TOWN OF EXETER, NEW HAMPSHIRE

10 FRONT STREET • EXETER, NH • 03833-3792 • (603) 778-0591 •FAX 772-4709
www.exeternh.gov

LEGAL NOTICE
EXETER PLANNING BOARD
AGENDA

The Exeter Planning Board will meet on Thursday, April 14, 2022 at 7:00 P.M. in the Nowak Room of the Exeter Town Office building located at 10 Front Street, Exeter, New Hampshire to consider the following:

APPROVAL OF MINUTES: March 24, 2022

NEW BUSINESS: PUBLIC HEARINGS

Public hearing on a proposed amendment to the Exeter Planning Board Site Plan Review and Subdivision Regulations (Section 5 and Section 9.13) to add language regarding "Electric Vehicle Charging". *A copy of the full text of the proposed amendment is available in the Planning Department office.*

The application of Phillips Exeter Academy for a multi-family site plan review, lot line adjustment and Shoreland Conditional Use Permit for the proposed construction of a faculty neighborhood development and associated site improvements on High Street and Gilman Lane. The subject properties are located in the C-1, Central Area Commercial and R-2, Single Family Residential zoning districts and are identified as Tax Map Parcel #71-117, #71-118 and #71-119.

OTHER BUSINESS

- Master Plan Discussion
- Field Modifications
- Bond and/or Letter of Credit Reductions and Releases

EXETER PLANNING BOARD
Langdon J. Plumer, Chairman

Posted 04/01/22: Exeter Town Office and Town of Exeter website

TOWN OF EXETER
PLANNING BOARD
MARCH 24, 2022
DRAFT MINUTES

I. PRELIMINARIES:

BOARD MEMBERS PRESENT BY ROLL CALL: Vice-Chair Aaron Brown, Pete Cameron, Clerk, John Grueter, Gwen English, Molly Cowan, Select Board Representative, and Robin Tyner, Alternate.

STAFF PRESENT: Town Planner Dave Sharples

II. CALL TO ORDER: Vice-Chair Brown called the meeting to order at 7:00 PM, introduced the members present and activated Alternate Robin Tyner.

III. OLD BUSINESS

APPROVAL OF MINUTES

February 10, 2022

Ms. English recommended edits.

Mr. Cameron motioned to approve the February 10, 2022 meeting minutes as amended. Mr. Grueter seconded the motion. A vote was taken, Ms. Tyner abstained. The motion passed 5-0-1.

IV. NEW BUSINESS

PUBLIC HEARINGS

1. Public hearing on a proposed amendment to the Exeter Planning Board Site Plan Review and Subdivision Regulations (Section 5 and Section 9.13) to add language regarding "Electric Vehicle Charging." *A copy of the full text of the proposed amendment is available in the Planning Department office.*

Mr. Sharples indicated that the Energy Committee has requested the Planning Board consider an amendment to its Site Plan Review & Subdivision Regulations addressing Electric Vehicle Charging for new multi-family residential projects and non-residential projects. Mr. Sharples provided a draft of the amendment proposed by the Energy Committee at their February 9, 2022 meeting. Definitions Section 5.11 for "Electric Vehicle Supply Equipment (EVSE) were proposed and Section 9.13.8 Projects which shall provide Electric Vehicle Charging Readiness for 5% of parking spaces for new multi-family residential projects: and 2% of parking spaces for new non-residential projects. Electric Vehicle Charging

Readiness (EVCR) was defined as a parking space that meets the requirement that the project have dedicated circuits on the electric panel with the capacity to accommodate the EVSE; and Conduit has been installed to allow the addition of all necessary wiring to electrify installed EVSE at the parking space(s) without having to excavate to do so. Mr. Sharples noted the proposed amendment does not require charging stations be installed.

Renay Allen, Chair of the Energy Committee presented the proposal on behalf of the Energy Committee. She noted the incentives to make workplaces attractive and business income which could be gained while the vehicles are charging outside a business. The goal is to reduce emissions in the community. Ms. Allen compared New Hampshire to other States as to the number of plug-in vehicles and hybrids and compared Exeter to other New Hampshire communities. The municipality has 4 such vehicles, 2 are owned by the Police Dept. New Hampshire dealerships have a low inventory, but she has spoken to dealerships who believe there will be a boom in sales once inventory is made available. There are charging stations at the Exeter Inn and the Volvo dealership. New Hampshire is on the low side with 322 compared with California which has 30,000 and Massachusetts with 4,128 and New York, 6,000. New Hampshire is lagging behind and this would help to remove potential barriers. She concluded that Exeter residents are buying these vehicles and it would be great if they could charge them too.

Mr. Grueter expressed concerns with taking away parking spaces which are already limited in multi-family projects and asked how long charging typically takes. Ms. Allen noted charging time is dependent on the vehicle, some charge for 25–50-mile range daily while others have a larger range and charging time for a distance of 300 miles.

Ms. Tyner noted this amendment is to prepare to accommodate charging stations. Ms. Allen explained how some associations and businesses might schedule charging with a common card as used for a copy machine.

Mr. Grueter questioned whether the parking spaces would be designated as with handicapped parking or could be utilized by residents the same way as a gas vehicle. Ms. Allen explained how there could be one charging head in between two spaces or even a double-sided head between four spaces as Ms. English had observed. One vehicle could be charging while the adjacent vehicle is waiting.

Ms. Tyner noted this is a starting point, not a maximum number. If owners want more stations the developers will listen and make adjustments.

Vice-Chair Brown opened the hearing to the public for comment at 7:27 PM and being none closed the hearing to the public.

Ms. Tyner disclosed that she was a member of the Energy Committee and questioned if it were acceptable for her to vote and there were no objections.

Ms. English proposed editing the amendment to “rounded” up instead of “round” up in #3.

Ms. Tyner motioned to adopt the proposed amendment to the Site Plan Review & Subdivision Regulations, Section 5.11 and Section 9.13.8 with the word "round" changed to "rounded." Ms. English seconded the motion. A vote was taken, all were in favor, the motion passed unanimously.

Mr. Sharples opined that the regulations have already added to parking spaces, and he has seen a lot of empty spaces.

A request by Ray Farm, LLC for a preliminary **conceptual** consultation with the Planning Board to discuss a proposed redesign of the remaining improvements associated with the Ray Farm Condominium project (senior living development) located off Ray Farmstead Road
Tax Map Parcel #47-8
Planning Board Case #22-3

Mr. Sharples indicated that the applicant is requesting a preliminary conceptual consultation with the Board to discuss a proposed redesign of the remaining improvements associated with Ray Farm Condominium project in the C-3 Epping Road Highway Commercial zoning district. A letter of explanation and supporting plans dated March 16, 2022 were provided to the Board. Mr. Sharples explained the parameters allowed for general discussion without noticing abutters and provided the relevant section of regulations and state statute.

Mr. Sharples again stressed the review is **conceptual.**

Dennis Hamel presented the conceptual plan to change the location of Building D from the location near the Mobil Station to behind the other three buildings known as A, B and C. The applicant added more land to the area behind those buildings and the location where Building D was previously to exist will be open space and not developed. He noted the applicant obtained a variance as the proposed location for Building D as it is in the C-3 zone which is not residential use. The building will look the same as the other three and the applicant feels they will have better sales by changing the location. It is served by water and sewer.

Mr. Sharples noted the Town will proceed with the Tiff Road and any changes will require any road to be compatible with the Tiff Road. Vice-Chair Brown noted the Tiff Road is required to access other property.

Vice-Chair Brown opened the hearing to the public for comments and questions and being none closed the hearing to the public at 7:48 PM.

V. OTHER BUSINESS

- Master Plan Discussion

  Mr. Sharples noted the Bike & Pedestrian Master Plan was approved and he has started a RFP. The MPOC will help move forward.

- Field Modifications

- Bond and/or Letter of Credit Reductions and Releases

  Mr. Sharples noted he will have one to bring to the next meeting.

- Public Comment

VIII. TOWN PLANNER'S ITEMS

Mr. Sharples provided the Board with a Regional Notification from the Town of Brentwood Planning Board for a public hearing on April 7, 2022 regarding a site plan application of Joseph Falzone at 41A Mill Road within Brentwood's Aquifer Protection District and in the Residential/Agricultural zone along the Exeter River. The proposal is for a 75-unit, 55+ condo (SF homes) development on approximately 72+/- acres of land adjacent the Exeter River. Per their March 3, 2022 Planning Board meeting and RSA 36-57 Exeter was one of 11 cities and towns to be notified along with RPC and Strafford Regional Planning Commission. The notice provides a link to the application and supporting documents. Mr. Sharples also provided a copy of their draft minutes of March 3, 2022 and contact information.

IX. CHAIRPERSON'S ITEMS

Vice-Chair Brown indicated he would like to see more discussion concerning the uses allowed on Epping Road. He opined that zoning is lagging and there is a vast corridor zoned C-3 commercial highway.

Ms. Tyner agreed there need to be more collaboration between the ZBA and Planning Board when there are multiple variances and waivers for the same item, an amendment might be considered. She opined those variances and waiver should be rare, the exception not the rule.

Mr. Cameron expressed the Board should consider being careful not to overload vehicles to the road.

Mr. Sharples noted there was funding for a corridor study. Cronin Road and State Route 27 were discussed. Mr. Sharples will put emphasis on that corridor.

X. PB REPRESENTATIVE'S REPORT ON "OTHER COMMITTEE ACTIVITY"

XI. ADJOURN.

Mr. Cameron motioned to adjourn the meeting at 8:09 PM. Ms. English seconded the motion. A vote was taken all were in favor, the motion passed 6-0-0.

Respectfully submitted,

Daniel Hoijer,
Recording Secretary

TOWN OF EXETER

Planning and Building Department

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Date: **April 7, 2022**

To: **Planning Board**

From: **Dave Sharples, Town Planner**

Re: **Phillips Exeter Academy** **PB Case #22-2**

The Applicant is seeking approval of a multi-family site plan, lot line adjustment and Shoreland Conditional Use permit for the proposed construction of a faculty neighborhood development project on High Street and Gilman Lane. The subject properties are located in the C-1, Central Area Commercial and R-2, Single Family Residential zoning districts and are identified as Tax Map Parcel #71-117, #71-118 and #71-119.

The Applicant has submitted a site plan, lot line adjustment plan, a Shoreland Conditional Use permit application and supporting documents, dated February 15, 2022 for review. Revised plans and supporting documents were received on April 5, 2022 and are enclosed for your review. The Applicant also provided a Traffic Memorandum, dated 2/7/22, prepared by Stephen Pernaw & Co. with their submittal and is included in the supporting documents.

A Technical Review Committee (TRC) meeting was conducted on March 9, 2022. A copy of the TRC comment letter, dated March 15, 2022 and UEI comments dated March 14, 2022 are also enclosed for your review.

The Applicant appeared before the Zoning Board of Adjustment at their December 21st, 2021 and was granted a special exception to permit the construction of two-family homes in the R-2 zoning district and a variance to allow a ten-foot (10') front yard setback where twenty-five feet (25') is required. A copy of the Notice of Decision and meeting minutes are also enclosed.

The Applicant presented their plans to the Historic District Commission (HDC) at their November 18th, 2021 meeting; discussions continued at their December 16th, 2021, January 20th and February 17th, 2022 meetings. The project was approved with some conditions specific to construction design and materials.

The Applicant presented their Shoreland Conditional Use Permit application to the Conservation Commission at their March 8th, 2022 meeting. The Commission voted to recommend approval of the CUP with several conditions. Please see enclosed memorandum from CC Chairman Andrew Koff, dated April 1, 2022.

We received updated plans in response to the TRC comments. We are in the process of reviewing this submission to determine if the comments have been addressed and I will update the board at the meeting.

The Applicant is requesting two (2) waivers from the Board's Site Plan Review and Subdivision Regulations, as follows:

- Section 9.3.6.4 for work within five (5) feet of an exterior property line
- Section 9.3.4.F.c.ii for fertilizer use during plant establishment

Please see waiver request letter included in supporting documents.

In the event the board chooses to hold a site walk, I will ask the applicant to mark out the important features of the site. I will be prepared with suggested conditions of approval at the meeting in the event the board decides to act on the request and forego a site walk.

Waiver Motions:

Grading within 5 feet of property line waiver motion: After reviewing the criteria for granting waivers, I move that the request of Phillips Exeter Academy (PB Case#22-2) for a waiver from Section 9.3.6.4. of the Site Plan Review and Subdivision Regulations regarding grading within 5 feet of the property line be APPROVED / APPROVED WITH THE FOLLOWING CONDITIONS / TABLED / DENIED.

Shoreland Protection District – Use of Fertilizer: After reviewing the criteria for granting waivers, I move that the request of Phillips Exeter Academy (PB Case #22-2) for a waiver from Section Article 9.3.4.F.c.ii of the Zoning Ordinance regarding the use of fertilizer in the Shoreland Protection District be APPROVED / APPROVED WITH THE FOLLOWING CONDITIONS / TABLED / DENIED.

Planning Board Motion:

Lot Line Adjustment Motion: I move that the request of Phillips Exeter Academy) PB Case #22-2) for Lot Line Adjustment approval be APPROVED / APPROVED WITH THE FOLLOWING CONDITIONS / TABLED / DENIED.

Conditional Use Permit (Shoreland) Motion: After reviewing the criteria for a Shoreland Conditional Use permit, I move that the request of Phillips Exeter Academy (PB Case #22-2) for a Conditional Use Permit be APPROVED / APPROVED WITH THE FOLLOWING CONDITIONS / TABLED / DENIED.

Multi-Family Site Plan Motion: I move that the request of Phillips Exeter Academy (PB Case #22-2) for Multi-Family Site Plan approval be APPROVED / APPROVED WITH THE FOLLOWING CONDITIONS / TABLED / DENIED.

Thank You.

Enclosures

TOWN OF EXETER

Planning and Building Department

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Date: March 15, 2022

To: Mark Leighton, Director of Facilities Management, PEA
Heather Taylor, Campus Planner/Architect, PEA
Curtis Boivin, Facilities Manager, PEA
Cory Belden, P.E., Altus Engineering, Inc.

From: Dave Sharples, Town Planner

Re: Site Plan Review TRC Comments - Phillips Exeter Academy
PB Case #22-2 Faculty Neighborhood Project, High Street & Gilman Lane
Tax Map Parcel #71-117, #71-118 and #71-119

The following comments are provided as a follow-up for technical review of the site plans and supporting documents submitted on February 15th, 2022 for the above-captioned project. The TRC meeting was held on Wednesday, March 9th, 2022 and materials were reviewed by Town departments.

TOWN PLANNER COMMENTS

LLA plan

1. What is that 10' strip in the NW corner?
2. Why is the LLA plan labeled "Preliminary Lot Line Adjustment"?
3. Please explain Note 6 that states the property boundaries "are gleaned from the Assessor's maps and cannot be relied upon for development purposes." Due to the nature of this area and development on and around the site, all property lines should be verified by the LLS and this Note should be removed for Planning Board submission.
4. Show monuments in accordance with Section 9.25.

Site plan/CUP

5. Are there any known environmental hazards onsite? Have any environmental studies been completed and, if so, please provide copies;
6. Need waiver from Section 9.3.6.4 regarding grading within 5' of a property line;
7. No Parking signs should be installed on each sides of the roadway from the traffic signal to the first driveway entrance;

8. Is the emergency access necessary? Check with Exeter fire Department. Ideally this curb cut should be abandoned as it is in a very difficult spot and left turns out of there can be impossible and potentially unsafe. It doesn't appear it will be gated so what is stopping folks from utilizing it outside an emergency?
9. UEI will review and send comments under separate cover;
10. The granite curbing and sidewalk into the site is appreciated;
11. Provide note per Section 7.5.5 of the Site Plan regulations;
12. Provide note per Section 7.5.16 of the Site Plan Regulations;
13. Provide assurance that all mechanical equipment shall be screened from adjacent roadways;
14. Are all the selected plant species compatible with the soil conditions on the site?
15. Please provide the hours the site lighting will remain illuminated and provide evidence of a timer that will reduce light intensity if they will remain on after 10pm. In addition, confirm that all lighting requirements in Section 9.20 are satisfied;
16. Please elaborate on the comment on page 2 of the Pernaw memo regarding the "current traffic signal timing plan and phasing plan. Specifically, please describe what the current signal timing plan and phasing plan is;
17. Confirm the traffic study addresses the requirements of Sections 7.14.4.1-4 and 8.7.1-8;
18. The Planning Board may conduct a site walk and I will ask them if they want to conduct one at the March 24th meeting so it will not disrupt the anticipated schedule. If they choose to hold a site walk, at a minimum, the applicant should clearly mark all access points and where the buildings and structures will be located. In other words, it should be easy for the board to understand where the buildings will be and where traffic will flow through the site.

PUBLIC WORKS COMMENTS

1. The traffic report is still under review by the Highway Superintendent.
2. Reconfigure the sewer pipe from SMH #4 to enter the existing sewer main in the same direction of flow.
3. Separate the watermain from the drain lines near PDMH#4. Provide two 45-deg bends instead of the 90-deg bend.
4. Show detail of the proposed watermain connection with the existing 4-inch watermain.
5. The existing sewer main is at capacity during peak flows. The additional 1050 gpd sewer flows from this development will be approved as the department investigates possible solutions.

6. The general pollutant percentage removals referenced in the drainage report should reference amounts actually removed for this particular site and compared to predevelopment.

FIRE DEPARTMENT COMMENTS

Basic requirements of the Exeter Fire Department. This list is not all inclusive and other requests may be made during the review process. Unless specifically required by code, some room for compromise is open.

Architectural Review (Rev 5: 9/7/2017):

- Interior utility room access
- Interior sprinkler room access
- Adequate attic access (sized for FF, if applicable))
- Catwalk access in unfinished areas that have sprinklers (handrails preferred)
- If building has truss roof or floors, must display sign according to ordinance 1301. Knox box required for all buildings with fire alarm or sprinkler systems (ordinance 1803)

Civil/Site Review:

- Hydrant near site access and towards rear of site (if applicable)

Sprinkler Review:

- NFPA 13(R,D) sprinkler system where required
- FDC: 4-inch storz with at least 18” clearance to ground
- Electric bell (no water motor gong)
- Attic protection in 13R systems

Fire Alarm Review:

- Single red beacon or strobe indicator on exterior (not horn-strobe)
- NFPA72 Fire Alarm System where required
- Cat 30 keys for pull stations and FACP

Elevators:

- Heat and smoke top and bottom (heats for the shunt trip)
- Dimensions to accommodate a stretcher (usually a 2500 lbs) 3'6" by 7' at a minimum
- Elevator recall to appropriate floor during an activation
- Sprinkler protection top and bottom if ANY combustible material in shaft. (can omit per NFPA 13 guidelines)
- Phone in car needs to be able to dial 911

Compliance with the applicable State Fire Codes and NFPA codes including NFPA 1140 Chapter 6 2017 edition, Building Access and Separation.

POLICE DEPARTMENT COMMENTS

Police Chief Poulin has recommended that traffic planning and police details go through Lt. Steve Bolduc at sbolduc@exeternh.gov. This is one of our busiest intersections at High/Portsmouth Ave and we will need to be looped in prior to any actual truck movement etc. for appropriate police details there.

NATURAL RESOURCE PLANNER COMMENTS

1. Explore potential to use a gravel wetland as it provides a more effective SS, TIN, TN, TP removal efficiencies to replace raingarden 2.
2. Label man-made wetland as such for wetland near the riverside outlet structure by Raingarden #2.
3. Recommend limiting erosion control measures to those made of natural fiber materials to avoid wildlife impacts.
4. Plans show a gap in silt fence along drainage swale to raingarden 2. Extend north until slopes level to protect erosion toward river.
5. Refer to Shoreland district regulations for fertilizer and include restrictions on plans and in stormwater maintenance documents and annual reports (9.3.4.F.a & b).
    a. --Prohibition for use of fertilizer w/I 100' of river.
    b. -From 100-300' fertilizer must be a min of 50% slow release, phosphate free, and may not exceed
    c. application rate of 0.5 lb./TN/1,000 Ft2 with an annual max of 1.5lb/1000ft2.

6. Seed specs (C5.1) indicate 12lbs/1000Ft2. If this amount is necessary for the purposes of establishing new vegetation, you need to seek a waiver from Planning Board.
7. Concerned about snow management in SW corner of site near 7 Gilman Lane. Consider signage to prevent pushing snow toward river where there is no stormwater intervention.
8. Considerations for any buffer enhancement with supplemental plantings?
9. CUP Attachment A references 3 raingardens. Where is the 3rd?

Please submit any revised plans along with a letter responding to these comments (and other review comments, if applicable) no later than April 5th, 2022, but sooner if possible, to allow staff adequate time to review the revisions and responses prior to the planning board hearing on April 14th, 2022.

civil &
environmental
engineering

UNDERWOOD
engineers

2775.00

March 14, 2022

David Sharples, Town Planner
Town Planning Office, Town of Exeter
10 Front Street
Exeter, NH 03833

Re: ***PEA High Street Faculty Neighborhood***
Design Review Engineering Services
Exeter, New Hampshire

Site Information:

Review No. 1

Tax Map/Lot#:	71 / 117, 118, & 119
Address:	High Street and Gilman Lane
Lot Area:	395.5 ac (1.9 ac developed for this project)
Proposed Use:	Residential and Institutional
Water:	Town
Sewer:	Town
Zoning District:	C-1 and R-2
Applicant:	Phillips Exeter Academy
Design Engineer:	Altus Engineering

Application Materials Received:

- Site plan set entitled "High Street Faculty Neighborhood" dated February 14, 2022 prepared by Altus Engineering.
- Site plan application materials prepared by Altus Engineering.
- AoT, Shoreland, and CUP applications prepared by Altus Engineering.
- Traffic Memo, sitework cost estimate, photos, and waiver request prepared by Altus Engineering.
- Drainage report and stormwater maintenance manual prepared by Altus Engineering.

Dear Mr. Sharples:

Based on our review of the above information, in addition to comments provided by the Town, we offer the following comments in accordance with the Town of Exeter Regulations and standard engineering practice.

General

1. An NHDES Sewer Connection Permit should be added to the list of permits on the plan set cover and on C2.1.

ph 603.230.9898
fx 603.230.9899
99 North State Street
Concord, NH 03301
underwoodengineers.com

Site Plan

2. Number or letter designations should be added to each of the units for identification.

3. Parking requirements should be listed on C2.1 for the residential units and the observatory classroom building.

4. It appears that the existing gate control post may be in conflict with both a proposed sewer main and with fire truck turning movements.

Utilities Plan

5. The existing sewer service for 35 High Street should be depicted and denoted as remaining or to be abandoned (per Exeter standards).

6. The proposed sewer service for the northwestern-most unit on High Street should not include angles/fittings without clean-outs. Consider relocating SM#3 easterly to accommodate a 90-deg entrance to sewer manhole #3.

7. The orphan label for SMH #3 between #1 and #2 should be deleted.

8. Sewer pipe slopes should be labeled.

9. Confirm all crossings of utilities are free of conflicts.

10. Water service material should be noted.

11. The size and material of the existing water service to 10 Gilman Lane and the observatory should be labeled if known.

12. The inverts of the existing tie-in manhole, downstream of PSMH #4, should be labeled. A note should be added to modify the invert as appropriate.

Grading and Drainage Plan

13. Will there be any gutters and downspouts? If so, downspout outlets should be shown on the plans.

14. Location of foundation drain outlets should be shown as appropriate.

15. A note should be added directing the site contractor to construct a concrete washout area prior to concrete placements.

16. The invert out at the plunge pool is below the flood plain elevation, so there is a possibility the rain garden could be flooded. Please confirm appropriate plant species have been chosen that can withstand occasional flooding.

Detail Sheets

17. Although observed water levels were not noted in the test pit logs in the AoT application, a relatively shallow water table is indicated, so dewatering should be anticipated for footings and trench work for utilities. It should be noted on Sheet C5.1 that the certified SWPPP inspector must be onsite daily during any dewatering activity under the new 2022 CGP guidelines.

18. A detail for a concrete washout area should be added.

Landscape Plan

19. The plan shows a retaining wall next to the existing transformer at the observatory entrance. This is not shown on the Civil drawings. The limit of new pavement is different on the landscape plan than the rest of the plans. Coordination is needed.

Stormwater Design and Modeling

20. It is unclear why some of the proposed catchbasins are being modelled with storage, particularly those identified as yard drains. Some are graded such that ponding above the rim of the structure can occur.

21. UE acknowledges that the project identifies infiltration practices as contributing to addressing pollutant loading requirements for the site, however the project does not appear to utilize infiltration beyond RG #1 and only marginally there. Please confirm the treatment BMPs being proposed and how each will contribute to the project's compliance with the Towns stormwater quality regulations.

22. It is not clear to UE that the project has demonstrated its compliance with the Pollutant Loading removal requirements per the Town of Exeter stormwater treatment regulations. Please provide calculations for pre- and post- development loads and removals.

23. PTAP Database: The Applicant is requested to enter project related stormwater tracking information contained in the site plan application documents using the Great Bay Pollution Tracking and Accounting Program (PTAP) database (www.unh.edu/unhsc/ptapp).

A written response is required to facilitate future reviews. Please contact us if you have any questions.

Very truly yours,
UNDERWOOD ENGINEERS, INC.

Allison M. Rees, P.E.
Project Manager

Robert J. Saunders, P.E.
Senior Project Engineer

TOWN OF EXETER
CONSERVATION COMMISSION MEMORANDUM

Date: April 1, 2022
To: Planning Board
From: Andrew Koff, Chair, Exeter Conservation Commission
Subject: PEA Shoreland CUP

Project Information:
Project Location: 35 High Street, Exeter, NH
Map/Lot: Map 71, Lots 117-119
CC Review Date: 3/8/22
PB CASE: #22-02

Following a presentation and review of the conditional use permit, the Exeter Conservation Commission voted as follows:

They recommend approval of the Shoreland Conditional Use Permit with the following conditions:

- Applicant to install the best possible stormwater drainage/filtration system in order reduce nitrogen and phosphorous discharges to the nearby Exeter River.
- If possible, the applicant will narrow the width of the internal private road in order to minimize impermeable areas.
- The applicant will apply for a waiver for initial fertilizer use to establish new landscaping.
- The applicant will review the necessity of an irrigation system for the lawn areas

Should design changes occur in a way that alters impacts to the buffers, we would request an opportunity for additional review.

Andrew Koff
Chair, Exeter Conservation Commission

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December 28, 2021

Roy W. Tilsley, Jr., Esquire
Bernstein, Shur, Sawyer & Nelson, P.A.
670 N. Commercial Street, Suite 108
POB 1120
Manchester, New Hampshire 03105-1120

Re: Zoning Board of Adjustment Case #21-15 - Phillips Exeter Academy
Variance and Special Exception Request
35 High Street, 10 Gilman Lane, 8 Gilman Lane, Exeter, N. H.
Tax Map Parcel #71-117, #71-118 and #71-119

Dear Attorney Tilsley:

This letter will serve as official confirmation that the Zoning Board of Adjustment, at its December 21st, 2021 meeting, voted to grant the above-captioned application(s) for a variance from Article 4, Section 4.3 Schedule II: Density and Dimensional Regulations-Residential to permit the proposed construction of a residential structure (two-family dwelling) approximately ten feet (10') from the front lot line where a twenty-five foot (25') front yard setback is required; and a special exception per Article 4, Section 4.2 Schedule I:Permitted Uses and Article 5.2 to permit the proposed development of the subject parcels, within the C-1, Central Area Commercial and R-2, Single Family Residential zoning districts, as presented.

The special exception approval was granted with the condition that a landscape buffer be provided along the eastern property boundary to the satisfaction of the Planning Board.

Please be advised that in accordance with Article 12, Section 12.4 of the Town of Exeter Zoning Ordinance entitled "Limits of Approval" that all approvals granted by the Board of Adjustment shall only be valid for a period of three (3) years from the date such approval was granted; therefore, should substantial completion of the improvements, modifications, alterations or changes in the property not occur in this period of time, this approval will expire.

If you should have any questions, please do not hesitate to contact the Building Department office at (603) 773-6112.

Sincerely,

Kevin M. Baum
Chairman
Exeter Zoning Board of Adjustment

cc: Mark Leighton, Director of Facilities Management, Phillips Exeter Academy
Corey Belden, P.E., Altus Engineering, Inc.
Douglas Eastman, Building Inspector/Code Enforcement Officer
Janet Whitten, Deputy Assessor

KMB:bsm

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Town of Exeter
Zoning Board of Adjustment
December 21, 2021, 7 PM
Town Offices Nowak Room
Final Minutes

I. Preliminaries

Members Present: Chair Kevin Baum, Vice-Chair Robert Prior, Clerk Esther Olson-Murphy, Rick Thielbar, Christopher Merrill - Alternate, Anne Surman - Alternate

Members Absent: Laura Davies, Martha Pennell - Alternate

Call to Order: Chair Kevin Baum called the meeting to order at 7 PM.

I. New Business

A. Continued public hearing on the application of Roger Elkus for a variance from Article 5, Section 5.5.3 to permit the proposed construction of a second principal building (residential) on the property located at 181 High Street. The subject property is located in the R-2, Single Family Residential zoning district. Tax Map Parcel #70-119. ZBA Case #21-13.

Mr. Baum said this application has been withdrawn by the applicant.

B. The application of Lisa Butler for a special exception per Article 5, Section 5.2 and Article 6, Section 6.18 – Cemetery Regulation to permit the proposed construction of a garage and enclosure of an existing deck within the required statutory 25-foot setback from the abutting cemetery. The subject property is located at 37 Linden Street, in the R-2, Single Family Residential zoning district. Tax Map Parcel #82-19. ZBA Case #21-14.

Mr. Merrill said he will exempt himself from this case because he is on the Cemetery Board. Ms. Surman will be the voting alternate.

Lisa Butler said this is the third stop in the special exception process. The Cemetery Trustee Board and Select Board have approved the request. She's looking to renovate the home to make it accessible for her partner, who is wheelchair-bound. If the cemetery were not there, it would be a 10 foot setback, but because of the cemetery it's a 25 foot setback. The ordinance provides for a special exception for "use and enjoyment" of the property, which for us would mean enclosing an existing porch and adding a garage. The changes would stay within the 10 foot setback. There's a shed by the cemetery fence that we will likely tear down. Mr. Prior said that there will actually be less intrusion for the cemetery with that structure removed.

Mr. Baum opened the public hearing, but there was no public comment. He closed the public hearing and brought the discussion back to the Board.

Mr. Prior said in this case, we can rely on the written submission and not go through the criteria.

Mr. Prior made a motion to approve the application of Lisa Butler for the special exception for the property of 33 Linden Street as submitted. Ms. Surman seconded. Mr. Baum said this clearly meets the criteria and it's an improvement over what's currently on the property. It's reasonable and will not detract from any property values or the public health, safety, or welfare. Mr. Prior, Mr. Thielbar, Ms. Surman, Ms. Olson-Murphy, and Mr. Baum voted aye, and the motion passed 5-0.

C. The application of Phillips Exeter Academy for a variance from Article 4, Section 4.3 Schedule II: Density and Dimensional Regulations-Residential to permit the proposed construction of a residential structure (two-family dwelling) approximately ten feet (10') from the front lot line where a twenty-five foot (25') front yard setback is required; and a special exception per Article 4, Section 4.2 Schedule I:Permitted Uses and Article 5.2 to permit the proposed construction of three (3) two-family dwellings within the R-2, Single Family Residential zoning district. The subject properties are located at 35 High Street, 10 Gilman Lane and 8 Gilman Lane, in the C-1 Central Area Commercial and R-2, Single Family Residential zoning districts. Tax Map Parcels #71-117, #71-118 and #71-119. ZBA Case #21-15.

Mr. Merrill said he will let Ms. Surman vote on this issue, but he will participate in the discussion.

Roy Tilsley of the Bernstein Shur Law Firm was present to represent Phillips Exeter Academy, as well as Cory Belden of Altus Engineering, Mark Leighton of PEA, and Robert Harbeson and Christina O'Brien from Market Square Architects.

Attorney Tilsley said the project is seeking one variance and one special exception to create a four acre lot out of 71-117,118, and a portion of 119. That lot contains 8 housing units for faculty; we're seeking to add 5 units for a total of 13. This lot is partially in the C-1 district and partially in the R-2 district. This project is subject to HDC and Planning Board review. The variance is from 4.3 to allow a structure, in this case a two-family dwelling, to be located within 10 feet from the front lot line in the R-2 zone, where 25 feet is required. It would be right next to an existing duplex on the C-1 side with a 10 foot setback. We had originally proposed 13.5 feet for the setback, but the HDC preferred having symmetry between the two properties with an enclosed front entryway. The special exception is from 4.2 and 5.2 to permit the three two-family duplexes on the R-2 portion of the lot.

Corey Belden of Altus Engineering spoke about the site design. Currently there are 8 units on the site. The structure at 35 High Street has 6 units and there are two single-families at 8 and 10 Gilman Lane. The proposal is to do a lot merger and lot line adjustment which will create a four acre lot that will contain the new development. Our goals were to provide better access to the site, the

ballfields, and the town DPW pump station, and to improve the intersection at Gilman Lane. We're looking to close off the curb cut and provide all access through the signalized intersection.

