DM ROMA
CONSULTING ENGINEERS

May 24, 2019

Amanda Lessard, Town Planner
Town of Windham
8 School Road
Windham, ME 04062

Re: Response to Review Comments
Highland Woods Subdivision
MTR Development, LLC - Applicant

Dear Amanda:

On behalf of MTR Development, LLC we have prepared the enclosed plans and supporting documents in response to Staff Review Comments for the proposed Highland Woods subdivision. The following letter includes a response to each comment and includes a summary of our response, our methodology or reasoning, and if any revisions were necessary indication of where the revision can be found.

Town Engineer Review Comments – E-mail Dated May 16, 2019

1. *Stormwater*
    a. *The stormwater plan was previously reviewed (1/22/19) by Jonathan Earle and found to be in compliance with the Basic and General standards. However, please provide a spillway analysis for the underdrained soil filters for a 25-yr storm with the spillway as the sole outlet; it was not included.*

Response: Included with this submission is an updated Stormwater Management Report which includes the spillway run model output. The top of berm elevations have been updated on the three (3) filter basins to provide a minimum of 12" freeboard modeled this way.

    b. *Provide additional ground topography for the footprints for each of the 3 filter basins rather than relying solely LIDAR aerial survey as part of the final plan submission.*

Response: Included are exhibits comparing the LIDAR survey with the on-the-ground survey performed by Survey, Inc. Underdrained Filter Basins FB-1 and FB-2 needed to be adjusted based on the results of the updated topography information.

    c. *The Hydrocad modeling output included in the Stormwater Management Report does not appear to include the post-development results for filter basins 1, 2, and 3. Please provide*

Response: Within the updated Stormwater Management Report are the complete print outs of the model including the filter basins.

2. *Traffic - As noted in the 1/22/19 review comments by Jonathan Earle, prior to final plan submission, the traffic study should be revised to show traffic generated from the reduced project size and not what was originally submitted.*

Response: Included with this submission is an updated traffic study.

3. *Provide monumentation/pins at all lot corners in conformance with 911.A.3.b. One or more of the rear lot pins are missing on Lots 5, 8, 9, 10 and 11.*

Response: The Subdivision Plan has been revised to include the additional property pins as requested.

Town Planner Review Comments – E-mail Dated May 16, 2019

2. *Map and lot numbers for all lots as assigned by the Town of Windham Assessing Department must be shown on any plans prepared for Planning Board signature.*

Response: The Subdivision Plan has been revised to include the assigned Tax Map and Lot numbers provided by the Town of Windham Assessing Department.

3. *Permanent monuments need to be placed on the ground and recorded on the plan for all lot boundaries.*

Response: The Subdivision Plan has been revised to include the additional property pins as requested.

Additional notes:

- *Staff found no evidence that the applicant intends to reserve title to spaces within the subdivision; if that is true, no further action is needed*

Response: The applicant does not intend to reserve title to spaces within the subdivision.

- *Open space lots should have different numbers assigned to them to avoid confusion*

Response: The open space lots on the Subdivision Plan are indicated as Open Space-1 and Open Space-2.

- *At the January 28, 2019 meeting, the Board requested that an easement for road access to then adjoining lot TM 7, Lot 29. The Board may want to see that or an alternative means of complying with 911,M,3 and 911,M,5,b,(5),iii to facilitate connections with future developments at adjacent lots, and permit convenient movement of traffic or facilitate emergency access and evacuation.*

Response: As a Condition of Approval, we are agreeable to providing an easement over Lot A to provide access to adjoining land. We will work with Town Staff to develop acceptable easement language.

- *At the January 28, 2019 meeting, the Board requested notes on the plan detailing the landscaping plan for a buffer with the abutting properties to lots 6 & 7, and that it be a deeded no-cut buffer.*

Response: We are meeting with the abutter to review the potential building windows associated with lots 6 and 7 and to review the buffer between the two properties. We have shown an area of existing trees that will be retained as a buffer.

Town Planner Review Comments – E-mail Dated May 23, 2019

- *The DEP and Army Corps permit #s needed to be added into their respective notes.*

Response: The MDEP and Army Corps of Engineers permit numbers have been added to the Subdivision Plan.

Please find the enclosed revised design plans, Stormwater Management Report and revised Traffic Study. Upon your review of the enclosed information, please do not hesitate to contact me if you have any questions or require any additional information.

Sincerely,

DM ROMA CONSULTING ENGINEERS

Dustin Roma

Dustin M. Roma, P.E.
President

DM ROMA
CONSULTING ENGINEERS

May 24, 2019

Amanda Lessard, Town Planner
Town of Windham
8 School Road
Windham, ME 04062

Re: Revised Traffic Memorandum
Highland Woods Subdivision
MTR Development, LLC - Applicant

Dear Amanda:

A Traffic Assessment was prepared for the proposed Highland Woods Subdivision by Traffic Solutions, Inc. dated July 22, 2018. The report provided analysis and estimates of traffic impact on the adjacent roadways for a 22-lot residential subdivision. We have since decided to phase the project, and the total number of lots has been reduced to 12 lots that are accessed by the proposed roadway (11 proposed cluster subdivision lots and one additional lot that is shown as Lot A on the proposed Subdivision Plan).

The proposed driveway intersection location has not changed from what was proposed when the initial traffic study assessment was completed. The only portion of the traffic memorandum that requires updating is Site Trip Generation, due to a reduction in the number of proposed lots. The following is a summary of the trip generation of the project based on 12 lots:

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 12 single-family homes can be expected to generate a total of 114 trips during a typical weekday; 9 trips in the morning peak hour and 12 trips in the evening peak hour

Upon your review of the enclosed information, please do not hesitate to contact me if you have any questions or require any additional information.

Sincerely,

DM ROMA CONSULTING ENGINEERS

Dustin Roma

Dustin M. Roma, P.E.
President

PO Box 1116, Windham, ME 04062 ○ (207) 310-0506 ○ dustin@dmroma.com

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 has been designed as a 11-lot single family residential cluster subdivision including the construction of 1,530± linear feet of roadway, creation of single-family house lots, associated earthwork, tree clearing, utilities and stormwater management facilities.

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 draining to the Presumpscot River.

B. Alterations to Land Cover

The 38-acre lot is primarily undeveloped woods and meadow. The proposed roadway will generate approximately 45,426± square feet (1.04± acres) of new impervious area, while the proposed lot development as indicated on the Post Development Watershed Map will generate an additional 14,642± square feet (0.34± acres) of new driveway and 15,576± square feet (0.36± acres) of new roofs, totaling approximately 75,644± square feet (1.74± acres) of new impervious area upon the completion of project. The project design also proposes the addition of 246,342± square feet (5.66± acres) of new landscaped area, which cumulatively results in a total new developed area of approximately 7.4± acres.

The development proposes less than 15 residential lots, the project will be subject to Stormwater Permit review from Maine Department of Environmental Protection (MDEP) and therefore a SLODA is not required for this project. As a requirement of the Stormwater Permit review, (the development proposes the creation of less than 3 acres of impervious area (1.74± acres as proposed), and the total developed project area is approximately 7.4± acres) the proposed development must meet the Basic and General 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. As a requirement of the Town of Windham Land Use Ordinance, the proposed development must meet the Basic, General, and Flooding Standards as indicated in the Chapter 500 Stormwater Management regulations.

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. Areas outside of the High Intensity Soil Survey, predominately Open Space, was supplemented with the Medium Intensity Soil Maps for Cumberland County, Maine published by the Natural Resources Conservation Service. The soils boundaries and hydrologic soils group (HSG) designations are indicated on the Watershed Maps. The High Intensity Soils Map has been included in the project plan set and the associated Soil Narrative by Longview Partners, LLC dated October 2018 is included as Attachment 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 providing attenuation of the peak rates of runoff leaving the site. The method utilized to predict the surface water runoff rates in this analysis is a computer program entitled HydroCAD, which is based on the same methods that were originally developed by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service, and utilized in the TR-20 modeling program. Peak rates of runoff are forecasted based upon land use, hydrologic soil conditions, vegetative cover, contributing watershed area, time of concentration, rainfall data, storage volumes of detention basins and the hydraulic capacity of structures. The computer model predicts the amount of runoff as a function of time, with the ability to include the attenuation effect due to dams, lakes, large wetlands, floodplains and constructed stormwater management basins. The input data for rainfalls with statistical recurrence frequencies of 2-, 10- and 25 years was obtained from Appendix H of the MDEP, Chapter 500 Stormwater Management, last revised in 2015. The National Weather Service developed four synthetic storm types to simulate rainfall patterns around the country. For analysis in Cumberland County, Maine, the type III rainfall pattern with a 24-hour duration is appropriate.

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 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 three (3) underdrained filter basins and the requirement for roofline drip edges around each building 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 86% 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

The proposed project is required by the Town of Windham to also meet the Flooding Standard outlined in the MDEP Chapter 500 requiring 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, three (3) underdrained filter basins, sized to provide treatment requirements of the General Standard, have been analyzed.

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 an unnamed stream.

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 unnamed 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	1.51	0.79	3.39	1.64	5.16	2.42
SP2	5.62	3.97	11.61	11.19	17.17	17.11
SP3	2.06	1.70	4.17	3.69	6.08	6.01
SP4	6.68	5.01	13.68	10.36	20.70	15.79

As illustrated in the table above, in general the proposed project's design including the integration of the three (3) 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.

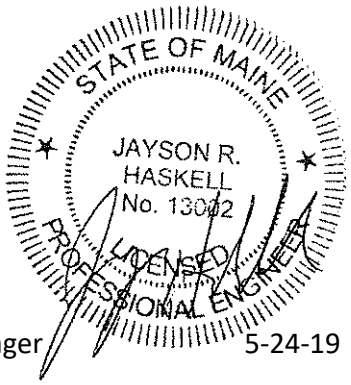
In addition, computations were performed to determine the depth of freeboard between the top of berm and the emergency spillways of each of the ponds during the 25-year storm event when the spillway is the sole discharge device. These calculations can be found as Attachment 4 of this report.

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 is included as Attachment 5 of this report.

Prepared by:

DM ROMA CONSULTING ENGINEERS



J.P. Connolly
Senior Project Engineer

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

5-24-19

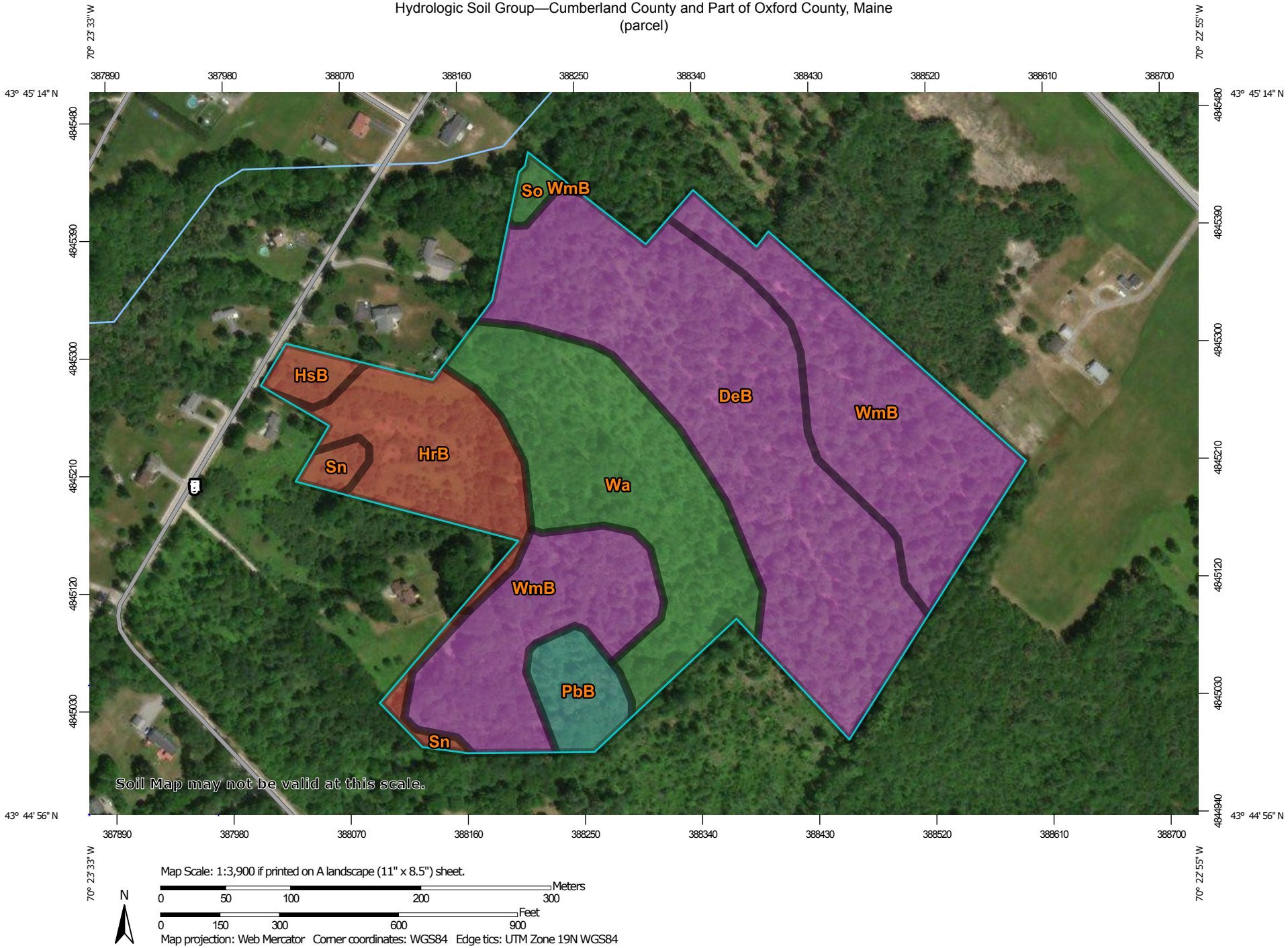
ATTACHMENT 1

SOILS MAP -

MEDIUM INTENSITY SOIL SURVEY & HIGH-INTENSITY SOIL SURVEY NARRATIVE

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

Hydrologic Soil Group—Cumberland County and Part of Oxford County, Maine
(parcel)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 13, Sep 11, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 29, 2012—Jun 26, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DeB	Deerfield loamy sand, 3 to 8 percent slopes	A	12.0	32.9%
HrB	Lyman-Tunbridge complex, 0 to 8 percent slopes, rocky	D	3.7	10.2%
HsB	Lyman-Abram complex, 0 to 8 percent slopes, very rocky	D	0.6	1.6%
PbB	Paxton fine sandy loam, 3 to 8 percent slopes	C	1.4	3.7%
Sn	Scantic silt loam, 0 to 3 percent slopes	D	0.7	1.9%
So	Scarboro sandy loam	A/D	0.3	0.9%
Wa	Walpole fine sandy loam	A/D	7.2	19.6%
WmB	Windsor loamy sand, 0 to 8 percent slopes	A	10.7	29.3%
Totals for Area of Interest			**36.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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
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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)	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND		BLACK	
10–20	FINE SAND	FRIABLE	OLIVE GRAY	COMMON / FAINT
20–40	FINE SAND W/ SILT LENSES	TO SOMEWHAT FIRM IN LENSES		
40–50				

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

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

Texture | Consistency | Color | Mottling (Depth 0–50 inches)

Soil Classification: Profile ____ Condition ____ | Slope ___ % | Limiting Factor ___ " | ☐ 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

Texture | Consistency | Color | Mottling (Depth 0–50 inches)

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

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

Texture | Consistency | Color | Mottling (Depth 0–50 inches)

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

[signature] — Site Evaluator Signature
237/213 — SE #/CSSH
10/11/18 — Date

Longview Partners, LLC
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Buxton, ME 04093
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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	47,731	0	708	11,429	0	0	35,594	No	0	0	None
WS-20***	69,039	3,211	0	15,118	2,605	1,245	46,860	No	0	0	None
WS-21	40,991	10,951	2,832	26,254	0	0	953	Yes	10,951	26,254	FB1
WS-22***	45,769	0	1,416	11,186	0	0	33,168	No	0	0	None
WS-23	210,174	11,424	0	13,591	0	0	185,159	Yes	11,424	13,591	FB3
WS-24	218,850	16,355	4,956	101,096	0	0	96,442	Yes	16,355	101,096	FB3
WS-30	24,571	0	0	2,852	0	0	21,719	No	0	0	None
WS-31	105,008	12,726	5,664	64,816	0	0	21,802	Yes	12,726	64,816	FB2
WS-40	520,188	0	0	0	0	0	520,188	No	0	0	None
WS-50	344,102	0	0		0	2,714	341,388	No	0	0	None
Total		**54,668**	**15,576**	**246,342**					**51,457**	**205,757**	

* 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 3,403± s.f. of impervious surface from Sta. 6+28 to Sta. 7+83 has been removed from Watershed WS-22; Approximately 1996± s.f. of impervious surface from Sta. 6+28 to Sta. 7+83 has been removed from Watershed WS-20.

New Impervious Area = 70,244 sf
Impervious Area Requiring Treatment (95%) = 66,732 sf
Impervious Area Treatment Provided = 67,033 sf
95% New Impervious Area Treated

New Developed Area = 316,587 sf
Developed Area Requiring Treatment (80%) = 253,269 sf
Developed Area Treatment Provided = 272,790 sf
86% New Developed Area Treated

Filter Basin FB-1

Tributary Impervious Area=	10,951	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) = 1,788 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 = 1,073 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=	64,816	sf	(WS-31 Landscaped Area)

Water Quality Volume (WQV) Calculation

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

WQV (Required) = 3,221 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 = 1,933 sf

Filter Area Provided = 1,951 sf > Required

Filter Basin FB-3

Tributary Impervious Area=	27,780	sf	(WS-23 &WS-24 Impervious Area)
Tributary Landscaped Area=	114,687	sf	(WS-23 &WS-24 Landscaped Area)

Water Quality Volume (WQV) Calculation

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

WQV (Required) = 6,138 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
214.75	4,456	0
216	6,821	7,064
217	8,652	17,782

Outlet Elevation = 216.00

Storage Volume Provided = 7,064 cf > Required

Filter Bottom Calculation

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

Filter Area Required = 3,683 sf

Filter Area Provided = 4,456 sf > Required

Typical Drip Edge Sizing Calculations

Tributary Impervious Area=	708	sf
Tributary Landscaped Area=	0	sf

Water Quality Volume (WQV) Calculation

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

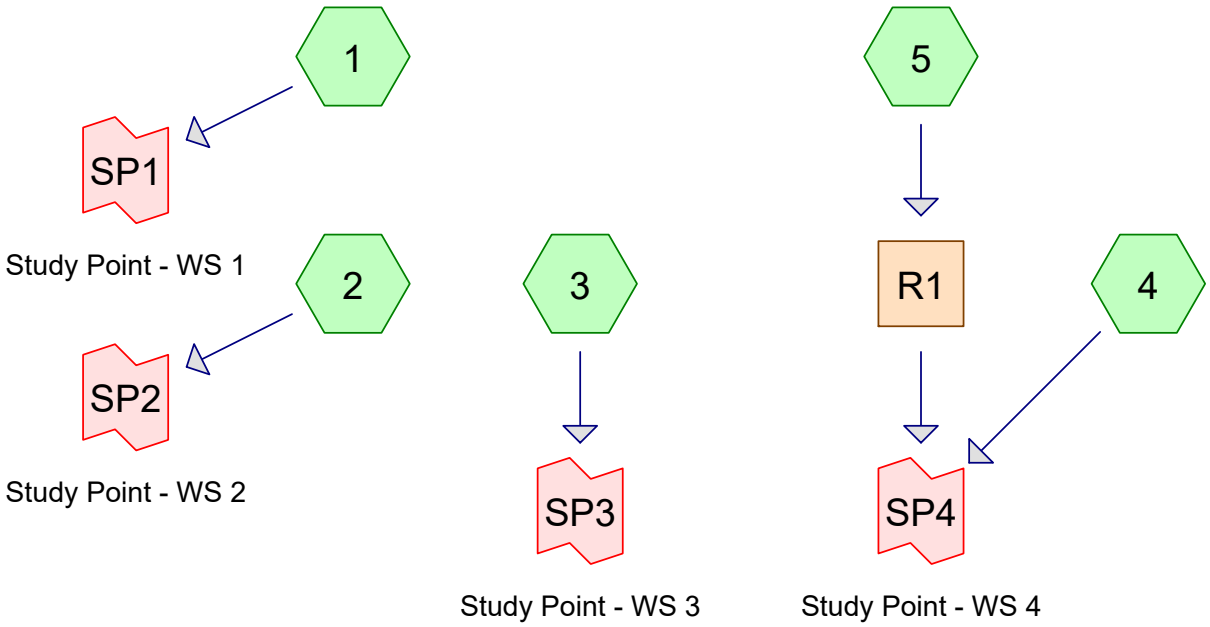
WQV (Required) = 59 cf

Drip Edge sizing:

Width	2	feet
Depth	1.5	feet
Length	54	feet
% Void (crushed stone	40%	
Total Volume Provide	**65**	**cf > Required**

ATTACHMENT 3

HYDROCAD OUTPUT



Subcat Reach Pond Link

Routing Diagram for 17001-Pre
Prepared by DM Roma Consulting Engineers, Printed 5/24/2019

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=0.76"
Flow Length=216' Tc=20.6 min CN=WQ Runoff=1.51 cfs 7,814 cf

Subcatchment 2: Runoff Area=491,926 sf 0.41% Impervious Runoff Depth=0.83"
Flow Length=1,526' Tc=32.3 min CN=WQ Runoff=5.62 cfs 34,160 cf

Subcatchment 3: Runoff Area=143,785 sf 0.00% Impervious Runoff Depth=1.02"
Flow Length=472' Tc=31.8 min CN=WQ Runoff=2.06 cfs 12,214 cf

Subcatchment 4: Runoff Area=528,612 sf 0.00% Impervious Runoff Depth=0.83"
Flow Length=1,041' Tc=32.5 min CN=WQ Runoff=6.14 cfs 36,581 cf

Subcatchment 5: Runoff Area=344,115 sf 0.00% Impervious Runoff Depth=0.18"
Flow Length=568' Tc=28.8 min CN=WQ Runoff=0.77 cfs 5,049 cf

Reach R1: Avg. Flow Depth=0.11' Max Vel=1.22 fps Inflow=0.77 cfs 5,049 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=0.64 cfs 5,049 cf

Link SP1: Study Point - WS 1 Inflow=1.51 cfs 7,814 cf
Primary=1.51 cfs 7,814 cf

Link SP2: Study Point - WS 2 Inflow=5.62 cfs 34,160 cf
Primary=5.62 cfs 34,160 cf

Link SP3: Study Point - WS 3 Inflow=2.06 cfs 12,214 cf
Primary=2.06 cfs 12,214 cf

Link SP4: Study Point - WS 4 Inflow=6.68 cfs 41,630 cf
Primary=6.68 cfs 41,630 cf

Summary for Subcatchment 1:

Runoff = 1.51 cfs @ 12.31 hrs, Volume= 7,814 cf, Depth= 0.76"

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 2-Year Rainfall=3.10", Ia/S=0.11

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 = 5.62 cfs @ 12.48 hrs, Volume= 34,160 cf, Depth= 0.83"

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 2-Year Rainfall=3.10", Ia/S=0.11

	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
20.6	150	0.0520	0.12		**Sheet Flow, Seg A to B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
5.5	311	0.0360	0.95		**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
32.3	1,526	Total			

Summary for Subcatchment 3:

Runoff = 2.06 cfs @ 12.47 hrs, Volume= 12,214 cf, Depth= 1.02"

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=0.11

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 = 6.14 cfs @ 12.47 hrs, Volume= 36,581 cf, Depth= 0.83"

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 2-Year Rainfall=3.10", Ia/S=0.11

	Area (sf)	CN	Description
*	163,798	30	Woods, Good, HSG A
	147,251	70	Woods, Good, HSG C
	215,480	77	Woods, Good, HSG D
	2,083	74	>75% Grass cover, Good, HSG C
	528,612		Weighted Average
	528,612		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 = 0.77 cfs @ 12.45 hrs, Volume= 5,049 cf, Depth= 0.18"

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=0.11

Area (sf)	CN	Description
246,096	30	Woods, Good, HSG A
71,077	55	Woods, Good, HSG B
24,228	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			

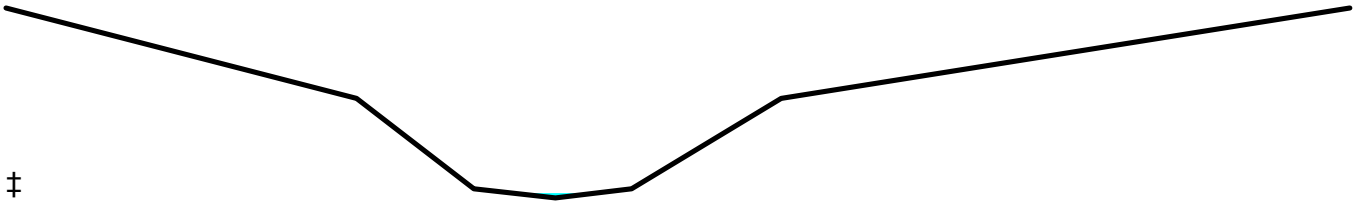
Summary for Reach R1:

Inflow Area = 344,115 sf, 0.00% Impervious, Inflow Depth = 0.18" for 2-Year event
Inflow = 0.77 cfs @ 12.45 hrs, Volume= 5,049 cf
Outflow = 0.64 cfs @ 12.65 hrs, Volume= 5,049 cf, Atten= 17%, Lag= 12.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.22 fps, Min. Travel Time= 15.1 min
Avg. Velocity = 0.71 fps, Avg. Travel Time= 25.8 min

Peak Storage= 574 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.11'
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 = 0.76" for 2-Year event
Inflow = 1.51 cfs @ 12.31 hrs, Volume= 7,814 cf
Primary = 1.51 cfs @ 12.31 hrs, Volume= 7,814 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 = 0.83" for 2-Year event
Inflow = 5.62 cfs @ 12.48 hrs, Volume= 34,160 cf
Primary = 5.62 cfs @ 12.48 hrs, Volume= 34,160 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 = 1.02" for 2-Year event
Inflow = 2.06 cfs @ 12.47 hrs, Volume= 12,214 cf
Primary = 2.06 cfs @ 12.47 hrs, Volume= 12,214 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 = 872,727 sf, 0.00% Impervious, Inflow Depth = 0.57" for 2-Year event
Inflow = 6.68 cfs @ 12.49 hrs, Volume= 41,630 cf
Primary = 6.68 cfs @ 12.49 hrs, Volume= 41,630 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=1.63"
Flow Length=216' Tc=20.6 min CN=WQ Runoff=3.39 cfs 16,732 cf

Subcatchment 2: Runoff Area=491,926 sf 0.41% Impervious Runoff Depth=1.69"
Flow Length=1,526' Tc=32.3 min CN=WQ Runoff=11.61 cfs 69,420 cf

Subcatchment 3: Runoff Area=143,785 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=472' Tc=31.8 min CN=WQ Runoff=4.17 cfs 24,335 cf

Subcatchment 4: Runoff Area=528,612 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=1,041' Tc=32.5 min CN=WQ Runoff=12.10 cfs 72,618 cf

Subcatchment 5: Runoff Area=344,115 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=568' Tc=28.8 min CN=WQ Runoff=1.99 cfs 14,358 cf

Reach R1: Avg. Flow Depth=0.16' Max Vel=1.55 fps Inflow=1.99 cfs 14,358 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=1.76 cfs 14,358 cf

Link SP1: Study Point - WS 1 Inflow=3.39 cfs 16,732 cf
Primary=3.39 cfs 16,732 cf

Link SP2: Study Point - WS 2 Inflow=11.61 cfs 69,420 cf
Primary=11.61 cfs 69,420 cf

Link SP3: Study Point - WS 3 Inflow=4.17 cfs 24,335 cf
Primary=4.17 cfs 24,335 cf

Link SP4: Study Point - WS 4 Inflow=13.68 cfs 86,976 cf
Primary=13.68 cfs 86,976 cf

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=2.44"
Flow Length=216' Tc=20.6 min CN=WQ Runoff=5.16 cfs 25,082 cf

Subcatchment 2: Runoff Area=491,926 sf 0.41% Impervious Runoff Depth=2.49"
Flow Length=1,526' Tc=32.3 min CN=WQ Runoff=17.17 cfs 101,943 cf

Subcatchment 3: Runoff Area=143,785 sf 0.00% Impervious Runoff Depth=2.94"
Flow Length=472' Tc=31.8 min CN=WQ Runoff=6.08 cfs 35,241 cf

Subcatchment 4: Runoff Area=528,612 sf 0.00% Impervious Runoff Depth=2.40"
Flow Length=1,041' Tc=32.5 min CN=WQ Runoff=17.64 cfs 105,734 cf

Subcatchment 5: Runoff Area=344,115 sf 0.00% Impervious Runoff Depth=0.88"
Flow Length=568' Tc=28.8 min CN=WQ Runoff=3.72 cfs 25,095 cf

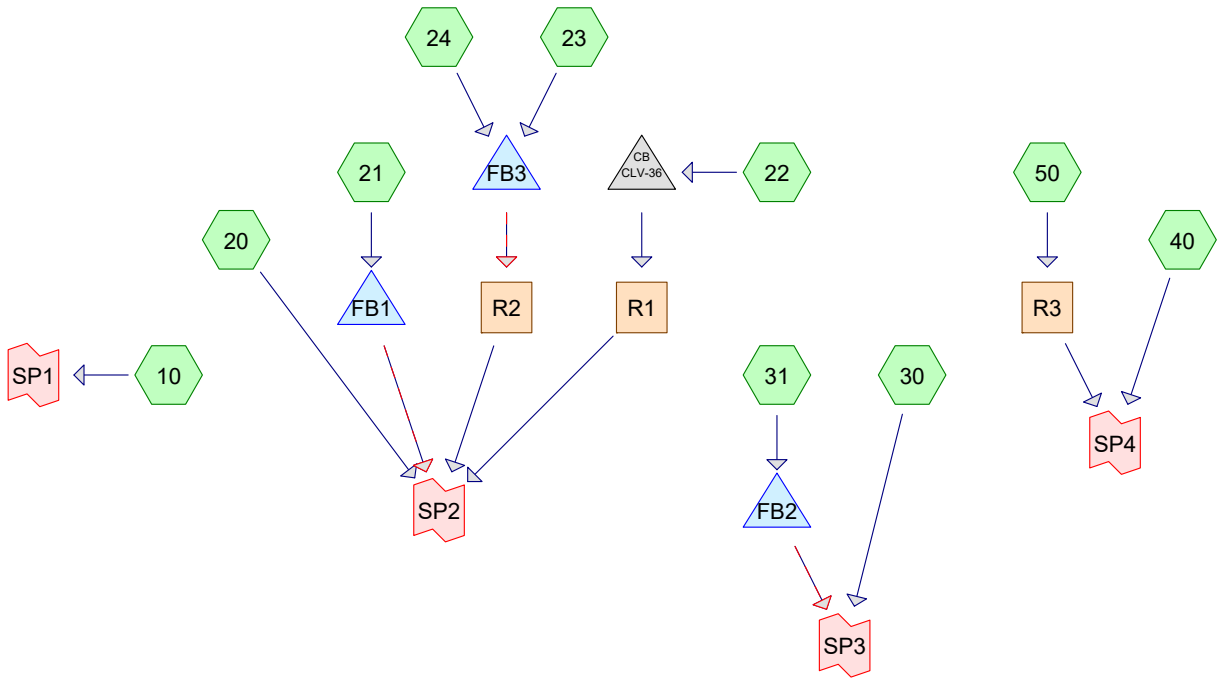
Reach R1: Avg. Flow Depth=0.20' Max Vel=1.82 fps Inflow=3.72 cfs 25,095 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=3.38 cfs 25,095 cf

Link SP1: Study Point - WS 1 Inflow=5.16 cfs 25,082 cf
Primary=5.16 cfs 25,082 cf

Link SP2: Study Point - WS 2 Inflow=17.17 cfs 101,943 cf
Primary=17.17 cfs 101,943 cf

Link SP3: Study Point - WS 3 Inflow=6.08 cfs 35,241 cf
Primary=6.08 cfs 35,241 cf

Link SP4: Study Point - WS 4 Inflow=20.70 cfs 130,829 cf
Primary=20.70 cfs 130,829 cf



Subcat Reach Pond Link

Routing Diagram for 17001-Post
Prepared by DM Roma Consulting Engineers, Printed 5/24/2019

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=47,730 sf 1.48% Impervious Runoff Depth=0.93"
Flow Length=144' Slope=0.0733 '/' Tc=17.4 min CN=WQ Runoff=0.79 cfs 3,718 cf

Subcatchment20: Runoff Area=71,035 sf 11.00% Impervious Runoff Depth=1.39"
Flow Length=572' Tc=16.0 min CN=WQ Runoff=1.83 cfs 8,232 cf

Subcatchment21: Runoff Area=40,991 sf 33.62% Impervious Runoff Depth=1.49"
Flow Length=448' Tc=6.0 min CN=WQ Runoff=1.42 cfs 5,103 cf

Subcatchment22: Runoff Area=49,172 sf 9.80% Impervious Runoff Depth=1.41"
Flow Length=322' Tc=36.0 min CN=WQ Runoff=0.92 cfs 5,781 cf

Subcatchment23: Runoff Area=210,174 sf 5.44% Impervious Runoff Depth=1.06"
Flow Length=854' Tc=37.8 min CN=WQ Runoff=2.83 cfs 18,531 cf

Subcatchment24: Runoff Area=218,850 sf 9.74% Impervious Runoff Depth=0.77"
Flow Length=1,474' Tc=45.0 min CN=WQ Runoff=1.88 cfs 14,051 cf

Subcatchment30: Runoff Area=24,571 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=385' Tc=20.7 min CN=WQ Runoff=0.54 cfs 2,631 cf

Subcatchment31: Runoff Area=105,008 sf 17.51% Impervious Runoff Depth=1.44"
Flow Length=561' Tc=32.5 min CN=WQ Runoff=2.07 cfs 12,625 cf

Subcatchment40: Runoff Area=520,188 sf 0.00% Impervious Runoff Depth=0.83"
Flow Length=1,576' Tc=58.5 min CN=WQ Runoff=4.41 cfs 35,845 cf

Subcatchment50: Runoff Area=344,122 sf 0.00% Impervious Runoff Depth=0.18"
Flow Length=560' Tc=32.7 min CN=WQ Runoff=0.73 cfs 5,060 cf

Reach R1: Avg. Flow Depth=0.17' Max Vel=1.49 fps Inflow=0.92 cfs 5,781 cf
n=0.035 L=595.6' S=0.0334 '/' Capacity=1,775.27 cfs Outflow=0.89 cfs 5,781 cf

Reach R2: Avg. Flow Depth=0.26' Max Vel=2.10 fps Inflow=3.05 cfs 32,589 cf
n=0.035 L=455.4' S=0.0375 '/' Capacity=1,879.32 cfs Outflow=2.98 cfs 32,589 cf

Reach R3: Avg. Flow Depth=0.10' Max Vel=1.21 fps Inflow=0.73 cfs 5,060 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=0.61 cfs 5,060 cf

Pond CLV-36: Peak Elev=215.40' Inflow=0.92 cfs 5,781 cf
36.0" Round Culvert w/ 12.0" inside fill n=0.013 L=54.6' S=0.0055 '/' Outflow=0.92 cfs 5,781 cf

Pond FB1: Peak Elev=200.06' Storage=2,191 cf Inflow=1.42 cfs 5,103 cf
Primary=0.04 cfs 3,997 cf Secondary=0.36 cfs 1,108 cf Outflow=0.40 cfs 5,104 cf

Pond FB2: Peak Elev=199.64' Storage=4,026 cf Inflow=2.07 cfs 12,625 cf
Primary=1.49 cfs 12,626 cf Secondary=0.00 cfs 0 cf Outflow=1.49 cfs 12,626 cf

Pond FB3: Peak Elev=216.47' Storage=10,163 cf Inflow=4.66 cfs 32,582 cf
Primary=3.05 cfs 32,589 cf Secondary=0.00 cfs 0 cf Outflow=3.05 cfs 32,589 cf

Link SP1: Inflow=0.79 cfs 3,718 cf
Primary=0.79 cfs 3,718 cf

Link SP2: Inflow=3.97 cfs 51,707 cf
Primary=3.97 cfs 51,707 cf

Link SP3: Inflow=1.70 cfs 15,257 cf
Primary=1.70 cfs 15,257 cf

Link SP4: Inflow=5.01 cfs 40,905 cf
Primary=5.01 cfs 40,905 cf

Summary for Subcatchment 10:

Runoff = 0.79 cfs @ 12.26 hrs, Volume= 3,718 cf, Depth= 0.93"

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=0.11

Area (sf)	CN	Description
11,429	74	>75% Grass cover, Good, HSG C
19,234	55	Woods, Good, HSG B
5,160	70	Woods, Good, HSG C
11,199	77	Woods, Good, HSG D
708	98	Roofs, HSG A
47,730		Weighted Average
47,022		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 = 1.83 cfs @ 12.23 hrs, Volume= 8,232 cf, Depth= 1.39"

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=0.11

	Area (sf)	CN	Description
*	2,605	98	Existing Paved roads
*	5,207	98	Proposed Paved roads
	1,076	30	Woods, Good, HSG A
	2,523	70	Woods, Good, HSG C
	1,506	77	Woods, Good, HSG D
	1,765	39	>75% Grass cover, Good, HSG A
	40,968	74	>75% Grass cover, Good, HSG C
	15,385	80	>75% Grass cover, Good, HSG D
	71,035		Weighted Average
	63,223		89.00% Pervious Area
	7,812		11.00% 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 = 1.42 cfs @ 12.09 hrs, Volume= 5,103 cf, Depth= 1.49"

