STORMWATER MANAGEMENT REPORT

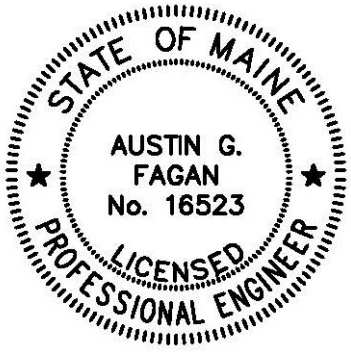
GUARDIAN ESTATES SUBDIVISION

Waterhouse Road
Gorham, Maine

Submitted by:

Gary and Megan Jordan
& Donald Grant

Prepared by:



BH2M
Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

Date:
February 2024

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LIST OF APPENDICES

1.0 INTRODUCTION

Gary and Megan Jordan & Donald Grant are proposing to construct a 14-lot residential subdivision known as Guardian Estates Subdivision (the project). The project is proposed to occupy approximately 29.52 acres on a parcel located off Waterman Road known as Tax Map 18, Lot 5-1. This project is required to obtain an Individual Stormwater Management Permit from the Maine DEP.

The scope of work includes but is not limited to:

- Tree clearing and grubbing
- Stump and boulder removal
- Construction of 2,600' of 22' wide paved roadway with a 5' sidewalk
- Installation of underground electric and communications conduit and transformer pads
- Installation of storm drain system including catch basins, stormdrain culverts, and vegetated swales.
- Construction of a wet pond
- Construction of a Grassed Underdrained Soil Filter

The proposed infrastructure improvements will create approximately 77,248 sf (1.77 acres) of new impervious area and 113,415 sf (2.60 acres) of newly vegetated area totaling 190,663 sf (4.38 acres) of newly developed area. To accurately size the proposed stormwater infrastructure and to assure that post development stormwater conditions will not impact the downstream properties, we have allocated 5,000 sf of impervious area and 30,000 sf of newly vegetated area on lots that are currently fully wooded with exception to lots 12, 13, & 14. Lot 12 has been allocated 10,000 sf of impervious and 60,000 sf of vegetated area. Lots 13 and 14 have been allocated 20,000 sf of impervious area. These allocations are not required to be counted towards the thresholds for Site Law permitting (3 acre of impervious and 20 acres of developed) because the applicant intends to sell the lots.

Lots 13 and 14 are intended to have density for up to 4 dwelling units each. No multi-family housing is being permitted or proposed on these lots at this time, so though we have made allocations for impervious area on each lot for stormwater quantity purposes, we are not considering these lots as multi family lots.

The Stormwater Management Plan has been prepared to satisfy the requirements of the Maine Department of Environmental Protections "Stormwater Management Rules" Chapters 500, 501 and 502, the most recent version of the "Maine Stormwater Best Management Practices Manual", and the Town of Gorham's Stormwater Ordinance.

1.1 OVERVIEW OF MODELING METHODOGY AND SOURCE INFORMATION

Hydrologic Analysis: The pre and post development conditions have been modeled using modeling software (Hydrocad Version 10) which is based upon the methodology contained within the USDA Soil Conservation Service Technical Release 55. Type III 24-hour storm distributions for Cumberland County were used for the analysis. The following return periods and 24-hour rainfall depths were used for the analysis:

Return Period	24-Hour Rainfall Depth
2-Year Storm	3.10 inches
10-Year Storm	4.60 inches
25-Year Storm	5.80 inches

Soils: The onsite soils used for the stormwater analysis were digitized from a high intensity soil survey that was completed by Mark Hampton Associates. The offsite soils used for the stormwater analysis were digitized from the Natural Resource Conservation Service (NRCS), web soil survey website. The source of the data is the Cumberland County Soil Survey (Class D). Refer to the following for additional documentation regarding the soils used for modelling:

- Appendix B of this Report
- Pre and Post Development Watershed Plans (Sheets A and B)

The onsite soils include:

Soil Map Unit	Unit Description	Hydrologic Soil Group
Brayton	Brayton fine sandy loam, 0-3% slopes	C
Colonel	Colonel stony sandy loam, 0-3% slopes	C
Dixfield	Dixfield stony sandy loam, 0-8% slopes	C
Lyman-Tunbridge Complex	Lyman-Tunbridge fine sandy loam, 3 to 8% slopes	C/D *

*Assumed D for wetland conditions

The offsite soils include:

Soil Map Unit	Unit Description	Hydrologic Soil Group
BgB	Nicholville very fine sandy loam, 0-8% slopes	C
DeB	Deerfield loamy fine sand, 3-8% slopes	A
HrB, HrC	Lyman-Tunbridge Complex, 0-15% slopes	D
PbB	Paxton fine sandy loam, 3 to 8% slopes	C
WmB	Windsor loamy sand, 0 to 8% slopes	A

Topography: LIDAR data from the Maine Office of GIS

Natural Resources: Wetland delineations performed by Mainely Soils

1.2 DESCRIPTION OF POINTS OF ANALYSIS

The watershed model analyzes the discharge of runoff at five Analysis Points as described below:

Analysis Point #1
Description: 15" driveway culvert at southeast corner of property land N/F Libby.
Pre Development Tributary Drainage Areas: 1.548 Acres
Post Development Tributary Drainage Areas: 1.863 Acres

Analysis Point #2
Description: Culmination of flow to northern property line land N/F Crosby.
Pre Development Tributary Drainage Areas: 18.187 Acres
Post Development Tributary Drainage Areas: 17.225 Acres

Analysis Point #3
Description: Culmination of flow to low point at western property line.
Pre Development Tributary Drainage Areas: 4.882 Acres
Post Development Tributary Drainage Areas: 3.829 Acres

Analysis Point #4
Description: Culmination of flow to ditch along Route 112 (Gorham bypass).
Pre Development Tributary Drainage Areas: 8.670 Acres
Post Development Tributary Drainage Areas: 12.627 Acres

Analysis Point #5
Description: Culmination of flow to southern property line land N/F Matthews.
Pre Development Tributary Drainage Areas: 8.462 Acres
Post Development Tributary Drainage Areas: 6.206 Acres

1.3 PRE DEVELOPMENT CONDITIONS

The Existing Conditions are shown on Sheet 2 and Sheet A of the accompanying plans. The parcel to be developed encompasses an area of approximately 29.52 acres and is located on Old Orchard Road in Gorham. The parcel is mostly wooded and lies within the Douglass Brook Watershed.

The watershed that was analyzed for this project is approximately 41.749 acres. The analysis points are described in Section 1.2 of this report. The watershed generally flows from east to west and is bounded by woodland to the north, residential land to the east and south, and the Gorham bypass to the west.

The Pre-Development Watershed Map is included as Sheet A of the accompanying plans and the Calculations are attached as Appendix C.

The Pre-Development Watershed Model predicts the following peak flow rates:

Pre-Development Peak Flows (cu. ft./sec)			
Analysis Point	**2-Year**	**10-Year**	**25-Year**
AP-1	1.29	2.75	4.02
AP-2	4.41	12.24	19.69
AP-3	2.47	5.63	8.45
AP-4	6.90	14.65	21.39
AP-5	4.40	10.29	15.61

1.4 POST DEVELOPMENT CONDITIONS

The proposed project will include construction of a 22’ wide paved roadway and 5’ sidewalk intended to support the development of 14 new lots. Below is a summary of the proposed developed areas associated with construction of the public infrastructure.

Proposed Impervious Area (Roadway)	=	77,248 sf
Proposed Landscaped Area	=	113,415 sf
Proposed Developed Area	=	190,663 sf

In order to accurately size all stormwater BMP's for post development stormwater modeling, allocations of impervious and landscaped area have been considered for each lot. These allocations consist of 5,000 sf of impervious area for lots 1-11, 10,000 sf for lot 12, and 20,000 sf for lots 13 and 14. Allocations of 30,000 sf of newly vegetated area for clearing have also been considered on wooded lots with the exception of lot 12 which has been allocated 60,000 sf.

Allocated Impervious Area (Lot Development)	=	105,000 sf
Allocated Landscaped Area	=	397,198 sf
Allocated Developed Area	=	502,198 sf

The project will include a Wet Pond and a Grassed Underdrained Soil Filter to provide treatment and attenuation of peak flows.

The Post Development Watershed Map is included as Sheet B of the accompanying plan set and the Calculations are attached as Appendix D.

The Post-Development Watershed Model predicts the following peak flow rates:

Post Development Peak Flows (cu. ft./sec)			
Analysis Point	**2-Year**	**10-Year**	**25-Year**
AP-1	1.10	2.16	3.79
AP-2	4.34	11.35	18.26
AP-3	2.43	5.15	7.52
AP-4	6.37	12.79	18.36
AP-5	3.37	7.90	11.98

1.5 BASIC STANDARDS

The proposed project is required to meet the Basic Standards for the Maine DEP. To meet the Basic Standards the project design must demonstrate that the erosion and sedimentation control, inspection and maintenance, and housekeeping standards specified in Appendices A, B, and C of 06-096 Chapter 500 (Maine DEP) are met, and that the grading or other construction activity will not impede or otherwise alter drainageways so as to have an unreasonable adverse impact on a wetland or waterbody, or an adjacent downslope parcel.

The proposed project will provide temporary (during construction) BMP's and post-construction BMP's. Refer to Sheets 7-9 of the project plans for erosion and sedimentation control narratives and details. The project requirements for inspection and maintenance during construction and post-construction are described in the Erosion and Sedimentation Control - Inspection and Maintenance Plan found in Appendix G of this Report. The housekeeping standards can also be found in the Inspection and Maintenance Plan.

1.6 GENERAL STANDARDS

The proposed project is required to meet the General Standards. To meet the general standards, the project design must demonstrate that the stormwater management system includes treatment measures that will provide pollutant removal or treatment and mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms and potential temperature impacts. This must be achieved by providing treatment of no less than 95% of the impervious area and no less than 80% of the developed area. For linear portions of projects, the treatment requirements can be reduced to no less than 75% of the impervious area and no less than 50% of the developed area (See 06-096 Chapter 500 4.C(5)(c)).

The stormwater management system includes a Wet Pond and a Grassed Underdrained Soil Filter. The proposed wet pond and soil filter have been designed in accordance with the design requirements outlined in the Maine Stormwater Best Management Practices Manual, Volume III, Chapters 4 and 7.1.

Below is a summary of the treatment areas associated with the proposed infrastructure. Refer to Appendix E for detailed calculations.

Stormwater Treatment Summary (Linear Project)	
Total Proposed (Linear) Impervious Area	77,248 sf
Total Proposed (Linear) Developed Area	113,415 sf
Total Treated (Linear) Impervious Area	69,935 sf
Total Treated (Linear) Developed Area	145,520 sf
Linear Impervious Area Treatment %	**90.53% (75% required)**
Linear Developed Area Treatment %	**76.32% (50% required)**

As shown in the Table above, the stormwater management system has been designed to meet the General Standard requirements. Detailed treatment calculations can be found in Appendix E.

Please note that a treatment credit for 1,780 sf of impervious area and 2,095 sf of grass (3,875 sf developed) has been considered for the proposed wetland crossing. Detailed treatment calculations can be found in Appendix E.

1.7 PHOSPHORUS STANDARD

The proposed project is located in the watershed of an unnamed stream tributary to Gully Brook. The proposed project is not located within the direct watershed of a lake or lake most-at-risk listed in 06-096 Chapter 502. The Phosphorus Standard does not apply to this project.

1.8 URBAN IMPAIRED STREAM STANDARD

The proposed project is located in the watershed of an unnamed stream tributary to Gully Brook. This stream and Gully Brook are not listed in 06-096 Chapter 502 as an Urban Impaired Stream. The Urban Impaired Stream Standard does not apply to this project.

1.9 FLOODING STANDARD

The proposed project is required to meet the Flooding Standards for the Town of Gorham. To meet the Flooding Standard, the project design must demonstrate that the stormwater management systems will accomplish the following:

a) The system must detain, retain, or result in the infiltration of stormwater from 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.
b) The design of piped or open channel systems must be based on a 25-year, 24-hour storm without overloading or flooding beyond channel limits.
c) The areas expected to be flooded by runoff from a 10-year or 25-year, 24-hour storm must be defined, and no buildings or other similar facilities may be planned within such areas.
d) Runoff from the project may not flood the primary access road to the project and any public roads bordering the project as a result of a 25-year, 24-hour storm.

The following table compares the Pre and Post Development peak flow rates for the 2-year, 10-year, and 25-year return periods. Refer to Appendix C for the Pre-Development model and Appendix D for Post Development model.

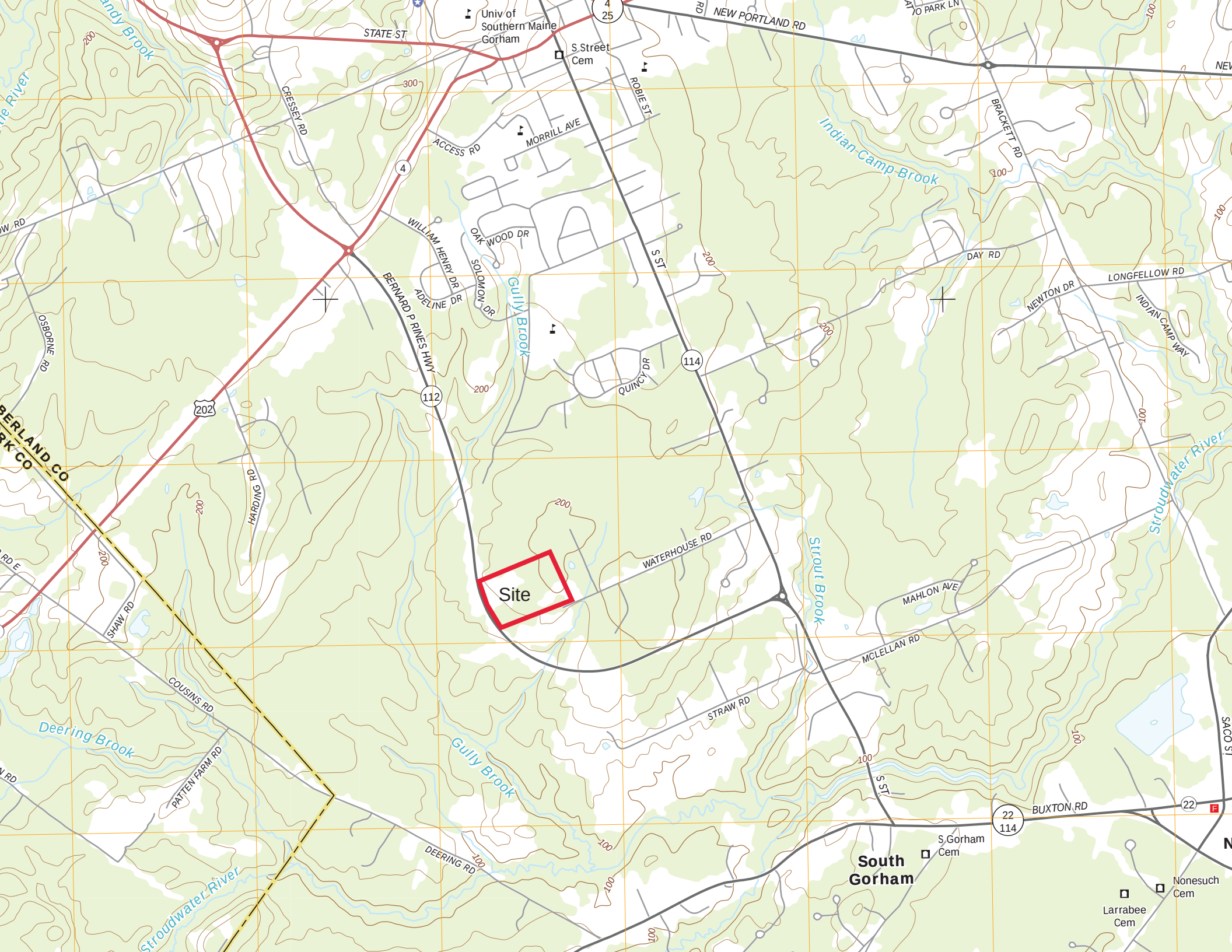
Peak Flow Comparison (cu. ft./sec)						
Analysis Point	2-Year		10-Year		25-Year	
	Pre	Post	Pre	Post	Pre	Post
AP-1	1.29	1.10	2.75	2.16	4.02	3.79
AP-2	4.41	4.34	12.24	11.35	19.69	18.26
AP-3	2.47	2.43	5.63	5.15	8.45	7.52
AP-4	6.90	6.37	14.65	12.79	21.39	18.36
AP-5	4.40	3.37	10.29	7.90	15.61	11.98

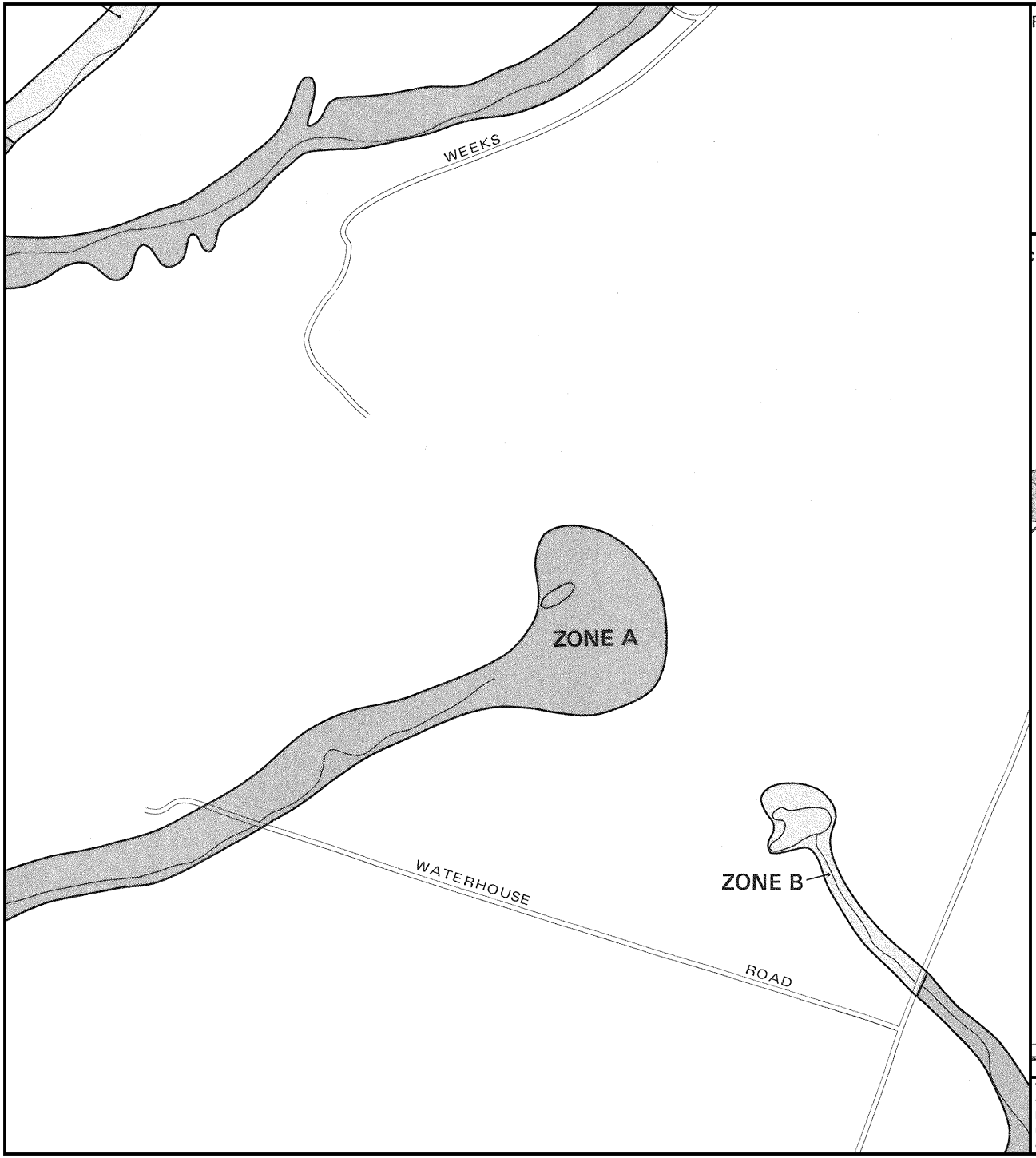
As illustrated in the table above, development of the proposed project will create a condition where the post development peak rates of runoff are decreased from the pre development peak rates of runoff for all storm events. No adverse impacts will be created to the downstream conditions as a result of this development.

1.10 CLOSURE

The proposed stormwater management facilities have been designed to mitigate stormwater impacts associated with development of the proposed project.

Appendix A
Figures


Site
STATE ST
Univ of Southern Maine Gorham
S Street Cem
NEW PORTLAND RD
CRESSEY RD
ACCESS RD
MORRILL AVE
ROBIE ST
Indian Camp Brook
BRACKETT RD
WILLIAM HENRY DR
OAK WOOD DR
SOLOMON DR
ADELINE DR
BERNARD P RINES HWY
Gully Brook
S ST
DAY RD
LONGFELLOW RD
NEWTON DR
INDIAN CAMP WAY
OSBORNE RD
QUINCY DR
HARDING RD
WATERHOUSE RD
Strout Brook
Stroudwater River
MAHLON AVE
MCLELLAN RD
SHAW RD
COUSINS RD
STRAW RD
Deering Brook
PATTEN FARM RD
DEERING RD
BUXTON RD
S Gorham Cem
South Gorham
Nonesuch Cem
Larrabee Cem
SACO ST
4
25
202
112
114
22



Program at (800) 638-6620.

APPROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
GORHAM, MAINE
CUMBERLAND COUNTY

PANEL 25 OF 30
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230047 0025 B

EFFECTIVE DATE:
OCTOBER 15, 1981

federal emergency management agency
federal insurance administration

Town of Gorham Public Map Viewer

10/14/2022, 9:43:57 AM

Roadways
Gorham Town Boundary
Parcel Labels
Parcels

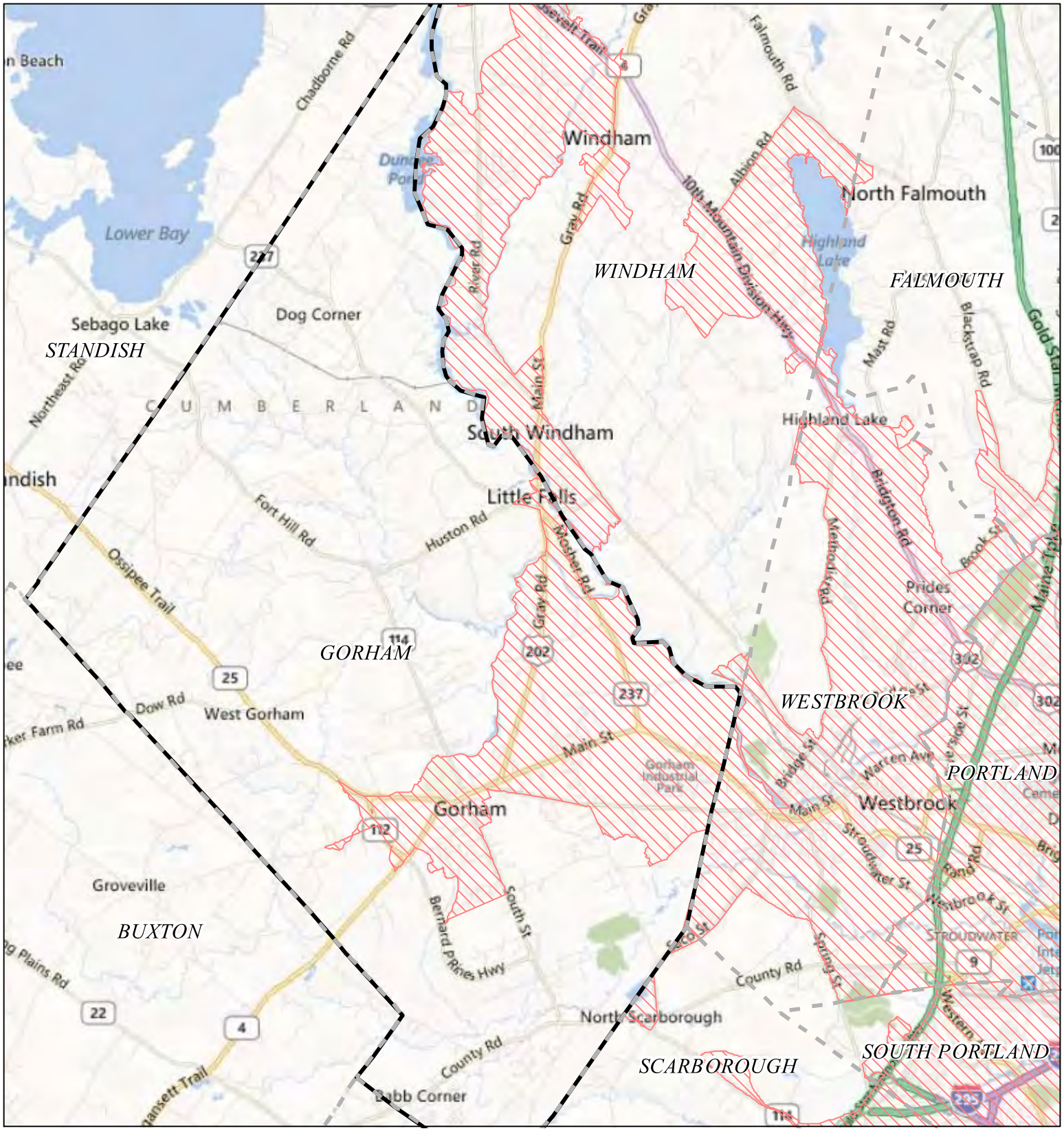
1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

Maxar

Public User
Town of Gorham



NPDES Phase II Stormwater Program
Automatically Designated MS4 Areas

Gorham ME

Regulated Area (2000 + 2010 Urbanized Area)

0 1 2 3 4 5 6 7 Kilometers

0 1 2 3 4 5 6 Miles

Town Population: **16428**

Regulated Population: **6814**

(Populations estimated from 2010 Census)

Urbanized Areas, Town Boundaries:
US Census (2000, 2010)
Base map © 2010 Microsoft Corporation
and its data suppliers

US EPA Region 1 GIS Center Map #8824, 11/19/2012

Appendix B
Soils Reports

Legend for Soil Maps

1. Drainage Class

Excessively Well Drained	EWD
Well Drained	WD
Moderately Well Drained	MWD
Somewhat Poorly Drained	SPD
Poorly Drained	PD
Very Poorly Drained	VPD

2. Slope Designation

0-3%	A
3-8%	B
8-15%	C
15-25%	D
>25%	E

3. Note: High Intensity Soil Survey has been prepared by Mark Hampton Associates, Inc. in accordance with the standards adopted by the Maine Association of Professional Soil Scientists, and the Maine Board of Certification of Geologists and Soil Scientists.

The accompanying soil profile descriptions, soil map, and this soil narrative report were done in accordance with the standards adopted by the Maine Association of Professional Soil Scientists, and the Maine Board of Certification of Geologists and Soil Scientists.

C.S.S. #216, L.S.E. #263 December 18, 2023

Mark J. Hampton Date

MARK HAMPTON ASSOCIATES, INC.

SOIL EVALUATION • WETLAND DELINEATIONS • SOIL SURVEYS • WETLAND PERMITTING

7348

Waterhouse Road
Gorham, ME
Gary Jordan

Soil Narrative Report

DATE:	Soil Profiles observed on January 10, 2023
BASE MAP:	Base plan provided by BH2M Scale 1 inch equals 100 feet and two foot contours.
GROUND CONTROL:	Soil survey boundaries located by Mark Hampton Associates, Inc. for Class A Soil Survey

Class A-High Intensity Soil Survey (Minimum Standards)

Mapping units of 1/8 acre or less.
Scale of 1"= 100 feet or larger.
Up to 25% inclusions in mapping units of which no more than 15% may be dissimilar soils.
Ground Control – test pits located accurately under the direction of a registered land surveyor or professional engineer.
Base Map –2 foot contour intervals

Provided:

Mapping units of 1/8 acre or less
Base map scale of 1"= 100 feet.
Up to 25 percent inclusions in mapping units of which no more than 15 percent is dissimilar soils.
Baseline information and test pits located under the direction of a registered land surveyor.
Ground topographic survey with two foot contours and ground control provided.

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Waterhouse Road
Gorham, ME
Gary Jordan

Dixfield
(Aquic Haplorthods)

SETTING

PARENT MATERIAL:	Derived from compact loamy glacial till.
LANDFORM:	Till plains, hills and ridges.
POSITION IN LANDSCAPE:	Plains and middle levels.
SLOPE GRADIENT RANGES:	(A) 0-3%, (B)3-8%

COMPOSITION AND SOIL CHARACTERISTICS

DRAINAGE CLASS: Moderately well drained with a perched watertable from 1.0 to 2.0 feet below the surface at some time from October to May or during periods of heavy precipitation.

TYPICAL PROFILE:

Surface Layer:	Dark brown, stony sandy loam, 0-7"
Subsurface Layer:	Brown, sandy loam, 7-20"
Subsoil Layer:	Olive brown, stony sandy loam 16-31"
Substratum:	Olive gray, stony sandy loam, 25-65"

HYDROLOGIC GROUP:	Group C
SURFACE RUNOFF:	Moderately Rapid
PERMEABILITY:	Moderate in solum, slow in substratum
DEPTH TO BEDROCK:	Greater than 65 inches
HAZARD TO FLOODING:	None

INCLUSIONS

(Within Mapping Unit)

CONTRASTING: Colonel, Brayton, Lyman-Tunbridge

USE AND MANAGEMENT

Development: There are few limiting factors for building site development

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Waterhouse Road
Gorham, ME
Gary Jordan

Colonel
(Aquic Haplorthods)

SETTING

PARENT MATERIAL:	Derived from dense, loamy glacial till
LANDFORM:	Drumlins and Sideslopes of glaciated uplands
POSITION IN LANDSCAPE:	Mid-positions on landform
SLOPE GRADIENT RANGES:	(A) 0-3%

COMPOSITION AND SOIL CHARACTERISTICS

DRAINAGE CLASS: Somewhat poorly drained with a perched watertable from 1.0 to 2.0 feet below the surface at some time from October to May or during periods of heavy precipitation.

TYPICAL PROFILE:

Surface Layer:	Dk gray brown, stony sandy loam 0-3"
Subsurface Layer:	Dark Brown, stony sandy loam, 3-12"
Subsoil Layer:	Olive Brown, stony sandy loam, 12-18"
Substratum:	Olive, stony, sandy loam, 18-65"

HYDROLOGIC GROUP:	Group C
SURFACE RUNOFF:	Moderate to moderately slow
PERMEABILITY:	Moderate and moderately slow
DEPTH TO BEDROCK:	Greater than 65 inches
HAZARD TO FLOODING:	None

INCLUSIONS

(Within Mapping Unit)

CONTRASTING: Lyman-Tunbridge, Brayton

USE AND MANAGEMENT

Development: The limiting factor for building site development is wetness due to the presence of a high watertable for a portion of the year. Proper foundation drainage or site modification is recommended.

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Waterhouse Road
Gorham, ME
Gary Jordan

Brayton
(Aeric Epiaquepts)

SETTING

PARENT MATERIAL:	Derived from dense glacial till
LANDFORM:	Toeslopes and depressions in glaciated uplands
POSITION IN LANDSCAPE:	Lower positions on landform
SLOPE GRADIENT RANGES:	(A) 0-3%

COMPOSITION AND SOIL CHARACTERISTICS

DRAINAGE CLASS: Poorly drained with a perched watertable from 0.0 to 1.0 feet below the surface at some time from October to May or during periods of heavy precipitation.

TYPICAL PROFILE:
Surface Layer: Dk gray, fine sandy loam 0-5",
Subsurface Layer: Gray fine sandy loam, 5-15",
Subsoil Layer: Grayish brown fine sandy loam, 15-24"
Substratum: Olive fine sandy loam, 24-65",

HYDROLOGIC GROUP:	Group C
SURFACE RUNOFF:	Moderate to moderately slow
PERMEABILITY:	Moderate and moderately slow
DEPTH TO BEDROCK:	Greater than 65 inches
HAZARD TO FLOODING:	None

INCLUSIONS
(Within Mapping Unit)

CONTRASTING: Dixfield, Colonel, Lyman-Tunbridge

USE AND MANAGEMENT

Development: The limiting factor for building site development is wetness due to the presence of an extremely high watertable for a portion of the year. This soil is not suitable for development without alteration, which may require additional permitting.

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Waterhouse Road
Gorham, ME
Gary & Megan Jordan

LYMAN-TUNBRIDGE COMPLEX

SETTING

PARENT MATERIAL:	Loamy glacial till
LANDFORM:	Glaciated uplands
POSITION IN LANDSCAPE:	Uppermost locations, sideslopes, shoulders and crests
SLOPE GRADIENT RANGES:	(B) 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

DRAINAGE CLASS: Excessively well drained Lyman (10-20 inches to bedrock) and Tunbridge (20-40 inches to bedrock)
These soils occur in a nonrepeating pattern with exposed bedrock outcrops and cannot be separated.

TYPICAL PROFILE:

Surface Layer:	Reddish brown fine sandy loam, 0-4 inches
Subsurface Layer:	Red brown fine sandy loam 4-12"
Subsoil Layer:	Dark red fine sandy loam 12-18"
Substratum:	Brown fine sandy loam 18-36"

HYDROLOGIC GROUP:	Group C/D
PERMEABILITY:	Slow to rapid, depending on slope and bedrock outcrops.
DEPTH TO BEDROCK:	Shallow (Lyman 10-20 inches) to moderately deep (Tunbridge 20-40 inches).
HAZARD TO FLOODING:	None

INCLUSIONS
(Within Mapping Unit)

CONTRASTING: Dixfield, Colonel

USE AND MANAGEMENT

Development: The limiting factor for building site development is depth to bedrock which ranges from 0 to 40 inches within this complex. Tunbridge and Lyman (deeper than 11 inches) soils may be suitable for subsurface wastewater disposal.

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PAGE ____ OF ____ FORM F (SS1) Rev. 7/21

SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Waterhouse Road	Gary & Megan Jordan	Gorham

Exploration Symbol # SS-1 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
O/E	Dark Brown	F. Sandy Loam	Grand	Very Friable	
Bhs	Reddish Brown	F. Sandy Loam	Weak Sub Ang Blocky	Friable	
Bs1	Olive Brown	Fine Sandy Loam	Fine Grandu	Firm	Common and Distinct
Cd	Olive	Sandy Loam	Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Dixfield

Limiting Factor: 16 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 6 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-2 ☐ Test Pit ☒ Boring ☐ Probe

____ " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	Black	F. Sandy Loam	Weak Angular	Very Friable	
Bg	Gray	F. Sandy Loam	Sub Ang Blocky	Friable	Common and Distinct
BC	Olive Brown	Sandy Loam	Thin Platy	Firm	
Cd	Olive Gray	Sandy Loam	Medium Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Brayton

Limiting Factor: 6 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-3 ☐ Test Pit ☒ Boring ☐ Probe

____ " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	Black	Sandy Loam	Fine Grandul	Friable	
Bg	Gray	Sandy Loam	Weak Sub Ang Blocky	Friable	Common and Distinct
BC	Olive Brown	Sandy Loam	Thin Platy	Firm	
Cd	Olive Gray	Sandy Loam	Medium Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Brayton

Limiting Factor: 6 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-4 ☐ Test Pit ☒ Boring ☐ Probe

____ " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
O/E	Dark Brown	F. Sandy Loam	Grand	Friable	
Bhs	Brown	F. Sandy Loam	Fine Grandul	Friable	
Bs1	Olive Brown	Sandy Loam	Fine Grandul	Firm	Common and Distinct
Cd	Olive	Sandy Loam	Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Dixfield

Limiting Factor: 17 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

STATE OF MAINE SOIL SCIENTIST

SOIL SCIENTIST INFORMATION AND SIGNATURE

Signature

Mark J. Hampton

Name Printed

1/13/2023

Date

216

SS License No.

MARK J. HAMPTON #216 CERTIFIED SOIL SCIENTIST

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Waterhouse Road	Gary & Megan Jordan	Gorham

Exploration Symbol # SS-5 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
O/E	Dark Brown	F. Sandy Loam	Grand	Very Friable	
Bhs	Reddish Brown	F. Sandy Loam	Weak Sub Ang Blocky	Friable	
Bs1	Olive Brown	Fine Sandy Loam	Fine Grandu	Firm	Common and Distinct
Cd	Olive	Sandy Loam	Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Dixfield

Limiting Factor: 16 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 6 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-6 ☐ Test Pit ☒ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
O/E	Dark Brown	F. Sandy Loam	Weak Angular	Very Friable	
Bhs	Reddish Brown	F. Sandy Loam	Sub Ang Blocky	Friable	
Bs1	Olive Brown	Sandy Loam	Thin Platy	Firm	Common and Distinct
Cd	Olive	Sandy Loam	Medium Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Dixfield

Limiting Factor: 15 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☒ SPD ☒ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-7 ☐ Test Pit ☒ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	Black	Sandy Loam	Fine Grandul	Friable	
Bg	Gray	Sandy Loam	Weak Sub Ang Blocky	Friable	Common and Distinct
BC	Olive Brown	Sandy Loam	Thin Platy	Firm	
Cd	Olive Gray	Sandy Loam	Medium Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Brayton

Limiting Factor: 6 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-8 ☐ Test Pit ☒ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	Black	F. Sandy Loam	Grand	Friable	
Bg	Gray	F. Sandy Loam	Fine Grandul	Friable	Common and Distinct
BC	Olive Brown	Sandy Loam	Fine Grandul	Firm	
Cd	Olive	Sandy Loam	Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Brayton

Limiting Factor: 6 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: [illegible]

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

SOIL SCIENTIST INFORMATION AND SIGNATURE

Signature

Mark J. Hampton

Name Printed

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Waterhouse Road	Gary & Megan Jordan	Gorham

Exploration Symbol # SS-9 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
O/E	Dark Brown	F. Sandy Loam	Grand	Very Friable	
Bhs	Reddish Brown	F. Sandy Loam	Weak Sub Ang Blocky	Friable	
Bs1	Brown	Fine Sandy Loam	Fine Grandu	Firm	Common and Distinct
Cd	Olive	Sandy Loam	Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Colonel

Limiting Factor: 13 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-10 ☐ Test Pit ☒ Boring ☐ Probe

____ " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	Black	F. Sandy Loam	Weak Angular	Very Friable	
Bg	Gray	F. Sandy Loam	Sub Ang Blocky	Friable	Common and Distinct
BC	Olive Brown	Sandy Loam	Thin Platy	Firm	
Cd	Olive	Sandy Loam	Medium Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Brayton

Limiting Factor: 6 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-11 ☐ Test Pit ☒ Boring ☐ Probe

____ " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	Black	Sandy Loam	Fine Grandul	Friable	
Bg	Gray	Sandy Loam	Weak Sub Ang Blocky	Friable	Common and Distinct
BC	Olive Brown	Sandy Loam	Thin Platy	Firm	
Cd	Olive Gray	Sandy Loam	Medium Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Brayton

Limiting Factor: 6 " Depth ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

Exploration Symbol # SS-12 ☐ Test Pit ☒ Boring ☐ Probe

____ " Organic horizon thickness Ground surface elev. ____

____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
O/E	Dark Brown	F. Sandy Loam	Grand	Friable	
Bhs	Reddish Brown	F. Sandy Loam	Fine Grandul	Friable	
Bs1	Brown	Sandy Loam	Fine Grandul	Firm	Common and Distinct
Cd	Olive	Sandy Loam	Platy	Very Firm	

Soil Details

Soil Series/Phase Name: Colonel

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 2 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group:

SOIL SCIENTIST INFORMATION AND SIGNATURE

Signature

Mark J. Hampton

Name Printed

1/13/2023

Date

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Waterhouse Road Subdivision	Gary & Megan Jordan	Gorham

Exploration Symbol # SS-13 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon *(inches)*

Horizon	Color	Texture	Structure	Consistence	Redox
O/A	Dark Brown	Sandy Loam	Grand	Very Friable	
Bs	Red Brown	Sandy Loam	Weak Fine Grand	Friable	
R		LEDGE			None Noted

Soil Details

Soil Series/Phase Name: Lyman-Tunbridge

Limiting Factor: 16 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 4 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group:

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon *(inches)*

Horizon	Color	Texture	Structure	Consistence	Redox

Soil Details

Soil Series/Phase Name:

Limiting Factor: " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic Soil Group:

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon *(inches)*

Horizon	Color	Texture	Structure	Consistence	Redox

Soil Details

Soil Series/Phase Name:

Limiting Factor: " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic Soil Group:

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon *(inches)*

Horizon	Color	Texture	Structure	Consistence	Redox

Soil Details

Soil Series/Phase Name:

Limiting Factor: " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic Soil Group:

SOIL SCIENTIST INFORMATION AND SIGNATURE

Signature

Mark J. Hampton

Name Printed

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Date

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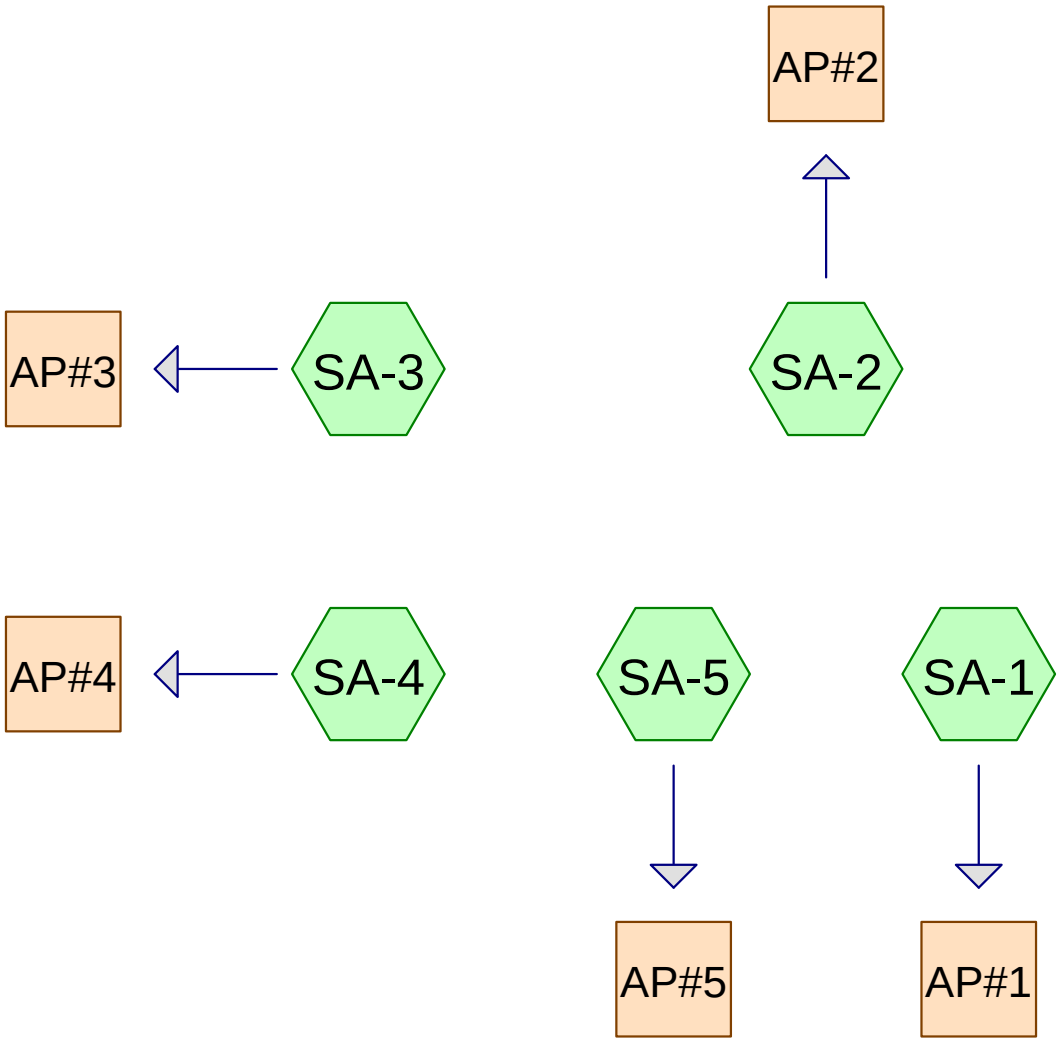
Appendix C
Pre Development Calculations