Mr. Prior asked Mr. Belden to discuss who is impacted by the closure of Gilman Lane. Mr. Belden said public access will be through the new access, but the easement will remain. The existing road will end at the new duplex driveway. We will close the curb cut completely, although it may serve as emergency access. Unitil and the town will still have access.

Ms. Surman asked if pedestrians can still use the road. Mr. Belden said it's a private road and owned by the Academy, but it will still be walkable. Mr. Prior asked for confirmation that Gilman Lane is at present a private road, and Mr. Belden said that it is. Mark Leighton said it is a private drive, but we allow people to walk down through there. The use of it will be the same as it is now, and we are improving it by adding a sidewalk.

Mr. Baum asked if the intersection would be signalized. Mr. Belden said there's currently a signal for the driveway at 35 High Street that's run on a detector.

Mr. Prior asked if the structure at 25 High Street, which is not an Academy property, has any rights over Gilman Drive. Mr. Leighton said no, but we've met with the owner of that property and we're willing to give him a piece of our property for his driveway.

Robert Harbeson of Market Square Architects presented the design proposals for the two duplexes and the triplex.

Attorney Tilsley said regarding the setback variance, if this were the C-1 zone, it would be a 10 foot required setback. We're very close to the C-1 zone. 35 High Street has a 10 foot setback, and the HDC liked the idea that the two buildings would be lining up. Many nearby properties are closer than 10 feet from their lot lines, so it's consistent with the area. In front of the lot line, there's a five foot concrete sidewalk, so there's some additional separation from traffic.

Attorney Tilsley went through the variance criteria. 1) The variance will not be contrary to the public interest and 2) The spirit of the ordinance will be observed; yes, the proposal does not alter the essential character of the neighborhood, as most properties have a 10 foot or less setback. It's not contrary to the public health, safety, or welfare. Closing off Gilman Lane and directing traffic through the signalized intersection will be a benefit for safety and traffic flow. 3) Substantial justice is done; yes, there's no gain to the public by strict enforcement of this ordinance in the requirement of a 25 foot setback. The loss to the applicant would be significant. It would make it hard to comply with the HDC and limit the potential for faculty housing on this site. 4) The value of surrounding properties will not be diminished; yes, the 10 foot setback would make it consistent with surrounding properties. 5) Literal enforcement of zoning ordinance will result in an undue hardship; yes, the location at Portsmouth Ave and High Street is on the edge of the C-1 and R-2 zoning districts and we're trying to find a way to marry the uses. There's no fair and substantial relationship

between the 25 foot setback requirement and its application to the property. It's a transitional area and the 10 foot setback is consistent with the rest of the neighborhood. The proposed use is reasonable; duplexes are allowed by special exception, and we're complying with the requirements of the HDC, which approved our attempt to line this up.

Attorney Tilsley said regarding the special exception, this is to allow three duplexes in the R-2 zone. Mr. Baum asked about the triplex. Attorney Tilsley said we're dealing with HDC on the triplex, and may get it or not. Mr. Baum said duplexes are permitted by special exception but triplexes are not. Attorney Tilsley said Mr. Eastman said because the triplex will be located in both zones, including C-1, it would be allowed. He discussed the setbacks for each building, which meets what's required.

Attorney Tilsley went through the special exception criteria. 1) The use has to be permitted by the zoning ordinance; yes, 4.2 section 1 says that duplexes are allowed by special exception in the R-2 zone. 2) The use is designed, located, and proposed to be operated so that the public health, safety, and convenience will be preserved; yes, we're providing on-site parking, ingress and egress from the signalized intersection, and with a wider curb cut, which will be a safer way to get to the property. 3) The proposed use is compatible with the zoning district and adjoining post-1972 development; yes, the neighborhood is predominantly multi-family. This is a transition area between C-1 and R-2, so we believe it's appropriate to have this use there. 4) Adequate landscaping and screening is provided; yes, there will be fencing and buffers along the back and sides. We will create an area that is appropriately screened from abutters. 5) Adequate off-street parking; yes, all parking will be provided on-site, with no on-street parking. We're adding just 5 units to what's there now, so it's not as big of a difference as it might appear. 6) The use conforms with all applicable regulations governing the district; yes, the only one not complied with is the 25 foot setback, which we are looking for variance relief from. 7) Planning Board Review; yes, that will be required anyway for the lot line adjustment and site plan. 8) The use will not adversely affect surrounding property values; yes, duplex and multifamily uses are consistent with this neighborhood. We have adequate screening, and are meeting rear and side setbacks. We are creating a walkable family-friendly area, which should actually enhance property values. Criteria 9) storage of hazardous materials and 10) dealing with the special treatment of specific lots in town do not apply.

Mr. Prior said regarding 2), he is concerned that by approving this we're increasing the number of people accessing High Street on that stretch. Is a traffic study planned or required? Mr. Belden said that will be hashed out during site review. Gilman Lane is a poor access and has a limited ability to make left hand turns, so we're looking to relocate that access.

Mr. Merrill asked what will happen if the HDC says they have to keep that building in the middle. Attorney Tilsley said it wouldn't change what we're requesting today. Mr. Belden said if required to be maintained, we'd look to turn it

into a duplex. Mr. Baum said we're dealing with these plans as presented. If something changes, they'd have to come back.

Mr. Merrill asked if the changes would affect the owners of 39 High Street. Mr. Leighton said not that they're aware of. That property's driveway does not trigger the light. Mr. Baum said he assumes the Planning Board will address that.

Anthony Zwaan of 7 Marlboro Street, an abutter, said the setback is a straightforward proposal, but the three duplexes are not consistent with the neighborhood. The Planning Board will look at this, but ZBA approvals severely limit subsequent review. It's a shame that there are so many units in this development. The relocation of Gilman Lane is predicated on the tearing down of 8 Gilman Lane and on being built right up to the property line of what used to be the High Street Market, with no buffer. The plan as presented doesn't fairly represent the lack of buffering for this project. Regarding public access, when the Court Street development was proposed, the Academy promised to maintain public access to the sports field, but that did not happen. This proposal is totally out of character with the neighborhood, small detached family homes would be better.

Attorney Tilsley said regarding the setbacks, we did 25 feet when 15 is required. The fence is along the property line with trees. Mr. Baum asked if they can do a more vegetated buffer, since a six foot tree along the property line is not going to shield the view. Mr. Belden said we will look to see which trees can be preserved, but the landscape architect felt like most of them were not worth preserving and that it was better to plant new trees. Mr. Leighton said we're open to more planting.

Attorney Tilsley said we identified multifamily properties along High Street, Marlboro Street, and Gilman Lane, and this is not unusual for this neighborhood. Mr. Baum said on Marlboro Street, #7 is not a two family and #10 is a commercial structure, but there is another two family behind that. Mr. Belden said this information came directly from the town's website.

Mr. Baum asked the applicants to address the question of public access to the trails and field. Attorney Tilsley said the access will be on whatever we call this new road. It will be the same level of access. Mr. Leighton said he understands their interest, but this is private property. There's no plan to make any changes to what Gilman Lane allows now, but we reserve the right to close the trails. Mr. Prior said being in compliance is not the same as honoring tradition. People are used to being able to walk with impunity on those grounds. He observed Gilman Lane today and observed 6 - 8 people go for a walk down to the river or to the fields.

Anthony Zwaan said this development looks and feels more like a development from a for-profit developer than from an institution that is part of the community. It's not respectful of the town or the neighborhood. They should give up a couple of units and be more respectful. Regarding open space and green space, this is intended to create a buffer around the buildings, but in this case

they're pushing the buildings out to the margins to create the illusion of space between the buildings, at the expense of abutters. A six foot fence is not an adequate screen. He doesn't understand the hardship here, or the suburban-style design.

Attorney Tilsley said we're open to whatever buffering makes sense. The intent is to buffer appropriately and that's why we created a setback that's bigger than required. Clustering the buildings together is something we'd do if we were trying to exceed the required density, but that's not what we have here. This is an allowed density. We're trying to create an attractive and livable area.

Mr. Prior went through the variance criteria. 1) The variance will not be contrary to the public interest and 2) The spirit of the ordinance will be observed; yes, he believes the variance will not be contrary to the public interest and will be consistent with the neighborhood. Mr. Baum said he agrees. He walked down there and the other houses are 10 feet to 0 feet setback. Mr. Prior continued with the variance criteria: 3) Substantial justice is done; yes, there's no harm to the public by having that building located this distance from the street, given that other buildings around it have the same setback. 4) The value of surrounding properties will not be diminished; yes, there's been no testimony to that effect, and he doesn't see any issues. The only question would potentially be with 25 High Street, but that varies from 9 - 11 feet from the street. 5) Literal enforcement of zoning ordinance will result in an unnecessary hardship; the balance is with the needs of the HDC, which has a say over the property. It's their desire, as well as the applicant's, to see the 10 foot setback. Mr. Baum said there's law that when surrounding properties have a similar condition, there's a hardship. The purpose of the setbacks is to provide safety and distance from the other properties, as well as consistency. This is an area where it doesn't make sense to have large yards.

Mr. Prior made a motion to approve Phillips Exeter Academy for a variance from Article 4, Section 4.3 Schedule II as presented. Mr. Baum seconded. Mr. Baum, Mr. Prior, Ms. Olson-Murphy, Ms. Surman, and Mr. Thielbar voted aye, and the motion passed 5-0.

Mr. Baum asked for discussion on the special exception. Mr. Prior said just because there are two-family houses in the area doesn't mean we have to extend the number of two-families. Ms. Olson-Murphy said the existing two-families were all one family houses that have been converted, while these look like duplexes. Mr. Baum said 47-49 is clearly a duplex, so they don't all look like single-family houses.

Mr. Prior went through the special exception criteria. 1) The use has to be permitted by the zoning ordinance; yes, 4.2 section 1 says that duplexes are allowed by special exception in the R-2 zone. 2) The use is designed, located, and proposed to be operated so that the public health, safety, welfare, and

convenience will be protected; while he dislikes the moving of Gilman Lane, he does see the benefit from a safety perspective for traffic to go through the light. However, he's concerned about the density of people in this development. He has some questions about how this proposal meets #2. Ms. Surman said this is a big change for that intersection. It would be nice to see a traffic study. Mr. Baum said it doubles the number of units, but only to 13, which is not a big increase. This will go through Planning review to deal with traffic. Mr. Prior said once we grant the usage, all a traffic study can do is a fine-grained analysis of the use. Mr. Baum said the Planning Board could say it's too much or unsafe, but he doesn't think that's going to happen with 13 units. Multifamily is permitted in the C-1. With faculty housing, typically at least one spouse will be walking to work. Ms. Olson-Murphy said these are family-sized units with more activity, which will impact the area. Mr. Prior continued with the criteria: 3) Proposed use is compatible with the zoning district and adjoining post-1972 development where it is to be located; yes and no. This neighborhood is not as uniformly or predominantly multi-family as the applicant has suggested. Mr. Baum said there is a lot of multi-family use along High Street. He has trouble with the idea of denial based on use when it's a zone that permits duplexes by special exception. Mr. Thielbar said a lot of the things we've discussed haven't been part of our purview. Mr. Prior continued with the criteria: 4) Adequate landscaping and screening; he believes that the applicant will honor the verbal commitment that was made to consider screening options, but we should consider putting in a condition. Mr. Baum said we should make it clear to the Planning Board that it's a concern and should be addressed. 5) Adequate off-street parking - yes, we have no evidence to the contrary - and ingress and egress are so designed to cause minimum interference on abutting streets; taken narrowly, yes, they're putting the entrance through the signaled intersection. His concern with traffic has to do with the volume coming out onto High Street, rather than disruption or interference, so they meet the language of #5. 6) The use conforms with all applicable regulations governing the district where located; yes, we have no evidence to the contrary. Mr. Baum said yes, it meets all setbacks and other requirements. 7) Planning Board Review; yes, that will be required, but we can still say that in our conditions. 8) Use will not adversely affect abutting property values; yes, we've had no testimony mentioning property values. Any impact would be best addressed by the landscaping. Mr. Baum said with a condition on landscaping, he's comfortable with this criteria. The other two criteria do not apply.

There was general discussion about possible conditions to the motion.

Mr. Thielbar moved to approve the application of Phillips Exeter Academy for a special exception per Article 4, Section 4.2 Schedule I: Permitted Uses and Article 5.2 to permit the proposed construction of the subject properties located at 35 High Street, 10 Gilman Lane and 8 Gilman Lane, in the C-1 Central Area Commercial and R-2, Single Family Residential zoning districts. Ms. Surman seconded.

Mr. Baum made a motion to amend the motion to add the condition to add a landscape buffer on the eastern property boundary to the satisfaction of the Planning Board. Mr. Thielbar seconded. Mr. Baum, Mr. Prior, Ms. Olson-Murphy, Ms. Surman, and Mr. Thielbar voted aye, and the amendment passed 5-0.

On the amended motion, Ms. Surman, Mr. Baum, and Mr. Thielbar voted aye, and Mr. Prior and Ms. Olson-Murphy voted nay. The amended motion passed 3-2.

II. Other Business

A. Approval of Minutes: November 17, 2021

Corrections: Mr. Prior line 303, should be “frontage feet” instead of “square feet.” Mr. Thielbar said line 201, “here” should be “there.” Ms. Olson-Murphy said her name was spelled wrong in lines 216, 219, 322, 323, and 331.

Mr. Thielbar made a motion to approve the minutes of November 17, 2021 as amended. Mr. Prior seconded. Mr. Baum abstained as he was not present at the Nov 17 meeting. Mr. Thielbar, Ms. Olson-Murphy, Mr. Prior, Ms. Surman, and Mr. Merrill voted aye, and the motion passed 5-0-1.

III. Adjournment

MOTION: Ms. Surman moved to adjourn. Mr. Thielbar seconded. All were in favor and the meeting was adjourned at 9:22 PM.

Respectfully Submitted,
Joanna Bartell
Recording Secretary

ALTUS ENGINEERING, INC.

Civil
Site Planning
Environmental
Engineering

133 Court Street
Portsmouth, NH
03801-4413

February 14, 2022

Town of Exeter
Planning Board / Conservation Commission
10 Front Street
Exeter, NH 03833

RE: Application for Site Plan Review, Lot Line Adjustment,
& Conditional Use Permit – Shoreland District
High Street Faculty Neighborhood Development
Tax Map 71, Lots 117-119
Case #2022-02

Dear Board and Commission Members,

On behalf of Phillips Exeter Academy (Academy), Altus Engineering, Inc. (Altus) is pleased to submit the attached Application for Site Plan Review, Lot line Adjustment and Conditional Use Permit – Shoreland Protection District to construct the proposed faculty residential development. The new faculty housing neighborhood is depicted on parcels 71-117, 118, and 119 at the intersection of High Street and Gilman Lane. The housing project will remove the existing building at 8 Gilman Lane and a portion of the building at 35 High Street to construct the new residential buildings, which will increase the total number of residential units on the site from eight to thirteen. The existing Gilman Lane connection to High Street will be closed and traffic routed to the existing signal at High Street and Portsmouth Avenue (See Traffic Memo). The existing site was also constructed prior to stormwater regulations, so the proposed development will provide improved water quality to the Exeter River by treating the surface runoff with bio-retention raingardens prior to discharge.

The Lot Line Adjustment application proposes to merge Lots 71-117, 71-118, and a portion of Lot 71-119 to create a new 4.1+/- acre lot for the development site. The remaining portion of Lot 71-119 will be approximately 391.4 acres.

The proposed development lies within the 300-foot shoreland buffer to the Exeter River, which includes a significant portion of the development area. The majority of the site area has been previously developed except for approximately 0.3 acres located furthest from the Exeter River. The natural vegetated buffer along the back of the Exeter River and the existing wooded buffer behind the Granger Observatory will be preserved. There will not be any direct wetland impacts associated with the proposed development. There is a small wetland area shown on the plans that is the discharge of a man-made drainage structure. The project proposes to remove and replace the existing corroded metal culvert with a new HDPE pipe and stone plunge pool outlet.

The Academy and Altus Engineering met with the Exeter River Advisory Committee on November 18, 2021 to discuss the proposed project. During the meeting it was noted that the project would not disturb the existing vegetated buffer along the river bank or adjacent to the observatory building and would provide stormwater treatment. It is our understanding that the Advisory Committee did not have any objections to the proposed development.

The Exeter Zoning Board of Adjustment granted relief for the following items at the December 21, 2021 meeting;

1. Variance - per article 4, section 4.3, schedule II: density and dimensional regulations - front yard setback in the R-2 district. To allow 10.0 feet, where 25 feet is required., and
2. Special Exception - per article 4, section 4.2, schedule I: permitted uses, to allow two-family homes in the R-2 district.

Additionally, the Academy and Market Square Architects have met with the Heritage Commission and Historic District Commission multiple times to discuss the project and are hoping for a final determination from the HDC at the February 17, 2022 meeting.

Included in the application materials, please find the following: Five (5) copies of the full size plans and supporting material for the Technical Review Committee and fifteen (15) copies (1 full size plans and 14 reduced plans) for the Conservation Commission.

1. Site Review Application & Checklists (TRC)
2. Lot Line Adjustment Application & Checklist (TRC)
3. Conditional Use Permit – Shoreland Protection District Application (TRC & CC)
4. Application Fees (TRC)
5. Abutter List and Mailing labels (TRC)
6. Site Cost Estimate (TRC)
7. Waiver Requests (TRC & CC)
8. USGS, Aerial, and FEMA Site Maps (TRC & CC)
9. Site Pictures (TRC & CC)
10. Preliminary Application to Connect to Sewer, Water, and Stormwater Drainage Systems (TRC)
11. Traffic Memorandum (TRC)
12. Drainage Report (TRC & CC)
13. Stormwater Inspection and Maintenance Manual TRC & CC)
14. Fire Engine Turning Template (TRC)
15. Project Plans (24” x 36”) (TRC & CC)
    - Including Preliminary Lot Line Adjustment (LA-1)
    - Including Conditional Use Permit Plans – Exeter Shoreland (CUP.1)

We respectfully request to be placed on the agenda for the Conservation Commission meeting scheduled for March 8, 2022 and to meet with Technical Review Committee to discuss the project in further detail. If you have any questions, please do not hesitate to contact us.

Sincerely,
ALTUS ENGINEERING, INC.

Cory D. Belden, PE

ECopy: Mark Leighton / Heather Taylor, Phillips Exeter Academy
Christina O’ Brien / Rob Harbeson, Market Square Architect
Enclosures
Altus Prj: P5075

ALTUS ENGINEERING, INC.

Civil
Site Planning
Environmental
Engineering

133 Court Street
Portsmouth, NH
03801-4413

April 5, 2022

Town of Exeter
Planning Board
10 Front Street
Exeter, NH 03833

RE: Application for Site Plan Review, Lot Line Adjustment,
& Conditional Use Permit – Shoreland District
High Street Faculty Neighborhood Development
Tax Map 71, Lots 117-119
Case #2022-02

Dear Board,

On behalf of Phillips Exeter Academy (Academy), Altus Engineering, Inc. (Altus) is pleased to submit the attached Application for Site Plan Review, Lot line Adjustment, and Conditional Use Permit – Shoreland Protection District to construct the proposed faculty residential development at the intersection of High Street and Gilman Lane. The new faculty neighborhood is depicted on parcels 71-117, 118, and 119 and is approximately 4.1 acres in size. The Lot Line Adjustment application proposes to merge Lots 71-117, 71-118, and a portion of Lot 71-119 to create a new 4.1+/- acre lot for the development site. The remaining portion of Lot 71-119 will be approximately 391.4 acres. The housing project will remove the existing building at 8 Gilman Lane and a portion of the building at 35 High Street to and construct four new two family homes and two single family homes, which will increase the total number of residential units on the site from eight to thirteen. The existing Gilman Lane connection to High Street will be closed and traffic routed to the existing signal at High Street and Portsmouth Avenue (See Traffic Memo). The existing site was also constructed prior to stormwater regulations, so the proposed development will provide improved water quality to the Exeter River by treating the surface runoff with bio-retention prior to discharge.

The proposed development lies within the 300-foot shoreland buffer to the Exeter River, which includes a significant portion of the development area. The majority of the site area has been previously developed except for approximately 0.3 acres located furthest from the Exeter River. The natural vegetated buffer along the bank of the Exeter River and the existing wooded buffer behind the Granger Observatory will be preserved. There will not be any direct wetland impacts associated with the proposed development. There is a small man-made wetland shown on the plans that is the discharge of a drainage culvert. The project proposes to remove and replace the existing corroded metal culvert with a new HDPE pipe and stone plunge pool outlet.

The Academy and Altus met have met with the Town of Exeter Planning and Building Department, Heritage Commission, Historic District Committee, Conservation Commission, Technical Review Committee, Underwood Engineering (UEI), the Exeter River Advisory Committee, and the RPC Exeter—Sqwamscott River Local Advisory Committee. Comments received from the reviews are noted in the following pages with responses.

Planning and Building Department:

Town Planner:

1. What is that 10' strip in the NW corner?
   AE: The 10' strip in question is to be deeded to Tax Map 72, Lot 62 to improve their access.

2. Why is the LLA plan labeled "Preliminary Lot Line Adjustment"?
   AE: The plan was labeled "Preliminary" because some of the property lines shown needed additional research. Millennium Engineering (MEI) has performed the required research to confirm property lines and prepared a revised lot line plan. All new lot lines from MEI have been updated in the project plans.

3. Please explain Note 6 that states the property boundaries "are gleaned from the Assessor's maps and cannot be relied upon for development purposes." Due to the nature of this area and development on and around the site, all property lines should be verified by the LLS and this Note should be removed for Planning Board submission.
   AE: As noted above, additional research was required on some of the property lines. This note has been revised and the property lines have been confirmed.

4. Show monuments in accordance with Section 9.25.
   AE: The new Plan of Land / Lot Line Adjustment Plan by MEI identifies monuments and monuments that will be set upon approval of the lot line adjustment.

5. Are there any known environmental hazards onsite? Have any environmental studies been completed and, if so, please provide copies;
   AE: There are no known environmental hazards. NHDES OneStop data check has been checked for the NHDES Permit applications and a Phase 1-A study is being conducted.

6. Need waiver from Section 9.3.6.4 regarding grading within 5' of a property line;
   AE: A waiver from Section 9.3.6.4 has been requested.

7. No Parking signs should be installed on each sides of the roadway from the traffic signal to the first driveway entrance;
   AE: No parking signs have been added to the plans, including through the turn.

8. Is the emergency access necessary? Check with Exeter fire Department. Ideally this curb cut should be abandoned as it is in a very difficult spot and left turns out of there can be impossible and potentially unsafe. It doesn't appear it will be gated so what is stopping folks from utilizing it outside an emergency?
   AE: Emergency access will only be provided through the designated entrance at the signalized intersection.

9. UEI will review and send comments under separate cover;
   AE: UEI Comments have been received and addressed below.

10. The granite curbing and sidewalk into the site is appreciated;
    AE: Noted.

11. Provide note per Section 7.5.5 of the Site Plan regulations;
    AE: Note is included on the Site Plan, C2.2, Site Note 2.

12. Provide note per Section 7.5.16 of the Site Plan Regulations;
    AE: Note is included on the Site Plan, C2.2, Site Note 1.

13. Provide assurance that all mechanical equipment shall be screened from adjacent roadways;
    AE: There is a transformer, and each unit will have an exterior HVAC condenser. Notes have been added to the Utility Plan and Landscape Plan indicating that they will be screened with evergreens form the roadway (High Street).

14. Are all the selected plant species compatible with the soil conditions on the site?
    AE: The landscape architect has selected the plant species for the site conditions.

15. Please provide the hours the site lighting will remain illuminated and provide evidence of a timer that will reduce light intensity if they will remain on after 10pm. In addition, confirm that all lighting requirements in Section 9.20 are satisfied;
    AE: The lights will be turned on based on the photocell readings and will reduce to lower level intensity at 10pm. Notes have been added to the plan.

16. Please elaborate on the comment on page 2 of the Pernaw memo regarding the "current traffic signal timing plan and phasing plan. Specifically, please describe what the current signal timing plan and phasing plan is;
    AE: Pernaw has indicated that they do not have access to the current timing of the traffic signal. The signal timing is maintained by Electric Light Company out of Cape Neddick. See bwlo form Pernaw:
    "We do not have access to the current timing of the traffic signal. In conjunction with our site inspection we "tested" the detector on the site driveway approach and were able to determine that the "green" time for the site driveway ranges from 4-12 seconds, depending upon demand. This is plenty for the proposed development. Page 1 describes the signal phasing we observed in the field. As it turns out, this signal is under the jurisdiction of the Town, not the State. The town should have the timing parameters in their files, or at least in the controller cabinet. We do not have access to the controller cabinet. I did check with the NHDOT, and was able to obtain the "Traffic Signal Approval" from 1986 that shows signal timing and phasing information (see Attachment) back then."

17. Confirm the traffic study addresses the requirements of Sections 7.14.4.1-4 and 8.7.1-8;
    AE: It should be noted that the traffic memorandum provided by Stephen G. Pernaw & Co. addressed the traffic impacts, traffic circulation, and safety but is not a complete Traffic Impact Analysis. As noted in the memorandum, the traffic impacts from the five additional units is negligible and the overall safety is improved by eliminating the existing Gilman Lane access. A new sidewalk is provided through the site for safe pedestrian access to High Street. Off-Street parking is provided on site (2 spaces for all units) and street parking on the shared driveways. Altus has prepared fire truck turning movement for fire access. It is our understanding that the project meets the requirements of Section 8.7 to provide safe vehicular and pedestrian traffic.

18. The Planning Board may conduct a site walk and I will ask them if they want to conduct one at the March 24th meeting so it will not disrupt the anticipated schedule. If they choose to hold a site walk, at a minimum, the applicant should clearly mark all access points and where the buildings and structures will be located. In other words, it should be easy for the board to understand where the buildings will be and where traffic will flow through the site.
    AE: Noted.

Public Works:

1. The traffic report is still under review by the Highway Superintendent.
    AE: Noted.

2. Reconfigure the sewer pipe from SMH #4 to enter the existing sewer main in the same direction of flow.
   AE: The sewer has been revised to connect to the sewer line in the same direction. As discussed with the town Engineer, the new sewer manhole will have an internal drop due to the depth of the existing sewer line (approximately 15 feet).

3. Separate the watermain from the drain lines near PDMH#4. Provide two 45-deg bends instead of the 90-deg bend.
   AE: The water main has been revised to have two 45 deg bend, see sheet C3.0.

4. Show detail of the proposed watermain connection with the existing 4-inch watermain.
   AE: A detail has been added to sheet C5.6 to show a reducer and gate valve.

5. The existing sewer main is at capacity during peak flows. The additional 1050 gpd sewer flows from this development will be approved as the department investigates possible solutions.
   AE: Noted.

6. The general pollutant percentage removals referenced in the drainage report should reference amounts actually removed for this particular site and compared to predevelopment.
   AE: Altus has worked with UEI and completed the PTAPP with a revised BMP for the stormwater treatment to increase nitrogen and Phosphorus removal. PTAPP calculated the pre-and post-development pollutant loads.

Fire Department:
Architectural, sprinkler, alarm, and elevator comments provided to architect for building permit.

1. Basic requirements of the Exeter Fire Department. This list is not all inclusive and other requests may be made during the review process. Unless specifically required by code, some room for compromise is open.
   AE: Noted

2. Hydrant near site access and towards rear of site (if applicable)
   AE: A new hydrant has been added for the site and there is an existing hydrant at the Portsmouth Ave / High St intersection.

Police Department:
1. Police Chief Poulin has recommended that traffic planning and police details go through Lt. Steve Bolduc at sbolduc@exeternh.gov. This is one of our busiest intersections at High/Portsmouth Ave and we will need to be looped in prior to any actual truck movement etc. for appropriate police details there.
   AE: Noted. Lt. Bolduc will be notified for any impacts to High St. Note added to site notes and utility notes.

Natural Resource Planner Comments:
1. Explore potential to use a gravel wetland as it provides a more effective SS, TIN, TN, TP removal efficiencies to replace raingarden 2.
   AE: Altus has worked with UEI and consulted the UNH Stormwater Center and NHDES to use an Enhanced Bio-retention with Internal Storage Reservoir (ISR) instead of the gravel wetland. The ISR indicated higher removal efficiencies than the gravel wetlands.

2. Label man-made wetland as such for wetland near the riverside outlet structure by Raingarden #2.
   AE: Wetland has been labeled man-made (from drainage outfall)

3. Recommend limiting erosion control measures to those made of natural fiber materials to avoid wildlife impacts.
   AE: Silt fence has been removed as an option and only tubular barriers or organic filter berms are included as options.

4. Plans show a gap in silt fence along drainage swale to raingarden 2. Extend north until slopes level to protect erosion toward river.
   AE: Barrier has been extended.

5. Refer to Shoreland district regulations for fertilizer and include restrictions on plans and in stormwater maintenance documents and annual reports (9.3.4.F.a & b).
   a. --Prohibition for use of fertilizer w/I 100' of river.
   b. -From 100-300' fertilizer must be a min of 50% slow release, phosphate free, and may not exceed
   c. application rate of 0.5 lb./TN/1,000 Ft2 with an annual max of 1.5lb/1000ft2.

   AE: Notes have been added to both landscape plan and the site plan that fertilizer is not to be used on site. A waiver is requested for the use of fertilizer during seed establishment period, as indicated in Section 9.3.4.F.c.ii.

6. Seed specs (C5.1) indicate 12lbs/1000Ft2. If this amount is necessary for the purposes of establishing new vegetation, you need to seek a waiver from Planning Board.
   AE: This application rate has been removed. A waiver is requested for use of fertilizer during plant establishment per Section 9.3.4.F.c.ii. Best management practices shall apply, a minimum of 50% slow release nitrogen, and for a maximum period of one -year.

7. Concerned about snow management in SW corner of site near 7 Gilman Lane. Consider signage to prevent pushing snow toward river where there is no stormwater intervention.
   AE: A sign for no snow storage has been added. The curb has been revised to allow better snow storage across the driveway.

8. Considerations for any buffer enhancement with supplemental plantings?
   AE: Buffer enhancements have been added to the riverbank in two areas.

9. CUP Attachment A references 3 raingardens. Where is the 3rd?
   AE: Original design plans had 3 raingardens, but the plans have been revised for two raingardens and shown on the plans and other supporting documents.

Underwood Engineers:

1. An NHDES Sewer Connection Permit should be added to the list of permits on the plan set cover and on C2.1.
   AE: Note has been added to the cover sheet and permitting notes, C2.1.

2. Number or letter designations should be added to each of the units for identification.
   AE: Units of measurement have been added to plan notes.

3. Parking requirements should be listed on C2.1 for the residential units and the observatory classroom building.
   AE: Parking requirements have been added to sheet C2.1

4. It appears that the existing gate control post may be in conflict with both a proposed sewer main and with fire truck turning movements.
   AE: With confirmation of the fire truck vehicle required, the gate control has been relocated outside the truck turning movement.

5. The existing sewer service for 35 High Street should be depicted and denoted as remaining or to be abandoned (per Exeter standards).
   AE: The sewer service to 35 High St is shown and labeled to remain on sheet C3.0.

6. The proposed sewer service for the northwestern-most unit on High Street should not include angles/fittings without clean-outs. Consider relocating SM#3 easterly to accommodate a 90-deg entrance to sewer manhole #3.
   AE: SMH #3 has been moved east and typical note added to the plan that cleanouts are located at all buildings.

7. The orphan label for SMH #3 between #1 and #2 should be deleted.
   AE: Note deleted.

8. Sewer pipe slopes should be labeled.
   AE: Sewer Pipe slopes have been labeled on plans.

9. Confirm all crossings of utilities are free of conflicts.
   AE: Sewer and storm drain crossings have been checked and verified.

10. Water service material should be noted.
    AE: Water services are called out as Type “K” copper in the water connection detail.

11. The size and material of the existing water service to 10 Gilman Lane and the observatory should be labeled if known.
    AE: Water services labeled as 1” and noted to verify in field.

12. The inverts of the existing tie-in manhole, downstream of PSMH #4, should be labeled. A note should be added to modify the invert as appropriate.
    AE: The sewer connection is removed and SMH #4 is relocated to connect to the existing gravity sewer in Gilman Lane.

13. Will there be any gutters and downspouts? If so, downspout outlets should be shown on the plans.
    AE: Gutter are not proposed.

14. Location of foundation drain outlets should be shown as appropriate.
    AE: Foundation plans are not currently available. The drain line in Gilman Lane has been lowered approximately 2.5 ft to allow for foundation drain connections.

15. A note should be added directing the site contractor to construct a concrete washout area prior to concrete placements.
    AE: A note has been added to the Site Preparation plan and detail added to sheet C5.8.

16. The invert out at the plunge pool is below the flood plain elevation, so there is a possibility the rain garden could be flooded. Please confirm appropriate plant species have been chosen that can withstand occasional flooding.
    AE: The raingarden is above the 100 year flood plan elevation. Landscape architect has designated wet tolerant seed mix for the bio-retention area.

17. Although observed water levels were not noted in the test pit logs in the AoT application, a relatively shallow water table is indicated, so dewatering should be anticipated for footings and trench work for utilities. It should be noted on Sheet CS.1 that the certified SWPPP inspector must be onsite daily during any dewatering activity under the new 2022 CGP guidelines.
    AE: Note is added to Sheet C2.1.

