximately 15 feet by 45 feet are proposed at locations on sandy (5C) soils. Plastic chamber disposal fields measuring approximately 15 to 21 feet wide and 38 feet long are proposed at locations on silty (7C/8C) soils. Disposal fields constructed with plastic chambers (or similar proprietary devices) are approximately half the side of a stone bed and are proposed for lots where silty soils are present to maximize the area on each lot meeting the standard 100-foot setback from proposed disposal fields.

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Site Setting

Surface water drainage is generally from east to west from a topographic high on the eastern property boundary toward Colley Wright Brook located 0.3 miles east of Highland Cliff Road. Review of Maine Geological Survey maps[1] indicate the surficial geology at the site and vicinity is mapped as an end-moraine complex, and no mapped significant sand and gravel aquifers are located within approximately 3 miles of the property. End moraine complexes consist of coarse gravel, sand, till and silt that was deposited at or near the ice front of a retreated marine-based glacier.

Soil test pit logs show that sand and loamy sand soils underly the hill on the east side of the property, and fine sandy loam soils with a silt loam hardpan are present at lower elevations on the western portions of the property.

Based on a review of soil test pit logs, geological and soil maps, surface topography, and observations made during the site visit on July 13, 2018, the silty till surficial materials occurring at lower elevations of the property likely extend beneath the sandy outwash deposits located on the hill on the east side of the property. A portion of this outwash deposit has been excavated on the property to the north to the elevation roughly coincident with the broad forested wetland in the center of the site.

Based on our understanding of site geology and topography, the shallow groundwater flow direction is estimated to be generally downhill and toward wetland areas. The hydraulic gradient in areas underlain by fine sandy loam to silt loam soils (i.e., the western half of the site) is estimated to be half of the average topographic gradient upgradient/downgradient of the disposal field. The hydraulic gradient in areas underlain by sandy soils (i.e., the eastern half of the site) is estimated to be 0.01 (1%) based on best professional judgment.

Nitrate-Nitrogen Assessment

A nitrate-nitrogen assessment was performed to estimate the distance from the disposal fields at which the concentration in groundwater would reach the Federal National Primary Drinking Water Standard and the Maine Maximum Exposure Guideline of 10 milligrams nitrogen per liter (mg-N/L). The average concentration of nitrate in septic tank effluent discharged from the disposal field used in this assessment is 40 mg-N/L.[2] Septic tank effluent will drain to the disposal field and infiltrate downward through unsaturated soil until a permanent or seasonally perched groundwater table is encountered. Thereupon flow is lateral and hydraulically downgradient.

The distance at which groundwater downgradient of the disposal field reaches 10 mg-N/L (plume length) was estimated using a three-dimensional analytical solution[3,4] for a point source in a uniform flow field. Variables used for the calculations include the permeability and effective porosity of soils, groundwater seepage velocity, and the daily mass of nitrate-nitrogen applied to groundwater. No

[1] https://www.maine.gov/dacf/mgs/pubs/index.shtml
[2] MEDEP, Site Location of Development Permit Application (October 2015) Section 17.B.2.(a).
[3] Baetsle, L.H. (1969), Migration of Radionuclides in Porous Media; Progress in Nuclear Energy, Series SIL, Health Physics. Pergamon Press, pp. 707-730.
[4] Chang, et al. (1998). Utilizing Baetsle's Equation to Model the Fate and Transport of MTBE in Groundwater, Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Ground Water Prevention, Detection, and Remediation Conference, Houston, TX.

allowance for nitrogen removal by soil microbes, vegetation or sorption is included in the plume length calculations as a conservative measure.

The three-dimensional analytical solution was adapted to simulate a 40-foot-long linear source area (disposal field) by assuming the direction of groundwater flow is perpendicular to the length of the field and calculating the additive effects of injecting nitrate-nitrogen into groundwater at 5-point sources located 10 feet apart along the downgradient side of the disposal field. For each point source, the steady state nitrate concentration was calculated for a regularly-spaced grid of points (point cloud) extending 5 feet apart along the plume center line to a distance of 300 feet, and at points located 5 feet apart extending cross gradient from the plume center line to a distance of 125 feet. The additive effects of each point source were then calculated by superimposing the point clouds, adding concentration values, and using data for points along the plume center line to determine the estimated plume length. In areas where disposal fields are located in close proximity and downgradient/upgradient from one another, the additive effects of multiple linear sources were simulated using the same methodology. The 10 mg-N/L nitrate plume lengths were calculated based on an assumed background nitrate concentration of 2 mg-N/L.

The treatment capacity of wetlands to remove nitrogen from groundwater through plant uptake and microbial activity is significant. Research[5] into the capacity of planted and unplanted wetlands to remove nitrogen show nitrogen removal rates in excess of 95% for planted wetlands and removal rates of 25% to 36% in unplanted (natural) wetlands. Using the 25% nitrate removal rate in Lin et. al. (2002) a wetland area nitrate removal rate of 0.0825 grams per square meter is calculated. The wetland area required to treat the daily mass of nitrate associated with a septic system serving a 3-bedroom home is calculated to be 5,335 square feet. In instances where the nitrate plume for a disposal field intersects a mapped wetland area prior the reaching 10 mg-N/L, the wetland's capacity to provide nitrate removal was evaluated.

The permeability of site soils was estimated using values listed in the Cumberland County Soil Survey. [6] The permeability of fine sandy loam to silt loam soils is estimated to be 0.8 feet per day (ft/day) based on the range of permeabilities for Buxton silt loam (0.4 to 4.0 ft/day). The permeability of sandy soils is estimated to be 4 ft/day based on the range of permeabilities for Deerfield loamy sand (4.0 to > 12.6 ft/day). The effective porosity for the fine sandy loam to silt loam soils, and the sandy soils, is estimated based on published [7] average values for silt (0.18) and fine sand (0.21).

The table below summarizes the results of our nitrate-nitrogen assessment. It includes the calculated estimated 10 mg-N/L plume length for each disposal field, notes regarding calculation methods for specific lots, along with proposed disposal field size and soils information at each location.

[5] Lin, et. al. (2002), Effects of macrophytes and external carbon sources on nitrate removal from groundwater in constructed wetlands. Environmental Pollution, v. 119, pp. 413-420.
[6] USDA Soil Conservation Services (1974), Soil Survey of Cumberland County, Maine.
[7] Fetter, C.W. (1994). Applied Hydrogeology, 3rd Edition, Prentice Hall

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Lot Nos.	10 mg-N/L Plume Length	Approx. Disposal Field Size / Type	Soil Profile & Drainage Condition
1	94 feet	21' x 38' Plastic Chambers	8C
2	130 feet downslope of Lot 1 disposal field (see Note 1)	21' x 38' Plastic Chambers	8C
3		21' x 38' Plastic Chambers	8/7C
4		21' x 38' Plastic Chambers	8C
5, 6, 7	Ends at Wetland Boundary (see Note 2)	21' x 38' Plastic Chambers	8C
8,9,10,11, 12		15' x 45' Stone Bed	5C or 7C
13	70 feet	15' x 45' Stone Bed	5C
14	70 feet	15' x 38' Plastic Chambers	5/7C
15	94 feet	21' x 38' Plastic Chambers	7/8C
16	70 feet	15' x 45' Stone Bed	5C or 7C
17, 18, 19, 20, 21, 22	70 feet	15' x 45' Stone Bed	5C

Notes:

1. The Lot 1 disposal field is directly downgradient of the disposal fields on Lots 2 and 3. The additive effects posed by the layout were simulated using three linear source areas spaced along the plume center line at distances approximated using the proposed layout.
2. Approximately 20,000 square feet of wetland is present downgradient of the disposal fields on lots 5 and 6, while the area of wetland downgradient of the disposal fields on the remaining lots indicated above far exceeds the 5,335 square feet of wetland required to treat a single three-bedroom septic system. The nitrate plumes for these systems are shown as terminating at the wetland boundary.
3. Soil test pit information is not available for the proposed disposal fields for Lots 8, 9, 10, 11, 12 and 16. The soils are assumed to be either 5C or 7C soils based on best professional judgment. Disposal fields depicted on the subdivision plan are based on an assumed 5C (sand) soil profile.

Water Supply Wells

SGS recommends that water supply wells for each lot be drilled bedrock wells installed outside of the well exclusion area shown on the enclosed subdivision plan prepared by DM Roma (Attachment C). The well exclusion area includes the 10 mg-N/L plume area associated with each disposal field and 100-foot setback area around each disposal field. The well exclusion zones are approximate, as the location and size/type of disposal fields constructed may vary from those shown.

There are areas on each lot located outside of the well exclusion zone(s) shown. However, the area for placement of a water supply well meeting the 100-foot disposal field setback is relatively small on several lots (e.g. Lots 1 and 7). In the event that a water supply well needs to be installed within a well exclusion area (< 100 feet from a disposal field), it shall be located outside the 10 mg-N/L plumes shown and topographically cross gradient or upgradient of the other proposed disposal field areas shown. Furthermore, the length of casing below the ground surface shall be increased in accordance with reduced setback criteria listed in Maine Subsurface Wastewater Rules (the same criteria are listed in the Maine Well Driller and Pump Installer Rules). Unless there is no reasonable alternative, significant changes to the proposed disposal field locations should not be made to avoid conflicts during subdivision build out.

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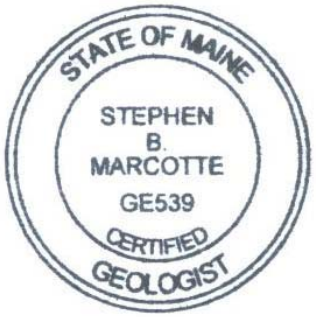
Conclusion:

The proposed subsurface wastewater disposal systems will not result in an increase of nitrate-nitrogen above 10 mg/L in groundwater at the property boundary.

Our findings are based on our interpretation of site conditions and the information provided to us. If there are changes in lot layout, proposed septic system design flows, or significant changes in disposal field size, we request the opportunity to review the changes and conduct further analysis as necessary to confirm the changes do not alter our conclusions.

Sincerely yours,
Summit Geoengineering Services



Stephen B. Marcotte, C.G.
Senior Geologist

Enclosures

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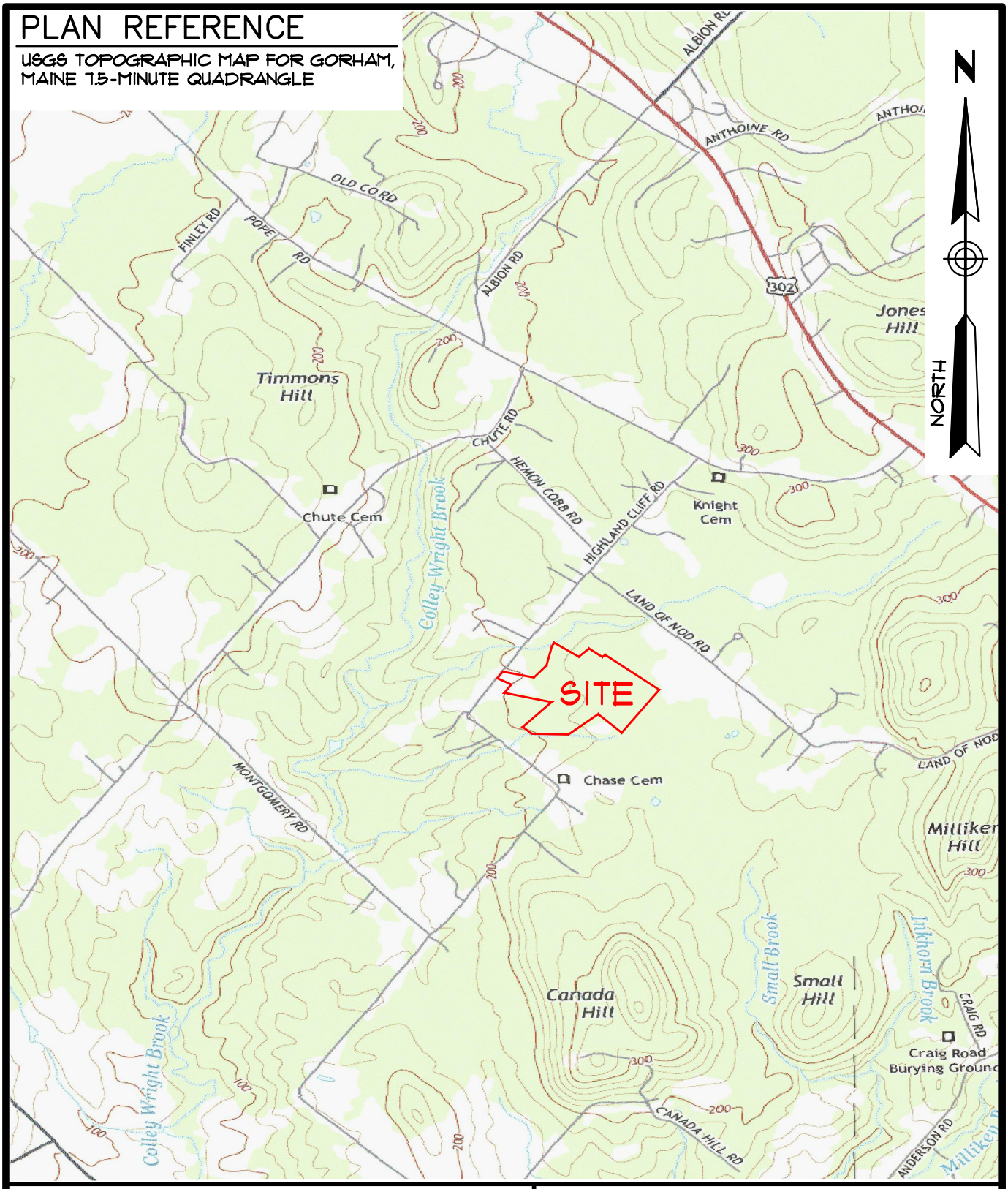
Attachment 1: Site Location Map

PLAN REFERENCE

USGS TOPOGRAPHIC MAP FOR GORHAM, MAINE 7.5-MINUTE QUADRANGLE



SITE LOCATION PLAN
HIGHLAND WOOD SUBDIVISION

HIGHLAND CLIFF ROAD - WINDHAM, ME

PREPARED FOR

DM ROMA CONSULTING ENGINEERS

DATE: 7-23-2018	DRAWN BY: SBM	CHECKED BY: WMP
JOB: 18243	SCALE: 1" = 2000'	FILE: 18243 MAP

145 LISBON ST. - SUITE 101
LEWISTON, ME 04240
Tel.: (207) 576-3313

173 PLEASANT STREET
ROCKLAND, ME 04841
Tel.: (207) 318-7761

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Attachment 2: Soil Test Pit Logs

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-1 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
VERY FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
SILT LOAM		YELLOWISH BROWN	
	SOMEWHAT FIRM	GRAYISH BROWN	FEW, FINE, & FAINT
			COMMON, MEDIUM, & DISTINCT
LIMIT OF EXCAVATION = 30"			

hydric	Slope %	Limiting factor	ground water
■ non-hydric	0-3	18"	▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 8 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-2 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
VERY FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		YELLOWISH BROWN	
SILT LOAM		LIGHT OLIVE BROWN	
	SOMEWHAT FIRM	GRAYISH BROWN	FEW, FINE, & FAINT
LIMIT OF EXCAVATION = 30"			

hydric	Slope %	Limiting factor	ground water
■ non-hydric	0-3	19"	▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 8 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-3 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
VERY FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
SILT LOAM		DARK YELLOWISH BROWN	
LOAMY SAND		GRAYISH BROWN	COMMON, MEDIUM, & DISTINCT
LIMIT OF EXCAVATION = 37"			

hydric	Slope %	Limiting factor	ground water
■ non-hydric	0-3	25"	▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 8/7 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-4 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

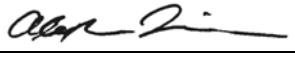
Texture	Consistency	Color	Mottling
VERY FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		YELLOWISH BROWN	
SILT LOAM		LIGHT OLIVE BROWN	
	SOMEWHAT FIRM	GRAYISH BROWN	FEW, FINE, & FAINT
LIMIT OF EXCAVATION = 30"			

hydric	Slope %	Limiting factor	ground water
■ non-hydric	0-3	24"	▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 8 Profile C Soil Condition _____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: 	Date: 6/8/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-5 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		DARK YELLOWISH BROWN	
		BROWN	
SILT LOAM		GRAY	COMMON, MEDIUM, & DISTINCT
LIMIT OF EXCAVATION = 30"			

hydric	non-hydric	Slope %	Limiting factor	ground water	restrictive layer	bedrock
▫	■	0-3	17"	■	▫	▫

C.S.S. Soil Series / phase name: ____ Drainage Class: ____ Hydrologic Group: ____

L.S.E. Soil Classification: 8 (Profile) C (Soil Condition) ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-6 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
VERY FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		BROWN	
SILT LOAM			
	FIRM	GRAY	COMMON, MEDIUM, & DISTINCT
LIMIT OF EXCAVATION = 30"			

hydric	non-hydric	Slope %	Limiting factor	ground water	restrictive layer	bedrock
▫	■	0-3	18"	■	■	▫

C.S.S. Soil Series / phase name: ____ Drainage Class: ____ Hydrologic Group: ____

L.S.E. Soil Classification: 8 (Profile) C (Soil Condition) ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-7 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
VERY FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		DARK YELLOWISH BROWN	
SILT LOAM			
	FIRM	GRAY	COMMON, MEDIUM, & DISTINCT
LIMIT OF EXCAVATION = 30"			

hydric	non-hydric	Slope %	Limiting factor	ground water	restrictive layer	bedrock
▫	■	0-3	18"	■	■	▫

C.S.S. Soil Series / phase name: ____ Drainage Class: ____ Hydrologic Group: ____

L.S.E. Soil Classification: 8 (Profile) C (Soil Condition) ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-8 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

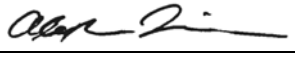
Texture	Consistency	Color	Mottling
SILT LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
FINE SANDY LOAM		BROWN	
		DARK YELLOWISH BROWN	
LOAMY SAND		LIGHT YELLOWISH BROWN	
LIMIT OF EXCAVATION = 34"			

hydric	non-hydric	Slope %	Limiting factor	ground water	restrictive layer	bedrock
▫	■	0-3	>34"	▫	▫	▫

C.S.S. Soil Series / phase name: ____ Drainage Class: ____ Hydrologic Group: ____

L.S.E. Soil Classification: 7 (Profile) C (Soil Condition) ____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: 	Date: 6/8/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-9 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		BROWN	
LOAMY SAND	LOOSE	LIGHT YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	0-3	>30"	▫ ground water ▪ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-10 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		BROWN	
LOAMY SAND	LOOSE	LIGHT YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	0-3	>30"	▫ ground water ▪ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-11 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		BROWN	
		DARK YELLOWISH BROWN	
LOAMY FINE SAND		LIGHT YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	0-3	>30"	▫ ground water ▪ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-12 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		BROWN	
		LIGHT YELLOWISH BROWN	
LOAMY FINE SAND			
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	0-3	>30"	▫ ground water ▪ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: Alexander A. Finamore	Date: 6/8/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-13 [X] Test Pit [ ] Boring

1 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		BROWN	
LOAMY FINE SAND		LIGHT YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

	Slope %	Limiting factor	
▫ hydric ■ non-hydric	0-3	>30"	▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-14 [X] Test Pit [ ] Boring

1 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
FINE SANDY LOAM		BROWN	
MEDIUM SAND		GRAYISH BROWN	FEW, FINE, & FAINT
LIMIT OF EXCAVATION = 30"			

	Slope %	Limiting factor	
▫ hydric ■ non-hydric	0-3	19"	■ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group

L.S.E. Soil Classification: 5/7 Profile C Soil Condition ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-15 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
FINE SANDY LOAM		BROWN	
SILT LOAM		GRAYISH BROWN	FEW, FINE, & FAINT
LIMIT OF EXCAVATION = 30"			

	Slope %	Limiting factor	
▫ hydric ■ non-hydric	0-3	19"	▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group

L.S.E. Soil Classification: 7/8 Profile C Soil Condition ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-16 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

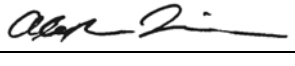
Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		DARK YELLOWISH BROWN	
		LIGHT YELLOWISH BROWN	
MEDIUM SAND	LOOSE		
LIMIT OF EXCAVATION = 30"			

	Slope %	Limiting factor	
▫ hydric ■ non-hydric	0-3	>30"	▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition ____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: 	Date: 6/8/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-17 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
■ non-hydric	0-3	>30"	

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-18 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
■ non-hydric	0-3	>30"	

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-19 [X] Test Pit [ ] Boring

0" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
■ non-hydric	0-3	>30"	

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-20 [X] Test Pit [ ] Boring

0" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

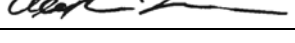
Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
■ non-hydric	0-3	>30"	

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: 	Date: 6/8/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-21 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	0-3	>30"	▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-22 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY SAND		BROWN	
		LIGHT YELLOWISH BROWN	
		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	0-3	>30"	▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-FB1 [X] Test Pit [ ] Boring

0" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
FINE SANDY LOAM		BROWN	
SILT LOAM	FIRM	GRAY	FEW, FINE, & FAINT
LIMIT OF EXCAVATION = 40"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	3-8	26"	▪ ground water ▪ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 8 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-FB2 [X] Test Pit [ ] Boring

0" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

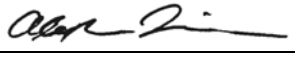
Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
FINE SANDY LOAM		BROWN	
SILT LOAM		GRAYISH BROWN	FEW, FINE, & FAINT
	FIRM	GRAY	COMMON, MEDIUM, & DISTINCT
LIMIT OF EXCAVATION = 40"			

hydric / non-hydric	Slope %	Limiting factor	ground water / restrictive layer / bedrock
▫ hydric ▪ non-hydric	0-3	17"	▪ ground water ▪ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: 	Date: 6/8/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-FB3 [X] Test Pit [ ] Boring

1 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		DARK GRAYISH BROWN	
		DARK YELLOWISH BROWN	
LOAMY FINE SAND		LIGHT OLIVE BROWN	
		GRAY	COMMON, MEDIUM, & DISTINCT
FINE SAND			
LIMIT OF EXCAVATION = 40"			

	Slope %	Limiting factor	
▫ hydric ▪ non-hydric	3-8	>25"	▪ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-FB4 [X] Test Pit [ ] Boring

1 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
SAND		LIGHT GRAY	
SANDY LOAM		BROWN	
		DARK YELLOWISH BROWN	
LOAMY SAND		LIGHT YELLOWISH BROWN	
MEDIUM SAND	LOOSE		
LIMIT OF EXCAVATION = 40"			

	Slope %	Limiting factor	
▫ hydric ▪ non-hydric	3-8	>40"	▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: 5 Profile C Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: _____ [ ] Test Pit [ ] Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling

	Slope %	Limiting factor	
▫ hydric ▪ non-hydric			▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: _____ Profile _____ Soil Condition _____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: _____ [ ] Test Pit [ ] Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling

	Slope %	Limiting factor	
▫ hydric ▪ non-hydric			▫ ground water ▫ restrictive layer ▫ bedrock

C.S.S. Soil Series / phase name: _____ Drainage Class _____ Hydrologic Group

L.S.E. Soil Classification: _____ Profile _____ Soil Condition _____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: 	Date: 6/8/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

To: Jayson Haskell
Dustin Roma
DM Roma Consulting Engineers

Date: October 22, 2018

From: Alexander A. Finamore, CWS, LSE
Mainely Soils, LLC

Re: Highland Woods Subdivision, Windham, ME – Wetland Delineation, Septic Test Pits, and Vernal Pool Memorandum

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At the request of DM Roma Consulting Engineers (the "Client"), Mainely Soils conducted an on-site review of previously delineated wetland and waterbody boundaries, performed additional septic suitability test pits, and a preliminary vernal pool survey at an approximately 38.43 acre parcel located on Highland Cliff Road in Windham, Maine. The property owner proposes to develop a 22 lot subdivision with associated open space. These field investigations were performed to provide baseline environmental data to inform the proposed expansion of use of the site. The natural resources assessments described in this memorandum were completed in October 2018. In addition to describing the identified resources this report describes the existing conditions within the study area, and the methodologies employed for the assessments.

PROJECT DESCRIPTION

The project site is located within a zone of Residential development along Highland Cliff Road identified as the Farm District in the Town of Windham. The proposed development site is currently occupied by forested land. Surrounding land use of the site is residential. Access to the proposed 22-lot subdivision will be from Highland Cliff Road, extending easterly into the site. In total, the wetland and waterbody delineation survey area encompassed approximately 38.43 acres, identified by the Town of Windham as Tax Map 7, LOT 36.

SITE DESCRIPTION

The Study Area occurs in the Southern Coastal biophysical region of Maine (McMahon, 1990). The Southern Coastal biophysical region is characterized by relatively flat terrain, with elevations generally ranging up to 100 feet above sea level. Bedrock is frequently exposed and covered by thin glacial deposits. Along the immediate coast, soils are generally deep sands (where beaches occur) or shallow sandy loams that are well to excessively drained. Extensive coarse-grained glaciomarine deposits occur in the central portion of the South Coastal Region and along its western margin. The survey area is located within the Presumpscot River watershed (Hydrologic Unit Classification (HUC) 8 identification 01060001), although surface water drainage within the site and vicinity is highly altered by existing developed land surfaces and stormwater management systems.

The Natural Resource Conservation Service soil survey mapping identifies native soils at the site as being formed within very deep glaciofluvial materials on outwash terraces, outwash plains, outwash deltas, kames, kame terraces, and eskers (Deerfield and Walpole series) with a portion of the site near Highland Cliff Road which is shallow to bedrock formed in loamy supraglacial till (Lyman and Tunbridge series) (Web Soil Survey, 2018). Soils within the site and the general vicinity have historically been altered by farming activities. Low areas on site contain streams and wetlands. These soils are identified as the Walpole series which are very deep, poorly drained soils formed in sandy outwash or eolian deposits.

Study Methodology

Mainely Soils conducted wetland delineation field work within the survey area on October 17, 2018. Wetlands had been previously delineated by others within the past year. Wetland lines were reviewed and edited as necessary. The boundary of wetlands were delineated in accordance with the Army Corps of Engineers 1987 Wetland Delineation Manual (1987 Manual) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) (Regional Supplement, 2012). All wetland delineations were conducted using the Routine Determination Methods, which requires that a wetland contain a dominance of hydrophytic vegetation, hydric soils, and evidence of hydrology in order to be considered a wetland. Wetland boundaries were located and demarcated using yellow and black day-glow flagging, with each flag labeled with the corresponding alphabetic wetland identification code and a flag number (i.e. A-1). Wetland flag locations were recorded in the field using a Trimble® GPS unit capable of sub meter accuracy, post processed, and transferred and incorporated onto project mapping.

Wetlands areas onsite were confirmed as accurate. Flagging was hung along the wetland boundaries in the vicinity of the proposed lots and road alignment for visibility. Additional field notes were also taken to record the classification of each wetland in accordance with the Classification of Wetlands and Deepwater Habitats of the United States, general site characteristics, unique qualities observed during the site assessment, and other considerations relevant to investigation findings and the future completion of a wetlands functions and values assessment in accordance with the Highway Methodology Workbook: Supplement. Representative photographs of each wetland were taken, field sketches were labeled of the wetland boundary on an aerial photograph-based map, and notes were recorded on the flagging sequence for each wetland.

Mainely Soils also surveyed the site for streams, in accordance with the State of Maine Natural Resources Protection Act stream criteria and definitions. One intermittent stream was added to the delineation in the southern portion of the site within a narrow wetland drainage..

Supplemental test pits were dug and assessed on the subject site within six of the proposed lots in accordance the Maine Subsurface Waste Water Disposal Rules by a Licensed Site Evaluator to account for a lot design change.

Vernal pools are small (usually less than one acre), seasonal wetlands that lack perennial inlet or outlet streams and have no permanent fish populations (Calhoun and deMaynadier 2004). Vernal pools are valuable wetland wildlife habitat because of their potentially high biological productivity and use as breeding habitat by specialized animal communities. The characteristics of vernal pools including size, duration of flooding, substrate type and vegetative community are directly affected by a variety of factors such as landscape setting, surficial geology, soil type, and surrounding vegetation (Maine Audubon Society 1999).

As onsite investigations took place in October outside of the vernal pool indicator breeding season, a preliminary Vernal pool survey was conducted at the Broadturn Road Subdivision site to identify and potential pool locations. No potential pools were identified onsite.

Study Results

Using the methodologies described above, a a wetland delineation was performed on October 17, 2018. A description of the identified resources follows. Representative Photographs and Wetland Delineation Data Forms can be provided upon request.

Wetlands at the project site consisted of two distinct features. One large wetland complex was identified extending from Highland Cliff Road into the interior of the site, then draining southerly offsite through a narrow drainage in a shallow ravine. This wetland was primarily a palustrine deciduous forested saturated wetland (PFO1B) with portions near Highland Cliff Road classified as a palustrine non-persistent saturated emergent wetland (PEM1B)(Cowardin et al. 1979). Dominant vegetation within this wetland included red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), gray birch (*Betula populifolia*), white pine (*Pinus strobus*), winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), woodland horsetail (*Equisetum arvense*), goldthread (*Coptis trifolia*), and bluejoint (*Calamagrostis canadensis*). At the time of the delineation, soils were saturated to the mineral surface and there were water stained leaves as signs of wetland hydrology. Soils consisted of a thick, dark silt mucky surface overlaying a depleted sandy substratum.

