ALLEN & MAJOR ASSOCIATES, INC.
100 Commerce Way
P.O. Box 2118
Woburn, MA 01888-0118
Tel: (781) 935-6889
Fax: (781) 935-2896

December 17, 2020

Ms. Kathryn A. Joubert
Town Planner
Planning Department
Northborough Town Hall
63 Main Street
Northborough MA, 01532

Re: A&M Project #: 1145-09
Definitive Subdivision Impact Report
0 Bartlett Street
Northborough, MA 01532
Assessors Map 51 Parcel 3 &
Assessors Map 66 Parcel 16

Dear Ms. Joubert,

On behalf of the Applicant, The Gutierrez Company; Allen & Major Associates, Inc. (A&M) respectfully submits this impact report in support of a definitive subdivision package submission for the proposed project located at 0 Bartlett Street, Assessors Map 51 Parcel 3 & Assessors Map 66 Parcel 16. Submittal items are as follows:

- Definitive Subdivision Site Plans entitled *"Plans for Non-Residential Definitive Subdivision of Land – Parcel H Way",* prepared by Allen & Major Associates, Inc., dated December 17, 2020.
- Form C Definitive Subdivision Application, signed
- Definitive Subdivision Filing fee check in the amount of $1,400 (for 4 total lots created), made payable to Town of Northborough, and a copy of filing fee check
- Certified abutters list provided by Northborough Assessor's office and labels for Planning Board notification of abutters
- A list of waivers sought for the project
- A memorandum from the Massachusetts Historical Commission (MHC) dated July 7, 2020 indicating "no adverse effects" from the Parcel H project
- Subsurface soils investigation results including test pit locations plan and Form 11 and NRCS soils report
- Drainage design calculations including existing and proposed watershed plans, HydroCAD output and stormwater pipe sizing table
- Traffic Memorandum prepared by VHB dated December 16, 2020 (175 pages, 3 copies provided under separate cover)
- Phase 1 Environmental Assessment report prepared by Sanborn Head (713 pages, 1 copy

provided under separate cover)

- Geotechnical engineering letter report prepared by Langan Engineering dated March 30, 2020 (82 pages, 1 copy provided under separate cover)

In addition to the documents noted above, the Applicant offers the following statements regarding the project in Accordance with Section 10-12-060 – Impact Report, of the Town of Northborough Subdivision Rules and Regulations, which requires an Impact Report for any subdivision application. The numbers below correspond to the items listed in Section 10-12-060. It should be noted that the driveway proposed by the project is intended solely for private use and would not be made public.

Section 10-12-060 – Impact Report:

1. A traffic impact assessment shall be submitted: A traffic memorandum prepared by VHB dated November 23, 2019 has been submitted with this impact report.

2. Time schedule for construction: There is no currently known construction time schedule.

3. Changes in surface drainage: No building is currently proposed on-site. The proposed subdivision road would create approximately 0.48+/- acres of impervious surface, which is approximately only 0.7% of the total site area. Therefore, 99.3% of the site is proposed to remain as pervious cover. The small area of proposed impervious area will be treated by catch basins with deep sumps and hoods, a water quality unit, and a surface drainage basin.

4. Increased consumption of groundwater: No building is currently proposed on-site, therefore, no increase in groundwater consumption is anticipated at this time.

5. Impact upon the existing water supply and distribution systems and well capacity of the town: No building is currently proposed on-site, therefore, no impact to the existing water supply is anticipated at this time.

6. Discharge of any material into the air or water: No building is currently proposed on-site, therefore, no permanent, long-term discharges to the air are anticipated at this time. Discharge of treated stormwater runoff from the proposed basin is expected, and will be discharged in accordance with the Commonwealth's Stormwater Management Standards.

7. Land erosion or loss of tree cover: Significant land erosion and/or loss of tree cover is not anticipated for the proposed subdivision. A rip-rap emergency overflow weir located at the eastern portion of the detention basin is the only proposed stormwater discharge point and will only discharge stormwater during significant rainfall events. The area of the proposed subdivision road has largely been historically cleared of woodland cover, and the existing cover is largely grass and scrub/shrub habitat. Therefore, significant loss of tree cover is not anticipated.

8. Harmony with the character of surrounding development: The subdivision is in the industrial zone located along Bartlett Street which is characterized by warehouse buildings of varying sizes in the immediate vicinity of the subdivision. The site is bordered by two industrial warehouse buildings to the east, and a residential zone and the Northborough Regional Highschool to the west and north. No building is currently proposed, but it is expected that the building(s), when developed, will be designed in

keeping with the style and character of industrial warehouse buildings. Lots H1 and H2 (which border the residential district and high school) will be screened by natural existing vegetation on the sides bordering those uses. Additionally, a minimum 50-foot natural buffer has been maintained between the industrially zoned subdivision lots and any residentially zoned district or development, per Section 10-20-020 "Plan Specifications" of the Town of Northborough Subdivision Rules and Regulations.

9. Identification of potential impacts to significant historic and archeological resources: The subdivision road proposes to cross over a Massachusetts MWRA aqueduct by means of a right-of-way over an existing earthen berm to access the site. The aqueduct is a historical linear feature. It is located approximately 14' below the surface in the area of the subdivision road. The Massachusetts Historical Commission (MHC) has reviewed the roadway design and crossing and has determined that the proposed crossing will have "no adverse effect" on the aqueduct. A copy of the memo, dated July 7, 2020, has been included with this filing.

10. Impact on pedestrian safety and convenience: The subdivision roadway has been designed to meet the Town of Northborough's design requirements by providing sidewalks along its length for pedestrian access, safety and convenience. The subdivision road is designed to meet the American Association of State & Highway Transportation Officials (AASHTO) requirements for safe sight lines along its length and where it meets with Bartlett Street. The roadway layout is designed to connect to a broader sidewalk network, should the community elect to advance plans along Bartlett Street and/or along the MWRA easement.

10. Noise impacts on residential premises: As no building is currently proposed, no noise impacts are able to be assessed.

11. Drainage impacts and control measures to protect adjacent properties within the subdivision and abutters' properties: An infiltration basin is proposed on-site to handle stormwater from the subdivision road. The infiltration basin is located in the interior of the site, not proximate to any abutter.

12. Impacts upon groundwater quality level. No building is currently proposed on-site. As just 0.7% of the site is proposed to be converted to impervious cover, groundwater quality and level should not be significantly impacted.

13. Impact upon surface water quality and level. No building is currently proposed on-site. As just 0.7% of the site is proposed to be converted to impervious cover, surface water quality and level should not be significantly impacted.

Section 10-16-030 (C.) Conformance with Master Plan: The project conforms with the Town of Northborough's 2020 Master Plan as follows:

- Land Use: The subject subdivision is located within the Industrial Zoning District and the subject lots will be developed with projects that are consistent with the zoned uses.
- Economic Development: The subdivision is part of the Crossroads Industrial Site. As noted in the Master Plan, "*The Crossroads Industrial Site has the potential for additional professional and advanced manufacturing employment.*" The subject land would be used to house such businesses. As also noted in the Master Plan, the site is one of the last remaining vacant parcels zoned for industrial use. As such, there are few if any

alternative locations for industrial uses.

- The subject site has conserved 13.2 acres of Conservation Restriction area. In total, more than 40 acres of Conservation Restriction land has been created by the Applicant on-site and on adjacent parcels.

The Applicant respectfully submits the following additional select information to the Planning Board per Section 10-20-030 of the Town of Northborough Subdivision Rules and Regulations, to clarify how the project meets the required content:

C. A certified abutter list as well as mailing labels have been included with the submission.

P. Subsurface investigation results including test pit data and groundwater conditions have been summarized and enumerated in the Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal sheets included with this submission. Percolation tests are not required as no septic system is needed for the project based on available municipal sewer services available within Bartlett Street. A copy of the geotechnical engineering letter report prepared by Langan Engineering dated March 30, 2020 (82 pages) has been provided under a separate cover.

V. A sketch plan showing a possible or prospective street layout for any adjacent land owned or controlled by the owner or the Applicant of the subdivision is not required as no properties or land adjacent to the subject sites are currently owned by the applicant for this definitive subdivision filing.

X. As described in response 8 above, a minimum 50-foot natural buffer has been maintained between the industrially zoned subdivision land and any residentially zoned district or development, per Section 10-20-020 “Plan Specifications” of the Town of Northborough Subdivision Rules and Regulations.

Y. A Phase 1 Environmental Site Assessment report prepared by a Licensed Site Professional has been included with this definitive subdivision submission filing under a separate cover.

In accordance with Section 10-20-040 “Environmental Analysis” of the Town of Northborough Subdivision Rules and Regulations, an environmental analysis is required whenever a subdivision proposes to create five (5) or greater lots. Four (4) total lots serviced by a private driveway are proposed. Therefore, an environmental analysis is not required and has not been included with this definitive subdivision filing.

Section 10-20-010C.(5) “General Provisions” and Section 10-16-030D. indicate that alternative plans to minimize blasting shall be submitted at the definitive stage, should blasting be anticipated on-site. Subsurface geotechnical investigations and test pits did not encounter any ledge on-site, and no blasting is anticipated given the small footprint of the proposed private access drive and limited site excavation. Additionally, a significant portion of the proposed private driveway crosses over a man-made earthen berm where bedrock is extremely unlikely to be encountered. Ground penetrating sonar analysis did not encounter any ledge in the area of the aqueduct.

Allen & Major Associates, Inc. looks forward to working with the Town of Northborough on this project. If you have any questions regarding this request, please do not hesitate to contact me directly at (781)-305-9426.

Very truly yours,

ALLEN & MAJOR ASSOCIATES, INC.

David M. Robinson, E.I.T.
Project Engineer-in-Training
Direct : (781)-305-9426
Cell : (603)-553-8151

Cc : The Gutierrez Company, Record file

NORTHBOROUGH PLANNING BOARD
63 Main Street
Northborough MA 01532
(508) 393-5019 office (508) 393-6996 fax
www.town.northborough.ma.us

FORM C
APPLICATION FOR A DEFINITIVE SUBDIVISION PLAN

The undersigned, being the applicant as defined under Ch. 41, Section 81-L, hereby submits said plan as a DEFINITIVE SUBDIVISION PLAN in accordance with the Rules & Regulations of the Northborough Planning Board and makes application to the Board for approval of said plan as shown on a plan entitled:

Name of Subdivision: Parcels B & H Subdivision

Location: 0 Bartlett Street (Map 51 Lot 3 and Map 66 Lot 16)

GIS Map & Parcel: PID 051.0-0003-0000.0 and PID 066.0-0016-0000.0

Zoning District: Industrial (I)

Groundwater District: GW-3 and GW-1 (Map 66 Lot 16) , GW-3 (Map 51 Lot 3)

Number of Proposed Lots: 4 total lots proposed

Total Acreage: 66.08+/- acres

Plans Prepared By: Allen & Major Associates, Inc.

Dated: December 17, 2020

The undersigned's title to said land is derived from:

By deed dated: Bk 23107, Pg 356, dated Oct. 17, 2000 (Map 51, Lot 3) and Bk 59095 Pg. 396 dated July 13, 2018, (Map 66, Lot 16)

Recorded in the Worcester County Registry of Deeds, Book: SEE ABOVE Page: SEE ABOVE

Registered in the Worcester Registry District of the Land Court, Certificate of Title No: N/A

And said land is current with regard to taxes and is free of encumbrances except for the following:

Said plan has (X) has not ( ) evolved from a preliminary plan submitted to the Board on July 8, 2020

And approved ( ), or approved with modifications ( ), or disapproved (X) on October 20, 2020

Waivers requested from the Northborough Subdivision Rules & Regulations:

See attached waivers list

Applicants Name: Israel Lopez (The Gutierrez Company)

Address/Phone/Email: 200 Summit Drive, Suite 400, Burlington MA 01803

Ph: (781)-685-4367 E-mail: ilopez@gutierrezco.com

Applicant's Signature:

Owners Name: Northborough Land Realty Trust, c/o Arthur J. Gutierrez Jr. as Trustee and not individually

Address/Phone/Email: SAME AS ABOVE

Owners Signature:

Received by Town Clerk: Date:

Town of Northborough

63 Main Street
Northborough, Massachusetts 01532

Project Address: 0 Bartlett Street (Map 51 Lot 3 & Map 66 Lot 16)

Please check all that apply: * Form B ____ * Form C X

Distribution List

The Subdivision Control Law, Sections 190-18(A) and 190-22(D), require that when either a Preliminary or Definitive Subdivision Plan is submitted to the Town Clerk, the applicant will simultaneously deliver an additional copy of such plan to:

Town Office	Received By	Date
Second Floor		
Town Clerk (requires original application)		
Board of Selectmen** (Administration Office)		
Fire Department (Administration Office)		
Police Department (Administration Office)		
Department of Public Works		
Assessor		
Board of Health (Building Department)		
Building Inspector (Building Department)		
First Floor		
Conservation Commission (Engineering Department)		
Town Engineer (Engineering Department)		
Earth Removal Board (Engineering Department)		
Town Planner (Planning Department)		
Planning Board (Planning Department) (requires 5 copies)		

** If a street name is not chosen from the historical list of street names (available from the Planning and Engineering Departments), the applicant must have written approval from the Board of Selectmen.

Note: A completed distribution sheet must be returned to the Town Planner.

ALLEN & MAJOR ASSOCIATES, INC. • WOBURN, MA 01801

52918

DATE	INVOICE NO.	COMMENT	AMOUNT	NET AMOUNT
11/09/2020	110920	Difinitive Filing Fee		1,400.00
DATE 11/09/20		**VENDOR** Town of Northborough	**TOTAL**	1,400.00

ALLEN & MAJOR ASSOCIATES, INC.
OPERATING ACCOUNT
100 COMMERCE WAY
WOBURN, MA 01801

NORTHERN BANK & TRUST COMPANY 53-309/113

52918

One Thousand Four Hundred and no/100

DATE	CHECK NO.	AMOUNT
11/09/20	52918	$1,400.00

PAY TO THE ORDER OF
TOWN OF NORTHBOROUGH
NORTHBOROUGH TOWN HALL
ASSESSOR'S OFFICE C/O JULIE BROWNLEE
63 MAIN STREET
NORTHBOROUGH MA 01532-1994

ALLEN & MAJOR ASSOCIATES, INC.

AUTHORIZED SIGNATURE

⑈052918⑈ ⑆011303097⑆ ⑈480 286 1⑈

Town of Northborough

Office of the Board of Assessors

63 Main Street, Massachusetts 01532-1994
Mon, Wed, Thurs 8-4 / Tuesday 8-7 / Friday 7-12
508-393-5005 phone, 508-393-6996 fax

JUN 22 2020

Certified Abutters List Request

Please allow 10 business days.