18. A detail for a concrete washout area should be added.
    AE: Detail is added to sheet C5.8.

19. The plan shows a retaining wall next to the existing transformer at the observatory entrance. This is not shown on the Civil drawings. The limit of new pavement is different on the landscape plan than the rest of the plans. Coordination is needed.
    AE: The wall is an existing wall. Landscape and civil drawings have been updated.

20. It is unclear why some of the proposed catch basins are being modelled with storage, particularly those identified as yard drains. Some are graded such that ponding above the rim of the structure can occur.
    AE: Typically yard drains are located at low points (ponding areas) in the lawn and are modelled with the storage.

21. UE acknowledges that the project identifies infiltration practices as contributing to addressing pollutant loading requirements for the site, however the project does not appear to utilize infiltration beyond RG #1 and only marginally there. Please confirm the treatment BMPs being proposed and how each will contribute to the project's compliance with the Towns stormwater quality regulations.
    AE: Altus has worked with UEI and consulted the UNH Stormwater Center and NHDES to use an Enhanced Bio-retention with Internal Storage Reservoir (ISR) in lieu of Raingarden #2. The ISR indicated higher removal efficiencies than the gravel wetlands and what is required by the town. As a conservative approach, minimal infiltration is modeled in the calculations although there will be some in both practices. NHDES groundwater recharge requirements are achieved through the modeling in Raingarden #1. NHDES Alteration of Terrain comments are pending.

22. It is not clear to UE that the project has demonstrated its compliance with the Pollutant Loading removal requirements per the Town of Exeter stormwater treatment regulations. Please provide calculations for pre- and post- development loads and removals.
    AE: As noted, Altus has worked with UEI and consulted the UNH Stormwater Center and NHDES to use an Enhanced Bio-retention with Internal Storage Reservoir (ISR). The ISR indicated higher removal efficiencies than the gravel wetlands and what is required by the town.

23. **PTAP Database:** The Applicant is requested to enter project related stormwater tracking information contained in the site plan application documents using the Great Bay Pollution Tracking and Accounting Program (PTAP) database (www.unh.edu/unhsc/ptapp).
    AE: The project has been entered into the PTAPP database.

Conservation Commission Conditions:

1. The applicant will look and review a system that is the best system to reduce nitrogen and phosphorus runoff.
   AE: As noted, Altus has worked with UEI and consulted the UNH Stormwater Center and NHDES to use an Enhanced Bio-retention with Internal Storage Reservoir (ISR). The ISR indicated higher removal efficiencies than the gravel wetlands and what is required by the town.

2. Applicant will look to narrow the roads to reduce impervious area.
   AE: In coordination with TRC and the fire dept, the roads have been narrowed by 2 feet except for the entrance at High Street to the first curve in the roadway.

3. Applicant will have to seek a waiver for the use of fertilizers to establish plantings (In this 300' buffer no fertilizers are allowed).
   AE: A waiver is requested for fertilizer use during plant establishment.

4. Applicant will review necessity of an irrigation system.
   AE: Irrigation has been reduced to only irrigate portion of the site closest to High Street.

The Exeter Zoning Board of Adjustment granted relief for the following items at the December 21, 2021 meeting;

1. Variance - per article 4, section 4.3, schedule II: density and dimensional regulations - front yard setback in the R-2 district. To allow 10.0 feet, where 25 feet is required., and
2. Special Exception - per article 4, section 4.2, schedule I: permitted uses, to allow two-family homes in the R-2 district.

Included in the application materials, please find fifteen (15) copies of the following application materials, including five (5) full size plans and ten (10) reduced plans.

1. Drainage Memorandum
2. Site Review Application & Checklists
3. Lot Line Adjustment Application & Checklist
4. Conditional Use Permit – Shoreland Protection District Application
5. Abutter List and Mailing labels
6. Site Cost Estimate
7. Waiver Requests
8. USGS, Aerial, and FEMA Site Maps
9. Site Pictures
10. Preliminary Application to Connect to Sewer, Water, and Stormwater Drainage Systems (TRC)
11. Traffic Memorandum
12. Drainage Report (3 full sets / 12 summaries)
13. Stormwater Inspection and Maintenance Manual
14. Fire Engine Turning Template
15. Project Plans (24” x 36”)

We respectfully request to be placed on the agenda for the Planning Board Hearing on April 14, 2022. If you have any questions, please do not hesitate to contact us.

Sincerely,
ALTUS ENGINEERING, INC.

Cory D. Belden, PE

ECopy: Mark Leighton / Heather Taylor, Phillips Exeter Academy
Christina O’ Brien / Rob Harbeson, Market Square Architect
Enclosures
Altus Prj: P5075

TOWN OF EXETER, NH
APPLICATION FOR SITE PLAN REVIEW

THIS IS AN APPLICATION FOR:

( ) COMMERCIAL SITE PLAN REVIEW
( ) INDUSTRIAL SITE PLAN REVIEW
(X) MULTI-FAMILY SITE PLAN REVIEW
( ) MINOR SITE PLAN REVIEW
(X) INSTITUTIONAL/NON-PROFIT SPR

OFFICE USE ONLY

_____ APPLICATION #
_____ DATE RECEIVED
_____ APPLICATION FEE
_____ PLAN REVIEW FEE
_____ ABUTTERS FEE
_____ LEGAL NOTICE FEE
_____ TOTAL FEES

_____ INSPECTION FEE
_____ INSPECTION COST
_____ REFUND (IF ANY)

1. **NAME OF LEGAL OWNER OF RECORD:** Phillips Exeter Academy

_____ **TELEPHONE:** ( ) 603 777-3292

ADDRESS: 20 Main Street, Exeter, NH 03833

2. **NAME OF APPLICANT:** Same as above

ADDRESS: _____

_____ **TELEPHONE:** ( )_____

3. **RELATIONSHIP OF APPLICANT TO PROPERTY IF OTHER THAN OWNER:** _____

_____
(Written permission from Owner is required, please attach.)

4. **DESCRIPTION OF PROPERTY:** Private Institution - Educational Facility

ADDRESS: 35 High Street, Gilman Lane, & 10 Gilman Lane - Exeter, NH 03833

TAX MAP: 71 **PARCEL #:** 117, 118, & 119 **ZONING DISTRICT:** C-1 &R-2

AREA OF ENTIRE TRACT: 395.5 acres **PORTION BEING DEVELOPED:** 1.9 acres

5. **ESTIMATED TOTAL SITE DEVELOPMENT COST $** $408,400 (Site Only)

6. **EXPLANATION OF PROPOSAL:** Construct a new faculty housing neighborhood to provide 13 residential units where 8 currently exist. See project narrative for detailed explanation.

7. **ARE MUNICIPAL SERVICES AVAILABLE?** (YES/NO) Yes. Municipal service are available

If yes, Water and Sewer Superintendent must grant written approval for connection.
If no, septic system must comply with W.S.P.C.C. requirements.

8. **LIST ALL MAPS, PLANS AND OTHER ACCOMPANYING MATERIAL SUBMITTED WITH THIS APPLICATION:**

ITEM:	NUMBER OF COPIES
A. Site Review Plans	5 Full Size
B. Abutters List	5 copies
C. Site Cost Estimate	5 copies
D. Drainage Report & Stormwater Maintenance Manual	1 Full, 4 Summaries
E. Traffic Memo	5 copies
F. Preliminary Application to Connect to Utilities	5 copies
G. Waiver Reqests	5 copies

9. **ANY DEED RESTRICTIONS AND COVENANTS THAT APPLY OR ARE CONTEMPLATED** (YES/NO) Yes. IF YES, ATTACH COPY.

10. **NAME AND PROFESSION OF PERSON DESIGNING PLAN:**

NAME: Cory D. Belden, PE

ADDRESS: 133 Court Street, Portsmouth, NH 03801

PROFESSION: Civil Engineer **TELEPHONE:** (603) 433-2335

11. **LIST ALL IMPROVEMENTS AND UTILITIES TO BE INSTALLED:**

Proposed demolition of #8 Gilman Lane and partial demolition of #35 High Street. #35 High steet will be modified to a two-family building. The project will construct four new two-family buildings and two new single family homes. The existing single family home, #10 Gilman Lane, will remain. Gilman Lane will be re-aligned to connect to the intersection of High Street at Portsmouth Avenue. New driveways, walkways, patio areas and landscaping;

Upgrades to site utilities include a new 8" water main, sanitary sewer collection, electrical and telecommunications improvements, and a closed drainage system with two (2) stormwater raingardens.

12. **HAVE ANY SPECIAL EXCEPTIONS OR VARIANCES BEEN GRANTED BY THE ZONING BOARD OF ADJUSTMENT TO THIS PROPERTY PREVIOUSLY?**

IF YES, DESCRIBE BELOW. **(**Please check with the Planning Department Office to verify)

Yes. THE EXETER ZONING BOARD OF ADJUSTMENT GRANTED RELIEF FOR THE FOLLOWING ITEMS AT THE DECEMBER 21, 2021 MEETING; 1) VARIANCE - PER ARTICLE 4, SECTION 4.3, SCHEDULE II - TO ALLOW 10 FT FRONT SETBACK, and 2) SPECIAL EXCEPTION - PER ARTICLE 4, SECTION 4.2, SCHEDULE I: TO ALLOW TWO-FAMILY HOMES IN THE R-2 DISTRICT.

13. **WILL THE PROPOSED PROJECT INVOLVE DEMOLITION OF ANY EXISTING BUILDINGS OR APPURTENANCES?** IF YES, DESCRIBE BELOW.
(Please note that any proposed demolition may require review by the Exeter Heritage Commission in accordance with Article 5, Section 5.3.5 of the Exeter Zoning Ordinance).

Yes. The proposed project will demolish the existing building at #8 Gilman Lane and a portion of the building at #35 High Street. The project received approval for the demolition from the Exeter Heritage Commission and is pending approval from the Historic District Commission.

14. **WILL THE PROPOSED PROJECT REQUIRE A "NOTICE OF INTENT TO EXCAVATE" (State of NH Form PA-38)? IF YES, DESCRIBE BELOW.**

Phillips Exeter Academy will file a Notice of Intent to Excavate, Form PA-38, with the municipal assessing officials as required.

NOTICE: I CERTIFY THAT THIS APPLICATION AND THE ACCOMPANYING PLANS AND SUPPORTING INFORMATION HAVE BEEN PREPARED IN CONFORMANCE WITH ALL APPLICABLE REGULATIONS; INCLUDING BUT NOT LIMITED TO THE "SITE PLAN REVIEW AND SUBDIVISION REGULATIONS" AND THE ZONING ORDINANCE. FURTHERMORE, IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 15.2 OF THE "SITE PLAN REVIEW AND SUBDIVISION REGULATIONS", I AGREE TO PAY ALL COSTS ASSOCIATED WITH THE REVIEW OF THIS APPLICATION.

DATE 02/14/2022 OWNER'S SIGNATURE 

Mark Leighton, Director of Facilities Management

ACCORDING TO RSA 676.4.I (c), THE PLANNING BOARD MUST DETERMINE WHETHER THE APPLICATION IS COMPLETE WITHIN 30 DAYS OF SUBMISSION. THE PLANNING BOARD MUST ACT TO APPROVE, CONDITIONALLY APPROVE, OR DENY AN APPLICATION WITHIN SIXTY FIVE (65) DAYS OF ITS ACCEPTANCE BY THE BOARD AS A COMPLETE APPLICATION. A SEPARATE FORM ALLOWING AN EXTENSION OR WAIVER TO THIS REQUIREMENT MAY BE SUBMITTED BY THE APPLICANT.

ABUTTERS: PLEASE LIST ALL PERSONS WHOSE PROPERTY IS LOCATED IN NEW HAMPSHIRE AND ADJOINS OR IS DIRECTLY ACROSS THE STREET OR STREAM FROM THE LAND UNDER CONSIDERATION BY THE BOARD. THIS LIST SHALL BE COMPILED FROM THE EXETER TAX ASSESSOR'S RECORDS.

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Please attach additional sheets, if needed

SITE PLAN REQUIREMENTS

7.4 Existing Site Conditions Plan

Submission of this plan will not be applicable in all cases. The applicability of such a plan will be considered by the TRC during its review process as outlined in Section 6.5 Technical Review Committee (TRC) of these regulations. The purpose of this plan is to provide general information on the site, its existing conditions, and to provide the base data from which the site plan or subdivision will be designed. The plan shall show the following:

APPLICANT	TRC	REQUIRED EXHIBITS
X	☐	7.4.1 Names, addresses, and telephone numbers of the owner, applicant, and person(s) or firm(s) preparing the plan.
X	☐	7.4.2 Location of the site under consideration, together with the current names and addresses of owners of record, of abutting properties and their existing land use.
X	☐	7.4.3 Title, date, north arrow, scale, and Planning Board Case Number.
X	☐	7.4.4 Tax map reference for the site under consideration, together with those of abutting properties.
X	☐	7.4.5 Zoning (including overlay) district references.
X	☐	7.4.6 A vicinity sketch or aerial photo showing the location of the land/site in relation to the surrounding public street system and other pertinent location features within a distance of 2,000-feet, or larger area if deemed necessary by the Town Planner.
X	☐	7.4.7 Natural features including watercourses and water bodies, tree lines, significant trees (20-inches or greater in diameter at breast height) and other significant vegetative cover, topographic features, and any other environmental features that are important to the site design process.
X	☐	7.4.8 Man-made features such as, but not limited to, existing roads, structures, and stonewalls. The plan shall also indicate which features are to be retained and which are to be removed or altered.
X	☐	7.4.9 Existing contours at intervals not to exceed 2-feet with spot elevations provided when the grade is less than 5%. All datum provided shall reference the latest applicable US Coast and Geodetic Survey datum and should be noted on the plan.
X	☐	7.4.10 A High Intensity Soil Survey (HISS) of the entire site, or appropriate portion thereof. Such soil surveys shall be prepared by a certified soil scientist in accordance with the standards established by the Rockingham County Conservation District. Any cover letters or explanatory data provided by the certified soil scientist shall also be submitted.

* See Existing Site Conditions Plan Notes, Page 10.

X	☐	7.4.11 State and Federally designated wetlands, setback information, total wetlands proposed to be filled, other pertinent information and the following wetlands note: "The landowner is responsible for complying with all applicable local, state, and federal wetlands regulations, including any permitting and setback requirements required under these regulations."
X	☐	7.4.12 Surveyed property lines including angles and bearings, distances, monument locations, and size of the entire parcel. A professional land surveyor licensed in New Hampshire must attest to said plan.
X	☐	7.4.13 The lines of existing abutting streets and driveway locations within 200-feet of the site.
X	☐	7.4.14 The location, elevation, and layout of existing catch basins and other surface drainage features.
X	☐	7.4.15 The shape, size, height, location, and use of all existing structures on the site and approximate location of structures within 200-feet of the site.
X	☐	7.4.16 The size and location of all existing public and private utilities, including off-site utilities to which connection is planned.
X	☐	7.4.17 The location of all existing easements, rights-of-way, and other encumbrances.
X	☐	7.4.18 All floodplain information, including the contours of the 100-year flood elevation, based upon the Flood Insurance Rate Map for Exeter, as prepared by the Federal Emergency Management Agency, dated May 17, 1982.
X	☐	7.4.19 All other features which would fully explain the existing conditions of the site.
X	☐	7.4.20 Name of the site plan or subdivision.

Existing Site Conditions Plan Notes

7.4.5 - Zoning Summary provided on Site Plan, Sheet C3.01.

7.4.6 - Area Plan provided, Sheet C0.01

7.4.10 - High Intensity Soil Survey performed by Gove Environmnetal Services in 2015 and verified in 2019. Site identified as Agawan soils (HSG B). Note on Drainage and Grading Plan.

7.4.18 - Site is not located within a designated floodplain.

7.5 Proposed Site Conditions Plan (Pertains to Site Plans Only)

The purpose of this plan is to illustrate and fully explain the proposed changes taking place within the site. The proposed site conditions plan shall depict the following:

APPLICANT	TRC	REQUIRED EXHIBITS
X	☐	7.5.1 Proposed grades and topographic contours at intervals not to exceed 2-feet with spot elevations where grade is less than 5%. All datum provided shall reference the latest applicable US Coast and Geodetic Survey datum and should be noted on the plan.
X	☐	7.5.2 The location and layout of proposed drainage systems and structures including elevations for catch basins.
X	☐	7.5.3 The shape, size, height, and location of all proposed structures, including expansion of existing structures on the site and first floor elevation(s). Building elevation(s) and a rendering of the proposed structure(s).
X	☐	7.5.4 High Intensity Soil Survey (HISS) information for the site, including the total area of wetlands proposed to be filled.
X	☐	7.5.5 State and Federally designated wetlands, setback information, total wetlands proposed to be filled, other pertinent information and the following wetlands note: "The landowner is responsible for complying with all applicable local, state, and federal wetlands regulations, including any permitting and setback requirements required under these regulations."
X	☐	7.5.6 Location and timing patterns of proposed traffic control devices.
X	☐	7.5.7 The location, width, curbing and paving of all existing and proposed streets, street rights-of-way, easements, alleys, driveways, sidewalks and other public ways. The plan shall indicate the direction of travel for one-way streets. See Section 9.14 – Roadways, Access Points, and Fire Lanes for further guidance.
X	☐	7.5.8 The location, size and layout of off-street parking, including loading zones. The plan shall indicate the calculations used to determine the number of parking spaces required and provided. See Section 9.13 – Parking Areas for further guidance.
X	☐	7.5.9 The size and location of all proposed public and private utilities, including but not limited to: water lines, sewage disposal facilities, gas lines, power lines, telephone lines, cable lines, fire alarm connection, and other utilities.
X	☐	7.5.10 The location, type, and size of all proposed landscaping, screening, green space, and open space areas.
X	☐	7.5.11 The location and type of all site lighting, including the cone(s) of illumination to a measurement of 0.5-foot-candle.
X	☐	7.5.12 The location, size, and exterior design of all proposed signs to be located on the site.
X	☐	7.5.13 The type and location of all solid waste disposal facilities and accompanying screening.

X	☐	7.5.14 Location of proposed on-site snow storage.
N/A	☐	7.5.15 Location and description of all existing and proposed easement(s) and/or right-of-way.
X	☐	7.5.16 A note indicating that: “All water, sewer, road (including parking lot), and drainage work shall be constructed in accordance with Section 9.5 Grading, Drainage, and Erosion & Sediment Control and the Standard Specifications for Construction of Public Utilities in Exeter, New Hampshire”. See Section 9.14 Roadways, Access Points, and Fire Lanes and Section 9.13 Parking Areas for exceptions.
X	☐	7.5.17 Signature block for Board approval

OTHER PLAN REQUIREMENTS (See Section indicated)

- ☐ 7.7 Construction plan
- ☐ 7.8 Utilities plan
- ☐ 7.9 Grading, drainage and erosion & sediment control plan
- ☐ 7.10 Landscape plan
- ☐ 7.11 Drainage Improvements and Storm Water Management Plan
- ☐ 7.12 Natural Resources Plan
- ☐ 7.13 Yield Plan

TOWN OF EXETER, NH
APPLICATION FOR MINOR SITE PLAN REVIEW, MINOR SUBDIVISION and/or LOT LINE ADJUSTMENT

A completed application shall contain the following items, although please note that some items may not apply such as waivers or conditional use permit:

1.	Application for Hearing	(X)
2.	Abutter's List Keyed to the Tax Map (including name and business address of all professionals responsible for the submission (engineer, landscape architect, wetland scientist, etc.)	See Site Review Application ( )
3.	Checklist for plan requirements	( )
4.	Letter of Explanation	( )
5.	Written request and justification for waiver(s) from Site Plan/Sub Regulations	
6.	Application to Connect and/or Discharge to Town of Exeter Sewer, Water, or Storm Water Drainage System(s) - if applicable	( )
7.	Application Fees	( )
8.	Seven (7) copies of 24'x36' plan set	( )
9.	Fifteen (15) 11"x 17" copies of the plan set	( )
10.	Three (3) pre-printed 1"x 2 5/8" labels for each abutter, the applicant and all consultants.	( )

NOTES: All required submittals must be presented to the Planning Department Office for distribution to other Town departments. Any material submitted directly to other departments will not be considered.

TOWN OF EXETER
MINOR SUBDIVISION, MINOR SITE PLAN, AND/OR LOT LINE ADJUSTMENT APPLICATION

THIS IS AN APPLICATION FOR:

( ) MINOR SITE PLAN
( ) MINOR (3lots or less) SUBDIVISION ( ) LOTS

(X) LOT LINE ADJUSTMENT

OFFICE USE ONLY

_____APPLICATION
_____DATE RECEIVED
_____APPLICATION FEE
_____PLAN REVIEW FEE
_____ABUTTER FEE
_____LEGAL NOTICE FEE
_____INSPECTION FEE
_____TOTAL FEES
_____AMOUNT REFUNDED

1. **NAME OF LEGAL OWNER OF RECORD:** Phillips Exeter Academy

ADDRESS: 20 Main Street
Exeter, NH 03833 **TELEPHONE:** ( ) 603 777-3292

2. **NAME OF APPLICANT:** Same as above

ADDRESS: _____

_____ **TELEPHONE:** ( )_____

3. **RELATIONSHIP OF APPLICANT TO PROPERTY IF OTHER THAN OWNER:** _____

(Written permission from Owner is required, please attach.)

4. **DESCRIPTION OF PROPERTY:** Private Institution - Educational Facility

ADDRESS: 35 High Street, Gilman Lane, & 10 Gilman Lane - Exeter, NH 03833

TAX MAP: 71 **PARCEL #:** 117, 118, & 119 **ZONING DISTRICT:** C-1 &R-2

AREA OF ENTIRE TRACT: 395.5 acres **PORTION BEING DEVELOPED:** 1.9 acres

5. **EXPLANATION OF PROPOSAL:** The proposed project will merge lots 071-117, 071-118, and a portion of Lot 071-119 to create a single lot for development. The new lot will be approximately 4.1 acres in size and will be developed to have 13 residential faculty units for Phillips Exeter Academy.

6. **ARE MUNICIPAL SERVICES AVAILABLE?** (YES/NO) Yes. Municipal services are available
IF YES, WATER AND SEWER SUPERINTENDENT MUST GRANT WRITTEN APPROVAL FOR CONNECTION. IF NO, SEPTIC SYSTEM MUST COMPLY WITH W.S.P.C.C. REQUIREMENTS.

7. **LIST ALL MAPS, PLANS AND OTHER ACCOMPANYING MATERIAL SUBMITTED WITH THIS APPLICATION:**

ITEM:	NUMBER OF COPIES
A. Site Review Plans (including Lot Line Adjustment Plan)	5 Full Size
B. See Site Review application Material submitted with this application	5 copies
C.	
D.	
E.	
F.	

8. **ANY DEED RESTRICTIONS AND COVENANTS THAT APPLY OR ARE CONTEMPLATED** (YES/NO) Yes. IF YES, ATTACH COPY.

9. **NAME AND PROFESSION OF PERSON DESIGNING PLAN:**

NAME: Jamie Gayton , PLS
ADDRESS: 370 Merrimack Street, Suite 49, Building 5, 2nd floor, Lawrence, MA 01843
PROFESSION: Licensed Land Surveyor **TELEPHONE: (** 617 **)** 338-0063

10. **LIST ALL IMPROVEMENTS AND UTILITIES TO BE INSTALLED:**

See Site Review application submitted with this application

11. **HAVE ANY SPECIAL EXCEPTIONS OR VARIANCES BEEN GRANTED BY THE ZONING BOARDOF ADJUSTMENT TO THIS PROPERTY PREVIOUSLY?**

(Please check with the Planning Department Office to verify) (YES/NO) Yes IF YES, LIST BELOW AND NOTE ON PLAN.

THE EXETER ZONING BOARD OF ADJUSTMENT GRANTED RELIEF FOR THE FOLLOWING ITEMS AT THE DECEMBER 21, 2021 MEETING; 1) VARIANCE - PER ARTICLE 4, SECTION 4.3, SCHEDULE II - TO ALLOW 10 FT FRONT SETBACK, and 2) SPECIAL EXCEPTION - PER ARTICLE 4, SECTION 4.2, SCHEDULE I: TO ALLOW TWO-FAMILY HOMES IN THE R-2 DISTRICT.

NOTICE:

I CERTIFY THAT THIS APPLICATION AND THE ACCOMPANYING PLANS AND SUPPORTING INFORMATION HAVE BEEN PREPARED IN CONFORMANCE WITH ALL APPLICABLE TOWN REGULATIONS, INCLUDING BUT NOT LIMITED TO THE "SITE PLAN REVIEW AND SUBDIVISION REGULATION" AND THE ZONING ORDINANCE. FURTHERMORE, IN ACCORDANCE WITH THE REQUIREMENTS OF THE "SITE PLAN REVIEW AND SUBDIVISION REGULATIONS", I AGREE TO PAY ALL COSTS ASSOCIATED WITH THE REVIEW OF THIS APPLICATION.

DATE 2/14/2022 APPLICANT'S SIGNATURE _____

Mark Leighton, Director of Facilities Management

ACCORDING TO RSA 676.4.I (c), THE PLANNING BOARD MUST DETERMINE WHETHER THE APPLICATION IS COMPLETE WITHIN 30 DAYS OF SUBMISSION. THE PLANNING BOARD MUST ACT TO EITHER APPROVE, CONDITIONALLY APPROVE, OR DENY AN APPLICATION WITHIN SIXTY FIVE (65) DAYS OF ITS ACCEPTANCE BY THE BOARD AS A COMPLETE APPLICATION. A SEPARATE FORM ALLOWING AN EXTENSION OR WAIVER TO THIS REQUIREMENT MAY BE SUBMITTED BY THE APPLICANT.

See Site Plan Review Application submitted with this application.

ABUTTERS: PLEASE LIST ALL PERSONS WHOSE PROPERTY IS LOCATED IN NEW HAMPSHIRE AND ADJOINS OR IS DIRECTLY ACROSS THE STREET OR STREAM FROM THE LAND UNDER CONSIDERATION BY THE BOARD. THIS LIST SHALL BE COMPILED FROM THE EXETER TAX ASSESSOR'S RECORDS.

TAX MAP _____
NAME _____
ADDRESS _____
_____

TAX MAP _____
NAME _____
ADDRESS _____
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TAX MAP _____
NAME _____
ADDRESS _____
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TAX MAP _____
NAME _____
ADDRESS _____
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SEE ATTACHED

TAX MAP _____
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TAX MAP _____
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Please attach additional sheets if needed

See Site Plan Review Application submitted with this application.

CHECK LIST FOR ~~MINOR SITE PLAN REVIEW~~, ~~MINOR SUBDIVISON AND~~ LOT LINE ADJUSTMENT

APPLICANT	TRC	REQUIRED EXHIBITS, SEE REGULATION 6.6.2.4
X	☐	a) The name and address of the property owner, authorized agent, the person or firm preparing the plan, and the person or firm preparing any other data to be included in the plan.
X	☐	b) Title of the site plan, subdivision or lot line adjustment, including Planning Board Case Number.
X	☐	c) Scale, north arrow, and date prepared.
X	☐	d) Location of the land/site under consideration together with the names and address of all owners of record of abutting properties and their existing use.
X	☐	e) Tax map reference for the land/site under consideration, together with those of abutting properties.
X	☐	f) Zoning (including overlay) district references.
X	☐	g) A vicinity sketch showing the location of the land/site in relation to the surrounding public street system and other pertinent location features within a distance of 1,000-feet.
NA	☐	h) For minor site plan review only, a description of the existing site and proposed changes thereto, including, but not limited to, buildings and accessory structures, parking and loading areas, signage, lighting, landscaping, and the amount of land to be disturbed.
X	☐	i) If deemed necessary by the Town Planner, natural features including watercourses and water bodies, tree lines, and other significant vegetative cover, topographic features and any other environmental features which are significant to the site plan review or subdivision design process.
X	☐	j) If deemed necessary by the Town Planner, existing contours at intervals not to exceed 2-feet with spot elevations provided when the grade is less than 5%. All datum provided shall reference the latest applicable US Coast and Geodetic Survey datum and should be noted on the plan.
X	☐	k) If deemed necessary by the Town Planner for proposed lots not served by municipal water and sewer utilities, a High Intensity Soil Survey (HISS) of the entire site, or portion thereof. Such soil surveys shall be prepared and stamped by a certified soil scientist in accordance with the standards established by the Rockingham County Conservation District. Any cover letters or explanatory data provided by the certified soil scientist shall also be submitted.
X	☐	l) State and federal jurisdictional wetlands, including delineation of required setbacks.
X	☐	m) A note as follows: "The landowner is responsible for complying with all applicable local, State, and Federal wetlands regulations, including any permitting and setback requirements required under these regulations."
X	☐	n) Surveyed exterior property lines including angles and bearings, distances, monument locations, and size of the entire parcel. A professional land surveyor licensed in New Hampshire must attest to said plan.

NA	☐	o) For minor site plans only, plans are not required to be prepared by a professional engineer or licensed surveyor unless deemed essential by the Town Planner or the TRC.
X	☐	p) For minor subdivisions and lot line adjustments only, the locations, dimensions, and areas of all existing and proposed lots.
X	☐	q) The lines of existing abutting streets and driveways locations within 100-feet of the site.
X	☐	r) The location, elevation, and layout of existing catch basins and other surface drainage features.
X	☐	s) The footprint location of all existing structures on the site and approximate location of structures within 100-feet of the site.
X	☐	t) The size and location of all existing public and private utilities.
X	☐	u) The location of all existing and proposed easements and other encumbrances.
X	☐	v) All floodplain information, including contours of the 100-year flood elevation, based upon the Flood Insurance Rate Map for Exeter, as prepared by the Federal Emergency Management Agency, dated May 17, 1982.
NA	☐	w) The location of all test pits and the 4,000-square-foot septic reserve areas for each newly created lot, if applicable.
NA	☐	x) The location and dimensions of all property proposed to be set aside for green space, parks, playgrounds, or other public or private reservations. The plan shall describe the purpose of the dedications or reservations, and the accompanying conditions thereof (if any).
NA	☐	y) A notation shall be included which explains the intended purpose of the subdivision. Include the identification and location of all parcels of land proposed to be dedicated to public use and the conditions of such dedications, and a copy of such private deed restriction as are intended to cover part of all of the tract.
NA	☐	z) Newly created lots shall be consecutively numbered or lettered in alphabetical order. Street address numbers shall be assigned in accordance with Section 9.17 Streets of these regulations.
X X	☐ ☐	aa) The following notations shall also be shown: • Explanation of proposed drainage easements, if any • Explanation of proposed utility easement, if any • Explanation of proposed site easement, if any • Explanation of proposed reservations, if any • Signature block for Board approval as follows: Town of Exeter Planning Board _____ _____ Chairman Date

Town of Exeter Planning Board Application

Conditional Use Permit: Shoreland Protection District
In accordance with Zoning Ordinance Article: 9.3

SUBMITTAL REQUIREMENTS:

(see Conservation Commission and Planning Board meeting dates and submission deadlines)

1. One (1) electronic copy of full application, including plans (color copy if available)
2. Fifteen (15) copies of the Application
3. Fifteen (15) 11"x17" and three (3) full sized copies of the plan which must include:
   Existing Conditions
   a. Property Boundaries
   b. Edge of Shoreland and associated Buffer (Shoreland Protection District – SPD)
   c. Structures, roads/access ways, parking, drainage systems, utilities, wells and wastewater disposal systems and other site improvements

   Proposed Conditions
   a. Edge of Shoreland and Shoreland Buffers and distances to the following:
      i. Edge of Disturbance
      ii. Structures, roads/access ways, parking, drainage systems, utilities, wells and wastewater disposal systems and other site improvements
   b. Name and phone number of all individuals whose professional seal appears on the plan
4. If applicant and/or agent is not the owner, a letter of authorization must accompany this application
5. Supporting documents i.e. Letters from the Department of Environmental Services, Standard Dredge and Fill Application and Photos of the property
6. A Town of Exeter Assessors list of names and mailing addresses of all abutters

Required Fees:
Planning Board Fee: **$50.00** Abutter Fee: **$10.00** Recording Fee (if applicable): **$25.00**

The Planning Office must receive the completed application, plans and fees on the day indicated on the Planning Board Schedule of Deadlines and Public Hearings.

APPLICANT	Name: Phillips Exeter Academy
	Address: 20 Main Street, Exeter, NH 03833
	Email Address: htaylor@exeter.edu
	Phone: 603-777-3292
PROPOSAL	Address: High Street, Exeter, NH 03833
	Tax Map # 71 Lot# 117-119 Zoning District: C-1, R-2
	Owner of Record: Phillips Exeter Academy
Person/Business performing work outlined in proposal	Name: Cory Belden, P.E., Altus Engineering, Inc.
	Address: 133 Court Street, Portsmouth, NH 03801
	Phone: 6034332335
Professional that delineated wetlands	Name: Luke Hurley, Gove Environmental Services, Inc
	Address: 4 Franklin Street, A-2
	Phone: Exeter, NH 03833

Town of Exeter
Planning Board Application
Conditional Use Permit: Shoreland Protection District

Detailed Proposal including intent, project description, and use of property: (Use additional sheet as needed)

See attachment A

Shoreland Protection District Impact (in square footage):			
Water Body	Exeter River	Lot A	Lot A + B
Temporary Impact	☐ 300 Foot SPD	0	0
	☐ 150 foot SPD	480	480
	☐ SPD Building Setback	0	0
	☐ 75 Vegetative Buffer	372	372
Permanent Impact	☐ 300 Foot SPD	54,580	54,580
	☐ 150 foot SPD	15,470	15,470
	☐ SPD Building Setback (150')	1,940	1,940
	☐ 75 Vegetative Buffer	2,170	2,170
Impervious Lot Coverage	SF of Lot within District	171,302	4,289,000
	SF of Impervious within District	47,250	85,650
	% of Impervious within District	27.6%	2.0%

List any variances/special exceptions granted by Zoning Board of Adjustment including dates:

See Attachment A.