Subcat Reach Pond Link

Routing Diagram for Pre Development - Guardian Estates
Prepared by HP Inc., Printed 2/9/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
14.596	74	>75% Grass cover, Good, HSG C (SA-1, SA-2, SA-3, SA-4, SA-5)
1.213	98	Offsite Impervious (SA-1, SA-2, SA-3, SA-4)
1.434	30	Woods, Good, HSG A (SA-2)
24.150	70	Woods, Good, HSG C (SA-1, SA-2, SA-3, SA-4, SA-5)
0.356	77	Woods, Good, HSG D (SA-2, SA-5)
41.749	**71**	**TOTAL AREA**

Summary for Reach AP#1:

Inflow Area = 1.548 ac, 10.42% Impervious, Inflow Depth > 0.99" for 2-YEAR STORM event
Inflow = 1.29 cfs @ 12.28 hrs, Volume= 0.127 af
Outflow = 1.29 cfs @ 12.28 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#2:

Inflow Area = 18.187 ac, 0.31% Impervious, Inflow Depth > 0.55" for 2-YEAR STORM event
Inflow = 4.41 cfs @ 12.92 hrs, Volume= 0.834 af
Outflow = 4.41 cfs @ 12.92 hrs, Volume= 0.834 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#3:

Inflow Area = 4.882 ac, 6.09% Impervious, Inflow Depth > 0.82" for 2-YEAR STORM event
Inflow = 2.47 cfs @ 12.58 hrs, Volume= 0.335 af
Outflow = 2.47 cfs @ 12.58 hrs, Volume= 0.335 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#4:

Inflow Area = 8.670 ac, 8.05% Impervious, Inflow Depth > 0.98" for 2-YEAR STORM event
Inflow = 6.90 cfs @ 12.32 hrs, Volume= 0.711 af
Outflow = 6.90 cfs @ 12.32 hrs, Volume= 0.711 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#5:

Inflow Area = 8.462 ac, 0.00% Impervious, Inflow Depth > 0.78" for 2-YEAR STORM event
Inflow = 4.40 cfs @ 12.48 hrs, Volume= 0.548 af
Outflow = 4.40 cfs @ 12.48 hrs, Volume= 0.548 af, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment SA-1:

Runoff = 1.29 cfs @ 12.28 hrs, Volume= 0.127 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.10"

	Area (sf)	CN	Description
*	7,021	98	Offsite Impervious
	46,568	74	>75% Grass cover, Good, HSG C
	13,823	70	Woods, Good, HSG C
	67,412	76	Weighted Average
	60,391		89.58% Pervious Area
	7,021		10.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0130	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.2	229	0.0610	1.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	65	0.0150	5.29	74.04	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
18.8	444	Total			

Summary for Subcatchment SA-2:

Runoff = 4.41 cfs @ 12.92 hrs, Volume= 0.834 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.10"

	Area (sf)	CN	Description
*	2,481	98	Offsite Impervious
	52,216	74	>75% Grass cover, Good, HSG C
	62,444	30	Woods, Good, HSG A
	662,768	70	Woods, Good, HSG C
	12,328	77	Woods, Good, HSG D
	792,237	67	Weighted Average
	789,756		99.69% Pervious Area
	2,481		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.5	150	0.0133	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
11.1	447	0.0179	0.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	183	0.0328	2.72		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.7	44	0.0455	1.07		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.0	353	0.0170	1.96		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.0	58	0.0345	0.93		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	471	0.0067	1.23		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
58.8	1,706	Total			

Summary for Subcatchment SA-3:

Runoff = 2.47 cfs @ 12.58 hrs, Volume= 0.335 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.10"

	Area (sf)	CN	Description
*	12,953	98	Offsite Impervious
	45,542	74	>75% Grass cover, Good, HSG C
	154,166	70	Woods, Good, HSG C
	212,661	73	Weighted Average
	199,708		93.91% Pervious Area
	12,953		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.2	150	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
7.5	368	0.0270	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
37.7	518	Total			

Summary for Subcatchment SA-4:

Runoff = 6.90 cfs @ 12.32 hrs, Volume= 0.711 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.10"

	Area (sf)	CN	Description
*	30,401	98	Offsite Impervious
	312,134	74	>75% Grass cover, Good, HSG C
	35,125	70	Woods, Good, HSG C
	377,660	76	Weighted Average
	347,259		91.95% Pervious Area
	30,401		8.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.0270	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
8.7	643	0.0310	1.23		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	95	0.0210	6.26	87.61	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
21.2	888	Total			

Summary for Subcatchment SA-5:

Runoff = 4.40 cfs @ 12.48 hrs, Volume= 0.548 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR STORM Rainfall=3.10"

Area (sf)	CN	Description
179,341	74	>75% Grass cover, Good, HSG C
186,105	70	Woods, Good, HSG C
3,171	77	Woods, Good, HSG D
368,617	72	Weighted Average
368,617		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	150	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	181	0.0440	1.05		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.4	265	0.0075	1.30		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.5	106	0.0570	1.19		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.7	702	Total			

Summary for Reach AP#1:

Inflow Area = 1.548 ac, 10.42% Impervious, Inflow Depth > 2.04" for 10-YEAR STORM event
Inflow = 2.75 cfs @ 12.27 hrs, Volume= 0.263 af
Outflow = 2.75 cfs @ 12.27 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#2:

Inflow Area = 18.187 ac, 0.31% Impervious, Inflow Depth > 1.36" for 10-YEAR STORM event
Inflow = 12.24 cfs @ 12.85 hrs, Volume= 2.066 af
Outflow = 12.24 cfs @ 12.85 hrs, Volume= 2.066 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#3:

Inflow Area = 4.882 ac, 6.09% Impervious, Inflow Depth > 1.80" for 10-YEAR STORM event
Inflow = 5.63 cfs @ 12.54 hrs, Volume= 0.731 af
Outflow = 5.63 cfs @ 12.54 hrs, Volume= 0.731 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#4:

Inflow Area = 8.670 ac, 8.05% Impervious, Inflow Depth > 2.04" for 10-YEAR STORM event
Inflow = 14.65 cfs @ 12.30 hrs, Volume= 1.472 af
Outflow = 14.65 cfs @ 12.30 hrs, Volume= 1.472 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#5:

Inflow Area = 8.462 ac, 0.00% Impervious, Inflow Depth > 1.73" for 10-YEAR STORM event
Inflow = 10.29 cfs @ 12.45 hrs, Volume= 1.219 af
Outflow = 10.29 cfs @ 12.45 hrs, Volume= 1.219 af, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment SA-1:

Runoff = 2.75 cfs @ 12.27 hrs, Volume= 0.263 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=4.60"

	Area (sf)	CN	Description
*	7,021	98	Offsite Impervious
	46,568	74	>75% Grass cover, Good, HSG C
	13,823	70	Woods, Good, HSG C
	67,412	76	Weighted Average
	60,391		89.58% Pervious Area
	7,021		10.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0130	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.2	229	0.0610	1.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	65	0.0150	5.29	74.04	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
18.8	444	Total			

Summary for Subcatchment SA-2:

Runoff = 12.24 cfs @ 12.85 hrs, Volume= 2.066 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=4.60"

	Area (sf)	CN	Description
*	2,481	98	Offsite Impervious
	52,216	74	>75% Grass cover, Good, HSG C
	62,444	30	Woods, Good, HSG A
	662,768	70	Woods, Good, HSG C
	12,328	77	Woods, Good, HSG D
	792,237	67	Weighted Average
	789,756		99.69% Pervious Area
	2,481		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.5	150	0.0133	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
11.1	447	0.0179	0.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	183	0.0328	2.72		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.7	44	0.0455	1.07		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.0	353	0.0170	1.96		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.0	58	0.0345	0.93		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	471	0.0067	1.23		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
58.8	1,706	Total			

Summary for Subcatchment SA-3:

Runoff = 5.63 cfs @ 12.54 hrs, Volume= 0.731 af, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=4.60"

	Area (sf)	CN	Description
*	12,953	98	Offsite Impervious
	45,542	74	>75% Grass cover, Good, HSG C
	154,166	70	Woods, Good, HSG C
	212,661	73	Weighted Average
	199,708		93.91% Pervious Area
	12,953		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.2	150	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
7.5	368	0.0270	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
37.7	518	Total			

Summary for Subcatchment SA-4:

Runoff = 14.65 cfs @ 12.30 hrs, Volume= 1.472 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=4.60"

	Area (sf)	CN	Description
*	30,401	98	Offsite Impervious
	312,134	74	>75% Grass cover, Good, HSG C
	35,125	70	Woods, Good, HSG C
	377,660	76	Weighted Average
	347,259		91.95% Pervious Area
	30,401		8.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.0270	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
8.7	643	0.0310	1.23		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	95	0.0210	6.26	87.61	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
21.2	888	Total			

Summary for Subcatchment SA-5:

Runoff = 10.29 cfs @ 12.45 hrs, Volume= 1.219 af, Depth> 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR STORM Rainfall=4.60"

	Area (sf)	CN	Description
	179,341	74	>75% Grass cover, Good, HSG C
	186,105	70	Woods, Good, HSG C
	3,171	77	Woods, Good, HSG D
	368,617	72	Weighted Average
	368,617		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	150	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	181	0.0440	1.05		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.4	265	0.0075	1.30		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.5	106	0.0570	1.19		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.7	702	Total			

Summary for Reach AP#1:

Inflow Area = 1.548 ac, 10.42% Impervious, Inflow Depth > 2.98" for 25-YEAR STORM event
Inflow = 4.02 cfs @ 12.26 hrs, Volume= 0.384 af
Outflow = 4.02 cfs @ 12.26 hrs, Volume= 0.384 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#2:

Inflow Area = 18.187 ac, 0.31% Impervious, Inflow Depth > 2.14" for 25-YEAR STORM event
Inflow = 19.69 cfs @ 12.83 hrs, Volume= 3.250 af
Outflow = 19.69 cfs @ 12.83 hrs, Volume= 3.250 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#3:

Inflow Area = 4.882 ac, 6.09% Impervious, Inflow Depth > 2.68" for 25-YEAR STORM event
Inflow = 8.45 cfs @ 12.53 hrs, Volume= 1.092 af
Outflow = 8.45 cfs @ 12.53 hrs, Volume= 1.092 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#4:

Inflow Area = 8.670 ac, 8.05% Impervious, Inflow Depth > 2.98" for 25-YEAR STORM event
Inflow = 21.39 cfs @ 12.30 hrs, Volume= 2.150 af
Outflow = 21.39 cfs @ 12.30 hrs, Volume= 2.150 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#5:

Inflow Area = 8.462 ac, 0.00% Impervious, Inflow Depth > 2.60" for 25-YEAR STORM event
Inflow = 15.61 cfs @ 12.44 hrs, Volume= 1.835 af
Outflow = 15.61 cfs @ 12.44 hrs, Volume= 1.835 af, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment SA-1:

Runoff = 4.02 cfs @ 12.26 hrs, Volume= 0.384 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	7,021	98	Offsite Impervious
	46,568	74	>75% Grass cover, Good, HSG C
	13,823	70	Woods, Good, HSG C
	67,412	76	Weighted Average
	60,391		89.58% Pervious Area
	7,021		10.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0130	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.2	229	0.0610	1.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	65	0.0150	5.29	74.04	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
18.8	444	Total			

Summary for Subcatchment SA-2:

Runoff = 19.69 cfs @ 12.83 hrs, Volume= 3.250 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,481	98	Offsite Impervious
	52,216	74	>75% Grass cover, Good, HSG C
	62,444	30	Woods, Good, HSG A
	662,768	70	Woods, Good, HSG C
	12,328	77	Woods, Good, HSG D
	792,237	67	Weighted Average
	789,756		99.69% Pervious Area
	2,481		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.5	150	0.0133	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
11.1	447	0.0179	0.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	183	0.0328	2.72		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.7	44	0.0455	1.07		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.0	353	0.0170	1.96		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.0	58	0.0345	0.93		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	471	0.0067	1.23		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
58.8	1,706	Total			

Summary for Subcatchment SA-3:

Runoff = 8.45 cfs @ 12.53 hrs, Volume= 1.092 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	12,953	98	Offsite Impervious
	45,542	74	>75% Grass cover, Good, HSG C
	154,166	70	Woods, Good, HSG C
	212,661	73	Weighted Average
	199,708		93.91% Pervious Area
	12,953		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.2	150	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
7.5	368	0.0270	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
37.7	518	Total			

Summary for Subcatchment SA-4:

Runoff = 21.39 cfs @ 12.30 hrs, Volume= 2.150 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	30,401	98	Offsite Impervious
	312,134	74	>75% Grass cover, Good, HSG C
	35,125	70	Woods, Good, HSG C
	377,660	76	Weighted Average
	347,259		91.95% Pervious Area
	30,401		8.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	150	0.0270	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
8.7	643	0.0310	1.23		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	95	0.0210	6.26	87.61	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
21.2	888	Total			

Summary for Subcatchment SA-5:

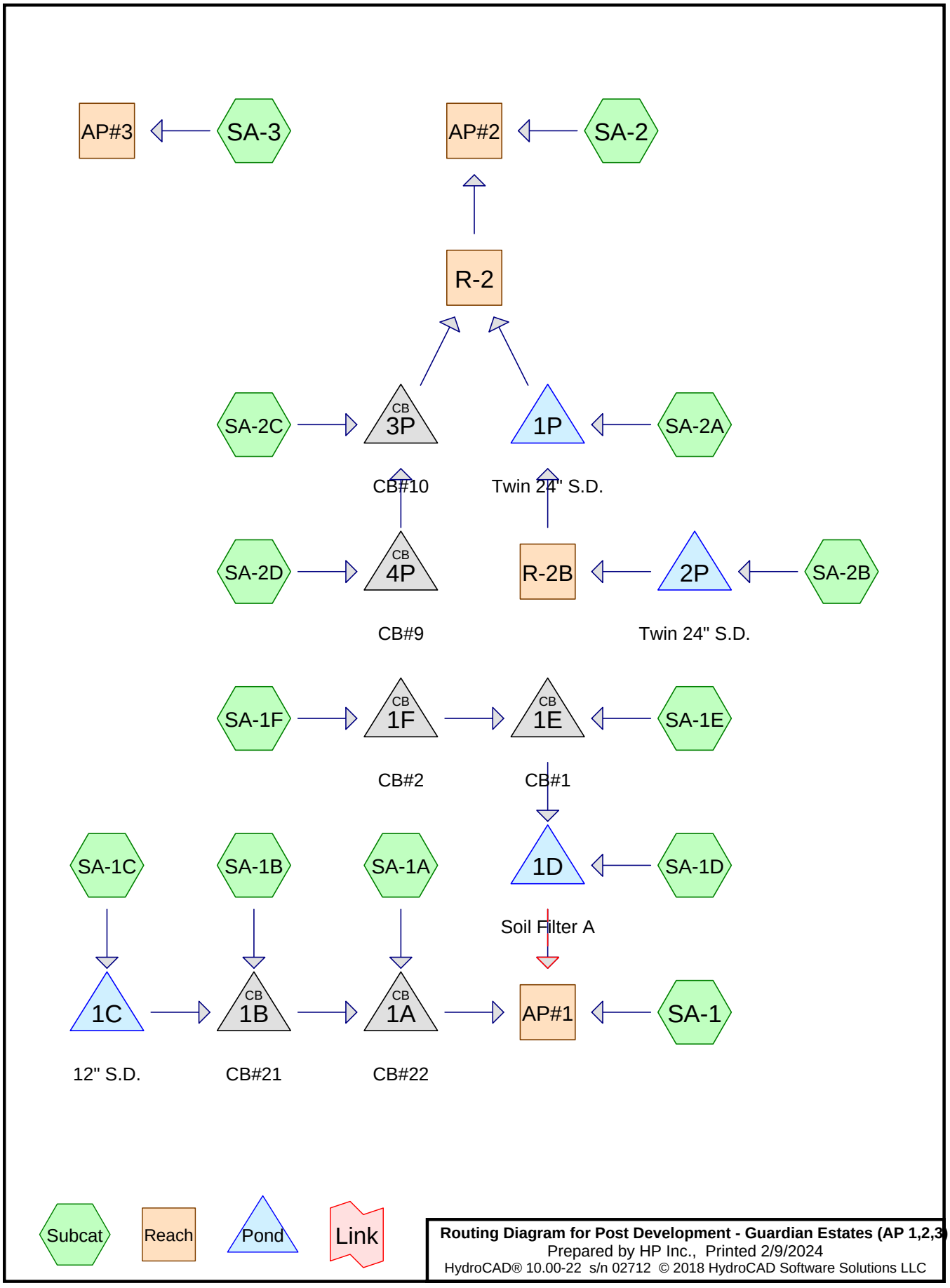
Runoff = 15.61 cfs @ 12.44 hrs, Volume= 1.835 af, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

Area (sf)	CN	Description
179,341	74	>75% Grass cover, Good, HSG C
186,105	70	Woods, Good, HSG C
3,171	77	Woods, Good, HSG D
368,617	72	Weighted Average
368,617		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	150	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	181	0.0440	1.05		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.4	265	0.0075	1.30		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.5	106	0.0570	1.19		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.7	702	Total			

Appendix D
Post Development Calculations



Routing Diagram for Post Development - Guardian Estates (AP 1,2,3)

Prepared by HP Inc., Printed 2/9/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.460	74	>75% Grass cover, Good, HSG C (SA-1, SA-1D, SA-1E, SA-2, SA-2B, SA-3)
6.364	74	Allocated Grass (C) (SA-2, SA-2A, SA-2B, SA-3)
1.148	98	Allocated Impervious (SA-2, SA-2A, SA-2B, SA-3)
0.515	98	Offsite Impervious (SA-1, SA-1C, SA-2B, SA-3)
0.978	74	Proposed Grass (C) (SA-1, SA-1A, SA-1B, SA-1C, SA-1D, SA-1E, SA-1F, SA-2, SA-2A, SA-2B, SA-2C, SA-2D, SA-3)
0.280	98	Proposed Impervious (SA-1, SA-1A, SA-1B, SA-1E, SA-1F, SA-2, SA-2C, SA-2D)
1.434	30	Woods, Good, HSG A (SA-2)
9.454	70	Woods, Good, HSG C (SA-2, SA-2A, SA-2B, SA-3)
0.283	77	Woods, Good, HSG D (SA-2B)
22.916	**72**	**TOTAL AREA**

Summary for Reach AP#1:

Inflow Area = 1.863 ac, 17.85% Impervious, Inflow Depth > 0.82" for 2-YEAR STORM event
Inflow = 1.10 cfs @ 12.23 hrs, Volume= 0.127 af
Outflow = 1.10 cfs @ 12.23 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#2:

Inflow Area = 17.225 ac, 6.30% Impervious, Inflow Depth > 0.68" for 2-YEAR STORM event
Inflow = 4.34 cfs @ 13.18 hrs, Volume= 0.971 af
Outflow = 4.34 cfs @ 13.18 hrs, Volume= 0.971 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#3:

Inflow Area = 3.829 ac, 13.76% Impervious, Inflow Depth > 0.98" for 2-YEAR STORM event
Inflow = 2.43 cfs @ 12.53 hrs, Volume= 0.312 af
Outflow = 2.43 cfs @ 12.53 hrs, Volume= 0.312 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#1:

Inflow Area = 1.863 ac, 17.85% Impervious, Inflow Depth > 1.79" for 10-YEAR STORM event
Inflow = 2.16 cfs @ 12.22 hrs, Volume= 0.278 af
Outflow = 2.16 cfs @ 12.22 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#2:

Inflow Area = 17.225 ac, 6.30% Impervious, Inflow Depth > 1.56" for 10-YEAR STORM event
Inflow = 11.35 cfs @ 12.80 hrs, Volume= 2.242 af
Outflow = 11.35 cfs @ 12.80 hrs, Volume= 2.242 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#3:

Inflow Area = 3.829 ac, 13.76% Impervious, Inflow Depth > 2.03" for 10-YEAR STORM event
Inflow = 5.15 cfs @ 12.51 hrs, Volume= 0.647 af
Outflow = 5.15 cfs @ 12.51 hrs, Volume= 0.647 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#1:

Inflow Area = 1.863 ac, 17.85% Impervious, Inflow Depth > 2.76" for 25-YEAR STORM event
Inflow = 3.79 cfs @ 12.36 hrs, Volume= 0.428 af
Outflow = 3.79 cfs @ 12.36 hrs, Volume= 0.428 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#2:

Inflow Area = 17.225 ac, 6.30% Impervious, Inflow Depth > 2.39" for 25-YEAR STORM event
Inflow = 18.26 cfs @ 12.66 hrs, Volume= 3.432 af
Outflow = 18.26 cfs @ 12.66 hrs, Volume= 3.432 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#3:

Inflow Area = 3.829 ac, 13.76% Impervious, Inflow Depth > 2.96" for 25-YEAR STORM event
Inflow = 7.52 cfs @ 12.50 hrs, Volume= 0.945 af
Outflow = 7.52 cfs @ 12.50 hrs, Volume= 0.945 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1A: CB#22

Inflow Area = 0.263 ac, 24.03% Impervious, Inflow Depth > 3.36" for 25-YEAR STORM event
Inflow = 1.03 cfs @ 12.10 hrs, Volume= 0.074 af
Outflow = 1.03 cfs @ 12.10 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min
Primary = 1.03 cfs @ 12.10 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 189.84' @ 12.10 hrs
Flood Elev= 192.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	188.92'	**12.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.92' / 188.72' S= 0.0050 '/' Cc= 0.900 n= 0.035, Flow Area= 0.79 sf

Primary OutFlow Max=1.02 cfs @ 12.10 hrs HW=189.84' (Free Discharge)
1=Culvert (Barrel Controls 1.02 cfs @ 1.77 fps)

Summary for Pond 1B: CB#21

Inflow Area = 0.224 ac, 19.00% Impervious, Inflow Depth > 3.24" for 25-YEAR STORM event
Inflow = 0.84 cfs @ 12.11 hrs, Volume= 0.061 af
Outflow = 0.84 cfs @ 12.11 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.11 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 189.66' @ 12.11 hrs
Flood Elev= 192.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	189.10'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 189.10' / 189.02' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.11 hrs HW=189.66' (Free Discharge)
1=Culvert (Barrel Controls 0.83 cfs @ 2.66 fps)

Summary for Pond 1C: 12" S.D.