DATE of REQUEST	June 22, 2020
REQUESTING COMPANY	Allen & Major Associates, Inc.
CONTACT PERSON	Dave Robinson, EIT
PHONE	781-305-9426
EMAIL	drobinson@allenmajor.com
PROPERTY ADDRESS(es)	0 & ~~301~~ Bartlett Street
MAP/PARCEL(s)	Map 51 Lot 3 and Map 66 Lot 16
OWNER(s)	NORTHBOROUGH LAND REALTY TRUST
OWNER MAILING ADDRESS(es)	200 Summit Drive, Suite 400, Burlington, MA 01803

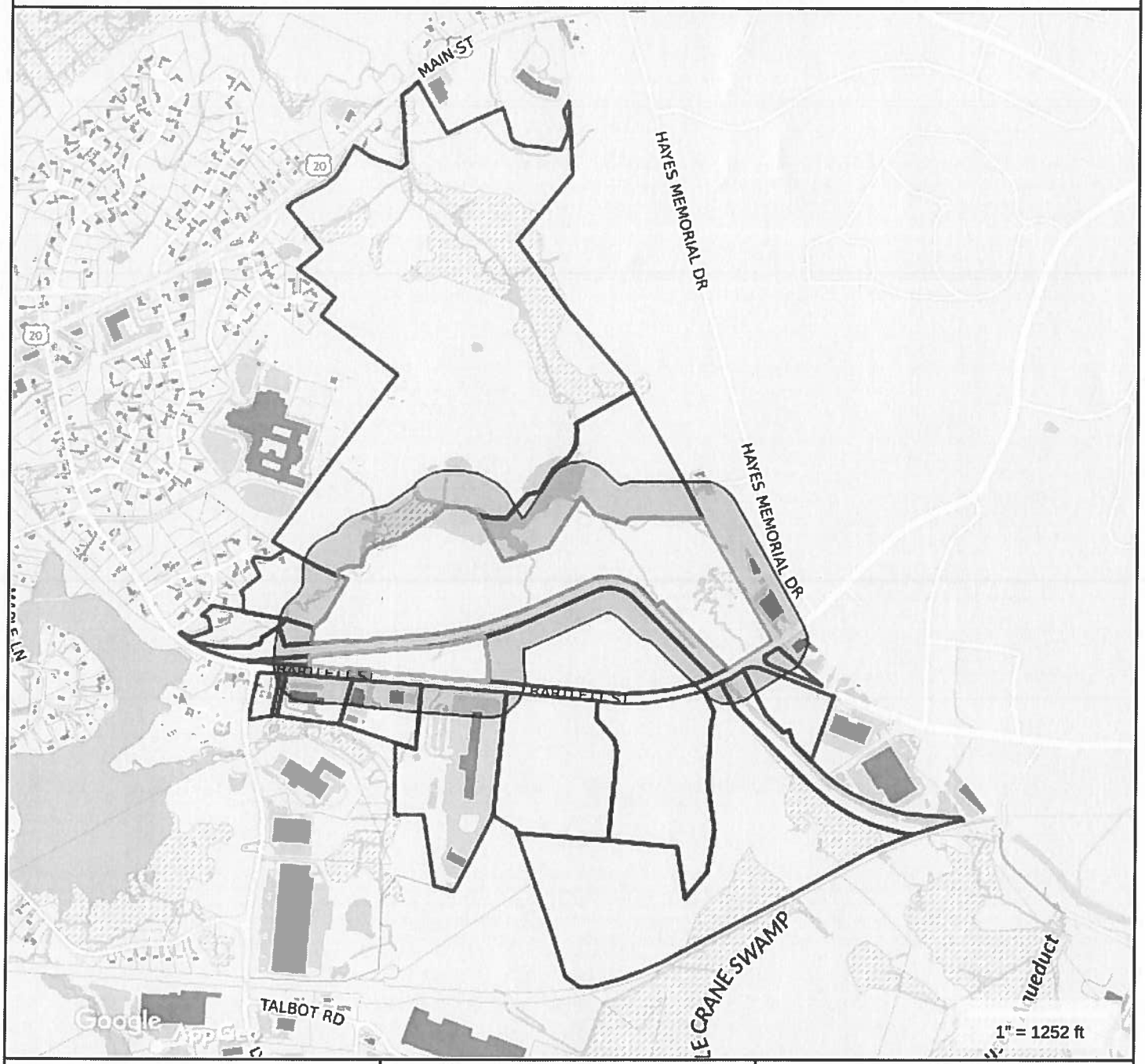
REQUESTING BOARD	APPLICABLE REGULATIONS	ABUTTERS / DISTANCE	#LABEL SETS	FEE
___ Planning Board – Scenic Road	Town Code Chapter 2-52-050	Owners within 100' of property	3 sets	$15
___ Planning Board – Site Plan	Planning Board Rules & Regulations Section 7.2 D(5)	Owners within 300' of property	3 sets	$15
___ Planning Board – Special Permit	MGL Chapter 40A Section 11	Owners within 300' of property	3 sets	$15
X Planning Board – Subdivisions	MGL Chapter 41 Section 81T	Owners within 300' of property	3 sets	$15
___ ZBA – Zoning Board of Appeals	MGL Chapter 40A Section 11	Owners within 300' of property	3 sets	$15
___ Conservation Commission	MGL Chapter 131, Section 40, MA Wetlands Protection Act, & the Northborough Wetlands Protection Bylaw	100' of property, unless otherwise stated	1 set	$10
___ Board of Health	Dependent on project	Owners within 100' of property	3 sets	$15
___ Board of Selectman: Fuel Storage	MGL Chapter 148, Section 13	Abutting owners & directly opposite	3 sets	$15
___ Board of Selectman: Liquor License	MGL Chapter 138, Section 15A	Abutting owners, & any school, church, or hospital within 500' of property	2 sets	$25
___ Board of Selectman: Pole Petition	MGL Chapter 166, Section 22	Abutting owners & directly opposite	1 set	$15
___ Board of Selectmen: Street Acceptance		Owners with driveways on the street	1 set	$10
___ DPW – Dept of Public Works	Dependent on project	Dependent on project: _____ feet	?	$10+
___ Engineering: Earth Works	Northborough Town Bylaws: Part 2 - General Legislation, Chapter 2-28, Earth Removal	Owners within 100' of property	1 set	$10
___ Other: _____				

To the Requesting Board/s: We certify that, from our Real Estate Property Lists, the following persons attached hereto appear as owners of all abutting property, as specified by the appropriate regulation (including, but not limited to, owners of land directly opposite said proposed activity on any public or private street or way, or across a body of water), as amended to the best of our knowledge and belief. If the property is within abutting distance of another Town, please contact their Assessors Office for another abutters list.

DATE of CERTIFICATION 6/23/20

Julie Brownlee/Megan Hennessy for the Board of Assessors
jbrownlee@town.northborough.ma.us ; mhennessy@town.northborough.ma.us

300ft Abutters Map - 0 Bartlett and 0 Bartlett



Property Information

Property ID	066.0-0016-0000.0
Location	0 BARTLETT STREET
Owner	NORTHBOROUGH LAND REALTY TRUST

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of Northborough, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

300ft Abutters List - 0 Bartlett and 0 Bartlett St

June 23, 2020

ID	Address #	Street Name	Owner Name	Owner Name 2	Owner Address 1	Owner Address 2	Owner City	State	Zip
051.0-0001-0000.0	0	BARTLETT STREET	COMMONWEALTH OF MASS/DCR	AQUEDUCT	251 CAUSEWAY STREET 8th Floor		BOSTON	MA	02114-2104
051.0-0002-0000.0	0	BARTLETT STREET	JENKINS PETER R Trustee	STIRRUP BROOK REALTY TRUST	1 MASTHEAD LANE		DARTMOUTH	MA	02748
051.0-0003-0000.0	0	BARTLETT STREET	NORTHBOROUGH LAND REALTY TRUST	GUTIERREZ ARTURO J & CATALI	200 WHEELER ROAD		BURLINGTON	MA	01803
066.0-0004-0000.0	0	BARTLETT STREET	JENKINS PETER R Trustee	STIRRUP BROOK REALTY TRUST	1 MASTHEAD LANE		DARTMOUTH	MA	02748
066.0-0009-0000.0	0	BARTLETT STREET	GOW IAN		146 BOSTON ROAD		SOUTHBOROUGH	MA	01772-1622
066.0-0016-0000.0	0	BARTLETT STREET	NORTHBOROUGH LAND REALTY TRUST	GUTIERREZ ARTURO J & CATALI	200 WHEELER ROAD		BURLINGTON	MA	01803
067.0-0001-0000.0	0	BARTLETT STREET	A2/BARTLETT AVE LLC		300 BAKER AVENUE Suite 280		CONCORD	MA	01742
067.0-0005-0000.0	0	BARTLETT STREET	COMMONWEALTH OF MASS/DCR	AQUEDUCT	251 CAUSEWAY STREET 8th Floor		BOSTON	MA	02114-2104
052.0-0097-0000.0	127	BARTLETT STREET	KIM EUGENE O & LINDA K Trustees	EUGENE O KIM 21 FAMILY TRUST	127 BARTLETT STREET		NORTHBOROUGH	MA	01532
066.0-0008-0000.0	170	BARTLETT STREET	FUNNLORE REALTY TRUST		170 BARTLETT STREET		NORTHBOROUGH	MA	01532
066.0-0007-0000.0	200	BARTLETT STREET	DUCEY JAMES JR & SHEA JOHN Trustees	BARTLETT ST REALTY TRUST	290 DURFEE STREET	c/o JASON DUCEY	SOUTHBRIDGE	MA	01550
066.0-0015-0000.0	210	BARTLETT STREET	NBORO REALTY LLC	c/o A DUIE PYLE INC	PO BOX 564		WEST CHESTER	PA	19381-0564
067.0-0007-0000.0	300	BARTLETT STREET	NBI NORTHBOROUGH LLC		c/o NORTHBRIDGE PARTNERS LLC	401 EDGEWATER PLACE Suite 107	WAKEFIELD	MA	01880
066.0-0005-0000.0	301	BARTLETT STREET	301 BARTLETT STREET LLC		28 STATE STREET 10th Floor		BOSTON	MA	02109
067.0-0008-0000.0	330	BARTLETT STREET	HILLSIDE XI LLC		28 STATE STREET 10th Floor		BOSTON	MA	02109
067.0-0006-0000.0	350	BARTLETT STREET	HILLSIDE XI LLC		28 STATE STREET 10th Floor		BOSTON	MA	02109
067.0-0004-0000.0	400	CEDAR HILL STREET	ACZ CEDAR HILL LLC		c/o CFC Investment & Mngmt Co Inc	1150 MAIN STREET Suite 1	CONCORD	MA	01742
050.0-0001-0000.0	150	HAYES MEMORIAL DRIVE	HAYES G LLC		28 STATE STREET 10th Floor		BOSTON	MA	02109
066.0-0010-0000.0	1	LYMAN STREET	GOW IAN		146 BOSTON ROAD		SOUTHBOROUGH	MA	01772-1622
033.0-0048-0000.0	0	MAIN STREET	NORTHBOROUGH-SOUTHBOROUGH	REGIONAL SCHOOL DISTRICT	99 BARTLETT STREET		NORTHBOROUGH	MA	01532
051.0-0009-0000.0	18	STIRRUP BROOK LANE	WATERS GARRETT J	WATERS KATHRINE D	18 STIRRUP BROOK LANE		NORTHBOROUGH	MA	01532

List of Waivers Requested

Definitive Subdivision Filing at 0 Bartlett Street (Map 51 Lot 3 and Map 66 Lot 16)

- No waivers requested.

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

July 7, 2020

Douglas L. Landry
Langan Engineering & Environmental Services, Inc.
26 ½ Grove Street
Natick, MA 01760

RE: Parcel H Development, 301 Bartlett Street, Northborough, MA. MHC #RC.67694. **EEA #16152.**

Dear Mr. Landry:

Staff of the Massachusetts Historical Commission (MHC) have reviewed additional information, prepared and submitted by Langan Engineering & Environmental Services, Inc., for the project referenced above.

Additional information indicates that the project has been designed to avoid and minimize adverse effects to the significant historic structure of the Wachusett Aqueduct. Lightweight fill material will be placed within the project access road over the aqueduct to distribute heavy vehicle loads. All new utilities and road safety equipment will be installed with approximately 8 feet of separation from the Aqueduct.

After review of additional information and MHC files, the MHC has determined that the project as proposed will have "no adverse effect" (950 CMR 71.07(2)(b)(2)) on the Wachusett Aqueduct Linear Historic District. If project plans change in future, then current project information should be submitted by the project engineer or proponent to the MHC for review and comment.

These comments are provided to assist in compliance with Massachusetts General Laws Chapter 9, Sections 26-27C (950 CMR 71) and MEPA (301 CMR 11). If you have questions or require additional information, please contact Jonathan K. Patton at this office.

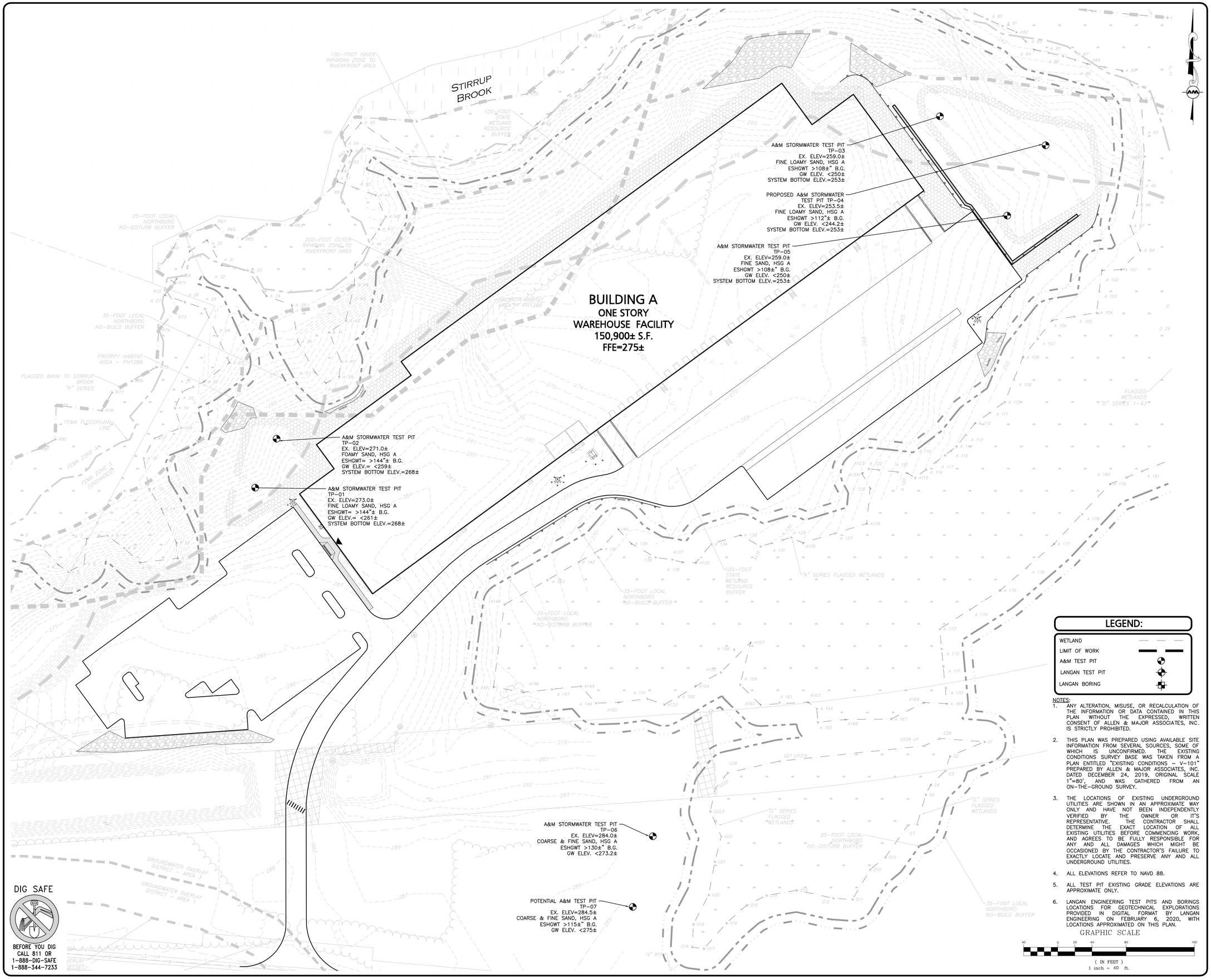
Sincerely,

Brona Simon

Brona Simon
Executive Director
State Historic Preservation Officer
State Archaeologist
Massachusetts Historical Commission

xc: Israel Lopez, The Gutierrez Company
Ralph Francesconi, MWRA
Katie Ronan, MWRA