Describe how your proposal meets the conditions of Article 9.3.4.G.2 of the Zoning Ordinance (attached for reference):

See Attachment A.

ALTUS ENGINEERING, INC.

Civil
Site Planning
Environmental
Engineering

133 Court Street
Portsmouth, NH
03801-4413

Attachment A

CONDITIONAL USE PERMIT APPLICATION

For

HIGH STREET FACULTY NEIGHBORHOOD DEVELOPMENT

Detailed Proposal including intent, project description, and use of property:

The project consists of the construction of new faculty housing in the location of the three existing housing buildings. The current site has eight faculty units, and the project proposes to add five more units to the site for a total of 13 units on the site. The existing #8 Gilman Lane house will be removed as well as a portion of the building at #35 High Street. The new site will contain 5 total two-family houses and three single family residences. The existing Gilman Lane access to High Street, which is located 150 feet west of the Portsmouth Ave Traffic signal will be closed and Gilman Lane will be re-routed to the existing signal at #35 High Street.

Site improvements include driveway improvements for Gilman Lane and emergency vehicle access, walkway improvements, landscaping, patios for outdoor gathering spaces, utilities, and stormwater improvements. The existing site was constructed prior to many of the current regulations and was developed into the buffer. The site is a pre-developed site and was constructed prior to stormwater regulations, so the proposed site will provide improved water quality discharge to the Exeter River by treating the surface runoff with bio-retention raingardens prior to discharge. The new buildings will be constructed in predominantly pre-developed areas. Two of the new buildings are partially located within the 150 foot buffer setback, but the total impervious area within the 150 foot setback will be reduced for the project. The natural vegetated buffer within the 75 foot shoreline area will be preserved.

The proposed stormwater management improvements include deep sump catch basins and a vegetated swale for pre-treatment of stormwater runoff, and three raingardens to treat, infiltrate, and control runoff from the site prior to discharging to the Exeter River. Therefore, the proposed site will provide improved water quality discharge to the wetlands.

List any variances/special exceptions granted by Zoning Board of Adjustment including dates:

The Exeter Zoning Board of Adjustment granted relief for the following items at the December 21, 2021 meeting;

1. Variance - per Article 4, Section 4.3, Schedule II: Density and dimensional regulations - residential, front yard setback in the R-2 district. To allow 10.0 feet, where 25 feet is required.

2. Special Exception - per Article 4, Section 4.2, schedule I: Permitted uses, to allow two-family homes in the R-2 district.

Describe how your proposal meets the conditions of Article 9.3.4.G.2 of the Town of Exeter Zoning Ordinance:

2. The Planning Board may grant a Conditional Use Permit for those uses listed above only after written findings of fact are made which have been reviewed by technical experts from the Rockingham Conservation District, if required by the Planning Board, at the cost of the developer, provided that all of the following are true:

a. The proposed use will not detrimentally affect the surface water quality of the adjacent river or tributary, or otherwise result in unhealthful conditions.

The proposed use is residential for the faculty of the Phillips Exeter Academy. The new residential houses will connect to municipal sewer. The existing site was developed prior to stormwater regulations and currently does not provide any stormwater treatment or retention for the developed site which contains approximately 32,250 sf of impervious area on site. The proposed development will provide stormwater treatment to comply with NHDES Alteration of Terrain Bureau and Town of Exeter stormwater regulations. Treatment will be provided to all impervious surfaces and runoff rates will be reduces from the current conditions. Therefore, the proposed site development will improve the quality of surface water discharging from the site and will have no detrimental impact to the Exeter River.

The Academy and Altus Engineering met with the Exeter River Advisory Committee on November 18, 2021 to discuss the proposed project. During the meeting it was noted that the project would not disturb the existing vegetated buffer along the river bank or adjacent to the observatory building and would provide stormwater treatment. The advisory Committee did not have any objections to the proposed development

b. The proposed use will discharge no waste water on site other than that normally discharged by domestic waste water disposal systems and will not involve on-site storage or disposal of hazardous or toxic wastes as herein defined.

The proposed use is residential only and will discharge all wastewater to the municipal sanitary collection system. There will not be storage of any hazardous materials on site.

c. The proposed use will not result in undue damage to spawning grounds and other wildlife habitat.

A National Heritage Bureau data check was performed for the project and NHB concluded that they did not anticipate any detrimental impacts to wildlife if the existing vegetated backs of the river are preserved. The proposed project will not impact the vegetated river buffer will not result in undue damage to wildlife habitat.

d. The proposed use complies with the use regulations identified in Article 9.3.4 Exeter Shoreland Protection District Ordinance – Use Regulations and all other applicable sections of this article.

The three proposed parcels for development total an area of approximately 396 acres in size. The proposed development would not come close to the 10% impervious area threshold for the full three lots. However, Phillips Exeter Academy is proposing a lot line adjustment plan that would separate the new development area from the existing largely undeveloped parent lot. The new lot will be approximately 4 acres in size and have 27.5 % impervious area (compared to 18.2% existing). As noted, the new lot is mostly pre-developed and the proposed development will provide stormwater management and treatment, where none currently exists.

e. The design and construction of the proposed use will be consistent with the intent of the purposes set forth in Article 9.3.1 Exeter Shoreland Protection District Ordinance – Authority and Purpose.

The proposed project will provide stormwater treatment to a pre-developed site that currently has no stormwater treatment or management. As noted in Section 9.3.1 the project will protect, maintain and enhance the water quality of the Exeter River to ensure the continued availability of a safe public water supply.

The existing vegetated river backs will be preserved for the project to ensure protection of habitat associated with the river and the natural and aesthetic value of the Exeter River for those that use the river for recreation. Phillips Exeter Academy also maintains a walking path along the river and has allowed the public to utilize the trails for enjoyment of the shoreline.

As noted in item A, Phillips Exeter Academy and Altus Engineering met with the Exeter River Advisory Committee on November 18, 2021 and they did not have any objections to the proposed development.

PHILLIPS EXETER ACADEMY

High Street Faculty Neighborhood Development

35 High Street, 8 Gilman Lane, & 10 Gilman Lane

Tax Map 71, Lots 117-119

Application Fee Worksheet

Site Plan Review (Major)	=	$250
Total New Building Floor Area		
Total New Floor Aera = 19.954 SF		
19,954 sf/ 1000 X $60.00	=	$1,197.24
Lot Line Adjustment		
$60 X 3 LOTS	=	$180
Conditional Use Permit	=	$50
Abutter Notices - $10 / ea		
96 abutter (including professionals)	=	$960
Public Notice	=	to be billed separately
TOTAL DUE	=	~~**$2,407.24**~~
	=	$2,637.24

PHILLIPS EXETER ACADEMY

20 Main Street, Exeter, NH 03833

High Street Faculty Neighborhood Development
Tax Map 71 Lots 117, 118, & 119

Planning Board – Site Plan Review/LLA/Conditional Use Permit Abutter's List

Owner / Professionals:

Owner/Applicant:
Tax Map 71, Lots 117, 118, 119 Phillips Exeter Academy 20 Main Street Exeter, NH 03833 Attn: Mark Leighton
Architect
Market Square Architects 104 Congress Street, Suite 203 Portsmouth, NH 03801 Attn: Christina O'Brien
Civil Engineer
Altus Engineering, Inc. 133 Court Street Portsmouth, NH 03801 Attn: Cory D. Belden
Land Surveyor
Nitsch Engineering 360 Merrimack Street, Suite 49 Building #5, Second Floor Lawrence, MA 01843 Attn: Jamie Gayton
Landscape Architect
Kyle Zick Landscape Inc. 36 Broomfield Street, Suite 302 Boston, MA 02108 Attn: Kyle Zick
Environmental Engineer
Gove Environmental Services, Inc. 8 Continental Dr. Unit H Exeter, NH 03833 Attn: Luke Hurley

Property Abutters List Attached.

Abutters List - Faculty Housing Developent at High Street (Abutters to PEA owned Parcels 71-117, 71-118 and 71-119)						
Direct Abutters:						
Parcel ID	**Owner**	**Property Address**	**Mailing Address**	**City**	**State**	**Zip Code**
71-005	High & Grange Street Realty	24-26 High Street	24-26 High Street	Exeter	NH	03833
71-006	Carol Miller Family Trust	30 High Street	30 High Street	Exeter	NH	03833
71-007	Two Portsmouth Ave Trust	2 Portsmouth Avenue	2 Portsmouth Avenue	Exeter	NH	03833
71-033	INFENG, LLC	1 Portsmouth Avenue	1 Portsmouth Avenue	Exeter	NH	03833
71-075	Danielle Vanderzanden	5 Fox Chapel Court	5 Fox Chapel Court	Exeter	NH	03833
71-076	Karen Clarke Living Trust	7 Fox Chapel Court	7 Fox Chapel Court	Exeter	NH	03833
71-077	Jeff Morrin	8 Fox Chapel Court	8 Fox Chapel Court	Exeter	NH	03833
71-091	Peter Smith Rev Living Trust	121 High Street	121 High Street	Exeter	NH	03833
71-092	Mayers and Shin Rev Trust	113 High Street	113 High Street	Exeter	NH	03833
71-093	Anne Campbell Rev Trust	111 High Street	111 High Street	Exeter	NH	03833
71-094	Gregory Wenger	101 High Street	101 High Street	Exeter	NH	03833
71-095	95 High Street Investment Trust	95 High Street	27 Garfield Street	Exeter	NH	03833
71-096	Nicole Gercke	89 High Street #2	89 High Street #2	Exeter	NH	03833
71-096	Jacqueline Bastien	89 High Street #5	89 High Street #5	Exeter	NH	03833
71-096	Michael Cleveland	89 High Street #4	89 High Street #4	Exeter	NH	03833
71-096	Terri Schoppmeyer	89 High Street #3	89 High Street #3	Exeter	NH	03833
71-096	Leavitt Farm Condominiums	89 High Street	89 High Street	Exeter	NH	03833
71-096	Laura Batchelder	89 High Street #1	89 High Street #1	Exeter	NH	03833
71-097	81 High Street LLC	81 High Street	81 High Street	Exeter	NH	03833
71-098	Emerson Commons	75 High Street	75 High Street	Exeter	NH	03833
71-098	Pediatric Pharmaceutical Consultants	75 High Street #JA1	75 High Street #JA1	Exeter	NH	03833
71-098	Cynthia Traver	75 High Street #EM4	75 High Street #EM4	Exeter	NH	03833
71-098	Audrey Bleakley	75 High Street #EM1	75 High Street #EM1	Exeter	NH	03833
71-098	Michael Tuttle Rev Trust	75 High Street #GA2	75 High Street #GA2	Exeter	NH	03833
71-098	Christian Barlow	75 High Street #JA3	75 High Street #JA3	Exeter	NH	03833
71-098	Cassandra Notz	75 High Street #JA4	75 High Street #JA4	Exeter	NH	03833
71-098	Todd Bissonnette	75 High Street #GA1	75 High Street #GA1	Exeter	NH	03833
71-098	Harrison Family Rev Trust	75 High Street #EM2	75 High Street #EM2	Exeter	NH	03833
71-098	Cassandra Rodier	75 High Street #JA4	75 High Street #JA4	Exeter	NH	03833
71-098	Judith Meaney	75 High Street #JA2	75 High Street #JA2	Exeter	NH	03833
71-098	Sonja Jacobson Rev Trust	75 High Street #EM3	75 High Street #EM3	Exeter	NH	03833
71-098	Landon Olbricht	75 High Street #GA3	75 High Street #GA3	Exeter	NH	03833
71-103	Virginia Gilmore Rev Trust	10 Gardner Street	10 Gardner Street	Exeter	NH	03833
71-104	Benjamin & Jill Sloan Rev Trust	11 Gardner Street	11 Gardner Street	Exeter	NH	03833
71-111	John Luzadre	10 Marlboro Street	10 Marlboro Street	Exeter	NH	03833
71-112	Nicholas Tolentino	9 Marlboro Street	9 Marlboro Street	Exeter	NH	03833
71-113	Anthony Zwaan	7 Marlboro Street	7 Marlboro Street	Exeter	NH	03833

Abutters List - Faculty Housing Developent at High Street (Abutters to PEA owned Parcels 71-117, 71-118 and 71-119)						
Direct Abutters:						
Parcel ID	**Owner**	**Property Address**	**Mailing Address**	**City**	**State**	**Zip Code**
71-115	Carol Miller Family Trust	47-49 High Street	47-49 High Street	Exeter	NH	03833
71-116	39-41 High Street LLC	39-31 High Street	39-31 High Street	Exeter	NH	03833
71-117	PEA	35 High Street	20 Main Street	Exeter	NH	03833
71-118	PEA	10 Gilman Lane	20 Main Street	Exeter	NH	03833
72-061	PEA	7 Gilman	20 Main Street	Exeter	NH	03833
72-062	J Donnell Rev Trust	25 High Street	25 High Street	Exeter	NH	03833
72-063	Troy Hogg	21 High Street	21 High Street	Exeter	NH	03833
72-074	Michael Defeo	28A Franklin Street	28A Franklin Street	Exeter	NH	03833
72-074	Benjamin Scoll	28B Franklin Street	28B Franklin Street	Exeter	NH	03833
72-074	Porches At Exeter LLC	28 Franklin Street	28 Franklin Street	Exeter	NH	03833
72-076	Carl Edlund	30 Franklin Street	30 Franklin Street	Exeter	NH	03833
72-078	Mary Banach	36 Franklin Street	36 Franklin Street	Exeter	NH	03833
72-078	Rivers Edge Condo Association	32-36 Franklin Street	32-36 Franklin Street	Exeter	NH	03833
72-078	Richard White	32 Franklin Street	32 Franklin Street	Exeter	NH	03833
72-078	Winbeck LLC	34 Franklin Street	34 Franklin Street	Exeter	NH	03833
72-079	Candice Cantalupo Rev Trust	44 Franklin Street	44 Franklin Street	Exeter	NH	03833
72-079	Candice Cantalupo Rev Trust	46 Franklin Street	46 Franklin Street	Exeter	NH	03833
72-079	Willow Bend Homeowners	44-46 Franklin Street	44-46 Franklin Street	Exeter	NH	03833
72-080	David Cowie	48 Franklin Street	48 Franklin Street	Exeter	NH	03833
72-081	Michael Lodico	47 Franklin Street	47 Franklin Street	Exeter	NH	03833
72-085	Nicholas Moutis	10 South Street	10 South Street	Exeter	NH	03833
72-086	Brian Kenyon	12 River Street	12 River Street	Exeter	NH	03833
72-087	Unitil	18 River Street	6 Liberty Lane	Hampton	NH	03842
72-083	Unitil	33 Gilman Lane	6 Liberty Lane	Hampton	NH	03842
72-089	Julie Kucharski	20 River Street	20 River Street	Exeter	NH	03833
72-090	Matthew Baillargeon	22 River Street	22 River Street	Exeter	NH	03833
72-091	R & J Rev Realty Trust	24-26 River Street	24-26 River Street	Exeter	NH	03833
72-094	Lars Holzman	30 River Street	30 River Street	Exeter	NH	03833
72-095	Lars Holzman	34 River Street	34 River Street	Exeter	NH	03833
72-096	Forbes-Fisher Rev Trust	36 River Street	36 River Street	Exeter	NH	03833
72-098	Edward Ganley	44 River Street	44 River Street	Exeter	NH	03833
83-001	PEA	Gilman Street	20 Main Street	Exeter	NH	03833
83-019	Town of Exeter	Bell Avenue	10 Front Street	Exeter	NH	03833
084-001	John Sanborn Rev Trust	25 Drinkwater Road	25 Drinkwater Road	Exeter	NH	03833
084-010	Christopher Mann	22 Folsom Street	22 Folsom Street	Exeter	NH	03833
084-011	John Steere	21 Folsom Street	21 Folsom Street	Exeter	NH	03833
084-014	Thomas Hanson	3 Fox Chapel Court	3 Fox Chapel Court	Exeter	NH	03833

Abutters List - Faculty Housing Developent at High Street (Abutters to PEA owned Parcels 71-117, 71-118 and 71-119)						
Direct Abutters:						
Parcel ID	**Owner**	**Property Address**	**Mailing Address**	**City**	**State**	**Zip Code**
085-048	Judith Darby Trust	2 Brooks Road	2 Brooks Road	Exeter	NH	03833
093-001	Barry Hartman	30 Drinkwater Road	30 Drinkwater Road	Exeter	NH	03833
093-002	Alexander Buxton	32 Drinkwater Road	32 Drinkwater Road	Exeter	NH	03833
093-003	Charles Rudinsky	34 Drinkwater Road	34 Drinkwater Road	Exeter	NH	03833
093-004	Lisa Chandler	36 Drinkwater Road	36 Drinkwater Road	Exeter	NH	03833
093-005	Crawford Family Rev Trust	38 Drinkwater Road	38 Drinkwater Road	Exeter	NH	03833
093-006	Dennis Derby	40 Drinkwater Road	40 Drinkwater Road	Exeter	NH	03833
093-007	Angela Sullivan	42 Drinkwater Road	42 Drinkwater Road	Exeter	NH	03833
093-008	Gregory Smith	44 Drinkwater Road	44 Drinkwater Road	Exeter	NH	03833
093-009	David and Nancy Loch & Barbara Sobczak	46 Drinkwater Road	46 Drinkwater Road	Exeter	NH	03833
093-010	Jed Carpentier	48 Drinkwater Road	48 Drinkwater Road	Exeter	NH	03833
093-011	Town of Exeter	50 Drinkwater Road	10 Front Street	Exeter	NH	03833
093-012	PEA	Drinkwater Road	20 Main Street	Exeter	NH	03833
094-019	PEA	Court Street	20 Main Street	Exeter	NH	03833
104-001	L Gilman c/o Mark Gilman	144 Court Street	144 Court Street	Exeter	NH	03833
105-001	Town of Exeter	50 Lary Lane	10 Front Street	Exeter	NH	03833
106-001	Charles Dunbar	54 Drinkwater Road	54 Drinkwater Road	Exeter	NH	03833
106-003	Robert Tuttle	56 Drinkwater Road	56 Drinkwater Road	Exeter	NH	03833
106-004	Bonnie Philo	72 Drinkwater Road	72 Drinkwater Road	Exeter	NH	03833
107-001	Kyle Barnett	58 Drinkwater Road	58 Drinkwater Road	Exeter	NH	03833
107-002	Peter Consigli	64 Drinkwater Road	64 Drinkwater Road	Exeter	NH	03833
107-003	Jose Salema	66 Drinkwater Road	66 Drinkwater Road	Exeter	NH	03833
107-004	Scott Haggett	68 Drinkwater Road	68 Drinkwater Road	Exeter	NH	03833
109-001	Cynthia Stone	74 Drinkwater Road	74 Drinkwater Road	Exeter	NH	03833
109-002	David Kady	80 Drinkwater Road	80 Drinkwater Road	Exeter	NH	03833
109-003	David Bowen	82 Drinkwater Road	82 Drinkwater Road	Exeter	NH	03833
110-002	Court Street Camp LLC	190 Court Street	190 Court Street	Exeter	NH	03833
** Note - 1 notification will be sent to PEA - with for all abutting parcels - including: 71-117, 71-118, 71-061, 83-001, 93-012, 94-019						
Confirmed through VGSI.com database						
96 Letters (1 for PEA, 1 for all others)						
?? There are 4 addition owners with multiple properties - could these be condensed to one letter?						

Faculty Neighborhood

High Street

Exeter, New Hampshire

Site Work - Cost Estimate

BASIS: Site Plans dated Februrary 2022

DATE: 11-Feb-22
PROJECT: 5075

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
SITE PREPARATION	1.00	LS	$50,000.00	$50,000
TEMPORARY EROSION CONTROL				
SILT BARRIER	531	LF	$2.50	$1,326
ALLOWANCE FOR E&SC INSPECTIONS	1	LS	$2,000.00	$2,000
AGGREGATE BASE COURSES				
12" BANK RUN GRAVEL	620	CY	$30.00	$18,600
6" CRUSHED GRAVEL	310	CY	$40.00	$12,400
HOT BITUMINOUS PAVEMENT				
BINDER AND WEARING COURSE	370	TONS	$90.00	$33,300
BITUMINOUS WALKWAYS	1,600	SF	$6.00	$9,600
STORM DRAINAGE				
CATCH BASINS/DMH	9	LS	$3,500.00	$31,500
YARD DRAINS	7	LS	$300.00	$2,100
AREA DRAINS	3	LS	$1,000.00	$3,000
RAINGARDENS	2575	SF	$7.00	$18,025
SEWER				
PIPE	575	LF	$70.00	$40,221
MANHOLES	4	LS	$3,500.00	$14,000
ELECTRIC				
TRANSFORMER	1	LS	$10,000.00	$10,000
CONDUIT	726	LF	$10.00	$7,262
WATER				
HYDRANT AND FITTINGS	1	LS	$10,000.00	$10,000
4", 6" & 8" D.I. PIPE	893	LF	$40.00	$35,711
CURBING				
VERTICAL GRANITE CURB	344	LF	$35.00	$12,034
LANDSCAPING				
PLANTING ALLOWANCE	1	LS	$20,000.00	$20,000
UNIT PAVERS	700	SF	$20.00	$14,000
SITE LIGHTING	2	EA	$4,000.00	$8,000
SIGNS/STRIPING	1	LS	$2,000.00	$2,000

SUBTOTAL:	**$355,080**
Contingency (15%):	**$53,320**
USE:	**$408,400**

Site Plan Review - Waiver Request

Phillips Exeter Academy
High Street Faculty Neighborhood Development

35 High Street, 8 Gilman Lane, & 10 Gilman Lane
Tax Map 71, Lots 117-119

April 5, 2022

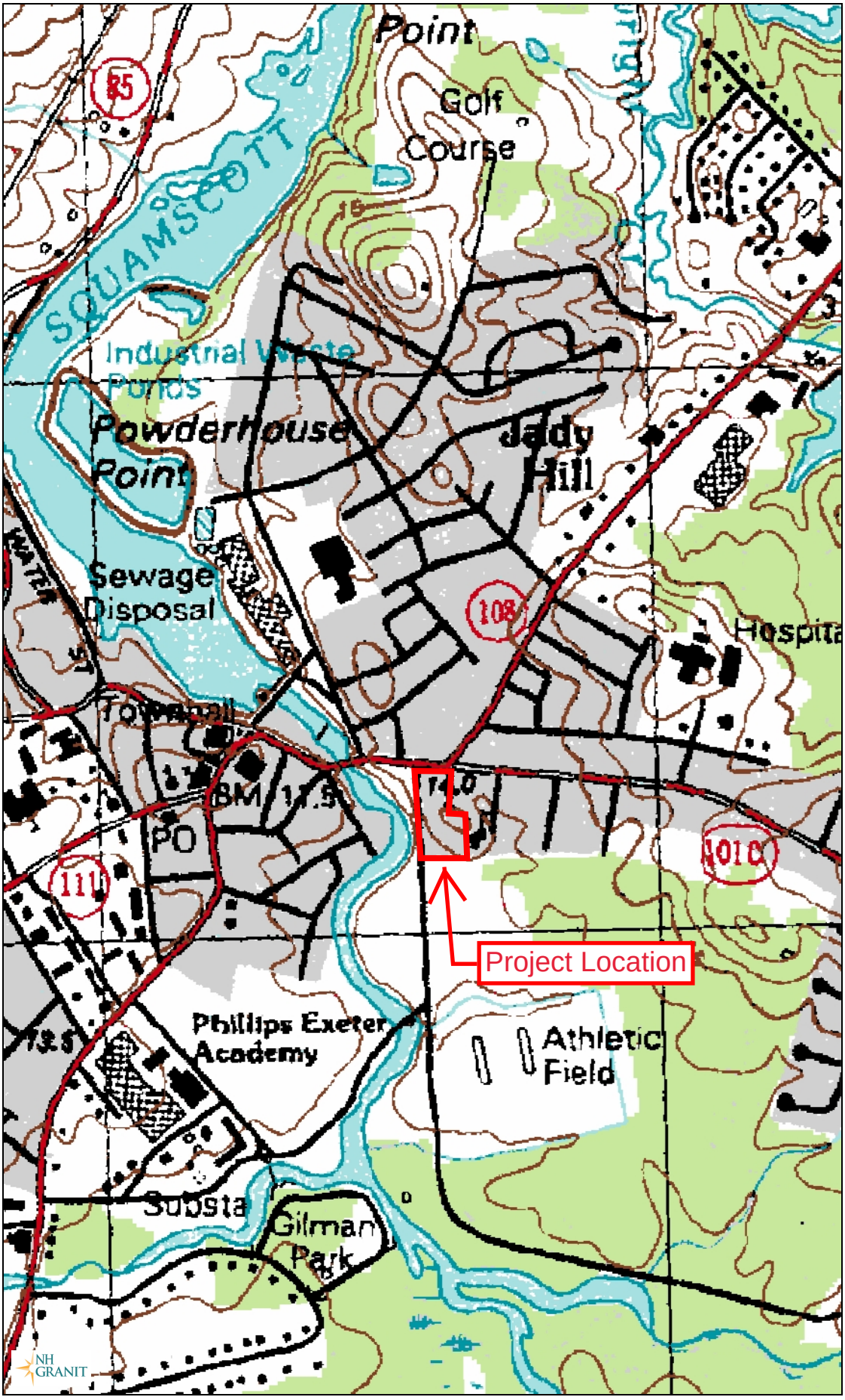
Waiver Request #1: 9.3.6.4 -Work within 5 feet of exterior property line

The proposed project site is an existing developed site. There are a number of existing improvements that extend to the property lines. The proposed project will work within 5 feet of the property line to remove some of the existing features and construct new improvements. Pavement and trees will be removed in agreement with the abutting property owners. Fence, sidewalk, and grading will also be done with 5 feet of the property line. Therefore, the applicant requests to grade within 5 feet of the to the property line as shown on the plans.

Waiver Request #2: 9.3.4.F.c.ii - Fertilizer use during plant establishment

A waiver is requested for use of fertilizer during plant establishment per Section 9.3.4.F.c.ii. of the Stormwater Management Standards. Best management practices shall apply, fertilizer shall have a minimum of 50% slow release nitrogen, and fertilizer us shall be for a maximum period of one -year.

Phillips Exeter Academy
High Street Faculty Housing Project



Legend

- State
- County
- City/Town
- 1893

Map Scale

1: 10,000

Map Generated: 11/3/2021

Notes


PEA - High St
Faculty Neighborhood Development
Legend
Project Location
High St
High St
Auburn Ave
Hall Pl
Franklin St
Gilman Ln
Gilman Ln
Marlboro St
Google Earth
400 ft
N

PIN
- Approximate location based on user input and does not represent an authoritative property location

MAP PANELS
- Selected FloodMap Boundary
- Digital Data Available
- No Digital Data Available
- Unmapped

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D
- Otherwise Protected Area
- Coastal Barrier Resource System Area

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth
- Regulatory Floodway Zone AE, AO, AH, VE, AR

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

SCALE

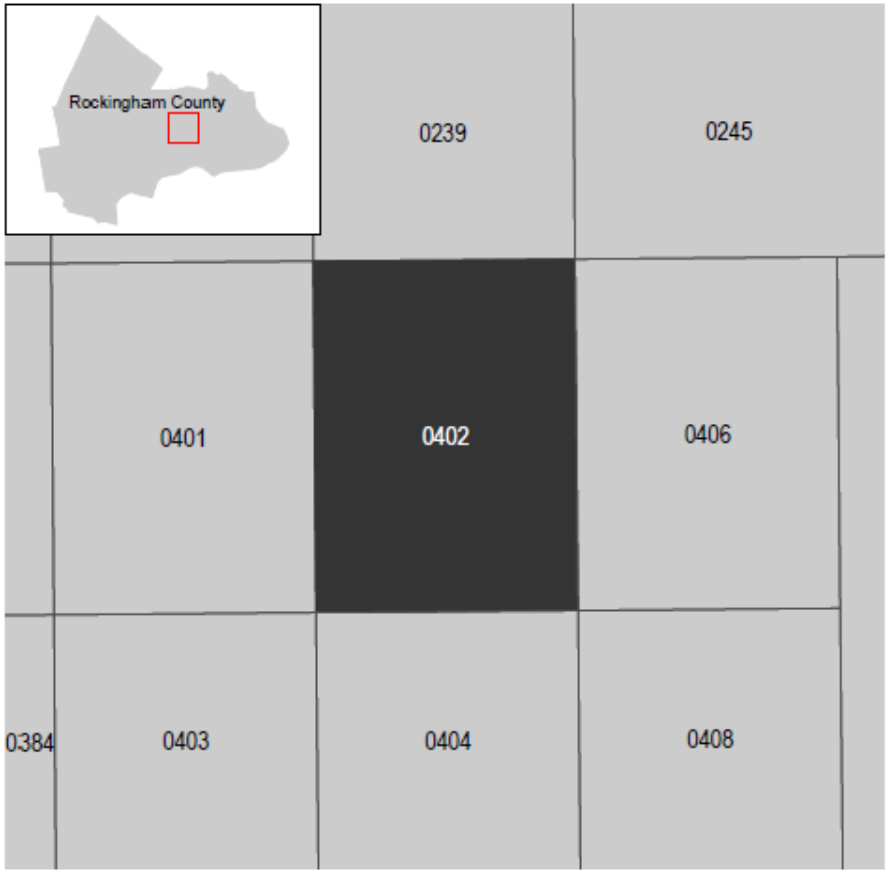
Map Projection:
State Plane New Hampshire FIPS 2800 Feet; North American Datum 1983;
Western Hemisphere; Vertical Datum: NGVD 29

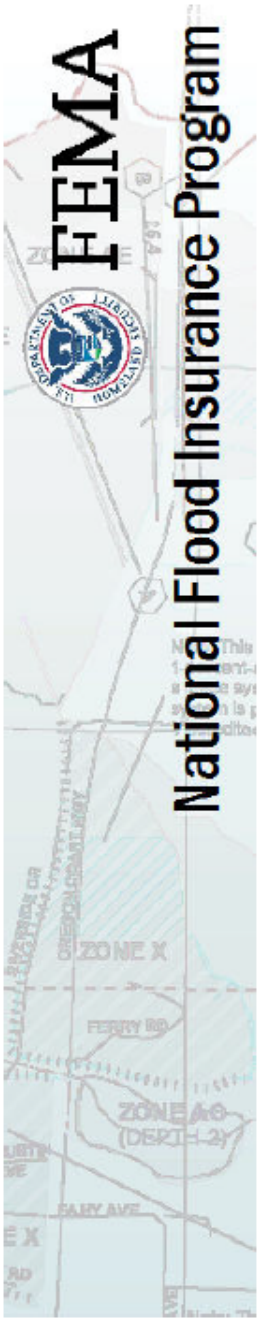
1 inch = 500 feet 1:6,000

0 500 1,000 2,000 feet

0 150 300 600 meters

PANEL LOCATOR





NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

ROCKINGHAM COUNTY, NEW HAMPSHIRE
(All Jurisdictions)

PANEL 402 OF 681

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER, TOWN OF	330130	0402	E
STRATHAM, TOWN OF	330197	0402	E

REVISED TO
REFLECT LOMR
EFFECTIVE: November 5, 2018

VERSION NUMBER
2.1.3.0

MAP NUMBER
33015C0402E

EFFECTIVE DATE
MAY 17, 2005

LEGEND

- [#] PHOTO NUMBER AND DIRECTION
- (1) PROPERTY LINE
- (2) 35 HIGH STREET
- (3) 8 GILMAN LANE
- (4) 10 GILMAN LANE

SK-1

PHOTO KEY

SCALE:

DATE: 2/22/21

High Street Housing
Residential Development

8 Gilman Lane
Exeter, NH 03833

REVISIONS

No

PHILLIPS EXETER ACADEMY
20 Main Street
Exeter, NH 03833

Phillips Exeter Academy | 35 High Street | Exeter, New Hampshire | Existing Site Plan | 05.14.2021 | 0 20 40 FT. | kzla

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

Photo 14

Photo 15

Photo 16

Photo 17

TOWN OF EXETER - DEPARTMENT OF PUBLIC WORKS

PRELIMINARY APPLICATION TO CONNECT AND/OR DISCHARGE TO TOWN OF EXETER SEWER, WATER, AND/OR STORMWATER DRAINAGE SYSTEM(S)

Project Name . High Street Faculty Neighborhood

Project Location . High Street

Applicant/Owner Name . Phillips Exeter Academy

Mailing Address . 20 Main Street, Exeter, NH 03833

Phone Number . 603-777-3292 email . htaylor@exeter.edu

Project Engineer . Cory Belden, P.E., Altus Engineering, Inc

Mailing Address . 133 Court Street, Portsmouth, NH 03801

Phone Number . 603-433-2335 email . cbelden@altus-eng.com

Type of Discharge/Connection ☒ Sewer ☒ Water ☒ Stormwater

Application completed by

Name . Cory Belden, P.E.