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=0.11

	Area (sf)	CN	Description
	953	30	Woods, Good, HSG A
	2,832	98	Unconnected roofs, HSG D
*	10,951	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
	40,991		Weighted Average
	27,208		66.38% Pervious Area
	13,783		33.62% Impervious Area
	2,832		20.55% 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 = 0.92 cfs @ 12.51 hrs, Volume= 5,781 cf, Depth= 1.41"

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=0.11

	Area (sf)	CN	Description
*	3,402	98	Proposed Roads & Driveways, Paved
	839	30	Woods, Good, HSG A
	3,851	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
	44,354		90.20% Pervious Area
	4,818		9.80% Impervious Area
	1,416		29.39% 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 23:

Runoff = 2.83 cfs @ 12.54 hrs, Volume= 18,531 cf, Depth= 1.06"

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=0.11

	Area (sf)	CN	Description
*	0	98	Unconnected roofs
	32	80	>75% Grass cover, Good, HSG D
	2,629	61	>75% Grass cover, Good, HSG B
	10,931	74	>75% Grass cover, Good, HSG C
*	11,424	98	Proposed Road & Driveways, Paved,
	13,593	30	Woods, Good, HSG A
	41,297	55	Woods, Good, HSG B
	55,184	70	Woods, Good, HSG C
	75,084	77	Woods, Good, HSG D
	210,174		Weighted Average
	198,750		94.56% Pervious Area
	11,424		5.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	150	0.0453	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.4	311	0.0367	0.96		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
10.6	393	0.0152	0.62		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
37.8	854	Total			

Summary for Subcatchment 24:

Runoff = 1.88 cfs @ 12.64 hrs, Volume= 14,051 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 2-Year Rainfall=3.10", Ia/S=0.11

	Area (sf)	CN	Description
	55,696	30	Woods, Good, HSG A
	25,601	55	Woods, Good, HSG B
	15,079	70	Woods, Good, HSG C
	4,956	98	Unconnected roofs, HSG A
	302	39	>75% Grass cover, Good, HSG A
	75,418	61	>75% Grass cover, Good, HSG B
	25,340	74	>75% Grass cover, Good, HSG C
	103	80	>75% Grass cover, Good, HSG D
*	12,059	98	Proposed Roads, Paved
*	4,296	98	Proposed Driveways, Paved parking
	218,850		Weighted Average
	197,539		90.26% Pervious Area
	21,311		9.74% Impervious Area
	4,956		23.26% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.4	150	0.0167	0.08		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
10.7	547	0.0289	0.85		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
1.9	777	0.0129	6.82	161.87	**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
45.0	1,474	Total			

Summary for Subcatchment 30:

Runoff = 0.54 cfs @ 12.30 hrs, Volume= 2,631 cf, Depth= 1.28"

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=0.11

	Area (sf)	CN	Description
	2,225	70	Woods, Good, HSG C
	19,317	77	Woods, Good, HSG D
	3,029	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 = 2.07 cfs @ 12.46 hrs, Volume= 12,625 cf, Depth= 1.44"

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=0.11

	Area (sf)	CN	Description
	21,802	70	Woods, Good, HSG C
	5,664	98	Unconnected roofs, HSG D
*	12,726	98	Proposed Road & Driveways, Paved
	64,816	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 = 4.41 cfs @ 12.82 hrs, Volume= 35,845 cf, Depth= 0.83"

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 2-Year Rainfall=3.10", Ia/S=0.11

	Area (sf)	CN	Description
*	163,798	30	Woods, Good, HSG A
	0	55	Woods, Good, HSG B
	140,732	70	Woods, Good, HSG C
	214,843	77	Woods, Good, HSG D
*	29	39	>75% Grass cover, Good, HSG A
	0	61	>75% Grass cover, Good, HSG B
	599	74	>75% Grass cover, Good, HSG C
	187	80	>75% Grass cover, Good, HSG D
	0	98	Unconnected roofs, HSG A
	520,188		Weighted Average
	520,188		100.00% Pervious Area

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 Subcatchment 50:

Runoff = 0.73 cfs @ 12.51 hrs, Volume= 5,060 cf, Depth= 0.18"

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=0.11

	Area (sf)	CN	Description
*	246,017	30	Woods, Good, HSG A
	70,977	55	Woods, Good, HSG B
	24,414	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
*	2,714	39	>75% Grass cover, Good, HSG A
	0	61	>75% Grass cover, Good, HSG B
	0	74	>75% Grass cover, Good, HSG C
	0	80	>75% Grass cover, Good, HSG D
	0	98	Unconnected roofs, HSG A
	344,122		Weighted Average
	344,122		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.9	150	0.0293	0.10		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	410	0.0405	1.01		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
32.7	560	Total			

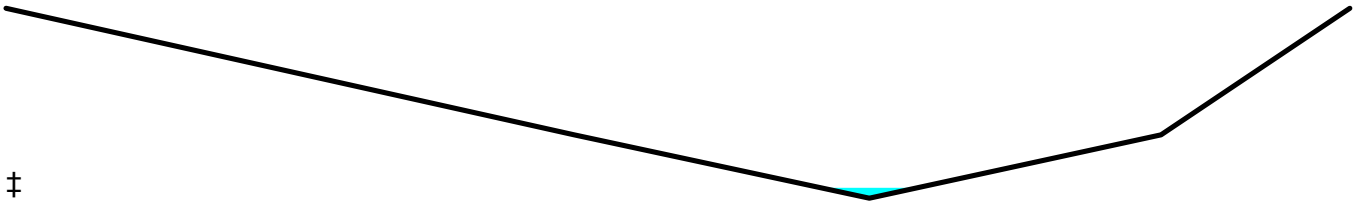
Summary for Reach R1:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 1.41" for 2-Year event
Inflow = 0.92 cfs @ 12.51 hrs, Volume= 5,781 cf
Outflow = 0.89 cfs @ 12.60 hrs, Volume= 5,781 cf, Atten= 4%, Lag= 5.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 6.7 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 14.9 min

Peak Storage= 355 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,775.27 cfs

Custom cross-section, Length= 595.6' Slope= 0.0334 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 214.85', Outlet Invert= 194.94'



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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	105.55
3.00	163.7	99.1	97,500	1,775.27

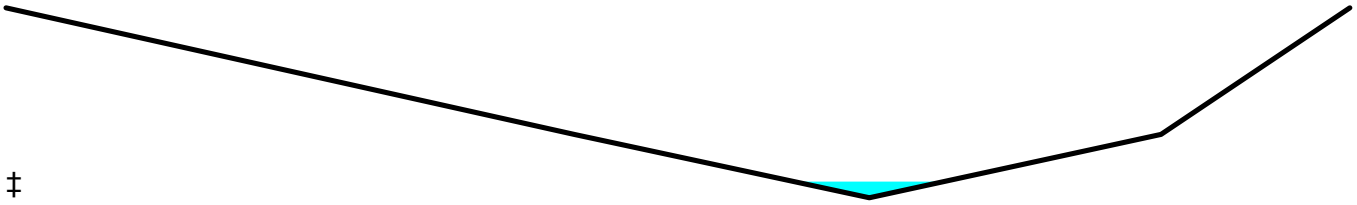
Summary for Reach R2:

Inflow Area = 429,024 sf, 7.63% Impervious, Inflow Depth = 0.91" for 2-Year event
Inflow = 3.05 cfs @ 12.97 hrs, Volume= 32,589 cf
Outflow = 2.98 cfs @ 13.03 hrs, Volume= 32,589 cf, Atten= 2%, Lag= 3.5 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= 3.6 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 7.6 min

Peak Storage= 648 cf @ 13.03 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 3.00' Flow Area= 163.7 sf, Capacity= 1,879.32 cfs

Custom cross-section, Length= 455.4' Slope= 0.0375 '/' (101 Elevation Intervals)
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 212.00', Outlet Invert= 194.94'



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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	111.74
3.00	163.7	99.1	74,549	1,879.32

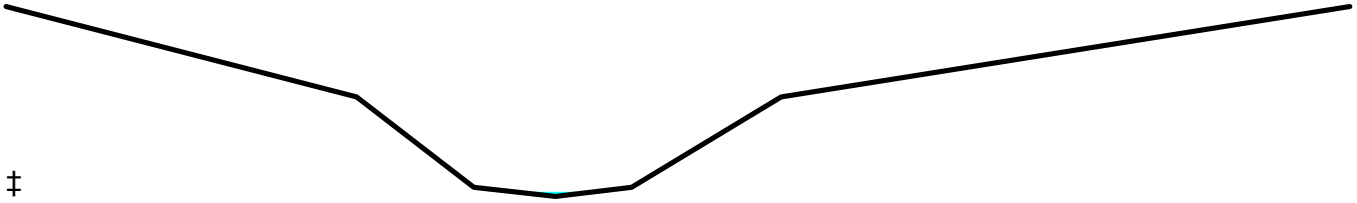
Summary for Reach R3:

Inflow Area = 344,122 sf, 0.00% Impervious, Inflow Depth = 0.18" for 2-Year event
Inflow = 0.73 cfs @ 12.51 hrs, Volume= 5,060 cf
Outflow = 0.61 cfs @ 12.71 hrs, Volume= 5,060 cf, Atten= 16%, Lag= 11.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Max. Velocity= 1.21 fps, Min. Travel Time= 15.2 min
Avg. Velocity = 0.71 fps, Avg. Travel Time= 25.8 min

Peak Storage= 559 cf @ 12.71 hrs
Average Depth at Peak Storage= 0.10'
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 Pond CLV-36:

Inflow Area = 49,172 sf, 9.80% Impervious, Inflow Depth = 1.41" for 2-Year event
Inflow = 0.92 cfs @ 12.51 hrs, Volume= 5,781 cf
Outflow = 0.92 cfs @ 12.51 hrs, Volume= 5,781 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.51 hrs, Volume= 5,781 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 215.40' @ 12.51 hrs
Flood Elev= 219.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	215.15'	**36.0" Round Culvert w/ 12.0" inside fill** L= 54.6' 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=0.91 cfs @ 12.51 hrs HW=215.40' TW=215.01' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.91 cfs @ 1.26 fps)

Summary for Pond FB1:

Inflow Area = 40,991 sf, 33.62% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 1.42 cfs @ 12.09 hrs, Volume= 5,103 cf
Outflow = 0.40 cfs @ 12.48 hrs, Volume= 5,104 cf, Atten= 72%, Lag= 23.3 min
Primary = 0.04 cfs @ 12.48 hrs, Volume= 3,997 cf
Secondary = 0.36 cfs @ 12.48 hrs, Volume= 1,108 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 200.06' @ 12.48 hrs Surf.Area= 1,755 sf Storage= 2,191 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 460.3 min (1,247.6 - 787.3)

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	195.55'	**0.8" Vert. 13/16" Orifice At Pipe End** C= 0.600
#2	Device 1	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
#3	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
#4	Device 2	198.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 196.00'

Primary OutFlow Max=0.04 cfs @ 12.48 hrs HW=200.06' TW=0.00' (Dynamic Tailwater)
↑—**1=13/16" Orifice At Pipe End** (Orifice Controls 0.04 cfs @ 10.19 fps)
↑—**2=Culvert** (Passes 0.04 cfs of 0.41 cfs potential flow)
↑—**4=Exfiltration** (Passes 0.04 cfs of 0.14 cfs potential flow)

Secondary OutFlow Max=0.36 cfs @ 12.48 hrs HW=200.06' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.36 cfs @ 0.62 fps)

Summary for Pond FB2:

Inflow Area = 105,008 sf, 17.51% Impervious, Inflow Depth = 1.44" for 2-Year event
Inflow = 2.07 cfs @ 12.46 hrs, Volume= 12,625 cf
Outflow = 1.49 cfs @ 12.75 hrs, Volume= 12,626 cf, Atten= 28%, Lag= 17.2 min
Primary = 1.49 cfs @ 12.75 hrs, Volume= 12,626 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= 199.64' @ 12.75 hrs Surf.Area= 3,009 sf Storage= 4,026 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 297.8 min (1,135.2 - 837.4)