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc



LEGEND:

- WETLAND
- LIMIT OF WORK
- A&M TEST PIT
- LANGAN TEST PIT
- LANGAN BORING

NOTES:

1. ANY ALTERATION, MISUSE, OR RECALCULATION OF THE INFORMATION OR DATA CONTAINED IN THIS PLAN WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.
2. THIS PLAN WAS PREPARED USING AVAILABLE SITE INFORMATION FROM SEVERAL SOURCES, SOME OF WHICH IS UNCONFIRMED. THE EXISTING CONDITIONS SURVEY BASE WAS TAKEN FROM A PLAN ENTITLED "EXISTING CONDITIONS – V-101" PREPARED BY ALLEN & MAJOR ASSOCIATES, INC. DATED DECEMBER 24, 2019, ORIGINAL SCALE 1"=80', AND WAS GATHERED FROM AN ON-THE-GROUND SURVEY.
3. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
4. ALL ELEVATIONS REFER TO NAVD 88.
5. ALL TEST PIT EXISTING GRADE ELEVATIONS ARE APPROXIMATE ONLY.
6. LANGAN ENGINEERING TEST PITS AND BORINGS LOCATIONS FOR GEOTECHNICAL EXPLORATIONS PROVIDED IN DIGITAL FORMAT BY LANGAN ENGINEERING ON FEBRUARY 6, 2020, WITH LOCATIONS APPROXIMATED ON THIS PLAN.

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

ISSUED FOR CLIENT REVIEW
FEBRUARY 26, 2020

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
1	2020-02-24	RESUBMITTED FOR SITE PLAN APPROVAL

APPLICANT\OWNER:
THE GUTIERREZ COMPANY
200 SUMMIT DRIVE, SUITE 400
BURLINGTON, MA 01803

PROJECT:
PARCEL H DEVELOPMENT
BARTLETT STREET
MAP 51 LOT 3 &
MAP 66 LOT 16
NORTHBOROUGH, MA

PROJECT NO.	1145-09	DATE:	2019-12-24
SCALE:	1"=40'	DWG. NAME:	C-1145-09
DESIGNED BY:	DMR	CHECKED BY:	CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil & structural engineering • land surveying
environmental consulting • landscape architecture
www.allenmajor.com
100 COMMERCE WAY
SUITE 5
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA • LAKEVILLE, MA • MANCHESTER, NH

DRAWING TITLE:
TEST PIT LOCATIONS PLAN

SHEET No.
C-108

N:\PROJECTS\1145-09\CIVIL\DRAWINGS\CURRENT\C-1145-09 - TEST PITS PLAN.DWG

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Northborough Land Realty Trust
Owner Name

0 & 301 Bartlett Street
Street Address

Map 51, Lot 3 (0 Bartlett) and Map 66 Lot 16 (301 Bartlett)
Map/Lot #

Northborough
City

MA
State

01532
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 245C, 254B (Soil Map Unit)

245C - Hinckley loamy sand, 8-15% slopes
254B - Merrimac fine sandy loam, 3-8% slopes
Soil Name

N/A
Soil Limitations

Glaciofluvial deposits
Soil Parent material

Outwash terrace and plains
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: N/A (Year Published/Source) N/A (Map Unit)

N/A
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☒ Yes ☐ No If yes, MassGIS Wetland Data Layer: Wooded swamp (Wetland Type)

7. Current Water Resource Conditions (USGS): N/A (Month/Day/ Year) Range: ☐ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed: UC Davis Websoil survey

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-01 (Hole #) | Feb. 25, 2020 (Date) | 9:30am (Time) | Overcast, 44 deg. F (Weather) | 42.321987 (Latitude) | 71.607562 (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Deciduous trees, scrub brush (Vegetation) | None noted (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 8-15% (Slope (%))

Description of Location: Wooded deciduous forest area

2. Soil Parent Material: Glaciofluvial materials | Outwash terrace (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 185 feet | Drainage Way N/A feet | Wetlands 115 feet | Property Line 145 feet | Drinking Water Well N/A feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	Topsoil	10YR3/2								Roots noted
12-28	B1	Loamy sand	10YR5/6								
28-48	C1	Med. sand	2.5Y5/4								
48-60	C2	Coarse sand	5Y4/2								Gravelly
60-144	C3	Fine loamy sand	5Y5/2								Thin redox line @ 60" (10YR 5/8) none below

Additional Notes: No water, no weeping, Thin redox line @ 60" (10YR 5/8), none below, likely perched water table at C2/C3 interface

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-02 (Hole #) | Feb. 25, 2020 (Date) | 8:45am (Time) | Overcast (Weather) | 42.321987 (Latitude) | 71.607562 (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Deciduous trees, brush (Vegetation) | None noted (Surface Stones (e.g., cobbles, stones, boulders, etc.) | 8-15% (Slope (%)

Description of Location: Wooded deciduous forest area

2. Soil Parent Material: Glaciofluvial desposits | Outwash terrace (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 160 feet | Drainage Way N/A feet | Wetlands 100 feet
Property Line 140 feet | Drinking Water Well N/A feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	Topsoil	10YR3/2								Roots noted
12-28	B	Sandy loam	10YR5/6								
28-50	C1	Loamy sand	2.5Y5/4								
50-62	C2	Coarse sand	5Y4/2								Gravelly
62-144	C3	Fine loamy sand	5Y5/2								Thin redox line @ 62", none below

Additional Notes: No water, no weeping, Thin redox line @ 62" (10YR 5/8), none below, likely perched water table at C2/C3 interface

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #_____	Obs. Hole #_____
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: >144 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: N/A inches Lower boundary: N/A inches

c. If no, at what depth was impervious material observed? Upper boundary: N/A inches Lower boundary: N/A inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Paul G Matos

Signature of Soil Evaluator

03/06/2020

Date

Paul G. Matos / SE 1511

Typed or Printed Name of Soil Evaluator / License #

6/30/2022

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

See test pits plan, Sheet C-108, revised through March 3, 2020.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Northborough Land Realty Trust
Owner Name

0 & 301 Bartlett Street
Street Address

Map 51, Lot 3 (0 Bartlett) and Map 66, Lot 16 (301 Bartlett)
Map/Lot #

Northborough
City

MA
State

01532
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 245C, 254B (Soil Map Unit)

245C - Hinckley loamy sand, 8-15% slopes
254B - Merrimac fine sandy loam, 3-8% slopes
Soil Name

N/A
Soil Limitations

Glaciofluvial materials
Soil Parent material

Outwash terrace and plain
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: N/A (Year Published/Source) N/A (Map Unit)

N/A
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☒ Yes ☐ No If yes, MassGIS Wetland Data Layer: Wooded swamp (Wetland Type)

7. Current Water Resource Conditions (USGS): N/A (Month/Day/ Year) Range: ☐ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed: UC David Websoil Survey

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-03 (Hole #) | Feb. 25, 2020 (Date) | 2:00pm (Time) | Sunny, 54 deg. F (Weather) | 42.321987 (Latitude) | 71.607562 (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Deciduous trees, scrub brush (Vegetation) | None noted (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: Wooded deciduous forest area

2. Soil Parent Material: Glaciofluvial materials | Outwash terrace (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 140 feet | Drainage Way N/A feet | Wetlands 125 feet | Property Line 320 feet | Drinking Water Well N/A feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	A	Topsoil	10YR3/2								Roots
9-34	B	Sandy Loam	10YR5/3								
34-108	C	Fine sandy loam	2.5Y5/2								

Additional Notes: No water observed, no redox features observed.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-04 (Hole #) | Feb. 25, 2020 (Date) | 1:30pm (Time) | Sunny, 54 deg. F (Weather) | 42.321987 (Latitude) | 71.607562 (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Deciduous trees, scrub (Vegetation) | None noted (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: Wooded deciduous forest area

2. Soil Parent Material: Glaciofluvial materials | Outwash terrace (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 165 feet | Drainage Way N/A feet | Wetlands 110 feet
Property Line 280 feet | Drinking Water Well N/A feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	Topsoil	10YR3/2								Roots
10-28	B	Sandy loam	10YR5/3								
28-112	C	Fine loamy sand	2.5Y5/2								

Additional Notes: No water, no redox observed

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #_____	Obs. Hole #_____
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: >112 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Paul G Matos

Signature of Soil Evaluator

03/06/2020

Date

Paul G. Matos / SE 1511

Typed or Printed Name of Soil Evaluator / License #

6/30/2022

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

See test pits plan, Sheet C-108, revised through March 3, 2020.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Northborough Land Realty Trust
Owner Name

0 & 301 Bartlett Street
Street Address

Map 51, Lot 3 (0 Bartlett) and Map 66, Lot 16 (301 Bartlett)
Map/Lot #

Northborough
City

MA
State

01532
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 245C, 254B (Soil Map Unit)

245C - Hinckley loamy sand, 8-15% slopes
254B - Merrimac fine sandy loam, 3-8% slopes
Soil Name

N/A
Soil Limitations

Glaciofluvial materials
Soil Parent material

Outwash terrace and plain
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: N/A (Year Published/Source) N/A (Map Unit)

N/A
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☒ Yes ☐ No If yes, MassGIS Wetland Data Layer: Wooded swamp (Wetland Type)

7. Current Water Resource Conditions (USGS): N/A (Month/Day/ Year) Range: ☐ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed: UC David Websoil Survey

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-05 (Hole #) | Feb. 25, 2020 (Date) | 12:45pm (Time) | Overcast, 52 deg. F (Weather) | 42.321987 (Latitude) | 71.607562 (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Deciduous trees, scrub brush (Vegetation) | None noted (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: Wooded deciduous forest area

2. Soil Parent Material: Glaciofluvial materials | Outwash terrace (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 250 feet | Drainage Way N/A feet | Wetlands 145 feet | Property Line 360 feet | Drinking Water Well N/A feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-14	A	Topsoil	10YR3/2								Roots
14-36	B	Sandy Loam	10YR5/3								
34-108	C	Fine sand	2.5Y5/2								Cobbles, rocks, boulders

Additional Notes: No water observed, no redox features observed.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-06 (Hole #) Feb. 25, 2020 (Date) 2:30pm (Time) Overcast, 52 deg. F (Weather) 42.321987 (Latitude) 71.607562 (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Deciduous trees, scrub (Vegetation) | None noted (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: Wooded deciduous forest area

2. Soil Parent Material: Glaciofluvial materials | Outwash terrace (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 800 feet | Drainage Way N/A feet | Wetlands 75 feet
Property Line 40 feet | Drinking Water Well N/A feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	Topsoil	10YR3/2								Roots
10-18	B	Loamy sand	10YR5/6								Gravelly
18-64	C1	Coarse sand	2.5Y4/3								
64-130	C2	Fine sand	5Y6/3								Thin redox line at 64"

Additional Notes: No water, no redox observed, thin redox line @ 64", likely perched water table, no redox below

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #_____	Obs. Hole #_____
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: >130 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Paul G Matos

Signature of Soil Evaluator

03/06/2020

Date

Paul G. Matos / SE 1511

Typed or Printed Name of Soil Evaluator / License #

6/30/2022

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

See test pits plan, Sheet C-108, revised through March 3, 2020.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Northborough Land Realty Trust
Owner Name

0 & 301 Bartlett Street
Street Address

Map 51, Lot 3 (0 Bartlett) and Map 66, Lot 16 (301 Bartlett)
Map/Lot #

Northborough
City

MA
State

01532
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 245C, 254B (Soil Map Unit)

245C - Hinckley loamy sand, 8-15% slopes
254B - Merrimac fine sandy loam, 3-8% slopes
Soil Name

N/A
Soil Limitations

Glaciofluvial materials
Soil Parent material

Outwash terrace and plain
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: N/A (Year Published/Source) N/A (Map Unit)

N/A
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☒ Yes ☐ No If yes, MassGIS Wetland Data Layer: Wooded swamp (Wetland Type)

7. Current Water Resource Conditions (USGS): N/A (Month/Day/ Year) Range: ☐ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed: UC David Websoil Survey

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-07 (Hole #) | Feb. 25, 2020 (Date) | 2:45pm (Time) | Overcast, 52 deg. F (Weather) | 42.321987 (Latitude) | 71.607562 (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Deciduous trees, scrub brush (Vegetation) | None noted (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: Wooded deciduous forest area

2. Soil Parent Material: Glaciofluvial materials | Outwash terrace (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 850 feet | Drainage Way N/A feet | Wetlands 75 feet | Property Line 100 feet | Drinking Water Well N/A feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: N/A Depth Weeping from Pit | N/A Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	Topsoil	10YR3/2								Roots
12-24	B	Loamy Sand	10YR5/6								Gravelly
24-66	C1	Coarse sand	2.5Y4/3								
66-115	C2	Fine Sand	5Y6/3								Thin redox line at 66"

Additional Notes: No water observed, no redox features observed, thin redox line at 66", no redox below, likely perched water table

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: Hole # _____ Date _____ Time _____ Weather _____ Latitude _____ Longitude:

1. Land Use: _____ (e.g., woodland, agricultural field, vacant lot, etc.) Vegetation _____ Surface Stones (e.g., cobbles, stones, boulders, etc.) _____ Slope (%)

   Description of Location: _____

2. Soil Parent Material: _____ _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet _____ feet
   Property Line _____ feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #_____	Obs. Hole #_____
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Paul G Matos

Signature of Soil Evaluator

03/06/2020

Date

Paul G. Matos / SE 1511

Typed or Printed Name of Soil Evaluator / License #

6/30/2022

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

See test pits plan, Sheet C-108, revised through March 3, 2020.