Signature _____ Date February 14, 2022

Reviewed and verified by Planning & Building Department _____

DESIGN FLOWS

The water and sewer design flow shall be based upon the New Hampshire Code of Administrative Rules, Env-Wq 1000 Subdivisions; Individual Sewage Disposal Systems, Table 1008-1 Unit Design Flow Figures (current version) or other methodology which may be deemed acceptable by the Town of Exeter. The minimum fee for a single-family residential unit is based on the design flow for two (2) bedrooms. Existing water and sewer flows may be based on meter readings for the current use.

If the proposed discharge is non-residential or is residential but exceeds 5,000 gallons per day (gpd), Section C must be completed. Certain water and sewer discharges must be approved by the State of New Hampshire Department of Environmental Services by way of permit and plan submittals. It is the responsibility of the applicant to ensure submittals are made to the state through the town is necessary. Final town approval cannot be made without the state's approval if required.

Stormwater design flows are based on the drainage analysis prepared by the applicant using the most current published precipitation data available.

APPROVALS ARE VALID FOR PERIOD OF ONE (1) YEAR FROM DATE OF APPROVAL

SECTION A: PROPOSED NEW CONNECTIONS OR MODIFICATION OF EXISTING CONNECTIONS

SANITARY SEWER

Description of work . Modify existing faculty residences and construct 5 new residential units

Title of plan . "High Street Faculty Neighborhood" Sheet C.2, Utility Plan

Total design flow (gpd) . 2730 GPD (Net increase of 1050 GPD for 5 faculty apartments)

**For any non-residential discharge or residential discharge exceeding 5,000 GPS, or for a change of use, complete Section C of this form.*

Approved _____ Date _____

Water & Sewer Managing Engineer

WATER

Description of work . Modify existing faculty residences and construct 5 new residential units

Title of plan "High Street Faculty Neighborhood" Sheet C.2, Utility Plan, Sheets C.4.1 & C.4.2 Grading and Drainage Plan

Total design flow (gpd) . 2730 GPD (Net increase of 1050 GPD for 5 faculty apartments)

Approved _____ Date _____

Water & Sewer Managing Engineer

STORMWATER

Description of work . No Connections to Municipal Storm Drain System

Title of plan . "High Street Faculty Neighborhood" Sheet C.4.1 & C.4.2, Grading and Drainage Plan

Total design flow (10-year storm, CFS) . No increase expected (All post development runoff rates to be decreased)

Approved _____ Date _____

Highway Superintendent

APPROVALS ARE VALID FOR PERIOD OF ONE (1) YEAR FROM DATE OF APPROVAL

SECTION B: IMPACT FEES

Provide the following information to determine if a water and/or sewer impact fee will be required for a new development or a change or increase in use.

Current/prior Use(s)

Describe current use(s) 8 existing faculty apartments

Use	Unit Flow (gpd)	Total Existing Flow
8 Units	210 GPD/Unit	1680 GPD

Total existing flow 1680 GPD

Proposed Use(s)

Describe proposed use(s) 13 faculty apartments

Use	Unit Design Flow (gpd)	Total Design Flow
13 Units	210 GPD/Unit	2730 GPD

Total proposed flow 2730

Impact Fees (80% of the design flow)

Change in flow rate (gpd) 1050 GPD x 0.8 = Impact Fee flow rate (gpd) 840 GPD

If there is a decrease in flow rates, no water or sewer impact fee will be charged. If there is an increase in flow rates, a water and/or sewer impact fee will be charged using the following formula:

Sewer Impact Fee: Flow increase (gpd) 840 x $4.85 = $4074.00

Water Impact Fee: Flow increase (gpd) 840 X $2.00 = $1680.00

Approved by Town of Exeter

Town Planner _____ Date _____

Water & Sewer Managing Engineer _____ Date _____

APPROVALS ARE VALID FOR PERIOD OF ONE (1) YEAR FROM DATE OF APPROVAL

SECTION C: SANITARY SEWER CLASSIFICATION AND BASELINE MONITORING

(NON-RESIDENTIAL DISCHARGES OR RESIDENTIAL DISCHARGE OVER 5,000 GPD)

In accordance with Title 40 of the Code of Federal Regulations, Part 403 Section 403.14, information provided herein shall be available to the public without restriction except as specified in 40 CFR Part 2. A discharge permit will be issued on the basis of the information provided in this section.

In accordance with all terms and conditions of the Town of Exeter, New Hampshire Ordinances Chapter 15, all persons discharging wastewater into the town's facilities shall comply with all applicable federal, state, and local Industrial Pre-treatment rules.

PART I - USER INFORMATION

Property Owner Name . Phillips Exeter Academy

Owner's Representative . Heather Taylor

Address . 20 Main Street

Phone . 603-777-4529 email . htaylor@exeter.edu

Tenant Name . N/A

Address .

Phone . email .

PART II - PRODUCT OR SERVICE INFORMATION

Products Manufactured . N/A

Services Provided . Residential Faculty Housing - 5 new units

SIC Code(s) . Building Area (SF) .

Number of Employees . Days/week of operation . Shifts per day .

PART III - CATEGORY OF SEWER DISCHARGE

Type of Discharge ☐ Septic ☒ Proposed ☐ Existing ☐ Change of Use

Water Use (gpd) . 2730 GPD (from Section A)

Check all that apply:

☒ Domestic waste only (toilets & sinks)

☐ Domestic waste plus some process wastewater

☐ Federal pre-treatment standards (40 CFR) applies

PART IV - CLASSIFICATION DETERMINATION *(to be completed by Town staff)*

CLASS 1 - SIGNIFICANT OR CATEGORICAL INDUSTRIAL USER _____

CLASS 2 - MINOR INDUSTRIAL OR COMMERCIAL USER _____

CLASS 3 - INSIGNIFICANT INDUSTRIAL OR COMMERCIAL USER _____

CLASS 4 - NON-SYSTEM USER, OR DISCONTINUED SERVICE _____

See attached sheet for the basis of the determination.

Determined by _____ Title _____ Date _____

Approved _____ Date _____

Water & Sewer Managing Engineer

PART V - CERTIFICATION

I have personally examined and am familiar with the information submitted in this section for the above name use. The information provided is true, accurate and complete. I am aware that there are significant penalties from federal, state and/or town regulatory agencies for submitting false information, including the possibility of fine and/or imprisonment.

I acknowledge and agree to pay all charges incurred for monitoring, testing and subsequent analysis performed on the Town of Exeter sewer, water and/or stormwater drainage system(s), in the course of determining the town's ability to serve the project. Further, I acknowledge and agree that failure to accurately declare said flow requirements shall be sufficient cause to deny access to the Town of Exeter sewer, water and/or stormwater drainage system(s).

Signature of Applicant _____ Altus Engineering Date February 14, 2022

Name of Property Owner Phillips Exeter Academy

APPROVALS ARE VALID FOR PERIOD OF ONE (1) YEAR FROM DATE OF APPROVAL

USER CLASSIFICATION SYSTEM FOR INDUSTRIAL DISCHARGE

CLASS 1: SIGNIFICANT INDUSTRIAL USER

Any industry and/or commercial establishment that:

- Is subject to National Pre-treatment standards as outlined in 40 CFR (Code of Federal Regulations) 403.5 (a) (b).
- Discharges a non-domestic waste stream of 5,000 GPD, or more.
- Contributes a non-domestic waste stream totaling 5% or more of the average dry weather hydraulic or organic (BOD<TSS< etc.) capacity of the Town of Exeter Sewer Treatment Facility.
- Has the reasonable potential, in the opinion of the POT Supervisor, to adversely affect the treatment plant, its workers, or the collection system by reason of inhibition, pass- through pollutants, or sludge contamination.

CLASS 2: MINOR INDUSTRIAL USERS

Small industries and commercial establishments (e.g. restaurants, auto repair shops, cleaners, etc.) whose individual discharges do not significantly impact the Town of Exeter Sewer Treatment Facility or systems, degrade receiving water quality or contaminate the sludge. Industries that have the potential to discharge a non-domestic or process waste stream, but at the present time discharge only sanitary waste, may also be included in this class. However, this class shall not include any categorical industries. Industries and commercial establishments in this classification will require a permit and be subject to all inspection, compliance monitoring, enforcement, and reporting requirements of the pretreatment program.

CLASS 3: INSIGNIFICANT INDUSTRIAL USERS

Users which will be eliminated from participation in Exeter's Pretreatment Program. These include industries and/or commercial establishments that discharge only domestic waste (toilets and sinks only) into the municipal sewer system or do not have any reasonable chance of discharging a non-domestic waste stream to the POTW. Class 3 users will be required to notify the Exeter Sewer Division of any change in discharge quantity or character.

CLASS 4: NON-SYSTEM USER

Any industry, business or commercial establishment identified in the Master List of Industrial Users that are not connected to the Exeter Sewer system or which has ceased to discharge to the system.

Industries and/or commercial establishments classified as Class 1 or Class 2 users will be regulated individually and have specific effluent limitations (including conventional pollutants, where necessary) in the discharge permit. All Class 1 and Class 2 users will require a State Discharge Permit, and be subject to all inspection, compliance monitoring, and enforcement and reporting requirements of the pretreatment program.

Stephen G. Pernaw & Company, Inc.

P.O. Box 1721 • Concord, NH 03302
tel: (603) 731-8500 • fax: (866) 929-6094 • sgp@ pernaw.com

Transportation: Engineering • Planning • Design

M E M O R A N D U M

Ref: 2185A

To: Cory D. Belden, P.E.
Altus Engineering, Inc.

From: Stephen G. Pernaw, P.E., PTOE

Subject: High Street Faculty Neighborhood
Exeter, New Hampshire

Date: February 7, 2022

As requested, Pernaw & Company, Inc. has evaluated the traffic implications associated with the proposed redevelopment project known as the "High Street Faculty Neighborhood" project located at 35 High Street and 8 & 10 Gilman Lane in Exeter New Hampshire. This evaluation included several trip generation analyses for the former, current, and proposed uses of the site, as well as a site inspection to view the traffic signal system at the High Street/Portsmouth Avenue/Main Site Driveway intersection. To summarize:

Proposed Development - According to the plan entitled: *"Site Plan-High Street Faculty Neighborhood,"* Sheet C2.00, prepared by Altus Engineering Inc. dated January 21, 2022 (no revisions), the 10 existing faculty apartments on Gilman Lane (including #7 Gilman Lane) and adjacent to the Main Site Driveway, will be reconfigured and expanded to include 15 faculty apartments; all of which will be accessible via the Main Site Driveway (signalized). The Gilman Lane intersection on High Street will be discontinued (see Attachment 1).

Existing Conditions - Portsmouth Avenue intersects the north side of High Street with an acute approach angle (approximately 55-degrees) and the existing Main Site Driveway creates the fourth leg of the intersection across from Portsmouth Avenue. This four-leg intersection operates under traffic signal, and the existing lane configuration is as follows:

- High Street EB Approach: One exclusive left-turn lane, one shared through-right lane
- High Street WB Approach: One shared left-through lane, one exclusive right-turn lane
- Portsmouth Avenue SB Approach: One shared left-through lane, one exclusive right-turn lane
- Main Site Driveway NB Approach: One shared left-through-right lane

The traffic signal controller operates with five basic phases: 1) southbound approach, 2) eastbound approach (with southbound right-turn overlap), 3) westbound approach, 4) northbound approach, and 5) an exclusive pedestrian phase (when actuated). The current signal timing plan provides 4 to 12 seconds of "green time" for vehicles exiting from the Main Site Driveway. The pedestrian actuated walk phase provides 27 seconds for pedestrians (Walk & Flashing Don't Walk).

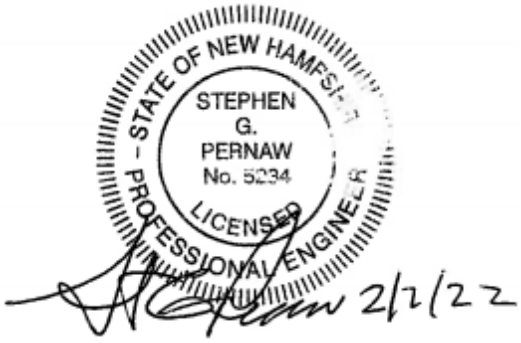
Trip Generation - To estimate the quantity of vehicle-trips associated with the current use of the site (10 faculty apartments) and proposed development (15 faculty apartments), Pernaw & Company, Inc. considered the standard trip generation rates and equations published by the Institute of Transportation Engineers[1] (ITE). More specifically, ITE Land Use Code 220 (Multifamily Housing-Low Rise) is the most applicable category for the subject site. The number of apartment units was utilized as the independent variable in this analysis. Strictly for comparison purposes, the trips generated by the former office use (Fosters Democrat) was estimated using Land Use Code 712 - Small Office Building. In this case, the gross floor area of the building was utilized as the independent variable. Table 1 summarizes the results of the trip generation analysis which are highlighted below:

- The use of Gilman Lane will be reduced from approximately 2 to 0 vehicle-trips during the weekday PM peak hour period as a result of its closure.
- The use of the Main Site Driveway will increase from approximately 3 to 8 vehicle-trips during the worst-case weekday PM peak hour period as the combined result of the additional faculty apartments and the closure of Gilman Lane.
- The traffic generated by the overall site is expected to increase minimally from 5 to 8 vehicle-trips during the weekday PM peak hour period.
- The proposed redevelopment of the site is expected to generate fewer vehicle-trips than the former office building during both the AM and PM peak hour periods.

The trip generation computations are attached (see Attachments 2-13).

Findings and Conclusions - The trip generation analyses contained herein demonstrate that the anticipated change in traffic generation is de minimis from a traffic operations and capacity standpoint. The actual trips generated by the site could be somewhat lower than shown in Table 1 given that some faculty will opt to walk to the campus rather than drive. The proposed closure of Gilman Lane is seen as a net positive as it eliminates several conflict points on the High Street corridor. Lastly, the current traffic signal timing plan and phasing plan is appropriate, and do not require modifications to accommodate the modest traffic changes that are anticipated.

Attachments



[1] Institute of Transportation Engineers, *Trip Generation*, 11th Edition (Washington, D.C., 2021)

Stephen G. Pernaw & Company, Inc.

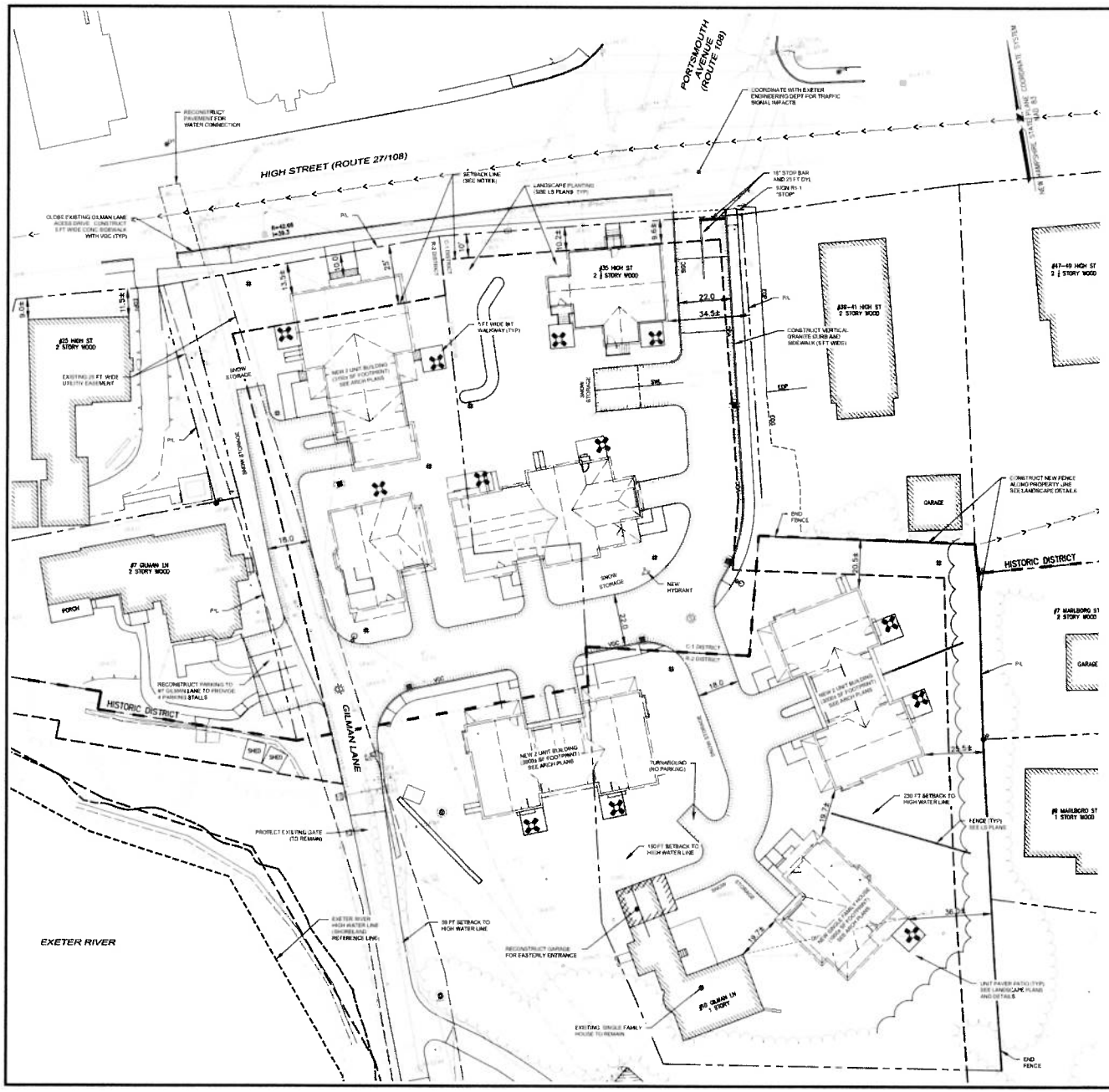
Table 1

Trip Generation Summary / Comparison
High Street Faculty Neighborhood

		Existing Apartments [2]			Proposed Apartments [2]			Net Change		
	Former Fosters Democrat Office [1]	Via Gilman Lane (4 Apts)	Via Signalized Driveway (6 Apts)	Total (10 Apts)	Via Gilman Lane (0 Apts)	Via Signalized Driveway (15 Apts)	Total (15 Apts)	Via Gilman Lane	Via Signalized Driveway	Overall Site
Weekday Peak Hour										
Entering	37 veh	14 veh	20 veh	34 veh	0 veh	51 veh	51 veh	-14 veh	31 veh	17 veh
Exiting	37 veh	14 veh	20 veh	34 veh	0 veh	51 veh	51 veh	-14 veh	31 veh	17 veh
Total	74 trips	28 trips	40 trips	68 trips	0 trips	102 trips	102 trips	-28 trips	62 trips	34 trips
AM Peak Hour										
Entering	7 veh	0 veh	0 veh	0 veh	0 veh	1 veh	1 veh	0 veh	1 veh	**1 veh**
Exiting	2 veh	2 veh	2 veh	4 veh	0 veh	5 veh	5 veh	-2 veh	3 veh	**1 veh**
Total	9 trips	2 trips	2 trips	4 trips	0 trips	6 trips	6 trips	-2 trips	4 trips	**2 trips**
PM Peak Hour										
Entering	4 veh	1 veh	2 veh	3 veh	0 veh	5 veh	5 veh	-1 veh	3 veh	**2 veh**
Exiting	7 veh	1 veh	1 veh	2 veh	0 veh	3 veh	3 veh	-1 veh	2 veh	**1 veh**
Total	11 trips	2 trips	3 trips	5 trips	0 trips	8 trips	8 trips	-2 trips	5 trips	**3 trips**

[1] ITE Land Use Code 712 - Small Office Building (5,169 sf)

[2] ITE Land Use Code 220 - Multifamily Housing (Low-Rise)



ZONING SUMMARY:

OWNER OF RECORD / APPLICANT
PHILLIPS EXETER ACADEMY
20 MAIN STREET
EXETER, NEW HAMPSHIRE 03833
603-772-4442

TAX MAP 71, LOTS 117, 118 & 119
PROPERTY ADDRESS: 35 HIGH STREET, 8 & 10 GILMAN LANE
ZONED C-1, CENTRAL AREA COMMERCIAL AND R-2, RURAL SINGLE FAMILY RESIDENCE

	C-2 REQUIRED	R-2 REQUIRED	PROVIDED
LOT AREA:	5,000 S.F.	15,000 S.F.	**8.0 ACRES (PER TOWN GIS)**
LOT WIDTH	50' MIN.	100' MIN.	**> 100 FT.**
DEPTH	100' MIN.	100' MIN.	**> 100 FT.**
FRONT SETBACK	10' MIN.	25' MIN.	**> 58.0± FT.**
SIDE SETBACK	10' MIN.	15' MIN.	**> 16.3± FT.**
REAR SETBACK	20' MIN.	25' MIN.	**> 80.7± FT.**
OPEN SPACE	5% MIN.	40% MIN.	**> 60%**

PARKING SUMMARY

RESIDENTIAL UNITS: 13 UNITS

- TWO PARKING STALLS PROVIDED FOR EACH UNIT

PERMITTING NOTES:

1. THE EXETER ZONING BOARD OF ADJUSTMENT GRANTED RELIEF FOR THE FOLLOWING ITEMS AT THE DECEMBER 21, 2021 MEETING:
   - 1.1. VARIANCE – PER ARTICLE 4, SECTION 4.3, SCHEDULE II: DENSITY AND DIMENSIONAL REGULATIONS – RESIDENTIAL. FRONT YARD SETBACK IN THE R-2 DISTRICT. TO ALLOW AN 10.0 FEET, WHERE 25 FEET IS REQUIRED.
   - 1.2. SPECIAL EXCEPTION – PER ARTICLE 4, SECTION 4.2, SCHEDULE I: PERMITTED USES, TO ALLOW TWO-FAMILY HOMES IN THE R-2 DISTRICT.
2. A NHDES SHORELAND PERMIT IS REQUIRED FOR THE PROPOSED SITE IMPROVEMENTS.
3. A NHDES ALTERATION OF TERRAIN PERMIT IS REQUIRED FOR THE PROPOSED SITE IMPROVEMENTS.
4. TOWN OF EXETER LOT LINE ADJUSTMENT AND SITE PLAN APPROVAL IS REQUIRED.

WAIVERS:

THE FOLLOWING WAIVERS WERE GRANTED BY THE EXETER PLANNING BOARD ON _____:

SITE NOTES:

1. ALL WATER, SEWER, ROAD, AND DRAINAGE WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 9.5 GRADING, DRAINAGE, AND EROSION & SEDIMENT CONTROL AND THE STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC UTILITIES IN EXETER, NEW HAMPSHIRE.
2. STRIPE PARKING AREAS AND DRIVES AS SHOWN INCLUDING PARKING SPACES, HANDICAP SYMBOLS, AND PAINTED ISLANDS. ALL MARKINGS TO BE CONSTRUCTED USING WHITE TRAFFIC PAINT, MEETING THE REQUIREMENTS OF AASHTO M248, TYPE F. TRAFFIC ARROWS ARE SHOWN FOR INFORMATION ONLY AND ARE NOT INTENDED TO BE PAINTED.
3. ALL PAVEMENT MARKINGS AND SIGNS TO CONFORM TO "MANUAL ON UNIFORM TRAFFIC DEVICES" AND "STANDARD ALPHABETS FOR HIGHWAY SIGNS AND PAVEMENT MARKINGS" LATEST EDITIONS AND THE ADA REQUIREMENTS.
4. SEE DETAILS FOR PARKING STALL MARKINGS, HANDICAP SYMBOLS, SIGNS AND SIGN DETAILS.
5. COORDINATE ALL WORK WITHIN FIVE (5) FEET OF PROPOSED BUILDINGS WITH BUILDING CONTRACTOR AND ARCHITECTURAL DRAWINGS.
6. CLEAN AND COAT VERTICAL FACE OF EXISTING PAVEMENT AT SAWCUT LINE WITH RS-1 IMMEDIATELY PRIOR TO PLACING NEW BITUMINOUS CONCRETE.
7. THE 100 YEAR FLOODPLAIN IS LOCATED THE PROJECT PARCELS AS SHOWN ON FEMA NATIONAL FLOOD INSURANCE PROGRAM MAP 33015C0404D, EFFECTIVE NOVEMBER 5, 2015. THE PROPOSED SITE IMPROVEMENTS DO NOT EXTEND INTO 100 YEAR FLOODPLAIN AS SHOWN.
8. IF THERE IS NOT ADEQUATE ROOM FOR SNOW STORAGE IN AN EXTREME STORM EVENT, THEN SNOW SHALL BE REMOVED FROM THE SITE.
9. SOLID WASTE TO BE STORED INSIDE OR WITH EXTERNAL BINS. SOLID WASTE WILL BE A PRIVATE COLLECTION SERVICE AND WILL NOT BE ROLLED TO HIGH STREET FOR TOWN CURBSIDE PICKUP. RECYCLING SHALL BE STORED IN INDIVIDUAL UNITS.

REFERENCE PLAN:

EXISTING CONDITIONS SURVEY PERFORMED AND PROVIDED BY NITSCH ENGINEERING, DATED MAY 28, 2021.

GRAPHIC SCALE
-20 0 10 20 40
(IN FEET)

CASE #22-00
TOWN OF EXETER PROJECT REFERENCE

ENGINEER:
ALTUS ENGINEERING, INC.
133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

SURVEYOR:
MARKET SQUARE ARCHITECTS
104 Congress Street
Suite 203
Portsmouth, NH 03801
(603) 501-0202

THIS DRAWING HAS NOT BEEN RELEASED FOR CONSTRUCTION

ISSUED FOR: CLIENT REVIEW

ISSUE DATE: JANUARY 21, 2022

REVISIONS:

NO	DESCRIPTION	BY	DATE
0	CLIENT REVIEW	CDB	01/21/22

DRAWN BY: CDB
APPROVED BY: CDB
DRAWING FILE: 5075SITE.DWG
SCALE: (24"x36") 1"=20'

OWNER/APPLICANT:
Phillips Exeter Academy
20 Main Street
Exeter, NH 03833

PROJECT:
PHILLIPS EXETER ACADEMY
HIGH STREET FACULTY NEIGHBORHOOD
EXETER, NH 03833

TITLE:
SITE PLAN

SHEET NUMBER:
C2.00

Attachment 1

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

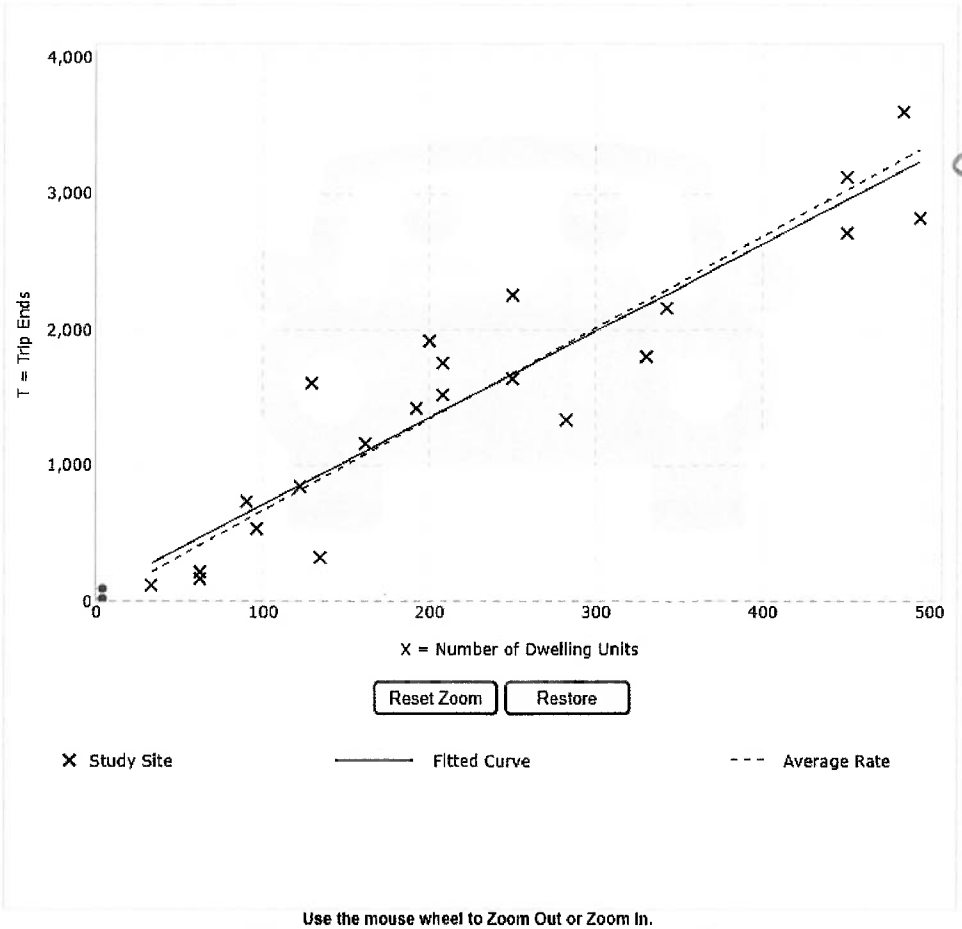
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
4 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. Num. of Dwelling Units:
229

Average Rate:
6.74

Range of Rates:
2.46 - 12.50

Standard Deviation:
1.79

Fitted Curve Equation:
T = 6.41(X) + 75.31

R^2:
0.86

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 27 (Total), 13 (Entry), 14 (Exit)
Fitted Curve: 101 (Total), 50 (Entry), 51 (Exit)

Attachment 2

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

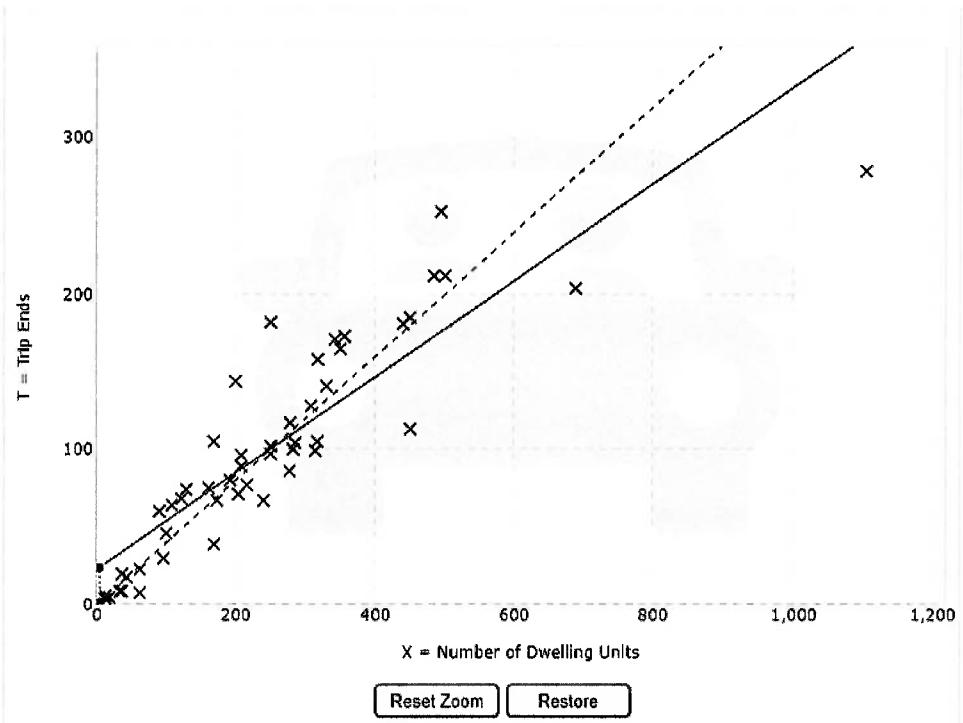
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
4 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
49

Avg. Num. of Dwelling Units:
249

Average Rate:
0.40

Range of Rates:
0.13 - 0.73

Standard Deviation:
0.12

Fitted Curve Equation:
T = 0.31(X) + 22.85

R^2:
0.79

Directional Distribution:
24% entering, 76% exiting

Calculated Trip Ends:
Average Rate: 2 (Total), 0 (Entry), 2 (Exit)
Fitted Curve: 24 (Total), 6 (Entry), 18 (Exit)