A second wetland area was identified within the northwestern extents of the site associated with a perennial stream located just to the north. This wetland was also characterized as a PFO1B wetland with similar vegetation, hydrology, and soils as the previously described wetland, but located in a floodplain setting.

One stream was delineated within the southern extents of the site. It was an intermittent stream approximately 3 feet wide with 6" vertical banks. It had a sandy substrate with approximately 2 inches of flowing water at the time of the delineation and flowed in a southerly direction. The stream originates within the large onsite wetland.

Six supplemental test pits were dug and assessed on the subject site by Alexander Finamore, LSE #391. Each test pit was located by GPS. All of the test pits contained deep sands associated with Deerfield soil series. All test pits have suitable soils to support a 'First Time System' according to the Maine Subsurface Waste Water Disposal Rules.

Summary

The information contained in this memorandum was collected in order to provide detailed, on-site information regarding wetland and waterbody resources. This information is intended to be used for project planning purposes and to support permitting needs. Two distinct wetland features were reviewed and confirmed onsite. Both wetlands generally exhibited a saturated hydroperiod, and provided groundwater discharge, floodflow alteration, and stormwater/water quality maintenance functions. One intermittent stream was identified on the site. No potential vernal pools were identified.

Wetlands are regulated by the U.S. Army Corps of Engineers under the federal Clean Water Act, and by the Maine Department of Environmental Protection under the Maine Natural Resources Protection Act (NRPA). The State of Maine further differentiates wetlands under NRPA by regulating certain wetlands as "wetlands of special significance" (WOSS). Only those wetlands within 25 feet of the perennial streams constitute as a WOSS under NRPA, although all wetlands are still subject to NRPA jurisdiction as non-WOSS wetlands.

Wetlands within the survey area may be further regulated under municipal ordinances, such as Shoreland Zone, Site Plan Review, or other local ordinances. Impacts to wetlands resulting from proposed project development require that permits first be obtained from the MDEP and the USACE before proceeding with construction, and where applicable, municipal governing bodies. Consultation with these agencies early in the project design process is encouraged.

References:

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe.1979. Classification of Wetlands and Deepwater Habitat in the United States. U.S. Fish and Wildlife Service. FWS/OBD-79/31 103pp.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

McMahon, J.S. 1990. The Biophysical Regions of Maine: Patterns in the Landscape and Vegetation. University of Maine.

U.S. Army Corps of Engineers (USACE). 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. ERDC/EL TR-12-01. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Web Soil Survey. 2018. U.S. Department of Agriculture – Natural Resources Conservation Service. http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Attachments:

1. Septic Test Pit Logs

Attachment 1

Septic Test Pit Logs

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-23 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		BROWN	
LOAMY FINE SAND		LIGHT YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

[ ] hydric [■] non-hydric | Slope %: 0-3 | Limiting factor: >30" | [ ] ground water [ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: 5 (Profile) | C (Soil Condition)

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-24 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

[ ] hydric [■] non-hydric | Slope %: 0-3 | Limiting factor: >30" | [ ] ground water [ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: 5 (Profile) | C (Soil Condition)

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-25 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

[ ] hydric [■] non-hydric | Slope %: 0-3 | Limiting factor: >30" | [ ] ground water [ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: 5 (Profile) | C (Soil Condition)

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-26 [X] Test Pit [ ] Boring

1" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY FINE SAND		BROWN	
LOAMY SAND		YELLOWISH BROWN	
LIMIT OF EXCAVATION = 30"			

[ ] hydric [■] non-hydric | Slope %: 0-3 | Limiting factor: >30" | [ ] ground water [ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: 5 (Profile) | C (Soil Condition)

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: Alexander A. Finamore	Date: 10/17/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Annie's Way Subdivision	MTR Development, LLC	Windham

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-27 [X] Test Pit [ ] Boring

1 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		DARK YELLOWISH BROWN	
		LIGHT YELLOWISH BROWN	
MEDIUM SAND	LOOSE		
LIMIT OF EXCAVATION = 30"			

hydric	Slope %	Limiting factor	ground water
[■] non-hydric	0-3	>30"	[ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group ____

L.S.E. Soil Classification: 5 Profile C Soil Condition ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-28 [X] Test Pit [ ] Boring

1 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
		DARK YELLOWISH BROWN	
		LIGHT YELLOWISH BROWN	
MEDIUM SAND	LOOSE		
LIMIT OF EXCAVATION = 30"			

hydric	Slope %	Limiting factor	ground water
[■] non-hydric	0-3	>30"	[ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group ____

L.S.E. Soil Classification: 5 Profile C Soil Condition ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: ____ [ ] Test Pit [ ] Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling

hydric	Slope %	Limiting factor	ground water
[ ] non-hydric			[ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group ____

L.S.E. Soil Classification: ____ Profile ____ Soil Condition ____

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: ____ [ ] Test Pit [ ] Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling

hydric	Slope %	Limiting factor	ground water
[ ] non-hydric			[ ] restrictive layer [ ] bedrock

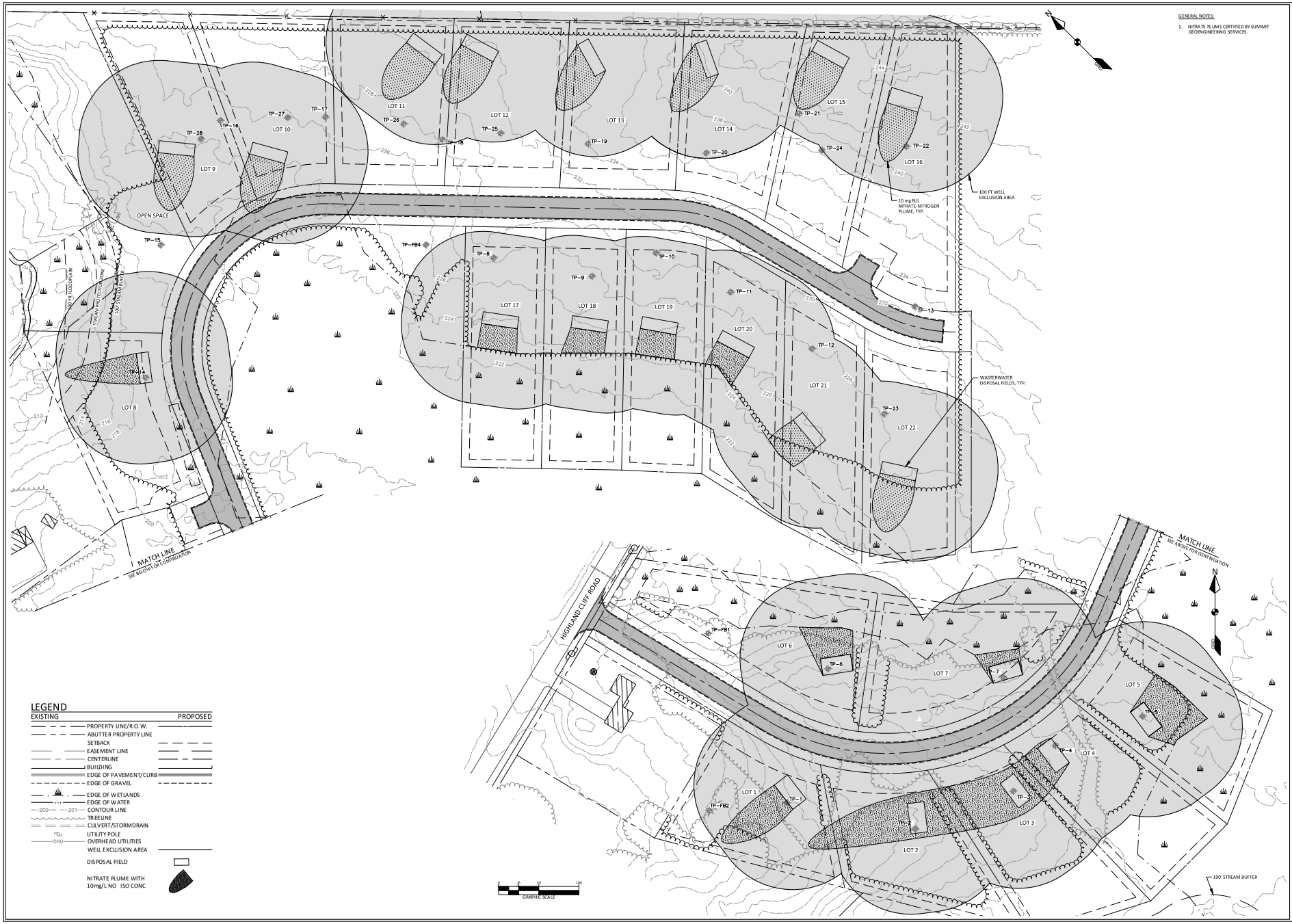
C.S.S. Soil Series / phase name: ____ Drainage Class ____ Hydrologic Group ____

L.S.E. Soil Classification: ____ Profile ____ Soil Condition ____

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: Alexander A. Finamore	Date: 10/17/18
	name printed/typed: Alexander A. Finamore	Lic.#: 391

Attachment 3: Proposed Subdivision Plan



DM ROMA
CONSULTING ENGINEERS
P.O. BOX 1116
WINDHAM, ME 04062
(207) 310 - 0506

REV	DATE	BY	DESCRIPTION
A	7-23-18	DMR	REVISED PER TOWN REVIEW COMMENTS
B	10-26-18	DMR	ISSUED FOR MAINE SLODA REVIEW

PLAN OF WASTEWATER DISPOSAL SYSTEMS

HIGHLAND WOODS SUBDIVISION
HIGHLAND CLIFF ROAD
WINDHAM, MAINE

FOR:
MTR DEVELOPMENT, LLC
PO BOX 8008
WESTBROOK, ME 04098

17001	JOB NUMBER
1" = 50'	SCALE:
10-26-2018	DATE:
SHEET 4 OF 11	
WW-1	

Traffic Solutions
William J. Bray, P.E.
235 Bancroft Street
Portland, ME 04102
(207) 774-3603
(207) 400-6890 mobile
trafficsolutions@maine.rr.com

July 22, 2018

Traffic Assessment

For Proposed

Highland Woods Residential Subdivision

Windham, Maine

INTRODUCTION

Chris Wilson is proposing a twenty-two lot (22) residential subdivision on a 38.43-acre parcel of property located on the east side of Highland Cliff Road in the Town of Windham. Access will be provided with construction of a new town road that intersects Highland Cliff Road south of the Land of Nod Road.

This document determines daily and peak hour trip generation of the proposed project for both peak commuter time periods, examines current roadway safety trends in the general vicinity of the proposed project, and reviews vehicle sight distance.

SITE TRAFFIC

Site Trip Generation: Daily and peak hour trip generation was determined for the proposed project based upon trip tables presented in the ninth edition of the Institute of Transportation Engineers (ITE) "**TRIP GENERATION**" handbook. The ITE publication provides numerous land use categories and the average volume of trips generated by each category.

The following trip rate was used to calculate trip generation for the proposed project:

Land Use #210 – Single-Family Detached Housing

Weekday	= 9.52 trips per dwelling unit
AM Peak Hour	= 0.75 trips per dwelling unit
PM Peak Hour	= 1.00 trips per dwelling unit

Accordingly, the proposed 22 single-family homes can be expected to generate a total of 209 trips during a typical weekday; 17 trips in the morning peak hour and 22 trips in the evening peak hour.

Site Trip Distribution: The Institute of Transportation Engineers handbook also provides the following directional distribution rates for a single-family home:

AM Peak Hour	= 25% enter site and 75% exit site
PM Peak Hour	= 63% enter site and 37% exit site

Based upon the noted directional distribution patterns, 13 trips during the morning peak hour and 8 trips in the evening peak hour will exit the site and the remaining trips (4 AM trip and 14 PM trips) will enter the site.

EXISTING SAFETY CONDITIONS

The Maine Department of Transportation's (MaineDOT) Accident Records Section provided the latest three-year (2015 through 2017) crash data for the full length of Highland Cliff Road between Pope Road and the end of the road, a distance of approximately 3.67 miles. Their report is presented as follows:

2015 -2017 Traffic Accident Summary

Location	Total Crashes	Critical Rate Factor
1. Highland Cliff Road @ Pope Road	1	1.11
2. Highland Cliff Road btw. Montgomery Road and Alweber Road	2	0.77
3. Highland Cliff Road btw. Canada Hill Road and Alweber Road	1	0.63

The MaineDOT considers any roadway intersection or segment a high crash location if both of the following criteria are met:

- ***8 or more accidents***
- ***A Critical Rate Factor greater than 1.00***

As the data presented in the chart shows, there are no high crash locations within the defined study area.

SIGHT DISTANCE

The Maine Department of Transportation's Highway Entrance and Driveway Rules require the following sight distances for a non-mobility roadway:

Sight Distance Standards

Speed Limit	Sight Distance
25 mph	200 feet
30	250
35	**305**
40	360
45	425
50	495
55	570

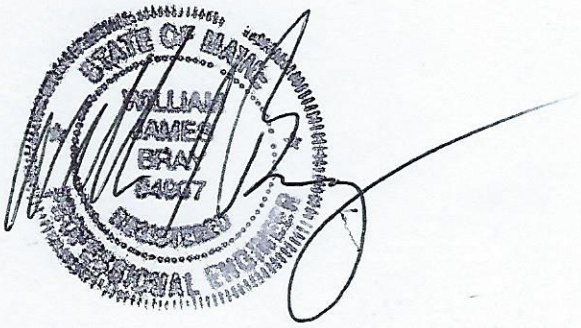
Highland Cliff Road is presently posted at 35mph, which requires an unobstructed sight distance of 305 feet. Field measurements were determined for both directions of travel from the proposed road entrance onto Highland Cliff Road consistent with MaineDOT's standard practices. A clear line-of-site in excess of 400-feet was measured both left and right from the centerline of the proposed subdivision road.

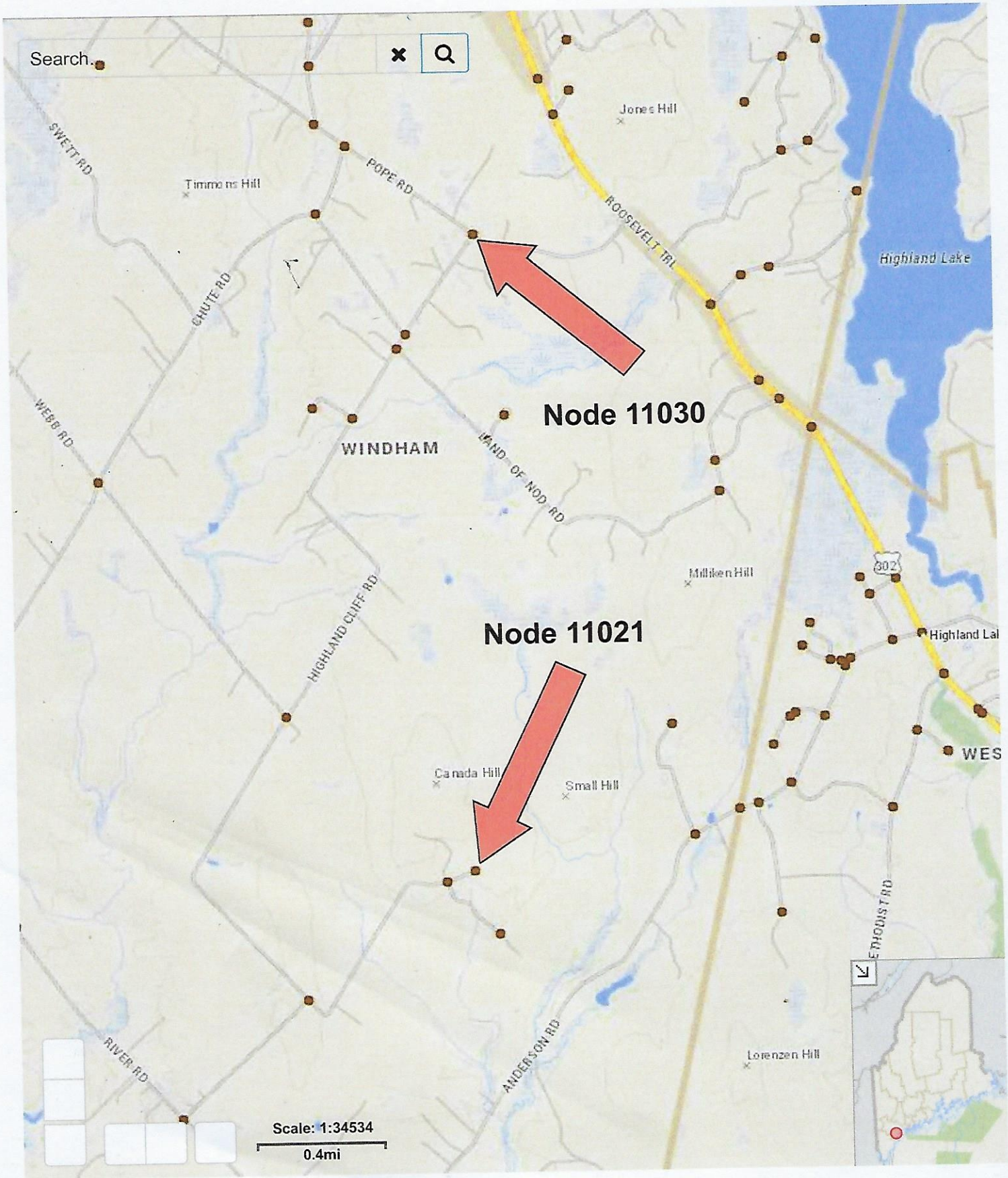
CONCLUSIONS

- The 22-lot residential subdivision can be expected to generate **209** daily trips; seventeen (**17**) trips in the morning peak hour and **22** trips during the afternoon peak commuter hour.

- The Maine Department of Transportation's most recent three-year (2014 to 2016) accident safety audit shows a total of 4 vehicle crashes have been reported for the full length of Highland Cliff Road.

- Vehicle sightlines measured in both directions from the proposed subdivision entrance onto Highland Cliff Road exceeds, by a considerable distance, the non-mobility highway sight distance standard for a posted speed limit of 35mph.




Search.
Jones Hill
SWETT RD
Timmons Hill
POPE RD
ROOSEVELT TRL
Highland Lake
CHUTE RD
Node 11030
WEBB RD
WINDHAM
MAND OF NOD RD
302
Milliken Hill
HIGHLAND CLIFF RD
Node 11021
Highland Lal
WES
Canada Hill
Small Hill
ANDERSON RD
Lorenzen Hill
RIVER RD
Scale: 1:34534
0.4mi

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☐ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Windham
Highland Cliff Rd. from Pope Rd. to End of Highland Cliff Rd.

REPORT PARAMETERS

Year 2015, Start Month 1 through Year 2017 End Month: 12

Route: **0500712**	Start Node: **11030**	Start Offset: **0**	☐ **Exclude First Node**
	End Node: **11021**	End Offset: **0**	☐ **Exclude Last Node**

Crash Summary I

Nodes

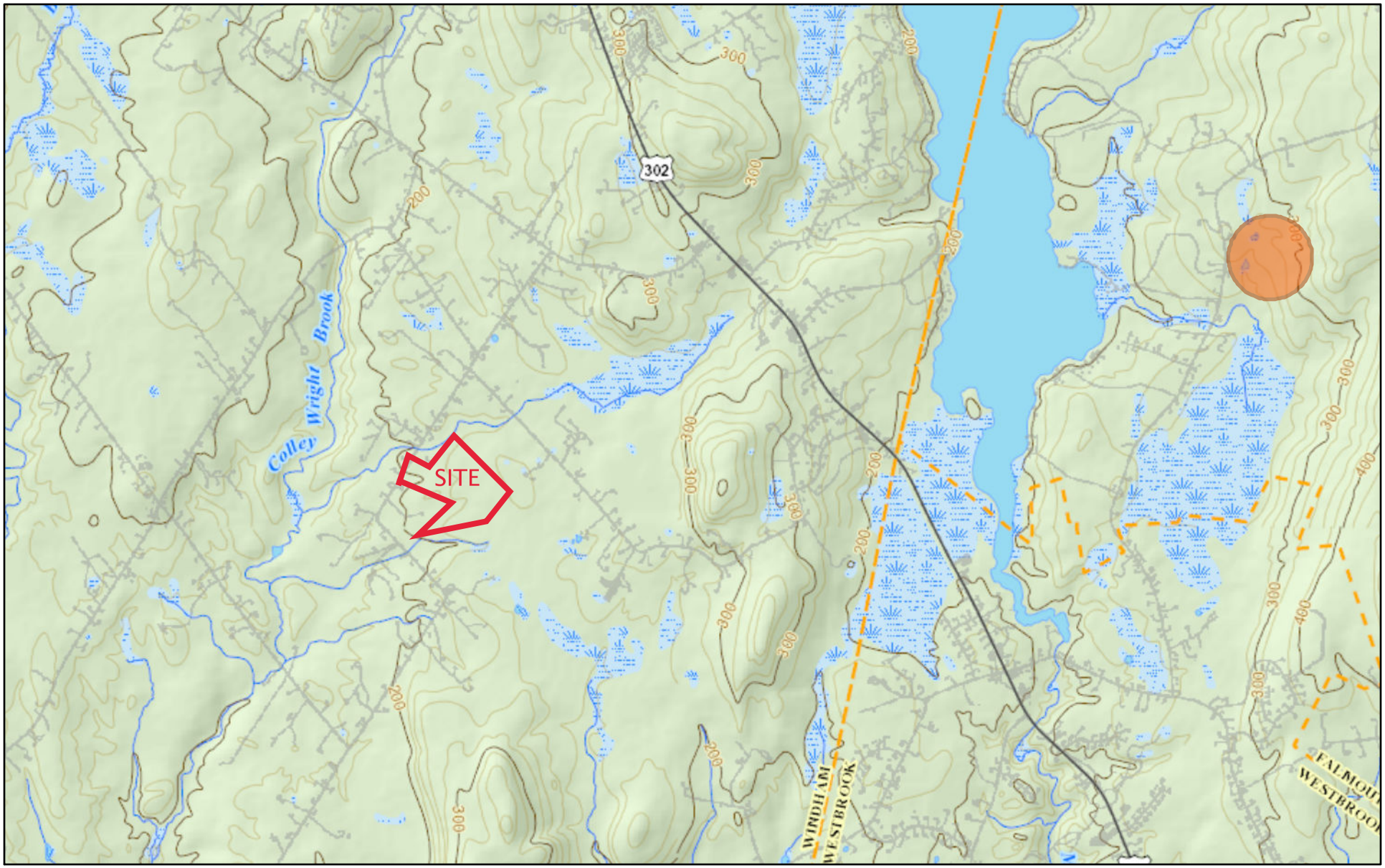
Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
11030	0500712 - 0	Int of HIGHLAND CLIFF RD, POPE RD	1	1	0	0	0	0	1	0.0	0.545	0.61 Statewide Crash Rate: 0.13	0.55	1.11
11028	0500712 - 0.37	Int of HERMAN COBB RD, HIGHLAND CLIFF RD	1	0	0	0	0	0	0	0.0	0.507	0.00 Statewide Crash Rate: 0.13	0.55	0.00
11027	0500712 - 0.43	Int of HIGHLAND CLIFF RD, LAND OF NOD RD	1	0	0	0	0	0	0	0.0	0.466	0.00 Statewide Crash Rate: 0.13	0.56	0.00
19540	0500712 - 0.67	Int of HIGHLAND CLIFF RD, TUCKER DR	1	0	0	0	0	0	0	0.0	0.260	0.00 Statewide Crash Rate: 0.13	0.54	0.00
11025	0500712 - 1.80	Int of HIGHLAND CLIFF RD, MONTGOMERY RD	1	0	0	0	0	0	0	0.0	0.190	0.00 Statewide Crash Rate: 0.13	0.48	0.00
11020	0500712 - 2.90	Int of AL WEBER RD, HIGHLAND CLIFF RD	1	0	0	0	0	0	0	0.0	0.202	0.00 Statewide Crash Rate: 0.13	0.50	0.00
18152	0500712 - 3.58	Int of CANADA HILL RD, HIGHLAND CLIFF RD	1	0	0	0	0	0	0	0.0	0.062	0.00 Statewide Crash Rate: 0.13	-0.39	0.00
11021	0500712 - 3.67	End of HIGHLAND CLIFF RD	1	0	0	0	0	0	0	0.0	0.006	0.00 Statewide Crash Rate: 0.13	-20.63	0.00
Study Years: 3.00		**NODE TOTALS:**		1	0	0	0	0	1	0.0	2.238	0.15	0.42	0.36

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
11028	11030	184838	0 - 0.37	0500712 - 0	0.37	1	0	0	0	0	0	0	0.0	0.00192	0.00	662.78	0.00
Int of HERMAN COBB RD, HIGHLAND CLIFF RD				RD INV 05 00712											Statewide Crash Rate: 232.07		
11027	11028	184835	0 - 0.06	0500712 - 0.37	0.06	1	0	0	0	0	0	0	0.0	0.00026	0.00	995.79	0.00
Int of HIGHLAND CLIFF RD, LAND OF NOD RD				RD INV 05 00712											Statewide Crash Rate: 232.07		
11027	19540	184837	0 - 0.24	0500712 - 0.43	0.24	1	0	0	0	0	0	0	0.0	0.00078	0.00	828.43	0.00
Int of HIGHLAND CLIFF RD, LAND OF NOD RD				RD INV 05 00712											Statewide Crash Rate: 232.07		
11025	19540	184831	0 - 1.13	0500712 - 0.67	1.13	1	0	0	0	0	0	0	0.0	0.00197	0.00	657.80	0.00
Int of HIGHLAND CLIFF RD, MONTGOMERY RD				RD INV 05 00712											Statewide Crash Rate: 232.07		
11020	11025	184822	0 - 1.10	0500712 - 1.80	1.10	1	2	0	0	0	1	1	50.0	0.00115	578.55	754.87	0.00
Int of AL WEBER RD, HIGHLAND CLIFF RD				RD INV 05 00712											Statewide Crash Rate: 232.07		
11020	18152	184824	0 - 0.68	0500712 - 2.90	0.68	1	1	0	0	0	0	0	0.0	0.00061	548.16	876.77	0.00
Int of AL WEBER RD, HIGHLAND CLIFF RD				RD INV 05 00712											Statewide Crash Rate: 232.07		
11021	18152	2036610	0 - 0.09	0500712 - 3.58	0.09	1	0	0	0	0	0	0	0.0	0.00001	0.00	-8261.08	0.00
End of HIGHLAND CLIFF RD				RD INV 05 00712											Statewide Crash Rate: 232.07		
Study Years: 3.00				**Section Totals:**	3.67		3	0	0	0	1	1	33.3	0.00670	149.16	483.92	0.31
				Grand Totals:	3.67		4	0	0	0	1	2	25.0	0.00670	198.88	522.41	0.38

Beginning With Habitat



June 4, 2018

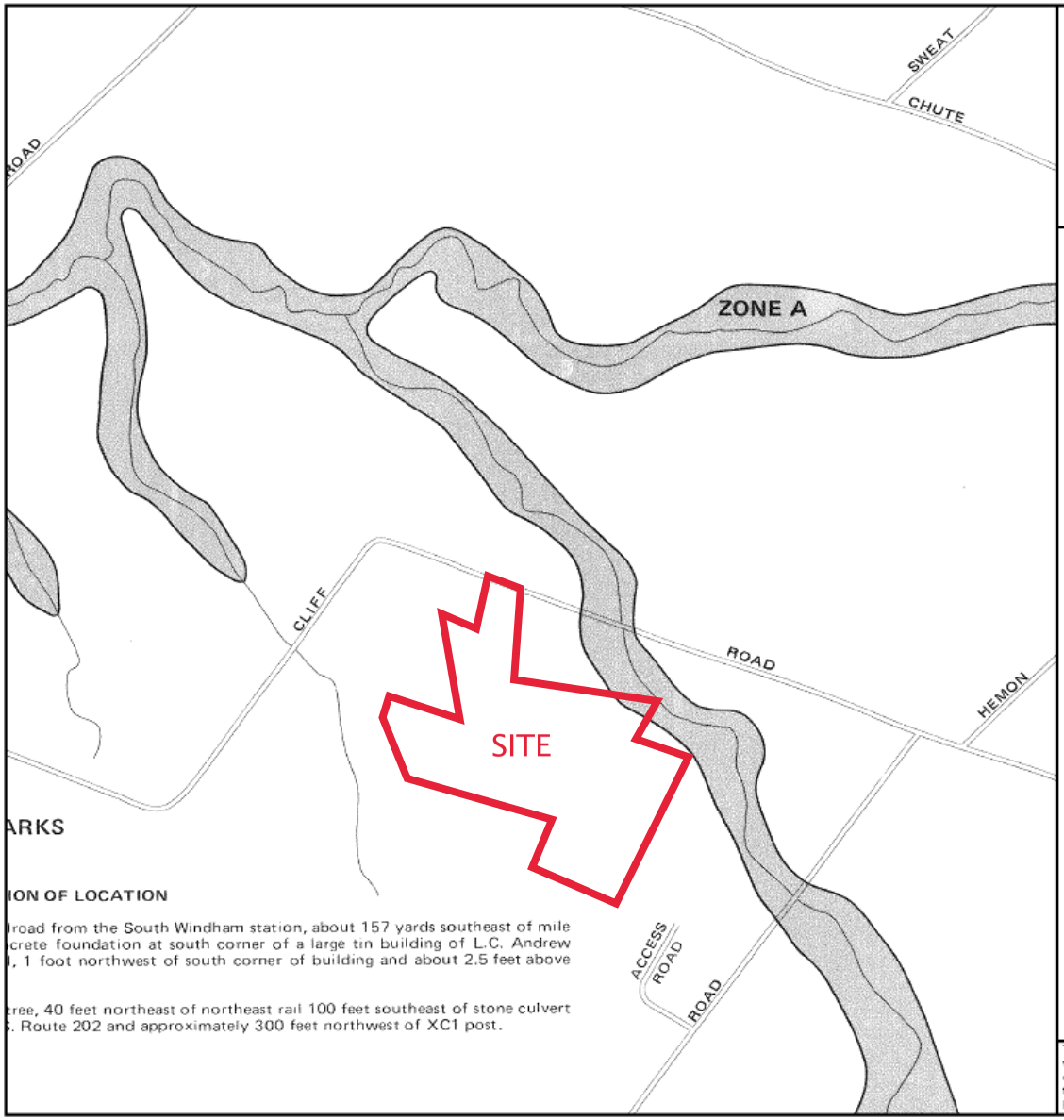
ETSC Animal Habitat Buffers

1:36,112

0 0.23 0.45 0.9 mi

0 0.35 0.7 1.4 km

This map is intended for planning purposes and should not be used for environmental or regulatory review.