Map Scale: 1:5,110 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 14, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
31A	Walpole sandy loam, 0 to 3 percent slopes	B/D	8.5	8.7%
51A	Swansea muck, 0 to 1 percent slopes	B/D	12.4	12.6%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	3.4	3.4%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	B	0.1	0.1%
245B	Hinckley loamy sand, 3 to 8 percent slopes	A	2.9	2.9%
245C	Hinckley loamy sand, 8 to 15 percent slopes	A	8.8	9.0%
248B	Amostown and Belgrade soils, 3 to 8 percent slopes	B	1.7	1.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	25.2	25.7%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	A	9.9	10.1%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	1.1	1.1%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	13.8	14.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	C/D	4.3	4.4%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	B	1.8	1.9%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	B	4.1	4.2%
Totals for Area of Interest			**98.0**	**100.0%**

Description

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

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

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

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

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

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

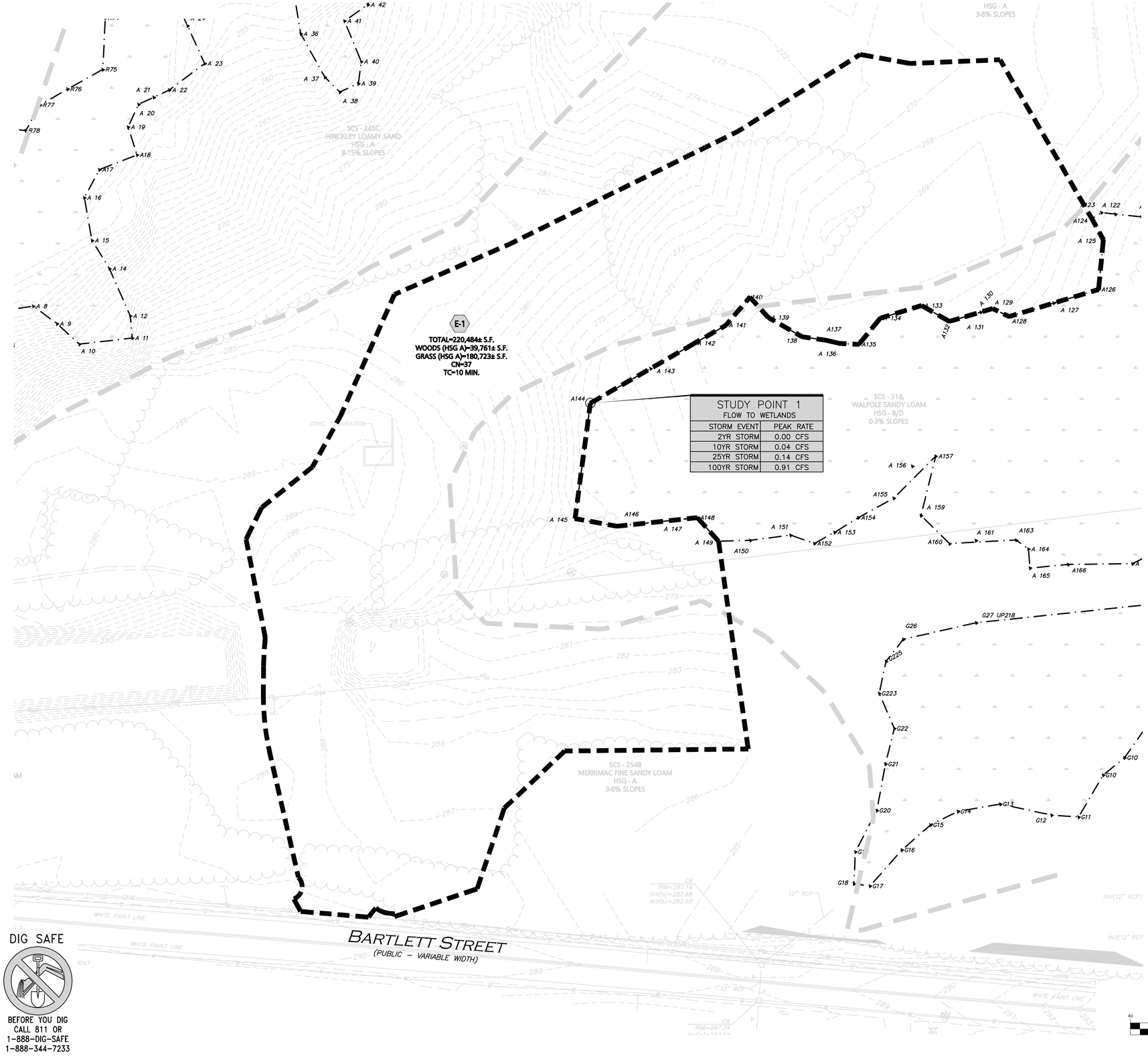
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



LEGEND

- PROPOSED WATERSHED
- SCS SOILS BOUNDARY
- SUBCATCHMENT LABEL — E-1

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

N:\PROJECTS\1145-09\CIVIL\DRAWINGS\CURRENT\DEFINITIVE SUBDIVISION\C-1145-09_WATERSHED-EXISTING.DWG

ISSUED FOR DEFINITIVE SUBDIVISION
NOVEMBER 24, 2020

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
THE GUTIERREZ COMPANY
200 SUMMIT DRIVE, SUITE 400
BURLINGTON, MA 01803

OWNER:
NORTHBOROUGH LAND REALTY TRUST
200 SUMMIT DRIVE, SUITE 400
BURLINGTON, MA 01803

PROJECT:
DEFINITIVE SUBDIVISION
PARCELS B-1, B-2, H-1 & H-2
0 BARTLETT STREET
MAP 51 LOT 3 & MAP 66 LOT 16
NORTHBOROUGH, MA

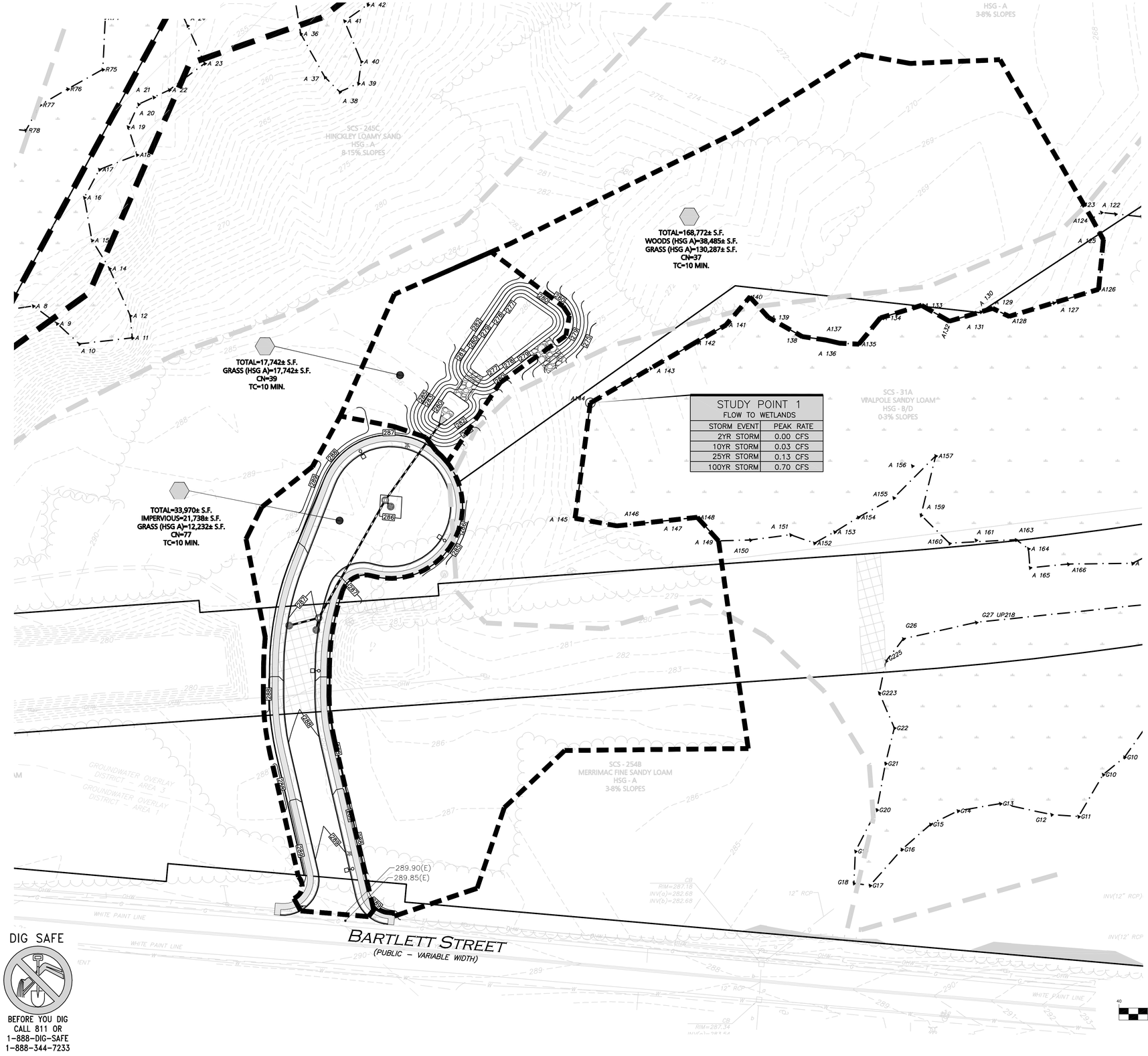
PROJECT NO.	1145-09	DATE:	NOV 24, 2020
SCALE:	1" = 40'	DWG. NAME:	C1145-09
DESIGNED BY:	DMR/NCD	CHECKED BY:	CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
PRE DEVELOPMENT
WATERSHED PLAN

SHEET No.
WS-1



LEGEND

- PROPOSED WATERSHED
- SCS SOILS BOUNDARY
- SUBCATCHMENT LABEL — P-1

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
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N:\PROJECTS\1145-09\CIVIL\DRAWINGS\CURRENT\DEFINITIVE SUBDIVISION\C-1145-09_WATERSHED--PROPOSED.DWG

ISSUED FOR DEFINITIVE SUBDIVISION
NOVEMBER 24, 2020

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

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THE GUTIERREZ COMPANY
200 SUMMIT DRIVE, SUITE 400
BURLINGTON, MA 01803

OWNER:
NORTHBOROUGH LAND REALTY TRUST
200 SUMMIT DRIVE, SUITE 400
BURLINGTON, MA 01803

PROJECT:
DEFINITIVE SUBDIVISION
PARCELS B-1, B-2, H-1 & H-2
0 BARTLETT STREET
MAP 51 LOT 3 & MAP 66 LOT 16
NORTHBOROUGH, MA

PROJECT NO.	1145-09	DATE:	NOV 24, 2020
SCALE:	1" = 40'	DWG. NAME:	C1145-09
DESIGNED BY:	DMR/NCD	CHECKED BY:	CMQ

PREPARED BY:

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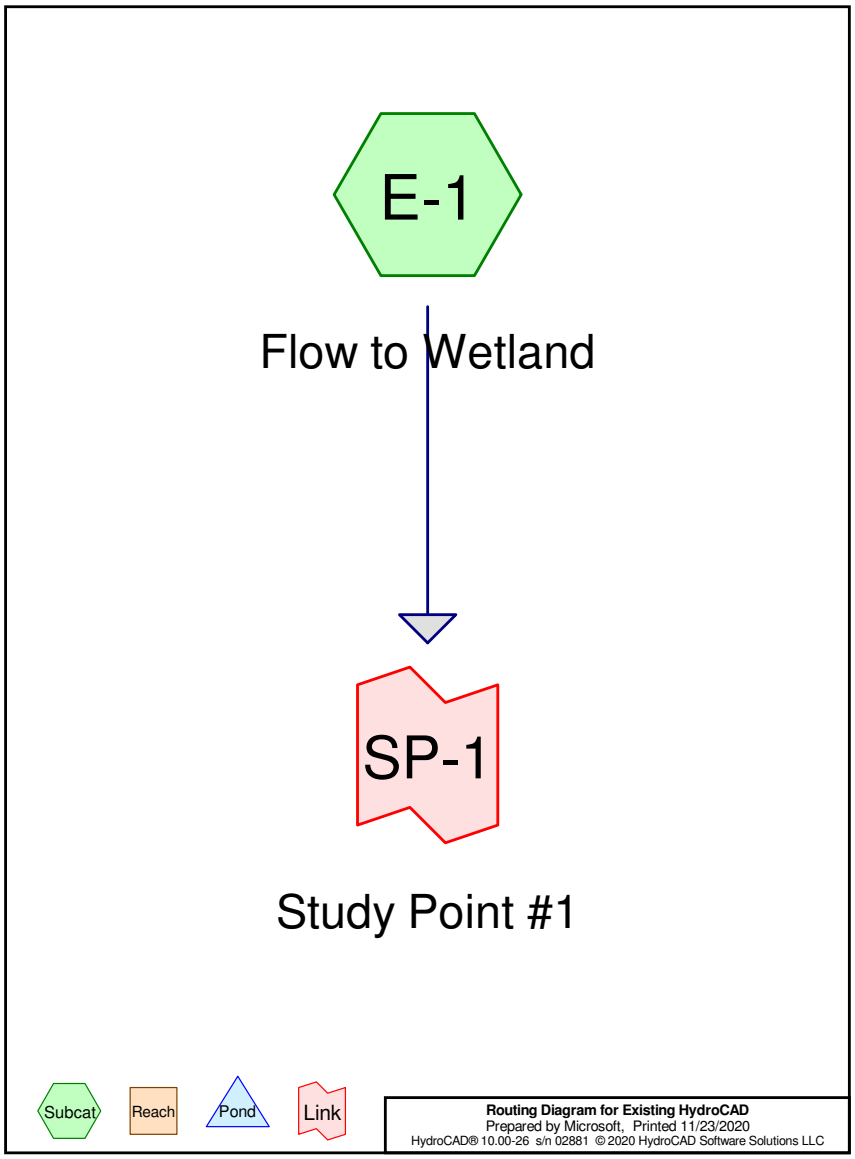
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
POST DEVELOPMENT
WATERSHED PLAN

SHEET No.
WS-2



Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
180,723	39	>75% Grass cover, Good, HSG A (E-1)
39,761	30	Woods, Good, HSG A (E-1)
220,484	**37**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
220,484	HSG A	E-1
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
220,484		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatch Numbers
180,723	0	0	0	0	180,723	>75% Grass cover, Good	
39,761	0	0	0	0	39,761	Woods, Good	
220,484	**0**	**0**	**0**	**0**	**220,484**	**TOTAL AREA**	

