WRIGHT-PIERCE
Engineering a Better Environment

Water
Wastewater
Infrastructure

May 7, 2013
W-P Project No. 12600A

Ms. Anna Breinich
Director of Planning and Development
Department of Planning and Development
28 Federal Street
Brunswick, ME 04011

Subject: Final Site Plan Review Application
Village Green Maine, LLC - Anaerobic Digester - Brunswick Landing

Dear Ms. Breinich:

On behalf of Village Green Maine, LLC and Village Green Brunswick Landing, LLC we are pleased to submit the attached Final Site Plan Application for a proposed Anaerobic Digester Project proposed for Brunswick Landing. We submitted a Sketch Plan application for this project in March and since that time we have been pursuing the Maine DEP Site Location of Development Permit Amendment for the project. The project has had some minor changes since the sketch plan submission as a result of comments from the DEP and owner driven changes. This green energy project involves constructing an anaerobic digester which will convert organic waste into electricity.

The facility will be located at the southern end of the airport tarmac, as shown on the attached location map and is accessed via a driveway from Orion Street, adjacent to Building 553. The site is currently occupied by the tarmac, some paved drives and grassed areas. The structures at the proposed facility will be located just off the existing concrete apron and will utilize the apron for maneuvering area for delivery vehicles. The entire site is in the R-AR zoning district and as an Industry Class 1 use it is permitted in the zone. The site also falls within the airport height restriction zone and the buildings, tanks and equipment will be well below the height restriction. Neighboring land uses include the airport, and large tracts of undeveloped land as well as two nearby buildings one of which is occupied by a machine shop (Building 553) and the other is vacant (Building 153).

The site will consist of a 2,500 S.F. building to house equipment and worker space and a series of tanks and equipment pads to accommodate the anaerobic digestion and electricity generation processes. There will be a total of 7,372 S.F. of new buildings including structures and tanks and 11,310 S.F. of new pavement and concrete equipment pads for a total new impervious area of 18,682 S.F. A portion of the tarmac will be used for access and the entrance from Orion Street will be regraded and aligned to accommodate the proposed use.

The project does fall within the Mare Brook urban impaired stream watershed and will be subject to the Maine DEP stormwater standards for urban impaired stream watersheds. Runoff from the project will be treated for quality and quantity with the primary treatment occurring in an under drained soil filter and an existing infiltration basin as shown on the attached grading plans. Credits for the urban impaired stream impacts will be gained through the removal of a paved roadway and replacement with grass. The project has received approval of the stormwater portion of the DEP application, see attached Technical Review Memorandum from Art McGlauflin dated May 6, 2013.

99 Main Street
Topsham, ME 04086 USA
Phone 207.725.8721 | Fax 207.729.8414

The project will be connected to the utilities at the site including, water, sewer, electricity, telephone and natural gas. The attached site plans show the existing conditions, proposed site layout, grading and utilities for the project. Applications with the Maine Department of Environmental Protection (DEP) have been made for an amendment to the Site Location Permit and for a Solid Waste Processing Facility.

We have attached a medium intensity soils map indicating the appropriate soils at the site to support the development. The attached flood map of the vicinity of the site shows that the site is not within the mapped 100 year flood zone. We have attached a wetlands evaluation of the site which indicates that there are no wetlands on the development site. The attached aquifer map shows that the site is located on a mapped aquifer, the site does not fall within the Town's Aquifer Protection Zones. We have also included correspondence from three state agencies regarding historical and cultural resources and the rare, threatened or endangered habitats in the vicinity which indicate that the site does not impact known resources. We have included letters from both the Brunswick Sewer District and the Brunswick Topsham Water District regarding their respective capacity to serve the project.

We have prepared a separate list of the criteria in Section 411 to demonstrate that we meet the items required by the ordinance for final site plan review.

We are requesting the following waivers from the standards for this unique project.

1. Waiver from the Class A Soil Survey standard. We have provided a medium intensity soil survey and have a geotechnical evaluation of the soils on the site. The project will not have an on-site septic disposal system.
2. Waiver from the location of all trees over 10" in diameter. The site has only a few trees along the eastern most boundary and none of the trees on the site are to be removed by the project.
3. Waiver from the landscape plan. The airport manager has requested, out of concern for the safety of the airport operations, that only grass be used for the landscaping around the site because shrubs and trees will provide habitat for animals that could conflict with airport operations. The red pine trees within the eastern lease line will remain.

The final plan application fee will be delivered separately and is based upon the total area of new buildings, including tanks (7,372 S.F.).

We look forward to your review and to meeting with the Planning Board to discuss the project. If you have any questions, please let me know.

Very truly yours,

WRIGHT-PIERCE

Jan B. Wiegman, P.E.
Project Manager

JBW/
Enclosure

cc: David Weyburn – Village Green Maine, LLC

MAJOR DEVELOPMENT REVIEW
FINAL PLAN APPLICATION

1. Project Name: Anaerobic Digester

2. Project Applicant
   Name: Village Green Maine, LLC/Village Green Brunswick Landing, LLC
   Address: 1090 Pacific Street, Suite #3
   Brooklyn, NY 11238
   Phone Number: 512-588-3283

3. Authorized Representative
   Name: Wright-Pierce
   Address: 99 Main Street
   Topsham, ME 04086
   Phone Number: 207-725-8721

3. List of Design Consultants. Indicate the registration number, address and phone number Of any engineer, surveyor, architect, landscape architect or planner used:

   1. Wright-Pierce, Jan Weigman, P.E. #5852, 99 Main Street, Topsham, ME 04089, 207-725-8721
   2. Titcomb Associates, David Titcomb, 133 Gray Road, Falmouth, ME 04105, 207-797-9199
   3. Penobscot Environmental Consulting, Inc., Michael Thompson, 420 Belfast Rd, Camden, ME 04843, 207-236-6144

5. Physical location of property being affected: Orion Street

6. Lot Size: 3.47 AC

7. Zoning District: R-AR

8. Indicate the interest of the applicant in the property and abutting property. For example, is the applicant the owner of the property and abutting property? If not, who owns the property subject to this application? The Applicant has an agreement with MRRA to negotiate a lease for the property. Agreement attached.

9. Assessor's Tax Map N/A Lot Number N/A of subject property.

10. Brief description of proposed use: The proposed use as an anaerobic digester will process organic waste into methane gas to operate a 1 MW generator to produce renewable energy.

11. Describe specific physical improvements to be done: Construct a building and tanks for the anaerobic digestion process, construct concrete loading/unloading area, extend utilities, and stormwater improvements

Owner Signature: _____

Applicant Signature (*if different*): _____

Required Attachments (by Applicant):

- Sketch Plan Check List
- Sketch Plan Requirements for Open Space Developments (if applicable)
- Request for Waivers (if applicable)
- Required Copies of Sketch Plan

Required Attachment (by Planning and Development Department):

- Listing of all owners of property within 200-foot radius of property under review.

FINAL PLAN REQUIREMENTS

Key: "O" = omit; "S"=submit; "NA"=not applicable; "W" = waiver P=pending

Item	O	S	NA	W	P	**Comments**
Name of Development		X				
Scale, date, north point, area, number of lots (if subdivision)		X				
Boundaries of all lots and tracts with accurate distances and bearings, locations of all permanent monuments property identified as existing or proposed.		X				
Certification by a professional land surveyor that the land has been surveyed and the boundaries established in accordance with the State of Maine Board of Licensure for Professional Surveyors standards for Category 1 (Standard Boundary Survey), conditions 1, 2, or 3.		X				Certification subject to Plan Survey Notes
Existing zoning district and overlay designation.		X				
Names of engineer and surveyor; and professional registration numbers of those who prepared the plan.		X				
Names of current owner(s) of subject parcel and abutting parcels.		X				
Name, location, width of paving and rights-of-way, profile, cross-section dimensions, curve radii of existing and proposed streets; profiles of center-lines of proposed streets, at a horizontal scale of 1" equals 50' and vertical scale of 1 inch equals 5 feet, with all elevations referred to in U.S.G.S. datum.			X			
A general road plan noting circulation, direction, traffic control devices, street lighting and type of lighting proposed.		X				
Existing and proposed easements associated with the development.		X				
Kind, location, profile and cross-section of all proposed drainage facilities, both within the development and outside of it, and a storm-water management plan which includes the submission requirements listed in the storm-water management checklist available in the Planning Department.		X				
Location of features, natural and artificial, such as water bodies, wetlands, streams, vegetation, railroads, ditches and buildings.		X				

Location of existing and proposed utilities; water, sewer, electrical lines, and profiles of underground facilities. Tentative locations of any private wells.		X				
Existing and proposed location, size, profile and cross section of sanitary sewers; description, plan and location of other means of sewage disposal with evidence of soil suitability.		X				
Topography with counter intervals of not more than 2 feet.		X				
A Class A (high intensity) Soil Survey prepared in accordance with the standards of the Maine Association of Professional Soil Scientists.				X		Provide Medium Intensity Soil Survey
Location of all existing trees over 10 inches in diameter, locations of tree stands, and a plan showing all trees to removed as a result of the development proposal.				X		Waiver requested.
Lighting plan showing details of all proposed lighting and the location of that lighting in relation to the site.					X	Will submit upon receipt.
Existing locations and proposed locations, widths and profiles of sidewalks.			X			
Location map.		X				
Approximate locations and dimensions of proposed parking areas.		X				
Proposed ownership and approximate location and dimensions of open spaces for conservation and recreation.			X			
Grading, erosion control, and landscaping plan; proposed finished grades, slopes, swells, and ground cover or other means of stabilization.		X				
Reference to special conditions stipulated by the Planning Board, with conditions either set forth in full or on the plan or identified as specific documents filed with the Board.			X			
A wetlands map drawn by a specialist delineating wetland boundaries in accordance with the methods prescribed by the US Army Corps of Engineers.		X				No wetlands found. See wetlands report.
Dedicated public open specs, areas protected by conservation easements, and existing and proposed open spaces or recreation areas.			X			

For Open Space Development, a note indicating the total permitted lot count of the entire land tract based upon the destiny standards in this Ordinance, the number of lots created by the Plan, and the numebr of lots permitted to be subdivided in the future, as well as a table showing setback requirements and impervious surface coverage limits for each lot.			X			
Building envelops showing acceptable locations for principal and accessory structures.		X				

FINAL PLAN/SUPPORTING DOCCUMENTS

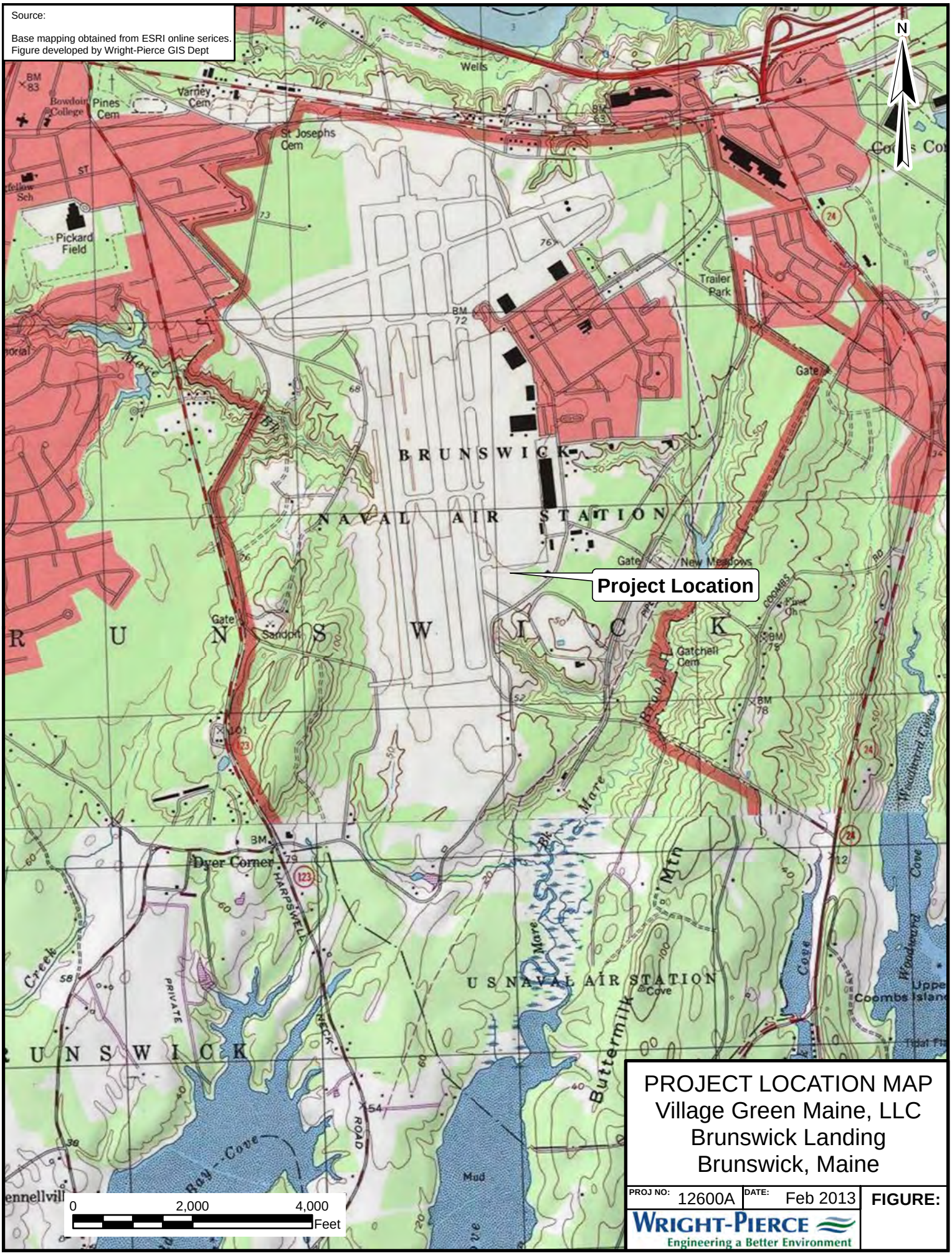
Key: "O" = omit; "S"=submit; "NA"=not applicable; "W" = waiver P=pending

Item	O	S	NA	W	P	**Comments**
Documentation of Ownership or contract.		X				
Drafts of legal documents appropriate to the application, including: deeds, easements, conservation easements, deed restrictions or covenants, home/property owners association declarations and by-laws, and such other agreements or documents as are necessary to show the manner in which conservation land will be owned, maintained, and protected.		X				
Draft performance guarantee or conditional agreement.			X			
Disclosure of any required permits from the Department of Environmental Protection, Marine Resources, US Army Corps of Engineers, Department of Inland Fisheries and Wildlife, or other agencies, as applicable; or, if a permit has already been granted, a copy of that permit.		X				DEP Site Location Amendment
Any additional studies required by the Planning Baord, which are deemed necessary in accordance with this Ordiancne.			X			
Storm water management program for the propsed project prepared by a professional engineer.		X				
A storm water management checklist prepared by the Cumebrland County Soil and Water Conservation District made availabel at the Brunswick Department of Planning and Development.			X			Not available

An erosion and sedimentation control checklist prepared by the Cumberland County Soil and Water Conservation District.		X				Erosion Control Plan included.
A statement from the Brunswick-Topsham Water District of conditions under which water will be provided.		X				
A statement from the Brunswick-Topsham Water District of its review and comments on the proposed use if the project involves development within the Aquifer Protection Zone.			X			
A Statement from the Fire Chief recommending the number, size, and location of hydrants, available pressure levels, road layout and street and project name, and any other fire protection measures to be taken.					X	
A statement from the Superintendent of the Brunswick Sewer District of the conditions under wich the Sewer Disticit wil provide sewerage disposal service and approval of the santiary sewers proposed within the development.		X				
Where a septic system is to be used, evidence of soil suitablity.			X			
All applicable materials necessary for the reviewing entity to review the propsoal in accordance with the Criteria of Section 411.		X				
A plan of all buildings with new construction or expansion of an existing facility, including type, size, and footprint, floor layout, setback, elevation of first floor slab, storage, and loading areas.		X				
An elevation view of all sides of each building proposed indicating height, color, bulk, surface treatment, and signage.		X				
A circulation plan describing all pedestrian and vehicle traffic flow on surrounding road systems.			X			
The size and proposed location of water supply and sewage disposal systems.		X				
A site landscaping plan indicating grade change, vegetation to be preserved, new plantings used to stabilize areas of cut and fill, screening, the size, location and purpose and type of vegetation.				X		Waiver requested.

Source:

Base mapping obtained from ESRI online serices.
Figure developed by Wright-Pierce GIS Dept



PROJECT LOCATION MAP
Village Green Maine, LLC
Brunswick Landing
Brunswick, Maine

PROJ NO: 12600A	DATE: Feb 2013	FIGURE:

WRIGHT-PIERCE
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W:\GIS_Development\Projects\ME\~OTHER\MRRA\12600A\Figures\ProjectLocation-8x11.mxd

May 7, 2013

W-P Project No. 12600A

Section 411 Standards
Final Site Plan Review Application
Village Green Maine, LLC - Anaerobic Digester - Brunswick Landing

411.1 Ordinance Provisions

A. The proposed site plan meets the Town's zoning requirements for use, density and dimensional requirements for the R-AR zoning District. The site dimension requirements are listed on a table on the site plans.

B. The proposed site plan meets the Town's requirements as listing in Chapter 3 of the Zoning Ordinance.

411.2 Preservation of Natural Features

The proposed site plan utilizes existing developed areas for the project footprint and does not disturb significant natural features at or near the site.