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'	**1.3" Vert. 1-5/16" Orifice in OCS** 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'	**Beehive Grate** 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=1.45 cfs @ 12.75 hrs HW=199.63' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.45 cfs of 2.56 cfs potential flow)
  - **3=1-5/16" Orifice in OCS** (Orifice Controls 0.09 cfs @ 9.32 fps)
    - **4=Exfiltration** (Passes 0.09 cfs of 0.24 cfs potential flow)
  - **5=Beehive Grate** (Custom Controls 1.37 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 = 429,024 sf, 7.63% Impervious, Inflow Depth = 0.91" for 2-Year event
Inflow = 4.66 cfs @ 12.58 hrs, Volume= 32,582 cf
Outflow = 3.05 cfs @ 12.97 hrs, Volume= 32,589 cf, Atten= 35%, Lag= 23.3 min
Primary = 3.05 cfs @ 12.97 hrs, Volume= 32,589 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= 216.47' @ 12.97 hrs Surf.Area= 7,497 sf Storage= 10,163 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 290.2 min (1,152.1 - 861.8)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	23,707 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	4,375	4,754.3	0.0	0	0	4,375
215.00	4,720	463.7	100.0	1,137	1,137	1,785,983
216.00	6,744	623.8	100.0	5,702	6,839	1,799,849
218.00	10,246	582.0	100.0	16,868	23,707	1,804,037

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**15.0" Round Culvert** L= 116.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.58' / 212.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	216.65'	**9.0' 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	212.58'	**2.0" Vert. 2" Orifice In OCS** C= 0.600
#4	Device 3	214.75'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.08'
#5	Device 1	216.25'	**Beehive Grate** 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=3.04 cfs @ 12.97 hrs HW=216.47' TW=212.25' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.04 cfs of 8.61 cfs potential flow)
  - **3=2" Orifice In OCS** (Orifice Controls 0.20 cfs @ 9.39 fps)
    - **4=Exfiltration** (Passes 0.20 cfs of 0.62 cfs potential flow)
  - **5=Beehive Grate** (Custom Controls 2.83 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=214.75' TW=212.00' (Dynamic Tailwater)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link SP1:

Inflow Area = 47,730 sf, 1.48% Impervious, Inflow Depth = 0.93" for 2-Year event
Inflow = 0.79 cfs @ 12.26 hrs, Volume= 3,718 cf
Primary = 0.79 cfs @ 12.26 hrs, Volume= 3,718 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 = 590,222 sf, 10.02% Impervious, Inflow Depth = 1.05" for 2-Year event
Inflow = 3.97 cfs @ 12.99 hrs, Volume= 51,707 cf
Primary = 3.97 cfs @ 12.99 hrs, Volume= 51,707 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 = 1.41" for 2-Year event
Inflow = 1.70 cfs @ 12.74 hrs, Volume= 15,257 cf
Primary = 1.70 cfs @ 12.74 hrs, Volume= 15,257 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 = 864,310 sf, 0.00% Impervious, Inflow Depth = 0.57" for 2-Year event
Inflow = 5.01 cfs @ 12.80 hrs, Volume= 40,905 cf
Primary = 5.01 cfs @ 12.80 hrs, Volume= 40,905 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=47,730 sf 1.48% Impervious Runoff Depth=1.89"
Flow Length=144' Slope=0.0733 '/' Tc=17.4 min CN=WQ Runoff=1.64 cfs 7,511 cf

Subcatchment20: Runoff Area=71,035 sf 11.00% Impervious Runoff Depth=2.54"
Flow Length=572' Tc=16.0 min CN=WQ Runoff=3.38 cfs 15,033 cf

Subcatchment21: Runoff Area=40,991 sf 33.62% Impervious Runoff Depth=2.54"
Flow Length=448' Tc=6.0 min CN=WQ Runoff=2.43 cfs 8,690 cf

Subcatchment22: Runoff Area=49,172 sf 9.80% Impervious Runoff Depth=2.58"
Flow Length=322' Tc=36.0 min CN=WQ Runoff=1.70 cfs 10,574 cf

Subcatchment23: Runoff Area=210,174 sf 5.44% Impervious Runoff Depth=2.04"
Flow Length=854' Tc=37.8 min CN=WQ Runoff=5.57 cfs 35,789 cf

Subcatchment24: Runoff Area=218,850 sf 9.74% Impervious Runoff Depth=1.52"
Flow Length=1,474' Tc=45.0 min CN=WQ Runoff=3.77 cfs 27,703 cf

Subcatchment30: Runoff Area=24,571 sf 0.00% Impervious Runoff Depth=2.44"
Flow Length=385' Tc=20.7 min CN=WQ Runoff=1.04 cfs 5,002 cf

Subcatchment31: Runoff Area=105,008 sf 17.51% Impervious Runoff Depth=2.61"
Flow Length=561' Tc=32.5 min CN=WQ Runoff=3.79 cfs 22,806 cf

Subcatchment40: Runoff Area=520,188 sf 0.00% Impervious Runoff Depth=1.64"
Flow Length=1,576' Tc=58.5 min CN=WQ Runoff=8.74 cfs 71,144 cf

Subcatchment50: Runoff Area=344,122 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=560' Tc=32.7 min CN=WQ Runoff=1.90 cfs 14,379 cf

Reach R1: Avg. Flow Depth=0.21' Max Vel=1.73 fps Inflow=1.70 cfs 10,574 cf
n=0.035 L=595.6' S=0.0334 '/' Capacity=1,775.27 cfs Outflow=1.65 cfs 10,574 cf

Reach R2: Avg. Flow Depth=0.38' Max Vel=2.71 fps Inflow=8.50 cfs 63,496 cf
n=0.035 L=455.4' S=0.0375 '/' Capacity=1,879.32 cfs Outflow=8.45 cfs 63,496 cf

Reach R3: Avg. Flow Depth=0.16' Max Vel=1.54 fps Inflow=1.90 cfs 14,379 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=1.70 cfs 14,379 cf

Pond CLV-36: Peak Elev=215.53' Inflow=1.70 cfs 10,574 cf
36.0" Round Culvert w/ 12.0" inside fill n=0.013 L=54.6' S=0.0055 '/' Outflow=1.70 cfs 10,574 cf

Pond FB1: Peak Elev=200.20' Storage=2,447 cf Inflow=2.43 cfs 8,690 cf
Primary=0.04 cfs 4,427 cf Secondary=2.28 cfs 4,265 cf Outflow=2.32 cfs 8,691 cf

Pond FB2: Peak Elev=200.04' Storage=5,295 cf Inflow=3.79 cfs 22,806 cf
Primary=2.70 cfs 22,715 cf Secondary=0.19 cfs 95 cf Outflow=2.89 cfs 22,809 cf

Pond FB3: Peak Elev=216.79' Storage=12,670 cf Inflow=9.24 cfs 63,492 cf
Primary=7.29 cfs 62,065 cf Secondary=1.21 cfs 1,431 cf Outflow=8.50 cfs 63,496 cf

Link SP1: Inflow=1.64 cfs 7,511 cf
Primary=1.64 cfs 7,511 cf

Link SP2: Inflow=11.19 cfs 97,793 cf
Primary=11.19 cfs 97,793 cf

Link SP3: Inflow=3.69 cfs 27,811 cf
Primary=3.69 cfs 27,811 cf

Link SP4: Inflow=10.36 cfs 85,522 cf
Primary=10.36 cfs 85,522 cf

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=47,730 sf 1.48% Impervious Runoff Depth=2.76"
Flow Length=144' Slope=0.0733 '/' Tc=17.4 min CN=WQ Runoff=2.42 cfs 10,971 cf

Subcatchment20: Runoff Area=71,035 sf 11.00% Impervious Runoff Depth=3.54"
Flow Length=572' Tc=16.0 min CN=WQ Runoff=4.73 cfs 20,942 cf

Subcatchment21: Runoff Area=40,991 sf 33.62% Impervious Runoff Depth=3.45"
Flow Length=448' Tc=6.0 min CN=WQ Runoff=3.32 cfs 11,798 cf

Subcatchment22: Runoff Area=49,172 sf 9.80% Impervious Runoff Depth=3.59"
Flow Length=322' Tc=36.0 min CN=WQ Runoff=2.37 cfs 14,729 cf

Subcatchment23: Runoff Area=210,174 sf 5.44% Impervious Runoff Depth=2.93"
Flow Length=854' Tc=37.8 min CN=WQ Runoff=8.03 cfs 51,297 cf

Subcatchment24: Runoff Area=218,850 sf 9.74% Impervious Runoff Depth=2.22"
Flow Length=1,474' Tc=45.0 min CN=WQ Runoff=5.58 cfs 40,558 cf

Subcatchment30: Runoff Area=24,571 sf 0.00% Impervious Runoff Depth=3.45"
Flow Length=385' Tc=20.7 min CN=WQ Runoff=1.48 cfs 7,074 cf

Subcatchment31: Runoff Area=105,008 sf 17.51% Impervious Runoff Depth=3.62"
Flow Length=561' Tc=32.5 min CN=WQ Runoff=5.29 cfs 31,649 cf

Subcatchment40: Runoff Area=520,188 sf 0.00% Impervious Runoff Depth=2.39"
Flow Length=1,576' Tc=58.5 min CN=WQ Runoff=12.75 cfs 103,597 cf

Subcatchment50: Runoff Area=344,122 sf 0.00% Impervious Runoff Depth=0.88"
Flow Length=560' Tc=32.7 min CN=WQ Runoff=3.53 cfs 25,123 cf

Reach R1: Avg. Flow Depth=0.24' Max Vel=1.88 fps Inflow=2.37 cfs 14,729 cf
n=0.035 L=595.6' S=0.0334 '/' Capacity=1,775.27 cfs Outflow=2.31 cfs 14,729 cf

Reach R2: Avg. Flow Depth=0.44' Max Vel=3.01 fps Inflow=12.92 cfs 91,856 cf
n=0.035 L=455.4' S=0.0375 '/' Capacity=1,879.32 cfs Outflow=12.86 cfs 91,856 cf

Reach R3: Avg. Flow Depth=0.20' Max Vel=1.79 fps Inflow=3.53 cfs 25,123 cf
n=0.030 L=1,103.6' S=0.0281 '/' Capacity=3,277.20 cfs Outflow=3.23 cfs 25,123 cf

Pond CLV-36: Peak Elev=215.62' Inflow=2.37 cfs 14,729 cf
36.0" Round Culvert w/ 12.0" inside fill n=0.013 L=54.6' S=0.0055 '/' Outflow=2.37 cfs 14,729 cf

Pond FB1: Peak Elev=200.25' Storage=2,530 cf Inflow=3.32 cfs 11,798 cf
Primary=0.04 cfs 4,581 cf Secondary=3.16 cfs 7,219 cf Outflow=3.20 cfs 11,800 cf

Pond FB2: Peak Elev=200.20' Storage=5,839 cf Inflow=5.29 cfs 31,649 cf
Primary=2.75 cfs 28,804 cf Secondary=2.30 cfs 2,851 cf Outflow=5.05 cfs 31,655 cf

Pond FB3: Peak Elev=216.98' Storage=14,234 cf Inflow=13.46 cfs 91,855 cf
Primary=8.47 cfs 83,700 cf Secondary=4.45 cfs 8,156 cf Outflow=12.92 cfs 91,856 cf

Link SP1: Inflow=2.42 cfs 10,971 cf
Primary=2.42 cfs 10,971 cf

Link SP2: Inflow=17.11 cfs 139,327 cf
Primary=17.11 cfs 139,327 cf

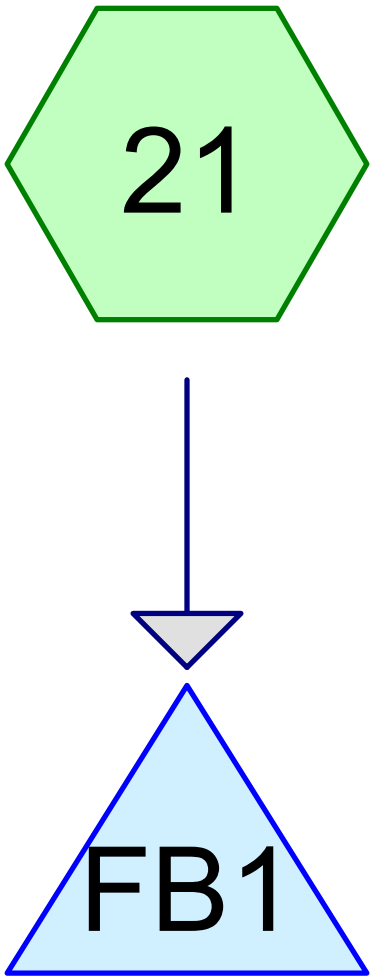
Link SP3: Inflow=6.01 cfs 38,729 cf
Primary=6.01 cfs 38,729 cf

Link SP4: Inflow=15.79 cfs 128,720 cf
Primary=15.79 cfs 128,720 cf

ATTACHMENT 4

SPILLWAY RUNS

SPILLWAY RUN
FILTER BASIN FB-1



Subcat Reach Pond Link

Routing Diagram for 17001-Post
Prepared by DM Roma Consulting Engineers, Printed 5/24/2019
HydroCAD® 10.00-20 s/n 09237 © 2017 HydroCAD Software Solutions LLC