Summary for Subcatchment E-1: Flow to Wetland

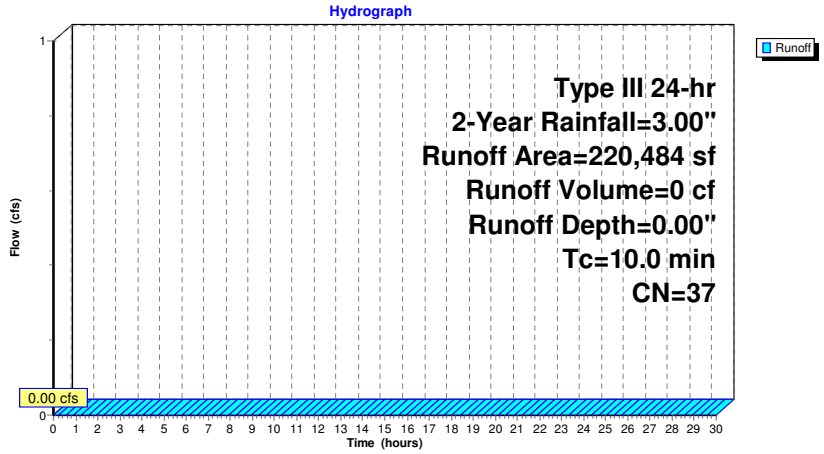
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
39,761	30	Woods, Good, HSG A
180,723	39	>75% Grass cover, Good, HSG A
220,484	37	Weighted Average
220,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment E-1: Flow to Wetland

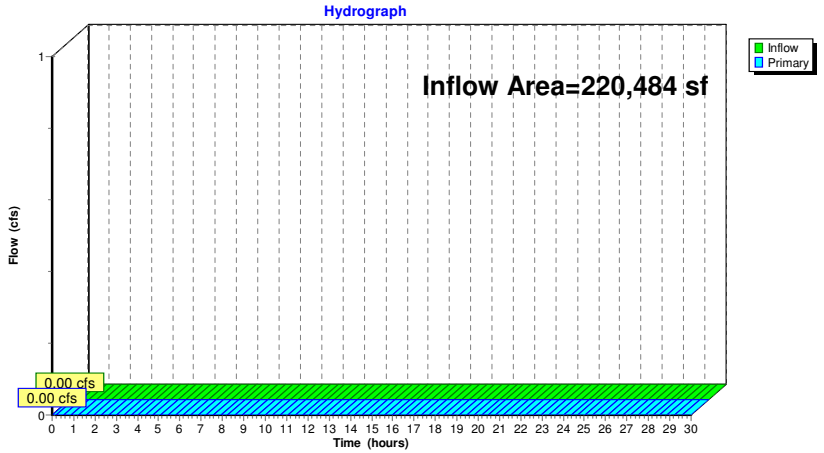


Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1



Summary for Subcatchment E-1: Flow to Wetland

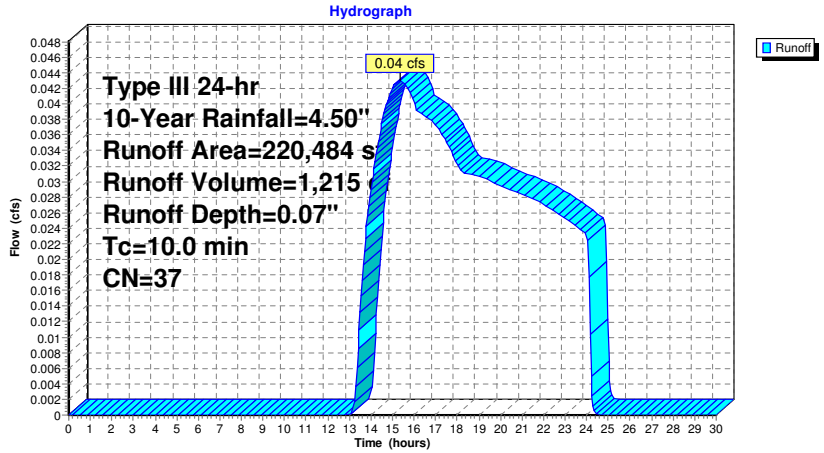
Runoff = 0.04 cfs @ 15.34 hrs, Volume= 1,215 cf, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
39,761	30	Woods, Good, HSG A
180,723	39	>75% Grass cover, Good, HSG A
220,484	37	Weighted Average
220,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment E-1: Flow to Wetland

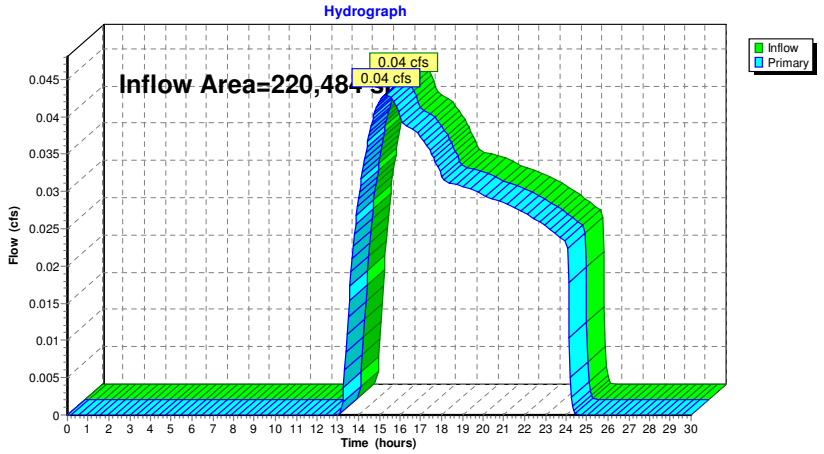


Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 0.00% Impervious, Inflow Depth = 0.07" for 10-Year event
Inflow = 0.04 cfs @ 15.34 hrs, Volume= 1,215 cf
Primary = 0.04 cfs @ 15.34 hrs, Volume= 1,215 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1



Summary for Subcatchment E-1: Flow to Wetland

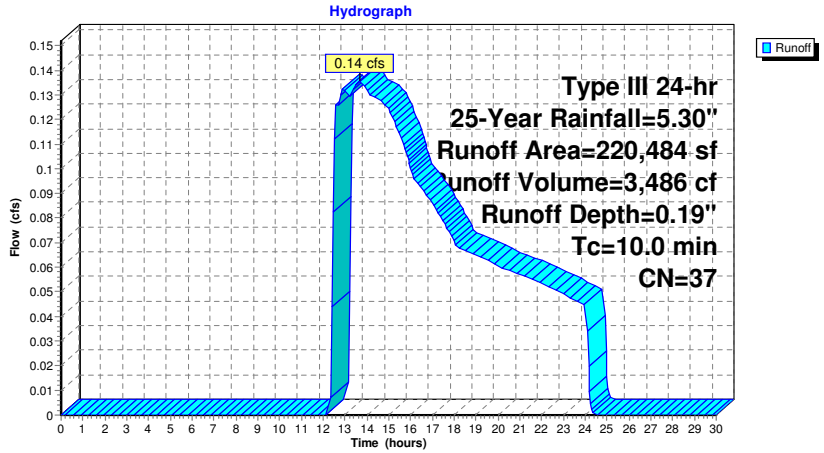
Runoff = 0.14 cfs @ 13.68 hrs, Volume= 3,486 cf, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
39,761	30	Woods, Good, HSG A
180,723	39	>75% Grass cover, Good, HSG A
220,484	37	Weighted Average
220,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment E-1: Flow to Wetland

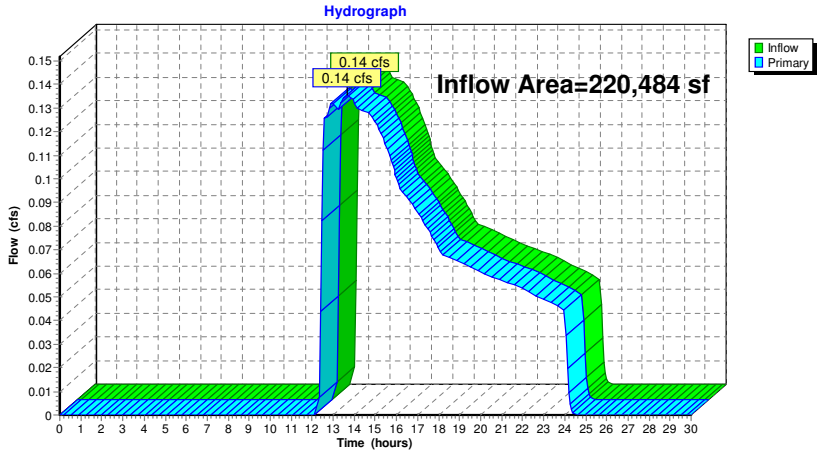


Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 0.00% Impervious, Inflow Depth = 0.19" for 25-Year event
Inflow = 0.14 cfs @ 13.68 hrs, Volume= 3,486 cf
Primary = 0.14 cfs @ 13.68 hrs, Volume= 3,486 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1



Summary for Subcatchment E-1: Flow to Wetland

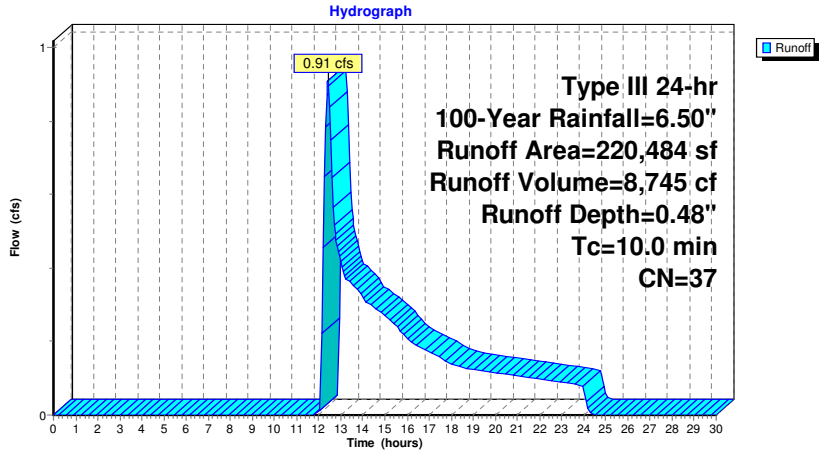
Runoff = 0.91 cfs @ 12.41 hrs, Volume= 8,745 cf, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
39,761	30	Woods, Good, HSG A
180,723	39	>75% Grass cover, Good, HSG A
220,484	37	Weighted Average
220,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment E-1: Flow to Wetland

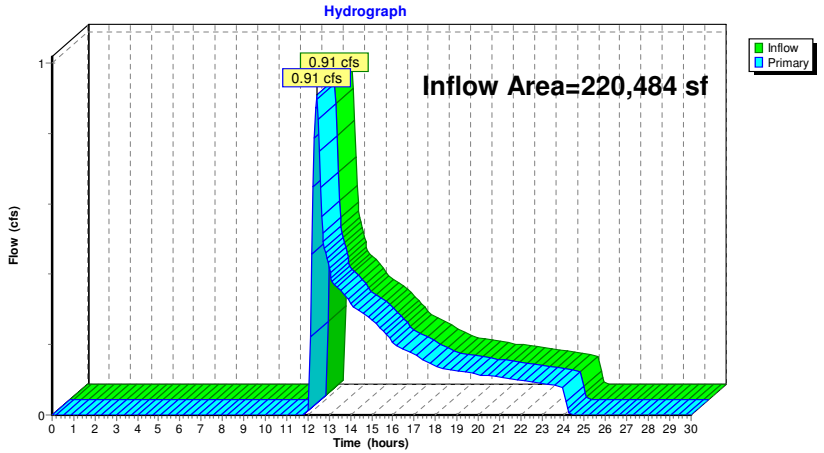


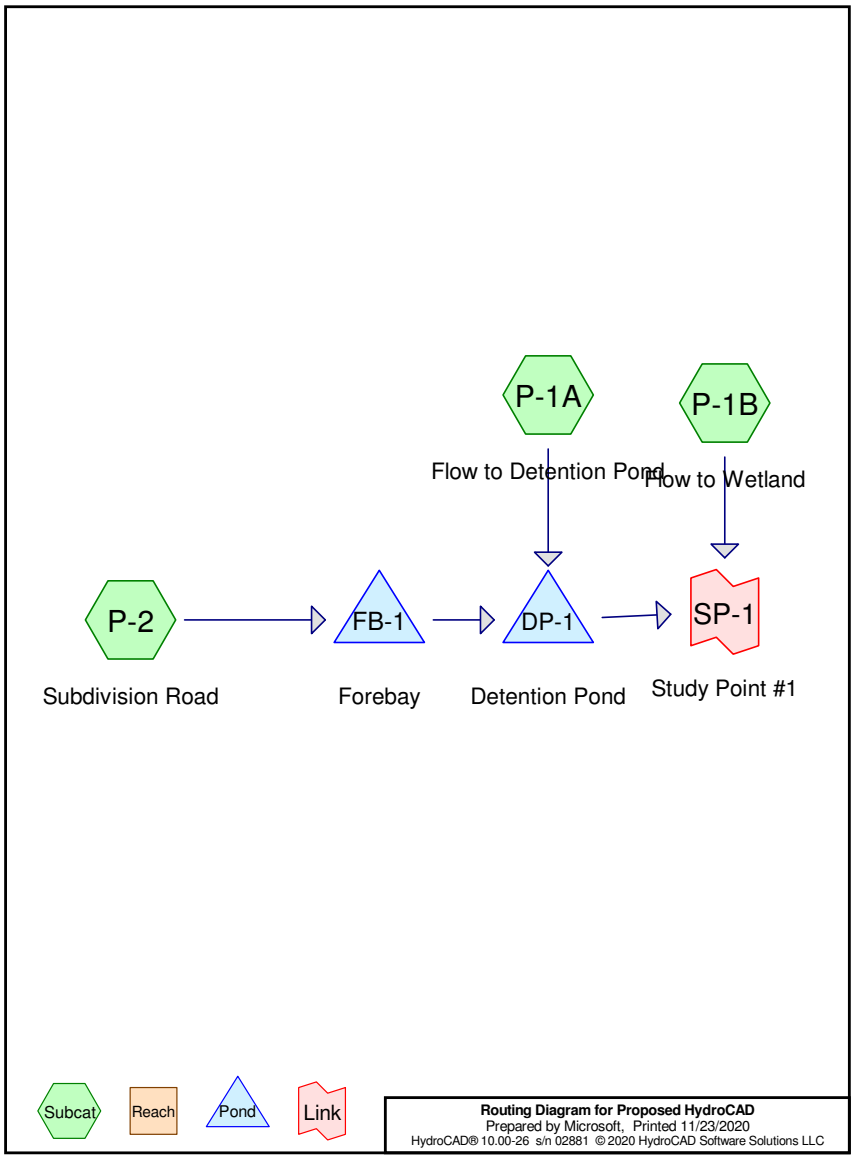
Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 0.00% Impervious, Inflow Depth = 0.48" for 100-Year event
Inflow = 0.91 cfs @ 12.41 hrs, Volume= 8,745 cf
Primary = 0.91 cfs @ 12.41 hrs, Volume= 8,745 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1





Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
160,261	39	>75% Grass cover, Good, HSG A (P-1A, P-1B, P-2)
21,738	98	Paved parking, HSG A (P-2)
38,485	30	Woods, Good, HSG A (P-1B)
220,484	**43**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
220,484	HSG A	P-1A, P-1B, P-2
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
220,484		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatch Numbers
160,261	0	0	0	0	160,261	>75% Grass cover, Good	
21,738	0	0	0	0	21,738	Paved parking	
38,485	0	0	0	0	38,485	Woods, Good	
220,484	**0**	**0**	**0**	**0**	**220,484**	**TOTAL AREA**	