411.3 Surface Waters, Wetlands and Marine Resources

The site is not located adjacent to a water body as is indicated in the attached location map. A wetland study was conducted on the site and no wetlands were determined to exist on the site and the proposed development will have no wetland impacts. A copy of the wetlands report is included with the application. The stormwater from the developed portion of the site will be treated in accordance with the Maine DEP stormwater requirements for a site in an urban impaired stream watershed and the treatment will mitigate site impacts to the downstream water resources.

411.4 Flood Hazard

The site is not located within a 100 year flood hazard zone as depicted on the flood map included with this application.

411.5 Stormwater Management

The stormwater management plan for the site includes the quality and quantity treatment of the stormwater from the developed portion of the site in accordance with the Maine Stormwater Law. The plan also addresses the additional treatment or credits that must be achieved for developments within urban impaired watersheds. The additional treatment credits will be achieved by elimination of existing paved surfaces on and adjacent to the site. The storm water management plan is included with the application.

411.6 Groundwater

The project will not impact groundwater at the site. The site is situated over and existing sand and gravel aquifer. The activities on the site will include the handling of solid wastes which will be contained and processed in enclosed tanks and concrete vaults. Groundwater aquifer maps of the site and vicinity are included with the application.

99 Main Street
Topsham, ME 04086 USA
Phone 207.725.8721 | Fax 207.729.8414

411.7 Erosion Control

A written Erosion and Sedimentation Control plan for the site construction and long term operation has been developed as part of the Maine DEP Site Location Amendment Application and is included with the application. The plan includes steps to be followed during construction of the site as well as recommendations for the maintenance of the site as a part of the ongoing upkeep of the site.

411.8 Sewage Disposal

The site will be connected to the MRRA sewer system at Brunswick Landing. The sewage will be treated by the Brunswick Sewer District (BSD) and will consist of the liquid component of the end product of the anaerobic digestion process. A letter from the BSD indicating the ability to serve the project has been included with the application.

411.9 Water

The project will use a relatively small amount of water and will be served by the public water system infrastructure operated by MRRA and served by the Brunswick Topsham Water District (BTWD). A letter indicating the BTWD's ability to serve the project has been included with the application.

411.10 Aesthetic, Cultural and Natural Values

The proposed development will not impact historical and cultural resources as noted in the response to the letter written to the Maine Historical Preservation Commission regarding the project. The applicant has also written to and received responses from the Natural Areas Program at the Maine Department of Conservation, and the Maine Department of Inland Fisheries and Wildlife. The response from the Natural Area Program states:

> "*According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. Based on the information in our files and the landscape context of this project, there is a low probability that rare or significant botanical features occur at this project location.*"

The response from the IF&W states that Department records indicate no occurrences of rare, threatened, or endangered animal species within the project area. It goes on to state that the Department has not mapped any Essential or Significant Wildlife Habitats or Fisheries Habitats that would be directly impacted by the project. The letters are included with the application.

411.11 Community Impact

The project will not require significant community resources beyond fire and police protection. The roadways within the Brunswick Landing are operated and maintained by MRRA. The impact of the project on community resources will be minimal.

411.12 Traffic

The proposed project will generate approximately 9 to 12 trucks per day and will have two to three employees. The truck traffic will occur over the course of the daily operating hours of the facility and is expected to have a minor impact during the peak hour times. The projected traffic during the evening peak hour (counting trucks as 2 trips per vehicle) will be 10 to 11 peak hour trips. The proposed driveway entrance has sufficient sight distance to accommodate the movements. The site also has six parking spaces with one accessible space. Truck maneuvering for the loading and unloading of material has been accommodated and the lease area reflects sufficient space to allow for turning and backing maneuvers within the perimeter fence. A truck exhibit showing the truck maneuvering movements has been included with the application.

411.13 Pedestrian and Bicycle Access and Safety

The access to the site will be wide enough to accommodate bicycles and pedestrians within the available access corridor. The traffic will be very light to the site and pedestrian vehicle conflicts are not anticipated.

411.14 Development Patterns

The industrial use proposed at the site is compatible with the industrial uses adjacent to the site.

411.15 Architectural Compatibility

The proposed architecture of the building will be in keeping with the industrial appearance of the adjacent structures. The proposed building will have a split faced masonry block exterior with color bands for interest. The roof will be a sloped metal roof which is very similar to several of the adjacent buildings. The tanks will have painted metal sides with a black rubber roof. A floor plan and elevations of the proposed building have been included with the application.

411.16 Municipal Solid Waste

It is anticipated that the project will produce minimal operational solid waste. The applicant will contract with a solid waste hauler for the trash generated at the facility. The end product from the operation of the facility is addressed in the Section 409 and 419 permit applications that have been filed with the Maine DEP.

411.17 Recreational Needs

The project is not a residential project so this requirement is not applicable to the project.

411.18 Access for Person with Disabilities

The site and buildings will be accessible to the extent required. Accessible parking has been provided.

411.19 Financial Capacity and Maintenance

The project will be funded a number of sources including equity, grants and loans. The developer is applying for an Efficiency Maine grant and has been in discussions with Coastal Enterprises, Inc. (CEI) and other institutions regarding financing of the project. A letter from CEI regarding the ongoing discussion regarding the project financing has been included with the application.

411.20 Noise and Dust

The project has a relatively low noise profile. The project is located on the southerly end of the concrete tarmac of the airport facility, and the closest residential use is over 2,600 feet away. The facility will not generate dust during operation. Minimal dust generation is anticipated during construction and will be minimized as addressed in the Erosion and Sedimentation Control Plan, included with this application.

411.21 Finding of Right, Title and Interest

The project site is a portion of property owned by the Midcoast Regional Redevelopment Authority (MRRA), reference deed dated March 29, 2011, and recorded in Book 28607, Page 1, Cumberland County Registry of Deeds.

Included with this application is a copy of a General Land Lease Term Sheet between MRRA and Village Green Maine, LLC, dated June 28, 2012, covering the original site of the proposed project. The project site boundaries have been adjusted to accommodate recent modifications to the site plan. A revision to the June 28, 2012 Term Sheet to take into account the modifications will be submitted to the MRRA Board for approval at the Board's March 6, 2013 meeting.

Attached hereto is a copy of correspondence from Tom Brubaker of MRRA staff to David Weyburn of Village Green Maine, LLC (VGM), dated February 20, 2013, citing MRRA's continued support of the project and the recommendation of the MRRA staff that the MRRA Board issue a revised Term Sheet to secure VGM's interest in the larger parcel. Also included is a letter from MRRA granting permission to remove pavement for urban impaired stream credits outside the lease area and for permission to connect a storm drain to and existing stromdrain crossing the lease area.

A draft of the property description for the proposed lease area is also included with the application.

411.23 Additional Design Review Guidelines in the BNAS and Conservation Districts

The site is within the BNAS Reuse District and will require approval from MRRA's design review process. This process is still under development so the approval has not been granted. The developer is working with MRRA to receive the approval prior to the anticipated Planning Board date for this application.

411.24 Environmental Compliance in the BNAS Reuse and Conservation Districts

The site is within the BNAS Reuse District and ground disturbance activities at the site will require compliance with the Soil Management Plan. The applicant is aware of this requirement.

PENOBSCOT
ENVIRONMENTAL CONSULTING, INC.

February 11, 2013
Jan Wiegman, P.E.
Wright-Pierce
99 Main St
Topsham, ME 04086

Re: Village Green Maine, LLC, - Site Visit to Former BNAS Regarding Wetlands

Dear Jan,

I'm presenting a report of my findings regarding wetlands and other regulated natural resources at the proposed digester facility site on the former Brunswick Naval Air Station (BNAS). I visited the site during snow-free ground conditions on February 7, 2013, and found no evidence of wetlands or other regulated natural resources in the project area, as described during the site visit by you and as illustrated on the Site Layout Plan that you provided.

Project Area Description

The project is located at the southeast end of the runway, east of the runway, north of Orion Street, and south of the paved apron. BNAS was recently closed and turned over for reuse for civilian purposes as part of an extensive review process that resulted in the completion of a Final Environmental Impact Statement (FEIS) that contains a great deal of information relevant to the proposed project[1]. Among other things, the FEIS included wetland delineations, vernal pool surveys, rare plant inventories, breeding bird surveys, ecological community mapping, and soil mapping.

Soils in the proposed project area are primarily Udorthents-Adams Complex and Adams Loamy Fine Sands. The Udorthent designation speaks to the grading and urbanization that is associated with this portion of BNAS. In general, though, Adams soils are very deep, excessively and somewhat excessively drained soils formed in glacial-fluvial or glacio-lacustrine sand. They are found on outwash plains, deltas, lake plains, moraines, terraces, and eskers. Adams soils are not hydric and are only rarely associated with wetland conditions.

As part of your project, you had Polaris Consultants, LLC, conduct geotechnical investigations in November 2012 and one of their test borings (B103) is relevant to the potential for wetlands in the project area. Boring B103 was a shallow drilling to establish depth to the water table, which was found at a depth of

[1] See *Final Environmental Impact Statement for the Disposal and Reuse of Naval Air Station Brunswick, Maine - Volume 1: Main Report - November 2010.*

approximately 8.5' below the ground surface. Although the boring was done outside the growing season, the relatively deep depth to water table illustrates why this site is devoid of wetlands.

As part of the FEIS process, ecological communities in the proposed project area were described as "Maintained Land" (i.e., mowed areas adjacent to the runway) and the only other community type near the project area is a small stand of trees classified as "White Pine/Red Pine Plantation". No wetlands, streams, or vernal pools were identified in the project area as part of the FEIS process.

Field Survey Results

The site was visited on February 7, 2013, during a time with frozen ground conditions but no snow (see Photo 1).

Photo 1. Typical site conditions, February 7, 2013.

The entire site was evaluated over a period of several hours that included an inspection of surface soil conditions and searches for wetland indicator plants and potential vernal pools. The survey area included

areas well beyond 250' of any proposed development activity to ensure that no activities were being proposed in potential vernal pool buffers.

The proposed project area is a uniform grassland community that is maintained by regular mowing. Dominant plants included little bluestem (*Schizachyrium scoparium*) with lesser amounts of poverty oatgrass (*Danthonia spicata*), *Rubus* sp., and lichens. As previously mentioned, there is a small stand of white pine/red pine plantation adjacent to the project area. None of the project area included areas of hydrophytic vegetation or indicators of wetland hydrology. Surface inspection of the soil confirmed that the entire project area consists of uniform, previously graded, sandy soils.

Conclusions

Wetland delineation work outside of the plant growing season must normally be interpreted with caution. In this case, though, previous work by wetland scientists as part of the FEIS process revealed no wetlands or vernal pools in the project area. In addition, soils are dominated by excessively drained sands and associated plant communities are reflective of these dry conditions. Given the weight of evidence, therefore, it is my opinion that the project as proposed will not influence any wetlands, vernal pools, vernal pool buffers, streams, or other regulated natural resources.

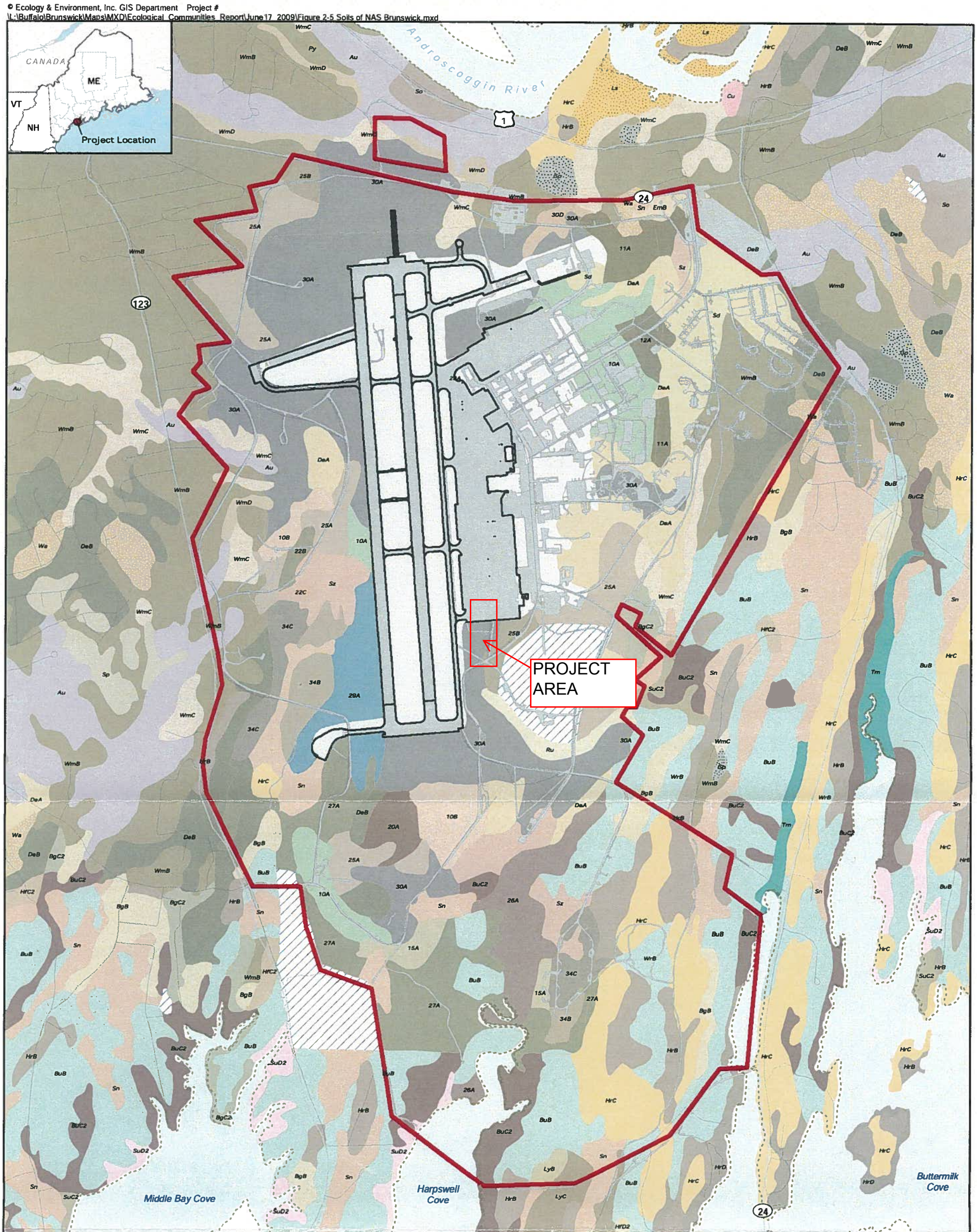
Please let me know if you have any questions regarding these conclusions.

Sincerely,

PENOBSCOT ENVIRONMENTAL CONSULTING, INC.

Michael Thompson, M.Sc., CWB, PWS
President

© Ecology & Environment, Inc. GIS Department Project #
L:\Buffalo\Brunswick\Maps\MXD\Ecological_Communities_Report\June17_2009\Figure 2-5 Soils of NAS Brunswick.mxd



Legend

Soil Type

///	No Value	25B	Adams loamy fine sand	BgC2	Belgrade very fine sandy loam	HrC	Hollis fine sandy loam	SuC2	Suffield silt loam
10A	Udorthents-Croghan complex	26A	Gouldsboro silt loam	BuB	Buxton silt loam	HrD	Hollis fine sandy loam	SuD2	Suffield silt loam
10B	Udorthents-Croghan complex	27A	Lamoine silt loam	BuC2	Buxton silt loam	*Ls	Limerick-Saco silt loams	Sz	Swanton fine sandy loam
11A	Haplaquents-Finch complex	28A	Urban land-Udorthents-Haplaquents assocociation	Cu	Cut and fill land	LyB	Lyman fine sandy loam	*Tm	Tidal marsh
12A	Haplaquents-Naumburg complex	29A	Haplaquents-Scantic complex	DeA	Deerfield loamy sand	LyC	Lyman fine sandy loam	*Wa	Walpole fine sandy loam
15A	Haplaquents-Lamoline complex	30A	Udorthents-Adams complex	DeB	Deerfield loamy sand	Py	Podunk fine sandy loam	WmB	Windsor loamy sand
*20A	Naumburg loamy fine sand	30D	Udorthents-Adams complex	EmB	Elmwood fine sandy loam	*Ru	Rumney fine sandy loam	WmC	Windsor loamy sand
22B	Adams-Lyman complex	34B	Tunbridge fine sandy loam	Gp	Gravel pits	*Sd	Saugatuck loamy sand	WmD	Windsor loamy sand
22C	Adams-Lyman complex	34C	Tunbridge fine sandy loam	HfC2	Hartland very fine sandy loam	*Sn	Scantic silt loam	WrB	Woodbridge fine sandy loam
25A	Adams loamy fine sand	Au	Au Gres loamy sand	HfD2	Hartland very fine sandy loam	*So	Scarboro sandy loam		
		BgB	Belgrade very fine sandy loam	HrB	Hollis fine sandy loam	*Sp	Sebago mucky peat		