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

Subcatchment21: Runoff Area=40,991 sf 33.62% Impervious Runoff Depth=3.45"
Flow Length=448' Tc=6.0 min CN=WQ Runoff=3.32 cfs 11,798 cf

Pond FB1: Peak Elev=200.25' Storage=2,534 cf Inflow=3.32 cfs 11,798 cf
Primary=0.00 cfs 0 cf Secondary=3.20 cfs 9,709 cf Outflow=3.20 cfs 9,709 cf

Top of Berm Elev.=201.25'
Peak Elev. in Spillway Run = 200.25'
Freeboard = 1'

Summary for Subcatchment 21:

Runoff = 3.32 cfs @ 12.09 hrs, Volume= 11,798 cf, Depth= 3.45"

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 25-Year Rainfall=5.80", Ia/S=0.11

	Area (sf)	CN	Description
	953	30	Woods, Good, HSG A
	2,832	98	Unconnected roofs, HSG D
*	10,951	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
	40,991		Weighted Average
	27,208		66.38% Pervious Area
	13,783		33.62% Impervious Area
	2,832		20.55% 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 Pond FB1:

Inflow Area = 40,991 sf, 33.62% Impervious, Inflow Depth = 3.45" for 25-Year event
Inflow = 3.32 cfs @ 12.09 hrs, Volume= 11,798 cf
Outflow = 3.20 cfs @ 12.12 hrs, Volume= 9,709 cf, Atten= 3%, Lag= 2.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 3.20 cfs @ 12.12 hrs, Volume= 9,709 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 200.25' @ 12.12 hrs Surf.Area= 1,846 sf Storage= 2,534 cf

Plug-Flow detention time= 132.5 min calculated for 9,709 cf (82% of inflow)
Center-of-Mass det. time= 58.0 min (839.7 - 781.6)

Volume	Invert	Avail.Storage	Storage Description
#1	198.50'	6,564 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

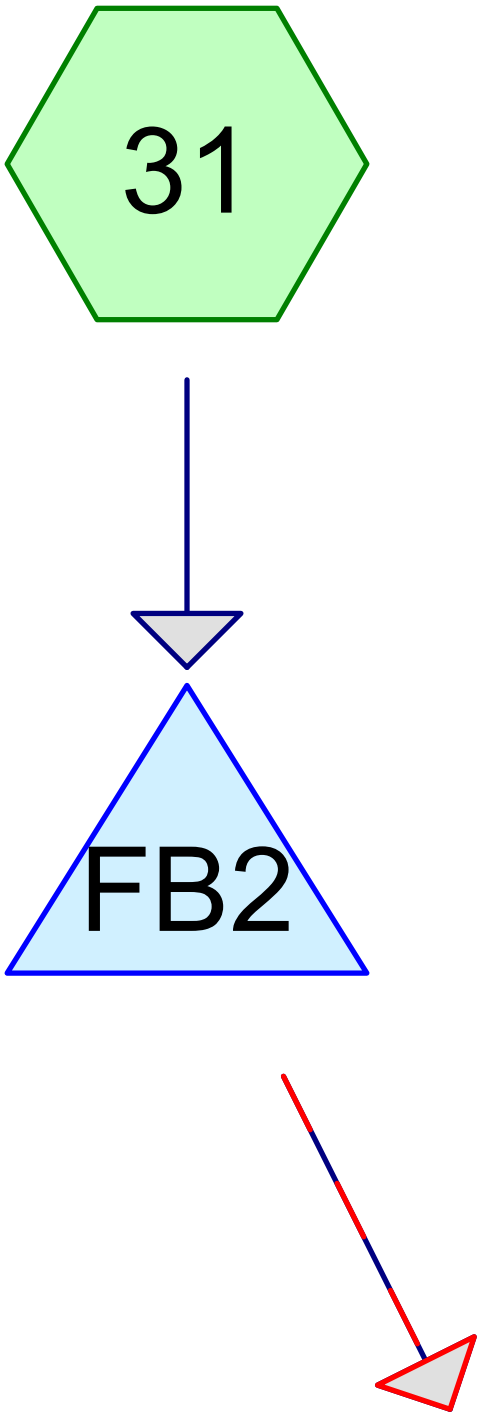
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.50	1,083	128.5	0.0	0	0	1,083
200.00	1,728	157.4	100.0	2,090	2,090	1,775
201.00	2,228	176.2	100.0	1,973	4,062	2,301
202.00	2,785	195.1	100.0	2,501	6,564	2,889

Device	Routing	Invert	Outlet Devices
#1	Primary	195.55'	**0.8" Vert. 13/16" Orifice At Pipe End X 0.00** C= 0.600
#2	Device 1	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
#3	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
#4	Device 2	198.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 196.00'

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.50' TW=0.00' (Dynamic Tailwater)
└─**1=13/16" Orifice At Pipe End** (Controls 0.00 cfs)
└─**2=Culvert** (Passes 0.00 cfs of 0.33 cfs potential flow)
└─**4=Exfiltration** (Passes 0.00 cfs of 0.06 cfs potential flow)

Secondary OutFlow Max=3.20 cfs @ 12.12 hrs HW=200.25' TW=0.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 3.20 cfs @ 1.29 fps)

SPILLWAY RUN
FILTER BASIN FB-2



Subcat Reach Pond Link

Routing Diagram for 17001-Post
Prepared by DM Roma Consulting Engineers, Printed 5/24/2019

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 31: Runoff Area=105,008 sf 17.51% Impervious Runoff Depth=3.62"
Flow Length=561' Tc=32.5 min CN=WQ Runoff=5.29 cfs 31,649 cf

Pond FB2: Peak Elev=200.34' Storage=6,334 cf Inflow=5.29 cfs 31,649 cf
Primary=0.00 cfs 0 cf Secondary=5.23 cfs 26,480 cf Outflow=5.23 cfs 26,480 cf

Top of Berm Elev.=201.40'
Peak Elev. in Spillway Run = 200.34'
Freeboard = 1'

Summary for Subcatchment 31:

Runoff = 5.29 cfs @ 12.45 hrs, Volume= 31,649 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=0.11

	Area (sf)	CN	Description
	21,802	70	Woods, Good, HSG C
	5,664	98	Unconnected roofs, HSG D
*	12,726	98	Proposed Road & Driveways, Paved
	64,816	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 Pond FB2:

Inflow Area = 105,008 sf, 17.51% Impervious, Inflow Depth = 3.62" for 25-Year event
Inflow = 5.29 cfs @ 12.45 hrs, Volume= 31,649 cf
Outflow = 5.23 cfs @ 12.49 hrs, Volume= 26,480 cf, Atten= 1%, Lag= 2.7 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 5.23 cfs @ 12.49 hrs, Volume= 26,480 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 200.34' @ 12.49 hrs Surf.Area= 3,522 sf Storage= 6,334 cf

Plug-Flow detention time= 117.6 min calculated for 26,447 cf (84% of inflow)
Center-of-Mass det. time= 48.8 min (872.1 - 823.3)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	8,811 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

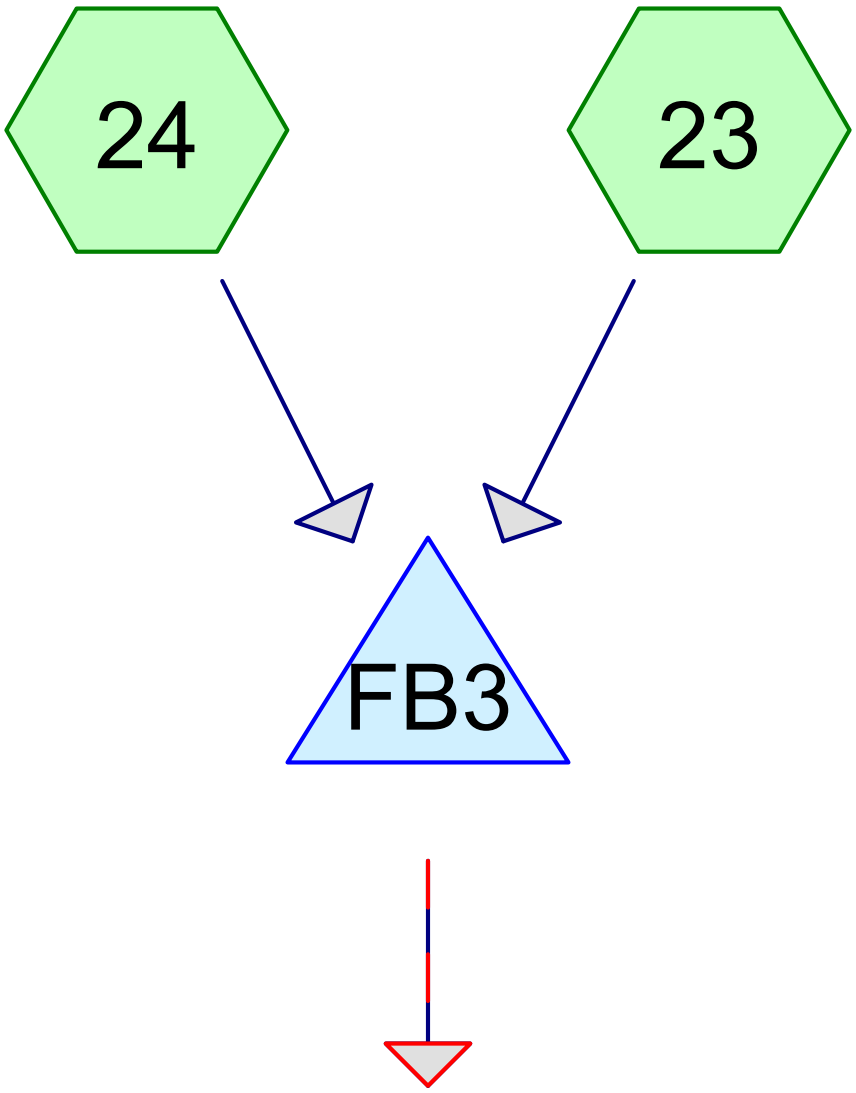
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
198.00	1,951	201.9	0.0	0	0	1,951
200.00	3,275	239.6	100.0	5,169	5,169	3,347
201.00	4,022	258.4	100.0	3,642	8,811	4,133

Device	Routing	Invert	Outlet Devices
#1	Primary	195.83'	**8.0" Round Culvert X 0.00** 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'	**1.3" Vert. 1-5/16" Orifice in OCS** 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'	**Beehive Grate** 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=0.00 cfs @ 0.00 hrs HW=198.00' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**3=1-5/16" Orifice in OCS** (Passes 0.00 cfs of 0.06 cfs potential flow)
    └─**4=Exfiltration** (Passes 0.00 cfs of 0.11 cfs potential flow)
  └─**5=Beehive Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=5.21 cfs @ 12.49 hrs HW=200.34' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 5.21 cfs @ 1.52 fps)

SPILLWAY RUN
FILTER BASIN FB-3



Subcat Reach Pond Link

Routing Diagram for 17001-Post
Prepared by DM Roma Consulting Engineers, Printed 5/24/2019

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 23: Runoff Area=210,174 sf 5.44% Impervious Runoff Depth=2.93"
Flow Length=854' Tc=37.8 min CN=WQ Runoff=8.03 cfs 51,297 cf

Subcatchment 24: Runoff Area=218,850 sf 9.74% Impervious Runoff Depth=2.22"
Flow Length=1,474' Tc=45.0 min CN=WQ Runoff=5.58 cfs 40,558 cf

Pond FB3: Peak Elev=217.31' Storage=17,097 cf Inflow=13.46 cfs 91,855 cf
Primary=0.00 cfs 0 cf Secondary=13.02 cfs 80,293 cf Outflow=13.02 cfs 80,293 cf

Top of Berm Elev.=218.30'
Peak Elev. in Spillway Run = 217.31'
Freeboard = 1'

Summary for Subcatchment 23:

Runoff = 8.03 cfs @ 12.53 hrs, Volume= 51,297 cf, Depth= 2.93"

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=0.11

	Area (sf)	CN	Description
*	0	98	Unconnected roofs
	32	80	>75% Grass cover, Good, HSG D
	2,629	61	>75% Grass cover, Good, HSG B
	10,931	74	>75% Grass cover, Good, HSG C
*	11,424	98	Proposed Road & Driveways, Paved,
	13,593	30	Woods, Good, HSG A
	41,297	55	Woods, Good, HSG B
	55,184	70	Woods, Good, HSG C
	75,084	77	Woods, Good, HSG D
	210,174		Weighted Average
	198,750		94.56% Pervious Area
	11,424		5.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	150	0.0453	0.11		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.4	311	0.0367	0.96		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
10.6	393	0.0152	0.62		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
37.8	854	Total			