Summary for Subcatchment P-1A: Flow to Detention Pond

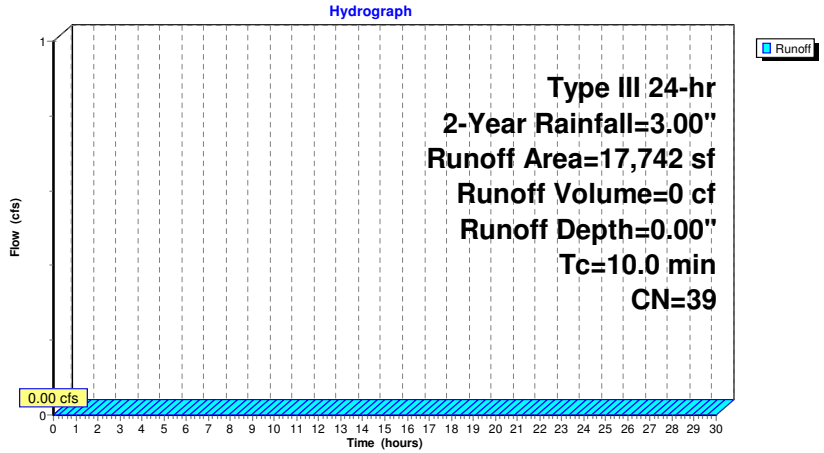
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
17,742	39	>75% Grass cover, Good, HSG A
17,742		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1A: Flow to Detention Pond



Summary for Subcatchment P-1B: Flow to Wetland

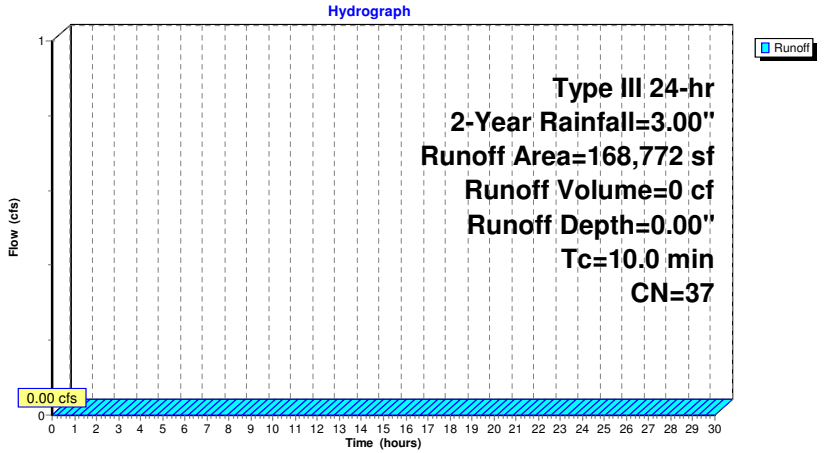
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
38,485	30	Woods, Good, HSG A
130,287	39	>75% Grass cover, Good, HSG A
168,772	37	Weighted Average
168,772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1B: Flow to Wetland



Summary for Subcatchment P-2: Subdivision Road

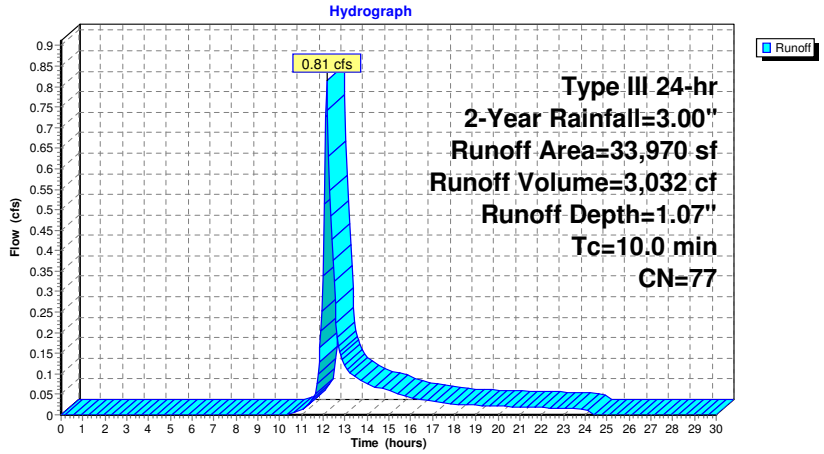
Runoff = 0.81 cfs @ 12.15 hrs, Volume= 3,032 cf, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
21,738	98	Paved parking, HSG A
12,232	39	>75% Grass cover, Good, HSG A
33,970	77	Weighted Average
12,232		36.01% Pervious Area
21,738		63.99% Impervious Area

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

Subcatchment P-2: Subdivision Road



Summary for Pond DP-1: Detention Pond

Inflow Area = 51,712 sf, 42.04% Impervious, Inflow Depth = 0.64" for 2-Year event
Inflow = 0.81 cfs @ 12.17 hrs, Volume= 2,756 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 278.17' @ 25.85 hrs Surf.Area= 2,727 sf Storage= 2,756 cf
Flood Elev= 279.50' Surf.Area= 3,650 sf Storage= 6,984 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

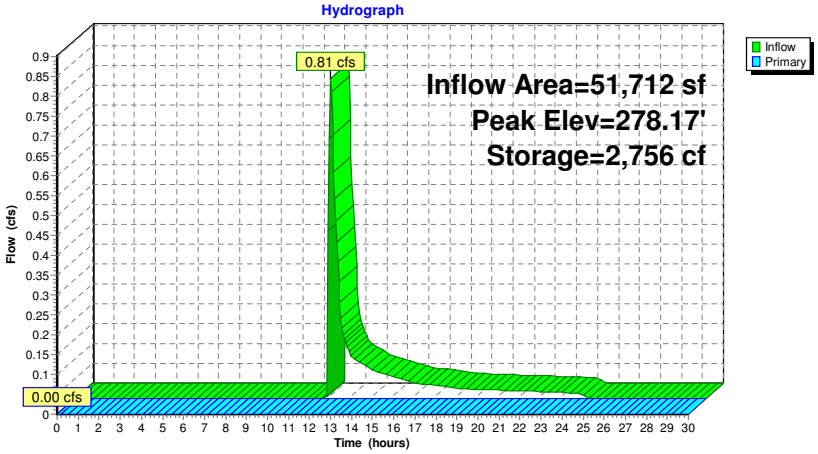
Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	8,902 cf	**Detention Pond (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,998	197.0	0	0	1,998
278.00	2,617	216.0	2,301	2,301	2,656
279.00	3,293	235.0	2,949	5,249	3,374
280.00	4,026	254.0	3,653	8,902	4,153

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**16.0' long x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP-1: Detention Pond



Summary for Pond FB-1: Forebay

Inflow Area = 33,970 sf, 63.99% Impervious, Inflow Depth = 1.07" for 2-Year event
Inflow = 0.81 cfs @ 12.15 hrs, Volume= 3,032 cf
Outflow = 0.81 cfs @ 12.17 hrs, Volume= 2,756 cf, Atten= 1%, Lag= 0.9 min
Primary = 0.81 cfs @ 12.17 hrs, Volume= 2,756 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 280.60' @ 12.17 hrs Surf.Area= 651 sf Storage= 339 cf
Flood Elev= 280.50' Surf.Area= 622 sf Storage= 276 cf

Plug-Flow detention time= 63.3 min calculated for 2,756 cf (91% of inflow)
Center-of-Mass det. time= 18.2 min (878.1 - 859.8)

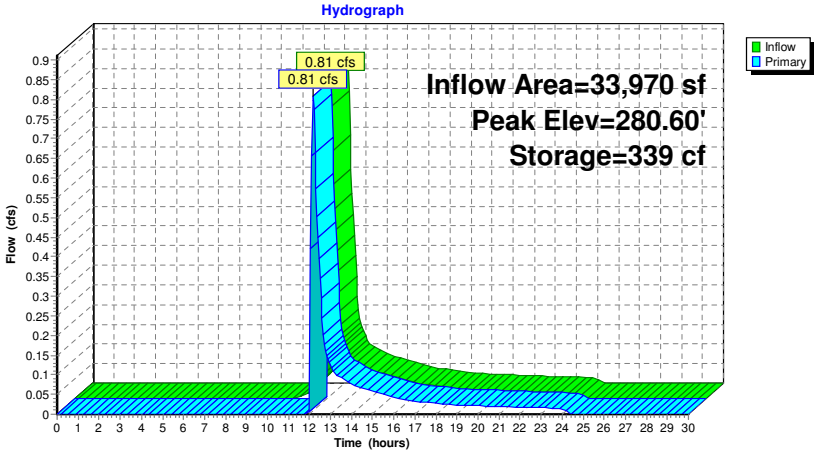
Volume	Invert	Avail.Storage	Storage Description
#1	280.00'	1,051 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
280.00	485	87.0	0	0	485
280.50	622	96.0	276	276	624
281.00	773	105.0	348	624	776
281.50	938	115.0	427	1,051	960

Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.79 cfs @ 12.17 hrs HW=280.60' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.79 cfs @ 0.80 fps)

Pond FB-1: Forebay

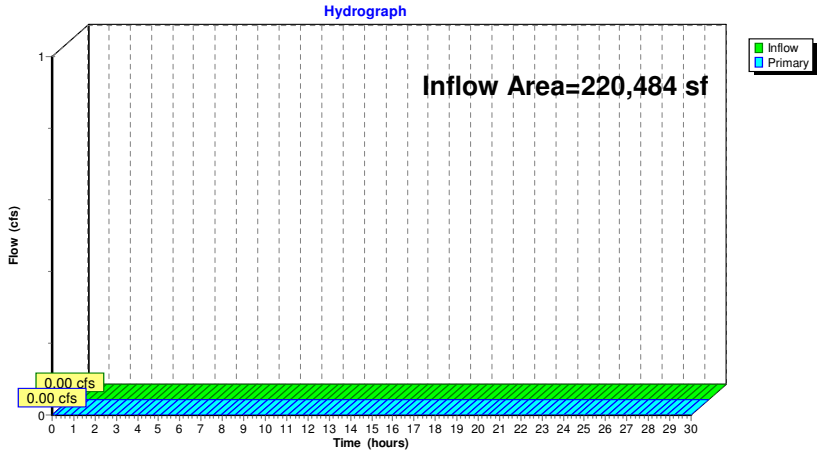


Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 9.86% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1



Summary for Subcatchment P-1A: Flow to Detention Pond

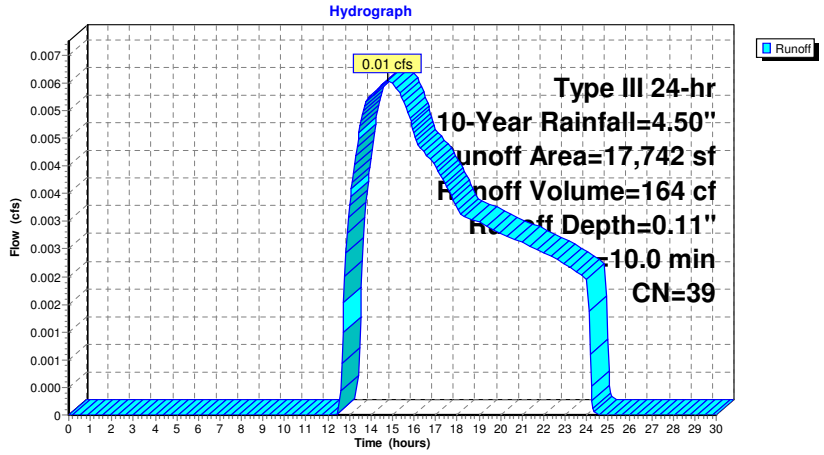
Runoff = 0.01 cfs @ 14.76 hrs, Volume= 164 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
17,742	39	>75% Grass cover, Good, HSG A
17,742		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1A: Flow to Detention Pond



Summary for Subcatchment P-1B: Flow to Wetland

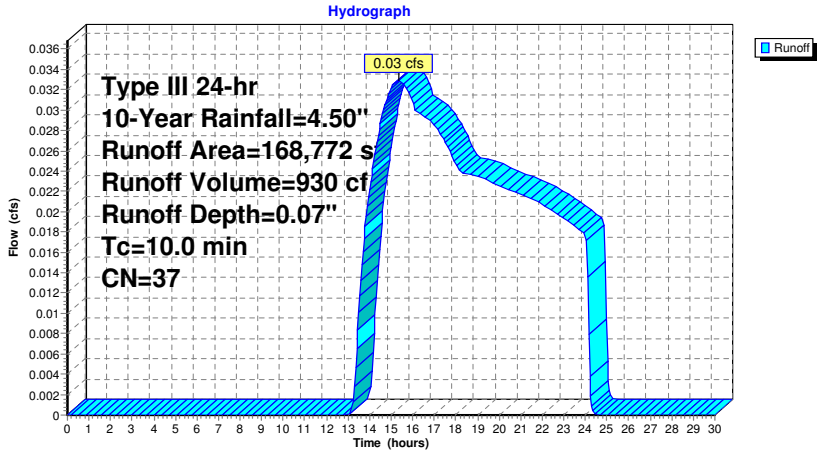
Runoff = 0.03 cfs @ 15.34 hrs, Volume= 930 cf, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
38,485	30	Woods, Good, HSG A
130,287	39	>75% Grass cover, Good, HSG A
168,772	37	Weighted Average
168,772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1B: Flow to Wetland



Summary for Subcatchment P-2: Subdivision Road

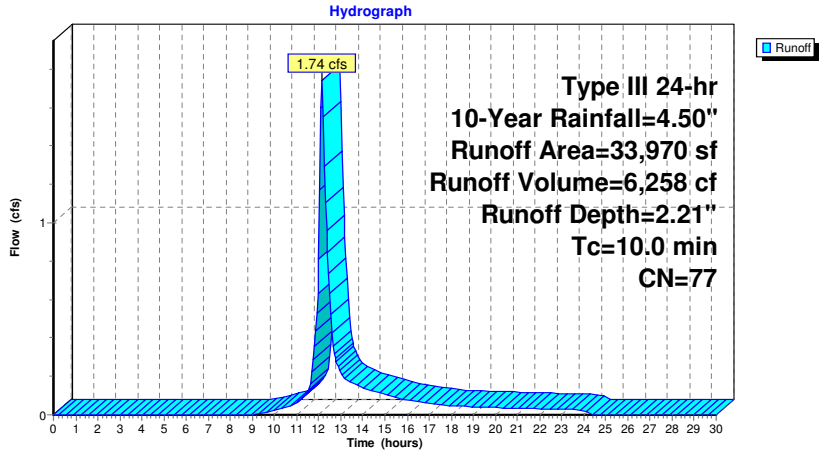
Runoff = 1.74 cfs @ 12.15 hrs, Volume= 6,258 cf, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
21,738	98	Paved parking, HSG A
12,232	39	>75% Grass cover, Good, HSG A
33,970	77	Weighted Average
12,232		36.01% Pervious Area
21,738		63.99% Impervious Area