*Note: * Indicates Hydric Soil Types*

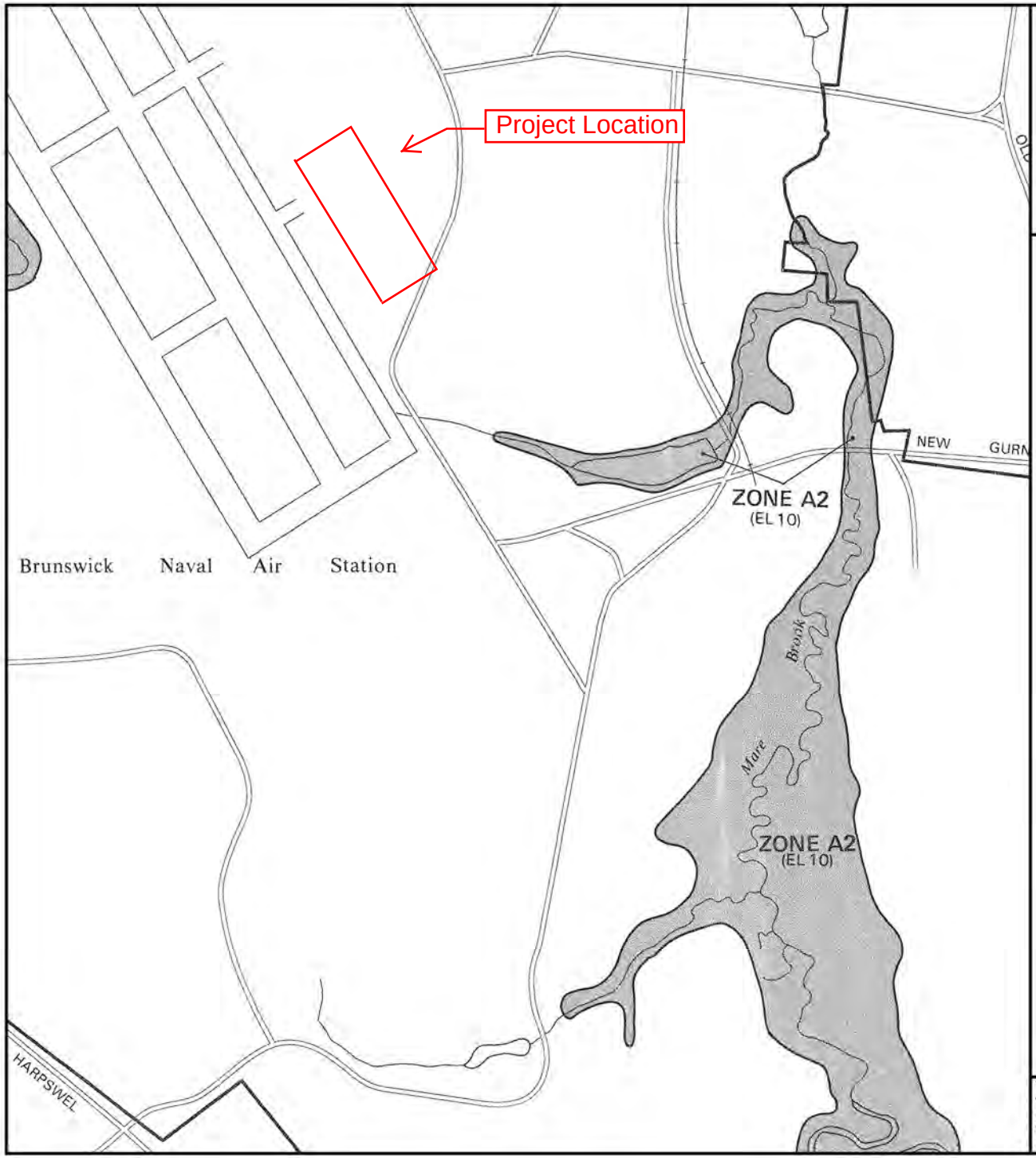
Source: Normandeau Associates, 1998.

NAS Brunswick Property Boundary

Figure 2-5
Soils of NAS Brunswick
Brunswick, Maine

N

0 0.125 0.25 0.5
Miles



APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
BRUNSWICK, MAINE
CUMBERLAND COUNTY

PANEL 15 OF 35
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230042 0015 B

EFFECTIVE DATE:
JANUARY 3, 1986

Federal Emergency Management Agency

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TECHNICAL REVIEW MEMORANDUM

Division of Land Resource Regulation

TO: Robert Green – Project Manager, Division of Land Resource Regulation

FROM: Art McGlauflin – Engineer, Division of Land Resource Regulation

DATE: May 6, 2013

SUBJECT: L-20116-26-Z-A, Village Green Maine - Anaerobic Energy, Brunswick

I have reviewed the additional information from Wright-Pierce for the stormwater management plan for Village Green Maine's Anaerobic Digester and Energy Production Facility at Brunswick Landing. The proposed plan now meets the state's standards for stormwater management. I have prepared a summary of the approved plan below. Please, call me if you have any questions about my review of this project.

Stormwater Management Summary

Applicant: Village Green Maine, L.L.C.
DEP#: L-20116-26-Z-A
Town: Brunswick
Engineer who prepared application: Jan Wiegman, Wright-Pierce
Parcel size: 3.47 acres
Site description: concrete tarmac, meadow, and access drive
Project description: anaerobic digester energy plant and street entrance modification
Size of impervious area: 0.43 acre
Size of developed area: 1.40 acres
Size of disturbed area: about 1.6 acres
Watershed: Mare Brook
Watershed type: urban-impaired stream
Applicable standards: basic, general, urban-impaired stream, and flooding

Village Green Maine proposes to develop an anaerobic digestion energy plant on a 3.47-acre lot within the Brunswick Landing site development. New development under this permit will include a 0.03-acre expansion of the entrance onto Orion Street; 0.23 acre of concrete and bituminous paved surfaces for the energy plant; 0.17 acre of tank and building roofs; and 0.97 acre of lawn and landscaped area. Together, these will add 0.43 acre of new impervious area and 1.40 acres of total developed area within the watershed of Mare Brook, an urban-impaired stream. This requires the project to meet the basic, general, urban-impaired stream, and flooding standards.

Basic Standard

Construction of the projects will disturb about 1.6 acres of the 3.47-acre site. The site is on a plain of well-drained sands with no protected natural resources nearby; thus, the erosion potential and

the risk of sediment impacts are very low. A simple erosion control plan utilizing the following measures will be used to prevent sediment discharges off the site to the Orion Street drainage system:

- sediment barriers will be installed on the downhill sides of the construction areas to prevent sediments from moving off the construction area,

- stone check dams will be installed in newly excavated ditch lines to reduce flow velocities and trap sediments, and

- disturbed soils will be stabilized with mulch (or permanent measures) within 30 days of the initial disturbance or within 15 days of completing the final grading for an area.

As the site's soils are predominantly fine sands, the timely stabilization of areas brought to final grade (particularly the ditches) will be the most effective means at preventing the erosion and transport of sand off the site.

▪ *Erosion and sediment control locations – plan sheet C-4 entitled "Site Grading & Erosion Control Plan", dated April 12, 2013*

▪ *Erosion control details and specifications – plan sheet C-7 entitled "Erosion Control Notes & Details", dated April 12, 2013*

<u>General Standard</u>

Construction of the anaerobic digestion energy facility will add 0.43 acre of impervious area and 1.40 acre of total developed area within the watershed of Mare Brook. This requires the project to meet the general standard for runoff pollutant removal, stream channel protection, and runoff cooling. Runoff from 95% of the new impervious area and 80% of the new developed area must be treated under this standard. To do this, Village Green Maine will undertake the following measures as part of the project's development:

1) construct and maintain a vegetated underdrained soil filter basin at the anaerobic energy facility site to treat runoff from 0.40 acre of new impervious area and 0.79 acre of landscaped area and

2) grade the site entrance and install a catch basin to direct runoff from 0.03 acre of the entrance's increased impervious area and 0.02 acre of entrance's new landscaped area to an existing infiltration basin adjacent Orion Street.

Together, these measures will treat 0.43 acre (100%) of the project's new impervious area and 1.24 acres (89%) of the project's new developed area. The treated runoff will be discharged via a 2-inch orifice and underground pipe to a 48-inch storm-drain running south off the Brunswick Landing project. This meets the general standard.

▪ *Vegetated underdrained soil filter basin location – plan sheet C-4 entitled "Site Grading & Erosion Control Plan", dated April 12, 2013*

- *Underdrained soil filter basin details and specifications – plan sheet C-9 entitled "Details", dated April 12, 2013*

- *Stormwater inspection and maintenance plan – "Inspection, Maintenance, and Housekeeping Plan Anaerobic Digester/Energy Production Facility"*

- *Contact for inspections and maintenance – David Weyburn, Managing Director, Village Green Maine, L.L.C., telephone: (512) 588-3283*

Urban-impaired Stream Standard

Runoff from the project drains to Mare Brook, an urban-impaired stream. This requires the project to include the elimination or treatment of runoff from existing sources within the brook's watershed. Under this standard, the project needs to provide 0.26 mitigation credits for development of 0.26 acre of non-roof impervious area, 0.17 acre of roof impervious area, and 0.97 acre of landscaped area. The project will provide 0.30 mitigation credits by eliminating 0.27 acre of existing roadway and 0.05 acre of existing parking areas and replacing them with lawn. 0.08 acre of the pavement removal will occur on an adjacent lot of the Brunswick Landing project. Village Green Maine has received permission from the Midcoast Regional Redevelopment Authority to remove this pavement as part of the anaerobic energy plant project. This meets the urban-impaired stream standard.

- *Location of pavement removals for the urban-impaired stream standard – plan sheet SW-1 entitled "Pre-development Drainage Plan", dated May 3, 2013*

Flooding Standard

Runoff from the project will flow to the road drainage system along the north side of Orion Street. Wright-Pierce has analyzed the drainage to the street and found that post-development runoff rates will be below predevelopment levels for the 10-year and 25-year storms. The analysis shows an increase in post-development flows to the street's drainage system for the 2-year storm. While this increase is large relative to predevelopment rates (350% more), it is very small in magnitude (0.07 cfs more). I recommend the increase be approved as insignificant (as allowed by section 4.E(2)(b) of the Chapter 500 rules).

- *Pre-development drainage plan – plan sheet SW-1 entitled "Pre-development Drainage Plan", dated May 3, 2013*

- *Post-development drainage plan – plan sheet SW-2 entitled "Post-development Drainage Plan", dated May 3, 2013*

SECTION 411.5

STORMWATER MANAGEMENT

Stormwater Management (Flooding and General Standards)

A. Narrative

The project site is part of the airport facility formerly of the Brunswick Naval Air Station (BNAS) now referred to as Brunswick Landing. Refer to "Section 1, Project Description" of this application for particulars on the project site. As stated in "Section 1", this application utilizes information from the Final Environmental Impact Statement (EIS) prepared for the BNAS closure issued in 2010 as supporting information.

Individual redevelopment projects at Brunswick Landing such as the project proposed herein are subject to review by the Maine Department of Environmental Protection (MDEP) as amendments to the existing Site Location of Development Permit and by the Town of Brunswick (Town) as provided for in the Town's Zoning Ordinance. As part of the application submissions, a site-specific Stormwater Management Plan has been developed for this project and is included in this Section.

B. Maps

1. The project boundaries are delineated on the attached Project Location Map which is compiled from the "Brunswick, ME" and "Orrs Island, ME" USGS 7½ minute quadrangle maps.

2. See "Section 411.3, Surface Waters, Wetlands and Marine Resources", of this application for a copy of a map entitled "Figure 2-5, Soils of NAS Brunswick, Brunswick, Maine", prepared by Ecology & Environment, Inc.

C. Drainage Plans

Reference is made to the attached Pre-Development and Post-Development Drainage Plans.

D. Runoff Analysis

A Runoff Analysis utilizing HydroCAD software was performed to evaluate and quantify the stormwater runoff characteristics of the site in both the pre-development and post-development conditions. The end product of the analysis is a summary of the peak discharges (in cubic feet per second) at the watershed Study Point for the Type III, 24-hour storms of the 2-year, 10-year and 25-year frequencies. The analysis also includes the calculations used to route stormwater through the a proposed Grassed Underdrained Soil Filter (USF).

Reference is made to the attached Stormwater Management Plan for the project and to Pre-Development and Post-Development Drainage Plans listed in “C. Drainage Plans”, above.

E. Flooding Standard Submissions

The provisions for managing the site stormwater runoff are presented in the attached Stormwater Management Plan.

F. General Standards Submissions

1. See the attached Stormwater Management Plan.
2. See the drainage plans referenced above in paragraph “C. Drainage Plans”.

G. Components of the Maintenance Plan

A detailed inspection and maintenance program and corresponding checklist has been prepared and attached to “Section 411.7, Erosion Control” of this application.

H. Maintenance by a Homeowner Association

Not Applicable.

I. Maintenance of Facilities by a Municipality or Quasi- Municipal District

Not Applicable.

J. General Inspection and Maintenance Requirements

A detailed inspection and maintenance program and corresponding checklist has been prepared and attached to “Section 411.7, Erosion Control” of this application.

SECTION 411.5A

STORMWATER MANAGEMENT PLAN

Anaerobic Digester/Energy Production Facility
Village Green Maine, LLC
Brunswick Landing
Brunswick, Maine

1.1 INTRODUCTION

This Stormwater Management Plan has been prepared to address the stormwater runoff impacts for both stormwater quantity and stormwater quality associated with the development of the anaerobic digester/energy production facility.

2.1 EXISTING CONDITIONS

The 151,333-square foot (3.47 acres) property proposed for development is situated on the southeasterly end of the concrete tarmac of the airport, easterly of the airport runways, and consists of:

- 43,236 square feet of existing concrete tarmac;
- 10,628 square feet of existing paved access road;

  53,864 square feet of impervious surfaces, and

- 91,113 square feet of grassland;
- 6,356 square feet of pine trees.

  97,469 square feet of pervious area

Currently, stormwater runoff from the portion of the site located on the existing concrete tarmac is directed to catch basins in the tarmac which are connected to a storm drain system that extends southerly via a 48-inch diameter concrete storm drain, passes under Orion Street and terminates at an existing stormwater control pond adjacent to Mare Brook. Runoff generated from the remainder of the site travels southerly via overland flow to a culvert located under Orion Street, thence by a shallow swale to an existing drainage course that runs southwesterly to Mare Brook.

According to Chapter 502, "Appendix B, Urban Impaired Streams", Mare Brook is an urban impaired stream, and therefore, the proposed project is required to meet the "Urban Impaired Stream Standard" of Chapter 500, "Section 4. Stormwater Standards". Reference is made to "Section 411.5B, Urban Impaired Stream Submissions" of this application.

2.1.1 Land Cover

See "2.1 Existing Conditions", above.

2.1.2 Site Topography

The topography of the portion of the site located on the concrete tarmac slopes (1.5%, more or less) to the north to the catch basins internal to the tarmac. The remainder of the site drains to the south towards Orion Street. A swale from the emergency outlet of a stormwater control pond located on a parcel to the east of the project site extends westerly parallel to the tarmac and then southerly parallel to the access road, and eventually dissipates into the adjacent wooded area. The topography of the site and adjacent areas is generally gently sloping, with a maximum elevation drop of approximately 8 feet over a distance of 650 feet from the tarmac to Orion Street.

2.1.3 Surface Water Features

There are no streams on or adjacent to the developed portion of the site. There is an existing infiltration basin located near the proposed access point with Orion Street. The site is not tributary to any lakes that are impaired or threatened by phosphorous.

2.1.4 Soils

As discussed in "Section 411.7, Erosion Control", of this application, the soils located at the project site can be classified as Hydrologic Soil Group "A".

3.1 PROPOSED CONDITIONS

Development of the project as proposed will involve keeping the tarmac in place and using it for maneuvering area and access drive for the site. The existing paved areas within the site south of the tarmac will be removed. The area south of the tarmac will be regraded and the proposed buildings, tanks and stormwater BMP located in this portion of the site. The 43,236 square foot portion of the existing tarmac included as part of the site is listed in the breakdown of impervious areas; however, as the tarmac will not be modified by the proposed development, its area has not been included in the stormwater quality or quantity control calculations for the project.

The proposed 151,333 square foot development site will consist of:

- 7,372 square feet of structures (buildings and processing tanks);
- 1,828 square feet of miscellaneous site surfaces (concrete equipment pads);
- 8,225 square feet of site pavement;
- 43,236 square feet of existing undisturbed tarmac

  60,661 square feet of impervious surfaces, and

- 84,316 square feet of grassland;
- 6,356 square feet of pine trees

  90,672 square feet of pervious surfaces.

The existing drainage characteristics of the portion of the site located southerly of the tarmac will be altered from the existing pattern as a majority of the runoff from the site will pass through a water quality treatment BMP prior to exiting the site. Treatment of the stormwater runoff will be achieved by directing runoff from the entire developed portion of the property into a new Grassed Underdrained Soil Filter (USF) and by directing the flow from the new paved area at the entrance to the existing infiltration basin.

The applicant proposes to meet the Urban Impaired Stream Standard by treating and/or reducing on-site and off-site pre-development impervious stormwater sources in accordance with "Section 6 A." of Chapter 500. See "Section 411.5, Stormwater Management", of this application.

3.1.1 Alteration to Land Cover

Several areas of pavement will be replaced with vegetation, the pavement width of the access road will be expanded into areas that are currently grass, and areas of grass will be converted to landscaped areas and/or impervious facility features.

3.1.2 Downstream Waterbodies

Surface runoff from the development is tributary to Mere Brook located approximately 2,800 feet southerly of the project site.

4.1 REGULATORY REQUIREMENTS

4.1.1 Town of Brunswick

The proposed project will require Development Review approval by the Town of Brunswick Planning Board. According to the Town of Brunswick Zoning Ordinance, "Subsection 411.5, Storm Water Management" of "Section 411, Review Standards", "…The proposed development shall satisfy the recommended storm water quality standards described in Storm Water Management for Maine: Best Management Practices, published by the State of Maine Department of Environmental Protection, November, 1995, as amended."