Summary for Subcatchment 24:

Runoff = 5.58 cfs @ 12.63 hrs, Volume= 40,558 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 25-Year Rainfall=5.80", Ia/S=0.11

	Area (sf)	CN	Description
	55,696	30	Woods, Good, HSG A
	25,601	55	Woods, Good, HSG B
	15,079	70	Woods, Good, HSG C
	4,956	98	Unconnected roofs, HSG A
	302	39	>75% Grass cover, Good, HSG A
	75,418	61	>75% Grass cover, Good, HSG B
	25,340	74	>75% Grass cover, Good, HSG C
	103	80	>75% Grass cover, Good, HSG D
*	12,059	98	Proposed Roads, Paved
*	4,296	98	Proposed Driveways, Paved parking
	218,850		Weighted Average
	197,539		90.26% Pervious Area
	21,311		9.74% Impervious Area
	4,956		23.26% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.4	150	0.0167	0.08		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
10.7	547	0.0289	0.85		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
1.9	777	0.0129	6.82	161.87	**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
45.0	1,474	Total			

Summary for Pond FB3:

Inflow Area = 429,024 sf, 7.63% Impervious, Inflow Depth = 2.57" for 25-Year event
Inflow = 13.46 cfs @ 12.56 hrs, Volume= 91,855 cf
Outflow = 13.02 cfs @ 12.66 hrs, Volume= 80,293 cf, Atten= 3%, Lag= 5.6 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 13.02 cfs @ 12.66 hrs, Volume= 80,293 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.06 hrs
Peak Elev= 217.31' @ 12.66 hrs Surf.Area= 8,957 sf Storage= 17,097 cf

Plug-Flow detention time= 102.6 min calculated for 80,192 cf (87% of inflow)
Center-of-Mass det. time= 44.3 min (892.6 - 848.2)

Volume	Invert	Avail.Storage	Storage Description
#1	214.75'	23,707 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	4,375	4,754.3	0.0	0	0	4,375
215.00	4,720	463.7	100.0	1,137	1,137	1,785,983
216.00	6,744	623.8	100.0	5,702	6,839	1,799,849
218.00	10,246	582.0	100.0	16,868	23,707	1,804,037

Device	Routing	Invert	Outlet Devices
#1	Primary	212.58'	**15.0" Round Culvert X 0.00** L= 116.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.58' / 212.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	216.65'	**9.0' 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	212.58'	**2.0" Vert. 2" Orifice In OCS** C= 0.600
#4	Device 3	214.75'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 212.08'
#5	Device 1	216.25'	**Beehive Grate** 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=0.00 cfs @ 0.00 hrs HW=214.75' TW=212.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  ├─**3=2" Orifice In OCS** (Passes 0.00 cfs of 0.15 cfs potential flow)
  │ └─**4=Exfiltration** (Passes 0.00 cfs of 0.24 cfs potential flow)
  └─**5=Beehive Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=13.01 cfs @ 12.66 hrs HW=217.31' TW=212.44' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.01 cfs @ 2.19 fps)

ATTACHMENT 5

INSPECTION, MAINTENANCE AND HOUSEKEEPING PLAN

DM ROMA
CONSULTING ENGINEERS

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

(Prepared by Jayson Haskell, PE #13002)

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 generating more than 0.5 inch of rainfall over a 24-hour period 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. **Construction vehicles and equipment:** Construction vehicles and equipment shall not be driven or stored within the underdrained filter basins. To ensure the underdrained filter basins function as designed perpetually, prohibiting vehicles and equipment from these areas will limit the risk of inhibiting the function of the underdrained filter basins due to compaction.

4. **Snow Storage:** The proposed underdrained filter basins (FB-1, FB-2, & FB-3) shall not be utilized for snow storage. Snow storage areas shall be located away from the basins, and in areas that will direct snow melt runoff into one of the basins on site.

5. **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.

Housekeeping

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 stormwater measures, including but not limited to those shown on the enclosed Stormwater Infrastructure Map must be maintained by the owner in effective operating condition. A qualified third-party inspector hired by the owner shall at least annually inspect the stormwater management facilities. This person should have knowledge of erosion and stormwater control including the standards and conditions of the site's approvals. The inspector shall be certified through the MDEP to inspect the stormwater infrastructure. 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:** The filter basins are not intended to function as snow storage areas. Inspector to verify that winter plowing operations are not dumping or pushing snow into the basins. The basins shall also not be used for vehicle or heavy equipment storage. Basin should be inspected after several major storm events (0.5 inches rainfall over 24 hours) to determine drawdown time during the first year. Basins to be inspected every six months thereafter with at least one inspection after a major storm event.

   The basin should drain dry within 24 to 48 hours following a one-inch storm. If ponding exceeds 48 hours, 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 basin should also be inspected annually for destabilization of side slopes, embankment settling and other signs of structural failure.

   The emergency spillways associated with the filter basins should be inspected semi-annually and following major storm events for the first year and every six months thereafter to remove any obstructions to flow. Any woody vegetation growing through riprap lining must be removed. Replace riprap on areas where any underlying filter fabric is showing through the stone or where stones have been dislodged.

E. **Roofline Drip edges:** 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 24 to 48 hours following a major storm event. 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 and MDEP 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.

INSPECTION AND MAINTENANCE LOG – GENERAL

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.

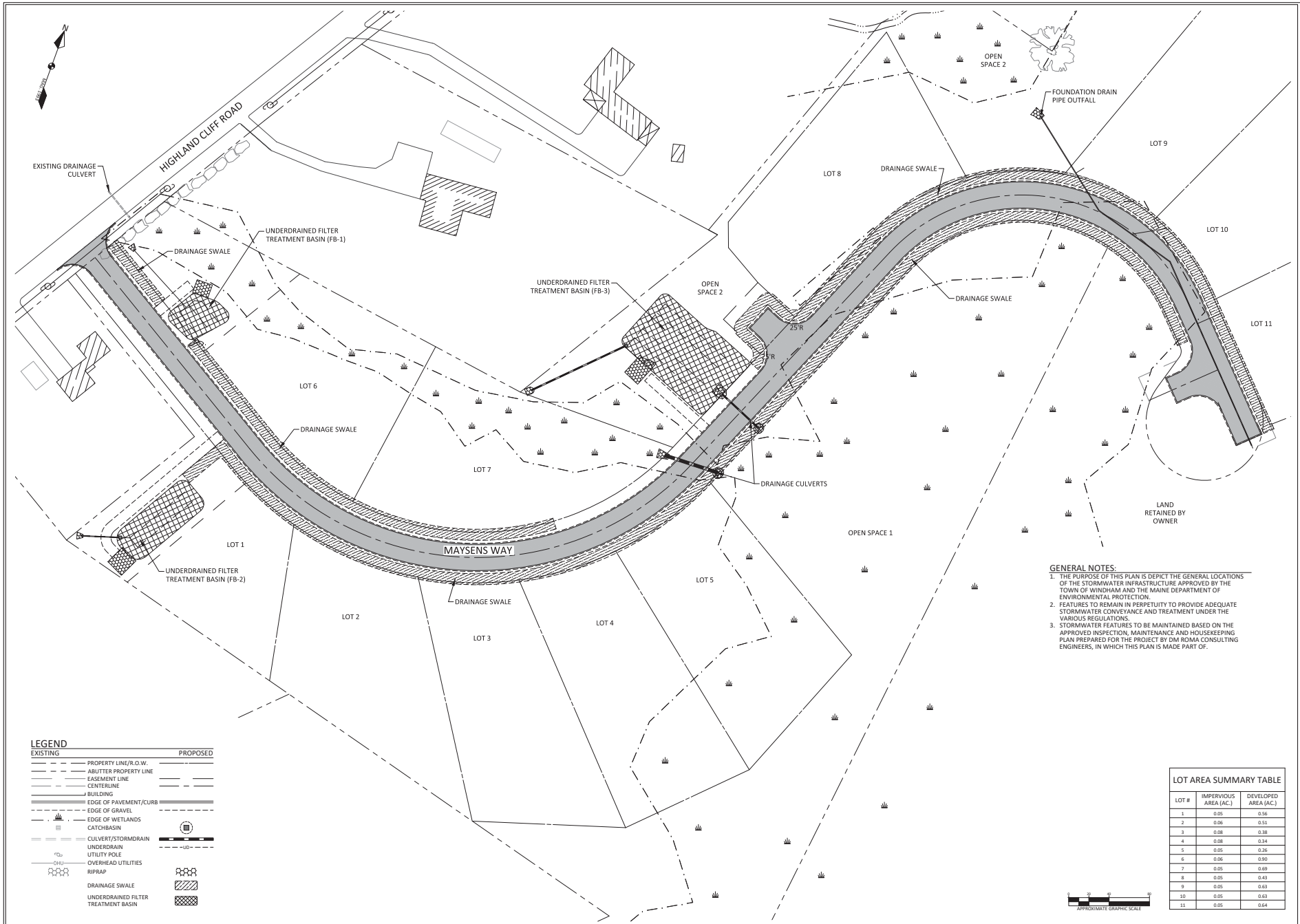
Maintenance Item	Maintenance Event	Date Performed	Responsible Personnel	Comments
Vegetated Areas	Inspect slopes and embankments early in Spring.			
Ditches, swales, and other open channels	Inspect after major rainfall event producing 1" of rain in two hours.			
	Inspect for erosion or slumping & repair			
	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.			
Roofline Dripedges	Check after each rainfall event to ensure that the stone reservoir drains within 24-48 hours.			
	Replace top several inches of filter if reservoir does not drain within 72 hours.			
	Inspect and remove sediment or debris build up on the surface of the stone			
	Inspect semi-annually for erosion or sediment accumulation and repair as necessary.			
Regular Maintenance	Clear accumulation of winter sand in paved areas annually.			

INSPECTION AND MAINTENANCE LOG – UNDERDRAINED FILTER BASINS

HIGHLAND WOODS SUBDIVISION
WINDHAM, MAINE

FILTER BASIN _____

Maintenance Item	Maintenance Event	Date Performed	Responsible Personnel	Comments
Underdrained Filter Basins	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.			
	Inspector to verify basin not utilized for snow storage			
	Inspector to verify basin not utilized for vehicle or heavy equipment storage.			
Emergency Spillways	Inspect and remove obstructions as necessary.			
	Remove woody vegetation.			
	Replace riprap as necessary.			



GENERAL NOTES:

1. THE PURPOSE OF THIS PLAN IS DEPICT THE GENERAL LOCATIONS OF THE STORMWATER INFRASTRUCTURE APPROVED BY THE TOWN OF WINDHAM AND THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION.
2. FEATURES TO REMAIN IN PERPETUITY TO PROVIDE ADEQUATE STORMWATER CONVEYANCE AND TREATMENT UNDER THE VARIOUS REGULATIONS.
3. STORMWATER FEATURES TO BE MAINTAINED BASED ON THE APPROVED INSPECTION, MAINTENANCE AND HOUSEKEEPING PLAN PREPARED FOR THE PROJECT BY DM ROMA CONSULTING ENGINEERS, IN WHICH THIS PLAN IS MADE PART OF.