ARKS

ION OF LOCATION

lroad from the South Windham station, about 157 yards southeast of mile
crete foundation at south corner of a large tin building of L.C. Andrew
l, 1 foot northwest of south corner of building and about 2.5 feet above

tree, 40 feet northeast of northeast rail 100 feet southeast of stone culvert
. Route 202 and approximately 300 feet northwest of XC1 post.

APPROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
WINDHAM, MAINE
CUMBERLAND COUNTY

PANEL 30 OF 35
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230189 0030 B

EFFECTIVE DATE:
SEPTEMBER 2, 1981

federal emergency management agency
federal insurance administration

DM ROMA
CONSULTING ENGINEERS

STORMWATER MANAGEMENT REPORT

HIGHLAND WOODS SUBDIVISION
HIGHLAND CLIFF ROAD
WINDHAM, MAINE

A. Narrative

MTR Development, LLC., the applicant, is proposing to develop a 38-acre parcel on Highland Cliff Road in Windham. The project site is identified as Lot 36 on the Town of Windham Assessors Map 7 and is located in the Farm Zoning District

The project site is located in the Farm Zoning (F) District and is proposed to be designed as a 22-lot Cluster subdivision. The propose development will include, but not limited to, the construction of 2,200± linear feet of subdivision road, creation of single-family house lots, associated earthwork, tree clearing, utilities and stormwater management facilities.

The proposed development will create a 50-foot Right of Way through the proposed project site, on which a proposed subdivision road will serve to provide access and frontage to the proposed 22 residential subdivision lots. The roadway has been designed as a 24-foot wide paved road with a 28-foot wide gravel base in accordance with the Town's standards for a Minor Local Street. Underground electric, telephone, cable and data service will be the only utilities extended through the proposed property, as the project proposes to provide water and sewer service via individual private water well and subsurface sewage disposal systems.

In general, the site drains northerly or southeasterly to unnamed tributaries of Colley Wright Brook, with the brook eventually drains to the Presumpscot River.

B. Alterations to Land Cover

The 38-acre lot is primarily undeveloped woods and meadow. As previously stated, the proposed development will be permitted through the Town as a 22-lot cluster subdivision. The stormwater design will incorporate both stormwater treatment and peak flow rate attenuation into the proposed development project design to meet the MEDEP requirements for the project and Town of Windham Land Use Ordinance.

As a requirement of the Stormwater Permit review, the proposed development must meet the Basic, General, and Flooding Standards as indicated in the Chapter 500 Stormwater Management regulations. While it is anticipated that the applicant will sell undeveloped lots which typically does not require the developer to treat the estimated lot development, the

Town of Windham Land Use Ordinance does not differentiate who will develop the lots requiring the lot development to be incorporated in the treatment calculations.

The proposed roadway will generate approximately 63,738± square feet (1.46± acres) of new impervious area, while the proposed lot development as indicated on the Post Development Watershed Map will generate an additional 26,729± square feet (0.61± acres) of new driveway and 31,152± square feet (0.72± acres) of new roofs, totaling approximately 121,619± square feet (2.79± acres) of new impervious area upon the completion of project. The project design also proposes the addition of 551,456± square feet (12.65± acres) of new landscaped area, which cumulatively results in a total developed area of approximately 15.73± acres.

The site is moderately sloped, draining northerly or southeasterly towards the tributary streams of Colley Wright Brook. The slopes that form the natural drainage channels are much steeper (3:1 or greater). Soils on the property were determined utilizing the High-Intensity Soil Survey prepared by Longview Partners, LLC for the project, as well as the Medium Intensity Soil Maps for Cumberland County, Maine published by the Natural Resources Conservation Service for areas outside the High-Intensity Soil Survey. The soils boundaries and hydrologic soils group (HSG) designations are indicated on the Watershed Maps. The High Intensity Soils Maps has been included in the project plan set and the associated Soil Narrative by Longview Partners, LLC dated October 2018 is enclosed as Exhibit 1 of this report.

C. Methodology and Modeling Assumptions

The proposed stormwater management system has been designed utilizing Best Management Practices to maintain existing drainage patterns while providing stormwater quality improvement measures. The goal of the storm drainage system design is to remove potential stormwater pollutants from runoff generated by the development while also meeting the Town's requirement to provide attenuation of the peak rates of runoff leaving the site.

D. Basic Standards

The project is required by the Town and the MDEP to provide permanent and temporary Erosion Control Best Management Practices. These methods are incorporated into the project design and outlined in detail in the plan set.

E. General Standard

The project design results in a proposed creation of less than 3 acres of impervious area (2.79± acres total project impervious area) and less than 20 acres of developed area (15.79± acres of total project developed area); therefore the proposed project is required by the MDEP and Town of Windham to meet the General Standards outlined in the MDEP Chapter 500 to provide water quality treatment for no less than 95% of the new impervious surface

and 80% of the total developed area associated with the project. This standard will be met by incorporating the construction of five (5) underdrained filter basins into the proposed project's storm water management design. The stormwater treatment calculations indicate that the project's storm water design is estimated to provide water quality treatment for 95% of the new impervious surface and 81% of the new developed area. Calculations can be found on the Post Development Watershed Map and are included as Attachment 2 in this report.

F. Flooding Standard

As previously stated the project will create of less than 3 acres of impervious area (2.79± acres total project impervious area) and less than 20 acres of developed area (15.45± acres of total project developed area). The proposed project is required by the MDEP, to meet the Flooding Standard. The project is also under the jurisdiction of the Town of Windham Land Use Ordinance, which requires the project to detain, retain or result in the infiltration of stormwater from the 24-hour storms of the 2-year, 10-year and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project. To maintain these rates, five underdrained filter basins, sized to provide treatment requirements of the General Standard, have been analyzed. Hydrology models indicate that the project's design will result in a decrease of peak stormwater runoff at all points of discharge when compared to pre-development sub-basin watershed models.

Study point 1 (shown on the watershed maps as SP1) provides an analysis point at the northern most portion of the site, where stormwater runoff from the site is tributary to Colley Wright Brook.

Study point 2 (SP2) provides an analysis point at the upstream end of an existing culvert under Highland Cliff Road, located along the property's Highland Cliff Road frontage, and to the north of the proposed road intersection. This point of analysis provides a comparison of the pre and post-developed watershed sub-catchment upstream of the existing culvert which drains a wetland system and ultimately discharges into an un-named tributary of Colley Wright Brook.

Study point 3 (SP3) provides an analysis point for drainage from a portion of the project site that crosses the property limit to the south of the existing culvert discussed in study point 2 (SP2), and discharges overland via an existing drainage channel and ultimately crosses Highland Cliff Road via an existing culvert located in the frontage of the abutting lot to the south of the project's frontage.

Study point 4 (SP4) provides an analysis point at the projects southwestern most point for drainage from the project site that is tributary to a wetland system that constricts to a narrow channel. Discharge at study point 4 ultimately continues across the property limits and is conveyed in the existing drainage channel in a southwesterly direction where it crosses

Highland Cliff Road and ultimately confluences with Colley Wright Brook. The following table summarizes the analysis:

Table 1 – Peak Rates of Stormwater Runoff						
Study Point	**2-Year (cfs)**		**10-Year (cfs)**		**25-Year (cfs)**	
	Pre	Post	Pre	Post	Pre	Post
SP1	1.91	1.55	3.85	3.68	5.62	5.59
SP2	6.39	5.39	12.45	12.41	17.94	17.63
SP3	2.35	1.84	4.50	3.77	6.41	6.21
SP4	6.13	6.13	13.22	11.81	20.28	16.91

As illustrated in the table above, in general the proposed project's design including the integration of the one (1) detention basin and five (5) proposed BMPs, specifically underdrained filter basins, maintains or reduces the peak rates of runoff at all study points in all the modeled storm events.

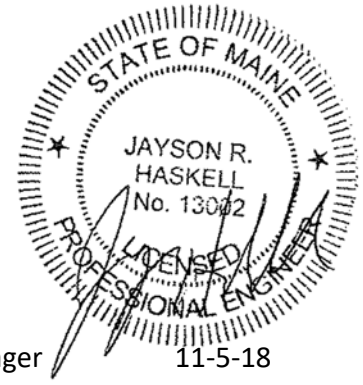
The watershed maps showing pre-development and post-development drainage patterns are included in the plan set and the computations performed with the HydroCAD software program are included as Attachment 3 of this report.

G. Maintenance of common facilities or property

The applicant will be responsible for the maintenance of the stormwater facilities until a homeowners' association is created. As part of the proposed project an Inspection, Maintenance and Housekeeping Plan for the project has been created and will be included with the MDEP Site Law Permit Application submittal package.

Prepared by:

DM ROMA CONSULTING ENGINEERS



J.P. Connolly
Senior Project Engineer

Jayson R. Haskell P.E.
Southern Maine Regional Manager

11-5-18

ATTACHMENT 1

SOILS MAP -

HIGH-INTENSITY SOIL SURVEY NARRATIVE

(CLASS A HIGH-INTENSITY SOIL SURVEY INCLUDED WITH PROJECT PLAN SET)

LONGVIEW PARTNERS, LLC

ENVIRONMENTAL PERMITTING SPECIALISTS

Soil Narrative Report

prepared for

Highland Woods Subdivision

N/F Wilson

(DM Roma Consulting Engineers)

Windham,, Maine

October 2018

Soil test pits observed October 11, 2018

Map prepared for a residential subdivision utilizing private water supplies and on-site subsurface wastewater disposal

Map scaled 1" = 100', base map provided by DM Roma Consulting Engineers

Mapping meets Maine Association of Professional Soil Scientists Class A High-Intensity mapping standards with minimum mapping units of 1/8 acre

ADAMS
(Typic Haplorthods)

SETTING

Parent Material: Derived from outwash, stratified drift material.

Landform: Occupy outwash terraces and sand plains, deltas, lake plains, moraines, terraces and eskers.

Position in Landscape: Usually occupies the upper positions of landform.

Slope Gradient Ranges: (B) 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat excessively to excessively well drained, with no evidence of high groundwater table within 3.5 feet of the soil surface.

Typical Profile Description:

Surface layer:	Pinkish gray sand, 0-4"
Subsurface layer:	Dark brown loamy sand, 4-10"
Subsoil layer:	Brown & yellowish brown sand,10-26"
Substratum:	Grayish brown sand, 26-70"

Hydrologic Group: Group A

Surface Run Off: Very slow to medium

Permeability: Rapid or very rapid

Depth to Bedrock: Very deep, greater than sixty inches

Hazard to Flooding: None

INCLUSIONS
(Within Mapping Unit)

Similar: Soils that are fine sandy loam to very fine sandy loam to a depth of 20 inches, Colton, Hermon. Small glacial till inclusions.

Dissimilar: Croghan soils that are moderately well drained and occur in shallow depressions. Stony surface inclusions, Elmwood (Eldridge), Skerry.

USE AND MANAGEMENT

Development with subsurface wastewater disposal: Adams soil is suitable for subsurface wastewater disposal in accordance with State of Maine Rules for Subsurface Wastewater Disposal. This soil requires a 24-inch separation distance from the bottom of the disposal area and the seasonal high groundwater table. This soil requires a minimum hydraulic loading rate of 2.6 square feet/gpd for disposal system design. Adams soil is suited for building site development.

Stormwater Design: The Adams soil is well drained to excessively well drained. The groundwater table is typically below 4.0'. The groundwater table in this particular setting within the study area is greater than 8.0'. This soil is well suited for subsurface stormwater treatments. The expected soil permeability is 6.0 to 20.0 inches/hour in the upper horizon approximately 0-2', and 20.0 inches/hour in the lower horizons.

BRAYTON
(Aeric Haplaquepts)

SETTING

Parent Material: Compact loamy glacial till.

Landform: Depressions and toeslopes of glaciated uplands.

Position in Landscape: Lowest positions on landform.

Slope Gradient Ranges: **(B)** 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Poorly drained, with a perched water table 0 to 1.0 feet beneath the soil surface from November through May or during periods of excessive precipitation.

Typical Profile Description:

Surface layer: Very dark grayish brown sandy loam, 0-5"
Subsurface layer: Grayish brown sandy loam, 5-15"
Subsoil layer: Olive gray fine sandy loam, 15-24"
Substratum: Olive sandy loam, 24-65"

Hydrologic Group: Group C

Surface Run Off: Moderate to moderately rapid.

Permeability: Moderate in solum, moderately slow or slow in dense substratum.

Depth to Bedrock: Deep, greater than 40 inches.

Hazard to Flooding: None

Erosion Factors: K: .24 - .32

INCLUSIONS
(Within Mapping Unit)

Similar: Colonel, Naumburg, Westbury, Swanton

Dissimilar: Naskeag, Peacham, Biddeford, Searsport

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness, due to the presence of a perched water table within one foot of the soil surface for a significant portion of the year. Proper foundation drainage or other site modification is recommended for construction. Brayton soil does not meet the minimum requirements for subsurface wastewater disposal in accordance with the State of Maine Subsurface Wastewater Disposal Rules. Brayton (poorly drained) may be classified as wetlands, based on the combined consideration of hydric conditions, hydrology, and vegetation.

CROGHAN
(Aquic Haplorthods)

SETTING

Parent Material: Derived from outwash or deltaic sand.

Landform: Occupy outwash terraces and sand plains.

Position in Landscape: Usually are found in intermediate or upper positions in the landscape.

Slope Gradient Ranges: **(B)** 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well-drained, with an apparent water table 1.5 to 2.0 feet below the soil surface from November through May. The water table fluctuates from approximately 1.5 feet during prolonged wet periods to depths greater than 4 feet in dry seasons.

Typical Profile Description:

Surface layer: Dark brown sand, 0-7"
Subsurface layer: Strong brown/yellowish brown, brown & pale brown sand with mottles below 13", 7-52"
Substratum: Grayish brown loose sand, 52-60"

Hydrologic Group: Group B
Surface Run Off: Slow to medium
Permeability: Rapid to very rapid in the lower horizons.
Depth to Bedrock: Deep, greater than 40".
Hazard to Flooding: None

INCLUSIONS

(Within Mapping Unit)

Similar: Adams, Duane, Colton, Hermon

Dissimilar: Nicholville, Naumburg, Elmwood (Eldridge)

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness due to the presence of a groundwater table. Proper foundation drainage or site modification is recommended. Croghan soils are suitable for subsurface wastewater disposal in accordance with State of Maine Rules for Subsurface Wastewater Disposal. This soil requires a 24-inch separation distance from the bottom of the disposal area and the seasonal high groundwater table. This soil requires a minimum hydraulic loading rate of 2.6 and 1.3 sq.ft/gpd for disposal beds and chamber area, respectively.

ELMWOOD (Eldridge)
(Aquic Dystric Eutrocrepts)

SETTING

Parent Material: Sandy glaciofluvial deposits underlain by loamy or clayey marine or lacustrine sediments.

Landform: Glacial lake plains, terraces, and glacial outwash areas.

Position in Landscape: Intermediate to upper positions in landform.

Slope Gradient Ranges: **(B)** 3-8% **(C)** 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well drained with a perched water table 1.5 to 3.5 feet beneath the soil surface from November through May, or during periods of heavy precipitation.

Typical Profile Description:

Surface layer:	Very dark grayish brown sandy loam or loamy sand, 0-9"
Subsurface layer:	Olive brown loamy sand, 9-17"
Subsoil layer:	Olive brown loamy sand, 17-27"
Substratum:	Olive very fine sand, silt, or silty clay, 27-65"

Hydrologic Group: Group C

Surface Run Off: Moderately rapid to rapid

Permeability: Rapid in the solum and moderately slow or slow in substratum.

Depth to Bedrock: Deep, greater than 40".

Hazard to Flooding: None

INCLUSIONS
(Within Mapping Unit)

Similar: Nicholville, Skerry, Hermon, Croghan, Adams

Dissimilar: Elmwood (S.W.P.), Lamoine, Colonel

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness due to the presence of a water table within 1.5 feet of the soil surface. Proper foundation drainage or other site modification is recommended for houses with foundations. Elmwood soil (moderately well drained) does meet the minimum criteria for subsurface wastewater disposal, in accordance with the State of Maine Subsurface Wastewater Disposal Rules. This soil requires a 12-inch separation distance between the bottom of any disposal area and seasonal high groundwater table. 3.3 sq. ft/gpd and 1.7 sq. ft/gpd are needed for disposal beds and chamber area, respectively.

Stormwater design: Elmwood (Eldridge) soils are generally moderately well drained. Permeability is expected to be 2-6 inches/hour in upper horizons, and less than 0.2 inches/hour in the substratum (23" – 60").

ELMWOOD (S.W.P.)

SETTING

Parent Material: Sandy glaciofluvial deposits underlain by loamy or clayey marine or lacustrine sediments.

Landform: Glacial lake plains, terraces, and glacial outwash areas.

Position in Landscape: Intermediate to upper positions in landform.

Slope Gradient Ranges: **(B)** 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly drained (S.W.P.) with a perched water table approximately 8 to 12 inches beneath the soil surface from November through May, or during periods of heavy precipitation.

Typical Profile Description:

Surface layer: Very dark grayish brown sandy loam or loamy sand, 0-9"
Subsurface layer: Olive brown loamy sand, 9-17"
Subsoil layer: Olive brown loamy sand, 17-27"
Substratum: Olive very fine sand, silt, or silty clay, 27-65"

Hydrologic Group: Group C

Surface Run Off: Moderately rapid to rapid

Permeability: Rapid in the solum and moderately slow or slow in substratum.

Depth to Bedrock: Deep, greater than 40".

Hazard to Flooding: None

INCLUSIONS
(Within Mapping Unit)

Similar: Lamoine, Nicholville (S.W.P.), Colonel, Eldridge, Skerry, moderately well drained taxajuncts)

Dissimilar: Roundabout, Lyman, Naskeag, Lamoine, Naumburg

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness due to the presence of a water table within 1.5 feet of the soil surface. Proper foundation drainage or other site modification is recommended for houses with foundations. Portions of these map units may be suitable for subsurface wastewater disposal, in accordance with the State of Maine Subsurface Wastewater Disposal Rules, in non-shoreland zones where the seasonal high groundwater table is 12"-15" below the soil surface. The required separation distance is 18" between the bottom of disposal areas and seasonal high groundwater table.

Stormwater Detention: Elmwood (s.w.p.) soils are somewhat poorly drained with a perched groundwater table ranging from 8 to 12 inches below the existing soil surface. The upper horizons (0 to 12") typically exhibit soil permeabilities of 2.0 to 6.0 in/hr, while the subsoil (below 12") soil permeability is typically less than 0.2 in/hr.

HERMON
(Typic Haplorthods)

SETTING

Parent Material: Loose loamy and sandy glacial till (or)
Sandy ablation glacial till without a restrictive subsurface.

Landform: Glaciated upland plains, hills and ridges.

Position in Landscape: Uppermost portions of landform.

Slope Gradient Ranges: **(B)** 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat excessively drained, with a water table greater than 6.0 feet beneath the existing soil surface.

Typical Profile Description:

Surface layer:	Pinkish gray sandy loam, 0-3"
Subsurface layer:	Dark reddish brown, 3-9"
Subsoil layer:	Strong brown & dark yellowish brown, 9-32"
Substratum:	Light olive brown gravelly coarse sand, 32-65"

Hydrologic Group: Group A

Surface Run Off: Slow to medium

Permeability: Moderately rapid or rapid in solum, rapid or very rapid in the loose substratum.

Depth to Bedrock: Very deep, greater than 60".

Hazard to Flooding: None

Erosion Factors: K: .10 - .17

INCLUSIONS
(Within Mapping Unit)

Similar: Skerry, Dixfield, Becket,Hermon (D slopes in C unit), Colton, Adams

Dissimilar: Waumbek (moderately well drained), Skerry, Colonel, Elmwood

USE AND MANAGEMENT

Development with subsurface wastewater disposal: Hermon soil is suitable for subsurface wastewater disposal, in a accordance with the State of Maine Rules for Subsurface Wastewater Disposal. Hermon soil requires a 12-inch separation distance between the seasonal high groundwater table and the bottom of any disposal area, and also requires 2.6 and 1.3 sq.ft/gpd for disposal beds and chamber area, respectively.

NAUMBURG
(Aeric Haplaquods)

SETTING

Parent Material: Derived from outwash, stratified drift and deltaic sediments.

Landform: Usually occupies low sand plains and terraces.

Position in Landscape: Naumburg soil is found in the lower positions of landscape.

Slope Gradient Ranges: **(A)** 0-3%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly to poorly drained, with an apparent water table 0 to 1.5 feet below the soil surface from November through May. The water table fluctuates from 0 feet during prolonged wet periods to depths greater than 1.5" in dry seasons.

Typical Profile Description:

Surface layer:	Black organic, 6" thick
Subsurface layer:	Reddish gray loamy sand, 0-6"
Subsoil layer:	Mottled dark reddish brown, dark brown, and yellowish brown sand, fine sand or loamy sand, 6-30"
Substratum:	Light brownish gray sand, 30-60"

Hydrologic Group: Group C

Surface Run Off: Very slow

Permeability: Rapid

Depth to Bedrock: Deep, greater than 40".

INCLUSIONS
(Within Mapping Unit)

Similar: Finch (with cementation), Enosburg (Swanton), Roundabout, Elmwood (SWP)

Dissimilar: Searsport (in microdepressions), Naumburg (Variant – very poorly drained), Naskeag, Brayton

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness due to the presence of a groundwater table. Proper foundation drainage or site modification is recommended. Portions of this map may be suitable for subsurface wastewater disposal, where the depth to limiting factor is greater than 12" from the existing soil surface outside shoreland zone areas. Naumburg (poorly drained) may be classified as wetlands, based on the combined consideration of hydric conditions hydrology, and vegetation.

SEARSPORT
(Histic Humaquepts)

SETTING

Parent Material: Derived from outwash and deltaic sandy deposits.

Landform: Outwash plains, deltas, and terraces.

Position in Landscape: Occupies pockets and low-lying depressions in landform.

Slope Gradient Ranges: **(A)** 0-3%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Very poorly drained with an apparent water table at or within 0.5 feet of the soil surface for more than six months of the year.

Typical Profile Description:

Surface layer: Very dark gray mucky peat, 0-8"
Subsurface layer: Very dark gray loamy fine sand, 8-13"
Subsoil layer: Dark gray loamy sand, common mottles, 13-23"
Substratum: Gray sand, common mottles, 23-65"

Hydrologic Group: Group D

Surface Run Off: Slow, or the soil is intermittently ponded.

Permeability: Rapid or very rapid in mineral horizons.

Depth to Bedrock: Deep, greater than 40".

Hazard to Flooding: Rare, through flooding may occur during spring and periods of excessive rainfall.

INCLUSIONS
(Within Mapping Unit)

Similar: Naumburg—on hummocks, Naumburg Variant—very poorly drained

Dissimilar: Chocorua, Sebago, Whatley

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness due to the presence of a high water table for the entire year. Proper foundation drainage or site modification is recommended. This soil is unsuitable for subsurface wastewater disposal. Searsport is usually classified as wetlands, based on the combined consideration of hydric conditions, hydrology, and vegetation.

SKERRY
(Aquic Haplorthods)

SETTING

Parent Material: Loamy glacial till underlain by sandy textured denser till.

Landform: Drumlins and glaciated uplands.

Position in Landscape: Usually occupies upper components of landform.

Slope Gradient Ranges: **(B)** 3-8% **(C)** 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well-drained, with a perched water table 1.5 to 3.5 feet below the soil surface from November through May.

Typical Profile Description:

Surface layer: Light gray fine sandy loam, 0-4"
Subsurface layer: Dark reddish brown fine sandy loam, 4-20"
Subsoil layer: Yellowish brown fine sandy loam, 20-25"
Substratum: Mixed brown and light olive brown fine sandy loam and sand, 25-65"

Hydrologic Group: Group C

Surface Run Off: Moderate

Permeability: Moderate in solum and slow or moderately slow in the compact substratum.

Depth to Bedrock: Deep, greater than 40".

Hazard to Flooding: None

INCLUSIONS
(Within Mapping Unit)

Similar: Dixfield, Checuncook, Hermon

Dissimilar: Tunbridge, Lyman (less than 40" to bedrock), Colonel, Westbury, Elmwood

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness due to the presence of a water table 1.5 to 3.5 feet beneath the soil surface for some period during the year. Proper foundation drainage is recommended for construction. Skerry soil is suitable for subsurface wastewater disposal as defined by the State of Maine Rules for Subsurface Wastewater Disposal, and requires a 12-inch separation distance from the bottom of any disposal area to the seasonal high groundwater table. Skerry soil also requires 3.3 sq.ft/gpd for disposal system design.

SWANTON (Enosburg)
(Aeric Haplaquepts)

SETTING

Parent Material: Formed from a thin mantle of sandy outwash materials over clayey marine or lacustrine sediments.

Landform: Nearly level or gently sloping areas on marine, lake, or outwash plains or deltas.

Position in Landscape: Usually occupies lower positions on landform.

Slope Gradient Ranges: **(B)** 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly to poorly drained, with a perched water table 0.5 to 1.5 feet beneath the soil surface.

Typical Profile Description:

Surface layer: Very dark gray sandy loam or loamy sand, 0-7"
Subsurface layer: Grayish brown sandy loam, loamy sand, or sand, 7-22"
Subsoil layer: Olive silty clay loam, 22-30"
Substratum: Olive silty clay, 30-60"

Hydrologic Group: Group C/D

Surface Run Off: Slow or medium

Permeability: Moderately rapid to rapid in the sandy mantle, slow to very slow in the dense clay substratum.

Depth to Bedrock: Deep, greater than 40".

Hazard to Flooding: None.

INCLUSIONS
(Within Mapping Unit)

Similar: Elmwood (S.W.P.), Lamoine, Scantic

Dissimilar: Finch, Biddeford, Whately, Naumburg

USE AND MANAGEMENT

Development with subsurface wastewater disposal: The limiting factor for building site development is wetness due to a high water table for some portion of the year. Proper foundation drainage or site modification is recommended for construction. Roundabout soil is unsuitable for subsurface wastewater disposal in accordance with State of Maine Rules for Subsurface Wastewater Disposal. Roundabout soil may be classified as wetlands based upon the combined consideration of hydric conditions, hydrology, and vegetation.

Stormwater design: Swanton soils are somewhat poorly to poorly drained. Soil permeability is 2.0-6.0 inches/hour in the upper part of the profile, and less than <0.2 inches/hour in the dense substratum (generally 22" – 60" beneath the soil surface).

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Department of Human Services
Division of Health Engineering

Town City Plantation	Street, Road Subdivision	Owner's Name
WINDHAM	HIGHLAND WOODS	WILSON, CHRIS

NOTE - TP A-F BY EXCAVATOR, BALANCE BY HAND SHOVEL/AUGER

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP A — ■ Test Pit ☐ Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND		DARK BROWN / YELLOWISH BROWN	
10–20	GRAVELLY LOAMY SAND	FRIABLE	LIGHT OLIVE BROWN	NONE
20–30	&			
30–40	SAND			EVIDENT
40–50	LIMIT OF EXCAVATION			

Soil Classification	Slope	Limiting Factor	
4 (Profile) B (Condition)	___ %	___ "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

HERMON

Observation Hole TP B — ■ Test Pit ☐ Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	GRAVELLY SANDY LOAM	FRIABLE	VERY DARK GR. BROWN	
10–20	STONY SANDY LOAM & LOAMY SAND	FIRM	OLIVE GRAY	MANY PROMINENT
30–40				
40–50	LIMIT OF EXCAVATION			

Soil Classification	Slope	Limiting Factor	
BRAYTON (Profile) / (Condition)	___ %	18"	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

(P.D.)