4.1.2 Maine Department of Environmental Protection (MDEP)

The MDEP Rules Chapter 500 describes stormwater management requirements for new development and redevelopment projects which involve modification to an existing Site Location of Development Permit (SLDP). These rules describe performance standards divided into five major categories: Basic Standards, General Standards, Phosphorous Standards, Urban Impaired Stream Standards and Flooding Standards.

A. Basic Standards: As a modification of an existing SLDP, the proposed project must meet the Basic Standards.

B. General Standards: As a modification of an existing SLDP, the proposed project must meet the General Standards.

C. Phosphorous Standards: A project is subject to the phosphorous standards when it is in the watershed of a lake most at risk as identified in Chapter 502. The project is not in the watershed of a lake that is identified as being Most at Risk in Chapter 502 and therefore the project is not subject to the Phosphorous Standards.

D. Urban Impaired Stream Standard: The proposed project is located in the direct watershed of Mare Brook, an urban impaired stream. As a modification of an existing SLDP, the proposed project must meet the Urban Impaired Stream Standard.

E. Flooding Standard: As a modification of an existing SLDP, the proposed project must meet the Flooding Standard.

4.2 WATER QUALITY TREATMENT

4.2.1 General Considerations

Stormwater quality treatment for the project will be provided by the proposed USF, the existing infiltration area and by eliminating paved surfaces and installing vegetated surfaces in its place. USF Number One (USF 1) and will be located adjacent to the proposed facility improvements at the southern end of the development area. The treated flows from USF 1 will be directed to a new drain manhole (DMH 1) to be located northerly of Orion Street. Flows from DMH1 will be piped under Orion Street and will outlet into an existing shallow grassed swale that leads southerly to an existing drainage course leading southwesterly to Mare Brook.

For the purposes of determining the extent of required post-development stormwater treatment, this project has been broken down into the following:

1. The Site Facility – for which the General Standards must be met; and

2. The Access Road – for which the General Standards must be met, but which is eligible for an exception from the General Standards as it is considered to be "…A linear portion of a project."

The location of the proposed USF, existing infiltration basin and proposed storm drain system are shown on the attached Project Plan Set. The details, design and specifications for the proposed USF is also shown on the attached Project Plan Set.

4.2.2 BMP Design Considerations

The USF was designed and sized in accordance with "Section 7.1.3 General Design Criteria", of MDEP Volume III. BMP Technical Design Manual:

1. Treatment Volume - A grassed underdrained soil filter (USF) must detain and filter a runoff volume equal to 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped developed area. The Linear Portion of a Project Exception provides for a reduction in the volume of runoff that needs to be treated;
2. Filter Area - The surface area of the filter must be no less than the sum of 5% of the impervious area and 2% of the landscaped area draining to the filter;
3. Basin Size - The size of a filter bed should never exceed 3,000 sq. ft. in basin bottom area; and
4. Peak Storage Depth Of The Channel Protection Volume - May not exceed 18 inches and should be designed to drain dry within 24 to 48 hours.

4.2.3 Required and Proposed Project Stormwater Runoff Treatment

1. As it applies to the Site Facility portion of the project, the General Standards require that the stormwater management system control runoff from no less than 95% of the impervious area and no less than 80% of the developed area that is impervious or landscaped;
2. As it applies to the project's Access Road, the applicable exception from the General Standards provides that for a linear portion of a project, runoff volume control may be

reduced to no less than 75% of the volume from the impervious area and no less than 50% of the developed area that is impervious or landscaped, or the runoff volume to each treatment measure may be reduced by 25%; and

3. The project must also meet the applicable Urban Impaired Stream Standards. See "Section 411.5, Stormwater Management" of this application.

The following **Table 1** shows the calculations used for sizing the USF, the comparison between the required and the provided filter area and the required and provided water quality treatment volumes of the USF.

Table #1 Stormwater Treatment Summary

Village Green Maine, LLC: Stormwater Treatment Summary

Note: Refer to Plans WS-1 & WS-2

Watershed	Watershed Area	New Pervious Dev. Area (SF)		New Imp. Dev. Area (SF)		Dev. Treatment Vol. Req. (CF) = Dev. Area x 0.4"	Imp. Treatment Vol. Req. (CF) = Imp. Area x 1"	Total Treatment Vol. Req. (CF)	Treatment Vol. Provided (CF)
		Total	Treated	Total	Treated				
105	51670	34,245	34,245	17,425	17,425	1,142	1,452	2,594	4,114
101	556652	9,010	0	0	0	0	0	0	0
110	9026	3,060	3,060	5,966	5,966	102	497	599	2,520
Totals	617348	46315	37,305	23,391	23,391				
TOTAL DEV. AREA SUBJECT TO TREATMENT					69,706			ACTUAL	REQUIRED
TOTAL PERVIOUS DEV AREA TREATED					37,305		TOTAL DEV AREA TREATED	87.1%	80%
TOTAL IMPERVIOUS DEV AREA TREATED					23,391		IMP AREA TREATED	100.0%	95%
NON TREATED PERVIOUS					9,010				
NON TREATED IMPERVIOUS					0				

As can be seen in **Table 1**, the proposed USF exceeds the minimums for required soil filter surface area and for water quality storage volumes. By incorporating the USF and the infiltration basin into the project's stormwater management system, the required standard of 80% treatment of the project's developed area is exceeded, by achieving 87.1% treatment. USF 1 and the existing infiltration basin treat 100% of the contributing watershed's impervious surfaces.

4.3 RUNOFF ANALYSIS

This section has been prepared to outline the proposed changes to the stormwater runoff peak flow rates as a result of the development.

4.3.1 Modeling Technique

The computer program HydroCAD, which is based on SCS TR-20 and TR-55 methodology, was used to analyze pre-development and post-development conditions. The 24-hour SCS Type III storm distribution for the 2, 10, 25 and 100-year storm frequencies were used for this analysis. The corresponding rainfall amounts for these storms are 3.0", 4.7", 5.5" and 6.7" respectively.

Reference is made to the HydroCAD calculation sheets for the pre-development and post-development conditions attached hereto.

Land use cover, watershed delineations, flow paths and hydrologic soils data were obtained using the following sources of information:

1. Existing topography from Navy records and on-the-ground surveys conducted by Titcomb Associates and Wright-Pierce personnel;
2. Aerial photography; and
3. The description of the soils as presented in “Section 411.7, Erosion Control”, of this application.

4.3.2 Study Points

There is one common study point (SP) identified for this project for both the pre-development conditions and the post-development conditions. The SP in the pre-development condition (SP Pre) is situated immediately downstream of the outlet of the existing 18-inch diameter culvert that extends under Orion Street opposite the project site. The SP in the post-development condition (SP Post) is located at the outlet of the proposed project storm drain system (from DMH 1) which is located just downstream of the outlet of the existing 18-inch diameter culvert (SP Pre) which, for all practical purposes, allows summing the flows from the culvert and the storm drain system for a comparison of pre-development and post-development runoff rates.

4.3.3 Pre-Development

The pre-development model represents the site in the current conditions. The study area Watershed was broken down into two subcatchments, 1Pre and 5Pre.

Runoff within Subcatchment 1Pre generally flows overland from the north and northeast in a southwesterly direction to an 18-inch diameter culvert (Culv 1) running westerly under an existing airport access road and then immediately into a second 18-inch diameter culvert (Culv 2) extending southerly under Orion Street to SP Pre.

Subcatchment 5Pre is located in the easterly portion of the site and runoff flows into the infiltration basin near the site entrance road.

Though not modeled as part of this analysis, runoff from Culv 2 enters a shallow, broad grassed swale that extends southerly to an existing well-defined drainage course that runs southwesterly to Mare Brook.

4.3.4 Post-Development

The post-development conditions depict the developed site including the facility improvements and the access improvements. Within the post-development model the Watershed is divided into three subcatchments, (101 through 105 and 110). Subcatchments 101 and 105 represent the division of Subcatchment 1Pre into the two post-development subcatchments. Subcatchment 5 is unchanged in extent by the development and is shown as Subcatchment 110Post in the post-development model.

Subcatchment 101 represents the central, relatively undisturbed portion of the watershed and runoff flows overland to Culv 102 (Culv 2 in the pre-development condition).

Subcatchment 105 includes the Site Facility off the south end of the tarmac. Runoff from 105 drains directly into USF1 (shown as Pond 106 in the diagram) for water quality and water

quantity treatment. Treated runoff from USF1 outlets through DMH 3 into DMH 2 and on to DMH 1.

Subcatchment 110 includes the easterly portion of the access road beyond the tarmac. Runoff from 110 drains directly into the existing infiltration basin for water quality and water quantity treatment.

4.3.5 Comparison of Peak Flow Rates

Table-3, below, summarizes the results of the stormwater runoff calculations at the Study Point for the 2, 10 and 25 year storm events for the project.

TABLE – 3
PRE-DEVELOPMENT VS POST-DEVELOPMENT
PEAK FLOW RATES SUMMARY TABLE

Study Point	**2-Year Storm**			**10-Year Storm**			**25-Year Storm**		
	Pre (cfs)	Post (cfs)	Diff. (cfs)	Pre (cfs)	Post (cfs)	Diff. (cfs)	Pre (cfs)	Post (cfs)	Diff. (cfs)
SP	0.02	0.09	+0.07	0.70	0.59	-0.11	1.58	1.44	-0.14

The discharge from the USF is controlled through the placement of a 1.5” orifice on the underdrain pipe leading from the filter basin to the outlet control structure. Even with the small orifice, the 2 year storm event in the post development condition results in a minor increase in peak flow at the study point. Further decreasing the orifice size to limit the flow would result in a higher potential for the clogging of the line and the system not functioning as intended. We request that the minor increase in the post development two year event flow be waived from meeting the flooding standard.

There is a minor increase in the runoff to the infiltration basin as a result of the increased impervious area at the entrance. The infiltration basin appears to be able to accommodate this flow and infiltrate it without causing overflow of the basin.

4.4 Spillway Sizing

The spillway for the USF has been designed to accommodate the 25 year storm event with the underdrain outlet clogged and only the spillway functioning. Under this scenario the peak elevation of the water surface in the impoundment reaches elevation 52.52 and the impoundment berm elevation is 54.0, leaving more than 1 foot of freeboard under the emergency condition. The spillway Hydrocad model is included in this section.

5.1 CONCLUSIONS

By incorporating the proposed BMPs presented in this report, and by reducing the amount of existing impervious surfaces, runoff from the proposed facility will receive treatment/control that meets the applicable Basic, General and Flooding Standards of Chapter 500, Stormwater Management, subject to the provisions of "Section 4.2.3. Required and Proposed Project Stormwater Runoff Treatment" of this Plan.

5.2 MAINTENANCE & PROTECTION OF STORMWATER SYSTEM

Long-term responsibilities for maintenance and protection of the project's stormwater drainage system, stormwater treatment systems, the road, paved areas and permanent erosion control measures will be assumed by the applicant. A Maintenance Plan has been developed for the project and the components of the plan are detailed in "Section 411.7, Erosion Control" of this application.

SECTION 411.5B

URBAN IMPAIRED STREAM SUBMISSIONS

Urban Impaired Stream Submissions

The project is located within the Mare Brook/Harpswell Cove Watershed. According to "Appendix B, Urban Impaired Streams", of Chapter 502, Mare Brook is an urban impaired stream and the proposed project is subject to subsection "D. Urban Impaired Stream Standard" of "Section 4. Stormwater Standards" in Chapter 500, Stormwater Management.

The applicant proposes to meet the urban impaired stream standard in part by obtaining "credits" for treating and/or reducing on-site pre-development impervious stormwater sources in accordance with "Section 6 A." of Chapter 500.

The existing site and the immediate area to the west of the site currently contains "non-roof" impervious surfaces consisting of a paved access road from Orion Street northerly to the airport tarmac (Rd 1), a paved access road extending from the north side of Orion Street in a northwesterly direction to one of the airport taxi-ways (Rd 2), and a paved driveway extending from the westerly side of the access road Rd 1 in westerly then northerly directions to a corner of the airport tarmac (Rd 3).

The northerly portion (0.11 acres) of existing Rd 1 will be removed as part of the development of the project facility. Approximately 0.08 acres of the northerly portion of Rd 1 will be within the actual developed portion of the site, will be replaced with grass and runoff from this area will receive treatment from the proposed Vegetated Underdrained Soil Filter (USF). The pavement of the remaining 0.03 acres of the access road will be removed and the area will be converted to meadow-type grasses similar to the surrounding area. This portion of the road will not receive any further water quality treatment.

The pavement of the easterly portion of Rd 3 (0.13 acres) will be removed as part of the construction of the facility and the area it formerly occupied will become part of the grassed or pervious area of the developed facility. Runoff from a 0.10-acre portion of this area will receive treatment by the USF, while the remaining 0.03 acres will be converted to meadow-type grasses.

The existing access road Rd 2 will remain as it is not within the site and provides needed access to the airport taxiway.

As set forth in "Section 6 A.", the total number of mitigation credits a project is required to obtain is determined by multiplying the number of developed project-acres of non-roof impervious area, roof impervious area and landscaped area by pre-determined required mitigation credit per-acre values for each category and then summing the total required credits. The required mitigation credits per acre for each of the three surface types were obtained from the table given in "Section 6 A(1)" of Chapter 500.

To determine the amount of credits earned for proposed mitigation activities, the values given in the table found in "Section 6 A(2)" of Chapter 500 were used. Attached to this Section is a spreadsheet entitled "Village Green Maine, LLC, URBAN IMPAIRED STREAM MITIGATION CREDIT CALCULATIONS" that determines and summarizes the mitigation credits the project requires and the mitigation credits the project earns. The spreadsheet shows that, by treating and/or removing existing impervious areas, the project achieves (**0.24 credits**) and exceeds the required level (**0.12 credits**) of mitigation.

Village Green Maine, LLC
Revised 5/3/2013
URBAN IMPAIRED STREAM MITIGATION CREDIT CALCULATIONS

EXISTING SITE -Areas to be Eliminated		
Non-roof imp.-Roads	sf	acre
Access Road South	4949	0.11
Access Road West	3560	0.08
Access Road West Off Site	3270	0.08
total	**11779**	**0.27**
Non-roof imp.-Parking		
low use parking lot	2146	0.05
total	**2146**	**0.05**
Roof Imp		
total	0	0
Landscaped		
total	0	0

Type of surface with or without required treatment	**Required compen-sation fee per acre**	**Required mitigation credit per acre**
non-roof impervious area	5000	0.5
roof	2000	0.2
landscaped area	1000	0.1

Mitigation activity	**Source type**	**Credit earned** (per acre mitigated)
Eliminate imperv. source area, replace with lawn	road	1
Eliminate imperv. source area, replace with lawn	low use parking lot	0.5

PROPOSED SITE - TREATED		
Non-roof imp.	sf	acre
entrance drive pvt	2191	0.05
Entrance Pvt Removal	(934)	(0.02)
site pavement	1301	0.03
site pads etc	1828	0.04
site conc pad	6924	0.16
total non-roof	**11310**	**0.26**
Roof Imp.		
tanks	4572	0.10
building	2800	0.06
total roof	**7372**	**0.17**
Landscaped		
landscaped	34245	0.79
total landscaped	**34245**	**0.79**

PROPOSED SITE

Type of surface with or without required treatment	**Area** (acres)	**Required mitigation credit per acre**	**Required mitigation credit**
non-roof impervious area	0.26	0.5	0.13
roof	0.17	0.2	0.03
landscaped	0.97	0.1	0.10
		Total credits required	**0.26**

Proposed mitigation activity	**Source Type**	**Credit earned per acre mitigated**	**Acres Mitigated**	**Mitigation credit earned**
Eliminate Impervious source area, replace with lawn	Road	1.00	0.27	0.27
Eliminate Impervious source area, replace with lawn	Low use parking lot	0.50	0.05	0.02
		Total acres	**0.27**	
		Total credits earned		**0.30**

PROPOSED SITE - UNTREATED		
Non-roof imp.		
	0	**0.00**
Landscaped		
USF berm	7855	0.18
meadow at former rds	0	0.00
total landscaped	7855	**0.18**
TOTAL IMPERVIOUS	18682	**0.43**
TOTAL LANDSCAPED	42100	**0.97**