Attachment 3

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

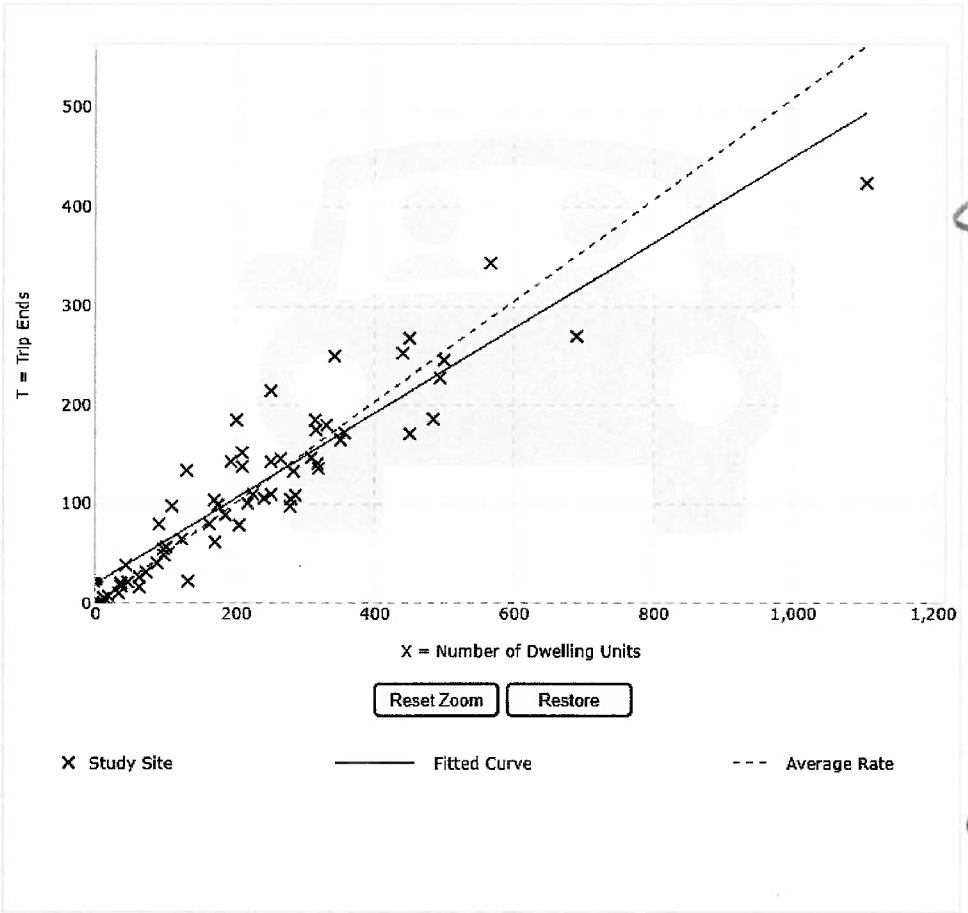
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
4 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
59

Avg. Num. of Dwelling Units:
241

Average Rate:
0.51

Range of Rates:
0.08 - 1.04

Standard Deviation:
0.15

Fitted Curve Equation:
T = 0.43(X) + 20.55

R^2:
0.84

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 2 (Total), 1 (Entry), 1 (Exit)
Fitted Curve: 22 (Total), 14 (Entry), 8 (Exit)

Attachment 4

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

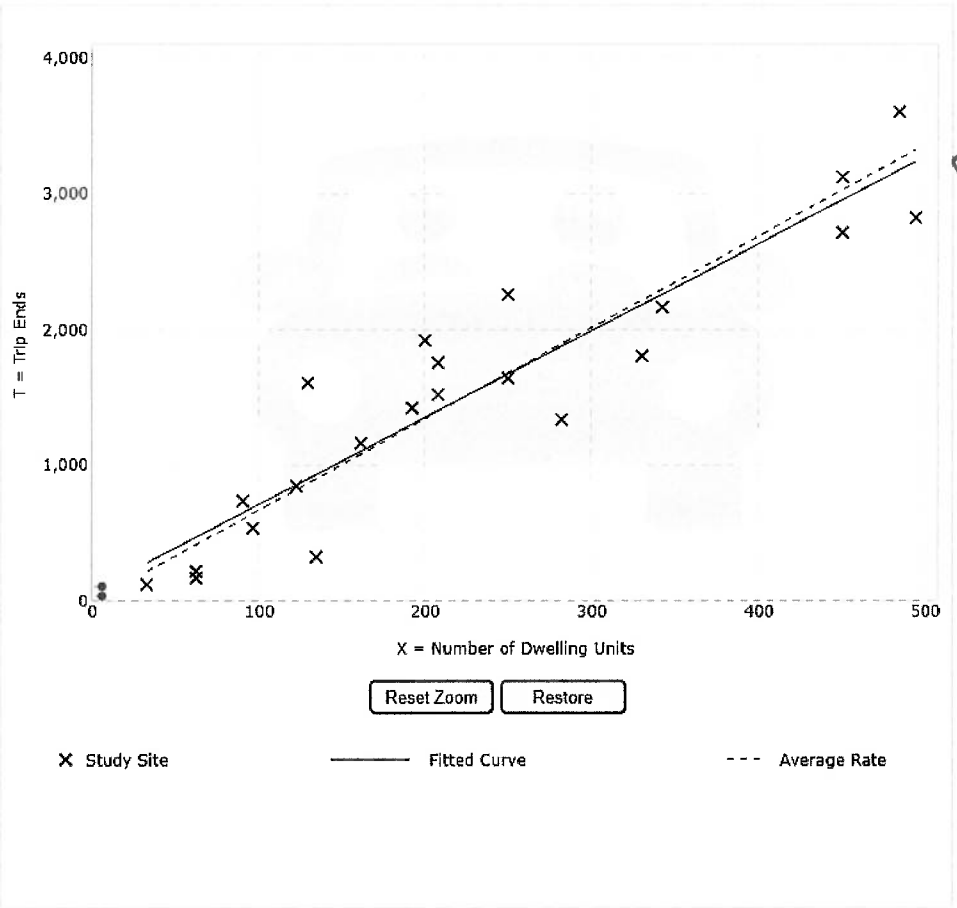
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
6 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. Num. of Dwelling Units:
229

Average Rate:
6.74

Range of Rates:
2.46 - 12.50

Standard Deviation:
1.79

Fitted Curve Equation:
T = 6.41(X) + 75.31

R^2:
0.86

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 40 (Total), 20 (Entry), 20 (Exit)
Fitted Curve: 114 (Total), 57 (Entry), 57 (Exit)

Attachment 5

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

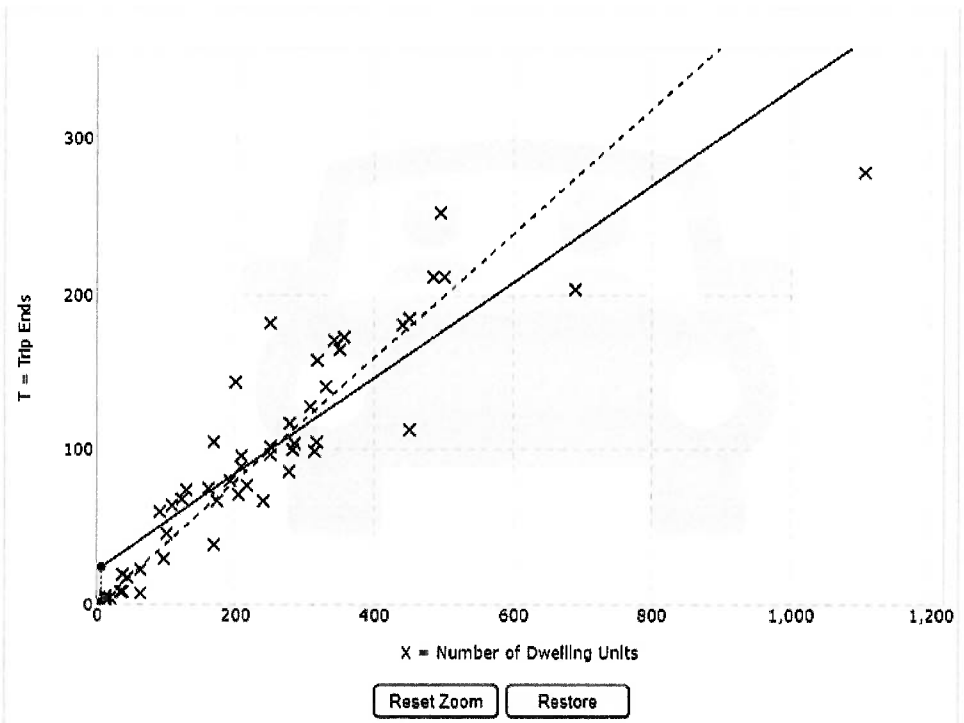
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
6 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
49

Avg. Num. of Dwelling Units:
249

Average Rate:
0.40

Range of Rates:
0.13 - 0.73

Standard Deviation:
0.12

Fitted Curve Equation:
T = 0.31(X) + 22.85

R^2:
0.79

Directional Distribution:
24% entering, 76% exiting

Calculated Trip Ends:
Average Rate: 2 (Total), 0 (Entry), 2 (Exit)
Fitted Curve: 25 (Total), 6 (Entry), 19 (Exit)

Attachment 6

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CO Trip Generation Manual, 11th Ed
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

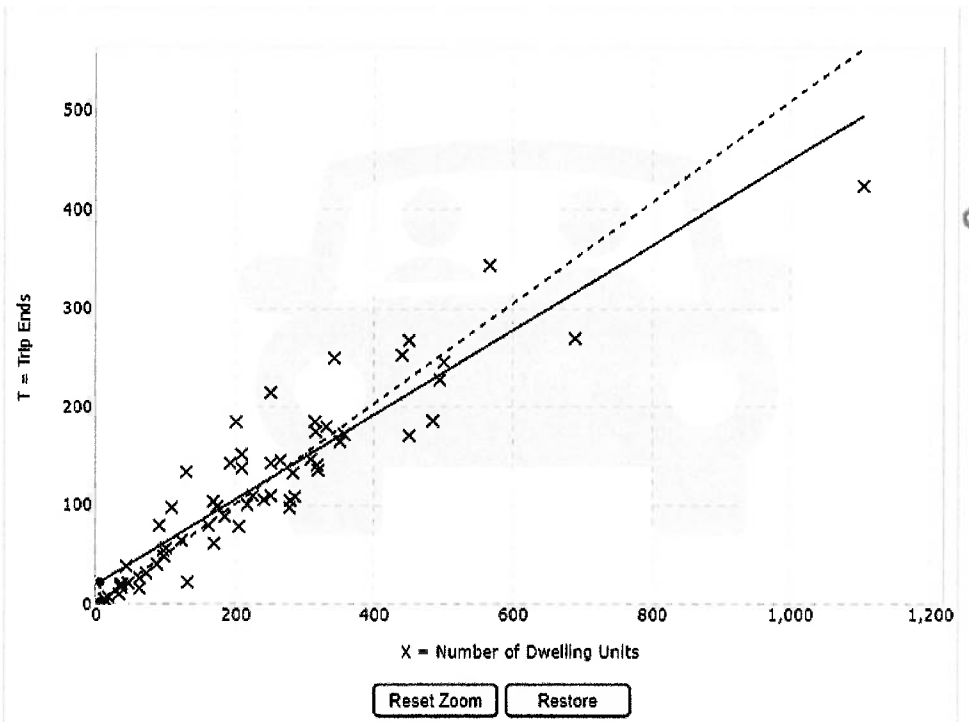
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
6 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
59

Avg. Num. of Dwelling Units:
241

Average Rate:
0.51

Range of Rates:
0.08 - 1.04

Standard Deviation:
0.15

Fitted Curve Equation:
T = 0.43(X) + 20.55

R^2:
0.84

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 3 (Total), 2 (Entry), 1 (Exit)
Fitted Curve: 23 (Total), 14 (Entry), 9 (Exit)

Attachment 7

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

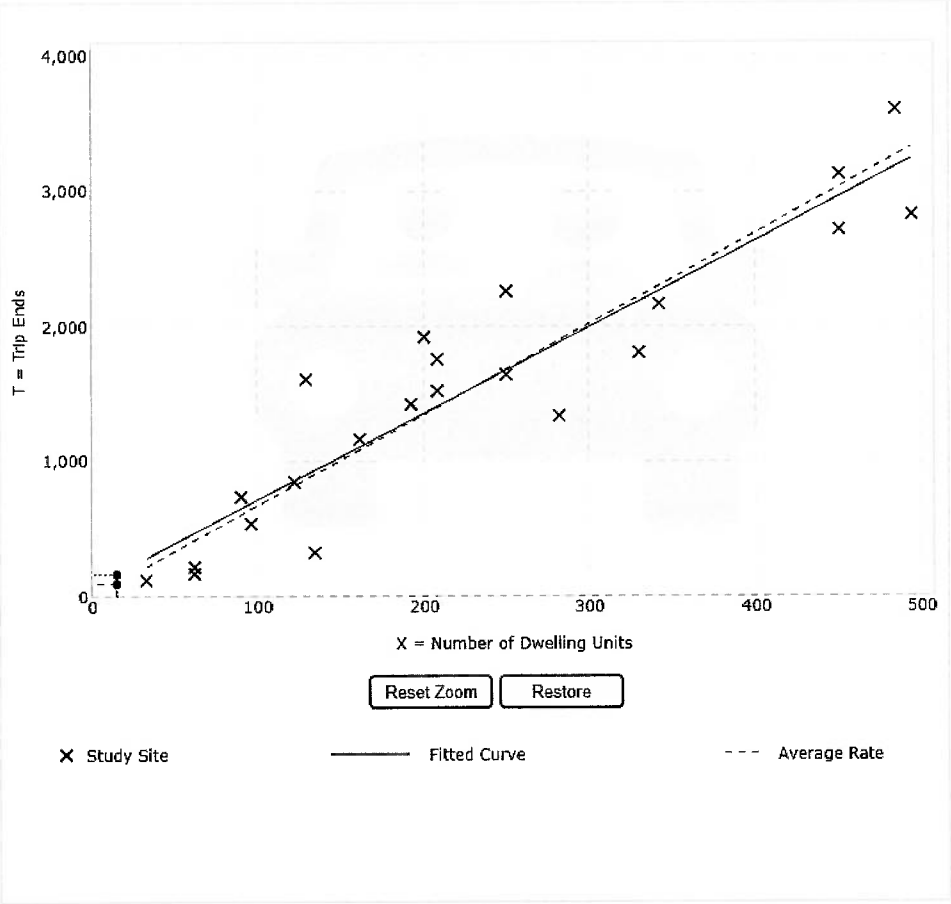
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
15 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. Num. of Dwelling Units:
229

Average Rate:
6.74

Range of Rates:
2.46 - 12.50

Standard Deviation:
1.79

Fitted Curve Equation:
T = 6.41(X) + 75.31

R^2:
0.86

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 101 (Total), 50 (Entry), 51 (Exit)
Fitted Curve: 171 (Total), 85 (Entry), 86 (Exit)

Attachment 8

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

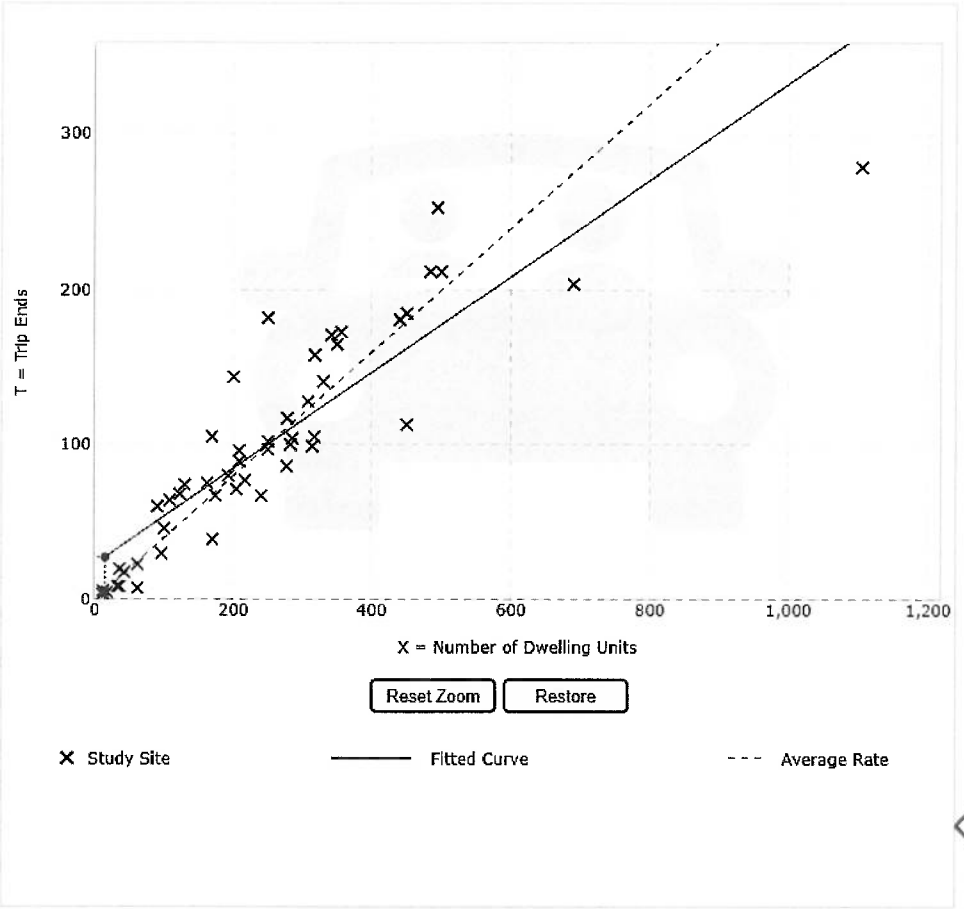
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
15 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
49

Avg. Num. of Dwelling Units:
249

Average Rate:
0.40

Range of Rates:
0.13 - 0.73

Standard Deviation:
0.12

Fitted Curve Equation:
$T = 0.31(X) + 22.85$

R^2:
0.79

Directional Distribution:
24% entering, 76% exiting

Calculated Trip Ends:
Average Rate: 6 (Total), 1 (Entry), 5 (Exit)
Fitted Curve: 28 (Total), 7 (Entry), 21 (Exit)

Attachment 9

ITETripGen Web-based App

Help | Stephen Pernaw

Graph Look Up

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
220

LAND USE GROUP:
(200-299) Residential

LAND USE :
220 - Multifamily Housing (Low-Rise)

LAND USE SUBCATEGORY:
Not Close to Rail Transit

SETTING/LOCATION:
General Urban/Suburban

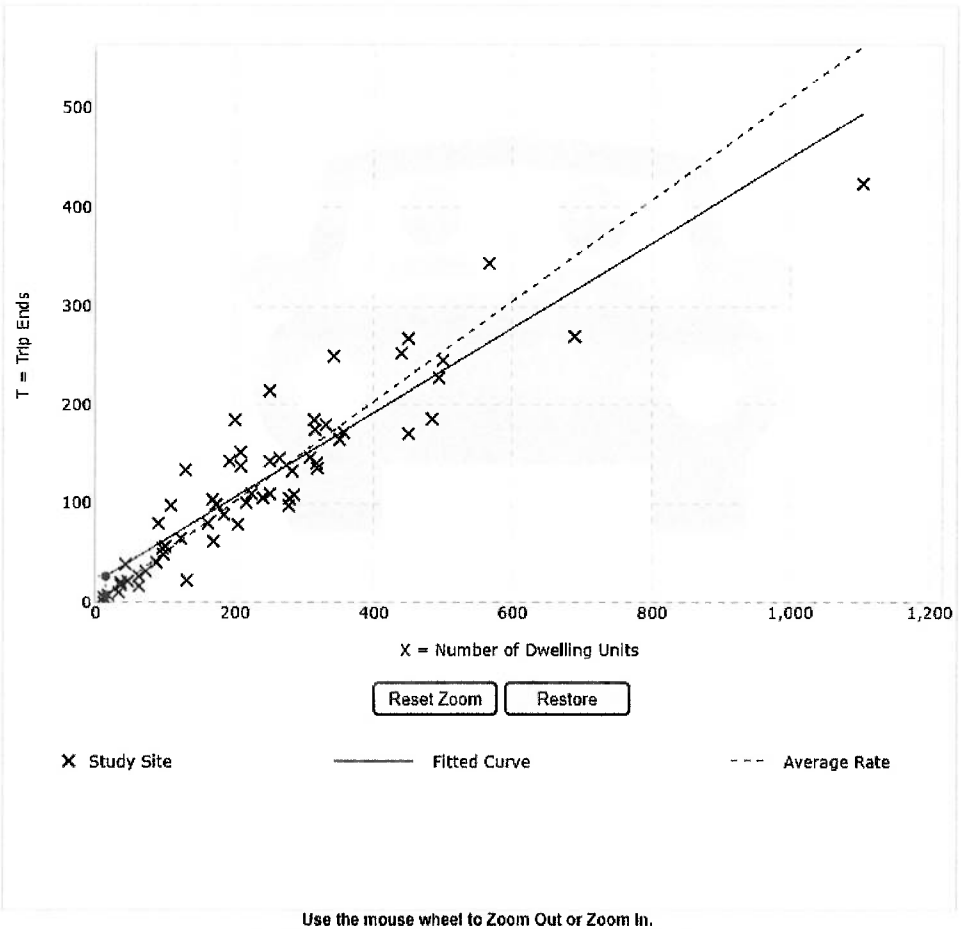
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
15 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Multifamily Housing (Low-Rise) - Not Close to Rail Transit (220) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
59

Avg. Num. of Dwelling Units:
241

Average Rate:
0.51

Range of Rates:
0.08 - 1.04

Standard Deviation:
0.15

Fitted Curve Equation:
T = 0.43(X) + 20.55

R^2:
0.84

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 8 (Total), 5 (Entry), 3 (Exit)
Fitted Curve: 27 (Total), 17 (Entry), 10 (Exit)

Attachment 10

Graph Look Up

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
712

LAND USE GROUP:
(700-799) Office

LAND USE :
712 - Small Office Building

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

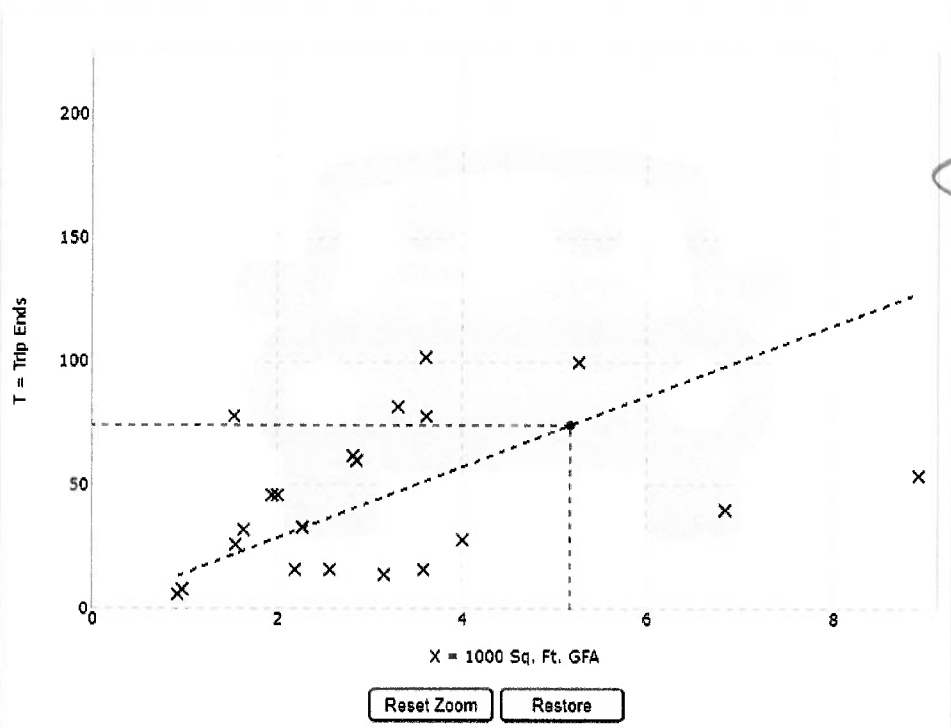
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
5.17 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Small Office Building (712) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
21

Avg. 1000 Sq. Ft. GFA:
3

Average Rate:
14.39

Range of Rates:
4.44 - 50.91

Standard Deviation:
10.16

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 74 (Total), 37 (Entry), 37 (Exit)

Attachment 11

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
712

LAND USE GROUP:
(700-799) Office

LAND USE :
712 - Small Office Building

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

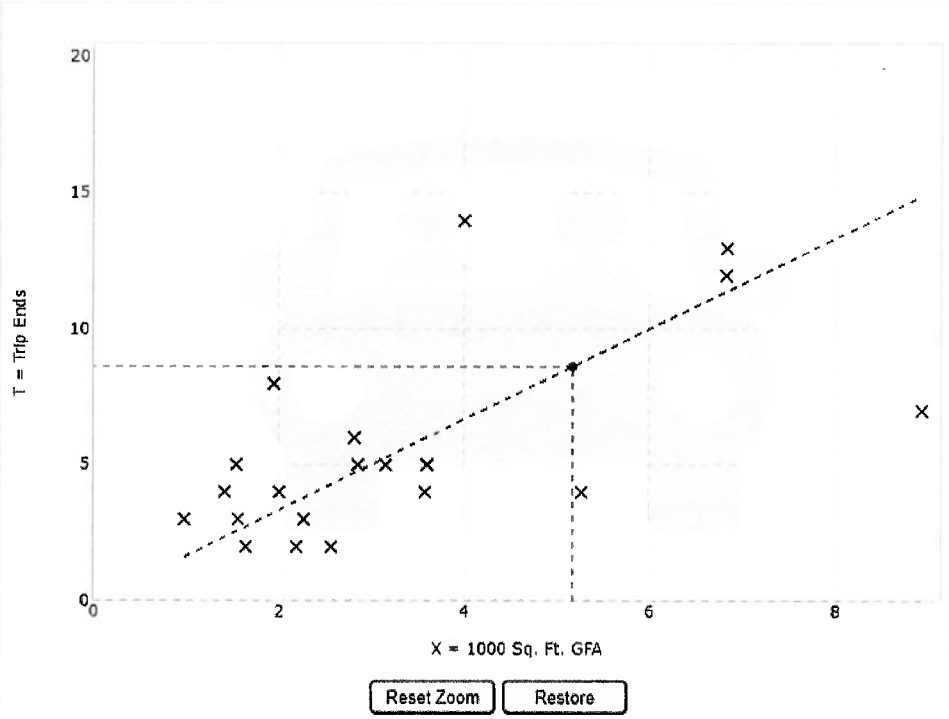
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
5.17 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Small Office Building (712) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
21

Avg. 1000 Sq. Ft. GFA:
3

Average Rate:
1.67

Range of Rates:
0.76 - 4.12

Standard Deviation:
0.89

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
82% entering, 18% exiting

Calculated Trip Ends:
Average Rate: 9 (Total), 7 (Entry), 2 (Exit)

Attachment 12

ITETripGen Web-based App

Help | Stephen Pernaw

Graph Look Up

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
712

LAND USE GROUP:
(700-799) Office

LAND USE :
712 - Small Office Building

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

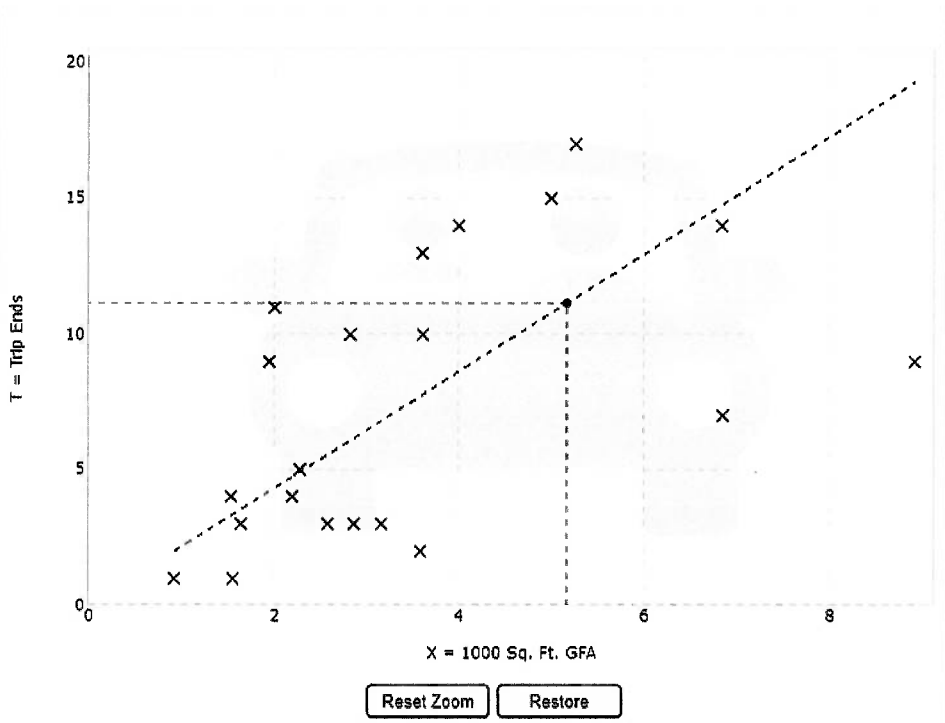
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
5.17 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Small Office Building (712) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
~~Peak Hour of Adjacent Street Traffic~~
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
21

Avg. 1000 Sq. Ft. GFA:
3

Average Rate:
2.16

Range of Rates:
0.56 - 5.50

Standard Deviation:
1.26

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
34% entering, 66% exiting

Calculated Trip Ends:
Average Rate: 11 (Total), 4 (Entry), 7 (Exit)

Attachment 13

Phillips Exeter Academy

High Street Faculty Neighborhood Development

35 High Street, 8 Gilman Lane, & 10 Gilman Lane

Tax Map 71, Lots 117-119

DRAINAGE REPORT

February 2022

Prepared By:

ALTUS ENGINEERING, INC.

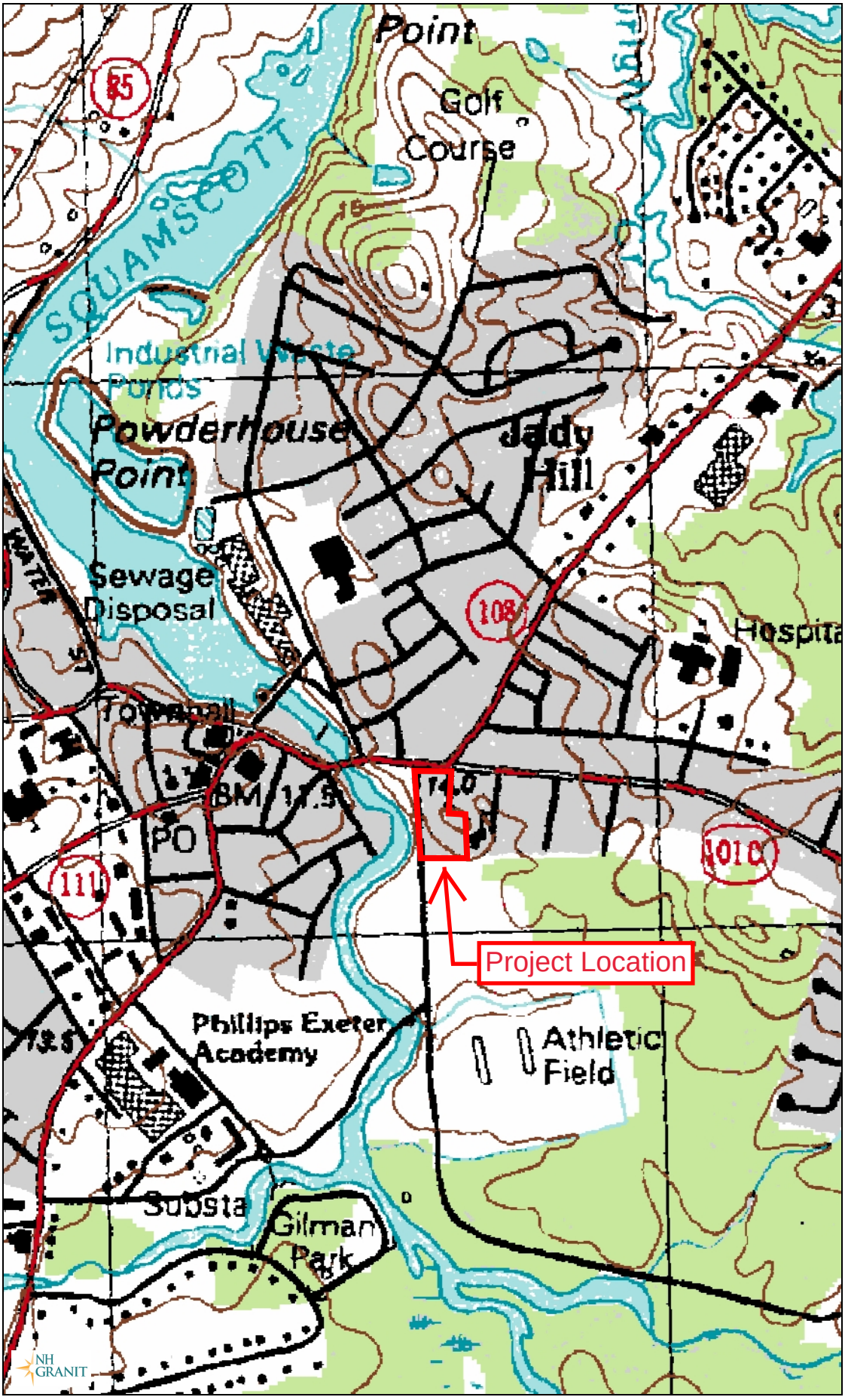
133 COURT STREET PORTSMOUTH, NH 03801
(603) 433-2335 www.ALTUS-ENG.com

High Street Faculty Neighborhood Development
35 High Street, 8 Gilman Lane, & 10 Gilman Lane
(Tax Map 71, Lots 117-119)

TABLE OF CONTENTS

Submitted in this Drainage Report:

Phillips Exeter Academy
High Street Faculty Housing Project



Legend

- State
- County
- City/Town
- 1893

Map Scale

1: 10,000

Map Generated: 11/3/2021

Notes

SECTION 2

PROJECT NARRATIVE

PHILLIPS EXETER ACADEMY
HIGH STREET FACULTY NEIGHBORHOOD DEVELOPMENT

35 High Street, 8 Gilman Lane, & 10 Gilman Lane
(Tax Maps 71, Lots 117-119)
Exeter, NH

Site Overview

Phillips Exeter Academy (Academy) is proposing to construct a new faculty neighborhood development at the intersection of Gilman Lane and High Street, in Exeter NH. The project consists of the construction of new faculty housing consisting of three single family residences and five two-family buildings. The current site has eight existing faculty units, so the project will add five more units to the site for a total of 13 units on the site. The existing #8 Gilman Lane house will be removed as well as a portion of the building at #35 High Street. The existing Gilman Lane access to High Street, which is located 150 feet west of the Portsmouth Ave Traffic signal will be closed and Gilman Lane will be re-routed to the signal at the intersection of High Street and Portsmouth Avenue, where there is an existing signal for #35 High Street.