LEGEND

EXISTING	PROPOSED
PROPERTY LINE/R.O.W.	
ABUTTER PROPERTY LINE	
EASEMENT LINE	
CENTERLINE	
BUILDING	
EDGE OF PAVEMENT/CURB	
EDGE OF GRAVEL	
EDGE OF WETLANDS	
CATCHBASIN	
CULVERT/STORMDRAIN	
UNDERDRAIN	UD
UTILITY POLE	
OVERHEAD UTILITIES	OHU
RIPRAP	
DRAINAGE SWALE	
UNDERDRAINED FILTER TREATMENT BASIN	

LOT AREA SUMMARY TABLE

LOT #	IMPERVIOUS AREA (AC.)	DEVELOPED AREA (AC.)
1	0.05	0.56
2	0.06	0.51
3	0.08	0.38
4	0.08	0.34
5	0.05	0.26
6	0.06	0.90
7	0.05	0.69
8	0.05	0.43
9	0.05	0.63
10	0.05	0.63
11	0.05	0.64

0 20 40 80
APPROXIMATE GRAPHIC SCALE

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

REV	DATE	BY	DESCRIPTION
A	1-7-19	DMR	ISSUED FOR PERMITTING
B	1-23-19	DMR	ISSUED FOR PERMITTING

STORMWATER INFRASTRUCTURE MAP

HIGHLAND WOODS SUBDIVISION
HIGHLAND CLIFF ROAD
WINDHAM, MAINE

FOR:
MTR DEVELOPMENT, LLC.
PO BOX 1028
WESTBROOK, ME 04098

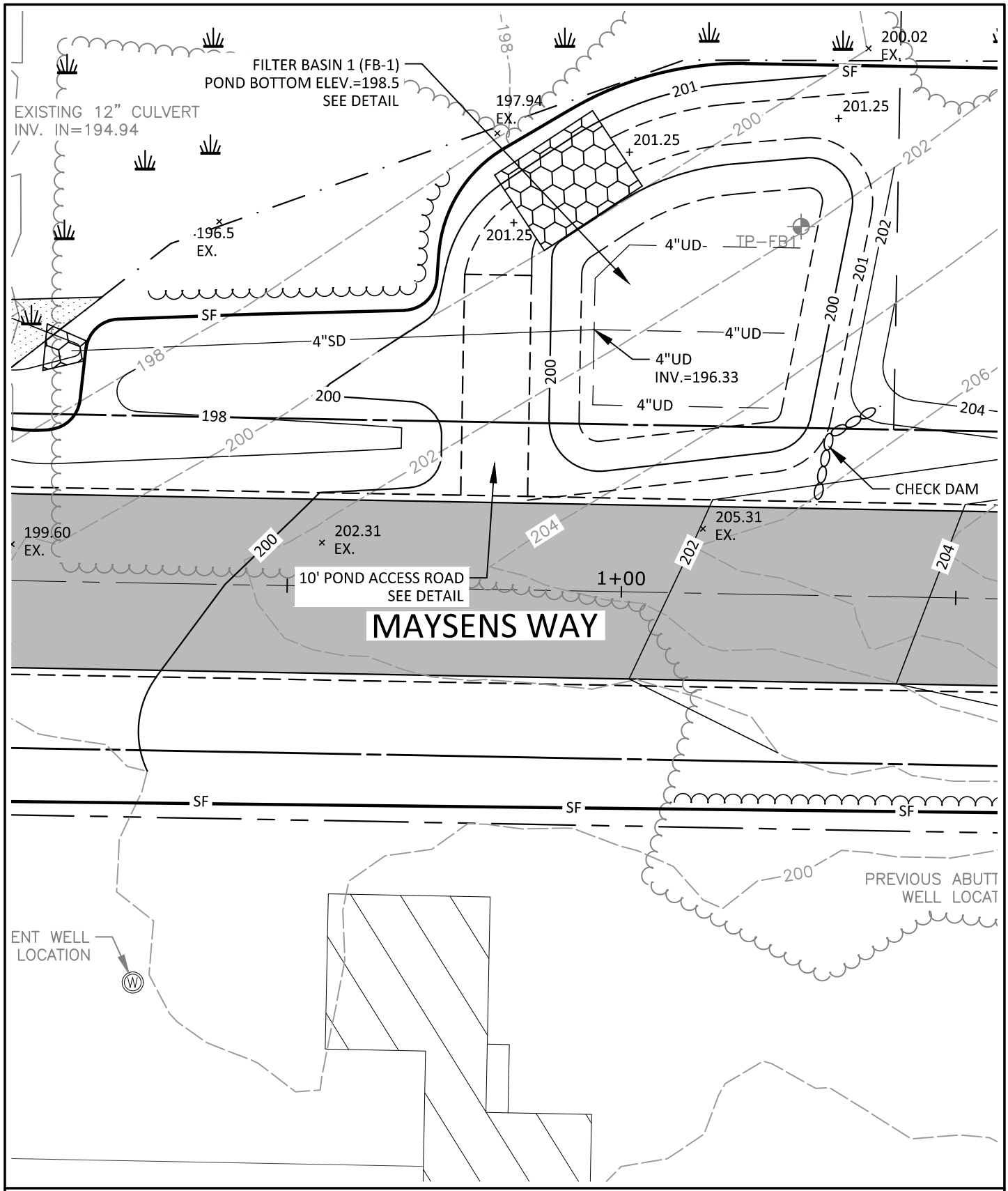
17001
JOB NUMBER:

NOT TO SCALE
SCALE:

4-24-2019
DATE:

SHEET 1 OF 1

SI-1



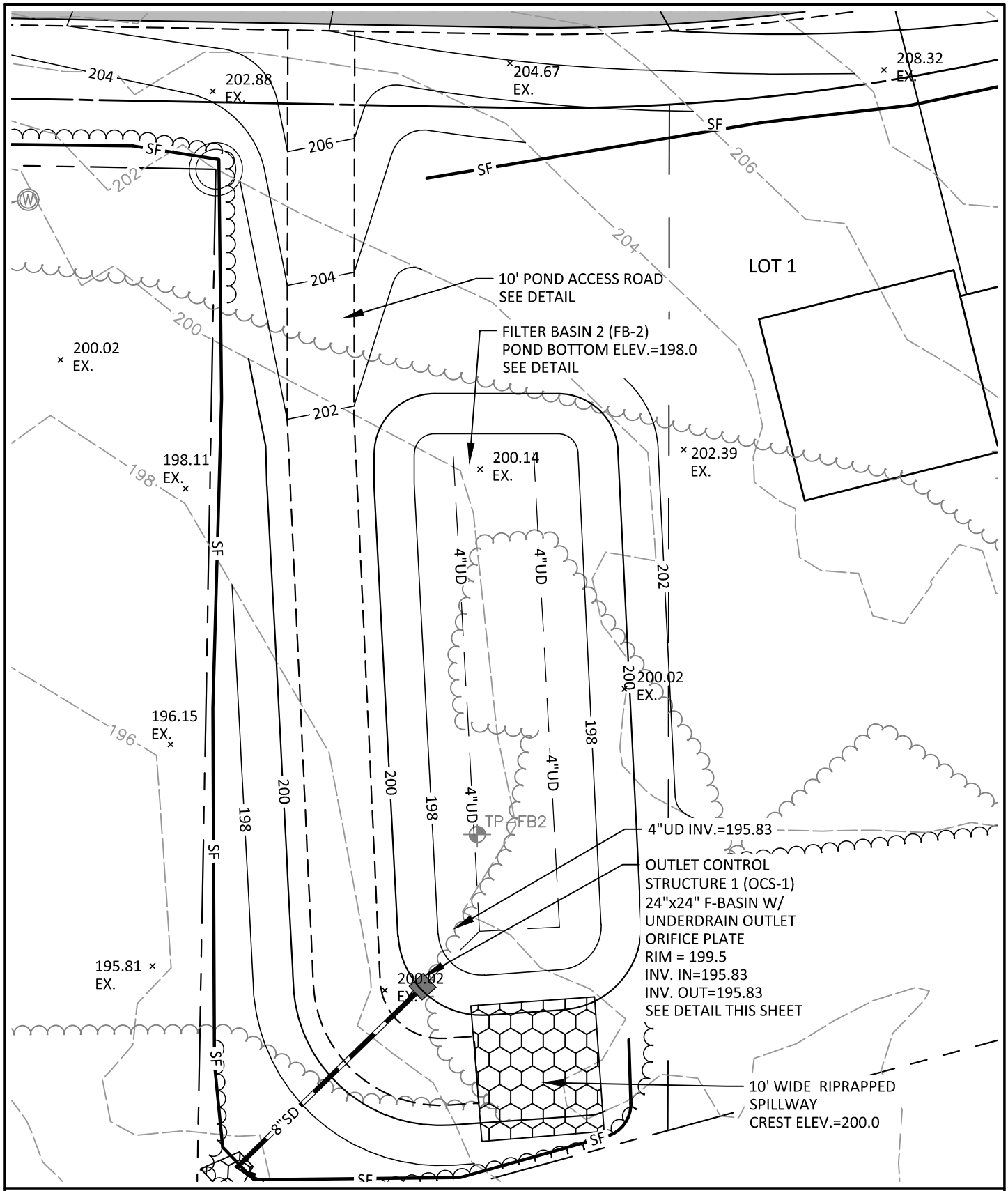
EXISTING GRADE SKETCH - FILTER BASIN 1

HIGHLAND WOODS SUBDIVISION - HIGHLAND CLIFF ROAD
WINDHAM, MAINE

FOR:
MTR DEVELOPMENT, LLC.
P.O. BOX 1028
WESTBROOK, MAINE 04098

SCALE: 1"=20'
DATE: 05-24-2019
JOB NUMBER: 17001

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



EXISTING GRADE SKETCH - FILTER BASIN 2

HIGHLAND WOODS SUBDIVISION - HIGHLAND CLIFF ROAD
WINDHAM, MAINE

FOR:
MTR DEVELOPMENT, LLC.
P.O. BOX 1028
WESTBROOK, MAINE 04098

SCALE: 1"=20'
DATE: 05-24-2019
JOB NUMBER: 17001

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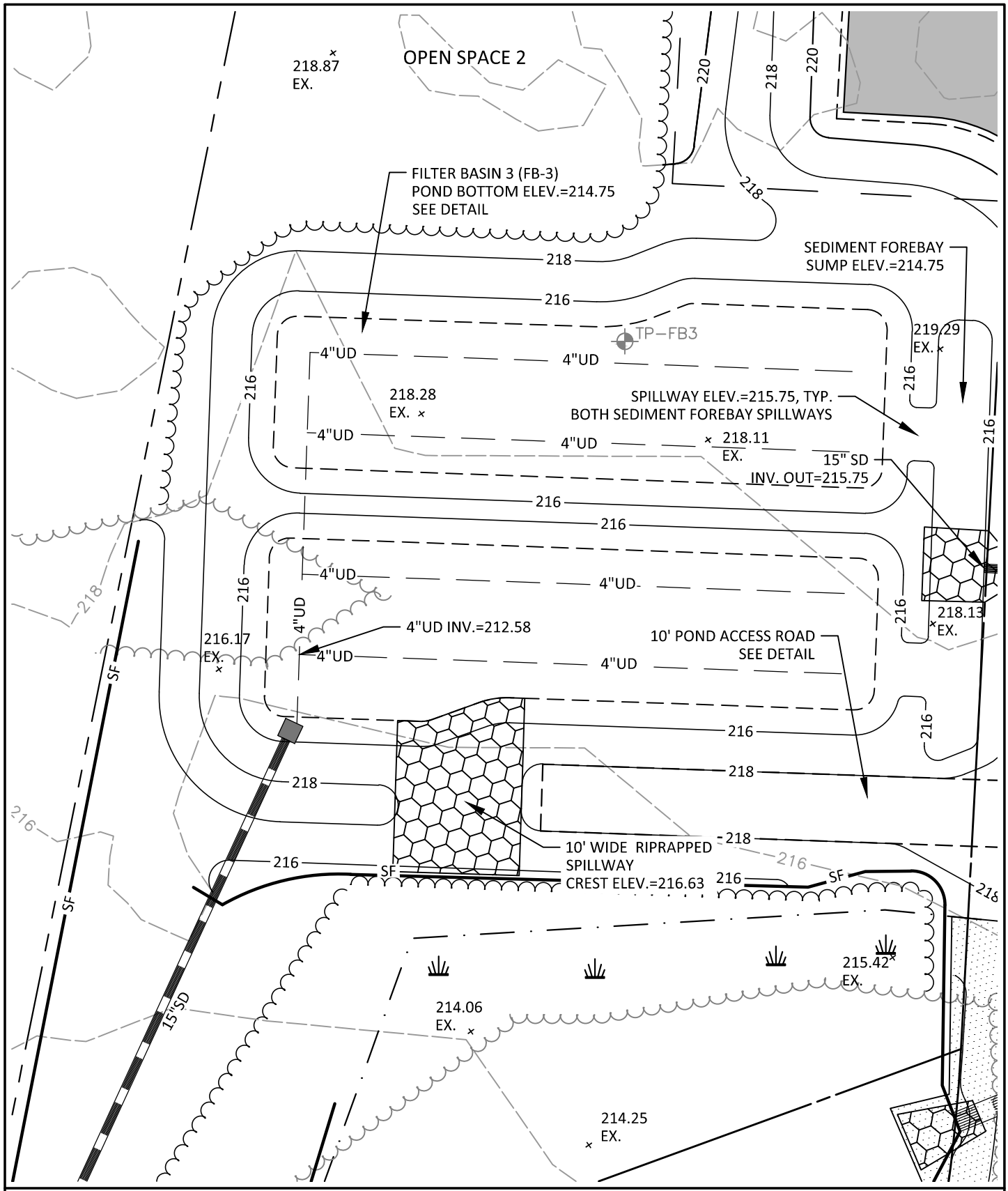
WINDHAM, ME 04062
(207) 310 - 0506



EXISTING GRADE SKETCH - FILTER BASIN 3

HIGHLAND WOODS SUBDIVISION - HIGHLAND CLIFF ROAD
WINDHAM, MAINE

FOR:
MTR DEVELOPMENT, LLC.
P.O. BOX 1028
WESTBROOK, MAINE 04098

SCALE: 1"=20'
DATE: 05-24-2019
JOB NUMBER: 17001

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