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

Subcatchment P-2: Subdivision Road



Summary for Pond DP-1: Detention Pond

Inflow Area = 51,712 sf, 42.04% Impervious, Inflow Depth = 1.43" for 10-Year event
Inflow = 1.74 cfs @ 12.16 hrs, Volume= 6,145 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 279.26' @ 25.85 hrs Surf.Area= 3,480 sf Storage= 6,145 cf
Flood Elev= 279.50' Surf.Area= 3,650 sf Storage= 6,984 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

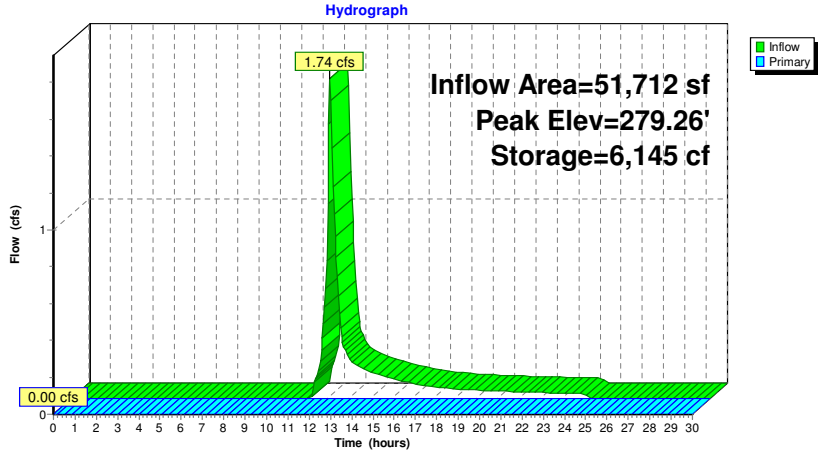
Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	8,902 cf	**Detention Pond (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,998	197.0	0	0	1,998
278.00	2,617	216.0	2,301	2,301	2,656
279.00	3,293	235.0	2,949	5,249	3,374
280.00	4,026	254.0	3,653	8,902	4,153

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**16.0' long x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP-1: Detention Pond



Summary for Pond FB-1: Forebay

Inflow Area = 33,970 sf, 63.99% Impervious, Inflow Depth = 2.21" for 10-Year event
Inflow = 1.74 cfs @ 12.15 hrs, Volume= 6,258 cf
Outflow = 1.74 cfs @ 12.16 hrs, Volume= 5,982 cf, Atten= 0%, Lag= 0.7 min
Primary = 1.74 cfs @ 12.16 hrs, Volume= 5,982 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 280.67' @ 12.16 hrs Surf.Area= 670 sf Storage= 383 cf
Flood Elev= 280.50' Surf.Area= 622 sf Storage= 276 cf

Plug-Flow detention time= 35.2 min calculated for 5,972 cf (95% of inflow)
Center-of-Mass det. time= 11.3 min (849.6 - 838.4)

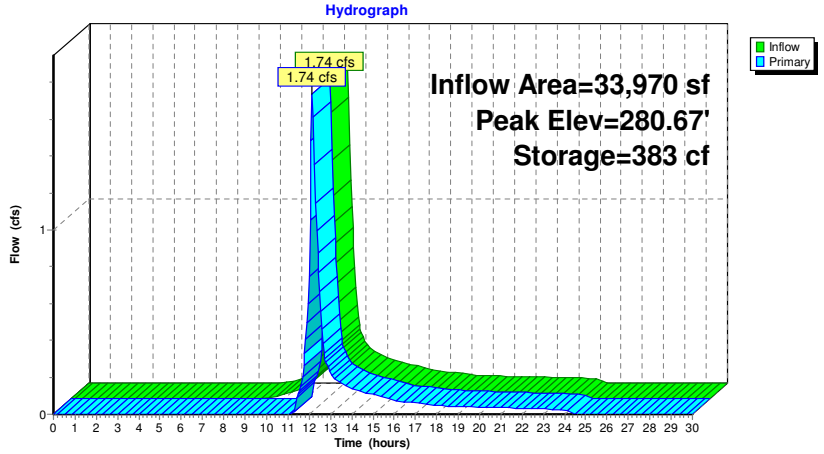
Volume	Invert	Avail.Storage	Storage Description
#1	280.00'	1,051 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
280.00	485	87.0	0	0	485
280.50	622	96.0	276	276	624
281.00	773	105.0	348	624	776
281.50	938	115.0	427	1,051	960

Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.71 cfs @ 12.16 hrs HW=280.66' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.71 cfs @ 1.04 fps)

Pond FB-1: Forebay

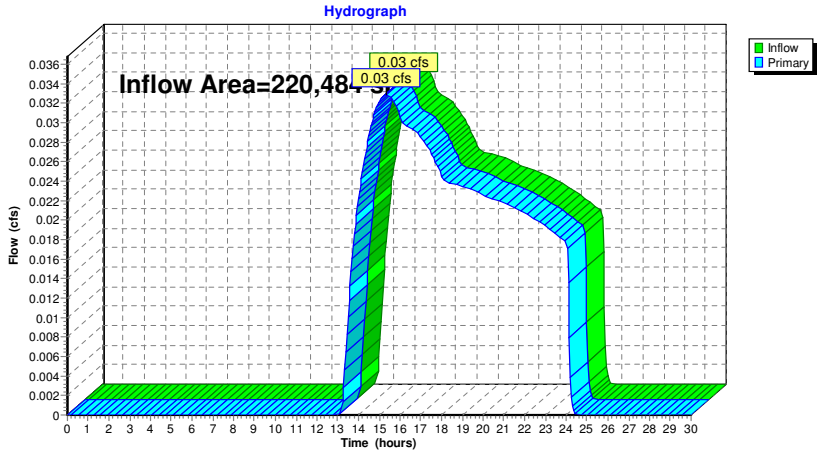


Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 9.86% Impervious, Inflow Depth = 0.05" for 10-Year event
Inflow = 0.03 cfs @ 15.34 hrs, Volume= 930 cf
Primary = 0.03 cfs @ 15.34 hrs, Volume= 930 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1



Summary for Subcatchment P-1A: Flow to Detention Pond

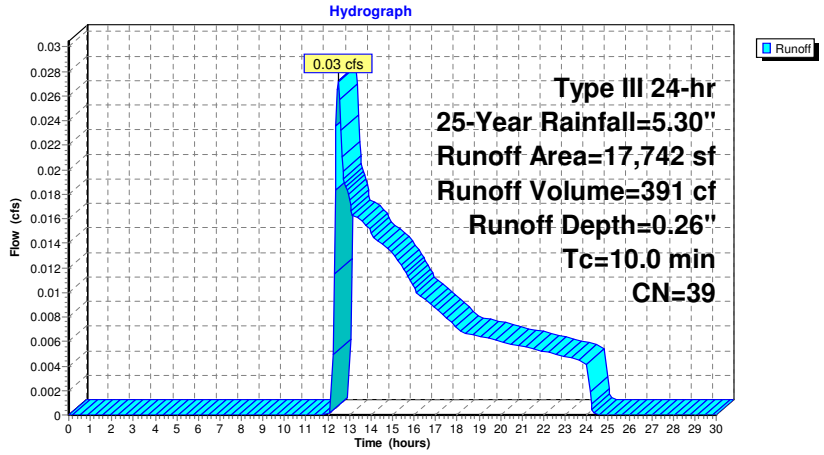
Runoff = 0.03 cfs @ 12.49 hrs, Volume= 391 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
17,742	39	>75% Grass cover, Good, HSG A
17,742		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1A: Flow to Detention Pond



Summary for Subcatchment P-1B: Flow to Wetland

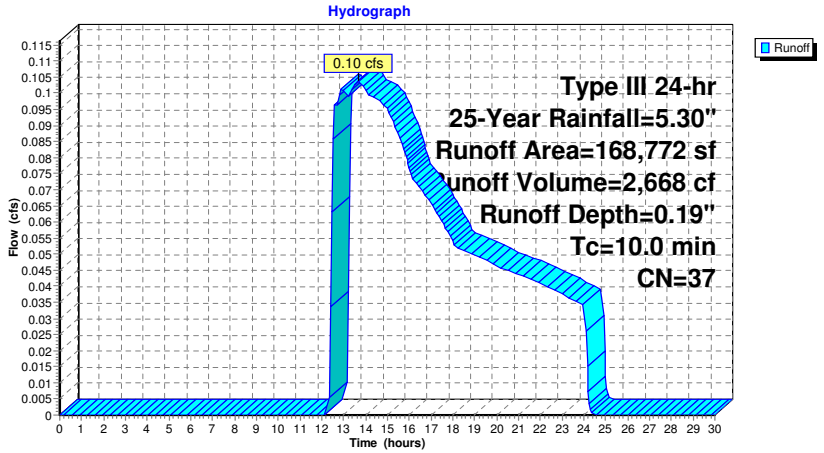
Runoff = 0.10 cfs @ 13.68 hrs, Volume= 2,668 cf, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
38,485	30	Woods, Good, HSG A
130,287	39	>75% Grass cover, Good, HSG A
168,772	37	Weighted Average
168,772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1B: Flow to Wetland



Summary for Subcatchment P-2: Subdivision Road

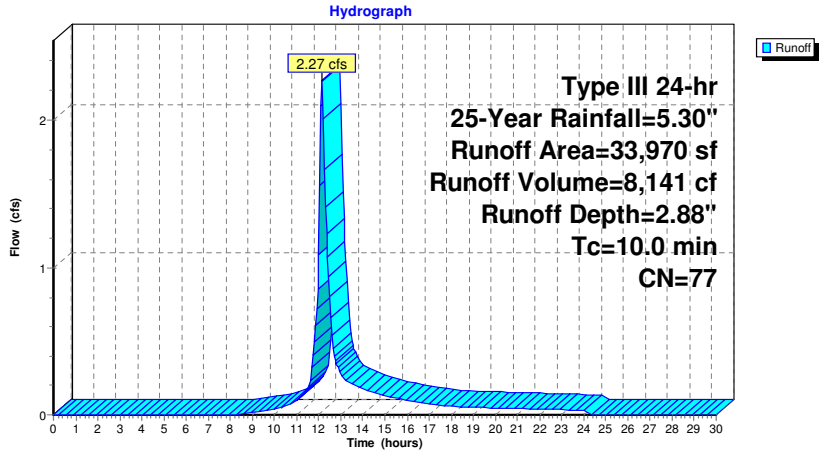
Runoff = 2.27 cfs @ 12.14 hrs, Volume= 8,141 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
21,738	98	Paved parking, HSG A
12,232	39	>75% Grass cover, Good, HSG A
33,970	77	Weighted Average
12,232		36.01% Pervious Area
21,738		63.99% Impervious Area

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

Subcatchment P-2: Subdivision Road



Summary for Pond DP-1: Detention Pond

Inflow Area = 51,712 sf, 42.04% Impervious, Inflow Depth = 1.92" for 25-Year event
Inflow = 2.27 cfs @ 12.16 hrs, Volume= 8,257 cf
Outflow = 0.07 cfs @ 17.80 hrs, Volume= 1,272 cf, Atten= 97%, Lag= 338.7 min
Primary = 0.07 cfs @ 17.80 hrs, Volume= 1,272 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 279.51' @ 17.80 hrs Surf.Area= 3,659 sf Storage= 7,027 cf
Flood Elev= 279.50' Surf.Area= 3,650 sf Storage= 6,984 cf

Plug-Flow detention time= 525.0 min calculated for 1,272 cf (15% of inflow)
Center-of-Mass det. time= 380.2 min (1,228.2 - 848.0)

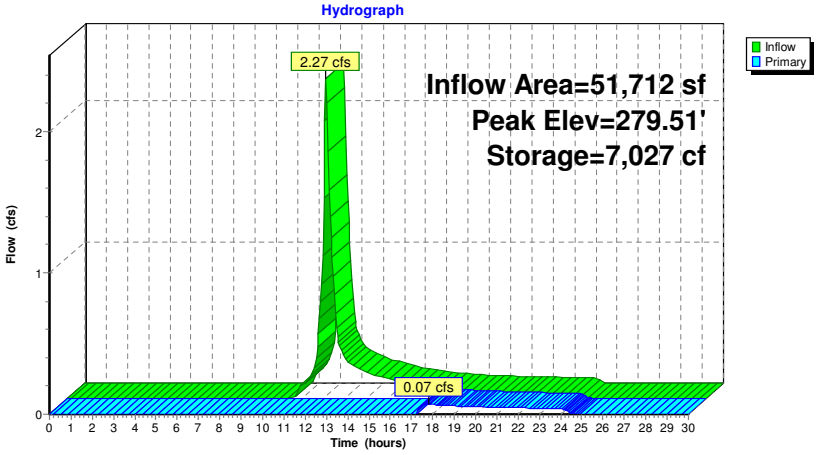
Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	8,902 cf	**Detention Pond (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,998	197.0	0	0	1,998
278.00	2,617	216.0	2,301	2,301	2,656
279.00	3,293	235.0	2,949	5,249	3,374
280.00	4,026	254.0	3,653	8,902	4,153

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**16.0' long x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=0.05 cfs @ 17.80 hrs HW=279.51' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.05 cfs @ 0.29 fps)

Pond DP-1: Detention Pond



Summary for Pond FB-1: Forebay

Inflow Area = 33,970 sf, 63.99% Impervious, Inflow Depth = 2.88" for 25-Year event
Inflow = 2.27 cfs @ 12.14 hrs, Volume= 8,141 cf
Outflow = 2.27 cfs @ 12.16 hrs, Volume= 7,865 cf, Atten= 0%, Lag= 0.7 min
Primary = 2.27 cfs @ 12.16 hrs, Volume= 7,865 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 280.70' @ 12.16 hrs Surf.Area= 680 sf Storage= 405 cf
Flood Elev= 280.50' Surf.Area= 622 sf Storage= 276 cf

Plug-Flow detention time= 29.1 min calculated for 7,865 cf (97% of inflow)
Center-of-Mass det. time= 9.9 min (840.7 - 830.8)

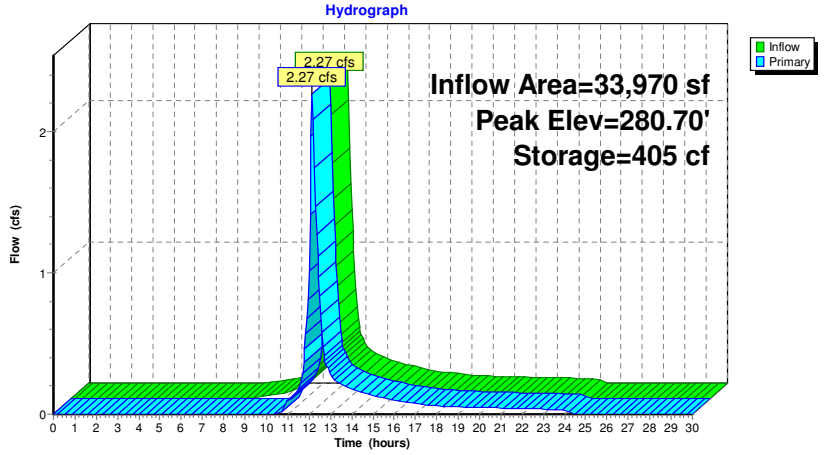
Volume	Invert	Avail.Storage	Storage Description
#1	280.00'	1,051 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
280.00	485	87.0	0	0	485
280.50	622	96.0	276	276	624
281.00	773	105.0	348	624	776
281.50	938	115.0	427	1,051	960

Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.24 cfs @ 12.16 hrs HW=280.70' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 2.24 cfs @ 1.14 fps)

Pond FB-1: Forebay

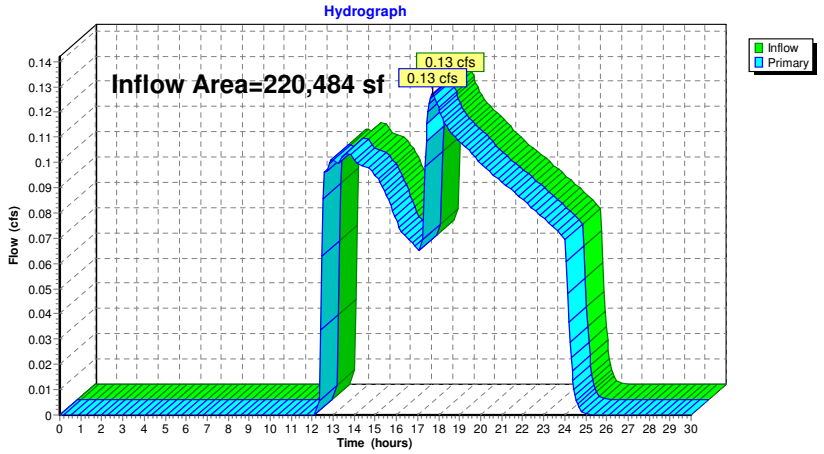


Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 9.86% Impervious, Inflow Depth = 0.21" for 25-Year event
Inflow = 0.13 cfs @ 17.71 hrs, Volume= 3,941 cf
Primary = 0.13 cfs @ 17.71 hrs, Volume= 3,941 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1



Summary for Subcatchment P-1A: Flow to Detention Pond

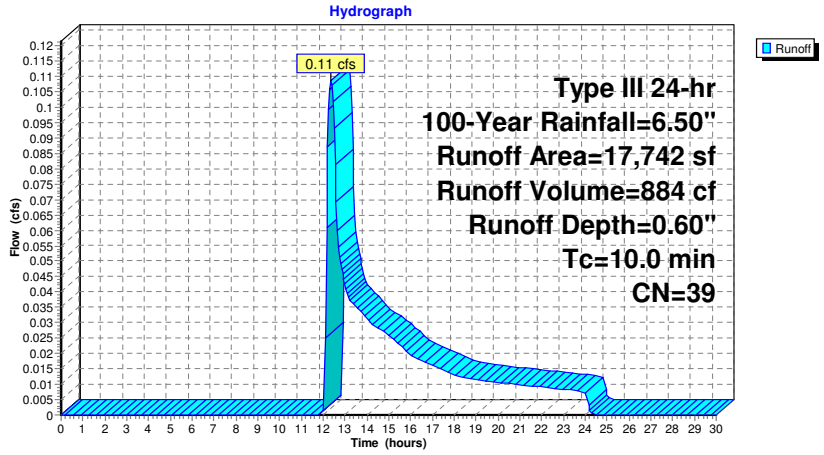
Runoff = 0.11 cfs @ 12.36 hrs, Volume= 884 cf, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
17,742	39	>75% Grass cover, Good, HSG A
17,742		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1A: Flow to Detention Pond



Summary for Subcatchment P-1B: Flow to Wetland

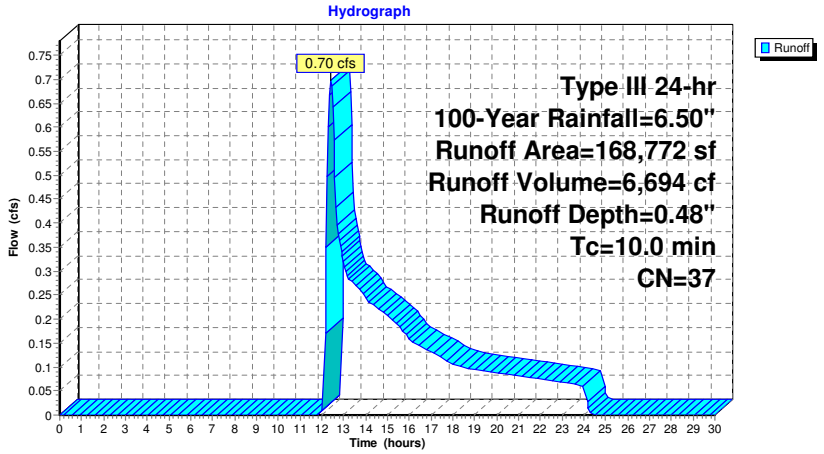
Runoff = 0.70 cfs @ 12.41 hrs, Volume= 6,694 cf, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
38,485	30	Woods, Good, HSG A
130,287	39	>75% Grass cover, Good, HSG A
168,772	37	Weighted Average
168,772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, Min.TC**

Subcatchment P-1B: Flow to Wetland



Summary for Subcatchment P-2: Subdivision Road

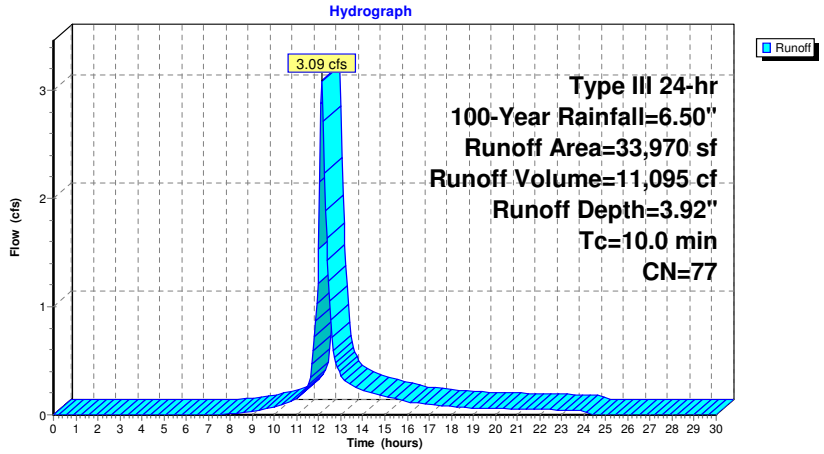
Runoff = 3.09 cfs @ 12.14 hrs, Volume= 11,095 cf, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
21,738	98	Paved parking, HSG A
12,232	39	>75% Grass cover, Good, HSG A
33,970	77	Weighted Average
12,232		36.01% Pervious Area
21,738		63.99% Impervious Area

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

Subcatchment P-2: Subdivision Road



Summary for Pond DP-1: Detention Pond

Inflow Area = 51,712 sf, 42.04% Impervious, Inflow Depth = 2.72" for 100-Year event
Inflow = 3.15 cfs @ 12.16 hrs, Volume= 11,703 cf
Outflow = 0.32 cfs @ 13.43 hrs, Volume= 4,719 cf, Atten= 90%, Lag= 76.3 min
Primary = 0.32 cfs @ 13.43 hrs, Volume= 4,719 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 279.54' @ 13.43 hrs Surf.Area= 3,678 sf Storage= 7,121 cf
Flood Elev= 279.50' Surf.Area= 3,650 sf Storage= 6,984 cf

Plug-Flow detention time= 299.3 min calculated for 4,711 cf (40% of inflow)
Center-of-Mass det. time= 174.7 min (1,013.9 - 839.2)

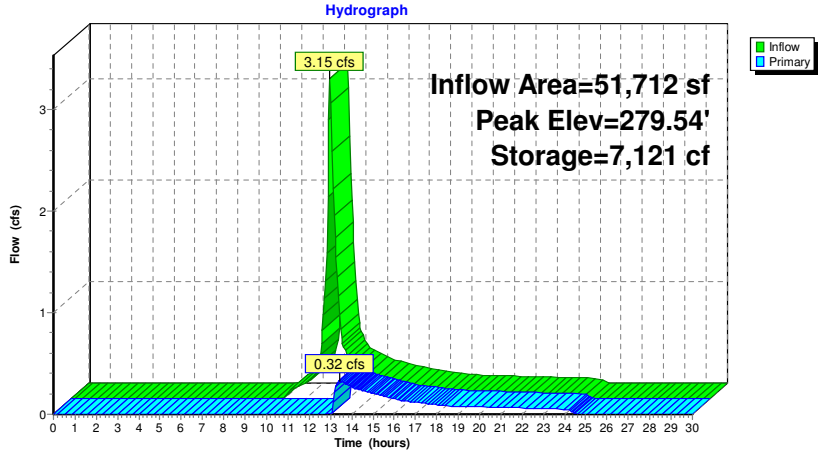
Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	8,902 cf	**Detention Pond (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,998	197.0	0	0	1,998
278.00	2,617	216.0	2,301	2,301	2,656
279.00	3,293	235.0	2,949	5,249	3,374
280.00	4,026	254.0	3,653	8,902	4,153

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	**16.0' long x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=0.30 cfs @ 13.43 hrs HW=279.54' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.30 cfs @ 0.51 fps)

Pond DP-1: Detention Pond



Summary for Pond FB-1: Forebay

Inflow Area = 33,970 sf, 63.99% Impervious, Inflow Depth = 3.92" for 100-Year event
Inflow = 3.09 cfs @ 12.14 hrs, Volume= 11,095 cf
Outflow = 3.09 cfs @ 12.15 hrs, Volume= 10,819 cf, Atten= 0%, Lag= 0.6 min
Primary = 3.09 cfs @ 12.15 hrs, Volume= 10,819 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 280.74' @ 12.15 hrs Surf.Area= 693 sf Storage= 436 cf
Flood Elev= 280.50' Surf.Area= 622 sf Storage= 276 cf

Plug-Flow detention time= 22.8 min calculated for 10,801 cf (97% of inflow)
Center-of-Mass det. time= 8.5 min (830.4 - 821.9)

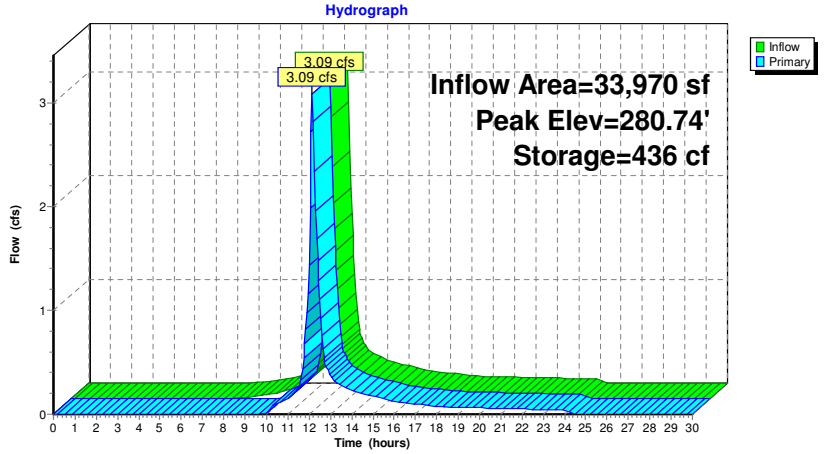
Volume	Invert	Avail.Storage	Storage Description
#1	280.00'	1,051 cf	**Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
280.00	485	87.0	0	0	485
280.50	622	96.0	276	276	624
281.00	773	105.0	348	624	776
281.50	938	115.0	427	1,051	960

Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.07 cfs @ 12.15 hrs HW=280.74' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.07 cfs @ 1.27 fps)

Pond FB-1: Forebay

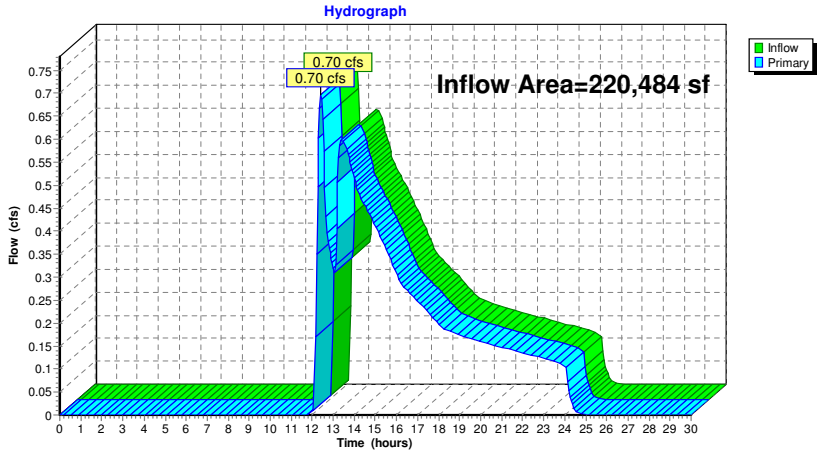


Summary for Link SP-1: Study Point #1

Inflow Area = 220,484 sf, 9.86% Impervious, Inflow Depth = 0.62" for 100-Year event
Inflow = 0.70 cfs @ 12.41 hrs, Volume= 11,412 cf
Primary = 0.70 cfs @ 12.41 hrs, Volume= 11,412 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link SP-1: Study Point #1



Allen & Major Associates, Inc. Computation Sheet

Title ***Pipe Sizing Table***
Project Parcel H Definitive Subdivision
Date Nov. 24, 2020
Revised TBD
A&M Project Number: 1145-09

Minimum Slope: 1.00%
Minimum Pipe Size: 12.00
Rainfall Intensity (in/hr): 5.30 (25 year storm)
Manning's n: 0.013 HDPE/PVC
Minimum Pipe Cover: 3.54'

By DMR
Chk'd CMQ
Apprv'd CMQ

0 Bartlett Street - Parcel H

Line						Req'd. Capac.	Pipe Size	Slope	Design Capacity		Drop	Invert Elevation		Rim Elev.	
From	To	Length	Area	wgt. *C*	*C* A	*Qd*	*D*	*s*	Q_{full}	V_{full}		Upper	Lower	Upper	Cover
Upper	Lower	(feet)	(acres)			(cfs)	(in)	(%)	(cfs)	(fps)	(feet)	(ft)	(ft)	(ft)	(ft)
CB1A	DMH1	25	0.135	0.75	0.101	0.53	12	1.00%	3.6	4.54	0.25	282.42	282.17	287.09	3.54
CB1B	DMH1	10	0.138	0.75	0.103	0.55	12	2.00%	5.0	6.42	0.20	282.37	282.17	287.09	3.59
DMH1	DMH2	113				1.08	12	1.00%	3.6	4.54	1.13	282.07	280.94	286.98	3.79
CB2	DMH2	7	0.330	0.77	0.253	1.34	12	1.00%	3.6	4.54	0.07	281.18	281.11	285.93	3.63
DMH2	FES1	78				2.42	15	1.00%	6.5	5.26	0.78	280.84	280.06	285.93	3.72