Inflow Area = 0.141 ac, 7.65% Impervious, Inflow Depth > 2.99" for 25-YEAR STORM event
Inflow = 0.49 cfs @ 12.12 hrs, Volume= 0.035 af
Outflow = 0.49 cfs @ 12.12 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.1 min
Primary = 0.49 cfs @ 12.12 hrs, Volume= 0.035 af

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

Peak Elev= 191.39' @ 12.12 hrs Surf.Area= 9 sf Storage= 2 cf
Flood Elev= 193.00' Surf.Area= 72 sf Storage= 58 cf

Plug-Flow detention time= 0.1 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (791.9 - 791.8)

Volume	Invert	Avail.Storage	Storage Description
#1	191.00'	58 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
191.00	1	0	0
192.00	21	11	11
193.00	72	47	58

Device	Routing	Invert	Outlet Devices
#1	Primary	191.00'	**12.0" Round Culvert** L= 24.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 191.00' / 189.20' S= 0.0750 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.47 cfs @ 12.12 hrs HW=191.39' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.47 cfs @ 1.67 fps)

Summary for Pond 1D: Soil Filter A

Inflow Area = 0.758 ac, 14.59% Impervious, Inflow Depth > 3.13" for 25-YEAR STORM event
Inflow = 2.15 cfs @ 12.19 hrs, Volume= 0.198 af
Outflow = 1.40 cfs @ 12.41 hrs, Volume= 0.126 af, Atten= 35%, Lag= 13.4 min
Primary = 0.03 cfs @ 12.41 hrs, Volume= 0.024 af
Secondary = 1.37 cfs @ 12.41 hrs, Volume= 0.102 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 191.89' @ 12.41 hrs Surf.Area= 2,603 sf Storage= 3,471 cf
Flood Elev= 193.00' Surf.Area= 3,518 sf Storage= 6,878 cf

Plug-Flow detention time= 124.7 min calculated for 0.126 af (64% of inflow)
Center-of-Mass det. time= 51.8 min (842.6 - 790.9)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	6,878 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	1,169	0	0
191.00	1,834	1,502	1,502
192.00	2,700	2,267	3,769
193.00	3,518	3,109	6,878

Device	Routing	Invert	Outlet Devices
#1	Primary	187.50'	**6.0" Round Culvert** L= 58.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.50' / 187.21' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	187.21'	**0.7" Vert. Orifice/Grate** C= 0.600
#3	Secondary	191.75'	**10.0' long x 15.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.03 cfs @ 12.41 hrs HW=191.89' (Free Discharge)
└**1=Culvert** (Passes 0.03 cfs of 1.38 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 10.08 fps)

Secondary OutFlow Max=1.35 cfs @ 12.41 hrs HW=191.89' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 1.35 cfs @ 0.99 fps)

Summary for Pond 1E: CB#1

Inflow Area = 0.398 ac, 27.81% Impervious, Inflow Depth > 3.43" for 25-YEAR STORM event
Inflow = 1.24 cfs @ 12.15 hrs, Volume= 0.114 af
Outflow = 1.24 cfs @ 12.15 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min
Primary = 1.24 cfs @ 12.15 hrs, Volume= 0.114 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 192.41' @ 12.15 hrs
Flood Elev= 195.19'

Device	Routing	Invert	Outlet Devices
#1	Primary	191.80'	**15.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 191.80' / 191.54' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.24 cfs @ 12.15 hrs HW=192.41' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.24 cfs @ 3.03 fps)

Summary for Pond 1F: CB#2

Inflow Area = 0.103 ac, 56.38% Impervious, Inflow Depth > 4.19" for 25-YEAR STORM event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.51 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
Primary = 0.51 cfs @ 12.09 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 192.44' @ 12.09 hrs
Flood Elev= 195.19'

Device	Routing	Invert	Outlet Devices
#1	Primary	192.06'	**12.0" Round Culvert**

L= 16.0' CPP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 192.06' / 191.90' S= 0.0100 '/' Cc= 0.900
n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.49 cfs @ 12.09 hrs HW=192.44' (Free Discharge)
1=Culvert (Barrel Controls 0.49 cfs @ 2.69 fps)

Summary for Pond 1P: Twin 24" S.D.

Inflow Area = 8.071 ac, 7.82% Impervious, Inflow Depth > 2.75" for 25-YEAR STORM event
Inflow = 12.11 cfs @ 12.71 hrs, Volume= 1.849 af
Outflow = 11.40 cfs @ 12.86 hrs, Volume= 1.845 af, Atten= 6%, Lag= 9.1 min
Primary = 11.40 cfs @ 12.86 hrs, Volume= 1.845 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 190.73' @ 12.86 hrs Surf.Area= 8,181 sf Storage= 4,408 cf

Plug-Flow detention time= 5.0 min calculated for 1.839 af (99% of inflow)
Center-of-Mass det. time= 4.3 min (834.8 - 830.6)

Volume	Invert	Avail.Storage	Storage Description
#1	189.20'	35,149 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
189.20	10	0	0
190.00	1,829	736	736
191.00	10,485	6,157	6,893
192.00	46,027	28,256	35,149

Device	Routing	Invert	Outlet Devices
#1	Primary	189.20'	**24.0" Round Culvert X 2.00** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.20' / 189.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=11.39 cfs @ 12.86 hrs HW=190.73' (Free Discharge)
1=Culvert (Barrel Controls 11.39 cfs @ 3.05 fps)

Summary for Pond 2P: Twin 24" S.D.

Inflow Area = 5.454 ac, 5.25% Impervious, Inflow Depth > 2.67" for 25-YEAR STORM event
Inflow = 8.36 cfs @ 12.66 hrs, Volume= 1.215 af
Outflow = 8.35 cfs @ 12.67 hrs, Volume= 1.215 af, Atten= 0%, Lag= 0.4 min
Primary = 8.35 cfs @ 12.67 hrs, Volume= 1.215 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 196.04' @ 12.67 hrs Surf.Area= 263 sf Storage= 101 cf

Plug-Flow detention time= 0.2 min calculated for 1.215 af (100% of inflow)

Center-of-Mass det. time= 0.2 min (828.6 - 828.4)

Volume	Invert	Avail.Storage	Storage Description
#1	195.00'	7,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
195.00	17	0	0
196.00	170	94	94
197.00	2,788	1,479	1,573
198.00	8,947	5,868	7,440

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**24.0" Round Culvert X 2.00** L= 68.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 195.00' / 194.66' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=8.34 cfs @ 12.67 hrs HW=196.03' (Free Discharge)
1=Culvert (Barrel Controls 8.34 cfs @ 3.70 fps)

Summary for Pond 3P: CB#10

Inflow Area = 0.109 ac, 72.02% Impervious, Inflow Depth > 4.53" for 25-YEAR STORM event
Inflow = 0.56 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.56 cfs @ 12.09 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min
Primary = 0.56 cfs @ 12.09 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 192.53' @ 12.09 hrs
Flood Elev= 196.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	192.10'	**12.0" Round Culvert** L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 192.10' / 191.74' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.55 cfs @ 12.09 hrs HW=192.52' (Free Discharge)
1=Culvert (Barrel Controls 0.55 cfs @ 2.58 fps)

Summary for Pond 4P: CB#9

Inflow Area = 0.037 ac, 76.66% Impervious, Inflow Depth > 4.60" for 25-YEAR STORM event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af
Outflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af

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

Peak Elev= 193.21' @ 12.09 hrs
Flood Elev= 196.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	193.00'	**12.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 193.00' / 192.20' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.19 cfs @ 12.09 hrs HW=193.21' (Free Discharge)
1=Culvert (Inlet Controls 0.19 cfs @ 1.56 fps)

Summary for Reach AP#1:

Inflow Area = 1.863 ac, 17.85% Impervious, Inflow Depth > 2.76" for 25-YEAR STORM event
Inflow = 3.79 cfs @ 12.36 hrs, Volume= 0.428 af
Outflow = 3.79 cfs @ 12.36 hrs, Volume= 0.428 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#2:

Inflow Area = 17.225 ac, 6.30% Impervious, Inflow Depth > 2.39" for 25-YEAR STORM event
Inflow = 18.26 cfs @ 12.66 hrs, Volume= 3.432 af
Outflow = 18.26 cfs @ 12.66 hrs, Volume= 3.432 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#3:

Inflow Area = 3.829 ac, 13.76% Impervious, Inflow Depth > 2.96" for 25-YEAR STORM event
Inflow = 7.52 cfs @ 12.50 hrs, Volume= 0.945 af
Outflow = 7.52 cfs @ 12.50 hrs, Volume= 0.945 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach R-2:

Inflow Area = 8.180 ac, 8.67% Impervious, Inflow Depth > 2.77" for 25-YEAR STORM event
Inflow = 11.45 cfs @ 12.86 hrs, Volume= 1.886 af
Outflow = 11.28 cfs @ 13.07 hrs, Volume= 1.860 af, Atten= 2%, Lag= 12.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.88 fps, Min. Travel Time= 7.7 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 20.8 min

Peak Storage= 5,196 cf @ 12.94 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00' Flow Area= 101.0 sf, Capacity= 345.96 cfs

100.00' x 1.00' deep channel, n= 0.035
Side Slope Z-value= 1.0 '/' Top Width= 102.00'
Length= 405.0' Slope= 0.0067 '/'
Inlet Invert= 189.20', Outlet Invert= 186.50'

Summary for Reach R-2B:

Inflow Area = 5.454 ac, 5.25% Impervious, Inflow Depth > 2.67" for 25-YEAR STORM event
Inflow = 8.35 cfs @ 12.67 hrs, Volume= 1.215 af
Outflow = 8.25 cfs @ 12.82 hrs, Volume= 1.203 af, Atten= 1%, Lag= 8.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.11 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 12.9 min

Peak Storage= 2,667 cf @ 12.73 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00' Flow Area= 76.0 sf, Capacity= 391.13 cfs

75.00' x 1.00' deep channel, n= 0.035
Side Slope Z-value= 1.0 '/' Top Width= 77.00'
Length= 360.0' Slope= 0.0152 '/'
Inlet Invert= 194.66', Outlet Invert= 189.20'

Summary for Subcatchment SA-1:

Runoff = 2.42 cfs @ 12.25 hrs, Volume= 0.229 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	364	98	Proposed Impervious
*	6,550	98	Offsite Impervious
*	7,734	74	Proposed Grass (C)
	22,028	74	>75% Grass cover, Good, HSG C
	36,676	79	Weighted Average
	29,762		81.15% Pervious Area
	6,914		18.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0130	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	158	0.0630	1.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	95	0.0470	9.36	131.06	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
18.1	403	Total			

Summary for Subcatchment SA-1A:

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.013 af, Depth> 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	894	98	Proposed Impervious
*	784	74	Proposed Grass (C)
	1,678	87	Weighted Average
	784		46.72% Pervious Area
	894		53.28% Impervious Area

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

Summary for Subcatchment SA-1B:

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.025 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	1,384	98	Proposed Impervious
*	2,221	74	Proposed Grass (C)
	3,605	83	Weighted Average
	2,221		61.61% Pervious Area
	1,384		38.39% Impervious Area

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

Summary for Subcatchment SA-1C:

Runoff = 0.49 cfs @ 12.12 hrs, Volume= 0.035 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	471	98	Offsite Impervious
*	5,687	74	Proposed Grass (C)
	6,158	76	Weighted Average
	5,687		92.35% Pervious Area
	471		7.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	150	0.0730	0.30		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"

Summary for Subcatchment SA-1D:

Runoff = 0.95 cfs @ 12.21 hrs, Volume= 0.084 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	5,699	74	Proposed Grass (C)
	9,996	74	>75% Grass cover, Good, HSG C
	15,695	74	Weighted Average
	15,695		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	150	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	161	0.0680	1.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.3	311	Total			

Summary for Subcatchment SA-1E:

Runoff = 0.90 cfs @ 12.20 hrs, Volume= 0.078 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,291	98	Proposed Impervious
*	863	74	Proposed Grass (C)
	9,685	74	>75% Grass cover, Good, HSG C
	12,839	78	Weighted Average
	10,548		82.16% Pervious Area
	2,291		17.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	150	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.4	25	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	101	0.0183	6.73	45.43	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=0.50' Z= 0.0 & 50.0 '/' Top.W=26.00' n= 0.012 Steel, smooth
14.5	276	Total			

Summary for Subcatchment SA-1F:

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,526	98	Proposed Impervious
*	1,954	74	Proposed Grass (C)
	4,480	88	Weighted Average
	1,954		43.62% Pervious Area
	2,526		56.38% Impervious Area

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

Summary for Subcatchment SA-2:

Runoff = 12.74 cfs @ 12.49 hrs, Volume= 1.572 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	1,353	98	Proposed Impervious
*	15,000	98	Allocated Impervious
*	5,012	74	Proposed Grass (C)
*	90,000	74	Allocated Grass (C)
	52,216	74	>75% Grass cover, Good, HSG C
	62,444	30	Woods, Good, HSG A
	167,976	70	Woods, Good, HSG C
	394,001	66	Weighted Average
	377,648		95.85% Pervious Area
	16,353		4.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	150	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	360	0.0310	0.88		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.7	453	0.0190	2.07		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
33.4	963	Total			

Summary for Subcatchment SA-2A:

Runoff = 5.10 cfs @ 12.50 hrs, Volume= 0.646 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	15,000	98	Allocated Impervious
*	7,551	74	Proposed Grass (C)
*	67,220	74	Allocated Grass (C)
	24,216	70	Woods, Good, HSG C
	113,987	76	Weighted Average
	98,987		86.84% Pervious Area
	15,000		13.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	150	0.0150	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.6	178	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	32	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
36.0	360	Total			

Summary for Subcatchment SA-2B:

Runoff = 8.36 cfs @ 12.66 hrs, Volume= 1.215 af, Depth> 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,481	98	Offsite Impervious
*	10,000	98	Allocated Impervious
*	1,880	74	Proposed Grass (C)
*	50,000	74	Allocated Grass (C)
	4,508	74	>75% Grass cover, Good, HSG C
	156,390	70	Woods, Good, HSG C
	12,328	77	Woods, Good, HSG D
	237,587	73	Weighted Average
	225,106		94.75% Pervious Area
	12,481		5.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.5	150	0.0133	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
11.1	447	0.0179	0.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	183	0.0328	2.72		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
47.7	780	Total			

Summary for Subcatchment SA-2C:

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.027 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,173	98	Proposed Impervious
*	948	74	Proposed Grass (C)
	3,121	91	Weighted Average
	948		30.37% Pervious Area
	2,173		69.63% Impervious Area

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

Summary for Subcatchment SA-2D:

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	1,232	98	Proposed Impervious
*	375	74	Proposed Grass (C)
	1,607	92	Weighted Average
	375		23.34% Pervious Area
	1,232		76.66% Impervious Area

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

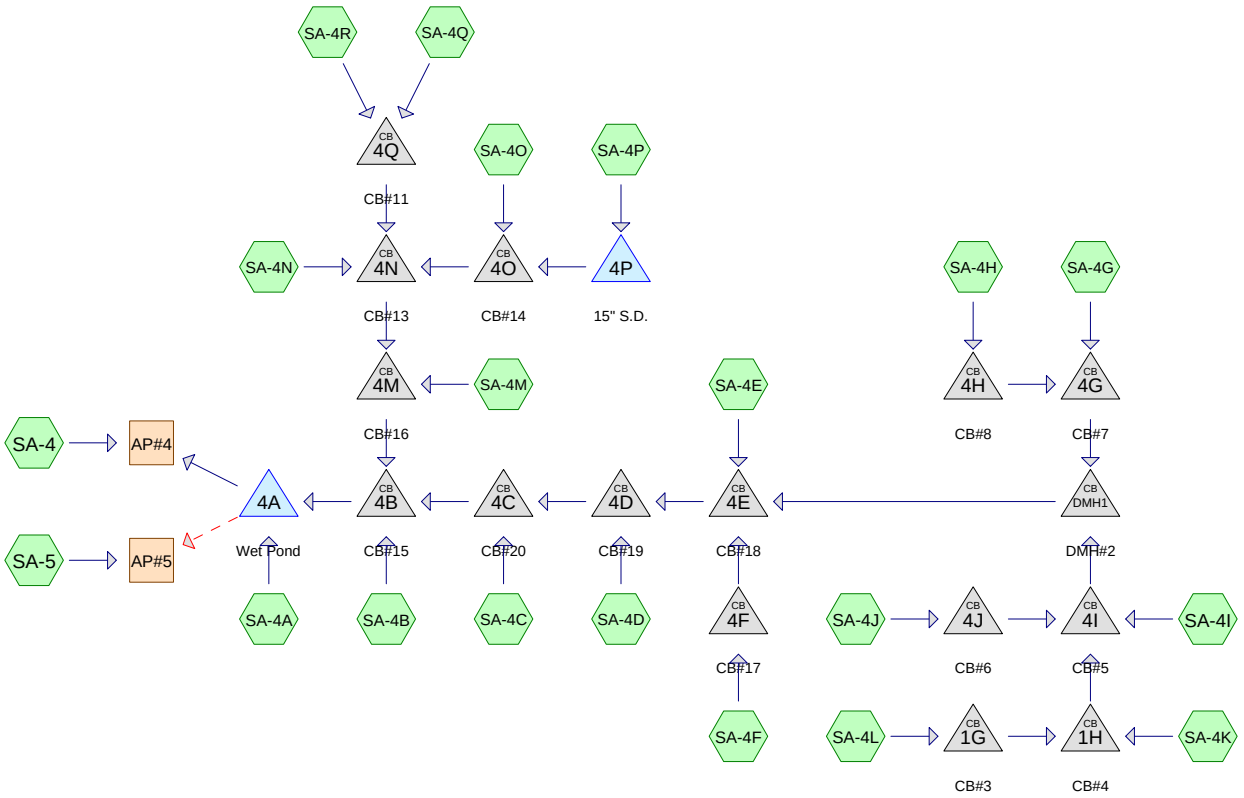
Summary for Subcatchment SA-3:

Runoff = 7.52 cfs @ 12.50 hrs, Volume= 0.945 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	10,000	98	Allocated Impervious
*	12,953	98	Offsite Impervious
*	1,902	74	Proposed Grass (C)
*	70,000	74	Allocated Grass (C)
	8,712	74	>75% Grass cover, Good, HSG C
	63,230	70	Woods, Good, HSG C
	166,797	76	Weighted Average
	143,844		86.24% Pervious Area
	22,953		13.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.2	150	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
5.3	261	0.0270	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.5	411	Total			



Subcat Reach Pond Link

Routing Diagram for Post Development - Guardian Estates (AP 4,5)