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP C — ■ Test Pit ☐ Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	GRAVELLY SANDY LOAM	FRIABLE	DARK BROWN / DARK YELLOWISH BROWN	
10–20	GRAVELLY LOAMY SAND & SAND	FIRM	OLIVE BROWN	COMMON/FAINT DISTANCT COMMON
30–40				
40–50	LIMIT OF EXCAVATION			

Soil Classification	Slope	Limiting Factor	
SKERRY (Profile) / (Condition)	___ %	18"	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP D — ■ Test Pit ☐ Boring

" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	STONY SANDY LOAM	FRIABLE	DK. BROWN / DARK YELLOWISH BROWN / YELLOWISH BROWN	
10–20	GRAVELLY LOAMY SAND & SAND	SOMEWHAT FIRM TO FIRM	LIGHT OLIVE BROWN	COMMON DISTANCT
30–40				
40–50	LIMIT OF EXCAVATION			

Soil Classification	Slope	Limiting Factor	
3 (Profile) C (Condition)	___ %	22"	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

3C SKERRY

James Logan — Site Evaluator Signature / SOIL SCIENTIST

237/213 — SE - / CSS#

10/11/18 — Date

Longview Partners, LLC
6 Second Street
Buxton, ME 04093
207-693-8799

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Department of Human Services
Division of Health Engineering

Town, City, Plantation	Street, Road, Subdivision	Owner's Name
WINDHAM	HIGHLAND WOODS	WILSON, CHRIS

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TPE ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

Depth	Texture	Consistency	Color	Mottling
0	STONY SANDY LOAM	FRIABLE	DK. BROWN	
10			DARK YELLOWISH BROWN	
20	STONY LOAMY SAND	FIRM	OL. BROWN	FEW, FAINT
30	& SAND		OLIVE	COMMON, DISTINCT
40				
50	LIMIT OF EXCAVATION			

Soil Classification	Slope	Limiting Factor	Ground Water / Restrictive Layer / Bedrock / Pit Depth
3 (Profile) C (Condition)	___ %	16"	☒ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SKERRY

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TPE ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

Depth	Texture	Consistency	Color	Mottling
0	MUCKY PEAT		BLACK	
10	LOAMY FINE SAND	FRIABLE	V. DARK GR. BROWN	D.D.
20			OLIVE GRAY	FEW 42"
30	FINE SAND			
40				
50	LIMIT OF EXCAVATION			

Soil Classification	Slope	Limiting Factor	Ground Water / Restrictive Layer / Bedrock / Pit Depth
SEARSPORT (Profile / Condition)	___ %	0"	☒ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TPG ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

Depth	Texture	Consistency	Color	Mottling
0	GRAVELLY FINE SANDY LOAM	FRIABLE	DARK BROWN	
10			DARK YELLOWISH BROWN	FEW FAINT
20	GRAVELLY LOAMY SAND		OL. BR.	COM FAINT
30	GRAVELLY LOAMY SAND & SAND	FIRM	OLIVE	COMMON, DISTINCT
40				
50				

Soil Classification	Slope	Limiting Factor	Ground Water / Restrictive Layer / Bedrock / Pit Depth
3 (Profile) C (Condition)	___ %	16"	☒ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SKENLRY

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TPH ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

Depth	Texture	Consistency	Color	Mottling
0	LOAMY SAND	FRIABLE	DARK BROWN	
10			MIXED DARK YELLOWISH BROWN	FEW FAINT
20				
30	FINE SAND & SILT	SOMEWHAT FIRM TO FIRM	OLIVE BROWN	COMMON, FAINT
40				
50				

Soil Classification	Slope	Limiting Factor	Ground Water / Restrictive Layer / Bedrock / Pit Depth
ELDRIDGE (Profile / Condition)	___ %	16"	☒ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

CROGHAN

James Logan — 237/213 — 10/11/18

Site Evaluator Signature / SOIL SCIENTIST — SE #/CSSH — Date

Longview Partners, LLC
6 Second Street
Buxton, ME 04093
207-693-8799

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Department of Human Services
Division of Health Engineering

Town City Plantation	Street Road Subdivision	Owner's Name
WINDHAM	HIGHLAND WOODS	WILSON, CHRIS

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP I ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND		VERY DARK GRAYISH BROWN	
10–20	FINE SAND	FRIABLE	OLIVE	COMMON, FAINT
20–50				

Soil Classification: NAUMBURG (Profile / Condition) | Slope: ___ % | Limiting Factor: 18" | ☒ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP J ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND		DARK BROWN	
10–20	FINE & MEDIUM SANDS	FRIABLE	DARK YELLOWISH BROWN / LIGHT OLIVE BROWN	FEW FAINT
20–30				COMMON, FAINT
30–50				

Soil Classification: CROGHAN (Profile / Condition) | Slope: ___ % | Limiting Factor: 18" | ☒ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP K ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND	FRIABLE	DARK / DARK YELLOWISH BROWN	
10–20	MEDIUM & COARSE SAND		YELLOWISH BROWN / LIGHT OLIVE BROWN	NONE EVIDENT
20–50				

Soil Classification: ADAMS (Profile / Condition) | Slope: ___ % | Limiting Factor: ___" | ☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole TP L ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND	FRIABLE	DARK BROWN / DARK YELLOWISH BROWN	
10–20	FINE & MEDIUM SANDS		YELLOWISH BROWN / LIGHT OLIVE BROWN	NONE EVIDENT
20–50				

Soil Classification: ADAMS (Profile / Condition) | Slope: ___ % | Limiting Factor: ___" | ☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

James Logan — 237/213 — 10/11/18

Site Evaluator Signature — SE #/CSS# — Date

Longview Partners, LLC
6 Second Street
Buxton, ME 04093
207-693-8799

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Department of Human Services
Division of Health Engineering

Town, City, Plantation	Street, Road, Subdivision	Owner's Name
WINDHAM	HIGHLAND WOODS	WILSON, CHRIS

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP M ■ Test Pit ☐ Boring

______ " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)

Depth	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND		BLACK	
10–20	FINE SAND	FRIABLE TO	OLIVE GRAY	COMMON / FAINT
20–50	FINE SAND W/ SILT LENSES	SOMEWHAT FIRM IN LENSES		

Soil Classification	Slope	Limiting Factor	
NAUMBURG (P.D.) Profile / Condition	___ %	<8 "	☒ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole ______ ■ Test Pit ☐ Boring

______ " Depth of Organic Horizon Above Mineral Soil

Depth	Texture	Consistency	Color	Mottling
0–50				

Soil Classification	Slope	Limiting Factor	
Profile / Condition	___ %	___ "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole ______ ■ Test Pit ☐ Boring

______ " Depth of Organic Horizon Above Mineral Soil

Depth	Texture	Consistency	Color	Mottling
0–50				

Soil Classification	Slope	Limiting Factor	
Profile / Condition	___ %	___ "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Observation Hole ______ ■ Test Pit ☐ Boring

______ " Depth of Organic Horizon Above Mineral Soil

Depth	Texture	Consistency	Color	Mottling
0–50				

Soil Classification	Slope	Limiting Factor	
Profile / Condition	___ %	___ "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

[signature] — Site Evaluator Signature

237/213 — SE # / CSSH

10/11/18 — Date

Longview Partners, LLC
6 Second Street
Buxton, ME 04093
207-693-8799

ATTACHMENT 2

STORMWATER TREATMENT CALCULATIONS

Stormwater Treatment Table

Highland Woods Subdivision

	Total Watershed Area (SF)	New Driveway and Road Impervious Area (SF)	New Building Area (SF)*	New Landscaped Area (SF)	Existing/Offsite Impervious Area (SF)**	Existing/Offsite Landscaped Area (SF)**	Existing Undeveloped Area (SF)	Treatment Provided	New Impervious Area Treated In Treatment Device (SF)	New Landscaped Area Treated In Treatment Device (SF)	Treatment Device
WS-10	47,727	0	708	13,972	0	0	33,047	No	0	0	None
WS-20***	70,357	4,529	0	55,930	2,658	0	6,579	No	0	0	None
WS-21	39,673	9,633	2,832	26,254	0	0	953	Yes	9,633	26,254	FB1
WS-22	196,382	16,513	1,128	47,440	0	0	131,301	Yes	16,513	47,440	FB3
WS-23	101,914	20,164	4,956	48,601	0	0	28,193	Yes	20,164	48,601	FB4
WS-24	362,784	25,841	11,328	238,218	0	0	87,397	Yes	25,841	238,218	FB5
WS-25***	46,831	1,060	1,416	11,186	0	0	33,169	No	0	0	None
WS-30	24,571	0	0	3,065	0	0	21,506	No	0	0	None
WS-31	105,008	12,726	5,664	65,403	0	0	21,215	Yes	12,726	65,403	FB2
WS-40	632,247	0	3,120	41,387	0	0	587,740	No	0	0	None
Total		**90,467**	**31,152**	**551,456**					**84,878**	**425,916**	

* All new buildings shall install a roofline drip edge to provide treatment for the rooftop impervious surface. The building's impervious area is included in the watershed and overall treatment calculations below, but not included in the BMP sizing calculations for each treatment device.

** The project is not taking credit for the Existing or Offsite impervious and landscaped areas, but are included in the BMP sizing calculations for each treatment device.

*** Development associated with a wetland road crossing is exempt from the Chapter 500 General Standards. Approximately 2341± s.f. of impervious surface from Sta. 6+28 to Sta. 7+83 has been removed from Watershed WS-25; Approximately 2657± s.f. of impervious surface from Sta. 6+28 to Sta. 7+83 has been removed from Watershed WS-20.

New Impervious Area =	121,619	sf
Impervious Area Requiring Treatment (95%) =	115,538	sf
Impervious Area Treatment Provided =	116,030	sf
	95%	New Impervious Area Treated

New Developed Area =	673,075	sf
Developed Area Requiring Treatment (80%) =	538,460	sf
Developed Area Treatment Provided =	541,946	sf
	81%	New Developed Area Treated

Filter Basin FB-1

Tributary Impervious Area=	9,633	sf	(WS-21 Impervious Area)
Tributary Landscaped Area=	26,254	sf	(WS-21 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 1,678 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
198.5	1,083	0
200	1,728	2,090

Outlet Elevation = 200.00

Storage Volume Provided = 2,090 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area Required = 1,007 sf

Filter Area Provided = 1,083 sf > Required

Filter Basin FB-2

Tributary Impervious Area=	12,726	sf	(WS-31 Impervious Area)
Tributary Landscaped Area=	65,403	sf	(WS-31 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 3,241 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
198	1,951	0
199.5	2,912	3,623

Outlet Elevation = 199.50

Storage Volume Provided= 3,623 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area Required = 1,944 sf

Filter Area Provided = 1,951 sf > Required

Filter Basin FB-3

Tributary Impervious Area=	16,513	sf	(WS-22 Impervious Area)
Tributary Landscaped Area=	47,440	sf	(WS-22 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 2,957 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
214.75	4,456	0
216.25	7,258	8,823

Outlet Elevation = 216.25

Storage Volume Provided = 8,823 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area Required = 1,774 sf

Filter Area Provided = 4,456 sf > Required

Filter Basin FB-4

Tributary Impervious Area=	20,164	sf	(WS-23 Impervious Area)
Tributary Landscaped Area=	48,601	sf	(WS-23 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 3,300 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
224.65	2,283	0
226.15	3,490	4,283

Outlet Elevation = 226.15

Storage Volume Provided= 4,283 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area Required = 1,980 sf

Filter Area Provided = 2,283 sf > Required

Filter Basins FB-5

Tributary Impervious Area=	25,841 sf	(WS-24 Impervious Area)
Tributary Landscaped Area=	238,218 sf	(WS-24 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 10,094 cf

Filter Basin FB-5 Stage Storage

Elevation	Area (sf)	Storage (cf)
219.5	6,189	0
220	6,895	3,269
221	8,392	10,901
222	11,966	21,027

Outlet Elevation = 221.00

Storage Volume Provided = 10,901 cf > Required

Filter Bottom Calculation

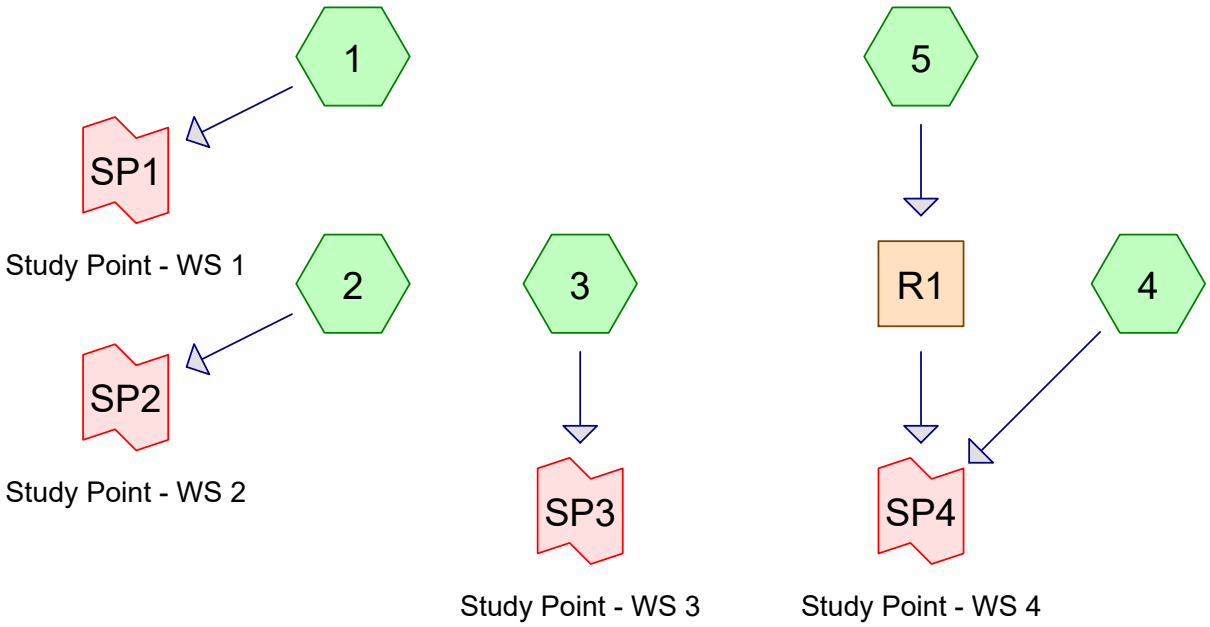
Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area Required = 6,056 sf

Filter Area Provided = 6,189 sf > Required

ATTACHMENT 3

HYDROCAD OUTPUT



Subcat Reach Pond Link

Routing Diagram for 17001-Pre
Prepared by {enter your company name here}, Printed 11/1/2018

Time span=0.00-48.00 hrs, dt=0.06 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=123,372 sf 0.00% Impervious Runoff Depth=0.94"
Flow Length=216' Tc=20.6 min CN=WQ Runoff=1.91 cfs 9,647 cf

Subcatchment 2: Runoff Area=491,926 sf 0.41% Impervious Runoff Depth=0.99"
Flow Length=1,639' Tc=35.4 min CN=WQ Runoff=6.39 cfs 40,584 cf

Subcatchment 3: Runoff Area=143,785 sf 0.00% Impervious Runoff Depth=1.17"
Flow Length=472' Tc=31.8 min CN=WQ Runoff=2.35 cfs 14,054 cf

Subcatchment 4: Runoff Area=528,638 sf 0.00% Impervious Runoff Depth=0.71"
Flow Length=1,041' Tc=32.5 min CN=WQ Runoff=5.02 cfs 31,359 cf

Subcatchment 5: Runoff Area=344,115 sf 0.00% Impervious Runoff Depth=0.33"
Flow Length=568' Tc=28.8 min CN=WQ Runoff=1.43 cfs 9,403 cf

Reach R1: Avg. Flow Depth=0.14' Max Vel=1.42 fps Inflow=1.43 cfs 9,403 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=1.24 cfs 9,403 cf

Link SP1: Study Point - WS 1 Inflow=1.91 cfs 9,647 cf
Primary=1.91 cfs 9,647 cf

Link SP2: Study Point - WS 2 Inflow=6.39 cfs 40,584 cf
Primary=6.39 cfs 40,584 cf

Link SP3: Study Point - WS 3 Inflow=2.35 cfs 14,054 cf
Primary=2.35 cfs 14,054 cf

Link SP4: Study Point - WS 4 Inflow=6.13 cfs 40,762 cf
Primary=6.13 cfs 40,762 cf

Total Runoff Area = 1,631,836 sf Runoff Volume = 105,046 cf Average Runoff Depth = 0.77"
99.88% Pervious = 1,629,838 sf 0.12% Impervious = 1,998 sf

Summary for Subcatchment 1:

Runoff = 1.91 cfs @ 12.30 hrs, Volume= 9,647 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

Area (sf)	CN	Description
63,359	55	Woods, Good, HSG B
47,280	70	Woods, Good, HSG C
12,733	77	Woods, Good, HSG D
123,372		Weighted Average
123,372		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	150	0.0564	0.13		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	66	0.0963	1.55		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
20.6	216	Total			

Summary for Subcatchment 2:

Runoff = 6.39 cfs @ 12.51 hrs, Volume= 40,584 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
	77,697	30	Woods, Good, HSG A
	110,621	55	Woods, Good, HSG B
	140,941	70	Woods, Good, HSG C
*	109,049	77	Woods, Good, HSG D
	302	39	>75% Grass cover, Good, HSG A
	36,631	74	>75% Grass cover, Good, HSG C
	14,687	80	>75% Grass cover, Good, HSG D
*	0	98	Roofs, HSG D
*	1,998	98	Paved roads w/curbs & sewers, HSG D
	491,926		Weighted Average
	489,928		99.59% Pervious Area
	1,998		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0467	0.12		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
7.7	424	0.0337	0.92		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
4.0	471	0.0174	1.98		**Shallow Concentrated Flow, Seg C to D** Grassed Waterway Kv= 15.0 fps
2.2	594	0.0390	4.49	347.26	**Channel Flow, Seg D to E** Area= 77.3 sf Perim= 197.1' r= 0.39' n= 0.035 Earth, dense weeds
35.4	1,639	Total			

Summary for Subcatchment 3:

Runoff = 2.35 cfs @ 12.45 hrs, Volume= 14,054 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

Area (sf)	CN	Description
8,430	30	Woods, Good, HSG A
91,982	70	Woods, Good, HSG C
21,591	77	Woods, Good, HSG D
21,782	74	>75% Grass cover, Good, HSG C
143,785		Weighted Average
143,785		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0373	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
6.1	178	0.0095	0.49		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
2.2	144	0.0471	1.09		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
31.8	472	Total			

Summary for Subcatchment 4:

Runoff = 5.02 cfs @ 12.47 hrs, Volume= 31,359 cf, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
*	281,993	30	Woods, Good, HSG A
	87,770	70	Woods, Good, HSG C
	69,172	77	Woods, Good, HSG D
	87,620	77	Woods, Good, HSG D
	2,083	74	>75% Grass cover, Good, HSG C
	528,638		Weighted Average
	528,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	150	0.0437	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
9.0	439	0.0267	0.82		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
1.4	452	0.0469	5.23	207.97	**Channel Flow, Seg C to D** Area= 39.8 sf Perim= 92.9' r= 0.43' n= 0.035 Earth, dense weeds
32.5	1,041	Total			

Summary for Subcatchment 5:

Runoff = 1.43 cfs @ 12.46 hrs, Volume= 9,403 cf, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

Area (sf)	CN	Description
245,996	30	Woods, Good, HSG A
70,977	55	Woods, Good, HSG B
24,428	70	Woods, Good, HSG C
2,714	39	>75% Grass cover, Good, HSG A
344,115		Weighted Average
344,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	150	0.0437	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
6.7	418	0.0434	1.04		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
28.8	568	Total			

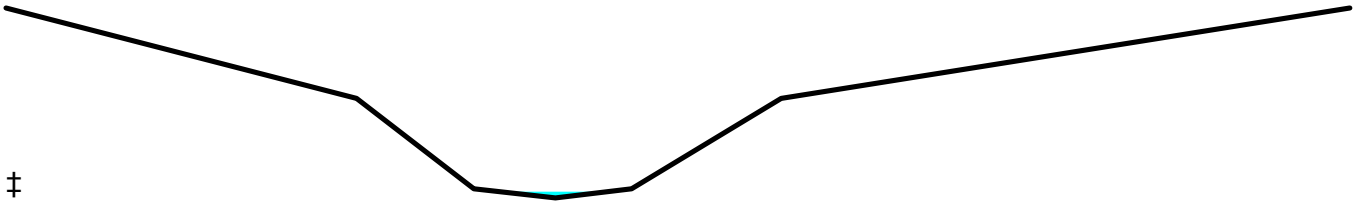
Summary for Reach R1:

Inflow Area = 344,115 sf, 0.00% Impervious, Inflow Depth = 0.33" for 2-Year event
Inflow = 1.43 cfs @ 12.46 hrs, Volume= 9,403 cf
Outflow = 1.24 cfs @ 12.62 hrs, Volume= 9,403 cf, Atten= 13%, Lag= 10.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.42 fps, Min. Travel Time= 12.9 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 23.9 min

Peak Storage= 959 cf @ 12.62 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 4.20' Flow Area= 271.1 sf, Capacity= 3,277.20 cfs

Custom cross-section, Length= 1,103.6' Slope= 0.0281 '/' (102 Elevation Intervals)
Constant n= 0.030 Earth, grassed & winding
Inlet Invert= 223.80', Outlet Invert= 192.80'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	218.00	0.00
40.15	216.00	2.00
53.58	214.00	4.00
62.93	213.80	4.20
71.66	214.00	4.00
88.79	216.00	2.00
153.92	218.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.20	1.8	18.1	1,995	3.23
2.20	68.5	48.9	75,628	712.35
4.20	271.1	154.3	299,173	3,277.20

Summary for Link SP1: Study Point - WS 1

Inflow Area = 123,372 sf, 0.00% Impervious, Inflow Depth = 0.94" for 2-Year event
Inflow = 1.91 cfs @ 12.30 hrs, Volume= 9,647 cf
Primary = 1.91 cfs @ 12.30 hrs, Volume= 9,647 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP2: Study Point - WS 2

Inflow Area = 491,926 sf, 0.41% Impervious, Inflow Depth = 0.99" for 2-Year event
Inflow = 6.39 cfs @ 12.51 hrs, Volume= 40,584 cf
Primary = 6.39 cfs @ 12.51 hrs, Volume= 40,584 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP3: Study Point - WS 3

Inflow Area = 143,785 sf, 0.00% Impervious, Inflow Depth = 1.17" for 2-Year event
Inflow = 2.35 cfs @ 12.45 hrs, Volume= 14,054 cf
Primary = 2.35 cfs @ 12.45 hrs, Volume= 14,054 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP4: Study Point - WS 4

Inflow Area = 872,753 sf, 0.00% Impervious, Inflow Depth = 0.56" for 2-Year event
Inflow = 6.13 cfs @ 12.50 hrs, Volume= 40,762 cf
Primary = 6.13 cfs @ 12.50 hrs, Volume= 40,762 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Time span=0.00-48.00 hrs, dt=0.06 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=123,372 sf 0.00% Impervious Runoff Depth=1.85"
Flow Length=216' Tc=20.6 min CN=WQ Runoff=3.85 cfs 19,061 cf

Subcatchment 2: Runoff Area=491,926 sf 0.41% Impervious Runoff Depth=1.90"
Flow Length=1,639' Tc=35.4 min CN=WQ Runoff=12.46 cfs 77,984 cf

Subcatchment 3: Runoff Area=143,785 sf 0.00% Impervious Runoff Depth=2.22"
Flow Length=472' Tc=31.8 min CN=WQ Runoff=4.50 cfs 26,580 cf

Subcatchment 4: Runoff Area=528,638 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=1,041' Tc=32.5 min CN=WQ Runoff=10.12 cfs 61,799 cf

Subcatchment 5: Runoff Area=344,115 sf 0.00% Impervious Runoff Depth=0.77"
Flow Length=568' Tc=28.8 min CN=WQ Runoff=3.63 cfs 22,109 cf

Reach R1: Avg. Flow Depth=0.20' Max Vel=1.79 fps Inflow=3.63 cfs 22,109 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=3.26 cfs 22,109 cf

Link SP1: Study Point - WS 1 Inflow=3.85 cfs 19,061 cf
Primary=3.85 cfs 19,061 cf

Link SP2: Study Point - WS 2 Inflow=12.46 cfs 77,984 cf
Primary=12.46 cfs 77,984 cf

Link SP3: Study Point - WS 3 Inflow=4.50 cfs 26,580 cf
Primary=4.50 cfs 26,580 cf

Link SP4: Study Point - WS 4 Inflow=13.22 cfs 83,908 cf
Primary=13.22 cfs 83,908 cf

Total Runoff Area = 1,631,836 sf Runoff Volume = 207,532 cf Average Runoff Depth = 1.53"
99.88% Pervious = 1,629,838 sf 0.12% Impervious = 1,998 sf

Summary for Subcatchment 1:

Runoff = 3.85 cfs @ 12.29 hrs, Volume= 19,061 cf, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

Area (sf)	CN	Description
63,359	55	Woods, Good, HSG B
47,280	70	Woods, Good, HSG C
12,733	77	Woods, Good, HSG D
123,372		Weighted Average
123,372		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	150	0.0564	0.13		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	66	0.0963	1.55		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
20.6	216	Total			

Summary for Subcatchment 2:

Runoff = 12.46 cfs @ 12.50 hrs, Volume= 77,984 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
	77,697	30	Woods, Good, HSG A
	110,621	55	Woods, Good, HSG B
	140,941	70	Woods, Good, HSG C
*	109,049	77	Woods, Good, HSG D
	302	39	>75% Grass cover, Good, HSG A
	36,631	74	>75% Grass cover, Good, HSG C
	14,687	80	>75% Grass cover, Good, HSG D
*	0	98	Roofs, HSG D
*	1,998	98	Paved roads w/curbs & sewers, HSG D
	491,926		Weighted Average
	489,928		99.59% Pervious Area
	1,998		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0467	0.12		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
7.7	424	0.0337	0.92		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
4.0	471	0.0174	1.98		**Shallow Concentrated Flow, Seg C to D**
					Grassed Waterway Kv= 15.0 fps
2.2	594	0.0390	4.49	347.26	**Channel Flow, Seg D to E**
					Area= 77.3 sf Perim= 197.1' r= 0.39'
					n= 0.035 Earth, dense weeds
35.4	1,639	Total			

Summary for Subcatchment 3:

Runoff = 4.50 cfs @ 12.45 hrs, Volume= 26,580 cf, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

Area (sf)	CN	Description
8,430	30	Woods, Good, HSG A
91,982	70	Woods, Good, HSG C
21,591	77	Woods, Good, HSG D
21,782	74	>75% Grass cover, Good, HSG C
143,785		Weighted Average
143,785		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0373	0.11		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
6.1	178	0.0095	0.49		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
2.2	144	0.0471	1.09		**Shallow Concentrated Flow, Seg C to D**
					Woodland Kv= 5.0 fps
31.8	472	Total			

Summary for Subcatchment 4:

Runoff = 10.12 cfs @ 12.46 hrs, Volume= 61,799 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
*	281,993	30	Woods, Good, HSG A
	87,770	70	Woods, Good, HSG C
	69,172	77	Woods, Good, HSG D
	87,620	77	Woods, Good, HSG D
	2,083	74	>75% Grass cover, Good, HSG C
	528,638		Weighted Average
	528,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	150	0.0437	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
9.0	439	0.0267	0.82		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
1.4	452	0.0469	5.23	207.97	**Channel Flow, Seg C to D** Area= 39.8 sf Perim= 92.9' r= 0.43' n= 0.035 Earth, dense weeds
32.5	1,041	Total			

Summary for Subcatchment 5:

Runoff = 3.63 cfs @ 12.44 hrs, Volume= 22,109 cf, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

Area (sf)	CN	Description
245,996	30	Woods, Good, HSG A
70,977	55	Woods, Good, HSG B
24,428	70	Woods, Good, HSG C
2,714	39	>75% Grass cover, Good, HSG A
344,115		Weighted Average
344,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	150	0.0437	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
6.7	418	0.0434	1.04		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
28.8	568	Total			

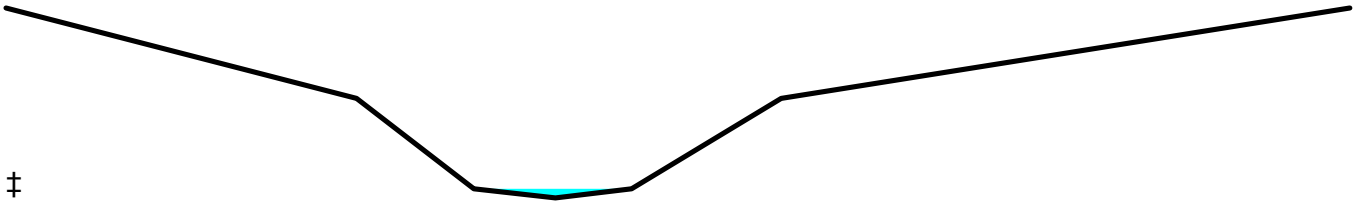
Summary for Reach R1:

Inflow Area = 344,115 sf, 0.00% Impervious, Inflow Depth = 0.77" for 10-Year event
Inflow = 3.63 cfs @ 12.44 hrs, Volume= 22,109 cf
Outflow = 3.26 cfs @ 12.57 hrs, Volume= 22,109 cf, Atten= 10%, Lag= 8.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.79 fps, Min. Travel Time= 10.3 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 21.2 min

Peak Storage= 2,006 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 4.20' Flow Area= 271.1 sf, Capacity= 3,277.20 cfs

Custom cross-section, Length= 1,103.6' Slope= 0.0281 '/' (102 Elevation Intervals)
Constant n= 0.030 Earth, grassed & winding
Inlet Invert= 223.80', Outlet Invert= 192.80'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	218.00	0.00
40.15	216.00	2.00
53.58	214.00	4.00
62.93	213.80	4.20
71.66	214.00	4.00
88.79	216.00	2.00
153.92	218.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.20	1.8	18.1	1,995	3.23
2.20	68.5	48.9	75,628	712.35
4.20	271.1	154.3	299,173	3,277.20

Summary for Link SP1: Study Point - WS 1

Inflow Area = 123,372 sf, 0.00% Impervious, Inflow Depth = 1.85" for 10-Year event
Inflow = 3.85 cfs @ 12.29 hrs, Volume= 19,061 cf
Primary = 3.85 cfs @ 12.29 hrs, Volume= 19,061 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP2: Study Point - WS 2

Inflow Area = 491,926 sf, 0.41% Impervious, Inflow Depth = 1.90" for 10-Year event
Inflow = 12.46 cfs @ 12.50 hrs, Volume= 77,984 cf
Primary = 12.46 cfs @ 12.50 hrs, Volume= 77,984 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP3: Study Point - WS 3

Inflow Area = 143,785 sf, 0.00% Impervious, Inflow Depth = 2.22" for 10-Year event
Inflow = 4.50 cfs @ 12.45 hrs, Volume= 26,580 cf
Primary = 4.50 cfs @ 12.45 hrs, Volume= 26,580 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP4: Study Point - WS 4

Inflow Area = 872,753 sf, 0.00% Impervious, Inflow Depth = 1.15" for 10-Year event
Inflow = 13.22 cfs @ 12.49 hrs, Volume= 83,908 cf
Primary = 13.22 cfs @ 12.49 hrs, Volume= 83,908 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Time span=0.00-48.00 hrs, dt=0.06 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=123,372 sf 0.00% Impervious Runoff Depth=2.69"
Flow Length=216' Tc=20.6 min CN=WQ Runoff=5.62 cfs 27,681 cf

Subcatchment 2: Runoff Area=491,926 sf 0.41% Impervious Runoff Depth=2.73"
Flow Length=1,639' Tc=35.4 min CN=WQ Runoff=17.94 cfs 111,774 cf

Subcatchment 3: Runoff Area=143,785 sf 0.00% Impervious Runoff Depth=3.15"
Flow Length=472' Tc=31.8 min CN=WQ Runoff=6.41 cfs 37,701 cf

Subcatchment 4: Runoff Area=528,638 sf 0.00% Impervious Runoff Depth=2.04"
Flow Length=1,041' Tc=32.5 min CN=WQ Runoff=14.85 cfs 90,057 cf

Subcatchment 5: Runoff Area=344,115 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=568' Tc=28.8 min CN=WQ Runoff=5.90 cfs 35,110 cf

Reach R1: Avg. Flow Depth=0.24' Max Vel=2.20 fps Inflow=5.90 cfs 35,110 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=5.55 cfs 35,110 cf

Link SP1: Study Point - WS 1 Inflow=5.62 cfs 27,681 cf
Primary=5.62 cfs 27,681 cf

Link SP2: Study Point - WS 2 Inflow=17.94 cfs 111,774 cf
Primary=17.94 cfs 111,774 cf

Link SP3: Study Point - WS 3 Inflow=6.41 cfs 37,701 cf
Primary=6.41 cfs 37,701 cf

Link SP4: Study Point - WS 4 Inflow=20.28 cfs 125,167 cf
Primary=20.28 cfs 125,167 cf

Total Runoff Area = 1,631,836 sf Runoff Volume = 302,323 cf Average Runoff Depth = 2.22"
99.88% Pervious = 1,629,838 sf 0.12% Impervious = 1,998 sf

Summary for Subcatchment 1:

Runoff = 5.62 cfs @ 12.29 hrs, Volume= 27,681 cf, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

Area (sf)	CN	Description
63,359	55	Woods, Good, HSG B
47,280	70	Woods, Good, HSG C
12,733	77	Woods, Good, HSG D
123,372		Weighted Average
123,372		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	150	0.0564	0.13		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	66	0.0963	1.55		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
20.6	216	Total			

Summary for Subcatchment 2:

Runoff = 17.94 cfs @ 12.49 hrs, Volume= 111,774 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
	77,697	30	Woods, Good, HSG A
	110,621	55	Woods, Good, HSG B
	140,941	70	Woods, Good, HSG C
*	109,049	77	Woods, Good, HSG D
	302	39	>75% Grass cover, Good, HSG A
	36,631	74	>75% Grass cover, Good, HSG C
	14,687	80	>75% Grass cover, Good, HSG D
*	0	98	Roofs, HSG D
*	1,998	98	Paved roads w/curbs & sewers, HSG D
	491,926		Weighted Average
	489,928		99.59% Pervious Area
	1,998		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0467	0.12		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
7.7	424	0.0337	0.92		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
4.0	471	0.0174	1.98		**Shallow Concentrated Flow, Seg C to D**
					Grassed Waterway Kv= 15.0 fps
2.2	594	0.0390	4.49	347.26	**Channel Flow, Seg D to E**
					Area= 77.3 sf Perim= 197.1' r= 0.39'
					n= 0.035 Earth, dense weeds
35.4	1,639	Total			

Summary for Subcatchment 3:

Runoff = 6.41 cfs @ 12.44 hrs, Volume= 37,701 cf, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

Area (sf)	CN	Description
8,430	30	Woods, Good, HSG A
91,982	70	Woods, Good, HSG C
21,591	77	Woods, Good, HSG D
21,782	74	>75% Grass cover, Good, HSG C
143,785		Weighted Average
143,785		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	150	0.0373	0.11		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
6.1	178	0.0095	0.49		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
2.2	144	0.0471	1.09		**Shallow Concentrated Flow, Seg C to D**
					Woodland Kv= 5.0 fps
31.8	472	Total			

Summary for Subcatchment 4:

Runoff = 14.85 cfs @ 12.46 hrs, Volume= 90,057 cf, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
*	281,993	30	Woods, Good, HSG A
	87,770	70	Woods, Good, HSG C
	69,172	77	Woods, Good, HSG D
	87,620	77	Woods, Good, HSG D
	2,083	74	>75% Grass cover, Good, HSG C
	528,638		Weighted Average
	528,638		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	150	0.0437	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
9.0	439	0.0267	0.82		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
1.4	452	0.0469	5.23	207.97	**Channel Flow, Seg C to D** Area= 39.8 sf Perim= 92.9' r= 0.43' n= 0.035 Earth, dense weeds
32.5	1,041	Total			

Summary for Subcatchment 5:

Runoff = 5.90 cfs @ 12.43 hrs, Volume= 35,110 cf, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

Area (sf)	CN	Description
245,996	30	Woods, Good, HSG A
70,977	55	Woods, Good, HSG B
24,428	70	Woods, Good, HSG C
2,714	39	>75% Grass cover, Good, HSG A
344,115		Weighted Average
344,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	150	0.0437	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
6.7	418	0.0434	1.04		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
28.8	568	Total			

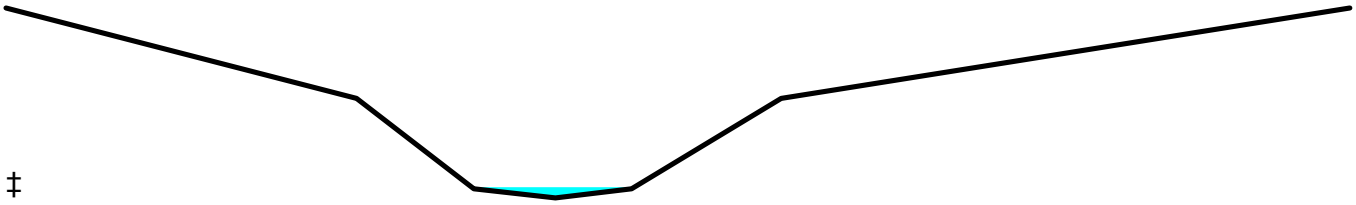
Summary for Reach R1:

Inflow Area = 344,115 sf, 0.00% Impervious, Inflow Depth = 1.22" for 25-Year event
Inflow = 5.90 cfs @ 12.43 hrs, Volume= 35,110 cf
Outflow = 5.55 cfs @ 12.53 hrs, Volume= 35,110 cf, Atten= 6%, Lag= 6.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 2.20 fps, Min. Travel Time= 8.4 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 19.8 min

Peak Storage= 2,779 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 4.20' Flow Area= 271.1 sf, Capacity= 3,277.20 cfs

Custom cross-section, Length= 1,103.6' Slope= 0.0281 '/' (102 Elevation Intervals)
Constant n= 0.030 Earth, grassed & winding
Inlet Invert= 223.80', Outlet Invert= 192.80'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	218.00	0.00
40.15	216.00	2.00
53.58	214.00	4.00
62.93	213.80	4.20
71.66	214.00	4.00
88.79	216.00	2.00
153.92	218.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.20	1.8	18.1	1,995	3.23
2.20	68.5	48.9	75,628	712.35
4.20	271.1	154.3	299,173	3,277.20

Summary for Link SP1: Study Point - WS 1

Inflow Area = 123,372 sf, 0.00% Impervious, Inflow Depth = 2.69" for 25-Year event
Inflow = 5.62 cfs @ 12.29 hrs, Volume= 27,681 cf
Primary = 5.62 cfs @ 12.29 hrs, Volume= 27,681 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP2: Study Point - WS 2

Inflow Area = 491,926 sf, 0.41% Impervious, Inflow Depth = 2.73" for 25-Year event
Inflow = 17.94 cfs @ 12.49 hrs, Volume= 111,774 cf
Primary = 17.94 cfs @ 12.49 hrs, Volume= 111,774 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP3: Study Point - WS 3

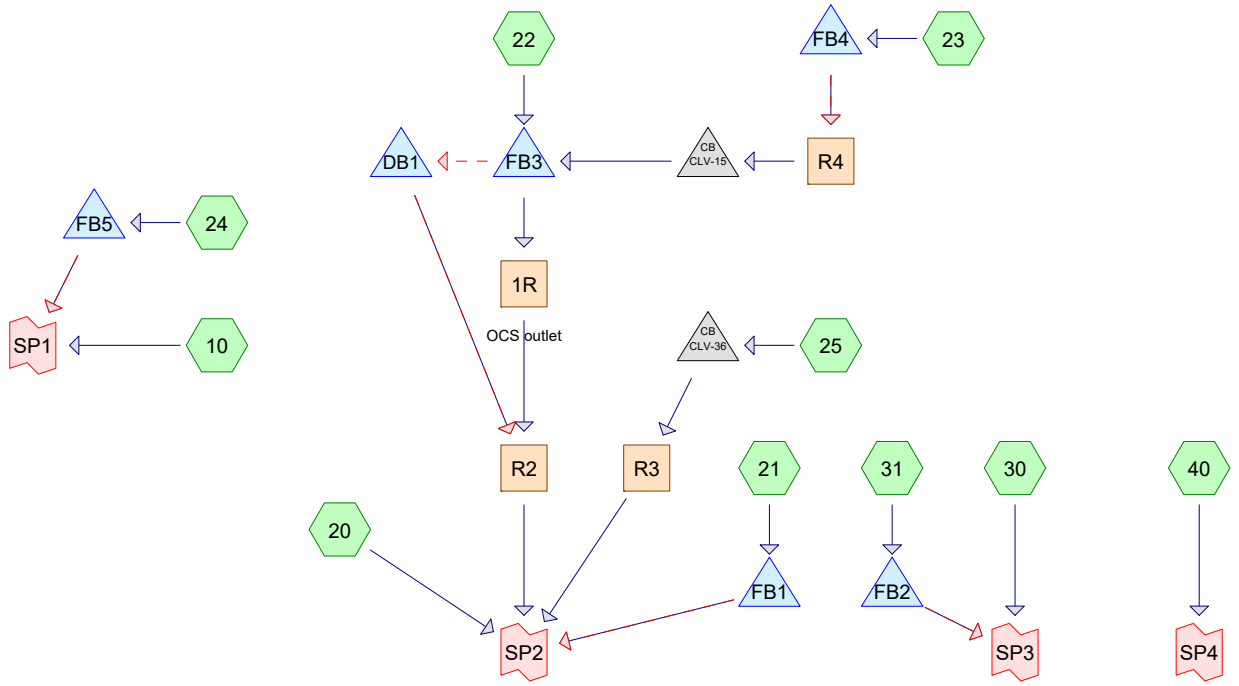
Inflow Area = 143,785 sf, 0.00% Impervious, Inflow Depth = 3.15" for 25-Year event
Inflow = 6.41 cfs @ 12.44 hrs, Volume= 37,701 cf
Primary = 6.41 cfs @ 12.44 hrs, Volume= 37,701 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP4: Study Point - WS 4

Inflow Area = 872,753 sf, 0.00% Impervious, Inflow Depth = 1.72" for 25-Year event
Inflow = 20.28 cfs @ 12.48 hrs, Volume= 125,167 cf
Primary = 20.28 cfs @ 12.48 hrs, Volume= 125,167 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs



Subcat Reach Pond Link

Routing Diagram for 17001-Post

Prepared by {enter your company name here}, Printed 11/1/2018

Time span=0.00-48.00 hrs, dt=0.06 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10: Runoff Area=47,727 sf 1.48% Impervious Runoff Depth=1.11"
Flow Length=144' Slope=0.0733 '/' Tc=17.4 min CN=WQ Runoff=0.94 cfs 4,406 cf

Subcatchment20: Runoff Area=72,353 sf 13.61% Impervious Runoff Depth=1.52"
Flow Length=572' Tc=16.0 min CN=WQ Runoff=2.01 cfs 9,170 cf

Subcatchment21: Runoff Area=39,673 sf 31.42% Impervious Runoff Depth=1.56"
Flow Length=448' Tc=6.0 min CN=WQ Runoff=1.45 cfs 5,159 cf

Subcatchment22: Runoff Area=196,382 sf 8.98% Impervious Runoff Depth=1.45"
Flow Length=668' Tc=22.6 min CN=WQ Runoff=4.57 cfs 23,694 cf

Subcatchment23: Runoff Area=101,914 sf 24.65% Impervious Runoff Depth=1.14"
Flow Length=641' Tc=15.3 min UI Adjusted CN=WQ Runoff=2.05 cfs 9,665 cf

Subcatchment24: Runoff Area=362,784 sf 10.25% Impervious Runoff Depth=0.72"
Flow Length=1,197' Tc=24.1 min UI Adjusted CN=WQ Runoff=3.79 cfs 21,642 cf

Subcatchment25: Runoff Area=49,172 sf 9.80% Impervious Runoff Depth=1.55"
Flow Length=322' Tc=36.0 min CN=WQ Runoff=1.00 cfs 6,365 cf

Subcatchment30: Runoff Area=24,571 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=385' Tc=20.7 min CN=WQ Runoff=0.59 cfs 2,911 cf

Subcatchment31: Runoff Area=105,008 sf 17.51% Impervious Runoff Depth=1.57"
Flow Length=561' Tc=32.5 min CN=WQ Runoff=2.24 cfs 13,734 cf

Subcatchment40: Runoff Area=632,247 sf 0.49% Impervious Runoff Depth=0.97"
Flow Length=1,576' Tc=58.5 min CN=WQ Runoff=6.13 cfs 50,898 cf

Reach 1R: OCS outlet Avg. Flow Depth=0.18' Max Vel=1.98 fps Inflow=0.24 cfs 15,636 cf
18.0" Round Pipe n=0.013 L=106.2' S=0.0055 '/' Capacity=7.76 cfs Outflow=0.24 cfs 15,636 cf

Reach R2: Avg. Flow Depth=0.28' Max Vel=2.02 fps Inflow=3.72 cfs 32,662 cf
n=0.035 L=455.4' S=0.0307 '/' Capacity=1,702.45 cfs Outflow=3.50 cfs 32,661 cf

Reach R3: Avg. Flow Depth=0.18' Max Vel=1.32 fps Inflow=1.00 cfs 6,365 cf
n=0.035 L=595.6' S=0.0235 '/' Capacity=1,488.65 cfs Outflow=0.96 cfs 6,365 cf

Reach R4: Avg. Flow Depth=0.05' Max Vel=0.85 fps Inflow=0.27 cfs 9,666 cf
n=0.030 L=362.4' S=0.0170 '/' Capacity=2,293.44 cfs Outflow=0.27 cfs 9,666 cf

Pond CLV-15: Peak Elev=216.43' Inflow=0.27 cfs 9,666 cf
15.0" Round Culvert n=0.013 L=47.0' S=0.0053 '/' Outflow=0.27 cfs 9,666 cf

Pond CLV-36: Peak Elev=215.41' Inflow=1.00 cfs 6,365 cf
36.0" Round Culvert w/ 12.0" inside fill n=0.013 L=55.0' S=0.0055 '/' Outflow=1.00 cfs 6,365 cf

Pond DB1: Peak Elev=216.24' Storage=4,515 cf Inflow=4.51 cfs 17,725 cf
Primary=3.48 cfs 17,025 cf Secondary=0.00 cfs 0 cf Outflow=3.48 cfs 17,025 cf

Pond FB1: Peak Elev=199.97' Storage=2,044 cf Inflow=1.45 cfs 5,159 cf
Primary=0.14 cfs 5,160 cf Secondary=0.00 cfs 0 cf Outflow=0.14 cfs 5,160 cf

Pond FB2: Peak Elev=199.63' Storage=4,019 cf Inflow=2.24 cfs 13,734 cf
Primary=1.61 cfs 13,738 cf Secondary=0.00 cfs 0 cf Outflow=1.61 cfs 13,738 cf

Pond FB3: Peak Elev=216.39' Storage=3,885 cf Inflow=4.77 cfs 33,359 cf
Primary=0.24 cfs 15,636 cf Secondary=4.51 cfs 17,725 cf Outflow=4.75 cfs 33,361 cf

Pond FB4: Peak Elev=225.96' Storage=3,626 cf Inflow=2.05 cfs 9,665 cf
Primary=0.27 cfs 9,666 cf Secondary=0.00 cfs 0 cf Outflow=0.27 cfs 9,666 cf

Pond FB5: Peak Elev=220.51' Storage=6,982 cf Inflow=3.79 cfs 21,642 cf
Primary=0.73 cfs 21,655 cf Secondary=0.00 cfs 0 cf Outflow=0.73 cfs 21,655 cf

Link SP1: Inflow=1.55 cfs 26,060 cf
Primary=1.55 cfs 26,060 cf

Link SP2: Inflow=5.39 cfs 53,356 cf
Primary=5.39 cfs 53,356 cf

Link SP3: Inflow=1.84 cfs 16,649 cf
Primary=1.84 cfs 16,649 cf

Link SP4: Inflow=6.13 cfs 50,898 cf
Primary=6.13 cfs 50,898 cf

Total Runoff Area = 1,631,831 sf Runoff Volume = 147,645 cf Average Runoff Depth = 1.09"
92.08% Pervious = 1,502,557 sf 7.92% Impervious = 129,274 sf

Summary for Subcatchment 10:

Runoff = 0.94 cfs @ 12.25 hrs, Volume= 4,406 cf, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

Area (sf)	CN	Description
13,358	74	>75% Grass cover, Good, HSG C
614	80	>75% Grass cover, Good, HSG D
19,231	55	Woods, Good, HSG B
3,231	70	Woods, Good, HSG C
10,585	77	Woods, Good, HSG D
708	98	Roofs, HSG A
47,727		Weighted Average
47,019		98.52% Pervious Area
708		1.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	144	0.0733	0.14		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Subcatchment 20:

Runoff = 2.01 cfs @ 12.22 hrs, Volume= 9,170 cf, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
*	2,658	98	Existing Paved roads
*	7,186	98	Proposed Paved roads
	2,600	30	Woods, Good, HSG A
	2,529	70	Woods, Good, HSG C
	1,450	77	Woods, Good, HSG D
	2,071	39	>75% Grass cover, Good, HSG A
	40,346	74	>75% Grass cover, Good, HSG C
	13,513	80	>75% Grass cover, Good, HSG D
	72,353		Weighted Average
	62,509		86.39% Pervious Area
	9,844		13.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	150	0.0474	0.18		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
1.8	422	0.0292	3.89	300.48	**Channel Flow, Seg B to C** Area= 77.3 sf Perim= 197.1' r= 0.39' n= 0.035 Earth, dense weeds
16.0	572	Total			

Summary for Subcatchment 21:

Runoff = 1.45 cfs @ 12.09 hrs, Volume= 5,159 cf, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
	953	30	Woods, Good, HSG A
	2,832	98	Unconnected roofs, HSG D
*	9,633	98	Proposed Roads & Driveways, Paved
	9,011	39	>75% Grass cover, Good, HSG A
	17,096	74	>75% Grass cover, Good, HSG C
	148	80	>75% Grass cover, Good, HSG D
	39,673		Weighted Average
	27,208		68.58% Pervious Area
	12,465		31.42% Impervious Area
	2,832		22.72% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	44	0.0505	0.14		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
0.8	404	0.0396	8.42	42.10	**Trap/Vee/Rect Channel Flow, Seg B to C** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
6.0	448	Total			

Summary for Subcatchment 22:

Runoff = 4.57 cfs @ 12.32 hrs, Volume= 23,694 cf, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
*	313	30	Woods, Good, HSG A
	2,212	55	Woods, Good, HSG B
	53,610	70	Woods, Good, HSG C
	75,166	77	Woods, Good, HSG D
	55	39	>75% Grass cover, Good, HSG A
	7,806	61	>75% Grass cover, Good, HSG B
	39,444	74	>75% Grass cover, Good, HSG C
	135	80	>75% Grass cover, Good, HSG D
*	1,128	98	Unconnected roofs
*	16,513	98	Proposed Road & Driveways, Paved
	196,382		Weighted Average
	178,741		91.02% Pervious Area
	17,641		8.98% Impervious Area
	1,128		6.39% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	36	0.0451	1.53		**Sheet Flow, Seg A to B** Smooth surfaces n= 0.011 P2= 3.10"
20.3	114	0.0112	0.09		**Sheet Flow, Seg B to C** Grass: Dense n= 0.240 P2= 3.10"
1.7	469	0.0113	4.50	22.49	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
0.2	49	0.0051	3.76	4.61	**Pipe Channel, Seg D to E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
22.6	668	Total			

Summary for Subcatchment 23:

Runoff = 2.05 cfs @ 12.21 hrs, Volume= 9,665 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Adj	Description
*	4,956	98	98	Unconnected roofs
	3,595	39	39	>75% Grass cover, Good, HSG A
	45,006	61	61	>75% Grass cover, Good, HSG B
*	20,164	98	98	Proposed Road & Driveways, Paved,
	28,193	30	30	Woods, Good, HSG A
	101,914			Weighted Average
	76,794			75.35% Pervious Area
	25,120			24.65% Impervious Area
	4,956			19.73% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	58	0.0090	0.07		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
2.4	583	0.0088	3.97	19.85	**Trap/Vee/Rect Channel Flow, Seg B to C** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
15.3	641	Total			

Summary for Subcatchment 24:

Runoff = 3.79 cfs @ 12.35 hrs, Volume= 21,642 cf, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Adj	Description
	81,157	30	30	Woods, Good, HSG A
	6,240	55	55	Woods, Good, HSG B
	11,328	98	98	Unconnected roofs, HSG A
	131,591	39	39	>75% Grass cover, Good, HSG A
	93,080	61	61	>75% Grass cover, Good, HSG B
	13,482	74	74	>75% Grass cover, Good, HSG C
	65	80	80	>75% Grass cover, Good, HSG D
*	16,205	98	98	Proposed Roads, Paved
*	9,636	98	98	Proposed Driveways, Paved parking
	362,784			Weighted Average
	325,615			89.75% Pervious Area
	37,169			10.25% Impervious Area
	11,328			30.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.9	150	0.0181	0.12		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
0.7	143	0.0489	3.56		**Shallow Concentrated Flow, Seg B to C** Unpaved Kv= 16.1 fps
0.1	64	0.0935	18.35	435.79	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=2.50' Z= 3.0 '/' Top.W=17.00' n= 0.030 Earth, grassed & winding
1.8	481	0.0050	4.49	126.68	**Trap/Vee/Rect Channel Flow, Seg D to E** Bot.W=2.00' D=2.75' Z= 3.0 '/' Top.W=18.50' n= 0.030 Earth, grassed & winding
0.6	359	0.0171	9.97	281.13	**Trap/Vee/Rect Channel Flow, Seg E to F** Bot.W=2.00' D=2.75' Z= 3.0 '/' Top.W=18.50' n= 0.025 Earth, clean & winding
24.1	1,197	Total			

Summary for Subcatchment 25:

Runoff = 1.00 cfs @ 12.50 hrs, Volume= 6,365 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
*	3,401	98	Proposed Roads & Driveways, Paved
	4,691	70	Woods, Good, HSG C
	28,478	77	Woods, Good, HSG D
*	1,416	98	Unconnected roofs, HSG D
	9,946	74	>75% Grass cover, Good, HSG C
	1,240	80	>75% Grass cover, Good, HSG D
	49,172		Weighted Average
	44,355		90.20% Pervious Area
	4,817		9.80% Impervious Area
	1,416		29.40% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.5	150	0.0180	0.08		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
4.5	172	0.0165	0.64		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
36.0	322	Total			

Summary for Subcatchment 30:

Runoff = 0.59 cfs @ 12.29 hrs, Volume= 2,911 cf, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

Area (sf)	CN	Description
2,189	70	Woods, Good, HSG C
19,317	77	Woods, Good, HSG D
3,065	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
24,571		Weighted Average
24,571		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.0774	0.14		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	91	0.0892	1.49		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
2.1	144	0.0531	1.15		**Shallow Concentrated Flow, Seg C to D**
					Woodland Kv= 5.0 fps
20.7	385	Total			

Summary for Subcatchment 31:

Runoff = 2.24 cfs @ 12.45 hrs, Volume= 13,734 cf, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
	21,215	70	Woods, Good, HSG C
	5,664	98	Unconnected roofs, HSG D
*	12,726	98	Proposed Road & Driveways, Paved
	65,403	74	>75% Grass cover, Good, HSG C
	105,008		Weighted Average
	86,618		82.49% Pervious Area
	18,390		17.51% Impervious Area
	5,664		30.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.9	150	0.0223	0.09		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	66	0.0060	0.39		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
0.6	276	0.0348	7.89	39.47	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
0.2	69	0.1157	5.48		**Shallow Concentrated Flow, Seg D to E** Unpaved Kv= 16.1 fps
32.5	561	Total			

Summary for Subcatchment 40:

Runoff = 6.13 cfs @ 12.81 hrs, Volume= 50,898 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 2-Year Rainfall=3.10", Ia/S=0.05

	Area (sf)	CN	Description
*	203,365	30	Woods, Good, HSG A
	1,052	55	Woods, Good, HSG B
	96,940	70	Woods, Good, HSG C
	286,383	77	Woods, Good, HSG D
*	1,474	39	>75% Grass cover, Good, HSG A
	30,981	61	>75% Grass cover, Good, HSG B
	8,745	74	>75% Grass cover, Good, HSG C
	187	80	>75% Grass cover, Good, HSG D
	3,120	98	Unconnected roofs, HSG A
	632,247		Weighted Average
	629,127		99.51% Pervious Area
	3,120		0.49% Impervious Area
	3,120		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.8	150	0.0163	0.08		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
13.2	592	0.0223	0.75		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
11.3	505	0.0223	0.75		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
1.2	329	0.0252	4.47	177.85	**Channel Flow, Seg D to E** Area= 39.8 sf Perim= 92.9' r= 0.43' n= 0.030 Earth, grassed & winding
58.5	1,576	Total			

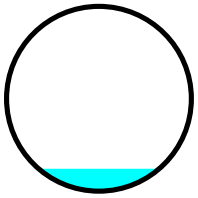
Summary for Reach 1R: OCS outlet

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 0.63" for 2-Year event
Inflow = 0.24 cfs @ 12.33 hrs, Volume= 15,636 cf
Outflow = 0.24 cfs @ 12.35 hrs, Volume= 15,636 cf, Atten= 0%, Lag= 1.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.98 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.60 fps, Avg. Travel Time= 1.1 min

Peak Storage= 13 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 7.76 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 106.2' Slope= 0.0055 '/'
Inlet Invert= 212.58', Outlet Invert= 212.00'