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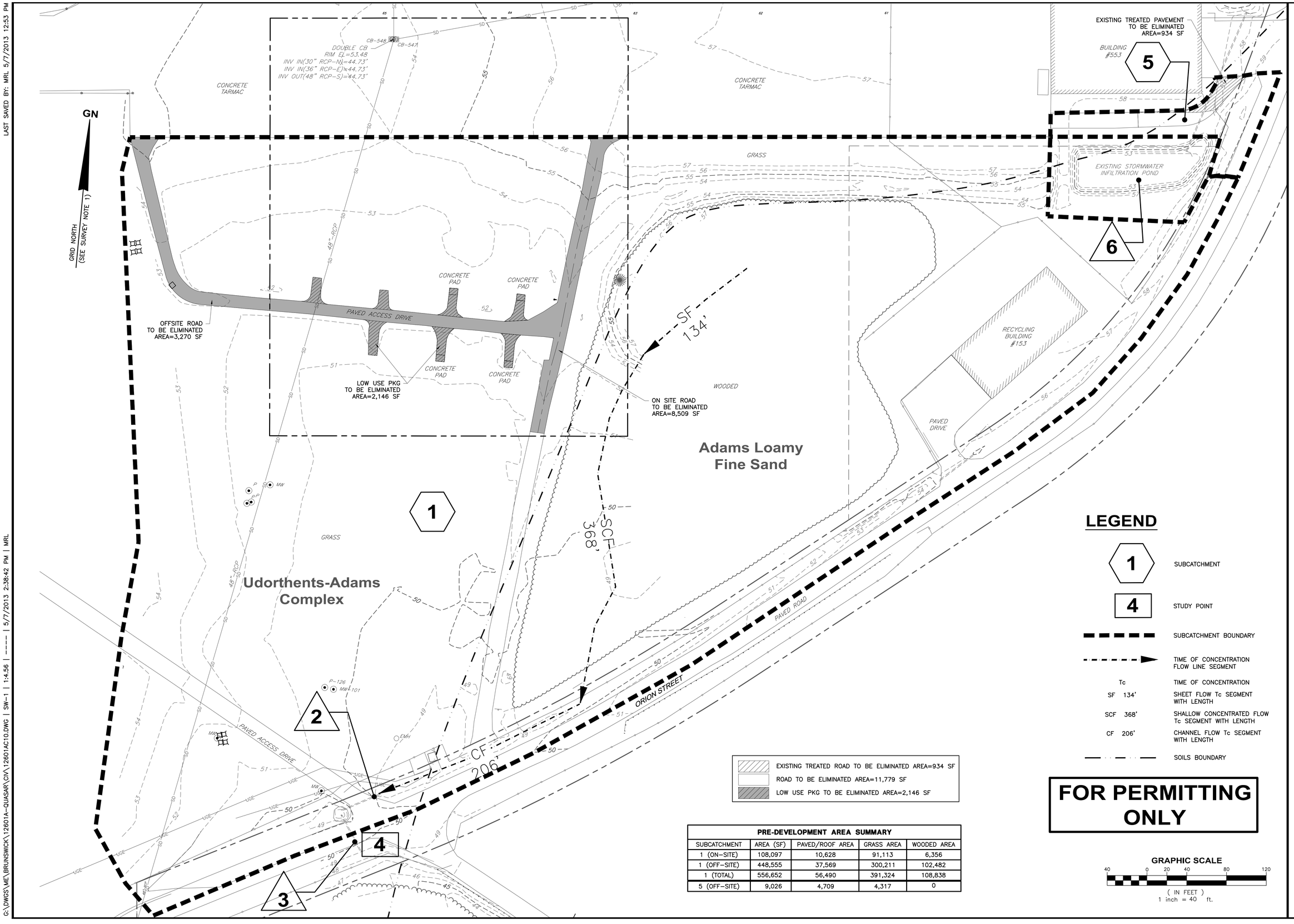

LEGEND

1	SUBCATCHMENT
4	STUDY POINT
	SUBCATCHMENT BOUNDARY
	TIME OF CONCENTRATION FLOW LINE SEGMENT
Tc	TIME OF CONCENTRATION
SF 134'	SHEET FLOW Tc SEGMENT WITH LENGTH
SCF 368'	SHALLOW CONCENTRATED FLOW Tc SEGMENT WITH LENGTH
CF 206'	CHANNEL FLOW Tc SEGMENT WITH LENGTH
	SOILS BOUNDARY

EXISTING TREATED ROAD TO BE ELIMINATED AREA=934 SF

ROAD TO BE ELIMINATED AREA=11,779 SF

LOW USE PKG TO BE ELIMINATED AREA=2,146 SF

PRE-DEVELOPMENT AREA SUMMARY

SUBCATCHMENT	AREA (SF)	PAVED/ROOF AREA	GRASS AREA	WOODED AREA
1 (ON-SITE)	108,097	10,628	91,113	6,356
1 (OFF-SITE)	448,555	37,569	300,211	102,482
1 (TOTAL)	556,652	56,490	391,324	108,838
5 (OFF-SITE)	9,026	4,709	4,317	0

FOR PERMITTING ONLY

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1	ISSUED FOR PERMITTING	JBW	4/13
2	REVISIONS PER DEP COMMENTS	JBW	5/13
3	SITE PLAN APPROVAL	JBW	5/13

DESIGNED BY: JCE
CAD COORD: MRL
CAD: MRL
CHECKED BY: JCE
DATE: 5-7-13
APPROVED BY: JCE
DATE: 5-7-13
PROJECT NO: 12601A

STATE OF MAINE
JAN B. S. WIEGMAN
No. 5552
PROFESSIONAL ENGINEER
5/6/13

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VILLAGE GREEN MAINE LLC
DIGESTER/GENERATION
BRUNSWICK, ME

PRE-DEVELOPMENT DRAINAGE PLAN

DRAWING
SW-1

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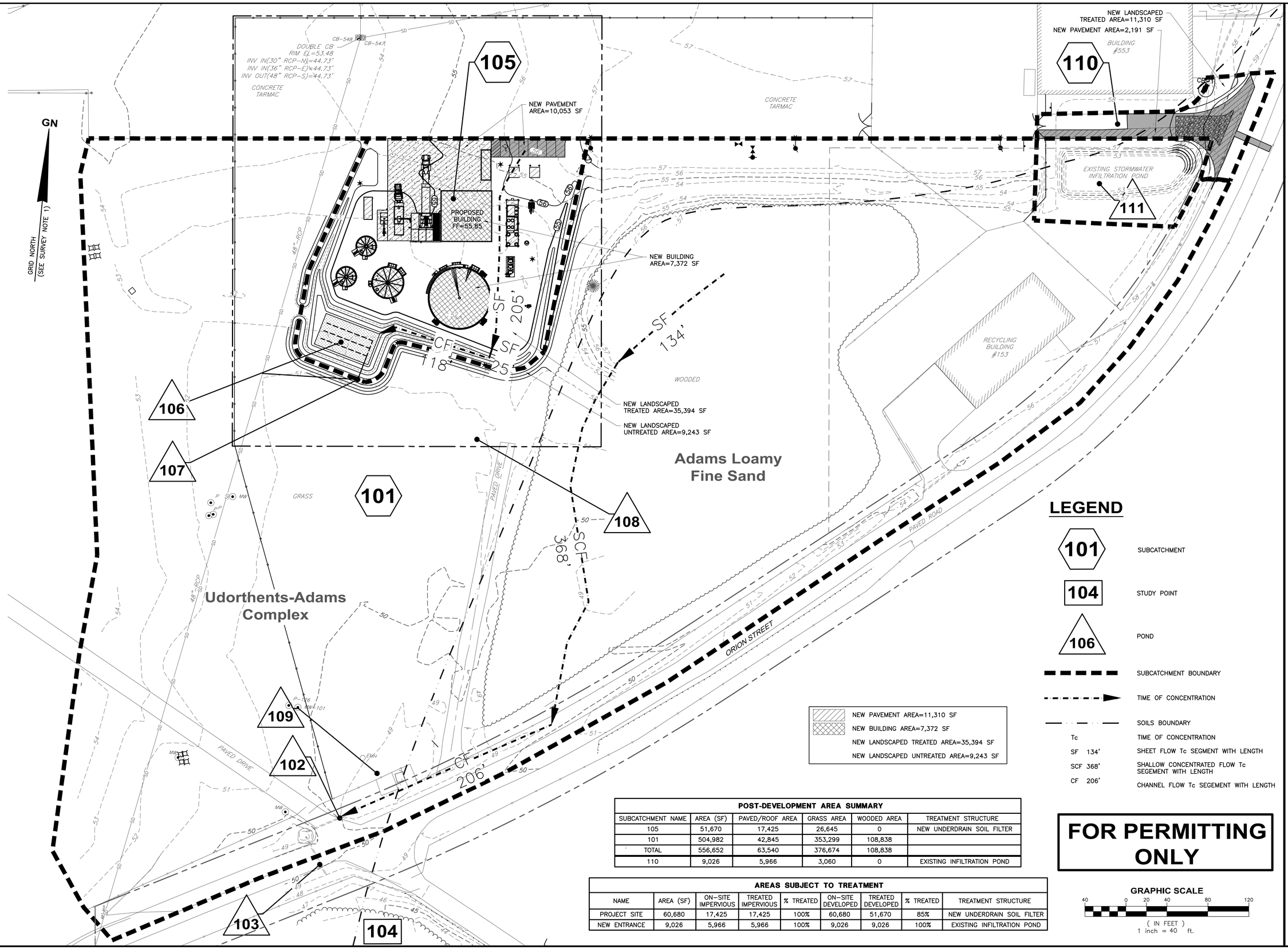

LEGEND

101	SUBCATCHMENT
104	STUDY POINT
106	POND
	SUBCATCHMENT BOUNDARY
	TIME OF CONCENTRATION
	SOILS BOUNDARY
Tc	TIME OF CONCENTRATION
SF 134'	SHEET FLOW Tc SEGMENT WITH LENGTH
SCF 368'	SHALLOW CONCENTRATED FLOW Tc SEGEMENT WITH LENGTH
CF 206'	CHANNEL FLOW Tc SEGEMENT WITH LENGTH

NEW PAVEMENT AREA=11,310 SF
NEW BUILDING AREA=7,372 SF
NEW LANDSCAPED TREATED AREA=35,394 SF
NEW LANDSCAPED UNTREATED AREA=9,243 SF

POST-DEVELOPMENT AREA SUMMARY

SUBCATCHMENT NAME	AREA (SF)	PAVED/ROOF AREA	GRASS AREA	WOODED AREA	TREATMENT STRUCTURE
105	51,670	17,425	26,645	0	NEW UNDERDRAIN SOIL FILTER
101	504,982	42,845	353,299	108,838	
TOTAL	556,652	63,540	376,674	108,838	
110	9,026	5,966	3,060	0	EXISTING INFILTRATION POND

AREAS SUBJECT TO TREATMENT

NAME	AREA (SF)	ON-SITE IMPERVIOUS	TREATED IMPERVIOUS	% TREATED	ON-SITE DEVELOPED	TREATED DEVELOPED	% TREATED	TREATMENT STRUCTURE
PROJECT SITE	60,680	17,425	17,425	100%	60,680	51,670	85%	NEW UNDERDRAIN SOIL FILTER
NEW ENTRANCE	9,026	5,966	5,966	100%	9,026	9,026	100%	EXISTING INFILTRATION POND

FOR PERMITTING ONLY

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
1	ISSUED FOR PERMITTING	JBW	4/13
2	REVISIONS PER DEP COMMENTS	JBW	5/13
3	SITE PLAN APPROVAL	JBW	5/13
4			

DESIGNED BY: JCE
CAD COORD: MRL
CAD: MRL
CHECKED BY: JCE
DATE: 5-7-13
APPROVED BY: JCE
DATE: 5-7-13
PROJECT NO: 12601A

STATE OF MAINE
JAN B. S. WIEGMAN
No. 6852
LICENSED PROFESSIONAL ENGINEER
5/6/13

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VILLAGE GREEN MAINE LLC
DIGESTER/GENERATION
BRUNSWICK, ME

POST-DEVELOPMENT DRAINAGE PLAN

DRAWING
SW-2

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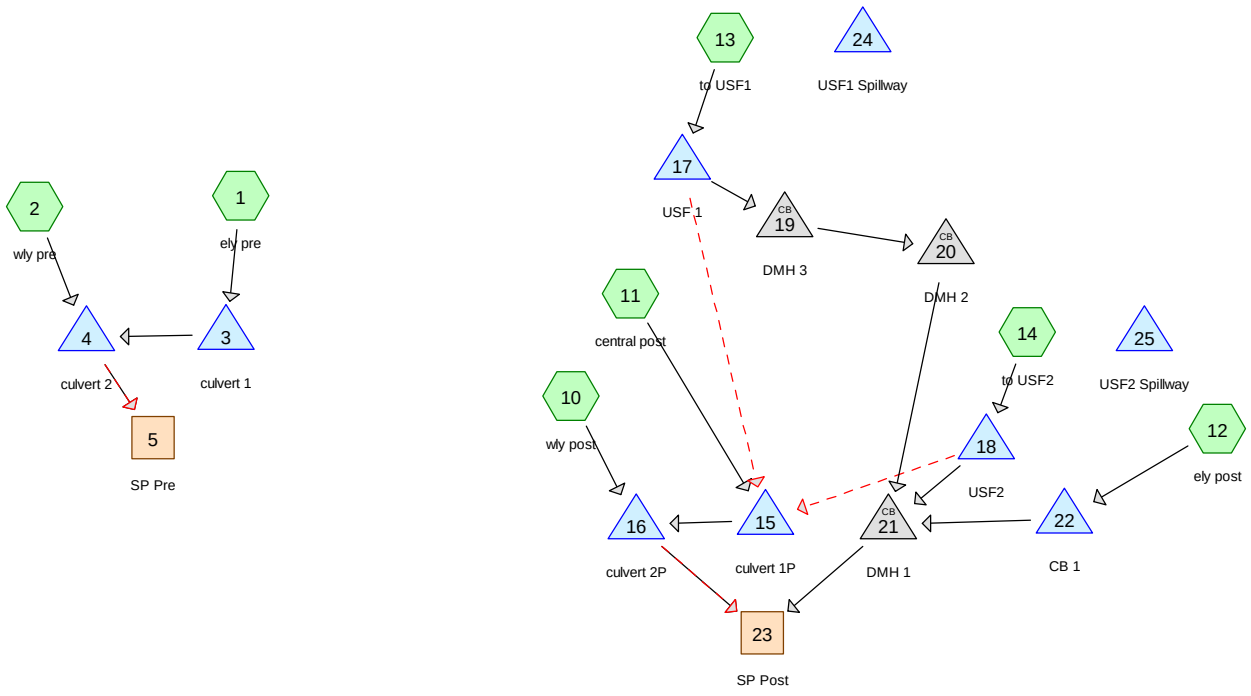


Subcat Reach Pond Link

Drainage Diagram for 12600 VGM LLC Brunswick
Prepared by Wright-Pierce, Printed 2/22/2013
HydroCAD® 9.00 s/n 02254 © 2009 HydroCAD Software Solutions LLC

Summary for Subcatchment 1: ely pre

Runoff = 0.66 cfs @ 12.95 hrs, Volume= 0.271 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 10 yr Rainfall=4.70"

	Area (sf)	CN	Description
*	8,330	98	Roofs, Bldg 153 HSG A
*	15,424	98	Orion Street
*	5,441	98	Pave at Bldg 153
*	18,921	98	On site pavement, incl access rd
*	3,177	98	On site airport rd
	70,977	30	Woods, Good, HSG A
	37,861	30	Woods, Good, HSG A
	355,941	39	Pasture/grassland/range, Good, HSG A
	516,072	43	Weighted Average
	464,779		90.06% Pervious Area
	51,293		9.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	134	0.0190	0.08		**Sheet Flow, SF 1** Woods: Light underbrush n= 0.400 P2= 3.00"
10.0	368	0.0150	0.61		**Shallow Concentrated Flow, SCF 1** Woodland Kv= 5.0 fps
0.8	206	0.0050	4.38	59.14	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.022 Earth, clean & straight
39.4	708	Total			

Summary for Subcatchment 2: wly pre

Runoff = 0.17 cfs @ 12.45 hrs, Volume= 0.034 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 10 yr Rainfall=4.70"

	Area (sf)	CN	Description
*	2,584	98	Orion Street
*	2,613	98	On site airport rd
	35,383	39	Pasture/grassland/range, Good, HSG A
	40,580	47	Weighted Average
	35,383		87.19% Pervious Area
	5,197		12.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	125	0.0300	0.14		**Sheet Flow, SF 1**
					Grass: Dense n= 0.240 P2= 3.00"
0.7	97	0.0200	2.28		**Shallow Concentrated Flow, SCF 1**
					Unpaved Kv= 16.1 fps
15.7	222	Total			

Summary for Subcatchment 10: wly post

Runoff = 0.17 cfs @ 12.45 hrs, Volume= 0.034 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 10 yr Rainfall=4.70"

	Area (sf)	CN	Description
*	2,584	98	Orion Street
*	2,613	98	On site airport rd
	35,383	39	Pasture/grassland/range, Good, HSG A
	40,580	47	Weighted Average
	35,383		87.19% Pervious Area
	5,197		12.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	125	0.0300	0.14		**Sheet Flow, SF 1**
					Grass: Dense n= 0.240 P2= 3.00"
0.7	97	0.0200	2.28		**Shallow Concentrated Flow, SCF 1**
					Unpaved Kv= 16.1 fps
15.7	222	Total			

Summary for Subcatchment 11: central post

Runoff = 0.21 cfs @ 12.78 hrs, Volume= 0.091 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 10 yr Rainfall=4.70"

	Area (sf)	CN	Description
*	2,456	98	Orion Street
*	3,177	98	On site airport rd
	189,561	39	Pasture/grassland/range, Good, HSG A
*	5,262	98	New Access Road
	200,456	42	Weighted Average
	189,561		94.56% Pervious Area
	10,895		5.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.4	130	0.0150	0.11		**Sheet Flow, SF 1**
					Grass: Dense n= 0.240 P2= 3.00"
7.2	492	0.0050	1.14		**Shallow Concentrated Flow, SCF 1**
					Unpaved Kv= 16.1 fps
27.6	622	Total			

Summary for Subcatchment 12: ely post

Runoff = 0.18 cfs @ 13.25 hrs, Volume= 0.097 af, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 10 yr Rainfall=4.70"