Prepared by HP Inc., Printed 2/9/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.588	74	>75% Grass cover, Good, HSG C (SA-4, SA-4K, SA-5)
2.754	74	Allocated Grass (C) (SA-4A, SA-4I, SA-4K, SA-4P, SA-5)
1.263	98	Allocated Impervious (SA-4, SA-4A, SA-4K, SA-4P, SA-5)
0.698	98	Offsite Impervious (SA-4)
1.625	74	Proposed Grass (C) (SA-4, SA-4A, SA-4B, SA-4C, SA-4D, SA-4E, SA-4F, SA-4G, SA-4H, SA-4I, SA-4J, SA-4L, SA-4M, SA-4N, SA-4O, SA-4P, SA-4Q, SA-4R, SA-5)
1.493	98	Proposed Impervious (SA-4, SA-4A, SA-4B, SA-4C, SA-4D, SA-4E, SA-4F, SA-4G, SA-4H, SA-4I, SA-4J, SA-4K, SA-4L, SA-4M, SA-4N, SA-4O, SA-4Q, SA-4R)
4.338	70	Woods, Good, HSG C (SA-4, SA-4I, SA-4K, SA-5)
0.073	77	Woods, Good, HSG D (SA-4I, SA-4K)
18.833	**77**	**TOTAL AREA**

Summary for Reach AP#4:

Inflow Area = 12.627 ac, 26.44% Impervious, Inflow Depth > 0.76" for 2-YEAR STORM event
Inflow = 6.37 cfs @ 12.24 hrs, Volume= 0.803 af
Outflow = 6.37 cfs @ 12.24 hrs, Volume= 0.803 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#5:

Inflow Area = 6.206 ac, 1.85% Impervious, Inflow Depth > 0.78" for 2-YEAR STORM event
Inflow = 3.37 cfs @ 12.43 hrs, Volume= 0.403 af
Outflow = 3.37 cfs @ 12.43 hrs, Volume= 0.403 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#4:

Inflow Area = 12.627 ac, 26.44% Impervious, Inflow Depth > 1.50" for 10-YEAR STORM event
Inflow = 12.79 cfs @ 12.23 hrs, Volume= 1.574 af
Outflow = 12.79 cfs @ 12.23 hrs, Volume= 1.574 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#5:

Inflow Area = 6.206 ac, 1.85% Impervious, Inflow Depth > 1.73" for 10-YEAR STORM event
Inflow = 7.90 cfs @ 12.41 hrs, Volume= 0.895 af
Outflow = 7.90 cfs @ 12.41 hrs, Volume= 0.895 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#4:

Inflow Area = 12.627 ac, 26.44% Impervious, Inflow Depth > 2.48" for 25-YEAR STORM event
Inflow = 18.36 cfs @ 12.22 hrs, Volume= 2.608 af
Outflow = 18.36 cfs @ 12.22 hrs, Volume= 2.608 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#5:

Inflow Area = 6.206 ac, 1.85% Impervious, Inflow Depth > 2.60" for 25-YEAR STORM event
Inflow = 11.98 cfs @ 12.40 hrs, Volume= 1.347 af
Outflow = 11.98 cfs @ 12.40 hrs, Volume= 1.347 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1G: CB#3

Inflow Area = 0.144 ac, 65.98% Impervious, Inflow Depth > 4.40" for 25-YEAR STORM event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 0.053 af
Outflow = 0.73 cfs @ 12.09 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min
Primary = 0.73 cfs @ 12.09 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 195.47' @ 12.09 hrs
Flood Elev= 199.59'

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.84' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 12.09 hrs HW=195.47' (Free Discharge)
1=Culvert (Barrel Controls 0.71 cfs @ 2.91 fps)

Summary for Pond 1H: CB#4

Inflow Area = 1.526 ac, 18.08% Impervious, Inflow Depth > 3.20" for 25-YEAR STORM event
Inflow = 4.18 cfs @ 12.23 hrs, Volume= 0.407 af
Outflow = 4.18 cfs @ 12.23 hrs, Volume= 0.407 af, Atten= 0%, Lag= 0.0 min
Primary = 4.18 cfs @ 12.23 hrs, Volume= 0.407 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 195.94' @ 12.23 hrs
Flood Elev= 199.59'

Device	Routing	Invert	Outlet Devices
#1	Primary	194.74'	**15.0" Round Culvert** L= 302.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 194.74' / 193.13' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=4.15 cfs @ 12.23 hrs HW=195.93' (Free Discharge)
1=Culvert (Barrel Controls 4.15 cfs @ 4.43 fps)

Summary for Pond 4A: Wet Pond

Inflow Area = 6.424 ac, 33.35% Impervious, Inflow Depth > 3.55" for 25-YEAR STORM event
Inflow = 19.94 cfs @ 12.14 hrs, Volume= 1.902 af
Outflow = 4.35 cfs @ 12.75 hrs, Volume= 0.969 af, Atten= 78%, Lag= 36.6 min
Primary = 4.35 cfs @ 12.75 hrs, Volume= 0.969 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

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

Starting Elev= 179.00' Surf.Area= 8,711 sf Storage= 34,787 cf
Peak Elev= 182.85' @ 12.75 hrs Surf.Area= 15,026 sf Storage= 80,023 cf (45,236 cf above start)
Flood Elev= 185.00' Surf.Area= 20,426 sf Storage= 118,064 cf (83,278 cf above start)

Plug-Flow detention time= 516.8 min calculated for 0.170 af (9% of inflow)
Center-of-Mass det. time= 74.4 min (853.6 - 779.3)

Volume	Invert	Avail.Storage	Storage Description
#1	173.00'	118,064 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
173.00	3,214	0	0
174.00	3,989	3,602	3,602
175.00	4,820	4,405	8,006
176.00	5,708	5,264	13,270
177.00	6,653	6,181	19,451
178.00	7,654	7,154	26,604
179.00	8,711	8,183	34,787
180.00	10,575	9,643	44,430
181.00	11,806	11,191	55,620
182.00	13,093	12,450	68,070
183.00	15,367	14,230	82,300
184.00	17,868	16,618	98,917
185.00	20,426	19,147	118,064

Device	Routing	Invert	Outlet Devices
#1	Primary	176.00'	**18.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 176.00' / 175.74' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	176.50'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	182.50'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)
#4	Secondary	183.25'	**20.0' long x 20.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.33 cfs @ 12.75 hrs HW=182.85' (Free Discharge)
└**1=Culvert** (Passes 4.33 cfs of 21.02 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.26 cfs @ 12.05 fps)
└**3=Sharp-Crested Vee/Trap Weir** (Weir Controls 4.07 cfs @ 1.94 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=179.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4B: CB#15

Inflow Area = 4.768 ac, 33.14% Impervious, Inflow Depth > 3.55" for 25-YEAR STORM event
Inflow = 14.99 cfs @ 12.12 hrs, Volume= 1.410 af
Outflow = 14.99 cfs @ 12.12 hrs, Volume= 1.410 af, Atten= 0%, Lag= 0.0 min
Primary = 14.99 cfs @ 12.12 hrs, Volume= 1.410 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 187.88' @ 12.12 hrs
Flood Elev= 193.87'

Device	Routing	Invert	Outlet Devices
#1	Primary	185.70'	**24.0" Round Culvert** L= 118.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.70' / 185.11' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=14.72 cfs @ 12.12 hrs HW=187.85' (Free Discharge)
1=Culvert (Barrel Controls 14.72 cfs @ 5.43 fps)

Summary for Pond 4C: CB#20

Inflow Area = 2.917 ac, 32.42% Impervious, Inflow Depth > 3.53" for 25-YEAR STORM event
Inflow = 9.32 cfs @ 12.12 hrs, Volume= 0.858 af
Outflow = 9.32 cfs @ 12.12 hrs, Volume= 0.858 af, Atten= 0%, Lag= 0.0 min
Primary = 9.32 cfs @ 12.12 hrs, Volume= 0.858 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 191.80' @ 12.12 hrs
Flood Elev= 194.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	189.51'	**18.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 189.51' / 189.14' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=9.13 cfs @ 12.12 hrs HW=191.74' (Free Discharge)
1=Culvert (Barrel Controls 9.13 cfs @ 5.17 fps)

Summary for Pond 4D: CB#19

Inflow Area = 2.781 ac, 30.75% Impervious, Inflow Depth > 3.49" for 25-YEAR STORM event
Inflow = 8.66 cfs @ 12.12 hrs, Volume= 0.808 af
Outflow = 8.66 cfs @ 12.12 hrs, Volume= 0.808 af, Atten= 0%, Lag= 0.0 min
Primary = 8.66 cfs @ 12.12 hrs, Volume= 0.808 af

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

Peak Elev= 192.08' @ 12.12 hrs
Flood Elev= 195.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	189.95'	**18.0" Round Culvert** L= 68.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 189.95' / 189.61' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=8.49 cfs @ 12.12 hrs HW=192.03' (Free Discharge)
1=Culvert (Barrel Controls 8.49 cfs @ 4.80 fps)

Summary for Pond 4E: CB#18

Inflow Area = 2.717 ac, 29.69% Impervious, Inflow Depth > 3.46" for 25-YEAR STORM event
Inflow = 8.35 cfs @ 12.12 hrs, Volume= 0.783 af
Outflow = 8.35 cfs @ 12.12 hrs, Volume= 0.783 af, Atten= 0%, Lag= 0.0 min
Primary = 8.35 cfs @ 12.12 hrs, Volume= 0.783 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 192.81' @ 12.12 hrs
Flood Elev= 197.45'

Device	Routing	Invert	Outlet Devices
#1	Primary	190.94'	**18.0" Round Culvert** L= 178.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 190.94' / 190.05' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=8.19 cfs @ 12.12 hrs HW=192.77' (Free Discharge)
1=Culvert (Barrel Controls 8.19 cfs @ 4.83 fps)

Summary for Pond 4F: CB#17

Inflow Area = 0.080 ac, 77.46% Impervious, Inflow Depth > 4.70" for 25-YEAR STORM event
Inflow = 0.43 cfs @ 12.09 hrs, Volume= 0.032 af
Outflow = 0.43 cfs @ 12.09 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.09 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 193.50' @ 12.09 hrs
Flood Elev= 197.45'

Device	Routing	Invert	Outlet Devices
#1	Primary	193.15'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 193.15' / 192.99' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.42 cfs @ 12.09 hrs HW=193.49' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.42 cfs @ 2.60 fps)

Summary for Pond 4G: CB#7

Inflow Area = 0.267 ac, 70.36% Impervious, Inflow Depth > 4.47" for 25-YEAR STORM event
Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.100 af
Outflow = 1.37 cfs @ 12.09 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.0 min
Primary = 1.37 cfs @ 12.09 hrs, Volume= 0.100 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 194.48' @ 12.09 hrs
Flood Elev= 197.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	193.87'	**15.0" Round Culvert** L= 290.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 193.87' / 192.42' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.34 cfs @ 12.09 hrs HW=194.47' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.34 cfs @ 3.33 fps)

Summary for Pond 4H: CB#8

Inflow Area = 0.165 ac, 66.48% Impervious, Inflow Depth > 4.40" for 25-YEAR STORM event
Inflow = 0.84 cfs @ 12.09 hrs, Volume= 0.061 af
Outflow = 0.84 cfs @ 12.09 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.09 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 194.64' @ 12.09 hrs
Flood Elev= 197.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	194.13'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 194.13' / 193.97' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.82 cfs @ 12.09 hrs HW=194.64' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.82 cfs @ 3.00 fps)

Summary for Pond 4I: CB#5

Inflow Area = 2.231 ac, 20.70% Impervious, Inflow Depth > 3.23" for 25-YEAR STORM event
Inflow = 6.27 cfs @ 12.17 hrs, Volume= 0.601 af
Outflow = 6.27 cfs @ 12.17 hrs, Volume= 0.601 af, Atten= 0%, Lag= 0.0 min
Primary = 6.27 cfs @ 12.17 hrs, Volume= 0.601 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 195.25' @ 12.17 hrs
Flood Elev= 198.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	193.03'	**15.0" Round Culvert** L= 121.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 193.03' / 192.42' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=6.20 cfs @ 12.17 hrs HW=195.22' (Free Discharge)
1=Culvert (Barrel Controls 6.20 cfs @ 5.05 fps)

Summary for Pond 4J: CB#6

Inflow Area = 0.163 ac, 67.84% Impervious, Inflow Depth > 4.40" for 25-YEAR STORM event
Inflow = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af
Outflow = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 195.51' @ 12.09 hrs
Flood Elev= 198.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.84' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.81 cfs @ 12.09 hrs HW=195.50' (Free Discharge)
1=Culvert (Barrel Controls 0.81 cfs @ 2.99 fps)

Summary for Pond 4M: CB#16

Inflow Area = 1.799 ac, 33.04% Impervious, Inflow Depth > 3.55" for 25-YEAR STORM event
Inflow = 5.41 cfs @ 12.11 hrs, Volume= 0.532 af
Outflow = 5.41 cfs @ 12.11 hrs, Volume= 0.532 af, Atten= 0%, Lag= 0.0 min
Primary = 5.41 cfs @ 12.11 hrs, Volume= 0.532 af

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

Peak Elev= 187.31' @ 12.11 hrs
Flood Elev= 193.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	185.90'	**18.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.90' / 185.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=5.32 cfs @ 12.11 hrs HW=187.29' (Free Discharge)
1=Culvert (Barrel Controls 5.32 cfs @ 4.06 fps)

Summary for Pond 4N: CB#13

Inflow Area = 1.752 ac, 32.14% Impervious, Inflow Depth > 3.53" for 25-YEAR STORM event
Inflow = 5.18 cfs @ 12.12 hrs, Volume= 0.515 af
Outflow = 5.18 cfs @ 12.12 hrs, Volume= 0.515 af, Atten= 0%, Lag= 0.0 min
Primary = 5.18 cfs @ 12.12 hrs, Volume= 0.515 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 188.84' @ 12.11 hrs
Flood Elev= 191.21'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.38'	**15.0" Round Culvert** L= 257.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.38' / 186.00' S= 0.0054 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.10 cfs @ 12.12 hrs HW=188.82' (Free Discharge)
1=Culvert (Barrel Controls 5.10 cfs @ 4.53 fps)

Summary for Pond 4O: CB#14

Inflow Area = 1.358 ac, 20.26% Impervious, Inflow Depth > 3.23" for 25-YEAR STORM event
Inflow = 3.60 cfs @ 12.24 hrs, Volume= 0.366 af
Outflow = 3.60 cfs @ 12.24 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min
Primary = 3.60 cfs @ 12.24 hrs, Volume= 0.366 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 188.78' @ 12.24 hrs
Flood Elev= 191.21'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.64'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.64' / 187.48' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.58 cfs @ 12.24 hrs HW=188.77' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.58 cfs @ 4.03 fps)

Summary for Pond 4P: 15" S.D.

Inflow Area = 1.117 ac, 10.28% Impervious, Inflow Depth > 2.98" for 25-YEAR STORM event
Inflow = 3.08 cfs @ 12.22 hrs, Volume= 0.277 af
Outflow = 3.01 cfs @ 12.26 hrs, Volume= 0.277 af, Atten= 2%, Lag= 2.1 min
Primary = 3.01 cfs @ 12.26 hrs, Volume= 0.277 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 189.63' @ 12.26 hrs Surf.Area= 486 sf Storage= 244 cf
Flood Elev= 190.00' Surf.Area= 675 sf Storage= 462 cf

Plug-Flow detention time= 1.1 min calculated for 0.277 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (799.0 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1	188.58'	4,390 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
188.58	10	0	0
189.00	172	38	38
190.00	675	424	462
191.00	7,181	3,928	4,390

Device	Routing	Invert	Outlet Devices
#1	Primary	188.58'	**15.0" Round Culvert** L= 24.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 188.58' / 187.74' S= 0.0350 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.99 cfs @ 12.26 hrs HW=189.62' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.99 cfs @ 2.74 fps)

Summary for Pond 4Q: CB#11

Inflow Area = 0.233 ac, 71.00% Impervious, Inflow Depth > 4.52" for 25-YEAR STORM event
Inflow = 1.21 cfs @ 12.09 hrs, Volume= 0.088 af
Outflow = 1.21 cfs @ 12.09 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min
Primary = 1.21 cfs @ 12.09 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 188.97' @ 12.09 hrs
Flood Elev= 193.31'

Device	Routing	Invert	Outlet Devices
#1	Primary	188.39'	**15.0" Round Culvert**

L= 182.0' CPP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 188.39' / 187.48' S= 0.0050 '/' Cc= 0.900
n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.17 cfs @ 12.09 hrs HW=188.96' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.17 cfs @ 3.17 fps)

Summary for Reach AP#4:

Inflow Area = 12.627 ac, 26.44% Impervious, Inflow Depth > 2.48" for 25-YEAR STORM event
Inflow = 18.36 cfs @ 12.22 hrs, Volume= 2.608 af
Outflow = 18.36 cfs @ 12.22 hrs, Volume= 2.608 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach AP#5:

Inflow Area = 6.206 ac, 1.85% Impervious, Inflow Depth > 2.60" for 25-YEAR STORM event
Inflow = 11.98 cfs @ 12.40 hrs, Volume= 1.347 af
Outflow = 11.98 cfs @ 12.40 hrs, Volume= 1.347 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond DMH1: DMH#2

Inflow Area = 2.498 ac, 26.00% Impervious, Inflow Depth > 3.37" for 25-YEAR STORM event
Inflow = 7.30 cfs @ 12.15 hrs, Volume= 0.701 af
Outflow = 7.30 cfs @ 12.15 hrs, Volume= 0.701 af, Atten= 0%, Lag= 0.0 min
Primary = 7.30 cfs @ 12.15 hrs, Volume= 0.701 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 193.91' @ 12.15 hrs
Flood Elev= 199.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	192.32'	**18.0" Round Culvert** L= 256.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 192.32' / 191.04' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=7.28 cfs @ 12.15 hrs HW=193.90' (Free Discharge)
└**1=Culvert** (Barrel Controls 7.28 cfs @ 4.86 fps)

Summary for Subcatchment SA-4:

Runoff = 18.12 cfs @ 12.22 hrs, Volume= 1.639 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	30,401	98	Offsite Impervious
*	1,693	98	Proposed Impervious
*	20,000	98	Allocated Impervious
*	5,831	74	Proposed Grass (C)
	177,142	74	>75% Grass cover, Good, HSG C
	35,125	70	Woods, Good, HSG C
	270,192	78	Weighted Average
	218,098		80.72% Pervious Area
	52,094		19.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	150	0.0470	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
5.4	343	0.0230	1.06		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	390	0.0210	6.26	87.61	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035
16.2	883	Total			

Summary for Subcatchment SA-4A:

Runoff = 5.72 cfs @ 12.19 hrs, Volume= 0.492 af, Depth> 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	4,499	98	Proposed Impervious
*	20,000	98	Allocated Impervious
*	27,658	74	Proposed Grass (C)
*	19,978	74	Allocated Grass (C)
	72,135	82	Weighted Average
	47,636		66.04% Pervious Area
	24,499		33.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	150	0.0260	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.2	100	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.6	250	Total			

Summary for Subcatchment SA-4B:

Runoff = 0.28 cfs @ 12.09 hrs, Volume= 0.020 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	1,760	98	Proposed Impervious
*	537	74	Proposed Grass (C)
	2,297	92	Weighted Average
	537		23.38% Pervious Area
	1,760		76.62% Impervious Area

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

Summary for Subcatchment SA-4C:

Runoff = 0.69 cfs @ 12.09 hrs, Volume= 0.050 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	3,946	98	Proposed Impervious
*	1,996	74	Proposed Grass (C)
	5,942	90	Weighted Average
	1,996		33.59% Pervious Area
	3,946		66.41% Impervious Area

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

Summary for Subcatchment SA-4D:

Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,104	98	Proposed Impervious
*	662	74	Proposed Grass (C)
	2,766	92	Weighted Average
	662		23.93% Pervious Area
	2,104		76.07% Impervious Area

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

Summary for Subcatchment SA-4E:

Runoff = 0.71 cfs @ 12.09 hrs, Volume= 0.051 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	4,141	98	Proposed Impervious
*	1,916	74	Proposed Grass (C)
	6,057	90	Weighted Average
	1,916		31.63% Pervious Area
	4,141		68.37% Impervious Area

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

Summary for Subcatchment SA-4F:

Runoff = 0.43 cfs @ 12.09 hrs, Volume= 0.032 af, Depth> 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,715	98	Proposed Impervious
*	790	74	Proposed Grass (C)
	3,505	93	Weighted Average
	790		22.54% Pervious Area
	2,715		77.46% Impervious Area

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

Summary for Subcatchment SA-4G:

Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.039 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	3,395	98	Proposed Impervious
*	1,033	74	Proposed Grass (C)
	4,428	92	Weighted Average
	1,033		23.33% Pervious Area
	3,395		76.67% Impervious Area

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

Summary for Subcatchment SA-4H:

Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.061 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	4,784	98	Proposed Impervious
*	2,412	74	Proposed Grass (C)
	7,196	90	Weighted Average
	2,412		33.52% Pervious Area
	4,784		66.48% Impervious Area

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

Summary for Subcatchment SA-4I:

Runoff = 1.75 cfs @ 12.15 hrs, Volume= 0.135 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	3,280	98	Proposed Impervious
*	1,197	74	Proposed Grass (C)
*	10,000	74	Allocated Grass (C)
	8,781	70	Woods, Good, HSG C
	357	77	Woods, Good, HSG D
	23,615	76	Weighted Average
	20,335		86.11% Pervious Area
	3,280		13.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	126	0.0317	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.2	80	0.0142	5.93	40.02	**Trap/Vee/Rect Channel Flow,** Bot.W=1.00' D=0.50' Z= 50.0 & 0.0 '/' Top.W=26.00' n= 0.012
10.2	206	Total			

Summary for Subcatchment SA-4J:

Runoff = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	4,812	98	Proposed Impervious
*	2,281	74	Proposed Grass (C)
	7,093	90	Weighted Average
	2,281		32.16% Pervious Area
	4,812		67.84% Impervious Area

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

Summary for Subcatchment SA-4K:

Runoff = 3.81 cfs @ 12.24 hrs, Volume= 0.354 af, Depth> 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	2,883	98	Proposed Impervious
*	5,000	98	Allocated Impervious
*	20,000	74	Allocated Grass (C)
	18,354	74	>75% Grass cover, Good, HSG C
	2,810	77	Woods, Good, HSG D
	11,148	70	Woods, Good, HSG C
	60,195	77	Weighted Average
	52,312		86.90% Pervious Area
	7,883		13.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	98	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.6	52	0.0400	1.40		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.8	160	0.0430	1.45		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.3	310	Total			

Summary for Subcatchment SA-4L:

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 0.053 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	4,135	98	Proposed Impervious
*	2,132	74	Proposed Grass (C)
	6,267	90	Weighted Average
	2,132		34.02% Pervious Area
	4,135		65.98% Impervious Area

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

Summary for Subcatchment SA-4M:

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.017 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	1,357	98	Proposed Impervious
*	686	74	Proposed Grass (C)
	2,043	90	Weighted Average
	686		33.58% Pervious Area
	1,357		66.42% Impervious Area

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

Summary for Subcatchment SA-4N:

Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	5,342	98	Proposed Impervious
*	1,663	74	Proposed Grass (C)
	7,005	92	Weighted Average
	1,663		23.74% Pervious Area
	5,342		76.26% Impervious Area

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

Summary for Subcatchment SA-4O:

Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.088 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	6,991	98	Proposed Impervious
*	3,525	74	Proposed Grass (C)
	10,516	90	Weighted Average
	3,525		33.52% Pervious Area
	6,991		66.48% Impervious Area

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

Summary for Subcatchment SA-4P:

Runoff = 3.08 cfs @ 12.22 hrs, Volume= 0.277 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	5,000	98	Allocated Impervious
*	3,656	74	Proposed Grass (C)
*	40,000	74	Allocated Grass (C)
	48,656	76	Weighted Average
	43,656		89.72% Pervious Area
	5,000		10.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	150	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.4	141	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.2	291	Total			

Summary for Subcatchment SA-4Q:

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.050 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	3,953	98	Proposed Impervious
*	2,038	74	Proposed Grass (C)
	5,991	90	Weighted Average
	2,038		34.02% Pervious Area
	3,953		65.98% Impervious Area

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

Summary for Subcatchment SA-4R:

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af, Depth> 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	3,241	98	Proposed Impervious
*	901	74	Proposed Grass (C)
	4,142	93	Weighted Average
	901		21.75% Pervious Area
	3,241		78.25% Impervious Area

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

Summary for Subcatchment SA-5:

Runoff = 11.98 cfs @ 12.40 hrs, Volume= 1.347 af, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR STORM Rainfall=5.80"

	Area (sf)	CN	Description
*	5,000	98	Allocated Impervious
*	9,891	74	Proposed Grass (C)
*	30,000	74	Allocated Grass (C)
	91,499	74	>75% Grass cover, Good, HSG C
	133,925	70	Woods, Good, HSG C
	270,315	72	Weighted Average
	265,315		98.15% Pervious Area
	5,000		1.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	150	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.4	265	0.0075	1.30		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.5	106	0.0570	1.19		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.8	521	Total			

Appendix E
Water Quality Calculations and BMP Sizing

BH2M
380B Main Street
Gorham, Maine 04038

WATER QUALITY CALCULATIONS
Guardian Estates Subdivision

Subcatchment ID	Linear Impervious Area (sf)	Allocated lot Impervious Area (sf)	Linear Lawn Area (sf)	Allocated Lot Lawn Area (sf)	Linear Developed Area (sf)	Lot Develped Area (sf)	Existing Impervious Area (sf)	Existing Landscaped Area (sf)	Treated Linear Impervious Area (sf)	Treated Linear Developed Area (sf)	BMP ID
1	364	0	7,734	0	8,098	0	6,550	22,028	0	0	None
1A	894	0	784	0	1,678	0	0	0	0	0	None
1B	1,384	0	2,221	0	3,605	0	0	0	0	0	None
1C	0	0	5,687	0	5,687	0	471		0	0	None
1D	0	0	5,699	0	5,699	0	0	9,996	0	5,699	Soil Filter A
1E	2,291	0	863	0	3,154	0	0	9,685	2,291	3,154	Soil Filter A
1F	2,526	0	1,954	0	4,480	0	0	0	2,526	4,480	Soil Filter A
2	1,353	15,000	5,012	90,000	6,365	105,000	0	282,636	0	0	None
2A	0	15,000	7,551	67,220	7,551	82,220	0	24,216	0	0	None
2B	0	10,000	1,880	50,000	1,880	60,000	2,481	173,226	0	0	None
2C	2,173	0	948	0	3,121	0	0	0	0	0	None
2D	1,232	0	375	0	1,607	0	0	0	0	0	None
3	0	10,000	1,902	70,000	1,902	80,000	12,953	71,942	0	0	None
4	1,693	20,000	5,831	0	7,524	20,000	30,401	212,267	0	0	None
4A	4,499	20,000	27,658	19,978	32,157	39,978	0	0	4,499	32,157	Wet Pond
4B	1,760	0	537	0	2,297	0	0	0	1,760	2,297	Wet Pond
4C	3,946	0	1,996	0	5,942	0	0	0	3,946	5,942	Wet Pond
4D	2,104	0	662	0	2,766	0	0	0	2,104	2,766	Wet Pond
4E	4,141	0	1,916	0	6,057	0	0	0	4,141	6,057	Wet Pond
4F	2,715	0	790	0	3,505	0	0	0	2,715	3,505	Wet Pond
4G	3,395	0	1,033	0	4,428	0	0	0	3,395	4,428	Wet Pond
4H	4,784	0	2,412	0	7,196	0	0	0	4,784	7,196	Wet Pond
4I	3,280	0	1,197	10,000	4,477	10,000	0	9,138	3,280	4,477	Wet Pond
4J	4,812	0	2,281	0	7,093	0	0	0	4,812	7,093	Wet Pond
4K	2,883	5,000	0	20,000	2,883	25,000	0	32,312	2,883	2,883	Wet Pond
4L	4,135	0	2,132	0	6,267	0	0	0	4,135	6,267	Wet Pond
4M	1,357	0	686	0	2,043	0	0	0	1,357	2,043	Wet Pond
4N	5,342	0	1,663	0	7,005	0	0	0	5,342	7,005	Wet Pond
4O	6,991	0	3,525	0	10,516	0	0	0	6,991	10,516	Wet Pond
4P	0	5,000	3,656	40,000	3,656	45,000	0	0	0	3,656	Wet Pond
4Q	3,953	0	2,038	0	5,991	0	0	0	3,953	5,991	Wet Pond
4R	3,241	0	901	0	4,142	0	0	0	3,241	4,142	Wet Pond
5	0	5,000	9,891	30,000	9,891	35,000	0	225,424		9,891	None
Total	**77,248**	**105,000**	**113,415**	**397,198**	**190,663**	**502,198**	**52,856**	**1,072,870**	**68,155**	**141,645**	

Linear Treatment Summary	
Total Proposed/Allocated Impervious Area (sq. ft.)=	77,248
Total Proposed/Allocated Developed Area (sq. ft.)=	190,663
* Total Treated New Impervious Area (sq. ft.)=	69,935
* Total Treated New Developed Area (sq. ft.)=	145,520
Impervious Area Treatment % =	**90.53%**
Developed Area Treatment % =	**76.32%**

*** Please note that 5,000 sf of impervious area and 30,000 sf of lawn area has been allocated for the development of each wooded lot. The roadway will create approximately 3,875 sf of wetland impact (1,780 sf impervious and 2,095 sf vegetated). This area is exempt from treatment.**

Guardian Estates
Wet Pond Volume

Elevation	Surface Area (ft^2)	Stage Volume (ft^3)	Cumulative Volume (ft^3)	Volume Above Permanent Pool	Comments
173	3,214	0	0		
174	3,989	3,602	3,602		
175	4,820	4,405	8,006		
176	5,708	5,264	13,270		
177	6,653	6,181	19,451		
178	7,654	7,154	26,604		Mean Depth= 3.48
179	8,711	8,183	34,787	0	Water Quality Elevation
180	10,575	9,643	44,430	9,643	
181	11,806	11,191	55,620	20,834	Channel Protection Elevation
182	13,093	12,450	68,070	33,283	
183	15,367	14,230	82,300	47,513	Spillway = 183.25
184	17,868	16,618	98,917	64,131	
185	20,426	19,147	118,064	83,278	Berm

Summary of Wet Pond Criteria	
WQ Volume Required (ft^3)	27,172
WQ Volume Provided (ft^3)	**34,787**
WQ Surface Elevation	179.00
CP Volume Required (ft^3)	12,614
CP Volume Provided (ft^3)	**20,834**
CP Surface Elevation	181.00
Length of Underdrain Bench Req'd	38
Invert of Underdrain	176.50
Length to Width Ratio	>3:1
Mean Depth	0.00
Embankment Elevation	185.00
Spillway Elevation	183.25
25 Year Surface Elevation (Plugged OCS)	183.39
100 Year Surface Elevation (Plugged OCS)	183.77

Freeboard (ft)
1.61
1.23

Orifice Sizing	
Discharge Coefficient	0.62
Orifice Diameter (inches)	2
Orifice Diameter (feet)	0.17
Orifice Area (ft^2)	0.022
Orifice Centerline Elevation	176.58

Orifice Eqn: $C*A*(2gH)^{\wedge 1/2}$

Q (cfs)	Stage Elevation	Total Drawdown at Stage (feet)	Pond Area (ft^2)	Drawdown Time (hrs)
0.2280	181.0	0.00	11,806	0.00
0.2524	182.0	1.00	13,093	14.41
0.2748	183.0	1.00	15,367	15.54
			Total Drawdown Time =	**29.94**

Required Sediment Storage			Provided Storage Volume		
Area to be Sanded	1.5	acres	Total # of CB's	18	
Sand Used per Storm	500	lbs/acre-storm	Sump Depth	2	ft
Weight of Sand	90	lbs/cf	CB Diameter	4	ft
# of Storms per Year	10	storms/year	CB Sediment Storage Volume	452.16	cf
Sediment Storage Required	**80.78**	**cf/year**	Forebay Volume	215	cf
			Total Volume	**667.16**	**cf**

Wet Pond Sizing Calculations

Water Quality Volume Sizing							
Subcatchment ID	Impervious Area (ft^2)	WQ Impervious Area Runoff Depth (inches)	WQ Impervious Volume Required (ft^3)	Landscaped Area (ft^2)	WQ Landscape Area Runoff Depth (inches)	WQ Landscape Volume Required (ft^3)	Total WQ Volume Required (ft^3)
4A	24,499	2.25	4,594	47,636	0.80	3,176	7,769
4B	1,760	2.25	330	537	0.80	36	366
4C	3,946	2.25	740	1,996	0.80	133	873
4D	2,104	2.25	395	662	0.80	44	439
4E	4,141	2.25	776	1,916	0.80	128	904
4F	2,715	2.25	509	790	0.80	53	562
4G	3,395	2.25	637	1,033	0.80	69	705
4H	4,784	2.25	897	2,412	0.80	161	1,058
4I	3,280	2.25	615	11,197	0.80	746	1,361
4J	4,812	2.25	902	2,281	0.80	152	1,054
4K	7,883	2.25	1,478	20,000	0.80	1,333	2,811
4L	4,135	2.25	775	2,132	0.80	142	917
4M	1,357	2.25	254	686	0.80	46	300
4N	5,342	2.25	1,002	1,663	0.80	111	1,112
4O	6,991	2.25	1,311	3,525	0.80	235	1,546
4P	5,000	2.25	938	43,656	0.80	2,910	3,848
4Q	3,953	2.25	741	2,038	0.80	136	877
4R	3,241	2.25	608	901	0.80	60	668
Total	**93,338**		**17,501**	**145,061**		**9,671**	**27,172**

Channel Protection Volume Sizing							
Subcatchment ID	Proposed Impervious Area (ft^2)	CP Impervious Area Runoff Depth (inches)	CP Impervious Volume Required (ft^3)	Proposed Landscaped Area (ft^2)	CP Landscape Area Runoff Depth (inches)	CP Landscape Volume Required (ft^3)	Total CP Volume Required (ft^3)
4A	24,499	1.00	2,042	47,636	0.40	1,588	3,629
4B	1,760	1.00	147	537	0.40	18	165
4C	3,946	1.00	329	1,996	0.40	67	395
4D	2,104	1.00	175	662	0.40	22	197
4E	4,141	1.00	345	1,916	0.40	64	409
4F	2,715	1.00	226	790	0.40	26	253
4G	3,395	1.00	283	1,033	0.40	34	317
4H	4,784	1.00	399	2,412	0.40	80	479
4I	3,280	1.00	273	11,197	0.40	373	647
4J	4,812	1.00	401	2,281	0.40	76	477
4K	7,883	1.00	657	20,000	0.40	667	1,324
4L	4,135	1.00	345	2,132	0.40	71	416
4M	1,357	1.00	113	686	0.40	23	136
4N	5,342	1.00	445	1,663	0.40	55	501
4O	6,991	1.00	583	3,525	0.40	118	700
4P	5,000	1.00	417	43,656	0.40	1,455	1,872
4Q	3,953	1.00	329	2,038	0.40	68	397
4R	3,241	1.00	270	901	0.40	30	300
Total	**93,338**		**7,778**	**145,061**		**4,835**	**12,614**

Total Water Quality Volume Required =	**27,172 ft^3**
Total Channel Protection Volume Required =	**12,614 ft^3**

Wet Pond Grate Sizing

Rim Elevation=	181	
Weir Perimeter (L)=	5.01	ft
Orifice Area (a)=	2.00	sf
# of Grates=	1	
g=	32.185	
C=	0.62	

Use Model # R-2560-E2

Weir Flow ($Q=3.27*L*H^{1.5}$)				
Stage Elevation	Notes	Head (ft)	Available Capacity (cfs)	Target Capacity (cfs)*
181.07	2 Year Elevation	0.07	0.30	0.22
182.60	10 Year Elevation	1.6	33.18	0.91
182.85	25 Year Elevation	1.85	41.25	4.35

Orifice Flow ($Q=C*a*(2gH)^{0.5}$)				
Stage Elevation	Notes	Head (ft)	Available Capacity (cfs)	Target Capacity (cfs)*
181.07	2 Year Elevation	0.07	2.63	0.22
182.6	10 Year Elevation	1.6	12.58	0.91
182.85	25 Year Elevation	1.85	13.53	4.35

*Note: Target Capacity is the Primary Outflow from the Hydrocad Model

Summary for Pond 1P: Plugged OCS

[82] Warning: Early inflow requires earlier time span

Inflow Area = 6.424 ac, 33.35% Impervious, Inflow Depth > 3.55" for 25-YEAR STORM event
Inflow = 19.94 cfs @ 12.14 hrs, Volume= 1.902 af
Outflow = 3.06 cfs @ 12.98 hrs, Volume= 0.709 af, Atten= 85%, Lag= 50.1 min
Secondary = 3.06 cfs @ 12.98 hrs, Volume= 0.709 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Starting Elev= 179.00' Surf.Area= 8,711 sf Storage= 34,787 cf
Peak Elev= 183.39' @ 12.98 hrs Surf.Area= 16,347 sf Storage= 88,513 cf (53,727 cf above start)
Flood Elev= 185.00' Surf.Area= 20,426 sf Storage= 118,064 cf (83,278 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 132.5 min (911.8 - 779.3)

Volume	Invert	Avail.Storage	Storage Description
#1	173.00'	118,064 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
173.00	3,214	0	0
174.00	3,989	3,602	3,602
175.00	4,820	4,405	8,006
176.00	5,708	5,264	13,270
177.00	6,653	6,181	19,451
178.00	7,654	7,154	26,604
179.00	8,711	8,183	34,787
180.00	10,575	9,643	44,430
181.00	11,806	11,191	55,620
182.00	13,093	12,450	68,070
183.00	15,367	14,230	82,300
184.00	17,868	16,618	98,917
185.00	20,426	19,147	118,064

Device	Routing	Invert	Outlet Devices
#1	Secondary	183.25'	**20.0' long x 20.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Secondary OutFlow Max=2.86 cfs @ 12.98 hrs HW=183.39' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 2.86 cfs @ 1.01 fps)

Summary for Pond 1P: Plugged OCS

[82] Warning: Early inflow requires earlier time span

Inflow Area = 6.424 ac, 33.35% Impervious, Inflow Depth > 5.57" for 100-YEAR STORM event
Inflow = 30.55 cfs @ 12.14 hrs, Volume= 2.980 af
Outflow = 20.44 cfs @ 12.38 hrs, Volume= 1.782 af, Atten= 33%, Lag= 14.2 min
Secondary = 20.44 cfs @ 12.38 hrs, Volume= 1.782 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Starting Elev= 179.00' Surf.Area= 8,711 sf Storage= 34,787 cf
Peak Elev= 183.77' @ 12.38 hrs Surf.Area= 17,298 sf Storage= 94,907 cf (60,121 cf above start)
Flood Elev= 185.00' Surf.Area= 20,426 sf Storage= 118,064 cf (83,278 cf above start)

Plug-Flow detention time= 258.6 min calculated for 0.983 af (33% of inflow)
Center-of-Mass det. time= 73.0 min (843.3 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1	173.00'	118,064 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
173.00	3,214	0	0
174.00	3,989	3,602	3,602
175.00	4,820	4,405	8,006
176.00	5,708	5,264	13,270
177.00	6,653	6,181	19,451
178.00	7,654	7,154	26,604
179.00	8,711	8,183	34,787
180.00	10,575	9,643	44,430
181.00	11,806	11,191	55,620
182.00	13,093	12,450	68,070
183.00	15,367	14,230	82,300
184.00	17,868	16,618	98,917
185.00	20,426	19,147	118,064

Device	Routing	Invert	Outlet Devices
#1	Secondary	183.25'	**20.0' long x 20.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Secondary OutFlow Max=20.22 cfs @ 12.38 hrs HW=183.77' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 20.22 cfs @ 1.95 fps)

Grassed Underdrained Soil Filter A Calculations

Subcatchment ID	Impervious Area (sf)	WQ Impervious Area Runoff Depth (inches)	WQ Impervious Volume Required (ft3)	Landscaped Area (sf)	WQ Landscape Area Runoff Depth (inches)	WQ Landscape Volume Required (ft^3)	Total WQ Volume Required (ft^3)
1D	0	1.25	0	5,699	0.40	190	190
1E	2,291	1.25	239	863	0.40	29	267
1F	2,526	1.25	263	1,954	0.40	65	328
Total	**4,817**		**502**	**8,516**		**284**	**786**

Summary of Underdrain Filter Sizing	
Total WQ Volume Required (ft^3)	786
WQ Volume Provided (ft^3)	**2,527**
Filter Surface Elevation	190.00
WQ Surface Elevation	191.50
Invert of Underdrain	187.67
5% of Tributary Impervious Area (sf)	241
2% of Tributary Landscaped (sf)	170
Filter Surface Area Required (sf)	411
Filter Surface Area Provided (sf)	**1,169**

Underdrain Filter Volume

Elevation	Surface Area (sf)	Average Stage Area (sf)	Stage Volume (sf)	Cumulative Volume (sf)
190	1,169			0
191	1,834	1,502	1,502	1,502
191.50	2,267	2,051	1,025	2,527
192	2,700	2,484	1,242	3,769
193	3,518	3,109	3,109	6,878
Water Quality Volume Provided (at Elevation 191.5) =				**2,527**

Orifice Sizing	
Discharge Coefficient	0.62
Orifice Size (inches)	0.75
Orifice Size (feet)	0.06
Orifice Area (sf)	0.003
Orifice Centerline Elevation	187.92

Orifice Eqn: $C*A*(2gH)^{\wedge 1/2}$

Q (cfs)	Stage Elevation	Total Drawdown at Stage	Pond Area	Drawdown Time (hrs)
0.0220	**190**	**0.00**	**1,169**	**0.00**
0.0268	**191**	**1.00**	**1,834**	**19.03**
0.0289	**191.5**	**0.50**	**2,267**	**10.91**
			Total Drawdown Time =	**29.94**

Required Sediment Storage		
Area to be Sanded	0.1	acres
Sand Used per Storm	500	lbs/acre-storm
Weight of Sand	90	lbs/cf
# of Storms per Year	10	storms/year
Sediment Storage Required	**6.14**	**cf/year**

Provided Storage Volume		
Total # of CB's	2	
Sump Depth	2	ft
CB Diameter	4	ft
CB Sediment Storage Volume	50.24	cf
Forebay Volume	57	cf
Total Volume	**107.24**	**cf**

Summary for Pond 1D: Soil Filter A

Inflow Area = 0.758 ac, 14.59% Impervious, Inflow Depth > 5.08" for 100-YEAR STORM event
Inflow = 3.45 cfs @ 12.19 hrs, Volume= 0.321 af
Outflow = 3.34 cfs @ 12.23 hrs, Volume= 0.249 af, Atten= 3%, Lag= 2.8 min
Primary = 0.03 cfs @ 12.23 hrs, Volume= 0.027 af
Secondary = 3.31 cfs @ 12.23 hrs, Volume= 0.222 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 192.00' @ 12.23 hrs Surf.Area= 2,698 sf Storage= 3,762 cf
Flood Elev= 193.00' Surf.Area= 3,518 sf Storage= 6,878 cf

Plug-Flow detention time= 90.2 min calculated for 0.248 af (77% of inflow)
Center-of-Mass det. time= 34.5 min (814.8 - 780.3)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	6,878 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	1,169	0	0
191.00	1,834	1,502	1,502
192.00	2,700	2,267	3,769
193.00	3,518	3,109	6,878

Device	Routing	Invert	Outlet Devices
#1	Primary	187.50'	**6.0" Round Culvert** L= 58.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.50' / 187.21' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	187.21'	**0.7" Vert. Orifice/Grate** C= 0.600
#3	Secondary	191.75'	**10.0' long x 15.0' 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) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.03 cfs @ 12.23 hrs HW=192.00' (Free Discharge)
↑ **1=Culvert** (Passes 0.03 cfs of 1.40 cfs potential flow)
↑ **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 10.21 fps)

Secondary OutFlow Max=3.28 cfs @ 12.23 hrs HW=192.00' (Free Discharge)
↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 3.28 cfs @ 1.33 fps)

Appendix F
Test Pit Information

Appendix G
Inspection and Maintenance Manual

EROSION AND SEDIMENTATION CONTROL INSPECTION AND MAINTENANCE PLAN

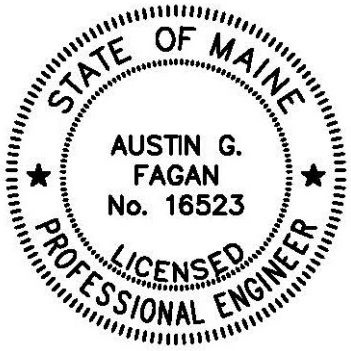
Guardian Estates Subdivision
Gorham, Maine

Submitted by:

Gary and Megan Jordan
& Donald Grant

Prepared by:

BH2M
Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors



Date:
February 2024

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1.0 INTRODUCTION

The intent of this plan is to establish inspection and maintenance procedures to be implemented for erosion and sediment control best management practices (BMP's) during construction, as well as for post-construction stormwater BMP's, for the Woodstone Subdivision Project. This plan has been prepared in conformance with the requirements set forth in 06-096 Chapter 500 – Stormwater Management, the Town of Raymond Post-Construction Stormwater Management Ordinance, and the Maine Construction General Permit.