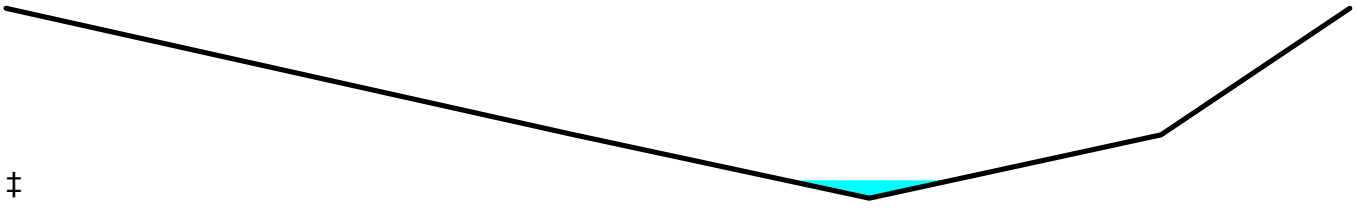
Summary for Reach R2:

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth > 1.31" for 2-Year event
Inflow = 3.72 cfs @ 12.55 hrs, Volume= 32,662 cf
Outflow = 3.50 cfs @ 12.62 hrs, Volume= 32,661 cf, Atten= 6%, Lag= 4.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 2.02 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 9.7 min

Peak Storage= 787 cf @ 12.62 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,702.45 cfs

Custom cross-section, Length= 455.4' Slope= 0.0307 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 212.00', Outlet Invert= 198.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	210.00	0.00
41.81	208.00	2.00
63.54	207.00	3.00
85.01	208.00	2.00
98.90	210.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	21.6	43.2	9,837	101.22
3.00	163.7	99.1	74,549	1,702.45

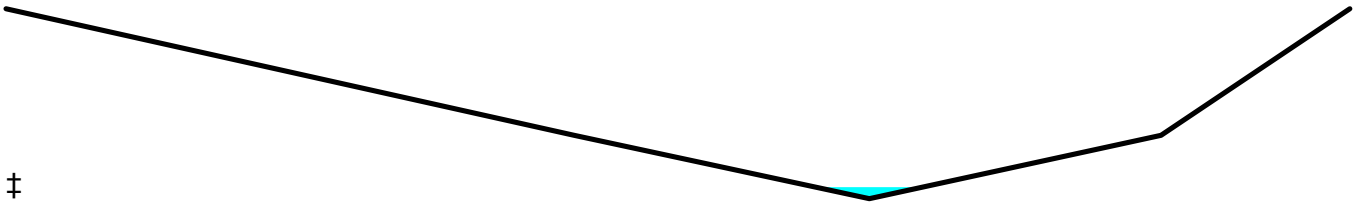
Summary for Reach R3:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 1.55" for 2-Year event
Inflow = 1.00 cfs @ 12.50 hrs, Volume= 6,365 cf
Outflow = 0.96 cfs @ 12.60 hrs, Volume= 6,365 cf, Atten= 5%, Lag= 6.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 7.5 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 16.9 min

Peak Storage= 431 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,488.65 cfs

Custom cross-section, Length= 595.6' Slope= 0.0235 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 212.00', Outlet Invert= 198.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	210.00	0.00
41.81	208.00	2.00
63.54	207.00	3.00
85.01	208.00	2.00
98.90	210.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	21.6	43.2	12,865	88.51
3.00	163.7	99.1	97,500	1,488.65

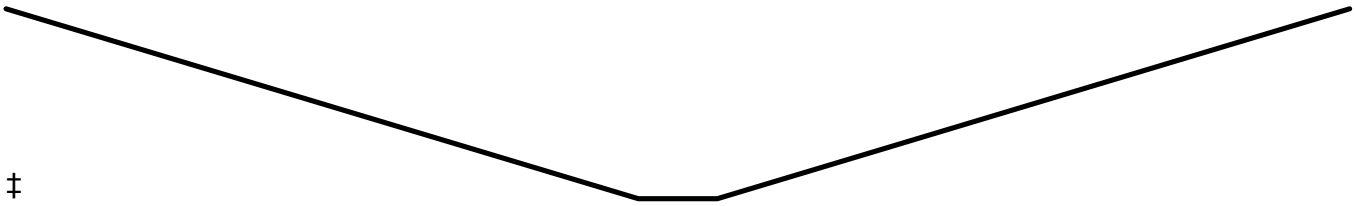
Summary for Reach R4:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.27 cfs @ 13.18 hrs, Volume= 9,666 cf
Outflow = 0.27 cfs @ 13.26 hrs, Volume= 9,666 cf, Atten= 0%, Lag= 4.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 8.2 min

Peak Storage= 115 cf @ 13.26 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 4.00' Flow Area= 216.0 sf, Capacity= 2,293.44 cfs

6.00' x 4.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 12.0 '/' Top Width= 102.00'
Length= 362.4' Slope= 0.0170 '/'
Inlet Invert= 222.15', Outlet Invert= 216.00'



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Summary for Pond CLV-15:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.27 cfs @ 13.26 hrs, Volume= 9,666 cf
Outflow = 0.27 cfs @ 13.26 hrs, Volume= 9,666 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 13.26 hrs, Volume= 9,666 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.43' @ 12.45 hrs
Flood Elev= 219.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	216.00'	**15.0" Round Culvert** L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 216.00' / 215.75' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.27 cfs @ 13.26 hrs HW=216.39' TW=216.29' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.27 cfs @ 1.22 fps)

Summary for Pond CLV-36:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 1.55" for 2-Year event
Inflow = 1.00 cfs @ 12.50 hrs, Volume= 6,365 cf
Outflow = 1.00 cfs @ 12.50 hrs, Volume= 6,365 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.00 cfs @ 12.50 hrs, Volume= 6,365 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 215.41' @ 12.50 hrs
Flood Elev= 219.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	215.15'	**36.0" Round Culvert w/ 12.0" inside fill** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 214.15' / 213.85' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 5.01 sf

Primary OutFlow Max=1.00 cfs @ 12.50 hrs HW=215.41' TW=212.18' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.00 cfs @ 1.30 fps)

Summary for Pond DB1:

Inflow = 4.51 cfs @ 12.33 hrs, Volume= 17,725 cf
Outflow = 3.48 cfs @ 12.55 hrs, Volume= 17,025 cf, Atten= 23%, Lag= 13.2 min
Primary = 3.48 cfs @ 12.55 hrs, Volume= 17,025 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.24' @ 12.55 hrs Surf.Area= 3,524 sf Storage= 4,515 cf

Plug-Flow detention time= 126.6 min calculated for 17,025 cf (96% of inflow)
Center-of-Mass det. time= 110.8 min (943.9 - 833.0)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	11,840 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.75	2,572	199.4	0.0	0	0	2,572
215.00	2,723	204.1	100.0	662	662	2,731
216.00	3,364	223.0	100.0	3,038	3,700	3,408
216.25	3,533	227.7	100.0	862	4,562	3,586
217.00	4,061	241.8	100.0	2,845	7,407	4,141
218.00	4,815	260.7	100.0	4,433	11,840	4,938

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**15.0" Round Culvert** L= 106.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.58' / 212.00' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.00'	**3.0" Vert. Orifice/Grate** C= 0.600

#3	Device 1	216.00'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#4	Secondary	216.75'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.44 cfs @ 12.55 hrs HW=216.23' TW=212.27' (Dynamic Tailwater)
↑**1=Culvert** (Passes 3.44 cfs of 8.53 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 5.07 fps)
3=neenah 4345 (Custom Controls 3.19 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=214.75' TW=212.00' (Dynamic Tailwater)
↑**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB1:

Inflow Area = 39,673 sf, 31.42% Impervious, Inflow Depth = 1.56" for 2-Year event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 5,159 cf
Outflow = 0.14 cfs @ 13.03 hrs, Volume= 5,160 cf, Atten= 90%, Lag= 56.5 min
Primary = 0.14 cfs @ 13.03 hrs, Volume= 5,160 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 199.97' @ 13.03 hrs Surf.Area= 1,715 sf Storage= 2,044 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 144.3 min (930.2 - 785.9)

Volume	Invert	Avail.Storage	Storage Description
#1	198.50'	6,564 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.50	1,083	128.5	0.0	0	0	1,083
200.00	1,728	157.4	100.0	2,090	2,090	1,775
201.00	2,228	176.2	100.0	1,973	4,062	2,301
202.00	2,785	195.1	100.0	2,501	6,564	2,889

Device	Routing	Invert	Outlet Devices
#1	Primary	196.33'	**4.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 196.33' / 195.55' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Secondary	200.00'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	198.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 196.00'

Primary OutFlow Max=0.14 cfs @ 13.03 hrs HW=199.97' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.14 cfs of 0.41 cfs potential flow)
└**3=Exfiltration** (Controls 0.14 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.50' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB2:

Inflow Area = 105,008 sf, 17.51% Impervious, Inflow Depth = 1.57" for 2-Year event
Inflow = 2.24 cfs @ 12.45 hrs, Volume= 13,734 cf
Outflow = 1.61 cfs @ 12.74 hrs, Volume= 13,738 cf, Atten= 28%, Lag= 17.2 min
Primary = 1.61 cfs @ 12.74 hrs, Volume= 13,738 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 199.63' @ 12.74 hrs Surf.Area= 3,007 sf Storage= 4,019 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 137.4 min (965.6 - 828.2)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	8,811 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.00	1,951	201.9	0.0	0	0	1,951
200.00	3,275	239.6	100.0	5,169	5,169	3,347
201.00	4,022	258.4	100.0	3,642	8,811	4,133

Device	Routing	Invert	Outlet Devices
#1	Primary	195.83'	**8.0" Round Culvert** L= 53.7' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.83' / 195.30' S= 0.0099 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	200.00'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	195.83'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	198.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 195.20'
#5	Device 1	199.50'	**Special & User-Defined** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600

Primary OutFlow Max=1.59 cfs @ 12.74 hrs HW=199.63' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.59 cfs of 2.56 cfs potential flow)
  └**3=Orifice/Grate** (Passes 0.24 cfs of 0.80 cfs potential flow)
    └**4=Exfiltration** (Controls 0.24 cfs)
  └**5=Special & User-Defined** (Custom Controls 1.34 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB3:

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 1.34" for 2-Year event
Inflow = 4.77 cfs @ 12.32 hrs, Volume= 33,359 cf
Outflow = 4.75 cfs @ 12.33 hrs, Volume= 33,361 cf, Atten= 0%, Lag= 0.7 min
Primary = 0.24 cfs @ 12.33 hrs, Volume= 15,636 cf
Secondary = 4.51 cfs @ 12.33 hrs, Volume= 17,725 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.39' @ 12.33 hrs Surf.Area= 2,864 sf Storage= 3,885 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 95.3 min (955.1 - 859.8)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	9,363 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.75	1,912	178.7	0.0	0	0	1,912
215.00	2,048	183.4	100.0	495	495	2,055
216.00	2,626	202.3	100.0	2,331	2,826	2,666
216.25	2,780	207.0	100.0	676	3,502	2,828
218.00	3,953	240.0	100.0	5,861	9,363	4,065

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**4.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	214.75'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.08'
#3	Secondary	216.25'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.24 cfs @ 12.33 hrs HW=216.39' TW=212.76' (Dynamic Tailwater)
└**1=Orifice/Grate** (Passes 0.24 cfs of 0.80 cfs potential flow)
  └**2=Exfiltration** (Controls 0.24 cfs)

Secondary OutFlow Max=4.48 cfs @ 12.33 hrs HW=216.39' TW=215.71' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 4.48 cfs @ 0.95 fps)

Summary for Pond FB4:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 2.05 cfs @ 12.21 hrs, Volume= 9,665 cf
Outflow = 0.27 cfs @ 13.18 hrs, Volume= 9,666 cf, Atten= 87%, Lag= 58.3 min
Primary = 0.27 cfs @ 13.18 hrs, Volume= 9,666 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 225.96' @ 13.18 hrs Surf.Area= 3,300 sf Storage= 3,626 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 128.8 min (927.8 - 798.9)

Volume	Invert	Avail.Storage	Storage Description
#1	224.65'	7,639 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
224.65	2,283	201.1	0	0	2,283
226.00	3,337	353.8	3,771	3,771	9,036
227.00	4,425	372.7	3,868	7,639	10,188

Device	Routing	Invert	Outlet Devices
#1	Primary	222.45'	**8.0" Round Culvert** L= 72.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.45' / 222.10' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	226.65'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	222.45'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	224.65'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 222.32'
#5	Device 1	226.15'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600

Primary OutFlow Max=0.27 cfs @ 13.18 hrs HW=225.96' TW=222.20' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.27 cfs of 2.16 cfs potential flow)
  └**3=Orifice/Grate** (Passes 0.27 cfs of 0.77 cfs potential flow)
    └**4=Exfiltration** (Controls 0.27 cfs)
  └**5=neenah 4345** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=224.65' TW=222.15' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB5:

Inflow Area = 362,784 sf, 10.25% Impervious, Inflow Depth = 0.72" for 2-Year event
Inflow = 3.79 cfs @ 12.35 hrs, Volume= 21,642 cf
Outflow = 0.73 cfs @ 13.27 hrs, Volume= 21,655 cf, Atten= 81%, Lag= 55.5 min
Primary = 0.73 cfs @ 13.27 hrs, Volume= 21,655 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 220.51' @ 13.27 hrs Surf.Area= 7,642 sf Storage= 6,982 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 79.2 min (911.8 - 832.5)

Volume	Invert	Avail.Storage	Storage Description
#1	219.50'	21,027 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
219.50	6,189	461.2	0	0	6,189
220.00	6,895	480.1	3,269	3,269	7,624
221.00	8,392	517.8	7,631	10,901	10,659
222.00	11,966	681.2	10,126	21,027	26,261

Device	Routing	Invert	Outlet Devices
#1	Primary	217.15'	**8.0" Round Culvert** L= 30.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 217.15' / 217.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	217.33'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	219.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 219.00'
#4	Device 1	221.00'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#5	Secondary	221.65'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.73 cfs @ 13.27 hrs HW=220.51' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.73 cfs of 2.67 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.73 cfs @ 8.36 fps)
    - **3=Exfiltration** (Passes 0.73 cfs of 1.17 cfs potential flow)
  - **4=neenah 4345** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=219.50' TW=0.00' (Dynamic Tailwater)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link SP1:

Inflow Area = 410,511 sf, 9.23% Impervious, Inflow Depth = 0.76" for 2-Year event
Inflow = 1.55 cfs @ 12.29 hrs, Volume= 26,060 cf
Primary = 1.55 cfs @ 12.29 hrs, Volume= 26,060 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP2:

Inflow Area = 459,494 sf, 15.21% Impervious, Inflow Depth = 1.39" for 2-Year event
Inflow = 5.39 cfs @ 12.60 hrs, Volume= 53,356 cf
Primary = 5.39 cfs @ 12.60 hrs, Volume= 53,356 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP3:

Inflow Area = 129,579 sf, 14.19% Impervious, Inflow Depth = 1.54" for 2-Year event
Inflow = 1.84 cfs @ 12.73 hrs, Volume= 16,649 cf
Primary = 1.84 cfs @ 12.73 hrs, Volume= 16,649 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP4:

Inflow Area = 632,247 sf, 0.49% Impervious, Inflow Depth = 0.97" for 2-Year event
Inflow = 6.13 cfs @ 12.81 hrs, Volume= 50,898 cf
Primary = 6.13 cfs @ 12.81 hrs, Volume= 50,898 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Time span=0.00-48.00 hrs, dt=0.06 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10: Runoff Area=47,727 sf 1.48% Impervious Runoff Depth=2.11"
Flow Length=144' Slope=0.0733 '/' Tc=17.4 min CN=WQ Runoff=1.82 cfs 8,373 cf

Subcatchment20: Runoff Area=72,353 sf 13.61% Impervious Runoff Depth=2.68"
Flow Length=572' Tc=16.0 min CN=WQ Runoff=3.57 cfs 16,143 cf

Subcatchment21: Runoff Area=39,673 sf 31.42% Impervious Runoff Depth=2.63"
Flow Length=448' Tc=6.0 min CN=WQ Runoff=2.45 cfs 8,711 cf

Subcatchment22: Runoff Area=196,382 sf 8.98% Impervious Runoff Depth=2.60"
Flow Length=668' Tc=22.6 min CN=WQ Runoff=8.30 cfs 42,583 cf

Subcatchment23: Runoff Area=101,914 sf 24.65% Impervious Runoff Depth=1.99"
Flow Length=641' Tc=15.3 min UI Adjusted CN=WQ Runoff=3.62 cfs 16,896 cf

Subcatchment24: Runoff Area=362,784 sf 10.25% Impervious Runoff Depth=1.38"
Flow Length=1,197' Tc=24.1 min UI Adjusted CN=WQ Runoff=7.48 cfs 41,643 cf

Subcatchment25: Runoff Area=49,172 sf 9.80% Impervious Runoff Depth=2.76"
Flow Length=322' Tc=36.0 min CN=WQ Runoff=1.79 cfs 11,292 cf

Subcatchment30: Runoff Area=24,571 sf 0.00% Impervious Runoff Depth=2.60"
Flow Length=385' Tc=20.7 min CN=WQ Runoff=1.09 cfs 5,322 cf

Subcatchment31: Runoff Area=105,008 sf 17.51% Impervious Runoff Depth=2.75"
Flow Length=561' Tc=32.5 min CN=WQ Runoff=3.96 cfs 24,096 cf

Subcatchment40: Runoff Area=632,247 sf 0.49% Impervious Runoff Depth=1.83"
Flow Length=1,576' Tc=58.5 min CN=WQ Runoff=11.81 cfs 96,573 cf

Reach 1R: OCS outlet Avg. Flow Depth=0.19' Max Vel=2.03 fps Inflow=0.26 cfs 18,043 cf
18.0" Round Pipe n=0.013 L=106.2' S=0.0055 '/' Capacity=7.76 cfs Outflow=0.26 cfs 18,044 cf

Reach R2: Avg. Flow Depth=0.39' Max Vel=2.49 fps Inflow=8.14 cfs 58,776 cf
n=0.035 L=455.4' S=0.0307 '/' Capacity=1,702.45 cfs Outflow=8.10 cfs 58,775 cf

Reach R3: Avg. Flow Depth=0.23' Max Vel=1.54 fps Inflow=1.79 cfs 11,292 cf
n=0.035 L=595.6' S=0.0235 '/' Capacity=1,488.65 cfs Outflow=1.73 cfs 11,292 cf

Reach R4: Avg. Flow Depth=0.16' Max Vel=1.67 fps Inflow=2.31 cfs 16,896 cf
n=0.030 L=362.4' S=0.0170 '/' Capacity=2,293.44 cfs Outflow=2.19 cfs 16,896 cf

Pond CLV-15: Peak Elev=216.97' Inflow=2.19 cfs 16,896 cf
15.0" Round Culvert n=0.013 L=47.0' S=0.0053 '/' Outflow=2.19 cfs 16,896 cf

Pond CLV-36: Peak Elev=215.54' Inflow=1.79 cfs 11,292 cf
36.0" Round Culvert w/ 12.0" inside fill n=0.013 L=55.0' S=0.0055 '/' Outflow=1.79 cfs 11,292 cf

Pond DB1: Peak Elev=216.62' Storage=5,898 cf Inflow=8.63 cfs 41,438 cf
Primary=7.88 cfs 40,732 cf Secondary=0.00 cfs 0 cf Outflow=7.88 cfs 40,732 cf

Pond FB1: Peak Elev=200.17' Storage=2,387 cf Inflow=2.45 cfs 8,711 cf
Primary=0.15 cfs 6,619 cf Secondary=1.76 cfs 2,097 cf Outflow=1.91 cfs 8,717 cf

Pond FB2: Peak Elev=200.06' Storage=5,362 cf Inflow=3.96 cfs 24,096 cf
Primary=2.70 cfs 23,889 cf Secondary=0.36 cfs 210 cf Outflow=3.06 cfs 24,099 cf

Pond FB3: Peak Elev=216.63' Storage=4,607 cf Inflow=9.28 cfs 59,479 cf
Primary=0.26 cfs 18,043 cf Secondary=8.63 cfs 41,438 cf Outflow=8.88 cfs 59,481 cf

Pond FB4: Peak Elev=226.32' Storage=4,907 cf Inflow=3.62 cfs 16,896 cf
Primary=2.31 cfs 16,896 cf Secondary=0.00 cfs 0 cf Outflow=2.31 cfs 16,896 cf

Pond FB5: Peak Elev=221.25' Storage=13,088 cf Inflow=7.48 cfs 41,643 cf
Primary=3.00 cfs 41,653 cf Secondary=0.00 cfs 0 cf Outflow=3.00 cfs 41,653 cf

Link SP1: Inflow=3.68 cfs 50,025 cf
Primary=3.68 cfs 50,025 cf

Link SP2: Inflow=12.41 cfs 94,927 cf
Primary=12.41 cfs 94,927 cf

Link SP3: Inflow=3.77 cfs 29,421 cf
Primary=3.77 cfs 29,421 cf

Link SP4: Inflow=11.81 cfs 96,573 cf
Primary=11.81 cfs 96,573 cf

Total Runoff Area = 1,631,831 sf Runoff Volume = 271,631 cf Average Runoff Depth = 2.00"
92.08% Pervious = 1,502,557 sf 7.92% Impervious = 129,274 sf

Summary for Subcatchment 10:

Runoff = 1.82 cfs @ 12.25 hrs, Volume= 8,373 cf, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

Area (sf)	CN	Description
13,358	74	>75% Grass cover, Good, HSG C
614	80	>75% Grass cover, Good, HSG D
19,231	55	Woods, Good, HSG B
3,231	70	Woods, Good, HSG C
10,585	77	Woods, Good, HSG D
708	98	Roofs, HSG A
47,727		Weighted Average
47,019		98.52% Pervious Area
708		1.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	144	0.0733	0.14		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Subcatchment 20:

Runoff = 3.57 cfs @ 12.22 hrs, Volume= 16,143 cf, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
*	2,658	98	Existing Paved roads
*	7,186	98	Proposed Paved roads
	2,600	30	Woods, Good, HSG A
	2,529	70	Woods, Good, HSG C
	1,450	77	Woods, Good, HSG D
	2,071	39	>75% Grass cover, Good, HSG A
	40,346	74	>75% Grass cover, Good, HSG C
	13,513	80	>75% Grass cover, Good, HSG D
	72,353		Weighted Average
	62,509		86.39% Pervious Area
	9,844		13.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	150	0.0474	0.18		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
1.8	422	0.0292	3.89	300.48	**Channel Flow, Seg B to C** Area= 77.3 sf Perim= 197.1' r= 0.39' n= 0.035 Earth, dense weeds
16.0	572	Total			

Summary for Subcatchment 21:

Runoff = 2.45 cfs @ 12.09 hrs, Volume= 8,711 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
	953	30	Woods, Good, HSG A
	2,832	98	Unconnected roofs, HSG D
*	9,633	98	Proposed Roads & Driveways, Paved
	9,011	39	>75% Grass cover, Good, HSG A
	17,096	74	>75% Grass cover, Good, HSG C
	148	80	>75% Grass cover, Good, HSG D
	39,673		Weighted Average
	27,208		68.58% Pervious Area
	12,465		31.42% Impervious Area
	2,832		22.72% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	44	0.0505	0.14		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
0.8	404	0.0396	8.42	42.10	**Trap/Vee/Rect Channel Flow, Seg B to C** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
6.0	448	Total			

Summary for Subcatchment 22:

Runoff = 8.30 cfs @ 12.31 hrs, Volume= 42,583 cf, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
*	313	30	Woods, Good, HSG A
	2,212	55	Woods, Good, HSG B
	53,610	70	Woods, Good, HSG C
	75,166	77	Woods, Good, HSG D
	55	39	>75% Grass cover, Good, HSG A
	7,806	61	>75% Grass cover, Good, HSG B
	39,444	74	>75% Grass cover, Good, HSG C
	135	80	>75% Grass cover, Good, HSG D
*	1,128	98	Unconnected roofs
*	16,513	98	Proposed Road & Driveways, Paved
	196,382		Weighted Average
	178,741		91.02% Pervious Area
	17,641		8.98% Impervious Area
	1,128		6.39% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	36	0.0451	1.53		**Sheet Flow, Seg A to B** Smooth surfaces n= 0.011 P2= 3.10"
20.3	114	0.0112	0.09		**Sheet Flow, Seg B to C** Grass: Dense n= 0.240 P2= 3.10"
1.7	469	0.0113	4.50	22.49	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
0.2	49	0.0051	3.76	4.61	**Pipe Channel, Seg D to E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
22.6	668	Total			

Summary for Subcatchment 23:

Runoff = 3.62 cfs @ 12.21 hrs, Volume= 16,896 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Adj	Description
*	4,956	98	98	Unconnected roofs
	3,595	39	39	>75% Grass cover, Good, HSG A
	45,006	61	61	>75% Grass cover, Good, HSG B
*	20,164	98	98	Proposed Road & Driveways, Paved,
	28,193	30	30	Woods, Good, HSG A
	101,914			Weighted Average
	76,794			75.35% Pervious Area
	25,120			24.65% Impervious Area
	4,956			19.73% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	58	0.0090	0.07		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
2.4	583	0.0088	3.97	19.85	**Trap/Vee/Rect Channel Flow, Seg B to C** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
15.3	641	Total			

Summary for Subcatchment 24:

Runoff = 7.48 cfs @ 12.34 hrs, Volume= 41,643 cf, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Adj	Description
	81,157	30	30	Woods, Good, HSG A
	6,240	55	55	Woods, Good, HSG B
	11,328	98	98	Unconnected roofs, HSG A
	131,591	39	39	>75% Grass cover, Good, HSG A
	93,080	61	61	>75% Grass cover, Good, HSG B
	13,482	74	74	>75% Grass cover, Good, HSG C
	65	80	80	>75% Grass cover, Good, HSG D
*	16,205	98	98	Proposed Roads, Paved
*	9,636	98	98	Proposed Driveways, Paved parking
	362,784			Weighted Average
	325,615			89.75% Pervious Area
	37,169			10.25% Impervious Area
	11,328			30.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.9	150	0.0181	0.12		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
0.7	143	0.0489	3.56		**Shallow Concentrated Flow, Seg B to C** Unpaved Kv= 16.1 fps
0.1	64	0.0935	18.35	435.79	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=2.50' Z= 3.0 '/' Top.W=17.00' n= 0.030 Earth, grassed & winding
1.8	481	0.0050	4.49	126.68	**Trap/Vee/Rect Channel Flow, Seg D to E** Bot.W=2.00' D=2.75' Z= 3.0 '/' Top.W=18.50' n= 0.030 Earth, grassed & winding
0.6	359	0.0171	9.97	281.13	**Trap/Vee/Rect Channel Flow, Seg E to F** Bot.W=2.00' D=2.75' Z= 3.0 '/' Top.W=18.50' n= 0.025 Earth, clean & winding
24.1	1,197	Total			

Summary for Subcatchment 25:

Runoff = 1.79 cfs @ 12.50 hrs, Volume= 11,292 cf, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
*	3,401	98	Proposed Roads & Driveways, Paved
	4,691	70	Woods, Good, HSG C
	28,478	77	Woods, Good, HSG D
*	1,416	98	Unconnected roofs, HSG D
	9,946	74	>75% Grass cover, Good, HSG C
	1,240	80	>75% Grass cover, Good, HSG D
	49,172		Weighted Average
	44,355		90.20% Pervious Area
	4,817		9.80% Impervious Area
	1,416		29.40% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.5	150	0.0180	0.08		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
4.5	172	0.0165	0.64		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
36.0	322	Total			

Summary for Subcatchment 30:

Runoff = 1.09 cfs @ 12.29 hrs, Volume= 5,322 cf, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

Area (sf)	CN	Description
2,189	70	Woods, Good, HSG C
19,317	77	Woods, Good, HSG D
3,065	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
24,571		Weighted Average
24,571		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.0774	0.14		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	91	0.0892	1.49		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
2.1	144	0.0531	1.15		**Shallow Concentrated Flow, Seg C to D**
					Woodland Kv= 5.0 fps
20.7	385	Total			

Summary for Subcatchment 31:

Runoff = 3.96 cfs @ 12.45 hrs, Volume= 24,096 cf, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
	21,215	70	Woods, Good, HSG C
	5,664	98	Unconnected roofs, HSG D
*	12,726	98	Proposed Road & Driveways, Paved
	65,403	74	>75% Grass cover, Good, HSG C
	105,008		Weighted Average
	86,618		82.49% Pervious Area
	18,390		17.51% Impervious Area
	5,664		30.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.9	150	0.0223	0.09		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	66	0.0060	0.39		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
0.6	276	0.0348	7.89	39.47	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
0.2	69	0.1157	5.48		**Shallow Concentrated Flow, Seg D to E** Unpaved Kv= 16.1 fps
32.5	561	Total			

Summary for Subcatchment 40:

Runoff = 11.81 cfs @ 12.80 hrs, Volume= 96,573 cf, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 10-Year Rainfall=4.60", Ia/S=0.05

	Area (sf)	CN	Description
*	203,365	30	Woods, Good, HSG A
	1,052	55	Woods, Good, HSG B
	96,940	70	Woods, Good, HSG C
	286,383	77	Woods, Good, HSG D
*	1,474	39	>75% Grass cover, Good, HSG A
	30,981	61	>75% Grass cover, Good, HSG B
	8,745	74	>75% Grass cover, Good, HSG C
	187	80	>75% Grass cover, Good, HSG D
	3,120	98	Unconnected roofs, HSG A
	632,247		Weighted Average
	629,127		99.51% Pervious Area
	3,120		0.49% Impervious Area
	3,120		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.8	150	0.0163	0.08		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
13.2	592	0.0223	0.75		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
11.3	505	0.0223	0.75		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
1.2	329	0.0252	4.47	177.85	**Channel Flow, Seg D to E** Area= 39.8 sf Perim= 92.9' r= 0.43' n= 0.030 Earth, grassed & winding
58.5	1,576	Total			