Site improvements include driveway improvements for Gilman Lane and emergency vehicle access, walkway improvements, landscaping, patios for outdoor gathering spaces, utilities, and stormwater improvements. The existing site was constructed prior to many of the current regulations and was developed into the buffer. The site is a pre-developed site and was constructed prior to stormwater regulations, so the proposed site will provide improved water quality discharge to the Exeter River by treating the surface runoff with bio-retention raingardens prior to discharge. The new buildings will be constructed in predominantly pre-developed areas. Two of the new buildings are partially located within the 100-150 foot buffer area, but the total impervious area within the 150 foot buffer will be reduced for the project. The natural vegetated buffer within the 75 foot shoreline area will be preserved.

The existing site was constructed prior to stormwater regulations and does not have treatment on site for the impervious areas draining to the Exeter River. The proposed project will provide pre-treatment through the use of deep sump catch basins and a pre-treatment swale, and treatment will be provided with bio-infiltration (raingarden) for the proposed site improvements. Porous pavers will be used for the residential patio surfaces to meet the intent of Low Impact Development (LID). The development area drains to the Exeter River as referenced by the attached USGS map. The site is located within the Coastal and Great Bay Regional Communities, so the rainfall precipitation results obtained from the Northeast Regional Climate Center (NRCC) have been increased by 15% for the hydrologic analysis. The stormwater management system proposed for the site will reduce peak flows and treat site runoff prior to discharging back to the wetlands and closed drainage system.

Drainage Summary

A complete drainage analysis of the stormwater modeling results is included in the Drainage Analysis section of this report. The following summary table compares "PRE" and "POST" development peak rates of runoff for the analyzed storm events at the Point of Analysis, located downstream from the proposed project at the Exeter River. The same point of analysis was used for both models for comparison. 15% was added to the NRCC Precipitation results for NH Seacoast Communities.

Stormwater Modeling Summary
Peak Q (cfs) for Type III 24-Hour Storm Events

	2-Yr Storm (3.70 inch)	10-Yr Storm (5.65 inch)	25-Yr Storm (7.19 inch)	50-Yr Storm (8.63 inch)
POA #1 (Exeter River)				
Pre-Development	7.38	16.25	21.91	26.69
Post- Development	7.01	16.07	18.90	21.33
Net Change	**-0.37**	**-0.18**	**-3.01**	**-5.36**

As the above table demonstrates, the proposed peak rates of runoff will be decreased from the existing conditions of the site at the analysis points for all analyzed storm events.

Site Soils

A Site Specific Soils Survey was conducted by Gove Environmental Services (GES), Inc, Luke Hurley, New Hampshire Certified Soil Scientist No. 017, in October 2021 to delineate the soils on site. A copy of Site Specific Soils Report is included in the Section 4 of this report and the Site Specific Soils Plan is included in the Project Plans.
GES indicated the presence of the following soil types:

Soil Series	Description	Hydrologic Soil Group
38	Eldridge	HSG C
943	Eldridge – Complex	HSG C
299	Udorthents, Urban Land (Impervious)	HSG D

GES performed two test pits as indicated in the report in the approximate locations of the two proposed stormwater facilities.

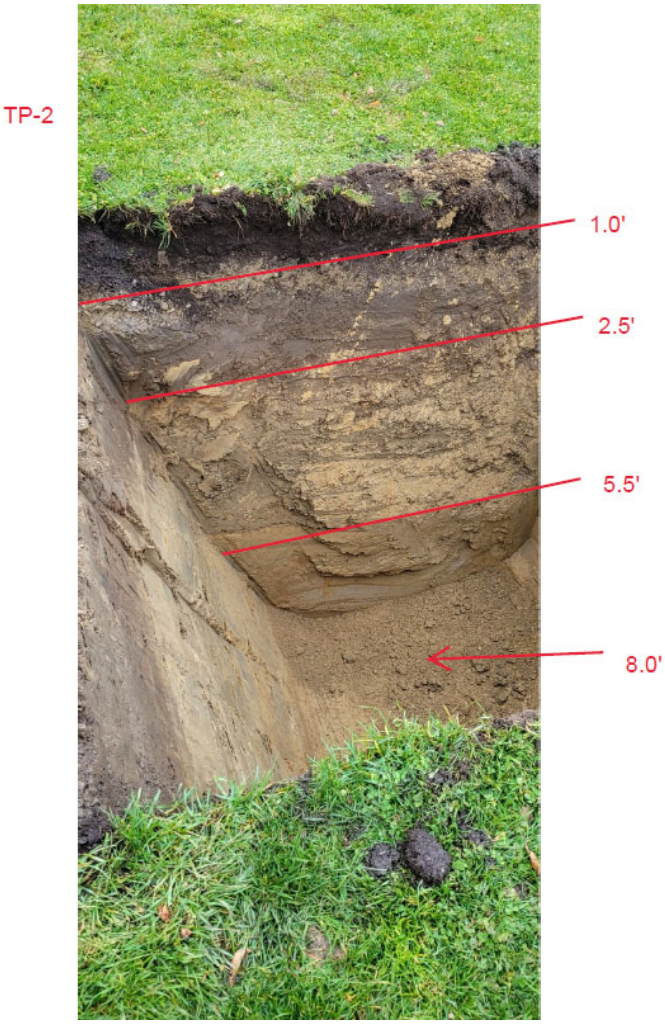
Test Pit #1
0-10" 10YR3/2 FSL, GR, FR
10-30" 2.5Y4/6 FLS, GR, FR
30-40" 2.5Y4/3 FLS/Si, OM, FR Redox 10YR 5/6
ESHWT 30"
Soil type: Eldridge

Test Pit #2
0-8” 10YR3/2 FSL, GR, FR
8-14” 2.5Y4/4 FLS, GR, FR
14-24” 5Y4/3 FLS/Si, OM, Fi, Redox 10YR 5/6
ESHWT 14”
Soil type: Eldridge Variant

SW Cole, the geotechnical engineer for the project also excavated test pits in similar locations to the test pits provide by GES. The pictures below are of the test pits.

Test Pit #1

Test Pit #2



Pre-Development (Existing Conditions)

The pre-development site conditions reflect the current conditions of the site, as depicted on the Pre-Development Watershed Plan. The existing grades and elevations shown on the plans are based on the survey completed by Nitsch Engineering, dated May 2021. The current site consists of three residential buildings (355 High Street, 8 Gilman Lane, and 10 Gilman Lane) and the Granger Observatory. Surface flows from the existing site discharge off the property in three locations and all drain to the Exeter River which is located approximately 300 feet west of the site. The Pre-Development analysis models the existing conditions from the previously developed site. The soil data from the Site Specific Soil Survey (by Gove Environmental Services) was used to the determine the hydrologic soil conditions for the site. The existing conditions survey and soil conditions were used to develop a model of the existing conditions to compare to the post-development conditions.

The study area for this drainage analysis is primarily the 4+/- acre proposed lot for development. Watersheds were developed inside and outside of the lot parcel lines for the analysis as appropriate. The existing watershed reflects the existing site conditions of the previously developed site with no existing stormwater management facilities. All of the surface water eventually discharges to the Exeter River, therefore a single Points of Analysis (POA) was used for comparison of pre to post development conditions.

Site topography, existing features, proposed site improvements, proposed grading, drainage and erosion control measures are shown on the accompanying plans. Recommended erosion control measures are based upon the December 2008 edition of the "New Hampshire Stormwater Manual Volumes I through 3" prepared by NHDES and Comprehensive Environmental, Inc. as amended.

Post-Development (Proposed Site Design)

The proposed project will construct a new faculty neighborhood development that consists of six new residential buildings. The existing #8 Gilman Lane house will be removed as well as a portion of the building at #35 High Street. The existing Gilman Lane access to High Street will be closed and Gilman Lane will be re-routed to the signalized intersection at High Street and Portsmouth Avenue. Site improvements include new buildings, roadway, driveways, walkways, landscaping, patios for outdoor gathering spaces, utilities, and stormwater improvements. The site is predominantly a pre-developed site and was constructed prior to stormwater regulations, so the proposed site will provide improved surface water discharge to the Exeter River by pre-treating the surface runoff and treating with bio-retention raingardens prior to discharge. The natural vegetated buffer within the 50 and 75 foot shoreline setback will be preserved.

The "Post-Development Watershed Plan" illustrates the proposed stormwater management system. The original subcatchments have been divided into numerous smaller areas to emulate the proposed grading and stormwater management system proposed for construction. The post-development conditions were analyzed at the same primary discharge point examined in the pre-development modeling.

Groundwater Recharge Volume

Based on NHDES regulations for groundwater recharge, (Env-Wq 1507.04) the proposed project will replace 0.38 acres of HSG C with impervious coverage. This requires a ground water recharge of 138 cubic feet. The proposed project will infiltrate approximately 1,220 cubic feet of surface runoff to meet this requirement.

Pollutant Removal

Based on the New Hampshire Stormwater Manual (Volume 2), the following pollutant removal rates would be expected from the implementation of the infiltration practices:

Pollutant	Removal %
Total Suspended Solids (TSS)	90%
Total Nitrogen (TN)	65%
Total Phosphorus (TP)	65%

CONCLUSION

This proposed residential development in Exeter, NH will not have an adverse effect on abutting properties and infrastructure as a result of stormwater runoff. The post-construction peak rates of runoff from the site will decrease for all of the modelled storm events (2, 10, 25, and 50 year storms). Appropriate steps will be taken to properly mitigate erosion and sedimentation through the construction of a storm water drainage system consisting of deep-sump catch basins and sediment forebays for pre-treatment, a raingarden and infiltration pond for stormwater treatment, and the use of temporary and permanent Best Management Practices for sediment and erosion control.

CALCULATION METHODS

The drainage study was completed using the USDA SCS TR-20 Method within the HydroCAD Stormwater Modeling System. Reservoir routing was performed with the Dynamic Storage Indication method which automates the calculation of Tailwater conditions. A Type III 24-hour rainfall distribution was utilized in analyzing the data for the 2, 10, 25, and 50 yr 24-hour storm events using rainfall data obtained from the Northeast Regional Climate Center (NRCC) Extreme Precipitation Tables. Northeast Regional Climate Center (NRCC) rainfall numbers have been increased by 15% for the hydrologic analysis for Seacoast Communities per NHDES Alteration of Terrain Guidelines.

Disclaimer

Altus Engineering, Inc. notes that stormwater modeling is limited in its capacity to precisely predict peak rates of runoff and flood elevations. Results should not be considered to represent actual storm events due to the number of variables and assumptions involved in the modeling effort. Surface roughness coefficients (n), entrance loss coefficients (ke), velocity factors (kv) and times of concentration (Tc) are based on subjective field observations and engineering judgment using available data. For design purposes, curve numbers (Cn) describe the average conditions. However, curve numbers will. vary from storm to storm depending on the antecedent runoff conditions (ARC) including saturation and frozen ground. Also, higher water elevations than predicted by modeling could occur if drainage channels, closed drain systems or culverts are not maintained and/or become blocked by debris before and/or during a storm event as this will impact flow capacity of the structures. Structures should be re-evaluated if future changes occur within relevant drainage areas in order to assess any required design modifications.

SECTION 3

National Heritage Bureau Results

Memo

NH Natural Heritage Bureau
NHB DataCheck Results Letter

Please note: portions of this document are confidential.
Maps and NHB record pages are confidential and should be redacted from public documents.

To: Cory Belden, Altus Engineering
133 Court St.
Portsmouth, NH 03801

From: Jessica Bouchard, NH Natural Heritage Bureau
Date: 8/18/2021 (valid until 08/18/2022)
Re: Review by NH Natural Heritage Bureau
Permits: MUNICIPAL POR - Exeter, NHDES - Alteration of Terrain Permit, NHDES - Shoreland Standard Permit, USEPA - Stormwater Pollution Prevention

NHB ID: **NHB21-2651** Town: Exeter Location: 35 High Street
Description: Phillips Exeter Academy is planning to construct a new faculty apartment neighborhood with 10-13 new units on a previously developed site.

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments **NHB: NHB has no concerns if there will be no impacts to the river bed and banks for the proposed project.**
F&G: No Comments At This Time

Plant species	State[1]	Federal	Notes
climbing hempvine (*Mikania scandens*)	E	--	Threats include changes to the hydrology (e.g., water levels) of its habitat and increased sedimentation or nutrients and pollutants in stormwater runoff.
seaside brookweed (*Samolus valerandi ssp. parviflorus*)	E	--	Occurs on river and streambanks, as well as estuarine and seashore habitats. Threats include direct destruction of the plants and major alterations of their habitat.
spongy-leaved arrowhead (*Sagittaria spatulata*)	E	--	Primarily vulnerable to changes to the hydrology of its habitat, especially alterations that change water levels. It may also be susceptible to increased pollutants and nutrients carried in stormwater runoff.

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

Memo

NH Natural Heritage Bureau
NHB DataCheck Results Letter

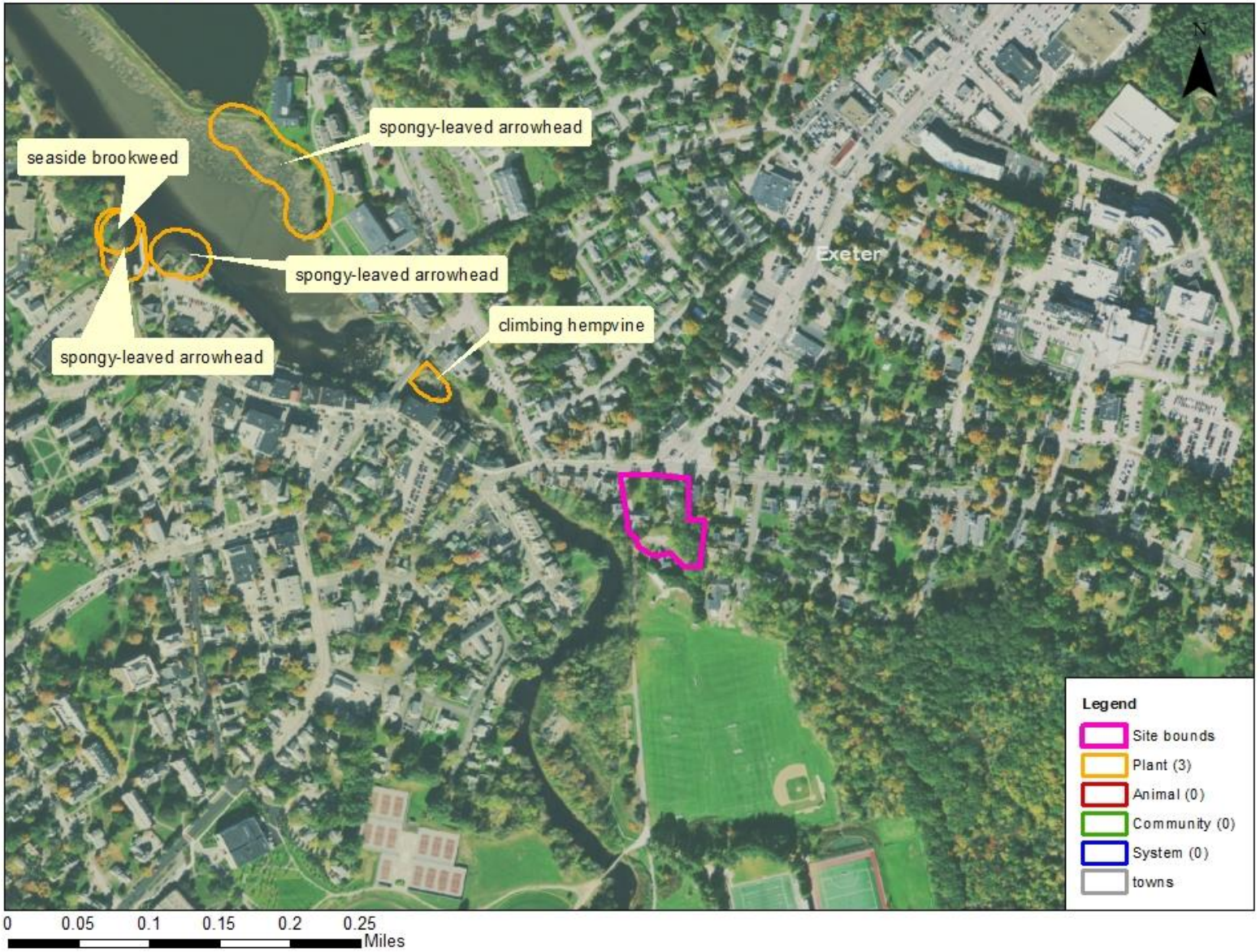
Please note: portions of this document are confidential.
Maps and NHB record pages are confidential and should be redacted from public documents.
information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

CONFIDENTIAL – NH Dept. of Environmental Services review

NHB21-2651



New Hampshire Natural Heritage Bureau - Plant Record

climbing hempvine (*Mikania scandens*)

Legal Status	Conservation Status
Federal: Not listed	Global: Demonstrably widespread, abundant, and secure
State: Listed Endangered	State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2019: More than 100 individuals observed. Occupied approximately 3% cover within 20x40 meter area. 2001: Searched for 40 feet upstream and 150 feet downstream of Great Bridge on Spring Street. Not found. 1984: One large twining clump (present in 1983) and two new small plants. Numerous inflorescences. 1983: A single large clump of healthy, trailing and climbing stems. Numerous clusters of fertile heads. Specimens collected.

General Area: 2019: Vegetated island in Squamscott River. Associated species include silver maple (*Acer saccharinum*), American elm (*Ulmus americana*), red maple (*Acer rubrum*), silky dogwood (*Swida amomum*), reed canary grass (*Phalaris arundinacea*), purple loosestrife (*Lythrum salicaria*), white turtlehead (*Chelone glabra*), yellow iris (*Iris pseudacorus*), spotted touch-me-not (*Impatiens capensis*), robust bluejoint (*Calamagrostis canadensis* var. *canadensis*), and dodder (*Cuscuta* sp.). 1984: Rock outcrop covered in part and surrounded with river mud (silt). 1983: Supported by one boulder near the center of the exposed rocky river bed. Growing with water willow (*Decodon verticillatus*) and water-pepper smartweed (*Persicaria hydropiper*) nearby.

General Comments: --

Management Comments: 1983: Extreme fluctuations of water level (operation of the dam sluice gate) could destroy this colony, as could human activity (such as playing children) in the exposed river bed.

Location

Survey Site Name: Squamscott River at Exeter
Managed By:

County: Rockingham
Town(s): Exeter
Size: .2 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2019: Vegetated island in Squamscott River on east side of String Bridge, Exeter. 1983: Squamscott River bed, below dam and above High Street Bridge (Rte. 101C), [ca. 250 feet downstream of (north of) Rte. 101 bridge].

Dates documented

First reported: 1983-08-25 Last reported: 2019-09-05

New Hampshire Natural Heritage Bureau - Plant Record

seaside brookweed (*Samolus valerandi ssp. parviflorus*)

Legal Status	Conservation Status
Federal: Not listed	Global: Demonstrably widespread, abundant, and secure
State: Listed Endangered	State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2019: More than 100 plants observed.
General Area: 2019: River shore mudflat with little-headed spikesedge (*Eleocharis parvula*), soft-stemmed bulrush (*Schoenoplectus tabernaemontani*), rough-fruited water-hemp (*Amaranthus tuberculatus*), spongy-leaved arrowhead (*Sagittaria spatulata*), and rushes (*Juncus* spp.).
General Comments: --
Management Comments: --

Location

Survey Site Name: Squamscott River at Exeter
Managed By:

County: Rockingham
Town(s): Exeter
Size: .4 acres
Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2019: Western shore of Squamscott River in Exeter, immediately adjacent to Phillips Exeter Academy's boathouse.

Dates documented

First reported: 2019-09-06 Last reported: 2019-09-06

New Hampshire Natural Heritage Bureau - Plant Record

spongy-leaved arrowhead (*Sagittaria spatulata*)

Legal Status	Conservation Status
Federal: Not listed	Global: Apparently secure but with cause for concern
State: Listed Endangered	State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Good quality, condition and landscape context ('B' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2019: Area A: Observed from western shore thorugh binoculars. Areas B and C: 50+ plants in total. 2003: Area A: Very common (hundreds of plants) in several areas.

General Area: 2019: Area C: River shore mudflat with little-headed spikesedge (*Eleocharis parvula*), soft-stemmed bulrush (*Schoenoplectus tabernaemontani*), rough-fruited water-hemp (*Amaranthus tuberculatus*), seaside brookweed (*Samolus valerandi* ssp. *parviflorus*), and rushes (*Juncus* spp.). 2003: Area A: Tidal ***brackish marsh*** with smooth cordgrass (*Spartina alterniflora*), softstem bulrush (*Schoenoplectus tabernaemontani*), and three-square rush (*Schoenoplectus pungens*). In alluvium, with fresh-water cordgrass (*Spartina pectinata*), common arrowhead (*Sagittaria latifolia*), and mild water pepper (*Persicaria hydropiperoides*).

General Comments: --
Management Comments: --

Location

Survey Site Name: Squamscott River at Exeter
Managed By:

County: Rockingham
Town(s): Exeter
Size: 3.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2019: Areas B and C: Shoreline on western shore of Squamscott River, on either side of Phillips Exeter Academy boathouse. 2003: Area A: 250 m south of Jady Hill Ave. along the east shore of the Squamscott River in Exeter.

Dates documented

First reported: 2003-07-25 Last reported: 2019-09-06

SECTION 4

SOILS

- **Site Specific Soils Survey Report (by Gove Environmental Service)**
- **Site Specific Soils Survey Map**


PEA - High St
Faculty Neighborhood Development
Legend
Project Location
High St
High St
Auburn Ave
Hall Pl
Franklin St
Gilman Ln
Gilman Ln
Marlboro St
Google Earth
400 ft
N

SECTION 6

FEMA Flood Mapping

PIN
- Approximate location based on user input and does not represent an authoritative property location

MAP PANELS
- Selected FloodMap Boundary
- Digital Data Available
- No Digital Data Available
- Unmapped

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D
- Otherwise Protected Area
- Coastal Barrier Resource System Area

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth
- Regulatory Floodway Zone AE, AO, AH, VE, AR

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

SCALE

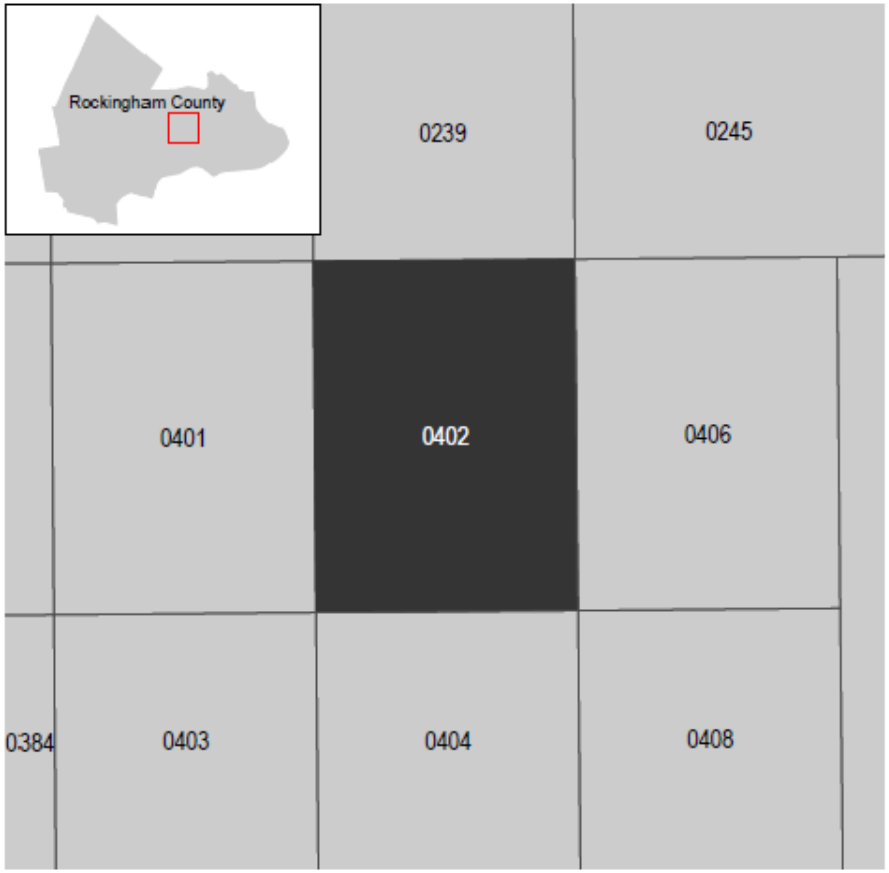
Map Projection:
State Plane New Hampshire FIPS 2800 Feet; North American Datum 1983;
Western Hemisphere; Vertical Datum: NGVD 29

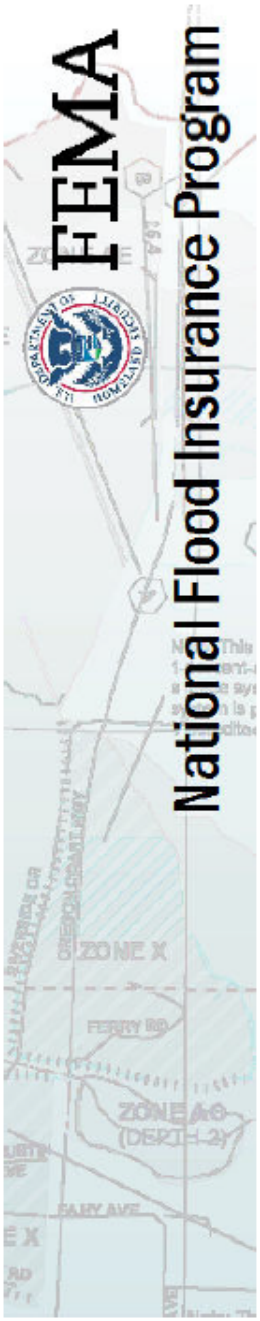
1 inch = 500 feet 1:6,000

0 500 1,000 2,000 feet

0 150 300 600 meters

PANEL LOCATOR





NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

ROCKINGHAM COUNTY, NEW HAMPSHIRE
(All Jurisdictions)

PANEL 402 OF 681

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER, TOWN OF	330130	0402	E
STRATHAM, TOWN OF	330197	0402	E

REVISED TO
REFLECT LOMR
EFFECTIVE: November 5, 2018

VERSION NUMBER
2.1.3.0

MAP NUMBER
33015C0402E

EFFECTIVE DATE
MAY 17, 2005

SECTIONS 7-9

7. Groundwater Recharge Volume
8. BMP Worksheets
9. RipRap/Plunge Pool Calculations

Groundwater Recharge Volume (GRV) Calculation

-	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
-	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
0.38	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
-	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.10	inches	Rd = weighted groundwater recharge depth	
0.038	ac-in	GRV = AI * Rd	
138	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12")	

Provide calculations below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):

New impervious areas include: Buildings, Houses, Driveways, roadways, parking lots and sidewalks.

For modeled Area:

Pre-Development Impervious Areas = 0.74 Acres

Post-Develoment Impervious Areas = 1.12 Acres

138 cf required

HydroCAD Pond RG1 = 0.024 ac-ft discarded = 1,045 CF discarded through infiltration

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.07)

Type/Node Name: **Node RG1: Raingarden 1**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable

Yes		Have you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.07(a)?	
0.25	ac	A = Area draining to the practice	
0.07	ac	A_I = Impervious area draining to the practice	
0.28	decimal	I = percent impervious area draining to the practice, in decimal form	
0.31	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.08	ac-in	WQV= 1" x Rv x A	
273	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
68	cf	25% x WQV (check calc for sediment forebay volume)	
205	cf	75% x WQV (check calc for surface sand filter volume)	
NR-Roof Only		Method of Pretreatment? (not required for clean or roof runoff)	
N/A	cf	V_{SED} = sediment forebay volume, if used for pretreatment	← ≥ 25%WQV
300	sf	A_{SA} = surface area of the practice	
0.06	iph	$Ksat_{DESIGN}$ = design infiltration rate[1]	
Yes	Yes/No	If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?	
182.2	hours	T_{DRAIN} = drain time = V / (A_{SA} * I_{DESIGN})	← ≤ 72-hrs
41.00	feet	E_{FC} = elevation of the bottom of the filter course material[2]	
	feet	E_{UD} = invert elevation of the underdrain (UD), if applicable	
40.50	feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
38.00	feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
41.00	feet	$D_{FC\ to\ UD}$ = depth to UD from the bottom of the filter course	← ≥ 1'
3.00	feet	$D_{FC\ to\ ROCK}$ = depth to bedrock from the bottom of the filter course	← ≥ 1'
0.50	feet	$D_{FC\ to\ SHWT}$ = depth to SHWT from the bottom of the filter course	← ≥ 1'
43.38	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
43.50	ft	Elevation of the top of the practice	
YES		50 peak elevation ≤ Elevation of the top of the practice	← yes

If a surface sand filter or underground sand filter is proposed:

YES	ac	Drainage Area check.	← < 10 ac
	cf	V = volume of storage[3] (attach a stage-storage table)	← ≥ 75%WQV
	inches	D_{FC} = filter course thickness	← 18", or 24" if within GPA
Sheet		Note what sheet in the plan set contains the filter course specification	
	Yes/No	Access grate provided?	← yes

If a bioretention area is proposed:

YES	ac	Drainage Area no larger than 5 ac?	← **yes**
440	cf	V = volume of storage[3] (attach a stage-storage table)	← **≥ WQV**
18.0	inches	D_{FC} = filter course thickness	← **18", or 24" if within GPA**
Sheet	C5.7	Note what sheet in the plan set contains the filter course specification	
4.0	:1	Pond side slopes	← **≥3:1**
Sheet	L1.01	Note what sheet in the plan set contains the planting plans and surface cover	

If porous pavement is proposed:

		Type of pavement proposed (concrete? Asphalt? Pavers? Etc)	
	acres	A_{SA} = surface area of the pervious pavement	
#DIV/0!	:1	ratio of the contributing area to the pervious surface area	← **5:1**
	inches	D_{FC} = filter course thickness	← **12", or 18" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course spec.	← **304.1 sand**

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

Note:
Underdrains are provided.
Exfiltration is only used to the bottom of filter media

Stage-Area-Storage for Pond RG1: Raingarden 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
39.75	375	0
39.80	375	7
39.85	375	15
39.90	375	22
39.95	375	30
40.00	375	38
40.05	375	45
40.10	375	53
40.15	375	60
40.20	375	68
40.25	375	75
40.30	375	82
40.35	375	90
40.40	375	97
40.45	375	105
40.50	375	113
40.55	375	120
40.60	375	128
40.65	375	135
40.70	375	143
40.75	375	150
40.80	375	156
40.85	375	162
40.90	375	169
40.95	375	175
41.00	375	181
41.05	375	182
41.10	375	183
41.15	375	184
41.20	375	185
41.25	375	186
41.30	375	187
41.35	375	188
41.40	375	188
41.45	375	189
41.50	375	190
41.55	375	191
41.60	375	192
41.65	375	193
41.70	375	194
41.75	375	195
41.80	375	196
41.85	375	197
41.90	375	198
41.95	375	199
42.00	375	200
42.05	375	201
42.10	375	202
42.15	375	202
42.20	375	203
42.25	375	204
42.30	375	205
42.35	375	206
42.40	375	207
42.45	375	208
42.50	375	209
42.55	392	228
42.60	410	248
42.65	427	269
42.70	445	291
42.75	463	314
42.80	480	337
42.85	498	362
42.90	515	387
42.95	533	413
43.00	550	440
43.05	567	468
43.10	585	497
43.15	602	527
43.20	620	557
43.25	638	589
43.30	655	621
43.35	673	654
43.40	690	688
43.45	708	723
43.50	725	759
43.55	1,152	806
43.60	1,580	874
43.65	2,007	964
43.70	2,435	1,075
43.75	2,863	1,208
43.80	3,290	1,361
43.85	3,718	1,537
43.90	4,145	1,733
43.95	4,573	1,951
44.00	**5,000**	**2,190**

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.07)