	Area (sf)	CN	Description
*	8,330	98	Roofs, Bldg 153 HSG A
*	12,968	98	Orion Street
*	5,441	98	Pave at Bldg 153
	70,977	30	Woods, Good, HSG A
	37,861	30	Woods, Good, HSG A
	113,109	39	Pasture/grassland/range, Good, HSG A
	248,686	41	Weighted Average
	221,947		89.25% Pervious Area
	26,739		10.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	134	0.0190	0.08		**Sheet Flow, SF 1**
					Woods: Light underbrush n= 0.400 P2= 3.00"
10.0	368	0.0150	0.61		**Shallow Concentrated Flow, SCF 1**
					Woodland Kv= 5.0 fps
38.6	502	Total			

Summary for Subcatchment 13: to USF1

Runoff = 0.95 cfs @ 12.52 hrs, Volume= 0.136 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 10 yr Rainfall=4.70"

	Area (sf)	CN	Description
	21,961	39	Pasture/grassland/range, Good, HSG A
*	1,511	98	New Site Pavement
*	882	98	New Site Misc. Pads
*	7,668	98	New Site Pad
*	2,500	98	New Site Building
*	4,415	98	New Site Tanks
*	4,753	98	New Site Access
*	7,600	39	New Site Filter Area
	51,290	64	Weighted Average
	29,561		57.64% Pervious Area
	21,729		42.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.6	205	0.0107	0.10		**Sheet Flow, SF 1** Grass: Dense n= 0.240 P2= 3.00"
0.4	118	0.0169	4.70	38.81	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
34.0	323	Total			

Summary for Subcatchment 14: to USF2

Runoff = 0.76 cfs @ 12.03 hrs, Volume= 0.051 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 10 yr Rainfall=4.70"

	Area (sf)	CN	Description
	4,840	39	Pasture/grassland/range, Good, HSG A
*	7,917	98	New Site Access
*	3,163	39	New Site Filter Area
	15,920	68	Weighted Average
	8,003		50.27% Pervious Area
	7,917		49.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0208	1.03		**Sheet Flow, SF 1** Smooth surfaces n= 0.011 P2= 3.00"
1.0	306	0.0182	4.88	40.27	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
1.4	331	Total			

Summary for Reach 5: SP Pre

Inflow Area = 12.779 ac, 10.15% Impervious, Inflow Depth = 0.29" for Brunswick 10 yr event
Inflow = 0.72 cfs @ 13.01 hrs, Volume= 0.305 af
Outflow = 0.72 cfs @ 13.01 hrs, Volume= 0.305 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Summary for Reach 23: SP Post

Inflow Area = 12.785 ac, 13.01% Impervious, Inflow Depth = 0.38" for Brunswick 10 yr event
Inflow = 0.64 cfs @ 12.94 hrs, Volume= 0.410 af
Outflow = 0.64 cfs @ 12.94 hrs, Volume= 0.410 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Summary for Pond 3: culvert 1

Inflow Area = 11.847 ac, 9.94% Impervious, Inflow Depth = 0.27" for Brunswick 10 yr event
Inflow = 0.66 cfs @ 12.95 hrs, Volume= 0.271 af
Outflow = 0.65 cfs @ 13.04 hrs, Volume= 0.271 af, Atten= 1%, Lag= 5.1 min
Primary = 0.65 cfs @ 13.04 hrs, Volume= 0.271 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.54' @ 13.04 hrs Surf.Area= 648 sf Storage= 92 cf

Plug-Flow detention time= 1.6 min calculated for 0.270 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (1,011.1 - 1,009.6)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	24,949 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	0	0.0	0	0	0
48.50	417	145.0	70	70	1,674
49.00	6,392	618.0	1,407	1,476	30,394
49.50	27,939	1,143.0	7,949	9,426	103,966
49.90	50,808	1,422.0	15,523	24,949	160,917

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 47.60' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal
#2	Secondary	49.80'	**69.0' 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=0.65 cfs @ 13.04 hrs HW=48.54' TW=47.33' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.65 cfs @ 2.16 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4: culvert 2

Inflow Area =	12.779 ac,	10.15% Impervious,	Inflow Depth =	0.29"	for Brunswick 10 yr event
Inflow =	0.72 cfs @	13.01 hrs,	Volume=	0.305 af	
Outflow =	0.72 cfs @	13.01 hrs,	Volume=	0.305 af,	Atten= 0%, Lag= 0.1 min
Primary =	0.72 cfs @	13.01 hrs,	Volume=	0.305 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 47.33' @ 13.01 hrs Surf.Area= 21 sf Storage= 5 cf

Plug-Flow detention time= 0.1 min calculated for 0.304 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,004.7 - 1,004.6)

Volume	Invert	Avail.Storage	Storage Description
#1	46.90'	1,936 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.90	0	0.0	0	0	0
47.00	7	10.0	0	0	8
48.00	72	31.0	34	34	79
49.00	594	129.0	291	325	1,330
50.00	2,921	275.0	1,611	1,936	6,028

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 40.0' CPP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 46.40' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	49.80'	**24.0' long x 25.0' 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=0.72 cfs @ 13.01 hrs HW=47.33' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.72 cfs @ 2.23 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=46.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15: culvert 1P

Inflow Area = 4.602 ac, 5.44% Impervious, Inflow Depth = 0.24" for Brunswick 10 yr event
Inflow = 0.21 cfs @ 12.78 hrs, Volume= 0.091 af
Outflow = 0.21 cfs @ 12.82 hrs, Volume= 0.091 af, Atten= 0%, Lag= 2.1 min
Primary = 0.21 cfs @ 12.82 hrs, Volume= 0.091 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.31' @ 12.82 hrs Surf.Area= 155 sf Storage= 16 cf

Plug-Flow detention time= 0.9 min calculated for 0.091 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (1,011.0 - 1,010.1)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	10,232 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	0	0.0	0	0	0
48.50	417	145.0	70	70	1,674
49.00	3,846	336.0	922	991	8,985
49.50	10,970	497.0	3,552	4,543	19,660
49.90	17,747	678.0	5,689	10,232	36,586

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 47.60' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal
#2	Secondary	49.80'	**69.0' 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=0.21 cfs @ 12.82 hrs HW=48.30' TW=47.17' (Dynamic Tailwater)
↑└**1=Culvert** (Barrel Controls 0.21 cfs @ 1.57 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' (Free Discharge)
↑└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 16: culvert 2P

Inflow Area = 5.533 ac, 6.68% Impervious, Inflow Depth = 0.27" for Brunswick 10 yr event
Inflow = 0.31 cfs @ 12.71 hrs, Volume= 0.125 af
Outflow = 0.31 cfs @ 12.72 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.1 min
Primary = 0.31 cfs @ 12.72 hrs, Volume= 0.125 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Peak Elev= 47.17' @ 12.72 hrs Surf.Area= 13 sf Storage= 2 cf

Plug-Flow detention time= 0.1 min calculated for 0.125 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (995.2 - 995.1)

Volume	Invert	Avail.Storage	Storage Description
#1	46.90'	1,936 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.90	0	0.0	0	0	0
47.00	7	10.0	0	0	8
48.00	72	31.0	34	34	79
49.00	594	129.0	291	325	1,330
50.00	2,921	275.0	1,611	1,936	6,028

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 40.0' CPP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 46.40' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	49.80'	**24.0' long x 25.0' 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=0.31 cfs @ 12.72 hrs HW=47.17' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.31 cfs @ 1.78 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=46.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 17: USF 1

Inflow Area =	1.177 ac, 42.36% Impervious, Inflow Depth = 1.39" for Brunswick 10 yr event			
Inflow =	0.95 cfs @	12.52 hrs, Volume=	0.136 af	
Outflow =	0.11 cfs @	15.74 hrs, Volume=	0.136 af, Atten= 88%, Lag= 193.2 min	
Primary =	0.11 cfs @	15.74 hrs, Volume=	0.136 af	
Secondary =	0.00 cfs @	5.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 51.54' @ 15.74 hrs Surf.Area= 3,389 sf Storage= 2,766 cf

Plug-Flow detention time= 277.3 min calculated for 0.136 af (100% of inflow)
Center-of-Mass det. time= 277.2 min (1,170.9 - 893.7)

Volume	Invert	Avail.Storage	Storage Description
#1	50.50'	17,091 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
50.50	2,048	192.0	0	0	2,048
51.00	2,569	228.0	1,152	1,152	3,256
52.00	4,165	386.0	3,335	4,487	10,982
52.50	4,950	594.0	2,276	6,763	27,205
53.00	5,983	738.0	2,729	9,492	42,472
54.00	9,340	1,061.0	7,599	17,091	88,721

Device	Routing	Invert	Outlet Devices
#1	Primary	47.88'	**1.5" Vert. Orifice/Grate** C= 0.600
#2	Device 1	48.01'	**4.0" Round Culvert** L= 27.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 47.88' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	50.50'	**2.440 in/hr Exfiltration over Surface area above 48.01'** Excluded Surface area = 0 sf Phase-In= 0.01'
#4	Secondary	52.00'	**6.0' 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=0.11 cfs @ 15.74 hrs HW=51.54' TW=48.03' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Orifice Controls 0.11 cfs @ 9.02 fps)
  └─**2=Culvert** (Passes 0.11 cfs of 0.67 cfs potential flow)
    └─**3=Exfiltration** (Passes 0.11 cfs of 0.19 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=50.50' TW=48.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 18: USF2

Inflow Area = 0.365 ac, 49.73% Impervious, Inflow Depth = 1.67" for Brunswick 10 yr event
Inflow = 0.76 cfs @ 12.03 hrs, Volume= 0.051 af
Outflow = 0.09 cfs @ 12.87 hrs, Volume= 0.051 af, Atten= 89%, Lag= 50.2 min
Primary = 0.09 cfs @ 12.87 hrs, Volume= 0.051 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.66' @ 12.87 hrs Surf.Area= 1,563 sf Storage= 782 cf

Plug-Flow detention time= 89.9 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 89.8 min (942.0 - 852.2)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	5,588 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	851	171.0	0	0	851
49.00	2,019	272.0	1,394	1,394	4,418
50.00	3,045	383.0	2,514	3,908	10,213
50.50	3,685	435.0	1,680	5,588	13,604

Device	Routing	Invert	Outlet Devices
#1	Primary	45.26'	**1.5" Vert. Orifice/Grate** C= 0.600
#2	Device 1	45.48'	**4.0" Round Culvert** L= 45.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 45.26' S= 0.0049 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	48.00'	**2.400 in/hr Exfiltration over Surface area above 45.48'** Excluded Surface area = 0 sf Phase-In= 0.01'
#4	Secondary	49.50'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.09 cfs @ 12.87 hrs HW=48.66' TW=44.92' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 0.09 cfs of 0.11 cfs potential flow)
  └─**2=Culvert** (Passes 0.09 cfs of 0.54 cfs potential flow)
    └─**3=Exfiltration** (Exfiltration Controls 0.09 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' TW=48.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 19: DMH 3

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 1.39" for Brunswick 10 yr event
Inflow = 0.11 cfs @ 15.74 hrs, Volume= 0.136 af
Outflow = 0.11 cfs @ 15.74 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 15.74 hrs, Volume= 0.136 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.03' @ 15.74 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	47.88'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 46.22' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.11 cfs @ 15.74 hrs HW=48.03' TW=46.40' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.11 cfs @ 1.32 fps)

Summary for Pond 20: DMH 2

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 1.39" for Brunswick 10 yr event
Inflow = 0.11 cfs @ 15.74 hrs, Volume= 0.136 af
Outflow = 0.11 cfs @ 15.74 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 15.74 hrs, Volume= 0.136 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 46.40' @ 15.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.22'	**15.0" Round Culvert** L= 319.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.63' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.11 cfs @ 15.74 hrs HW=46.40' TW=44.92' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.11 cfs @ 1.50 fps)

Summary for Pond 21: DMH 1

Inflow Area = 7.252 ac, 17.85% Impervious, Inflow Depth = 0.47" for Brunswick 10 yr event
Inflow = 0.37 cfs @ 13.26 hrs, Volume= 0.285 af
Outflow = 0.37 cfs @ 13.26 hrs, Volume= 0.285 af, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 13.26 hrs, Volume= 0.285 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 44.94' @ 13.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.63'	**18.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.37 cfs @ 13.26 hrs HW=44.94' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.37 cfs @ 2.15 fps)

Summary for Pond 22: CB 1

Inflow Area = 5.709 ac, 10.75% Impervious, Inflow Depth = 0.20" for Brunswick 10 yr event
Inflow = 0.18 cfs @ 13.25 hrs, Volume= 0.097 af
Outflow = 0.18 cfs @ 13.25 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.2 min
Primary = 0.18 cfs @ 13.25 hrs, Volume= 0.097 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 45.73' @ 13.26 hrs Surf.Area= 13 sf Storage= 2 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (1,033.4 - 1,033.2)

Volume	Invert	Avail.Storage	Storage Description
#1	45.59'	14,215 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
45.59	13	16.0	0	0	13
48.49	13	16.0	38	38	59
48.50	20	16.0	0	38	60
49.00	99	48.0	27	65	223
49.50	14,754	799.0	2,677	2,742	50,843
50.00	32,265	731.0	11,473	14,215	59,131

Device	Routing	Invert	Outlet Devices
#1	Primary	45.50'	**15.0" Round Culvert** L= 173.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.63' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.18 cfs @ 13.25 hrs HW=45.73' TW=44.94' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.18 cfs @ 1.69 fps)

Summary for Subcatchment 1: ely pre

Runoff = 1.80 cfs @ 12.79 hrs, Volume= 0.498 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	8,330	98	Roofs, Bldg 153 HSG A
*	15,424	98	Orion Street
*	5,441	98	Pave at Bldg 153
*	18,921	98	On site pavement, incl access rd
*	3,177	98	On site airport rd
	70,977	30	Woods, Good, HSG A
	37,861	30	Woods, Good, HSG A
	355,941	39	Pasture/grassland/range, Good, HSG A
	516,072	43	Weighted Average
	464,779		90.06% Pervious Area
	51,293		9.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	134	0.0190	0.08		**Sheet Flow, SF 1** Woods: Light underbrush n= 0.400 P2= 3.00"
10.0	368	0.0150	0.61		**Shallow Concentrated Flow, SCF 1** Woodland Kv= 5.0 fps
0.8	206	0.0050	4.38	59.14	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.022 Earth, clean & straight
39.4	708	Total			

Summary for Subcatchment 2: wly pre

Runoff = 0.36 cfs @ 12.33 hrs, Volume= 0.056 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	2,584	98	Orion Street
*	2,613	98	On site airport rd
	35,383	39	Pasture/grassland/range, Good, HSG A
	40,580	47	Weighted Average
	35,383		87.19% Pervious Area
	5,197		12.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	125	0.0300	0.14		**Sheet Flow, SF 1**
					Grass: Dense n= 0.240 P2= 3.00"
0.7	97	0.0200	2.28		**Shallow Concentrated Flow, SCF 1**
					Unpaved Kv= 16.1 fps
15.7	222	Total			

Summary for Subcatchment 10: wly post

Runoff = 0.36 cfs @ 12.33 hrs, Volume= 0.056 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	2,584	98	Orion Street
*	2,613	98	On site airport rd
	35,383	39	Pasture/grassland/range, Good, HSG A
	40,580	47	Weighted Average
	35,383		87.19% Pervious Area
	5,197		12.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	125	0.0300	0.14		**Sheet Flow, SF 1**
					Grass: Dense n= 0.240 P2= 3.00"
0.7	97	0.0200	2.28		**Shallow Concentrated Flow, SCF 1**
					Unpaved Kv= 16.1 fps
15.7	222	Total			

Summary for Subcatchment 11: central post

Runoff = 0.67 cfs @ 12.64 hrs, Volume= 0.174 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	2,456	98	Orion Street
*	3,177	98	On site airport rd
	189,561	39	Pasture/grassland/range, Good, HSG A
*	5,262	98	New Access Road
	200,456	42	Weighted Average
	189,561		94.56% Pervious Area
	10,895		5.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.4	130	0.0150	0.11		**Sheet Flow, SF 1** Grass: Dense n= 0.240 P2= 3.00"
7.2	492	0.0050	1.14		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.6	622	Total			

Summary for Subcatchment 12: ely post

Runoff = 0.59 cfs @ 12.84 hrs, Volume= 0.192 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	8,330	98	Roofs, Bldg 153 HSG A
*	12,968	98	Orion Street
*	5,441	98	Pave at Bldg 153
	70,977	30	Woods, Good, HSG A
	37,861	30	Woods, Good, HSG A
	113,109	39	Pasture/grassland/range, Good, HSG A
	248,686	41	Weighted Average
	221,947		89.25% Pervious Area
	26,739		10.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	134	0.0190	0.08		**Sheet Flow, SF 1** Woods: Light underbrush n= 0.400 P2= 3.00"
10.0	368	0.0150	0.61		**Shallow Concentrated Flow, SCF 1** Woodland Kv= 5.0 fps
38.6	502	Total			

Summary for Subcatchment 13: to USF1

Runoff = 1.35 cfs @ 12.51 hrs, Volume= 0.188 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
	21,961	39	Pasture/grassland/range, Good, HSG A
*	1,511	98	New Site Pavement
*	882	98	New Site Misc. Pads
*	7,668	98	New Site Pad
*	2,500	98	New Site Building
*	4,415	98	New Site Tanks
*	4,753	98	New Site Access
*	7,600	39	New Site Filter Area
	51,290	64	Weighted Average
	29,561		57.64% Pervious Area
	21,729		42.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.6	205	0.0107	0.10		**Sheet Flow, SF 1** Grass: Dense n= 0.240 P2= 3.00"
0.4	118	0.0169	4.70	38.81	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
34.0	323	Total			