1.1 PROJECT DESCRIPTION

Stephen and Hilda are proposing to construct a 5-lot residential subdivision known as Woodstone Subdivision (the project). The Project is proposed to occupy approximately 37.28 acres on a parcel located off Raymond Cape Road known as Tax Map 4 Block 30.

The scope of work includes but is not limited to:

- Tree clearing and grubbing
- Stump and boulder removal
- Construction of an 18' wide gravel road with 2' shoulders (22' overall)
- Installation of underground electric and communications conduit and transformer pads
- Installation of storm drain system including culverts
- Construction of two grassed underdrained soil filters

1.2 REQUIRED PERMITS

The following is a list of Municipal, State, and Federal permits that are required for the Project:

Municipal
Town Gorham Subdivision Permit

State of Maine
Stormwater Management Law Permit - Individual

Federal
Maine General Permit – Self Verification

1.3 REFERENCES

This plan has been developed in accordance with the following:

- Stormwater Management Law 38 M.R.S. §420-C and §420-D
  http://legislature.maine.gov/statutes/38/title38sec420-C.html
  http://legislature.maine.gov/statutes/38/title38sec420-D.html

- 06-096 Chapter 500 – Stormwater Management
  http://www.maine.gov/sos/cec/rules/06/096/096c500.docx

- General Permit – Construction Activity
  Maine Pollutant Discharge Elimination System (MPDES)
  https://www.maine.gov/dep/land/stormwater/construction.html

- Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual for Designers and Engineers
  https://www.maine.gov/dep/land/erosion/escbmps/esc_bmp_engineers.pdf

- Maine Erosion and Sediment Control Practices Field Guide for Contractors
  https://www.maine.gov/dep/land/erosion/escbmps/esc_bmp_field.pdf

- MaineDOT Best Management Practices for Erosion and Sedimentation Control
  https://www.maine.gov/mdot/env/documents/bmp/BMP2008full.pdf

1.4 RESPONSIBLE PARTIES

Preparer/Design Engineer:	Austin G Fagan, PE BH2M 380B Main Street Gorham, Me. 04038 (207) 839-2771
Developer/Applicant:	Gary and Megan Jordan & Donald Grant 33 Quincy Drive Gorham, Maine 04038
Site Contractor:	_____ _____ _____
Owner:	Gary and Megan Jordan & Donald Grant 33 Quincy Drive Gorham, Maine 04038
Post Construction Stormwater Inspector*:	Austin G Fagan, PE BH2M 380B Main Street Gorham, Me. 04038 (207) 839-2771
Stormwater Maintenance**:	
During Construction:	Gary and Megan Jordan & Donald Grant 33 Quincy Drive Gorham, Maine 04038
Post Construction:	_____ _____ _____

** During construction, the Developer/Applicant or their representatives will be responsible for implementing the erosion and sediment control BMP's as well routine inspections and maintenance of the BMP's.

Post-construction stormwater BMP inspection, maintenance, reporting, and required recertifications will be the responsibility of the Owner or their representatives until a Home Owners Association (HOA) is established. Once the Guardian Estates Subdivision Home Owners Association is established they will be responsible for Post Construction operations and maintenance.

1.5 INSPECTION AND MAINTENANCE – DURING CONSTRUCTION

Anyone who conducts or directs an activity that involves exposing, filling or displacing soil or other earthen materials should take appropriate measures to prevent erosion and the loss of sediment beyond the project site or into a sensitive resource. Erosion and sediment control measures should be in place before the activity begins and should remain functional until the site is permanently stabilized. All measures should remain effective until all areas are permanently stabilized. Any disturbed area should be regularly inspected until the site is fully stabilized with either 90% grass cover or a permanent impervious surface such as pavement. A person who has knowledge of erosion and sediment control measures and of stormwater management practices should inspect the site at a minimum once a week, and before and after a storm event. Any failing measure should be repaired or modified to adequately stabilize the site prior to the next storm event or no later than 7 calendar days. The inspection frequency table found in Appendix D shall be used as a guide for inspecting each specific BMP. The inspection form found in Appendix B shall be used to record the inspection, its outcome, and the required maintenance.

Refer to the Plans found in Appendix A for additional erosion and sediment control details and narratives.

General Inspection, Maintenance, and Documentation Requirements

1. Inspection and corrective action: Inspect disturbed and impervious areas, erosion control measures, and material storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. Inspect these areas at least once a week as well as before and within 24 hours after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections.

2. Maintenance: If BMP's 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 additional BMPs or significant repair of BMPs are necessary, implementation must be completed within 7 calendar days and prior to any storm event. All measures must be maintained in effective operating condition until areas are permanently stabilized.

3. Documentation: Maintain a binder with construction inspection forms summarizing the inspections and any corrective action taken. The forms must include the name and qualifications of the person making the inspections, the date of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Refer to Appendix B for the construction inspection form. Major observations must include BMP's that need maintenance, BMP's that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the inspection form what corrective action should be taken and when it was taken. The Owner shall retain a copy of the inspection forms for a period of at least five years from the completion of permanent stabilization.

   Site-Specific BMP's

   Refer to Appendix D for inspection and maintenance requirements and frequencies of site-specific BMP's. Refer to the Plans found in Appendix A for narratives and details of the site-specific BMP's. The following is a list of the site-specific BMP's that will require routine inspection and maintenance:

   - Sedimentation Barriers (Silt Fence or Erosions Control Mix Berm)
   - Stabilized Construction Entrance
   - Construction Limit Barrier Fence
   - Stone Check Dam
   - Temporary Sediment Trap
   - Pipe Inlet/Outlet Protection
   - Temporary Grass/Stone Lined Swale
   - Roadways and sidewalks
   - Snow storage areas
   - Catch basins and storm drain manholes
   - Storm drains and culverts
   - Wet pond
   - Grassed Underdrained Soil Filters

Winter Construction

Winter construction is any construction activity performed during the period from November 1 through April 15. If disturbed areas are not stabilized with permanent measures by November 1 or new soil disturbance occurs after November 1, but before April 15, then these areas must be protected and runoff from them must be controlled by additional measures and restrictions.

Site Stabilization: For winter stabilization, hay mulch is applied at twice the standard temporary stabilization rate. At the end of each construction day, areas that have been brought to final grade must be stabilized. Mulch may not be spread on top of snow.

1. Sediment Barriers: All areas within 75 feet of a protected natural resource must be protected with a double row of sediment barriers.

2. Ditches: All vegetated ditch lines that have not been stabilized by November 1, or will be worked during the winter construction period, must be stabilized with an appropriate stone lining backed by an appropriate gravel bed or geotextile unless specifically released from this standard by Maine DEP.

3. Slopes: Mulch netting must be used to anchor mulch on all slopes greater than 8% unless erosion control blankets or erosion control mix is being used on these slopes.

Refer to the Plans contained in Appendix A for additional winter construction erosion and sediment control requirements.

1.6 INSPECTION AND MAINTENANCE – POST-CONSTRUCTION

The long-term operation and maintenance of a stormwater management system is as critical to its performance as its design and construction. Proper operation and maintenance practices ensure that stormwater BMP's continue to improve water quality by removing pollutants effectively over the long-term and decreasing the risk of re-suspending sediment. Without proper maintenance, BMPs are likely to fail and will no longer provide treatment of stormwater. The following includes a summary of the inspection, maintenance, and documentation requirements for post-construction stormwater BMP's.

Refer to the Plans contained in Appendix A for details and locations of site-specific post-construction BMP's.

General Inspection, Maintenance, and Documentation Requirements

1. Inspection and maintenance: All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections. The following areas, facilities, and measures must be inspected and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site.

    a) Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after significant rainfall events (1 inch in 24-hour period) to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

    b) Inspect catch basins and drain manholes annually and clean out either when the sump is half full or when sediment is within one foot of the invert of the outlet pipe. Clean-out must include the removal and legal disposal of any accumulated sediments and debris at the bottom of the basin, at any inlet grates, at any inflow channels to the basin, and at any pipes between basins. If the basin outlet is designed to trap floatable materials, then remove the floating debris and any floating oils (using oil absorptive pads).

    c) Inspect ditches, swales and other open stormwater channels in the spring, in late fall, and after significant rainfall events (1 inch in 24-hour period) to remove any obstructions to flow, remove accumulated sediments and debris, to control vegetated growth that could obstruct flow, and to 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.

    d) Inspect culverts in the spring, in late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the culvert’s inlet and outlet.

e) Inspect at least once per year, each underdrained soil filter, including the filter embankments, vegetation, underdrain piping, and overflow spillway. Remove and dispose of accumulated sediments in the filter. If needed, rehabilitate any clogged surface linings, and flush underdrain piping.

f) Inspect at least once per year, each stormwater wet pond, including the pond's embankments, outlet structure, and emergency spillway. Remove and dispose of accumulated sediments in the pond. Control woody vegetation on the pond's embankments.

g) Inspect level spreaders in the spring, in late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, and outlet, and repair any erosion damage at the inlet and outlet.

2. Regular maintenance

a) Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder. If water bars or open-top culverts are used to divert runoff from road surfaces, clean-out any sediments within or at the outlet of these structures to restore their function.

3. Documentation: Maintain a binder of inspection forms summarizing inspection, maintenance, and any corrective actions taken. The inspection forms 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. Refer to Appendix C for inspection forms. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed of after removal. The log must be made accessible to Department staff and a copy provided to the Department upon request. The Owner shall retain a copy of the logs for a period of at least five years from the completion of permanent stabilization.

4. The site-specific post-construction BMP's for the Guardian Estates Subdivision include the following:

   - Underdrained Soil Filters
   - Wet pond
   - Vegetated swales
   - Roadways and sidewalks
   - Storm Drain System (including culverts, storm drains, catch basins, drain manholes, and vegetated and reinforced ditches/swales).
   - Snow storage areas
   - Rip rap inlet and outlet aprons
   - Sediment forebay

1.7 RECERTIFICATION OF STORMWATER MANAGEMENT SYSTEMS

All projects permitted under Stormwater Management Law since 2005 require reporting every 5 years. Certification must be sent to the Department of Environmental Protection within three months of the expiration of each five-year interval from the date of issuance of the permit stating that the stormwater management system has been inspected, maintained, and repaired (if needed). Refer to Condition # of the Stormwater Management Law Permit Order contained in Appendix F. The standard form for "Five-Year Recertification for Long-Term Maintenance of Stormwater Management Systems" is contained in Appendix E. The general inspection and maintenance requirements include but are not limited to the following:

1. 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.

2. 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.

3. 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.

   Note: 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.

1.8 SITE-SPECIFIC BMP MAINTENANCE AND ANNUAL REPORTING REQUIREMENTS

Below is a site-specific of list BMP's implemented for the Project as well as their ID, discharge location, and inspection and certification requirements.

Table 1 - Post-Construction BMP Designation Table

Post-Const. BMP ID	Type of Post-Const. BMP	Discharge Location	MS4 (YES/NO)	Inspection Frequency	Post-Const. Certification Requirement	Post-Const. Responsibility
BMP-A	Vegetated Areas	N/A	N/A	N/A	N/A	Home Owners Association
BMP-B	Vegetated Ditches	Wet Pond	No	Annual	Annual Certification	Home Owners Association
BMP-C	Roadway Culvert	Level Spreader	No	Annual	Annual Certification	Home Owners Association
BMP-D	Catch Basins	Wet Pond/ Soil Filter	No	Annual	Annual Certification	Home Owners Association
BMP-E	Drain Manholes	Wet Pond	No	Annual	Annual Certification	Home Owners Association
BMP-F	Stormdrain Pipes	Wet Pond/ Soil Filter	No	Annual	Annual Certification	Home Owners Association
BMP-G	Wet Pond	Level Spreader	No	Biannual	Annual Certification	Home Owners Association
BMP-H	Roadway & Parking	Stormdrain System	No	Biannual	Annual Certification	Home Owners Association
BMP-I	Soil Filter	Offsite Swale	No	Biannual	Annual Certification	Home Owners Association
BMP-J	Level Spreader	Onsite Low Point	No	Biannual	Annual Certification	Home Owners Association

1.9 HOUSEKEEPING

The following performance standards shall apply:

1. Spill prevention: Controls must be used to prevent pollutants from construction and waste materials stored 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.

NOTE: Any spill or release of toxic or hazardous substances must be reported to the Department. For oil spills, call 1-800-482-0777 which is available 24 hours a day. For spills of toxic or hazardous material, call 1-800-452-4664 which is available 24 hours a day. For more information, visit the Department's website at : http://www.maine.gov/dep/spills/emergspillresp/

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.

   See 06-096 Chapter 500 - Appendix D for license by rule standards for infiltration of stormwater.

NOTE: Lack of appropriate pollutant removal best management practices (BMPs) may result in violations of the groundwater quality standard established by 38 M.R.S.A. §465-C(1).

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, 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.

NOTE: Take care in sourcing water. Dewatering a stream without a permit from the Department may violate state water quality standards and the *Natural Resources Protection Act*.

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.

NOTE: To prevent these materials from becoming a source of pollutants, construction and post- construction activities related to a project may be required to comply with applicable provision of rules related to solid, universal, and hazardous waste, including, but not limited to, the Maine solid waste and hazardous waste management rules; Maine hazardous waste management rules; Maine oil conveyance and storage rules; and Maine pesticide requirements.

5. 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.

NOTE: Dewatering controls are discussed in the "Maine Erosion and Sediment Control BMPs, Maine Department of Environmental Protection."

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;
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;
k) Potable water sources including waterline flushings; and
l) Landscape irrigation.

7. Unauthorized non-stormwater discharges: The Department's approval under this Chapter does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with 06-096 Chapter 500 - Appendix C (6). Specifically, the Department'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.

8. Additional requirements: Additional requirements may be applied on a site-specific basis.

Appendix A
Plans

Appendix B
Construction Inspection Forms

CONSTRUCTION INSPECTION FORM FOR EROSION AND SEDIMENT CONTROL					
General Information:					
Site Name:	Date:		Inspected by:		
Owner:					
Retained 3PI:	Last Rain Date:			Amount:	
Reason for Inspection:	Weekly	Winter	Final	Rain Event	Complaint
Description of disturbed area:					
Photos:					

	YES/NO/NA	COMMENTS
1. Is an Erosion and Sediment Control Plan available?		
ESC plan on-site and followed		
Other:		
2. Are all erosion control practices installed properly, maintained and functioning?		
Disturbed areas stable		
Concentrated flow inlet/outlet protection		
All areas at final grade		
Disturbed dormant areas stabilized		
Access roads and parking		
Hillsides and stockpiles		
Other:		
3. Are all sedimentation control practices installed properly, maintained and functioning?		
Construction entrance		
Sedimentation basins/traps/diversions		
Perimeter controls		
Check dams		
Other:		
4. Is maintenance of ESC measures, construction activities and housekeeping kept-up?		
Sedimentation/erosion in ditches		
Tracked Sediment or dust at exits		
Hazardous material storage and spill control practices		
Waste management (concrete, hazardous material, etc.)		
Other:		
5. Violation, Corrective Actions, Recommendations		
Sediment discharged from site?		
Corrective action required?		
Site compliant with all permits?		
Notice of violation or stop work order issued?		
Comments/Corrective Actions (complete corrective actions before the next rain event and within 7 day)		

Appendix C
Post-Construction Inspection Forms

Guardian Estates Subdivision
Post-Construction Inspection Form (Ditches, Swales and Open Stormwater Channels)

Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Obstructions, sediment or debris noticeable in ditch line?		
Mowing required?		
Woody vegetation apparent in ditches?		
Side slopes stable? Signs of slumping?		
Rip rap stable? Underlying filter fabric visible?		

Additional Comments:

Guardian Estates Subdivision **Post-Construction Inspection Form (Vegetated Area)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
All slopes and embankments well vegetated? Signs of sparse growth?		
Rill erosion apparent in vegetated areas?		
Downs slope of level spreaders/ditch turnouts stable?		
Mowing of vegetated areas appropriate?		

Additional Comments:

Guardian Estates Subdivision
Post-Construction Inspection Form (Roadway and Parking Areas)

Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Winter sand accumulation apparent?		
Pavement Sweeping required?		
Gravel shoulders graded appropriately?		
Gravel road grading required?		
Low spots causing puddling?		

Additional Comments:

Guardian Estates Subdivision
Post-Construction Inspection Form (Storm Drain System including catch basins and culverts)

Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Accumulated debris or sediment at inlet, outlet, or within culvert/storm drain?		
Flow obstructions present?		
Erosion apparent at culvert inlet/outlet?		
Accumulated debris around catch basin grate?		
Accumulated debris in catch basin sump?		
Floating debris or oils found in catch basins?		

Additional Comments:

Guardian Estates Subdivision
Post-Construction Inspection Form (Buffers/Level Spreaders)

Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Erosion or concentrated flows evident?		
Downgradient of level spreaders stable?		
Level spreaders built along contour?		
Evidence of accumulated sediment in level spreader trough?		
Number of level spreaders adequate for flow distribution?		
Buffer monumentation visible?		
Evidence of buffer vegetation removal or frequent mowing?		
Temporary or permanent structures within the buffer?		
Evidence of motorized vehicles operating in buffer?		
Trash, debris, or waste within buffer area?		
Additional Comments:		

Guardian Estates Subdivision
Post-Construction Inspection Form (Underdrain Filter)

Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Debris apparent in basin bottom?		
Vegetation established in basin bottom?		
Basin draining within 72 hours?		
Inlet forebay rip rap stable and free of debris?		
Embankment and side slopes stable? Sloughs or unvegetated areas apparent?		
Outlet free of debris? Rip rap stable?		
Valve in operating condition?		
Outlet control structure operational free of debris?		
Orifice free of debris and operational?		