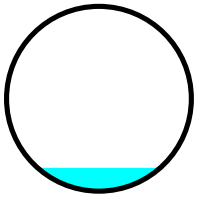
Summary for Reach 1R: OCS outlet

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 0.73" for 10-Year event
Inflow = 0.26 cfs @ 12.56 hrs, Volume= 18,043 cf
Outflow = 0.26 cfs @ 12.57 hrs, Volume= 18,044 cf, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 2.03 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.69 fps, Avg. Travel Time= 1.0 min

Peak Storage= 14 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 7.76 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 106.2' Slope= 0.0055 '/'
Inlet Invert= 212.58', Outlet Invert= 212.00'



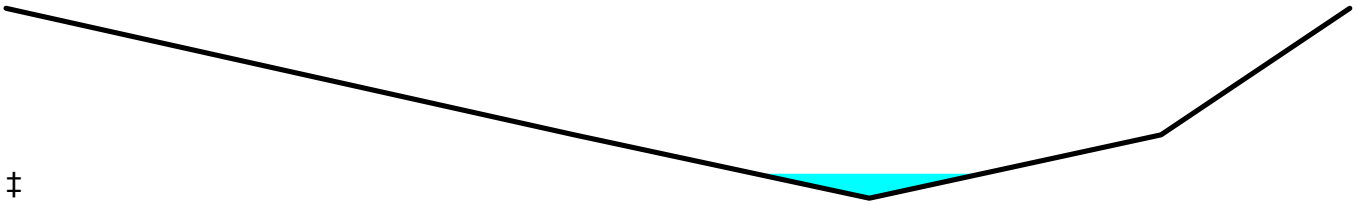
Summary for Reach R2:

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 2.36" for 10-Year event
Inflow = 8.14 cfs @ 12.50 hrs, Volume= 58,776 cf
Outflow = 8.10 cfs @ 12.55 hrs, Volume= 58,775 cf, Atten= 1%, Lag= 2.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 8.8 min

Peak Storage= 1,479 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,702.45 cfs

Custom cross-section, Length= 455.4' Slope= 0.0307 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 212.00', Outlet Invert= 198.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	210.00	0.00
41.81	208.00	2.00
63.54	207.00	3.00
85.01	208.00	2.00
98.90	210.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	21.6	43.2	9,837	101.22
3.00	163.7	99.1	74,549	1,702.45

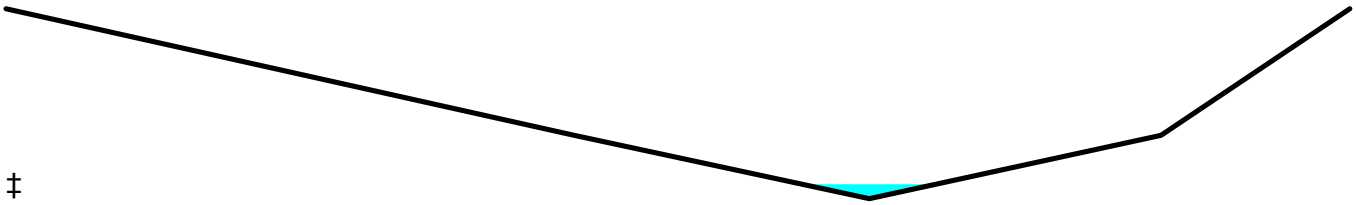
Summary for Reach R3:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 2.76" for 10-Year event
Inflow = 1.79 cfs @ 12.50 hrs, Volume= 11,292 cf
Outflow = 1.73 cfs @ 12.58 hrs, Volume= 11,292 cf, Atten= 3%, Lag= 5.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.54 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 15.2 min

Peak Storage= 670 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,488.65 cfs

Custom cross-section, Length= 595.6' Slope= 0.0235 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 212.00', Outlet Invert= 198.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	210.00	0.00
41.81	208.00	2.00
63.54	207.00	3.00
85.01	208.00	2.00
98.90	210.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	21.6	43.2	12,865	88.51
3.00	163.7	99.1	97,500	1,488.65

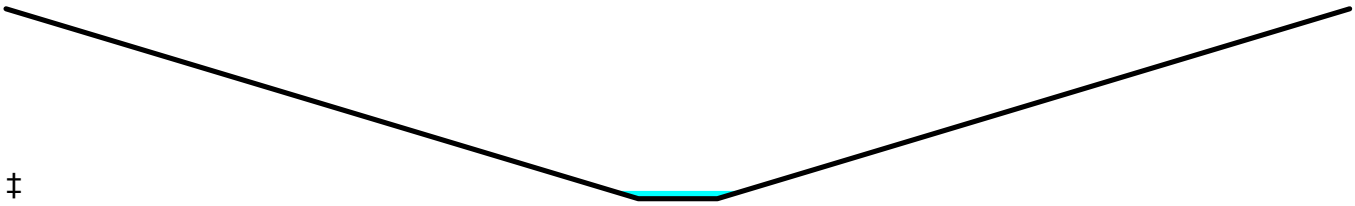
Summary for Reach R4:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 1.99" for 10-Year event
Inflow = 2.31 cfs @ 12.44 hrs, Volume= 16,896 cf
Outflow = 2.19 cfs @ 12.50 hrs, Volume= 16,896 cf, Atten= 5%, Lag= 3.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.67 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 7.7 min

Peak Storage= 476 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 4.00' Flow Area= 216.0 sf, Capacity= 2,293.44 cfs

6.00' x 4.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 12.0 '/' Top Width= 102.00'
Length= 362.4' Slope= 0.0170 '/'
Inlet Invert= 222.15', Outlet Invert= 216.00'



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Summary for Pond CLV-15:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 1.99" for 10-Year event
Inflow = 2.19 cfs @ 12.50 hrs, Volume= 16,896 cf
Outflow = 2.19 cfs @ 12.50 hrs, Volume= 16,896 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.19 cfs @ 12.50 hrs, Volume= 16,896 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.97' @ 12.52 hrs
Flood Elev= 219.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	216.00'	**15.0" Round Culvert** L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 216.00' / 215.75' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.06 cfs @ 12.50 hrs HW=216.96' TW=216.61' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.06 cfs @ 2.80 fps)

Summary for Pond CLV-36:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 2.76" for 10-Year event
Inflow = 1.79 cfs @ 12.50 hrs, Volume= 11,292 cf
Outflow = 1.79 cfs @ 12.50 hrs, Volume= 11,292 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.79 cfs @ 12.50 hrs, Volume= 11,292 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 215.54' @ 12.50 hrs
Flood Elev= 219.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	215.15'	**36.0" Round Culvert w/ 12.0" inside fill** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 214.15' / 213.85' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 5.01 sf

Primary OutFlow Max=1.78 cfs @ 12.50 hrs HW=215.54' TW=212.22' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.78 cfs @ 1.57 fps)

Summary for Pond DB1:

Inflow = 8.63 cfs @ 12.42 hrs, Volume= 41,438 cf
Outflow = 7.88 cfs @ 12.50 hrs, Volume= 40,732 cf, Atten= 9%, Lag= 5.3 min
Primary = 7.88 cfs @ 12.50 hrs, Volume= 40,732 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.62' @ 12.50 hrs Surf.Area= 3,786 sf Storage= 5,898 cf

Plug-Flow detention time= 74.4 min calculated for 40,681 cf (98% of inflow)
Center-of-Mass det. time= 66.1 min (904.2 - 838.2)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	11,840 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.75	2,572	199.4	0.0	0	0	2,572
215.00	2,723	204.1	100.0	662	662	2,731
216.00	3,364	223.0	100.0	3,038	3,700	3,408
216.25	3,533	227.7	100.0	862	4,562	3,586
217.00	4,061	241.8	100.0	2,845	7,407	4,141
218.00	4,815	260.7	100.0	4,433	11,840	4,938

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**15.0" Round Culvert** L= 106.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.58' / 212.00' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.00'	**3.0" Vert. Orifice/Grate** C= 0.600

#3	Device 1	216.00'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#4	Secondary	216.75'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=7.86 cfs @ 12.50 hrs HW=216.61' TW=212.39' (Dynamic Tailwater)
↑**1=Culvert** (Passes 7.86 cfs of 9.05 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 0.29 cfs @ 5.87 fps)
3=neenah 4345 (Custom Controls 7.57 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=214.75' TW=212.00' (Dynamic Tailwater)
↑**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB1:

Inflow Area = 39,673 sf, 31.42% Impervious, Inflow Depth = 2.63" for 10-Year event
Inflow = 2.45 cfs @ 12.09 hrs, Volume= 8,711 cf
Outflow = 1.91 cfs @ 12.19 hrs, Volume= 8,717 cf, Atten= 22%, Lag= 6.5 min
Primary = 0.15 cfs @ 12.20 hrs, Volume= 6,619 cf
Secondary = 1.76 cfs @ 12.19 hrs, Volume= 2,097 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 200.17' @ 12.20 hrs Surf.Area= 1,808 sf Storage= 2,387 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 122.2 min (904.2 - 782.0)

Volume	Invert	Avail.Storage	Storage Description
#1	198.50'	6,564 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.50	1,083	128.5	0.0	0	0	1,083
200.00	1,728	157.4	100.0	2,090	2,090	1,775
201.00	2,228	176.2	100.0	1,973	4,062	2,301
202.00	2,785	195.1	100.0	2,501	6,564	2,889

Device	Routing	Invert	Outlet Devices
#1	Primary	196.33'	**4.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 196.33' / 195.55' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Secondary	200.00'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	198.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 196.00'

Primary OutFlow Max=0.15 cfs @ 12.20 hrs HW=200.16' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.15 cfs of 0.42 cfs potential flow)
└**3=Exfiltration** (Controls 0.15 cfs)

Secondary OutFlow Max=1.62 cfs @ 12.19 hrs HW=200.16' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.62 cfs @ 1.02 fps)

Summary for Pond FB2:

Inflow Area = 105,008 sf, 17.51% Impervious, Inflow Depth = 2.75" for 10-Year event
Inflow = 3.96 cfs @ 12.45 hrs, Volume= 24,096 cf
Outflow = 3.06 cfs @ 12.68 hrs, Volume= 24,099 cf, Atten= 23%, Lag= 14.2 min
Primary = 2.70 cfs @ 12.68 hrs, Volume= 23,889 cf
Secondary = 0.36 cfs @ 12.68 hrs, Volume= 210 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 200.06' @ 12.68 hrs Surf.Area= 3,317 sf Storage= 5,362 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 106.6 min (927.3 - 820.8)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	8,811 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.00	1,951	201.9	0.0	0	0	1,951
200.00	3,275	239.6	100.0	5,169	5,169	3,347
201.00	4,022	258.4	100.0	3,642	8,811	4,133

Device	Routing	Invert	Outlet Devices
#1	Primary	195.83'	**8.0" Round Culvert** L= 53.7' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.83' / 195.30' S= 0.0099 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	200.00'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	195.83'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	198.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 195.20'
#5	Device 1	199.50'	**Special & User-Defined** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600

Primary OutFlow Max=2.70 cfs @ 12.68 hrs HW=200.06' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 2.70 cfs @ 7.74 fps)
└**3=Orifice/Grate** (Passes < 0.85 cfs potential flow)
└**4=Exfiltration** (Passes < 0.29 cfs potential flow)
└**5=Special & User-Defined** (Passes < 7.19 cfs potential flow)

Secondary OutFlow Max=0.33 cfs @ 12.68 hrs HW=200.06' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.33 cfs @ 0.60 fps)

Summary for Pond FB3:

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 2.39" for 10-Year event
Inflow = 9.28 cfs @ 12.41 hrs, Volume= 59,479 cf
Outflow = 8.88 cfs @ 12.42 hrs, Volume= 59,481 cf, Atten= 4%, Lag= 0.5 min
Primary = 0.26 cfs @ 12.56 hrs, Volume= 18,043 cf
Secondary = 8.63 cfs @ 12.42 hrs, Volume= 41,438 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.63' @ 12.56 hrs Surf.Area= 3,018 sf Storage= 4,607 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 63.6 min (914.7 - 851.1)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	9,363 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.75	1,912	178.7	0.0	0	0	1,912
215.00	2,048	183.4	100.0	495	495	2,055
216.00	2,626	202.3	100.0	2,331	2,826	2,666
216.25	2,780	207.0	100.0	676	3,502	2,828
218.00	3,953	240.0	100.0	5,861	9,363	4,065

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**4.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	214.75'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.08'
#3	Secondary	216.25'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.26 cfs @ 12.56 hrs HW=216.63' TW=212.77' (Dynamic Tailwater)
└**1=Orifice/Grate** (Passes 0.26 cfs of 0.83 cfs potential flow)
└**2=Exfiltration** (Controls 0.26 cfs)

Secondary OutFlow Max=0.00 cfs @ 12.42 hrs HW=216.57' TW=216.58' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB4:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 1.99" for 10-Year event
Inflow = 3.62 cfs @ 12.21 hrs, Volume= 16,896 cf
Outflow = 2.31 cfs @ 12.44 hrs, Volume= 16,896 cf, Atten= 36%, Lag= 14.0 min
Primary = 2.31 cfs @ 12.44 hrs, Volume= 16,896 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 226.32' @ 12.44 hrs Surf.Area= 3,673 sf Storage= 4,907 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 125.9 min (924.0 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1	224.65'	7,639 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
224.65	2,283	201.1	0	0	2,283
226.00	3,337	353.8	3,771	3,771	9,036
227.00	4,425	372.7	3,868	7,639	10,188

Device	Routing	Invert	Outlet Devices
#1	Primary	222.45'	**8.0" Round Culvert** L= 72.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.45' / 222.10' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	226.65'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	222.45'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	224.65'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 222.32'
#5	Device 1	226.15'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600

Primary OutFlow Max=2.28 cfs @ 12.44 hrs HW=226.32' TW=222.30' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 2.28 cfs @ 6.52 fps)
  - **3=Orifice/Grate** (Passes < 0.81 cfs potential flow)
    - **4=Exfiltration** (Passes < 0.32 cfs potential flow)
  - **5=neenah 4345** (Passes < 1.97 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=224.65' TW=222.15' (Dynamic Tailwater)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB5:

Inflow Area = 362,784 sf, 10.25% Impervious, Inflow Depth = 1.38" for 10-Year event
Inflow = 7.48 cfs @ 12.34 hrs, Volume= 41,643 cf
Outflow = 3.00 cfs @ 12.81 hrs, Volume= 41,653 cf, Atten= 60%, Lag= 28.3 min
Primary = 3.00 cfs @ 12.81 hrs, Volume= 41,653 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 221.25' @ 12.81 hrs Surf.Area= 9,221 sf Storage= 13,088 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 116.9 min (947.8 - 830.9)

Volume	Invert	Avail.Storage	Storage Description
#1	219.50'	21,027 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
219.50	6,189	461.2	0	0	6,189
220.00	6,895	480.1	3,269	3,269	7,624
221.00	8,392	517.8	7,631	10,901	10,659
222.00	11,966	681.2	10,126	21,027	26,261

Device	Routing	Invert	Outlet Devices
#1	Primary	217.15'	**8.0" Round Culvert** L= 30.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 217.15' / 217.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	217.33'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	219.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 219.00'
#4	Device 1	221.00'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#5	Secondary	221.65'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.00 cfs @ 12.81 hrs HW=221.25' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 3.00 cfs @ 8.59 fps)
  - **2=Orifice/Grate** (Passes < 0.81 cfs potential flow)
    - **3=Exfiltration** (Passes < 1.85 cfs potential flow)
  - **4=neenah 4345** (Passes < 3.45 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=219.50' TW=0.00' (Dynamic Tailwater)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link SP1:

Inflow Area = 410,511 sf, 9.23% Impervious, Inflow Depth = 1.46" for 10-Year event
Inflow = 3.68 cfs @ 12.67 hrs, Volume= 50,025 cf
Primary = 3.68 cfs @ 12.67 hrs, Volume= 50,025 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP2:

Inflow Area = 459,494 sf, 15.21% Impervious, Inflow Depth = 2.48" for 10-Year event
Inflow = 12.41 cfs @ 12.45 hrs, Volume= 94,927 cf
Primary = 12.41 cfs @ 12.45 hrs, Volume= 94,927 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP3:

Inflow Area = 129,579 sf, 14.19% Impervious, Inflow Depth = 2.72" for 10-Year event
Inflow = 3.77 cfs @ 12.39 hrs, Volume= 29,421 cf
Primary = 3.77 cfs @ 12.39 hrs, Volume= 29,421 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP4:

Inflow Area = 632,247 sf, 0.49% Impervious, Inflow Depth = 1.83" for 10-Year event
Inflow = 11.81 cfs @ 12.80 hrs, Volume= 96,573 cf
Primary = 11.81 cfs @ 12.80 hrs, Volume= 96,573 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Time span=0.00-48.00 hrs, dt=0.06 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10: Runoff Area=47,727 sf 1.48% Impervious Runoff Depth=3.00"
Flow Length=144' Slope=0.0733 '/' Tc=17.4 min CN=WQ Runoff=2.60 cfs 11,928 cf

Subcatchment20: Runoff Area=72,353 sf 13.61% Impervious Runoff Depth=3.67"
Flow Length=572' Tc=16.0 min CN=WQ Runoff=4.91 cfs 22,153 cf

Subcatchment21: Runoff Area=39,673 sf 31.42% Impervious Runoff Depth=3.56"
Flow Length=448' Tc=6.0 min CN=WQ Runoff=3.31 cfs 11,766 cf

Subcatchment22: Runoff Area=196,382 sf 8.98% Impervious Runoff Depth=3.60"
Flow Length=668' Tc=22.6 min CN=WQ Runoff=11.53 cfs 58,986 cf

Subcatchment23: Runoff Area=101,914 sf 24.65% Impervious Runoff Depth=2.75"
Flow Length=641' Tc=15.3 min UI Adjusted CN=WQ Runoff=5.07 cfs 23,363 cf

Subcatchment24: Runoff Area=362,784 sf 10.25% Impervious Runoff Depth=2.00"
Flow Length=1,197' Tc=24.1 min UI Adjusted CN=WQ Runoff=11.00 cfs 60,524 cf

Subcatchment25: Runoff Area=49,172 sf 9.80% Impervious Runoff Depth=3.79"
Flow Length=322' Tc=36.0 min CN=WQ Runoff=2.47 cfs 15,529 cf

Subcatchment30: Runoff Area=24,571 sf 0.00% Impervious Runoff Depth=3.62"
Flow Length=385' Tc=20.7 min CN=WQ Runoff=1.52 cfs 7,411 cf

Subcatchment31: Runoff Area=105,008 sf 17.51% Impervious Runoff Depth=3.77"
Flow Length=561' Tc=32.5 min CN=WQ Runoff=5.45 cfs 33,026 cf

Subcatchment40: Runoff Area=632,247 sf 0.49% Impervious Runoff Depth=2.61"
Flow Length=1,576' Tc=58.5 min CN=WQ Runoff=16.91 cfs 137,668 cf

Reach 1R: OCS outlet Avg. Flow Depth=0.20' Max Vel=2.10 fps Inflow=0.29 cfs 19,582 cf
18.0" Round Pipe n=0.013 L=106.2' S=0.0055 '/' Capacity=7.76 cfs Outflow=0.29 cfs 19,582 cf

Reach R2: Avg. Flow Depth=0.44' Max Vel=2.73 fps Inflow=11.73 cfs 81,652 cf
n=0.035 L=455.4' S=0.0307 '/' Capacity=1,702.45 cfs Outflow=11.64 cfs 81,652 cf

Reach R3: Avg. Flow Depth=0.26' Max Vel=1.66 fps Inflow=2.47 cfs 15,529 cf
n=0.035 L=595.6' S=0.0235 '/' Capacity=1,488.65 cfs Outflow=2.39 cfs 15,529 cf

Reach R4: Avg. Flow Depth=0.19' Max Vel=1.81 fps Inflow=2.87 cfs 23,374 cf
n=0.030 L=362.4' S=0.0170 '/' Capacity=2,293.44 cfs Outflow=2.82 cfs 23,374 cf

Pond CLV-15: Peak Elev=217.29' Inflow=2.82 cfs 23,374 cf
15.0" Round Culvert n=0.013 L=47.0' S=0.0053 '/' Outflow=2.82 cfs 23,374 cf

Pond CLV-36: Peak Elev=215.63' Inflow=2.47 cfs 15,529 cf
36.0" Round Culvert w/ 12.0" inside fill n=0.013 L=55.0' S=0.0055 '/' Outflow=2.47 cfs 15,529 cf

Pond DB1: Peak Elev=216.93' Storage=7,125 cf Inflow=12.14 cfs 62,778 cf
Primary=9.47 cfs 60,209 cf Secondary=1.97 cfs 1,861 cf Outflow=11.44 cfs 62,070 cf

Pond FB1: Peak Elev=200.24' Storage=2,520 cf Inflow=3.31 cfs 11,766 cf
Primary=0.16 cfs 7,502 cf Secondary=3.05 cfs 4,266 cf Outflow=3.21 cfs 11,768 cf

Pond FB2: Peak Elev=200.21' Storage=5,870 cf Inflow=5.45 cfs 33,026 cf
Primary=2.75 cfs 29,909 cf Secondary=2.46 cfs 3,121 cf Outflow=5.22 cfs 33,030 cf

Pond FB3: Peak Elev=216.94' Storage=5,561 cf Inflow=13.82 cfs 82,360 cf
Primary=0.29 cfs 19,582 cf Secondary=12.14 cfs 62,778 cf Outflow=12.42 cfs 82,361 cf

Pond FB4: Peak Elev=226.72' Storage=6,445 cf Inflow=5.07 cfs 23,363 cf
Primary=2.40 cfs 23,079 cf Secondary=0.47 cfs 296 cf Outflow=2.87 cfs 23,374 cf

Pond FB5: Peak Elev=221.81' Storage=18,821 cf Inflow=11.00 cfs 60,524 cf
Primary=3.22 cfs 58,310 cf Secondary=1.64 cfs 2,216 cf Outflow=4.87 cfs 60,527 cf

Link SP1: Inflow=5.59 cfs 72,455 cf
Primary=5.59 cfs 72,455 cf

Link SP2: Inflow=17.63 cfs 131,102 cf
Primary=17.63 cfs 131,102 cf

Link SP3: Inflow=6.21 cfs 40,442 cf
Primary=6.21 cfs 40,442 cf

Link SP4: Inflow=16.91 cfs 137,668 cf
Primary=16.91 cfs 137,668 cf

Total Runoff Area = 1,631,831 sf Runoff Volume = 382,353 cf Average Runoff Depth = 2.81"
92.08% Pervious = 1,502,557 sf 7.92% Impervious = 129,274 sf

Summary for Subcatchment 10:

Runoff = 2.60 cfs @ 12.24 hrs, Volume= 11,928 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

Area (sf)	CN	Description
13,358	74	>75% Grass cover, Good, HSG C
614	80	>75% Grass cover, Good, HSG D
19,231	55	Woods, Good, HSG B
3,231	70	Woods, Good, HSG C
10,585	77	Woods, Good, HSG D
708	98	Roofs, HSG A
47,727		Weighted Average
47,019		98.52% Pervious Area
708		1.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	144	0.0733	0.14		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Subcatchment 20:

Runoff = 4.91 cfs @ 12.22 hrs, Volume= 22,153 cf, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
*	2,658	98	Existing Paved roads
*	7,186	98	Proposed Paved roads
	2,600	30	Woods, Good, HSG A
	2,529	70	Woods, Good, HSG C
	1,450	77	Woods, Good, HSG D
	2,071	39	>75% Grass cover, Good, HSG A
	40,346	74	>75% Grass cover, Good, HSG C
	13,513	80	>75% Grass cover, Good, HSG D
	72,353		Weighted Average
	62,509		86.39% Pervious Area
	9,844		13.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	150	0.0474	0.18		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
1.8	422	0.0292	3.89	300.48	**Channel Flow, Seg B to C** Area= 77.3 sf Perim= 197.1' r= 0.39' n= 0.035 Earth, dense weeds
16.0	572	Total			

Summary for Subcatchment 21:

Runoff = 3.31 cfs @ 12.09 hrs, Volume= 11,766 cf, Depth= 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
	953	30	Woods, Good, HSG A
	2,832	98	Unconnected roofs, HSG D
*	9,633	98	Proposed Roads & Driveways, Paved
	9,011	39	>75% Grass cover, Good, HSG A
	17,096	74	>75% Grass cover, Good, HSG C
	148	80	>75% Grass cover, Good, HSG D
	39,673		Weighted Average
	27,208		68.58% Pervious Area
	12,465		31.42% Impervious Area
	2,832		22.72% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	44	0.0505	0.14		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
0.8	404	0.0396	8.42	42.10	**Trap/Vee/Rect Channel Flow, Seg B to C** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
6.0	448	Total			

Summary for Subcatchment 22:

Runoff = 11.53 cfs @ 12.31 hrs, Volume= 58,986 cf, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
*	313	30	Woods, Good, HSG A
	2,212	55	Woods, Good, HSG B
	53,610	70	Woods, Good, HSG C
	75,166	77	Woods, Good, HSG D
	55	39	>75% Grass cover, Good, HSG A
	7,806	61	>75% Grass cover, Good, HSG B
	39,444	74	>75% Grass cover, Good, HSG C
	135	80	>75% Grass cover, Good, HSG D
*	1,128	98	Unconnected roofs
*	16,513	98	Proposed Road & Driveways, Paved
	196,382		Weighted Average
	178,741		91.02% Pervious Area
	17,641		8.98% Impervious Area
	1,128		6.39% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	36	0.0451	1.53		**Sheet Flow, Seg A to B** Smooth surfaces n= 0.011 P2= 3.10"
20.3	114	0.0112	0.09		**Sheet Flow, Seg B to C** Grass: Dense n= 0.240 P2= 3.10"
1.7	469	0.0113	4.50	22.49	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
0.2	49	0.0051	3.76	4.61	**Pipe Channel, Seg D to E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
22.6	668	Total			

Summary for Subcatchment 23:

Runoff = 5.07 cfs @ 12.21 hrs, Volume= 23,363 cf, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Adj	Description
*	4,956	98	98	Unconnected roofs
	3,595	39	39	>75% Grass cover, Good, HSG A
	45,006	61	61	>75% Grass cover, Good, HSG B
*	20,164	98	98	Proposed Road & Driveways, Paved,
	28,193	30	30	Woods, Good, HSG A
	101,914			Weighted Average
	76,794			75.35% Pervious Area
	25,120			24.65% Impervious Area
	4,956			19.73% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	58	0.0090	0.07		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
2.4	583	0.0088	3.97	19.85	**Trap/Vee/Rect Channel Flow, Seg B to C** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
15.3	641	Total			

Summary for Subcatchment 24:

Runoff = 11.00 cfs @ 12.34 hrs, Volume= 60,524 cf, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Adj	Description
	81,157	30	30	Woods, Good, HSG A
	6,240	55	55	Woods, Good, HSG B
	11,328	98	98	Unconnected roofs, HSG A
	131,591	39	39	>75% Grass cover, Good, HSG A
	93,080	61	61	>75% Grass cover, Good, HSG B
	13,482	74	74	>75% Grass cover, Good, HSG C
	65	80	80	>75% Grass cover, Good, HSG D
*	16,205	98	98	Proposed Roads, Paved
*	9,636	98	98	Proposed Driveways, Paved parking
	362,784			Weighted Average
	325,615			89.75% Pervious Area
	37,169			10.25% Impervious Area
	11,328			30.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.9	150	0.0181	0.12		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
0.7	143	0.0489	3.56		**Shallow Concentrated Flow, Seg B to C** Unpaved Kv= 16.1 fps
0.1	64	0.0935	18.35	435.79	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=2.50' Z= 3.0 '/' Top.W=17.00' n= 0.030 Earth, grassed & winding
1.8	481	0.0050	4.49	126.68	**Trap/Vee/Rect Channel Flow, Seg D to E** Bot.W=2.00' D=2.75' Z= 3.0 '/' Top.W=18.50' n= 0.030 Earth, grassed & winding
0.6	359	0.0171	9.97	281.13	**Trap/Vee/Rect Channel Flow, Seg E to F** Bot.W=2.00' D=2.75' Z= 3.0 '/' Top.W=18.50' n= 0.025 Earth, clean & winding
24.1	1,197	Total			

Summary for Subcatchment 25:

Runoff = 2.47 cfs @ 12.49 hrs, Volume= 15,529 cf, Depth= 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
*	3,401	98	Proposed Roads & Driveways, Paved
	4,691	70	Woods, Good, HSG C
	28,478	77	Woods, Good, HSG D
*	1,416	98	Unconnected roofs, HSG D
	9,946	74	>75% Grass cover, Good, HSG C
	1,240	80	>75% Grass cover, Good, HSG D
	49,172		Weighted Average
	44,355		90.20% Pervious Area
	4,817		9.80% Impervious Area
	1,416		29.40% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.5	150	0.0180	0.08		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
4.5	172	0.0165	0.64		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
36.0	322	Total			

Summary for Subcatchment 30:

Runoff = 1.52 cfs @ 12.28 hrs, Volume= 7,411 cf, Depth= 3.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