Summary for Subcatchment 14: to USF2

Runoff = 1.04 cfs @ 12.03 hrs, Volume= 0.068 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
	4,840	39	Pasture/grassland/range, Good, HSG A
*	7,917	98	New Site Access
*	3,163	39	New Site Filter Area
	15,920	68	Weighted Average
	8,003		50.27% Pervious Area
	7,917		49.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0208	1.03		**Sheet Flow, SF 1** Smooth surfaces n= 0.011 P2= 3.00"
1.0	306	0.0182	4.88	40.27	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
1.4	331	Total			

Summary for Reach 5: SP Pre

Inflow Area = 12.779 ac, 10.15% Impervious, Inflow Depth = 0.52" for Brunswick 25 yr event
Inflow = 1.62 cfs @ 13.04 hrs, Volume= 0.554 af
Outflow = 1.62 cfs @ 13.04 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Summary for Reach 23: SP Post

Inflow Area = 12.785 ac, 13.01% Impervious, Inflow Depth = 0.64" for Brunswick 25 yr event
Inflow = 1.61 cfs @ 12.74 hrs, Volume= 0.678 af
Outflow = 1.61 cfs @ 12.74 hrs, Volume= 0.678 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Summary for Pond 3: culvert 1

Inflow Area = 11.847 ac, 9.94% Impervious, Inflow Depth = 0.50" for Brunswick 25 yr event
Inflow = 1.80 cfs @ 12.79 hrs, Volume= 0.498 af
Outflow = 1.50 cfs @ 13.08 hrs, Volume= 0.498 af, Atten= 17%, Lag= 17.4 min
Primary = 1.50 cfs @ 13.08 hrs, Volume= 0.498 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.89' @ 13.08 hrs Surf.Area= 4,402 sf Storage= 863 cf

Plug-Flow detention time= 3.8 min calculated for 0.497 af (100% of inflow)
Center-of-Mass det. time= 3.7 min (978.4 - 974.7)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	24,949 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	0	0.0	0	0	0
48.50	417	145.0	70	70	1,674
49.00	6,392	618.0	1,407	1,476	30,394
49.50	27,939	1,143.0	7,949	9,426	103,966
49.90	50,808	1,422.0	15,523	24,949	160,917

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 47.60' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal
#2	Secondary	49.80'	**69.0' 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=1.50 cfs @ 13.08 hrs HW=48.89' TW=47.58' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.50 cfs @ 2.70 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4: culvert 2

Inflow Area =	12.779 ac,	10.15% Impervious,	Inflow Depth =	0.52"	for Brunswick 25 yr event
Inflow =	1.62 cfs @	13.04 hrs,	Volume=	0.554 af	
Outflow =	1.62 cfs @	13.04 hrs,	Volume=	0.554 af,	Atten= 0%, Lag= 0.2 min
Primary =	1.62 cfs @	13.04 hrs,	Volume=	0.554 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 47.58' @ 13.04 hrs Surf.Area= 37 sf Storage= 12 cf

Plug-Flow detention time= 0.1 min calculated for 0.553 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (973.3 - 973.2)

Volume	Invert	Avail.Storage	Storage Description
#1	46.90'	1,936 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.90	0	0.0	0	0	0
47.00	7	10.0	0	0	8
48.00	72	31.0	34	34	79
49.00	594	129.0	291	325	1,330
50.00	2,921	275.0	1,611	1,936	6,028

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 40.0' CPP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 46.40' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	49.80'	**24.0' long x 25.0' 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=1.61 cfs @ 13.04 hrs HW=47.58' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.61 cfs @ 2.82 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=46.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15: culvert 1P

Inflow Area = 4.602 ac, 5.44% Impervious, Inflow Depth = 0.45" for Brunswick 25 yr event
Inflow = 0.67 cfs @ 12.64 hrs, Volume= 0.174 af
Outflow = 0.66 cfs @ 12.71 hrs, Volume= 0.174 af, Atten= 3%, Lag= 4.1 min
Primary = 0.66 cfs @ 12.71 hrs, Volume= 0.174 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.55' @ 12.71 hrs Surf.Area= 590 sf Storage= 93 cf

Plug-Flow detention time= 1.3 min calculated for 0.174 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (973.0 - 971.7)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	10,232 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	0	0.0	0	0	0
48.50	417	145.0	70	70	1,674
49.00	3,846	336.0	922	991	8,985
49.50	10,970	497.0	3,552	4,543	19,660
49.90	17,747	678.0	5,689	10,232	36,586

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 47.60' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal
#2	Secondary	49.80'	**69.0' 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=0.66 cfs @ 12.71 hrs HW=48.55' TW=47.37' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.66 cfs @ 2.17 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 16: culvert 2P

Inflow Area = 5.533 ac, 6.68% Impervious, Inflow Depth = 0.50" for Brunswick 25 yr event
Inflow = 0.88 cfs @ 12.61 hrs, Volume= 0.230 af
Outflow = 0.88 cfs @ 12.62 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.1 min
Primary = 0.88 cfs @ 12.62 hrs, Volume= 0.230 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Peak Elev= 47.38' @ 12.62 hrs Surf.Area= 24 sf Storage= 6 cf

Plug-Flow detention time= 0.1 min calculated for 0.230 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (961.9 - 961.8)

Volume	Invert	Avail.Storage	Storage Description
#1	46.90'	1,936 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.90	0	0.0	0	0	0
47.00	7	10.0	0	0	8
48.00	72	31.0	34	34	79
49.00	594	129.0	291	325	1,330
50.00	2,921	275.0	1,611	1,936	6,028

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 40.0' CPP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 46.40' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	49.80'	**24.0' long x 25.0' 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=0.87 cfs @ 12.62 hrs HW=47.38' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.87 cfs @ 2.35 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=46.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 17: USF 1

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 1.91" for Brunswick 25 yr event
Inflow = 1.35 cfs @ 12.51 hrs, Volume= 0.188 af
Outflow = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af, Atten= 91%, Lag= 230.4 min
Primary = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 51.98' @ 16.35 hrs Surf.Area= 4,122 sf Storage= 4,386 cf

Plug-Flow detention time= 413.9 min calculated for 0.188 af (100% of inflow)
Center-of-Mass det. time= 413.9 min (1,297.6 - 883.7)

Volume	Invert	Avail.Storage	Storage Description
#1	50.50'	17,091 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
50.50	2,048	192.0	0	0	2,048
51.00	2,569	228.0	1,152	1,152	3,256
52.00	4,165	386.0	3,335	4,487	10,982
52.50	4,950	594.0	2,276	6,763	27,205
53.00	5,983	738.0	2,729	9,492	42,472
54.00	9,340	1,061.0	7,599	17,091	88,721

Device	Routing	Invert	Outlet Devices
#1	Primary	47.88'	**1.5" Vert. Orifice/Grate** C= 0.600
#2	Device 1	48.01'	**4.0" Round Culvert** L= 27.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 47.88' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	50.50'	**2.440 in/hr Exfiltration over Surface area above 48.01'** Excluded Surface area = 0 sf Phase-In= 0.01'
#4	Secondary	52.00'	**6.0' 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=0.12 cfs @ 16.35 hrs HW=51.98' TW=48.04' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Orifice Controls 0.12 cfs @ 9.56 fps)
  └─**2=Culvert** (Passes 0.12 cfs of 0.71 cfs potential flow)
    └─**3=Exfiltration** (Passes 0.12 cfs of 0.23 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=50.50' TW=48.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 18: USF2

Inflow Area = 0.365 ac, 49.73% Impervious, Inflow Depth = 2.24" for Brunswick 25 yr event
Inflow = 1.04 cfs @ 12.03 hrs, Volume= 0.068 af
Outflow = 0.10 cfs @ 12.96 hrs, Volume= 0.068 af, Atten= 90%, Lag= 55.7 min
Primary = 0.10 cfs @ 12.96 hrs, Volume= 0.068 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.87' @ 12.96 hrs Surf.Area= 1,844 sf Storage= 1,149 cf

Plug-Flow detention time= 119.6 min calculated for 0.068 af (100% of inflow)
Center-of-Mass det. time= 119.5 min (962.8 - 843.3)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	5,588 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	851	171.0	0	0	851
49.00	2,019	272.0	1,394	1,394	4,418
50.00	3,045	383.0	2,514	3,908	10,213
50.50	3,685	435.0	1,680	5,588	13,604

Device	Routing	Invert	Outlet Devices
#1	Primary	45.26'	**1.5" Vert. Orifice/Grate** C= 0.600
#2	Device 1	45.48'	**4.0" Round Culvert** L= 45.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 45.26' S= 0.0049 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	48.00'	**2.400 in/hr Exfiltration over Surface area above 45.48'** Excluded Surface area = 0 sf Phase-In= 0.01'
#4	Secondary	49.50'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.10 cfs @ 12.96 hrs HW=48.87' TW=45.08' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 0.10 cfs of 0.11 cfs potential flow)
  └─**2=Culvert** (Passes 0.10 cfs of 0.56 cfs potential flow)
    └─**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' TW=48.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 19: DMH 3

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 1.91" for Brunswick 25 yr event
Inflow = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af
Outflow = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.04' @ 16.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	47.88'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 46.22' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.12 cfs @ 16.35 hrs HW=48.04' TW=46.41' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.12 cfs @ 1.34 fps)

Summary for Pond 20: DMH 2

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 1.91" for Brunswick 25 yr event
Inflow = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af
Outflow = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 16.35 hrs, Volume= 0.188 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 46.41' @ 15.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.22'	**15.0" Round Culvert** L= 319.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.63' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.12 cfs @ 16.35 hrs HW=46.41' TW=44.95' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.12 cfs @ 1.52 fps)

Summary for Pond 21: DMH 1

Inflow Area = 7.252 ac, 17.85% Impervious, Inflow Depth = 0.74" for Brunswick 25 yr event
Inflow = 0.80 cfs @ 12.85 hrs, Volume= 0.448 af
Outflow = 0.80 cfs @ 12.85 hrs, Volume= 0.448 af, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 12.85 hrs, Volume= 0.448 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 45.08' @ 12.85 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.63'	**18.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.80 cfs @ 12.85 hrs HW=45.08' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.80 cfs @ 2.67 fps)

Summary for Pond 22: CB 1

Inflow Area = 5.709 ac, 10.75% Impervious, Inflow Depth = 0.40" for Brunswick 25 yr event
Inflow = 0.59 cfs @ 12.84 hrs, Volume= 0.192 af
Outflow = 0.59 cfs @ 12.85 hrs, Volume= 0.192 af, Atten= 0%, Lag= 0.1 min
Primary = 0.59 cfs @ 12.85 hrs, Volume= 0.192 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 45.92' @ 12.85 hrs Surf.Area= 13 sf Storage= 4 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (990.7 - 990.6)

Volume	Invert	Avail.Storage	Storage Description
#1	45.59'	14,215 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
45.59	13	16.0	0	0	13
48.49	13	16.0	38	38	59
48.50	20	16.0	0	38	60
49.00	99	48.0	27	65	223
49.50	14,754	799.0	2,677	2,742	50,843
50.00	32,265	731.0	11,473	14,215	59,131

Device	Routing	Invert	Outlet Devices
#1	Primary	45.50'	**15.0" Round Culvert** L= 173.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.63' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.58 cfs @ 12.85 hrs HW=45.92' TW=45.08' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.58 cfs @ 2.38 fps)

Summary for Subcatchment 1: ely pre

Runoff = 0.02 cfs @ 22.67 hrs, Volume= 0.009 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 2yr Rainfall=3.00"

	Area (sf)	CN	Description
*	8,330	98	Roofs, Bldg 153 HSG A
*	15,424	98	Orion Street
*	5,441	98	Pave at Bldg 153
*	18,921	98	On site pavement, incl access rd
*	3,177	98	On site airport rd
	70,977	30	Woods, Good, HSG A
	37,861	30	Woods, Good, HSG A
	355,941	39	Pasture/grassland/range, Good, HSG A
	516,072	43	Weighted Average
	464,779		90.06% Pervious Area
	51,293		9.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	134	0.0190	0.08		**Sheet Flow, SF 1** Woods: Light underbrush n= 0.400 P2= 3.00"
10.0	368	0.0150	0.61		**Shallow Concentrated Flow, SCF 1** Woodland Kv= 5.0 fps
0.8	206	0.0050	4.38	59.14	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.022 Earth, clean & straight
39.4	708	Total			

Summary for Subcatchment 2: wly pre

Runoff = 0.01 cfs @ 15.37 hrs, Volume= 0.004 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 2yr Rainfall=3.00"

	Area (sf)	CN	Description
*	2,584	98	Orion Street
*	2,613	98	On site airport rd
	35,383	39	Pasture/grassland/range, Good, HSG A
	40,580	47	Weighted Average
	35,383		87.19% Pervious Area
	5,197		12.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	125	0.0300	0.14		**Sheet Flow, SF 1**
					Grass: Dense n= 0.240 P2= 3.00"
0.7	97	0.0200	2.28		**Shallow Concentrated Flow, SCF 1**
					Unpaved Kv= 16.1 fps
15.7	222	Total			

Summary for Subcatchment 10: wly post

Runoff = 0.01 cfs @ 15.37 hrs, Volume= 0.004 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 2yr Rainfall=3.00"

	Area (sf)	CN	Description
*	2,584	98	Orion Street
*	2,613	98	On site airport rd
	35,383	39	Pasture/grassland/range, Good, HSG A
	40,580	47	Weighted Average
	35,383		87.19% Pervious Area
	5,197		12.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	125	0.0300	0.14		**Sheet Flow, SF 1**
					Grass: Dense n= 0.240 P2= 3.00"
0.7	97	0.0200	2.28		**Shallow Concentrated Flow, SCF 1**
					Unpaved Kv= 16.1 fps
15.7	222	Total			

Summary for Subcatchment 11: central post

Runoff = 0.00 cfs @ 23.73 hrs, Volume= 0.002 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 2yr Rainfall=3.00"

	Area (sf)	CN	Description
*	2,456	98	Orion Street
*	3,177	98	On site airport rd
	189,561	39	Pasture/grassland/range, Good, HSG A
*	5,262	98	New Access Road
	200,456	42	Weighted Average
	189,561		94.56% Pervious Area
	10,895		5.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.4	130	0.0150	0.11		**Sheet Flow, SF 1** Grass: Dense n= 0.240 P2= 3.00"
7.2	492	0.0050	1.14		**Shallow Concentrated Flow, SCF 1** Unpaved Kv= 16.1 fps
27.6	622	Total			

Summary for Subcatchment 12: ely post

Runoff = 0.00 cfs @ 24.10 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 2yr Rainfall=3.00"

	Area (sf)	CN	Description
*	8,330	98	Roofs, Bldg 153 HSG A
*	12,968	98	Orion Street
*	5,441	98	Pave at Bldg 153
	70,977	30	Woods, Good, HSG A
	37,861	30	Woods, Good, HSG A
	113,109	39	Pasture/grassland/range, Good, HSG A
	248,686	41	Weighted Average
	221,947		89.25% Pervious Area
	26,739		10.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	134	0.0190	0.08		**Sheet Flow, SF 1** Woods: Light underbrush n= 0.400 P2= 3.00"
10.0	368	0.0150	0.61		**Shallow Concentrated Flow, SCF 1** Woodland Kv= 5.0 fps
38.6	502	Total			

Summary for Subcatchment 13: to USF1

Runoff = 0.25 cfs @ 12.60 hrs, Volume= 0.046 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 2yr Rainfall=3.00"

	Area (sf)	CN	Description
	21,961	39	Pasture/grassland/range, Good, HSG A
*	1,511	98	New Site Pavement
*	882	98	New Site Misc. Pads
*	7,668	98	New Site Pad
*	2,500	98	New Site Building
*	4,415	98	New Site Tanks
*	4,753	98	New Site Access
*	7,600	39	New Site Filter Area
	51,290	64	Weighted Average
	29,561		57.64% Pervious Area
	21,729		42.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.6	205	0.0107	0.10		**Sheet Flow, SF 1** Grass: Dense n= 0.240 P2= 3.00"
0.4	118	0.0169	4.70	38.81	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
34.0	323	Total			

Summary for Subcatchment 14: to USF2

Runoff = 0.25 cfs @ 12.04 hrs, Volume= 0.019 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 2yr Rainfall=3.00"

	Area (sf)	CN	Description
	4,840	39	Pasture/grassland/range, Good, HSG A
*	7,917	98	New Site Access
*	3,163	39	New Site Filter Area
	15,920	68	Weighted Average
	8,003		50.27% Pervious Area
	7,917		49.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0208	1.03		**Sheet Flow, SF 1** Smooth surfaces n= 0.011 P2= 3.00"
1.0	306	0.0182	4.88	40.27	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
1.4	331	Total			

Summary for Reach 5: SP Pre

Inflow Area = 12.779 ac, 10.15% Impervious, Inflow Depth = 0.01" for Brunswick 2yr event
Inflow = 0.02 cfs @ 22.35 hrs, Volume= 0.012 af
Outflow = 0.02 cfs @ 22.35 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Summary for Reach 23: SP Post

Inflow Area = 12.785 ac, 13.01% Impervious, Inflow Depth = 0.07" for Brunswick 2yr event
Inflow = 0.15 cfs @ 12.81 hrs, Volume= 0.071 af
Outflow = 0.15 cfs @ 12.81 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Summary for Pond 3: culvert 1

Inflow Area = 11.847 ac, 9.94% Impervious, Inflow Depth = 0.01" for Brunswick 2yr event
Inflow = 0.02 cfs @ 22.67 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 22.70 hrs, Volume= 0.009 af, Atten= 0%, Lag= 1.7 min
Primary = 0.02 cfs @ 22.70 hrs, Volume= 0.009 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.09' @ 22.70 hrs Surf.Area= 13 sf Storage= 0 cf