Additional Comments:

Guardian Estates Subdivision
Post-Construction Inspection Form (Wet Ponds & Detention Basins)

Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Embankment showing signs of settlement, slope erosion, piping, or slumping?		
Woody vegetation growing in embankment?		
Debris accumulated at trash racks?		
Outlet control structure operating as intended? Orifice clear of debris?		
Accumulated sediment in forebay?		
Emergency spillway stable? Dislodged rip rap?		
Internal outlet control structure free of debris?		
Dewatering drain/valve operational?		
Sediment accumulating in pond bottom? Dredging needed?		
Gravel trench outlet operational? Pond draining within 24 hours? Debris accumulated over gravel trench?		
Additional Comments:		

Appendix D

Inspection Frequency Checklist and Long-Term Inspection & Maintenance Plan

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before and After a Storm	After Construction
SEDIMENT BARRIERS			
Sediment barriers are installed prior to soil disturbances	X	X	
Silt fences are keyed in and tight	X	X	
Barriers are repaired and replaced as necessary	X	X	
Barriers are removed when the site is stabilized - Silt fence should be cut at the ground surface			X
TEMPORARY STABILIZATION			
Areas are stabilized if idle for 14 days or more	X	X	
Daily stabilization within 100 ft of a natural resource	X	X	
MULCH			
Seed and mulch within 7 days of final grading. Ground is not visible	X	X	
Erosion control mix is 4-6 inch thick	X	X	
Erosion control blankets or hay mulch are anchored	X	X	
VEGETATION			
Vegetation provides 90% soil cover	X		X
Loam or soil amendment were provided	X		X
New seeded areas are mulched and protected from vehicle, foot traffic and runoff	X	X	X
Areas that will remain unworked for more than 1 year are vegetated with grass	X		
SLOPES AND EMBANKMENTS			
Final graded slopes and embankments are stabilized	X	X	X
Diversions are provided for areas with rill erosion	X	X	X
Areas steeper than 2:1 are riprapped	X		
Stones are angular, durable and various in size	X		
Riprap is underlain with a gravel layer or filter fabric	X		
STORMWATER CHANNELS AND CULVERTS			
Ditches and swales are permanently stabilized–channels that will be riprapped have been over-excavated	X	X	X
Ditches are clear of obstructions, accumulated sediments or debris	X	X	X
Ditch lining/bottoms are free of erosion	X	X	X
Check dams are spaced correctly to slow flow velocity	X		
Underlying filter fabric or gravel is not visible	X	X	X
Culvert aprons and plunge pools are sized for expected flows volume and velocity	X		
Stones are angular, durable and various in size	X		
Culverts are sized to avoid upgradient flooding	X	X	
Culvert protection extends to the maximum flow elevation within the ditch	X	X	X
Culvert is embedded, not hanging	X	X	X

CATCH BASIN SYSTEMS			
Catch basins are built properly	X		
Accumulated sediments and debris are removed from sump, grate and collection area		X	X
Floating debris and floating oils are removed from trap			X
ROADWAYS AND PARKING SURFACES			
The gravel pad at the construction entrance is clear from sediments	X	X	
Roads are crowned		X	X
Cross drainage (culvert) is provided	X		
False ditches (from winter sand) are graded		X	X
BUFFERS			
Buffers are free of erosion or concentrated flows		X	X
The downgradient of spreaders and turnouts is stable		X	X
Level spreaders are on the contour			X
The number of spreaders and ditch turnouts is adequate for flow distribution		X	X
Any sediment accumulation is removed from within spreader or turnouts		X	X
STORMWATER BASINS AND TRAPS			
Embankments are free of settlement, slope erosion, internal piping, and downstream swamping		X	X
All flow control structure or orifices are operational and clear of debris or sediments		X	X
Any pre-treatment structure that collects sediment or hydrocarbons is clean or maintained		X	X
Vegetated filters and infiltration basins have adequate grass growth			X
Any impoundment or forebay is free of sediment		X	X
WINTER CONSTRUCTION (November 1st-April15th)			
Final graded areas are mulched daily at twice the normal rate with hay, and anchor (not on snow)	Daily		
A double row of sediment barrier is provided for all areas within 100 ft of a sensitive resource (use erosion control mix on frozen ground)	Daily		
Newly constructed ditches are riprapped	Daily		
Slopes greater than 8% are covered with an erosion control blanket or a 4-inch layer of erosion control mix	Daily		
HOUSEKEEPING PUNCH LIST			
All disturbed areas are permanently stabilized, and plantings are established (grass seeds have germinated with 90% vegetative cover)			X
All trash, sediments, debris or any solid waste have been removed from stormwater channels, catch basins, detention structures, discharge points, etc.			X
All ESC devices have been removed: (silt fence and posts, diversions and sediment structures, etc.)			X
All deliverables (certifications, survey information, as-built plans, reports, notice of termination (NOT), etc.) in accordance with all permit requirements have been submitted to town, Maine DEP, association, owner, etc.			X

INSPECTION AND MAINTENANCE PLAN FOR STORMWATER MANAGEMENT STRUCTURES (BMPS)

	INSPECTION SCHEDULE	CORRECTIVE ACTIONS
VEGETATED AREAS	Annually early spring and after heavy rains	Inspect all slopes and embankments and replant areas of bare soil or with sparse growth
		Armor rill erosion areas with riprap or divert the runoff to a stable area
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Mow vegetation as specified for the area
DITCHES, SWALES AND OPEN STORMWATER CHANNELS	Annually spring and late fall and after heavy rains	Remove obstructions, sediments or debris from ditches, swales and other open channels
		Repair any erosion of the ditch lining
		Mow vegetated ditches
		Remove woody vegetation growing through riprap
		Repair any slumping side slopes
		Repair riprap where underlying filter fabric or gravel is showing or if stones have dislodge
CULVERTS	Spring and late fall and after heavy rains	Remove accumulated sediments and debris at the inlet, outlet, or within the conduit
		Remove any obstruction to flow
		Repair any erosion damage at the culvert's inlet and outlet
CATCH BASINS	Annually in the spring	Remove sediments and debris from the bottom of the basin and inlet grates
		Remove floating debris and oils (using oil absorptive pads) from any trap
ROADWAYS AND PARKING AREAS	Annually in the spring or as needed	Clear and remove accumulated winter sand in parking lots and along roadways
		Sweep pavement to remove sediment
		Grade road shoulders and remove accumulated winter sand
		Grade gravel roads and gravel shoulders
		Clean out the sediment within water bars or open-top culverts
		Ensure that stormwater runoff is not impeded by false ditches of sediment in the shoulder
RESOURCE AND TREATMENT BUFFERS	Annually in the spring	Inspect buffers for evidence of erosion, concentrated flow, or encroachment by development
		Manage the buffer's vegetation with the requirements in any deed restrictions
		Repair any sign of erosion within a buffer
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Install more level spreaders, or ditch turn-outs if needed for a better distribution of flow
		Clean out any accumulation of sediment within the spreader bays or turnout pools
		Mow non-wooded buffers no shorter than six inches and less than three times per year
WETPONDS AND DETENTION BASINS	Annually in fall and after heavy rains	Inspect the embankments for settlement, slope erosion, piping, and slumping
		Mow the embankment to control woody vegetation
		Inspect the outlet structure for broken seals, obstructed orifices, and plugged trash racks
		Remove and dispose of sediments and debris within the control structure
		Repair any damage to trash racks or debris guards
		Replace any dislodged stone in riprap spillways
		Remove and dispose of accumulated sediments within the impoundment and forebay
FILTRATION AND INFILTRATION BASINS	Annually in the spring and late fall	Clean the basin of debris, sediment and hydrocarbons
		Provide for the removal and disposal of accumulated sediments within the basin
		Renew the basin media if it fails to drain within 72 hours after a one inch rainfall event
		Till, seed and mulch the basin if vegetation is sparse
		Repair riprap where underlying filter fabric or gravel is showing or where stones have dislodged
PROPRIETARY DEVICES	As specified by manufacturer	Contract with a third-party for inspection and maintenance
		Follow the manufacturer's plan for cleaning of devices
OTHER PRACTICES	As specified for devices	Contact the department for appropriate inspection and maintenance requirements for other drainage control and runoff treatment measures.

Appendix E

Five-Year Recertification for Long-Term Maintenance of Stormwater Management Systems

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Land Resources
17 State House Station
Augusta, Maine 04333

FIVE-YEAR RECERTIFICATION FOR LONG-TERM MAINTENANCE OF STORMWATER MANAGEMENT SYSTEMS

For Site Location & Stormwater Projects

This form complies with the condition that requires reporting every 5 years on the long-term maintenance of stormwater management structures of projects permitted under the Stormwater Management Law since 2005. Complete the following sections, include inspection photos, and use additional paper if needed. A copy of the report if the inspection was performed by a professional experienced in BMP maintenance should be included. Electronic copy of this form and information about the five-year recertication are available on the Maine DEP website at: http://www.maine.gov/dep/land/stormwater/stormwaterbmps/

Please type or print in black ink only

Owner/Licensee		**3rd Party Inspection Company** (if applicable)	
Name of Representative:		**Name of Inspector or preparer of report:**	
Company:		**Company:**	
Mailing Address:		**Mailing Address:**	
Daytime Phone #:		**Daytime Phone #:**	
E-mail Address:		**E-mail Address:**	

LOCATION OF DEVELOPMENT			
Name of Project:			
Address and Town:			
DEP Permit Number:		**Year of Permit:**	

PROJECT SPECIFICS	
If the project is unfinished, please describe its current status and your plans for the future. The filing of this report of on-site long-term maintenance activities is still required.	
If the project is within a MPDES Regulated Town, the maintenance report prepared for the town should be submitted with this form.	
If the project is a subdivision with a Homeowner's association, identify the responsible party.	
Confirm that the required recording of deed restrictions for the protection of buffers or conservation land has been done, and that the buffers are maintained according to the restrictions.	
Identify the contractor for the required renewal of a 5-year maintenance contract for the inspection, cleaning and maintenance of manufactured proprietary structures.	
Is a maintenance log available for review?	

Appendix F
Permit Orders

Appendix G
Stormwater Report Narrative

STORMWATER MANAGEMENT REPORT

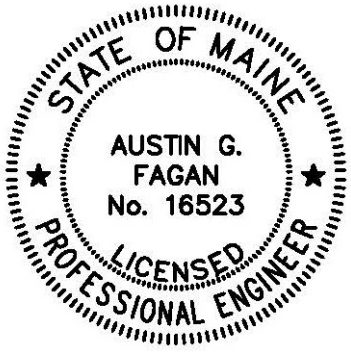
GUARDIAN ESTATES SUBDIVISION

Waterhouse Road
Gorham, Maine

Submitted by:

Gary and Megan Jordan
& Donald Grant

Prepared by:



BH2M
Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

Date:
February 2024

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LIST OF APPENDICES

1.0 INTRODUCTION

Gary and Megan Jordan & Donald Grant are proposing to construct a 14-lot residential subdivision known as Guardian Estates Subdivision (the project). The project is proposed to occupy approximately 29.52 acres on a parcel located off Waterman Road known as Tax Map 18, Lot 5-1. This project is required to obtain an Individual Stormwater Management Permit from the Maine DEP.

The scope of work includes but is not limited to:

- Tree clearing and grubbing
- Stump and boulder removal
- Construction of 2,600' of 22' wide paved roadway with a 5' sidewalk
- Installation of underground electric and communications conduit and transformer pads
- Installation of storm drain system including catch basins, stormdrain culverts, and vegetated swales.
- Construction of a wet pond
- Construction of a Grassed Underdrained Soil Filter

The proposed infrastructure improvements will create approximately 77,248 sf (1.77 acres) of new impervious area and 113,415 sf (2.60 acres) of newly vegetated area totaling 190,663 sf (4.38 acres) of newly developed area. To accurately size the proposed stormwater infrastructure and to assure that post development stormwater conditions will not impact the downstream properties, we have allocated 5,000 sf of impervious area and 30,000 sf of newly vegetated area on lots that are currently fully wooded with exception to lots 12, 13, & 14. Lot 12 has been allocated 10,000 sf of impervious and 60,000 sf of vegetated area. Lots 13 and 14 have been allocated 20,000 sf of impervious area. These allocations are not required to be counted towards the thresholds for Site Law permitting (3 acre of impervious and 20 acres of developed) because the applicant intends to sell the lots.

Lots 13 and 14 are intended to have density for up to 4 dwelling units each. No multi-family housing is being permitted or proposed on these lots at this time, so though we have made allocations for impervious area on each lot for stormwater quantity purposes, we are not considering these lots as multi family lots.

The Stormwater Management Plan has been prepared to satisfy the requirements of the Maine Department of Environmental Protections "Stormwater Management Rules" Chapters 500, 501 and 502, the most recent version of the "Maine Stormwater Best Management Practices Manual", and the Town of Gorham's Stormwater Ordinance.

1.1 OVERVIEW OF MODELING METHODOGY AND SOURCE INFORMATION

Hydrologic Analysis: The pre and post development conditions have been modeled using modeling software (Hydrocad Version 10) which is based upon the methodology contained within the USDA Soil Conservation Service Technical Release 55. Type III 24-hour storm distributions for Cumberland County were used for the analysis. The following return periods and 24-hour rainfall depths were used for the analysis:

Return Period	24-Hour Rainfall Depth
2-Year Storm	3.10 inches
10-Year Storm	4.60 inches
25-Year Storm	5.80 inches

Soils: The onsite soils used for the stormwater analysis were digitized from a high intensity soil survey that was completed by Mark Hampton Associates. The offsite soils used for the stormwater analysis were digitized from the Natural Resource Conservation Service (NRCS), web soil survey website. The source of the data is the Cumberland County Soil Survey (Class D). Refer to the following for additional documentation regarding the soils used for modelling:

- Appendix B of this Report
- Pre and Post Development Watershed Plans (Sheets A and B)

The onsite soils include:

Soil Map Unit	Unit Description	Hydrologic Soil Group
Brayton	Brayton fine sandy loam, 0-3% slopes	C
Colonel	Colonel stony sandy loam, 0-3% slopes	C
Dixfield	Dixfield stony sandy loam, 0-8% slopes	C
Lyman-Tunbridge Complex	Lyman-Tunbridge fine sandy loam, 3 to 8% slopes	C/D *

*Assumed D for wetland conditions

The offsite soils include:

Soil Map Unit	Unit Description	Hydrologic Soil Group
BgB	Nicholville very fine sandy loam, 0-8% slopes	C
DeB	Deerfield loamy fine sand, 3-8% slopes	A
HrB, HrC	Lyman-Tunbridge Complex, 0-15% slopes	D
PbB	Paxton fine sandy loam, 3 to 8% slopes	C
WmB	Windsor loamy sand, 0 to 8% slopes	A

Topography: LIDAR data from the Maine Office of GIS

Natural Resources: Wetland delineations performed by Mainely Soils

1.2 DESCRIPTION OF POINTS OF ANALYSIS

The watershed model analyzes the discharge of runoff at five Analysis Points as described below:

Analysis Point #1
Description: 15" driveway culvert at southeast corner of property land N/F Libby.
Pre Development Tributary Drainage Areas: 1.548 Acres
Post Development Tributary Drainage Areas: 1.863 Acres

Analysis Point #2
Description: Culmination of flow to northern property line land N/F Crosby.
Pre Development Tributary Drainage Areas: 18.187 Acres
Post Development Tributary Drainage Areas: 17.225 Acres

Analysis Point #3
Description: Culmination of flow to low point at western property line.
Pre Development Tributary Drainage Areas: 4.882 Acres
Post Development Tributary Drainage Areas: 3.829 Acres

Analysis Point #4
Description: Culmination of flow to ditch along Route 112 (Gorham bypass).
Pre Development Tributary Drainage Areas: 8.670 Acres
Post Development Tributary Drainage Areas: 12.627 Acres

Analysis Point #5
Description: Culmination of flow to southern property line land N/F Matthews.
Pre Development Tributary Drainage Areas: 8.462 Acres
Post Development Tributary Drainage Areas: 6.206 Acres

1.3 PRE DEVELOPMENT CONDITIONS

The Existing Conditions are shown on Sheet 2 and Sheet A of the accompanying plans. The parcel to be developed encompasses an area of approximately 29.52 acres and is located on Old Orchard Road in Gorham. The parcel is mostly wooded and lies within the Douglass Brook Watershed.

The watershed that was analyzed for this project is approximately 41.749 acres. The analysis points are described in Section 1.2 of this report. The watershed generally flows from east to west and is bounded by woodland to the north, residential land to the east and south, and the Gorham bypass to the west.

The Pre-Development Watershed Map is included as Sheet A of the accompanying plans and the Calculations are attached as Appendix C.

The Pre-Development Watershed Model predicts the following peak flow rates:

Pre-Development Peak Flows (cu. ft./sec)			
Analysis Point	**2-Year**	**10-Year**	**25-Year**
AP-1	1.29	2.75	4.02
AP-2	4.41	12.24	19.69
AP-3	2.47	5.63	8.45
AP-4	6.90	14.65	21.39
AP-5	4.40	10.29	15.61

1.4 POST DEVELOPMENT CONDITIONS

The proposed project will include construction of a 22’ wide paved roadway and 5’ sidewalk intended to support the development of 14 new lots. Below is a summary of the proposed developed areas associated with construction of the public infrastructure.

Proposed Impervious Area (Roadway)	=	77,248 sf
Proposed Landscaped Area	=	113,415 sf
Proposed Developed Area	=	190,663 sf

In order to accurately size all stormwater BMP's for post development stormwater modeling, allocations of impervious and landscaped area have been considered for each lot. These allocations consist of 5,000 sf of impervious area for lots 1-11, 10,000 sf for lot 12, and 20,000 sf for lots 13 and 14. Allocations of 30,000 sf of newly vegetated area for clearing have also been considered on wooded lots with the exception of lot 12 which has been allocated 60,000 sf.

Allocated Impervious Area (Lot Development)	=	105,000 sf
Allocated Landscaped Area	=	397,198 sf
Allocated Developed Area	=	502,198 sf

The project will include a Wet Pond and a Grassed Underdrained Soil Filter to provide treatment and attenuation of peak flows.

The Post Development Watershed Map is included as Sheet B of the accompanying plan set and the Calculations are attached as Appendix D.

The Post-Development Watershed Model predicts the following peak flow rates:

Post Development Peak Flows (cu. ft./sec)			
Analysis Point	**2-Year**	**10-Year**	**25-Year**
AP-1	1.10	2.16	3.79
AP-2	4.34	11.35	18.26
AP-3	2.43	5.15	7.52
AP-4	6.37	12.79	18.36
AP-5	3.37	7.90	11.98

1.5 BASIC STANDARDS

The proposed project is required to meet the Basic Standards for the Maine DEP. To meet the Basic Standards the project design must demonstrate that the erosion and sedimentation control, inspection and maintenance, and housekeeping standards specified in Appendices A, B, and C of 06-096 Chapter 500 (Maine DEP) are met, and that the grading or other construction activity will not impede or otherwise alter drainageways so as to have an unreasonable adverse impact on a wetland or waterbody, or an adjacent downslope parcel.

The proposed project will provide temporary (during construction) BMP's and post-construction BMP's. Refer to Sheets 7-9 of the project plans for erosion and sedimentation control narratives and details. The project requirements for inspection and maintenance during construction and post-construction are described in the Erosion and Sedimentation Control - Inspection and Maintenance Plan found in Appendix G of this Report. The housekeeping standards can also be found in the Inspection and Maintenance Plan.

1.6 GENERAL STANDARDS

The proposed project is required to meet the General Standards. To meet the general standards, the project design must demonstrate that the stormwater management system includes treatment measures that will provide pollutant removal or treatment and mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms and potential temperature impacts. This must be achieved by providing treatment of no less than 95% of the impervious area and no less than 80% of the developed area. For linear portions of projects, the treatment requirements can be reduced to no less than 75% of the impervious area and no less than 50% of the developed area (See 06-096 Chapter 500 4.C(5)(c)).

The stormwater management system includes a Wet Pond and a Grassed Underdrained Soil Filter. The proposed wet pond and soil filter have been designed in accordance with the design requirements outlined in the Maine Stormwater Best Management Practices Manual, Volume III, Chapters 4 and 7.1.

Below is a summary of the treatment areas associated with the proposed infrastructure. Refer to Appendix E for detailed calculations.

Stormwater Treatment Summary (Linear Project)	
Total Proposed (Linear) Impervious Area	77,248 sf
Total Proposed (Linear) Developed Area	113,415 sf
Total Treated (Linear) Impervious Area	69,935 sf
Total Treated (Linear) Developed Area	145,520 sf
Linear Impervious Area Treatment %	**90.53% (75% required)**
Linear Developed Area Treatment %	**76.32% (50% required)**

As shown in the Table above, the stormwater management system has been designed to meet the General Standard requirements. Detailed treatment calculations can be found in Appendix E.

Please note that a treatment credit for 1,780 sf of impervious area and 2,095 sf of grass (3,875 sf developed) has been considered for the proposed wetland crossing. Detailed treatment calculations can be found in Appendix E.

1.7 PHOSPHORUS STANDARD

The proposed project is located in the watershed of an unnamed stream tributary to Gully Brook. The proposed project is not located within the direct watershed of a lake or lake most-at-risk listed in 06-096 Chapter 502. The Phosphorus Standard does not apply to this project.

1.8 URBAN IMPAIRED STREAM STANDARD

The proposed project is located in the watershed of an unnamed stream tributary to Gully Brook. This stream and Gully Brook are not listed in 06-096 Chapter 502 as an Urban Impaired Stream. The Urban Impaired Stream Standard does not apply to this project.

1.9 FLOODING STANDARD

The proposed project is required to meet the Flooding Standards for the Town of Gorham. To meet the Flooding Standard, the project design must demonstrate that the stormwater management systems will accomplish the following:

a) The system must detain, retain, or result in the infiltration of stormwater from 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.
b) The design of piped or open channel systems must be based on a 25-year, 24-hour storm without overloading or flooding beyond channel limits.
c) The areas expected to be flooded by runoff from a 10-year or 25-year, 24-hour storm must be defined, and no buildings or other similar facilities may be planned within such areas.
d) Runoff from the project may not flood the primary access road to the project and any public roads bordering the project as a result of a 25-year, 24-hour storm.

The following table compares the Pre and Post Development peak flow rates for the 2-year, 10-year, and 25-year return periods. Refer to Appendix C for the Pre-Development model and Appendix D for Post Development model.

Peak Flow Comparison (cu. ft./sec)						
Analysis Point	2-Year		10-Year		25-Year	
	Pre	Post	Pre	Post	Pre	Post
AP-1	1.29	1.10	2.75	2.16	4.02	3.79
AP-2	4.41	4.34	12.24	11.35	19.69	18.26
AP-3	2.47	2.43	5.63	5.15	8.45	7.52
AP-4	6.90	6.37	14.65	12.79	21.39	18.36
AP-5	4.40	3.37	10.29	7.90	15.61	11.98

As illustrated in the table above, development of the proposed project will create a condition where the post development peak rates of runoff are decreased from the pre development peak rates of runoff for all storm events. No adverse impacts will be created to the downstream conditions as a result of this development.

1.10 CLOSURE

The proposed stormwater management facilities have been designed to mitigate stormwater impacts associated with development of the proposed project.