Area (sf)	CN	Description
2,189	70	Woods, Good, HSG C
19,317	77	Woods, Good, HSG D
3,065	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
24,571		Weighted Average
24,571		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.0774	0.14		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	91	0.0892	1.49		**Shallow Concentrated Flow, Seg B to C**
					Woodland Kv= 5.0 fps
2.1	144	0.0531	1.15		**Shallow Concentrated Flow, Seg C to D**
					Woodland Kv= 5.0 fps
20.7	385	Total			

Summary for Subcatchment 31:

Runoff = 5.45 cfs @ 12.44 hrs, Volume= 33,026 cf, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
	21,215	70	Woods, Good, HSG C
	5,664	98	Unconnected roofs, HSG D
*	12,726	98	Proposed Road & Driveways, Paved
	65,403	74	>75% Grass cover, Good, HSG C
	105,008		Weighted Average
	86,618		82.49% Pervious Area
	18,390		17.51% Impervious Area
	5,664		30.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.9	150	0.0223	0.09		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	66	0.0060	0.39		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
0.6	276	0.0348	7.89	39.47	**Trap/Vee/Rect Channel Flow, Seg C to D** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
0.2	69	0.1157	5.48		**Shallow Concentrated Flow, Seg D to E** Unpaved Kv= 16.1 fps
32.5	561	Total			

Summary for Subcatchment 40:

Runoff = 16.91 cfs @ 12.79 hrs, Volume= 137,668 cf, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Type III 24-hr 25-Year Rainfall=5.80", Ia/S=0.05

	Area (sf)	CN	Description
*	203,365	30	Woods, Good, HSG A
	1,052	55	Woods, Good, HSG B
	96,940	70	Woods, Good, HSG C
	286,383	77	Woods, Good, HSG D
*	1,474	39	>75% Grass cover, Good, HSG A
	30,981	61	>75% Grass cover, Good, HSG B
	8,745	74	>75% Grass cover, Good, HSG C
	187	80	>75% Grass cover, Good, HSG D
	3,120	98	Unconnected roofs, HSG A
	632,247		Weighted Average
	629,127		99.51% Pervious Area
	3,120		0.49% Impervious Area
	3,120		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.8	150	0.0163	0.08		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
13.2	592	0.0223	0.75		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
11.3	505	0.0223	0.75		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
1.2	329	0.0252	4.47	177.85	**Channel Flow, Seg D to E** Area= 39.8 sf Perim= 92.9' r= 0.43' n= 0.030 Earth, grassed & winding
58.5	1,576	Total			

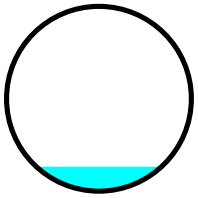
Summary for Reach 1R: OCS outlet

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 0.79" for 25-Year event
Inflow = 0.29 cfs @ 12.53 hrs, Volume= 19,582 cf
Outflow = 0.29 cfs @ 12.54 hrs, Volume= 19,582 cf, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 2.10 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.74 fps, Avg. Travel Time= 1.0 min

Peak Storage= 15 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 7.76 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 106.2' Slope= 0.0055 '/'
Inlet Invert= 212.58', Outlet Invert= 212.00'



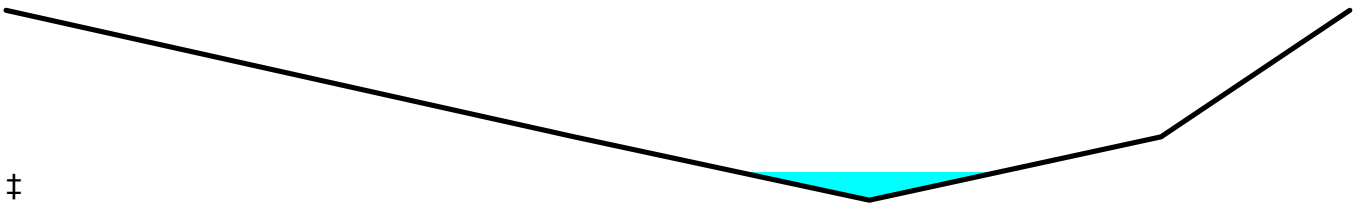
Summary for Reach R2:

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 3.28" for 25-Year event
Inflow = 11.73 cfs @ 12.47 hrs, Volume= 81,652 cf
Outflow = 11.64 cfs @ 12.51 hrs, Volume= 81,652 cf, Atten= 1%, Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 2.73 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 8.3 min

Peak Storage= 1,941 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,702.45 cfs

Custom cross-section, Length= 455.4' Slope= 0.0307 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 212.00', Outlet Invert= 198.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	210.00	0.00
41.81	208.00	2.00
63.54	207.00	3.00
85.01	208.00	2.00
98.90	210.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	21.6	43.2	9,837	101.22
3.00	163.7	99.1	74,549	1,702.45

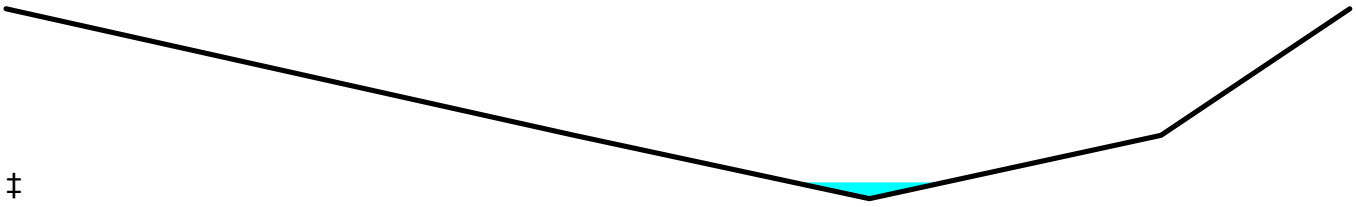
Summary for Reach R3:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 3.79" for 25-Year event
Inflow = 2.47 cfs @ 12.49 hrs, Volume= 15,529 cf
Outflow = 2.39 cfs @ 12.57 hrs, Volume= 15,529 cf, Atten= 3%, Lag= 4.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.66 fps, Min. Travel Time= 6.0 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 14.2 min

Peak Storage= 856 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,488.65 cfs

Custom cross-section, Length= 595.6' Slope= 0.0235 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 212.00', Outlet Invert= 198.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	210.00	0.00
41.81	208.00	2.00
63.54	207.00	3.00
85.01	208.00	2.00
98.90	210.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	21.6	43.2	12,865	88.51
3.00	163.7	99.1	97,500	1,488.65

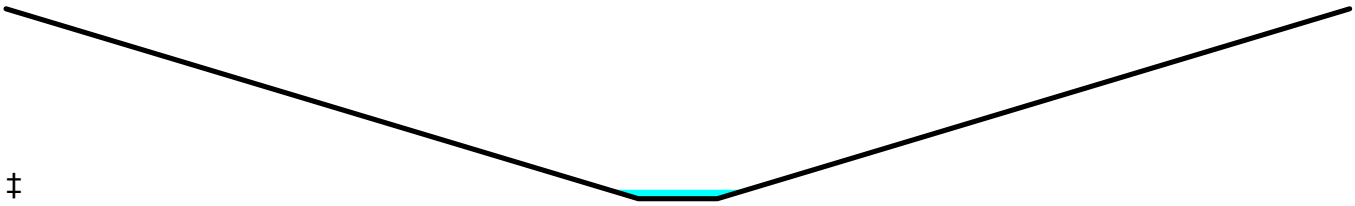
Summary for Reach R4:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 2.75" for 25-Year event
Inflow = 2.87 cfs @ 12.47 hrs, Volume= 23,374 cf
Outflow = 2.82 cfs @ 12.51 hrs, Volume= 23,374 cf, Atten= 2%, Lag= 2.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.81 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 7.5 min

Peak Storage= 564 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 4.00' Flow Area= 216.0 sf, Capacity= 2,293.44 cfs

6.00' x 4.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 12.0 '/' Top Width= 102.00'
Length= 362.4' Slope= 0.0170 '/'
Inlet Invert= 222.15', Outlet Invert= 216.00'



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Summary for Pond CLV-15:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 2.75" for 25-Year event
Inflow = 2.82 cfs @ 12.51 hrs, Volume= 23,374 cf
Outflow = 2.82 cfs @ 12.51 hrs, Volume= 23,374 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.82 cfs @ 12.51 hrs, Volume= 23,374 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 217.29' @ 12.55 hrs
Flood Elev= 219.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	216.00'	**15.0" Round Culvert** L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 216.00' / 215.75' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.71 cfs @ 12.51 hrs HW=217.27' TW=216.93' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.71 cfs @ 2.21 fps)

Summary for Pond CLV-36:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 3.79" for 25-Year event
Inflow = 2.47 cfs @ 12.49 hrs, Volume= 15,529 cf
Outflow = 2.47 cfs @ 12.49 hrs, Volume= 15,529 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.47 cfs @ 12.49 hrs, Volume= 15,529 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 215.63' @ 12.49 hrs
Flood Elev= 219.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	215.15'	**36.0" Round Culvert w/ 12.0" inside fill** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 214.15' / 213.85' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 5.01 sf

Primary OutFlow Max=2.46 cfs @ 12.49 hrs HW=215.63' TW=212.25' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.46 cfs @ 1.75 fps)

Summary for Pond DB1:

Inflow = 12.14 cfs @ 12.42 hrs, Volume= 62,778 cf
Outflow = 11.44 cfs @ 12.47 hrs, Volume= 62,070 cf, Atten= 6%, Lag= 3.3 min
Primary = 9.47 cfs @ 12.47 hrs, Volume= 60,209 cf
Secondary = 1.97 cfs @ 12.47 hrs, Volume= 1,861 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.93' @ 12.47 hrs Surf.Area= 4,010 sf Storage= 7,125 cf

Plug-Flow detention time= 56.3 min calculated for 61,992 cf (99% of inflow)
Center-of-Mass det. time= 50.8 min (884.1 - 833.4)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	11,840 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.75	2,572	199.4	0.0	0	0	2,572
215.00	2,723	204.1	100.0	662	662	2,731
216.00	3,364	223.0	100.0	3,038	3,700	3,408
216.25	3,533	227.7	100.0	862	4,562	3,586
217.00	4,061	241.8	100.0	2,845	7,407	4,141
218.00	4,815	260.7	100.0	4,433	11,840	4,938

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**15.0" Round Culvert** L= 106.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.58' / 212.00' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.00'	**3.0" Vert. Orifice/Grate** C= 0.600

#3	Device 1	216.00'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#4	Secondary	216.75'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=9.47 cfs @ 12.47 hrs HW=216.93' TW=212.44' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 9.47 cfs @ 7.72 fps)
  └─**2=Orifice/Grate** (Passes < 0.32 cfs potential flow)
  └─**3=neenah 4345** (Passes < 9.24 cfs potential flow)

Secondary OutFlow Max=1.94 cfs @ 12.47 hrs HW=216.93' TW=212.44' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 1.94 cfs @ 1.09 fps)

Summary for Pond FB1:

Inflow Area = 39,673 sf, 31.42% Impervious, Inflow Depth = 3.56" for 25-Year event
Inflow = 3.31 cfs @ 12.09 hrs, Volume= 11,766 cf
Outflow = 3.21 cfs @ 12.13 hrs, Volume= 11,768 cf, Atten= 3%, Lag= 2.4 min
Primary = 0.16 cfs @ 12.13 hrs, Volume= 7,502 cf
Secondary = 3.05 cfs @ 12.13 hrs, Volume= 4,266 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 200.24' @ 12.13 hrs Surf.Area= 1,843 sf Storage= 2,520 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 107.3 min (886.7 - 779.5)

Volume	Invert	Avail.Storage	Storage Description
#1	198.50'	6,564 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.50	1,083	128.5	0.0	0	0	1,083
200.00	1,728	157.4	100.0	2,090	2,090	1,775
201.00	2,228	176.2	100.0	1,973	4,062	2,301
202.00	2,785	195.1	100.0	2,501	6,564	2,889

Device	Routing	Invert	Outlet Devices
#1	Primary	196.33'	**4.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 196.33' / 195.55' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Secondary	200.00'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	198.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 196.00'

Primary OutFlow Max=0.16 cfs @ 12.13 hrs HW=200.24' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.16 cfs of 0.42 cfs potential flow)
└**3=Exfiltration** (Controls 0.16 cfs)

Secondary OutFlow Max=2.98 cfs @ 12.13 hrs HW=200.24' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 2.98 cfs @ 1.26 fps)

Summary for Pond FB2:

Inflow Area = 105,008 sf, 17.51% Impervious, Inflow Depth = 3.77" for 25-Year event
Inflow = 5.45 cfs @ 12.44 hrs, Volume= 33,026 cf
Outflow = 5.22 cfs @ 12.54 hrs, Volume= 33,030 cf, Atten= 4%, Lag= 5.9 min
Primary = 2.75 cfs @ 12.54 hrs, Volume= 29,909 cf
Secondary = 2.46 cfs @ 12.54 hrs, Volume= 3,121 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 200.21' @ 12.54 hrs Surf.Area= 3,425 sf Storage= 5,870 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 92.0 min (908.0 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	8,811 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.00	1,951	201.9	0.0	0	0	1,951
200.00	3,275	239.6	100.0	5,169	5,169	3,347
201.00	4,022	258.4	100.0	3,642	8,811	4,133

Device	Routing	Invert	Outlet Devices
#1	Primary	195.83'	**8.0" Round Culvert** L= 53.7' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.83' / 195.30' S= 0.0099 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	200.00'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	195.83'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	198.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 195.20'
#5	Device 1	199.50'	**Special & User-Defined** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600

Primary OutFlow Max=2.75 cfs @ 12.54 hrs HW=200.21' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 2.75 cfs @ 7.88 fps)
  └**3=Orifice/Grate** (Passes < 0.86 cfs potential flow)
    └**4=Exfiltration** (Passes < 0.30 cfs potential flow)
  └**5=Special & User-Defined** (Passes < 8.14 cfs potential flow)

Secondary OutFlow Max=2.46 cfs @ 12.54 hrs HW=200.21' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 2.46 cfs @ 1.18 fps)

Summary for Pond FB3:

Inflow Area = 298,296 sf, 14.34% Impervious, Inflow Depth = 3.31" for 25-Year event
Inflow = 13.82 cfs @ 12.32 hrs, Volume= 82,360 cf
Outflow = 12.42 cfs @ 12.42 hrs, Volume= 82,361 cf, Atten= 10%, Lag= 5.6 min
Primary = 0.29 cfs @ 12.53 hrs, Volume= 19,582 cf
Secondary = 12.14 cfs @ 12.42 hrs, Volume= 62,778 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 216.94' @ 12.53 hrs Surf.Area= 3,216 sf Storage= 5,561 cf

Plug-Flow detention time= 50.5 min calculated for 82,258 cf (100% of inflow)
Center-of-Mass det. time= 50.9 min (893.5 - 842.7)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	9,363 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.75	1,912	178.7	0.0	0	0	1,912
215.00	2,048	183.4	100.0	495	495	2,055
216.00	2,626	202.3	100.0	2,331	2,826	2,666
216.25	2,780	207.0	100.0	676	3,502	2,828
218.00	3,953	240.0	100.0	5,861	9,363	4,065

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**4.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	214.75'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.08'
#3	Secondary	216.25'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.29 cfs @ 12.53 hrs HW=216.94' TW=212.78' (Dynamic Tailwater)
└**1=Orifice/Grate** (Passes 0.29 cfs of 0.86 cfs potential flow)
  └**2=Exfiltration** (Controls 0.29 cfs)

Secondary OutFlow Max=0.00 cfs @ 12.42 hrs HW=216.89' TW=216.92' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB4:

Inflow Area = 101,914 sf, 24.65% Impervious, Inflow Depth = 2.75" for 25-Year event
Inflow = 5.07 cfs @ 12.21 hrs, Volume= 23,363 cf
Outflow = 2.87 cfs @ 12.47 hrs, Volume= 23,374 cf, Atten= 43%, Lag= 15.8 min
Primary = 2.40 cfs @ 12.47 hrs, Volume= 23,079 cf
Secondary = 0.47 cfs @ 12.47 hrs, Volume= 296 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 226.72' @ 12.47 hrs Surf.Area= 4,105 sf Storage= 6,445 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 112.2 min (909.3 - 797.1)

Volume	Invert	Avail.Storage	Storage Description
#1	224.65'	7,639 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
224.65	2,283	201.1	0	0	2,283
226.00	3,337	353.8	3,771	3,771	9,036
227.00	4,425	372.7	3,868	7,639	10,188

Device	Routing	Invert	Outlet Devices
#1	Primary	222.45'	**8.0" Round Culvert** L= 72.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.45' / 222.10' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	226.65'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#3	Device 1	222.45'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 3	224.65'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 222.32'
#5	Device 1	226.15'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600

Primary OutFlow Max=2.40 cfs @ 12.47 hrs HW=226.72' TW=222.34' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 2.40 cfs @ 6.87 fps)
  - **3=Orifice/Grate** (Passes < 0.85 cfs potential flow)
    - **4=Exfiltration** (Passes < 0.37 cfs potential flow)
  - **5=neenah 4345** (Passes < 7.28 cfs potential flow)

Secondary OutFlow Max=0.46 cfs @ 12.47 hrs HW=226.72' TW=222.34' (Dynamic Tailwater)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 0.46 cfs @ 0.67 fps)

Summary for Pond FB5:

Inflow Area = 362,784 sf, 10.25% Impervious, Inflow Depth = 2.00" for 25-Year event
Inflow = 11.00 cfs @ 12.34 hrs, Volume= 60,524 cf
Outflow = 4.87 cfs @ 12.78 hrs, Volume= 60,527 cf, Atten= 56%, Lag= 26.2 min
Primary = 3.22 cfs @ 12.78 hrs, Volume= 58,310 cf
Secondary = 1.64 cfs @ 12.78 hrs, Volume= 2,216 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 221.81' @ 12.78 hrs Surf.Area= 11,238 sf Storage= 18,821 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 108.2 min (937.1 - 828.9)

Volume	Invert	Avail.Storage	Storage Description
#1	219.50'	21,027 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
219.50	6,189	461.2	0	0	6,189
220.00	6,895	480.1	3,269	3,269	7,624
221.00	8,392	517.8	7,631	10,901	10,659
222.00	11,966	681.2	10,126	21,027	26,261

Device	Routing	Invert	Outlet Devices
#1	Primary	217.15'	**8.0" Round Culvert** L= 30.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 217.15' / 217.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	217.33'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	219.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 219.00'
#4	Device 1	221.00'	**neenah 4345** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#5	Secondary	221.65'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.22 cfs @ 12.78 hrs HW=221.81' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 3.22 cfs @ 9.24 fps)
  - **2=Orifice/Grate** (Passes < 0.87 cfs potential flow)
    - **3=Exfiltration** (Passes < 2.44 cfs potential flow)
  - **4=neenah 4345** (Passes < 8.65 cfs potential flow)

Secondary OutFlow Max=1.64 cfs @ 12.78 hrs HW=221.81' TW=0.00' (Dynamic Tailwater)
- **5=Broad-Crested Rectangular Weir** (Weir Controls 1.64 cfs @ 1.03 fps)

Summary for Link SP1:

Inflow Area = 410,511 sf, 9.23% Impervious, Inflow Depth = 2.12" for 25-Year event
Inflow = 5.59 cfs @ 12.74 hrs, Volume= 72,455 cf
Primary = 5.59 cfs @ 12.74 hrs, Volume= 72,455 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP2:

Inflow Area = 459,494 sf, 15.21% Impervious, Inflow Depth = 3.42" for 25-Year event
Inflow = 17.63 cfs @ 12.46 hrs, Volume= 131,102 cf
Primary = 17.63 cfs @ 12.46 hrs, Volume= 131,102 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP3:

Inflow Area = 129,579 sf, 14.19% Impervious, Inflow Depth = 3.75" for 25-Year event
Inflow = 6.21 cfs @ 12.52 hrs, Volume= 40,442 cf
Primary = 6.21 cfs @ 12.52 hrs, Volume= 40,442 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

Summary for Link SP4:

Inflow Area = 632,247 sf, 0.49% Impervious, Inflow Depth = 2.61" for 25-Year event
Inflow = 16.91 cfs @ 12.79 hrs, Volume= 137,668 cf
Primary = 16.91 cfs @ 12.79 hrs, Volume= 137,668 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs

ATTACHMENT 4

INSPECTION, MAINTENANCE AND HOUSEKEEPING PLAN

DM ROMA
CONSULTING ENGINEERS

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

HIGHLAND WOODS SUBDIVISION
HIGHLAND CLIFF ROAD
WINDHAM, MAINE

Responsible Party

Owner: MTR Development, LLC.
P.O. Box 1028
Westbrook, Maine 04098

The owners are responsible for the maintenance of all stormwater management structures and related site components and the keeping of a maintenance log book with service records until such time that a homeowner's association is created. Records of all inspections and maintenance work performed must be kept on file with the owner and retained for a minimum of five years. The maintenance log will be made available to the Town and Maine Department of Environmental Protection (MDEP) upon request. At a minimum, the maintenance of stormwater management systems will be performed on the prescribed schedule.

The procedures outlined in this plan are provided as a general overview of the anticipated practices to be utilized on this site. In some instances, additional measures may be required due to unexpected conditions. *The Maine Erosion and Sedimentation Control BMP* and *Stormwater Management for Maine: Best Management Practices* Manuals published by the MDEP should be referenced for additional information.

During Construction

1. **Inspection and Corrective Action:** It is the contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. Inspection shall occur on all disturbed and impervious areas, erosion control measures, material storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as 24 hours before and after a storm event and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections.

2. **Maintenance:** Erosion controls shall be maintained in effective operating condition until areas are permanently stabilized. If best management practices (BMPs) need to be repaired, the repair work should be initiated upon discovery of the problem but no later than the end of the next workday. If BMPs need to be maintained or modified, additional

BMPs are necessary, or other corrective action is needed, implementation must be completed within seven calendar days and prior to any rainfall event.

3. **Documentation:** A report summarizing the inspections and any corrective action taken must be maintained on site. The log must include the name(s) and qualifications of the person making the inspections; the date(s) of the inspections; and the major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to MDEP staff, and a copy must be provided upon request. The owner shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

Houskeeping

1. **Spill prevention:** Controls must be used to prevent pollutants from construction and waste materials on site to enter stormwater, which includes storage practices to minimize exposure of the materials to stormwater. The site contractor or operator must develop, and implement as necessary, appropriate spill prevention, containment, and response planning measures.

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. Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area, in order to prevent the accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization.

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, but other water additives may be considered as needed. A stabilized construction entrance (SCE) should be included to minimize tracking of mud and sediment. If off-site tracking occurs, public roads should be swept immediately and no less than once a week and prior to significant storm events. Operations during dry months, that experience fugitive dust problems, should wet down unpaved access roads

once a week or more frequently as needed with a water additive to suppress fugitive sediment and dust.

4. **Debris and other materials:** Minimize the exposure of construction debris, building and landscaping materials, trash, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials to precipitation and stormwater runoff. These materials must be prevented from becoming a pollutant source.

5. **Excavation de-watering:** Excavation 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 removed from the ponded area, either through gravity or pumping, 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. **Authorized Non-stormwater discharges:** Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:
   (a) Discharges from firefighting activity;
   (b) Fire hydrant flushings;
   (c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);
   (d) Dust control runoff in accordance with permit conditions and Appendix (C)(3);
   (e) Routine external building washdown, not including surface paint removal, that does not involve detergents;
   (f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;
   (g) Uncontaminated air conditioning or compressor condensate;
   (h) Uncontaminated groundwater or spring water;
   (i) Foundation or footer drain-water where flows are not contaminated;
   (j) Uncontaminated excavation dewatering (see requirements in Appendix C(5));
   (k) Potable water sources including waterline flushings; and
   (l) Landscape irrigation.

7. **Unauthorized non-stormwater discharges:** Approval from the MDEP does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with Section 6 above. Specifically, the MDEP's approval does not authorize discharges of the following:

(a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;
(b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;
(c) Soaps, solvents, or detergents used in vehicle and equipment washing; and
(d) Toxic or hazardous substances from a spill or other release.

Post construction

1. **Inspection and Corrective Action:** All measures must be maintained by the owner in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions of the permit, shall conduct the inspections. The following areas, facilities, and measures must be inspected, and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site.

   A. **Vegetated Areas:** 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 is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

   B. **Ditches, Swales, and Open Channels:** Inspect ditches, swales, and other open channels in the spring, late fall, and after heavy rains to remove any obstructions to flow, remove accumulated sediments and debris, control vegetative 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 adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or side slopes.

   C. **Culverts:** Inspect culverts in the spring, late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the culvert's inlet and outlet.

   D. **Underdrained Filter Basins and Detention Basins:** Basins should be inspected semi-annually and following major storm events for the first year and every six months thereafter. Basins should drain within 48 hours following a one-inch storm and if a larger storm fills the system to overflow, it shall drain within 36 to 60 hours. If ponding

exceeds 48 hours, within the detention basin, ensure that the low flow orifice in the detention basin's outlet control structure is not clogged or obstructed.

If ponding exceeds 48 hours in the underdrained filter basins, the top of the filter bed must be rototilled to reestablish the soil's filtration capacity. If water ponds on the surface of the bed for more than 72 hours, the top several inches of the filter shall be replaced with fresh material.

Inspect for debris and sediment build up in the forebay and basin and remove as needed. Mowing of the basin can only occur semi-annually to a height of no less than 6 inches utilizing a hand-held string trimmer or push-mower. Any bare areas or erosion rills shall be repaired with new filter media or sandy loam then seeded and mulched. The basins should also be inspected annually for destabilization of side slopes, embankment settling and other signs of structural failure.

E. Roofline Drip edge: The drip edges should be inspected semi-annually and following major storm events for the first year and every six months thereafter. The reservoir crushed stone should drain within 48 hours following a one-inch storm and if a larger storm fills the system to overflow, it shall drain within 36 to 60 hours. If ponding exceeds 48 hours, the stone reservoir course shall be removed and the filter bed be rototilled to reestablish the soil's filtration capacity. If water ponds in the reservoir course for more than 72 hours, the top several inches of the filter shall be replaced with fresh material. Inspect for debris and sediment build up at surface and remove as needed. The drip edges are part of the stormwater management plan and cannot be paved over or altered in anyway.

F. Regular Maintenance: Clear accumulations of winter sand along roadway once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along pavement shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader.

G. Documentation: 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 log must be made accessible to Town staff upon request. The permittee shall retain a copy of the log for a period of at least five years from the completion of permanent stabilization. Attached is a sample log.

Re-certification

Submit a certification of the following to the MDEP within three months of the expiration of each five-year interval from the date of issuance of the permit.

(a) **Identification and repair of erosion problems**. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.

(b) **Inspection and repair of stormwater control system**. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

(c) **Maintenance**. The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the Department, and the maintenance log is being maintained.

Municipalities with separate storm sewer systems regulated under the Maine Pollutant Discharge Elimination System (MPDES) Program may report on all regulated systems under their control as part of their required annual reporting in lieu of separate certification of each system. Municipalities not regulated by the MPDES Program, but that are responsible for maintenance of permitted stormwater systems, may report on multiple stormwater systems in one report.

Duration of Maintenance

Perform maintenance as described.

MAINTENANCE LOG

HIGHLAND WOODS SUBDIVISION
WINDHAM, MAINE

The following stormwater management and erosion control items shall be inspected and maintained as prescribed in the Maintenance Plan with recommended frequencies as identified below. The owner is responsible for keeping this maintenance log on file for a minimum of five years and shall provide a copy to the Town and MDEP upon request. Inspections are to be performed by a qualified third-party inspector and all corrective actions shall be performed by personnel familiar with stormwater management systems and erosion controls.

Maintenance Item	Maintenance Event	Date Performed	Responsible Personnel	Comments
Vegetated Areas	Inspect slopes and embankments early in Spring.			
Ditches, swales, and other open channels	Inspect after major rainfall event producing 1" of rain in two hours.			
	Inspect for erosion or slumping & repair			
	Mowed at least annually.			
Culverts	Inspect semiannually and after major rainfall.			
	Repair erosion at inlet or outlet of pipe.			
	Repair displaced riprap.			
	Clean accumulated sediment in culverts when >20% full.			
Underdrained Filter Basins, Detention Basin, And Roofline Drip edges	Check after each rainfall event to ensure that pond drains within 24-48 hours.			
	Replace top several inches of filter if pond does not drain within 72 hours.			
	Mow grass no more than twice a year to no less than 6 inches in height.			
	Inspect semi-annually for erosion or sediment accumulation and repair as necessary.			
Regular Maintenance	Clear accumulation of winter sand in paved areas annually.			

People's United Bank

June 7th, 2018

Town of Windham
8 School Rd
Windham, ME 04062

RE: MTR Development LLC

To whom it may concern:

We understand that Chris Wilson of MTR Development LLC is proposing to construct approx. 2000 feet of paved town road for a 22 lot subdivision called Highland Woods. While the bank is not at a point where we can issue a commitment letter, we have had a long relationship with MTR Development and feel that between cash on hand and borrowing ability that MTR Development has the financial ability to build out this project.

If you should have any comments or questions, please feel free to contact me at 828-3048.

Sincerely,

Andrew M Cook
Senior Vice President