Plug-Flow detention time= 0.4 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (1,269.8 - 1,269.5)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	24,949 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	0	0.0	0	0	0
48.50	417	145.0	70	70	1,674
49.00	6,392	618.0	1,407	1,476	30,394
49.50	27,939	1,143.0	7,949	9,426	103,966
49.90	50,808	1,422.0	15,523	24,949	160,917

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 47.60' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal
#2	Secondary	49.80'	**69.0' 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=0.02 cfs @ 22.70 hrs HW=48.09' TW=46.97' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.02 cfs @ 0.72 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4: culvert 2

Inflow Area =	12.779 ac,	10.15% Impervious,	Inflow Depth =	0.01"	for Brunswick 2yr event
Inflow =	0.02 cfs @	22.34 hrs,	Volume=	0.012 af	
Outflow =	0.02 cfs @	22.35 hrs,	Volume=	0.012 af,	Atten= 0%, Lag= 0.1 min
Primary =	0.02 cfs @	22.35 hrs,	Volume=	0.012 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 46.97' @ 22.35 hrs Surf.Area= 3 sf Storage= 0 cf

Plug-Flow detention time= 0.1 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,222.6 - 1,222.5)

Volume	Invert	Avail.Storage	Storage Description
#1	46.90'	1,936 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.90	0	0.0	0	0	0
47.00	7	10.0	0	0	8
48.00	72	31.0	34	34	79
49.00	594	129.0	291	325	1,330
50.00	2,921	275.0	1,611	1,936	6,028

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 40.0' CPP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 46.40' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	49.80'	**24.0' long x 25.0' 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=0.02 cfs @ 22.35 hrs HW=46.97' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.02 cfs @ 1.29 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=46.90' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15: culvert 1P

Inflow Area = 4.602 ac, 5.44% Impervious, Inflow Depth = 0.00" for Brunswick 2yr event
Inflow = 0.00 cfs @ 23.73 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 23.74 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.6 min
Primary = 0.00 cfs @ 23.74 hrs, Volume= 0.002 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.05' @ 23.74 hrs Surf.Area= 4 sf Storage= 0 cf

Plug-Flow detention time= 0.2 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (1,314.1 - 1,313.9)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	10,232 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	0	0.0	0	0	0
48.50	417	145.0	70	70	1,674
49.00	3,846	336.0	922	991	8,985
49.50	10,970	497.0	3,552	4,543	19,660
49.90	17,747	678.0	5,689	10,232	36,586

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**12.0" Round Culvert** L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 47.60' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal
#2	Secondary	49.80'	**69.0' 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=0.00 cfs @ 23.74 hrs HW=48.05' TW=46.94' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.00 cfs @ 0.47 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 16: culvert 2P

Inflow Area = 5.533 ac, 6.68% Impervious, Inflow Depth = 0.01" for Brunswick 2yr event
Inflow = 0.01 cfs @ 22.62 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 22.63 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.3 min
Primary = 0.01 cfs @ 22.63 hrs, Volume= 0.005 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Peak Elev= 46.94' @ 22.63 hrs Surf.Area= 1 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.005 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (1,168.7 - 1,168.6)

Volume	Invert	Avail.Storage	Storage Description
#1	46.90'	1,936 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
46.90	0	0.0	0	0	0
47.00	7	10.0	0	0	8
48.00	72	31.0	34	34	79
49.00	594	129.0	291	325	1,330
50.00	2,921	275.0	1,611	1,936	6,028

Device	Routing	Invert	Outlet Devices
#1	Primary	46.90'	**12.0" Round Culvert** L= 40.0' CPP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 46.40' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Secondary	49.80'	**24.0' long x 25.0' 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=0.01 cfs @ 22.63 hrs HW=46.94' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.01 cfs @ 0.96 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=46.90' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 17: USF 1

Inflow Area =	1.177 ac, 42.36% Impervious, Inflow Depth = 0.47" for Brunswick 2yr event			
Inflow =	0.25 cfs @	12.60 hrs, Volume=	0.046 af	
Outflow =	0.10 cfs @	13.43 hrs, Volume=	0.046 af, Atten= 62%, Lag= 49.9 min	
Primary =	0.10 cfs @	13.43 hrs, Volume=	0.046 af	
Secondary =	0.00 cfs @	5.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 50.66' @ 13.44 hrs Surf.Area= 2,210 sf Storage= 344 cf

Plug-Flow detention time= 25.8 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 25.8 min (958.7 - 932.9)

Volume	Invert	Avail.Storage	Storage Description
#1	50.50'	17,091 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
50.50	2,048	192.0	0	0	2,048
51.00	2,569	228.0	1,152	1,152	3,256
52.00	4,165	386.0	3,335	4,487	10,982
52.50	4,950	594.0	2,276	6,763	27,205
53.00	5,983	738.0	2,729	9,492	42,472
54.00	9,340	1,061.0	7,599	17,091	88,721

Device	Routing	Invert	Outlet Devices
#1	Primary	47.88'	**1.5" Vert. Orifice/Grate** C= 0.600
#2	Device 1	48.01'	**4.0" Round Culvert** L= 27.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 47.88' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	50.50'	**2.440 in/hr Exfiltration over Surface area above 48.01'** Excluded Surface area = 0 sf Phase-In= 0.01'
#4	Secondary	52.00'	**6.0' 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=0.10 cfs @ 13.43 hrs HW=50.66' TW=48.02' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Orifice Controls 0.10 cfs @ 7.83 fps)
  └─**2=Culvert** (Passes 0.10 cfs of 0.57 cfs potential flow)
    └─**3=Exfiltration** (Passes 0.10 cfs of 0.12 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=50.50' TW=48.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 18: USF2

Inflow Area = 0.365 ac, 49.73% Impervious, Inflow Depth = 0.63" for Brunswick 2yr event
Inflow = 0.25 cfs @ 12.04 hrs, Volume= 0.019 af
Outflow = 0.06 cfs @ 12.50 hrs, Volume= 0.019 af, Atten= 77%, Lag= 27.2 min
Primary = 0.06 cfs @ 12.50 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.18' @ 12.50 hrs Surf.Area= 1,029 sf Storage= 173 cf

Plug-Flow detention time= 20.1 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 20.1 min (904.5 - 884.5)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	5,588 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	851	171.0	0	0	851
49.00	2,019	272.0	1,394	1,394	4,418
50.00	3,045	383.0	2,514	3,908	10,213
50.50	3,685	435.0	1,680	5,588	13,604

Device	Routing	Invert	Outlet Devices
#1	Primary	45.26'	**1.5" Vert. Orifice/Grate** C= 0.600
#2	Device 1	45.48'	**4.0" Round Culvert** L= 45.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 45.26' S= 0.0049 '/' Cc= 0.900 n= 0.010 PVC, smooth interior
#3	Device 2	48.00'	**2.400 in/hr Exfiltration over Surface area above 45.48'** Excluded Surface area = 0 sf Phase-In= 0.01'
#4	Secondary	49.50'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.06 cfs @ 12.50 hrs HW=48.18' TW=44.83' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Passes 0.06 cfs of 0.10 cfs potential flow)
  └─**2=Culvert** (Passes 0.06 cfs of 0.50 cfs potential flow)
    └─**3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=48.00' TW=48.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 19: DMH 3

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 0.47" for Brunswick 2yr event
Inflow = 0.10 cfs @ 13.43 hrs, Volume= 0.046 af
Outflow = 0.10 cfs @ 13.44 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 13.44 hrs, Volume= 0.046 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 48.02' @ 13.44 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	47.88'	**15.0" Round Culvert** L= 130.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 46.22' S= 0.0128 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.10 cfs @ 13.44 hrs HW=48.02' TW=46.39' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.10 cfs @ 1.27 fps)

Summary for Pond 20: DMH 2

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 0.47" for Brunswick 2yr event
Inflow = 0.10 cfs @ 13.44 hrs, Volume= 0.046 af
Outflow = 0.10 cfs @ 13.44 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 13.44 hrs, Volume= 0.046 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 46.39' @ 13.40 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	46.22'	**15.0" Round Culvert** L= 319.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.63' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.10 cfs @ 13.44 hrs HW=46.39' TW=44.83' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.10 cfs @ 1.47 fps)

Summary for Pond 21: DMH 1

Inflow Area = 7.252 ac, 17.85% Impervious, Inflow Depth = 0.11" for Brunswick 2yr event
Inflow = 0.15 cfs @ 12.81 hrs, Volume= 0.066 af
Outflow = 0.15 cfs @ 12.81 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 12.81 hrs, Volume= 0.066 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 44.83' @ 12.81 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	44.63'	**18.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.15 cfs @ 12.81 hrs HW=44.83' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.15 cfs @ 1.66 fps)

Summary for Pond 22: CB 1

Inflow Area = 5.709 ac, 10.75% Impervious, Inflow Depth = 0.00" for Brunswick 2yr event
Inflow = 0.00 cfs @ 24.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 24.10 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 45.59' @ 5.00 hrs Surf.Area= 13 sf Storage= 0 cf

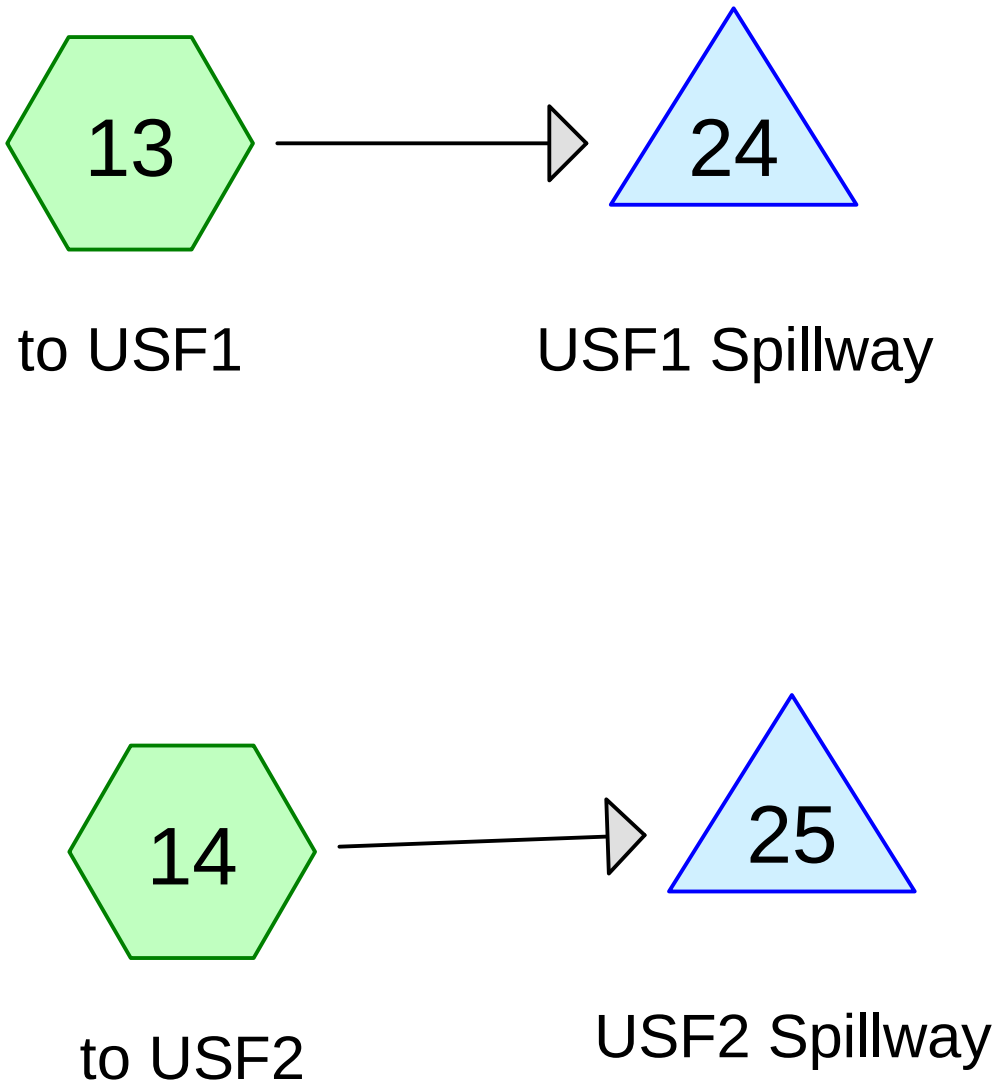
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

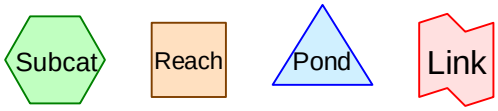
Volume	Invert	Avail.Storage	Storage Description
#1	45.59'	14,215 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
45.59	13	16.0	0	0	13
48.49	13	16.0	38	38	59
48.50	20	16.0	0	38	60
49.00	99	48.0	27	65	223
49.50	14,754	799.0	2,677	2,742	50,843
50.00	32,265	731.0	11,473	14,215	59,131

Device	Routing	Invert	Outlet Devices
#1	Primary	45.50'	**15.0" Round Culvert** L= 173.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 44.63' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 24.10 hrs HW=45.59' TW=44.70' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.00 cfs of 0.03 cfs potential flow)





Drainage Diagram for 12600 VGM LLC Brunswick Spillway
Prepared by Wright-Pierce, Printed 2/22/2013
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Summary for Subcatchment 13: to USF1

Runoff = 1.35 cfs @ 12.51 hrs, Volume= 0.188 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
	21,961	39	Pasture/grassland/range, Good, HSG A
*	1,511	98	New Site Pavement
*	882	98	New Site Misc. Pads
*	7,668	98	New Site Pad
*	2,500	98	New Site Building
*	4,415	98	New Site Tanks
*	4,753	98	New Site Access
*	7,600	39	New Site Filter Area
	51,290	64	Weighted Average
	29,561		57.64% Pervious Area
	21,729		42.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.6	205	0.0107	0.10		**Sheet Flow, SF 1** Grass: Dense n= 0.240 P2= 3.00"
0.4	118	0.0169	4.70	38.81	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
34.0	323	Total			

Summary for Subcatchment 14: to USF2

Runoff = 1.04 cfs @ 12.03 hrs, Volume= 0.068 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr Brunswick 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
	4,840	39	Pasture/grassland/range, Good, HSG A
*	7,917	98	New Site Access
*	3,163	39	New Site Filter Area
	15,920	68	Weighted Average
	8,003		50.27% Pervious Area
	7,917		49.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0208	1.03		**Sheet Flow, SF 1** Smooth surfaces n= 0.011 P2= 3.00"
1.0	306	0.0182	4.88	40.27	**Trap/Vee/Rect Channel Flow, CF 1** Bot.W=1.00' D=1.50' Z= 3.0 '/' Top.W=10.00' n= 0.035 Earth, dense weeds
1.4	331	Total			

Summary for Pond 24: USF1 Spillway

Inflow Area = 1.177 ac, 42.36% Impervious, Inflow Depth = 1.91" for Brunswick 25 yr event
Inflow = 1.35 cfs @ 12.51 hrs, Volume= 0.188 af
Outflow = 0.23 cfs @ 14.16 hrs, Volume= 0.086 af, Atten= 83%, Lag= 98.9 min
Secondary = 0.23 cfs @ 14.16 hrs, Volume= 0.086 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 52.06' @ 14.16 hrs Surf.Area= 4,253 sf Storage= 4,665 cf

Plug-Flow detention time= 305.5 min calculated for 0.086 af (46% of inflow)
Center-of-Mass det. time= 172.1 min (1,055.8 - 883.7)

Volume	Invert	Avail.Storage	Storage Description
#1	50.50'	17,024 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
50.50	1,792	176.0	0	0	1,792
51.00	2,569	228.0	1,084	1,084	3,467
52.00	4,165	386.0	3,335	4,419	11,193
52.50	4,950	594.0	2,276	6,695	27,416
53.00	5,983	738.0	2,729	9,425	42,683
54.00	9,340	1,061.0	7,599	17,024	88,932

Device	Routing	Invert	Outlet Devices
#1	Secondary	52.00'	**6.0' 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

Secondary OutFlow Max=0.23 cfs @ 14.16 hrs HW=52.06' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.23 cfs @ 0.65 fps)

Summary for Pond 25: USF2 Spillway

Inflow Area = 0.365 ac, 49.73% Impervious, Inflow Depth = 2.24" for Brunswick 25 yr event
Inflow = 1.04 cfs @ 12.03 hrs, Volume= 0.068 af
Outflow = 0.02 cfs @ 17.85 hrs, Volume= 0.010 af, Atten= 98%, Lag= 349.4 min
Secondary = 0.02 cfs @ 17.85 hrs, Volume= 0.010 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-50.00 hrs, dt= 0.05 hrs

Peak Elev= 49.51' @ 17.85 hrs Surf.Area= 2,514 sf Storage= 2,542 cf

Plug-Flow detention time= 535.1 min calculated for 0.010 af (15% of inflow)
Center-of-Mass det. time= 387.2 min (1,230.5 - 843.3)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	5,588 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
48.00	851	171.0	0	0	851
49.00	2,019	272.0	1,394	1,394	4,418
50.00	3,045	383.0	2,514	3,908	10,213
50.50	3,685	435.0	1,680	5,588	13,604

Device	Routing	Invert	Outlet Devices
#1	Secondary	49.50'	**15.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Secondary OutFlow Max=0.02 cfs @ 17.85 hrs HW=49.51' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.02 cfs @ 0.21 fps)