Type/Node Name: **Node RG2: Raingarden 2**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable

Yes		Have you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.07(a)?	
2.46	ac	A = Area draining to the practice	
0.95	ac	A_I = Impervious area draining to the practice	
0.39	decimal	I = percent impervious area draining to the practice, in decimal form	
0.40	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.98	ac-in	WQV= 1" x Rv x A	
3,550	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
887	cf	25% x WQV (check calc for sediment forebay volume)	
2,662	cf	75% x WQV (check calc for surface sand filter volume)	
NR-Roof Only		Method of Pretreatment? (not required for clean or roof runoff)	
N/A	cf	V_{SED} = sediment forebay volume, if used for pretreatment	← ≥ 25%WQV
2,000	sf	A_{SA} = surface area of the practice	
1.00	iph	$Ksat_{DESIGN}$ = design infiltration rate[1]	
Yes	Yes/No	If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?	
21.3	hours	T_{DRAIN} = drain time = V / (A_{SA} * I_{DESIGN})	← ≤ 72-hrs
26.75	feet	E_{FC} = elevation of the bottom of the filter course material[2]	
25.50	feet	E_{UD} = invert elevation of the underdrain (UD), if applicable	
25.75	feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
21.00	feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
1.25	feet	$D_{FC\ to\ UD}$ = depth to UD from the bottom of the filter course	← ≥ 1'
5.75	feet	$D_{FC\ to\ ROCK}$ = depth to bedrock from the bottom of the filter course	← ≥ 1'
1.00	feet	$D_{FC\ to\ SHWT}$ = depth to SHWT from the bottom of the filter course	← ≥ 1'
30.67	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
31.00	ft	Elevation of the top of the practice	
YES		50 peak elevation ≤ Elevation of the top of the practice	← yes

If a surface sand filter or underground sand filter is proposed:

YES	ac	Drainage Area check.	← < 10 ac
	cf	V = volume of storage[3] (attach a stage-storage table)	← ≥ 75%WQV
	inches	D_{FC} = filter course thickness	← 18", or 24" if within GPA
Sheet		Note what sheet in the plan set contains the filter course specification	
	Yes/No	Access grate provided?	← yes

If a bioretention area is proposed:

YES	ac	Drainage Area no larger than 5 ac?	← **yes**
4,545	cf	V = volume of storage[3] (attach a stage-storage table)	← **≥ WQV**
18.0	inches	D_{FC} = filter course thickness	← **18", or 24" if within GPA**
Sheet	C5.7	Note what sheet in the plan set contains the filter course specification	
3.0	:1	Pond side slopes	← **≥3:1**
Sheet	L1.01	Note what sheet in the plan set contains the planting plans and surface cover	

If porous pavement is proposed:

		Type of pavement proposed (concrete? Asphalt? Pavers? Etc)	
	acres	A_{SA} = surface area of the pervious pavement	
#DIV/0!	:1	ratio of the contributing area to the pervious surface area	← **5:1**
	inches	D_{FC} = filter course thickness	← **12", or 18" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course spec.	← **304.1 sand**

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

Note:
Raingarden #1 drains to Raingarden #2 (treated runoff)
Exfiltration is not used for the design.
Underdrains are provided

Stage-Area-Storage for Pond RG2: Raingarden 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
25.50	2,200	0
25.60	2,200	88
25.70	2,200	176
25.80	2,200	264
25.90	2,200	352
26.00	2,200	440
26.10	2,200	528
26.20	2,200	616
26.30	2,200	704
26.40	2,200	792
26.50	2,200	880
26.60	2,200	953
26.70	2,200	1,025
26.80	2,200	1,067
26.90	2,200	1,078
27.00	2,200	1,089
27.10	2,200	1,100
27.20	2,200	1,111
27.30	2,200	1,122
27.40	2,200	1,133
27.50	2,200	1,144
27.60	2,200	1,155
27.70	2,200	1,166
27.80	2,200	1,177
27.90	2,200	1,188
28.00	2,200	1,199
28.10	2,200	1,210
28.20	2,200	1,221
28.30	2,236	1,337
28.40	2,309	1,565
28.50	2,382	1,799
28.60	2,455	2,041
28.70	2,527	2,290
28.80	2,600	2,547
28.90	2,673	2,810
29.00	2,745	3,081
29.10	2,818	3,359
29.20	2,891	3,645
29.30	2,964	3,937
29.40	3,036	4,237
29.50	3,109	4,545
29.60	3,182	4,859
29.70	3,255	5,181
29.80	3,327	5,510
29.90	3,400	5,846
30.00	3,473	6,190
30.10	3,545	6,541
30.20	3,618	6,899
30.30	3,691	7,265
30.40	3,764	7,637
30.50	3,836	8,017
30.60	3,909	8,405
30.70	3,982	8,799
30.80	4,055	9,201
30.90	4,127	9,610
31.00	**4,200**	**10,027**

OUTLET PROTECTION

FOR A PIPE FLOWING FULL WITH LOW TAILWATER

RIPRAP SIZE - D50 (inches)

PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	4											
5cfs	4											
8cfs	5	4										
10cfs	6	5	4									
12cfs	8	6	6									
15cfs	8	6	8	5								
17cfs		8	8	5								
20cfs		10	10	6	5							
25cfs		12	12	6	6							
30cfs				8	8	6						
40cfs				12	10	8	6					
50cfs				16	12	10	8	6				
60cfs				18	16	12	10	8				
70cfs					18	15	12	8				
80cfs					20	16	15	10	8			
90cfs						18	16	12	10			
100cfs						20	18	12	10			
125cfs						24	20	16	12	10		
150cfs							24	20	16	12	10	
200cfs								24	20	18	15	12

PP#1 = 9.0 cfs

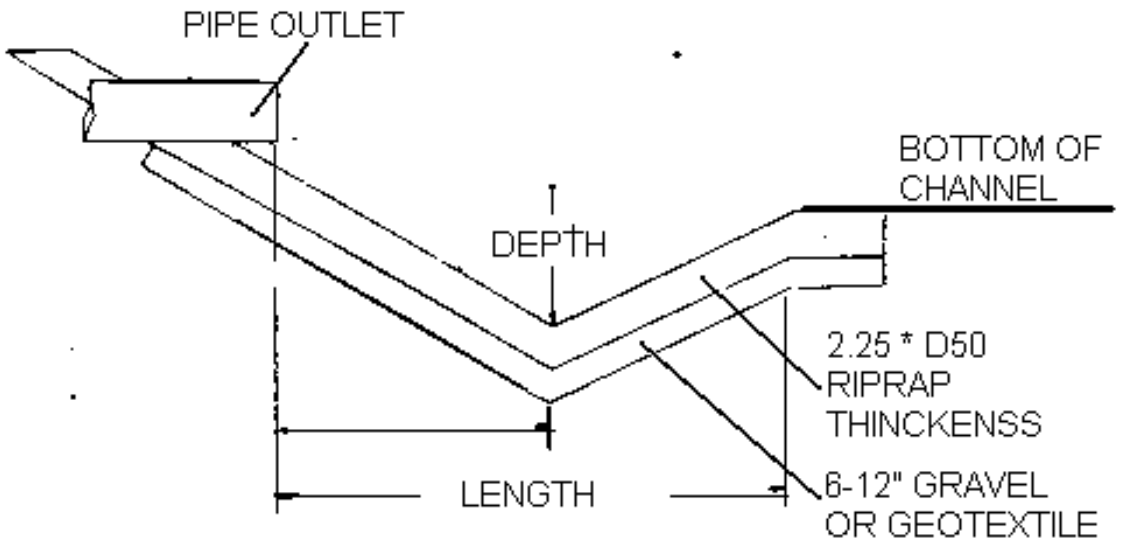
PP#2 = 13.3 cfs

MINIMUM LENGTH OF APRON (FEET)

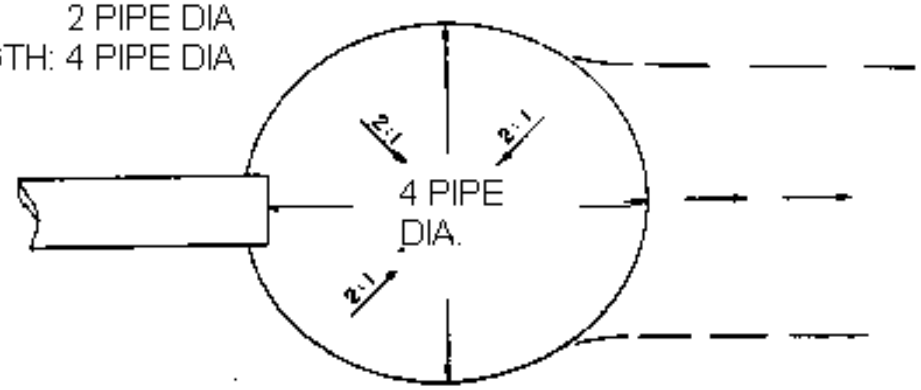
PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	8											
5cfs	8											
8cfs	11	10										
10cfs	14	12	10									
15cfs	18	16	14	12								
20cfs		18	18	16	12							
30cfs			22	20	18	16						
40cfs			26	24	24	20	18					
50cfs				26	26	24	22	18				
70cfs					30	30	28	25				
100cfs						36	36	33	27			
150cfs						42	42	42	38	33	28	
200cfs								48	45	42	37	32

From USDA Soild Conservation Service



PLUNGE POOL
DEPTH: 1 PIPE DIA
SIDE: 2 PIPE DIA
LENGTH: 4 PIPE DIA



OUTLET PLUNGE POOL

SECTION 10

DRAINAGE ANALYSIS

- **Extreme Precipitation Tables**
- **Pre Development Modeling Results**
- **Post Development Modeling Results**

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	70.942 degrees West
Latitude	42.981 degrees North
Elevation	0 feet
Date/Time	Mon, 31 Jan 2022 22:12:52 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.66	0.82	1.04	**1yr**	0.71	0.99	1.22	1.57	2.05	2.68	2.90	**1yr**	2.37	2.79	3.21	3.91	4.54	**1yr**
2yr	0.32	0.50	0.62	0.82	1.03	1.30	**2yr**	0.89	1.18	1.52	1.94	2.49	3.22	3.57	**2yr**	2.85	3.43	3.94	4.68	5.33	**2yr**
5yr	0.38	0.58	0.73	0.98	1.26	1.62	**5yr**	1.08	1.47	1.90	2.45	3.16	4.09	4.59	**5yr**	3.62	4.41	5.05	5.97	6.75	**5yr**
10yr	0.42	0.66	0.83	1.13	1.46	1.91	**10yr**	1.26	1.73	2.25	2.92	3.78	4.91	5.56	**10yr**	4.34	5.34	6.09	7.19	8.07	**10yr**
25yr	0.49	0.77	0.98	1.35	1.80	2.37	**25yr**	1.55	2.16	2.81	3.68	4.80	6.25	7.15	**25yr**	5.53	6.88	7.80	9.19	10.22	**25yr**
50yr	0.55	0.87	1.12	1.56	2.11	2.80	**50yr**	1.82	2.55	3.34	4.39	5.75	7.50	8.67	**50yr**	6.64	8.33	9.42	11.08	12.24	**50yr**
100yr	0.61	0.99	1.27	1.81	2.47	3.32	**100yr**	2.13	3.01	3.98	5.25	6.89	9.00	10.50	**100yr**	7.97	10.10	11.37	13.36	14.66	**100yr**
200yr	0.69	1.13	1.46	2.09	2.89	3.92	**200yr**	2.49	3.56	4.72	6.26	8.25	10.82	12.72	**200yr**	9.57	12.23	13.72	16.11	17.57	**200yr**
500yr	0.82	1.35	1.76	2.55	3.57	4.89	**500yr**	3.08	4.44	5.91	7.90	10.47	13.79	16.41	**500yr**	12.21	15.78	17.61	20.66	22.33	**500yr**

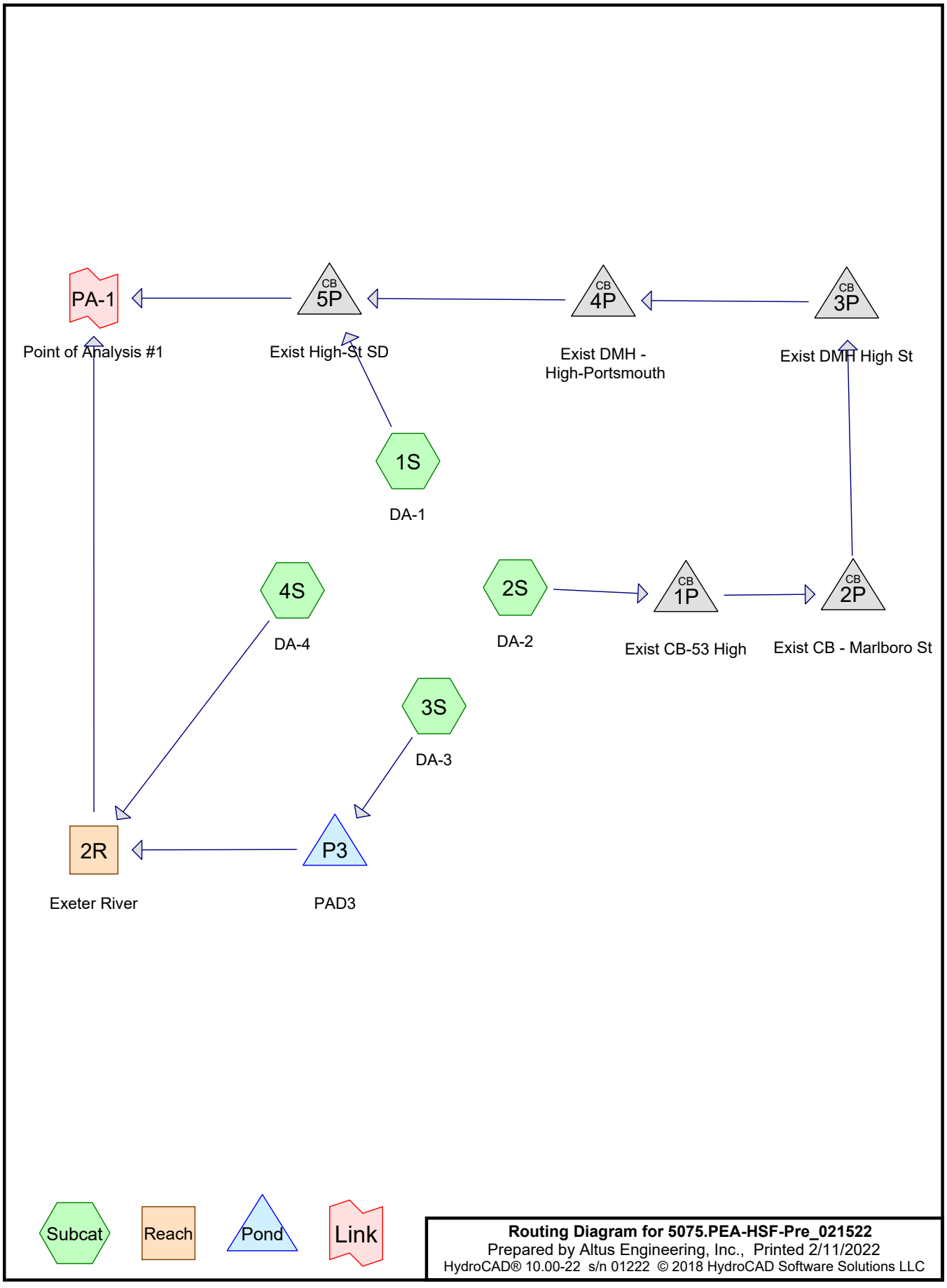
Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.61	0.75	0.89	**1yr**	0.64	0.87	0.95	1.25	1.54	2.29	2.54	**1yr**	2.03	2.44	2.89	3.43	4.02	**1yr**
2yr	0.32	0.49	0.60	0.82	1.01	1.19	**2yr**	0.87	1.17	1.37	1.82	2.33	3.11	3.49	**2yr**	2.75	3.36	3.85	4.56	5.14	**2yr**
5yr	0.36	0.55	0.68	0.94	1.19	1.42	**5yr**	1.03	1.39	1.62	2.12	2.73	3.81	4.26	**5yr**	3.38	4.10	4.70	5.62	6.31	**5yr**
10yr	0.40	0.61	0.75	1.05	1.36	1.63	**10yr**	1.17	1.59	1.82	2.40	3.07	4.39	4.95	**10yr**	3.89	4.76	5.46	6.53	7.26	**10yr**
25yr	0.46	0.69	0.86	1.23	1.62	1.95	**25yr**	1.40	1.91	2.12	2.78	3.58	4.94	6.02	**25yr**	4.37	5.78	6.64	7.96	8.89	**25yr**
50yr	0.51	0.77	0.96	1.38	1.85	2.25	**50yr**	1.60	2.20	2.37	3.12	4.01	5.59	6.96	**50yr**	4.95	6.69	7.69	9.26	10.28	**50yr**
100yr	0.57	0.86	1.08	1.55	2.13	2.58	**100yr**	1.84	2.52	2.65	3.48	4.48	6.30	8.04	**100yr**	5.58	7.73	8.90	10.75	11.84	**100yr**
200yr	0.64	0.96	1.21	1.76	2.45	2.96	**200yr**	2.11	2.89	2.95	3.88	5.00	7.08	9.69	**200yr**	6.27	9.32	10.31	12.47	13.68	**200yr**
500yr	0.75	1.11	1.43	2.08	2.96	3.58	**500yr**	2.55	3.50	3.42	4.48	5.81	8.22	11.85	**500yr**	7.27	11.39	12.52	15.14	16.51	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.44	0.54	0.72	0.89	1.08	**1yr**	0.76	1.06	1.26	1.71	2.17	2.96	3.12	**1yr**	2.62	3.00	3.56	4.28	4.98	**1yr**
2yr	0.33	0.51	0.63	0.86	1.06	1.26	**2yr**	0.91	1.23	1.48	1.94	2.48	3.39	3.67	**2yr**	3.00	3.53	4.06	4.85	5.62	**2yr**
5yr	0.40	0.62	0.77	1.06	1.34	1.62	**5yr**	1.16	1.58	1.87	2.48	3.17	4.38	4.93	**5yr**	3.88	4.74	5.42	6.35	7.20	**5yr**
10yr	0.48	0.73	0.91	1.27	1.64	1.97	**10yr**	1.41	1.93	2.26	3.02	3.81	5.45	6.19	**10yr**	4.83	5.95	6.79	7.88	8.89	**10yr**
25yr	0.59	0.90	1.11	1.59	2.09	2.56	**25yr**	1.81	2.50	2.93	3.92	4.88	7.62	8.38	**25yr**	6.75	8.06	9.12	10.50	11.53	**25yr**
50yr	0.69	1.05	1.31	1.88	2.53	3.11	**50yr**	2.18	3.04	3.56	4.78	5.91	9.56	10.56	**50yr**	8.46	10.15	11.45	13.06	14.18	**50yr**
100yr	0.81	1.23	1.54	2.22	3.05	3.78	**100yr**	2.63	3.70	4.34	5.84	7.17	11.99	13.30	**100yr**	10.61	12.79	14.34	16.29	17.46	**100yr**
200yr	0.95	1.44	1.82	2.64	3.68	4.62	**200yr**	3.17	4.51	5.29	7.13	8.68	15.09	16.13	**200yr**	13.35	15.51	18.00	20.31	21.51	**200yr**
500yr	1.19	1.77	2.27	3.30	4.70	5.98	**500yr**	4.05	5.84	6.87	9.32	11.20	20.47	21.74	**500yr**	18.12	20.90	24.26	27.21	28.40	**500yr**

Powered by ACIS
Northeast Regional Climate Center



Routing Diagram for 5075.PEA-HSF-Pre_021522
Prepared by Altus Engineering, Inc., Printed 2/11/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.343	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 4S)
0.010	96	Gravel surface, HSG C (1S, 2S)
0.548	98	Paved parking, HSG C (1S, 2S, 3S, 4S)
0.167	98	Roofs, HSG C (1S, 3S)
0.026	98	Unconnected pavement, HSG C (1S, 3S)
0.986	70	Woods, Good, HSG C (2S, 3S, 4S)
4.078	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
4.078	HSG C	1S, 2S, 3S, 4S
0.000	HSG D	
0.000	Other	
4.078		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.343	0.000	0.000	2.343	>75% Grass cover, Good	1S, 2S, 3S, 4S
0.000	0.000	0.010	0.000	0.000	0.010	Gravel surface	1S, 2S
0.000	0.000	0.548	0.000	0.000	0.548	Paved parking	1S, 2S, 3S, 4S
0.000	0.000	0.167	0.000	0.000	0.167	Roofs	1S, 3S
0.000	0.000	0.026	0.000	0.000	0.026	Unconnected pavement	1S, 3S
0.000	0.000	0.986	0.000	0.000	0.986	Woods, Good	2S, 3S, 4S
0.000	**0.000**	**4.078**	**0.000**	**0.000**	**4.078**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	36.00	3.50	70.0	0.4643	0.012	12.0	0.0	0.0
2	2P	35.50	34.50	150.0	0.0067	0.012	12.0	0.0	0.0
3	3P	34.50	32.50	330.0	0.0061	0.012	18.0	0.0	0.0
4	4P	32.50	31.50	200.0	0.0050	0.012	18.0	0.0	0.0
5	5P	31.40	30.00	300.0	0.0047	0.012	18.0	0.0	0.0
6	P3	23.50	16.90	20.0	0.3300	0.024	15.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 Runoff Area=27,290 sf 24.61% Impervious Runoff Depth=3.47"
Flow Length=250' Tc=7.5 min CN=80 Runoff=3.56 cfs 0.181 af

Subcatchment 2S: DA-2 Runoff Area=28,720 sf 20.65% Impervious Runoff Depth=3.18"
Flow Length=150' Slope=0.0400 '/' Tc=10.4 min CN=77 Runoff=3.11 cfs 0.174 af

Subcatchment 3S: DA-3 Runoff Area=89,740 sf 17.09% Impervious Runoff Depth=3.18"
Tc=12.0 min UI Adjusted CN=77 Runoff=9.26 cfs 0.545 af

Subcatchment 4S: DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=75 Runoff=3.75 cfs 0.182 af

Reach 2R: Exeter River Avg. Flow Depth=0.39' Max Vel=2.67 fps Inflow=11.97 cfs 0.727 af
n=0.020 L=500.0' S=0.0050 '/' Capacity=406.94 cfs Outflow=11.30 cfs 0.727 af

Pond 1P: Exist CB-53 High Peak Elev=37.18' Inflow=3.11 cfs 0.174 af
12.0" Round Culvert n=0.012 L=70.0' S=0.4643 '/' Outflow=3.11 cfs 0.174 af

Pond 2P: Exist CB - Marlboro St Peak Elev=36.67' Inflow=3.11 cfs 0.174 af
12.0" Round Culvert n=0.012 L=150.0' S=0.0067 '/' Outflow=3.11 cfs 0.174 af

Pond 3P: Exist DMH High St Peak Elev=35.35' Inflow=3.11 cfs 0.174 af
18.0" Round Culvert n=0.012 L=330.0' S=0.0061 '/' Outflow=3.11 cfs 0.174 af

Pond 4P: Exist DMH - High-Portsmouth Peak Elev=33.40' Inflow=3.11 cfs 0.174 af
18.0" Round Culvert n=0.012 L=200.0' S=0.0050 '/' Outflow=3.11 cfs 0.174 af

Pond 5P: Exist High-St SD Peak Elev=32.88' Inflow=6.59 cfs 0.355 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=6.59 cfs 0.355 af

Pond P3: PAD3 Peak Elev=26.27' Storage=124 cf Inflow=9.26 cfs 0.545 af
15.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=8.65 cfs 0.545 af

Link PA-1: Point of Analysis #1 Inflow=16.25 cfs 1.083 af
Primary=16.25 cfs 1.083 af

Total Runoff Area = 4.078 ac Runoff Volume = 1.083 af Average Runoff Depth = 3.19"
81.85% Pervious = 3.338 ac 18.15% Impervious = 0.740 ac

Summary for Subcatchment 1S: DA-1

Runoff = 3.56 cfs @ 11.99 hrs, Volume= 0.181 af, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

Area (sf)	CN	Description
2,560	98	Roofs, HSG C
3,500	98	Paved parking, HSG C
125	96	Gravel surface, HSG C
655	98	Unconnected pavement, HSG C
20,450	74	>75% Grass cover, Good, HSG C
0	70	Woods, Good, HSG C
27,290	80	Weighted Average
20,575		75.39% Pervious Area
6,715		24.61% Impervious Area
655		9.75% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0300	0.19		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.70"
3.1	200	0.0050	1.06		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	250	Total			

Summary for Subcatchment 2S: DA-2

Runoff = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

Area (sf)	CN	Description
0	98	Roofs, HSG C
5,930	98	Paved parking, HSG C
290	96	Gravel surface, HSG C
0	98	Unconnected pavement, HSG C
9,600	74	>75% Grass cover, Good, HSG C
12,900	70	Woods, Good, HSG C
28,720	77	Weighted Average
22,790		79.35% Pervious Area
5,930		20.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0400	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.70"
1.7	100	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	150	Total			

Summary for Subcatchment 3S: DA-3

Runoff = 9.26 cfs @ 12.04 hrs, Volume= 0.545 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

Area (sf)	CN	Adj	Description
4,705	98		Roofs, HSG C
10,170	98		Paved parking, HSG C
0	96		Gravel surface, HSG C
465	98		Unconnected pavement, HSG C
62,000	74		>75% Grass cover, Good, HSG C
12,400	70		Woods, Good, HSG C
89,740	78	77	Weighted Average, UI Adjusted
74,400			82.91% Pervious Area
15,340			17.09% Impervious Area
465			3.03% Unconnected

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

Summary for Subcatchment 4S: DA-4

Runoff = 3.75 cfs @ 11.97 hrs, Volume= 0.182 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

Area (sf)	CN	Description
0	98	Roofs, HSG C
4,250	98	Paved parking, HSG C
10,000	74	>75% Grass cover, Good, HSG C
17,650	70	Woods, Good, HSG C
31,900	75	Weighted Average
27,650		86.68% Pervious Area
4,250		13.32% Impervious Area

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

Summary for Reach 2R: Exeter River

Inflow Area = 2.792 ac, 16.10% Impervious, Inflow Depth = 3.13" for 10-yr event
Inflow = 11.97 cfs @ 12.01 hrs, Volume= 0.727 af
Outflow = 11.30 cfs @ 12.10 hrs, Volume= 0.727 af, Atten= 6%, Lag= 5.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.67 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 12.3 min

Peak Storage= 2,124 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 3.00' Flow Area= 48.0 sf, Capacity= 406.94 cfs

10.00' x 3.00' deep channel, n= 0.020
Side Slope Z-value= 2.0 '/' Top Width= 22.00'
Length= 500.0' Slope= 0.0050 '/'
Inlet Invert= 15.00', Outlet Invert= 12.50'

‡

Summary for Pond 1P: Exist CB-53 High

[58] Hint: Peaked 14.78' above defined flood level

Inflow Area = 0.659 ac, 20.65% Impervious, Inflow Depth = 3.18" for 10-yr event
Inflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af
Outflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min
Primary = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 37.18' @ 12.02 hrs
Flood Elev= 22.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	36.00'	**12.0" Round Culvert** L= 70.0' Ke= 0.500 Inlet / Outlet Invert= 36.00' / 3.50' S= 0.4643 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=3.03 cfs @ 12.02 hrs HW=37.14' (Free Discharge)
1=Culvert (Inlet Controls 3.03 cfs @ 3.86 fps)

Summary for Pond 2P: Exist CB - Marlboro St

[58] Hint: Peaked 14.27' above defined flood level
[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.66'

Inflow Area = 0.659 ac, 20.65% Impervious, Inflow Depth = 3.18" for 10-yr event
Inflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af
Outflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min
Primary = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 36.67' @ 12.02 hrs
Flood Elev= 22.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	**12.0" Round Culvert** L= 150.0' Ke= 0.500 Inlet / Outlet Invert= 35.50' / 34.50' S= 0.0067 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=3.03 cfs @ 12.02 hrs HW=36.64' (Free Discharge)
1=Culvert (Inlet Controls 3.03 cfs @ 3.86 fps)

Summary for Pond 3P: Exist DMH High St

[58] Hint: Peaked 12.95' above defined flood level
[79] Warning: Submerged Pond 2P Primary device # 1 OUTLET by 0.84'

Inflow Area = 0.659 ac, 20.65% Impervious, Inflow Depth = 3.18" for 10-yr event
Inflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af
Outflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min
Primary = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 35.35' @ 12.02 hrs
Flood Elev= 22.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.50'	**18.0" Round Culvert** L= 330.0' Ke= 0.500 Inlet / Outlet Invert= 34.50' / 32.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.03 cfs @ 12.02 hrs HW=35.34' (Free Discharge)
1=Culvert (Barrel Controls 3.03 cfs @ 4.34 fps)

Summary for Pond 4P: Exist DMH - High-Portsmouth

[58] Hint: Peaked 11.00' above defined flood level
[79] Warning: Submerged Pond 3P Primary device # 1 OUTLET by 0.90'

Inflow Area = 0.659 ac, 20.65% Impervious, Inflow Depth = 3.18" for 10-yr event
Inflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af
Outflow = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min
Primary = 3.11 cfs @ 12.02 hrs, Volume= 0.174 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 33.40' @ 12.02 hrs
Flood Elev= 22.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.50'	**18.0" Round Culvert** L= 200.0' Ke= 0.500 Inlet / Outlet Invert= 32.50' / 31.50' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.03 cfs @ 12.02 hrs HW=33.39' (Free Discharge)
1=Culvert (Barrel Controls 3.03 cfs @ 3.99 fps)

Summary for Pond 5P: Exist High-St SD

[58] Hint: Peaked 10.48' above defined flood level
[79] Warning: Submerged Pond 4P Primary device # 1 INLET by 0.38'

Inflow Area = 1.286 ac, 22.58% Impervious, Inflow Depth = 3.32" for 10-yr event
Inflow = 6.59 cfs @ 12.00 hrs, Volume= 0.355 af
Outflow = 6.59 cfs @ 12.00 hrs, Volume= 0.355 af, Atten= 0%, Lag= 0.0 min
Primary = 6.59 cfs @ 12.00 hrs, Volume= 0.355 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 32.88' @ 12.00 hrs
Flood Elev= 22.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.40'	**18.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 31.40' / 30.00' S= 0.0047 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=6.58 cfs @ 12.00 hrs HW=32.88' (Free Discharge)
1=Culvert (Barrel Controls 6.58 cfs @ 4.70 fps)

Summary for Pond P3: PAD3

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=40)

Inflow Area = 2.060 ac, 17.09% Impervious, Inflow Depth = 3.18" for 10-yr event
Inflow = 9.26 cfs @ 12.04 hrs, Volume= 0.545 af
Outflow = 8.65 cfs @ 12.07 hrs, Volume= 0.545 af, Atten= 7%, Lag= 1.7 min
Primary = 8.65 cfs @ 12.07 hrs, Volume= 0.545 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 26.27' @ 12.07 hrs Surf.Area= 849 sf Storage= 124 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 0.1 min (826.7 - 826.7)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	8 cf	**2.00'D x 2.50'H Vertical Cone/Cylinder**
#2	26.00'	7,510 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		7,518 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	20	0	0
27.00	3,100	1,560	1,560
28.00	8,800	5,950	7,510

Device	Routing	Invert	Outlet Devices
#1	Primary	23.50'	**15.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 23.50' / 16.90' S= 0.3300 '/' Cc= 0.900 n= 0.024, Flow Area= 1.23 sf

Primary OutFlow Max=8.61 cfs @ 12.07 hrs HW=26.25' (Free Discharge)
└**1=Culvert** (Inlet Controls 8.61 cfs @ 7.02 fps)

Summary for Link PA-1: Point of Analysis #1

Inflow Area = 4.078 ac, 18.15% Impervious, Inflow Depth = 3.19" for 10-yr event
Inflow = 16.25 cfs @ 12.05 hrs, Volume= 1.083 af
Primary = 16.25 cfs @ 12.05 hrs, Volume= 1.083 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 Runoff Area=27,290 sf 24.61% Impervious Runoff Depth=1.80"
Flow Length=250' Tc=7.5 min CN=80 Runoff=1.88 cfs 0.094 af

Subcatchment 2S: DA-2 Runoff Area=28,720 sf 20.65% Impervious Runoff Depth=1.58"
Flow Length=150' Slope=0.0400 '/' Tc=10.4 min CN=77 Runoff=1.55 cfs 0.087 af

Subcatchment 3S: DA-3 Runoff Area=89,740 sf 17.09% Impervious Runoff Depth=1.58"
Tc=12.0 min UI Adjusted CN=77 Runoff=4.61 cfs 0.271 af

Subcatchment 4S: DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=1.45"
Tc=6.0 min CN=75 Runoff=1.84 cfs 0.088 af

Reach 2R: Exeter River Avg. Flow Depth=0.26' Max Vel=2.05 fps Inflow=6.06 cfs 0.360 af
n=0.020 L=500.0' S=0.0050 '/' Capacity=406.94 cfs Outflow=5.45 cfs 0.360 af

Pond 1P: Exist CB-53 High Peak Elev=36.67' Inflow=1.55 cfs 0.087 af
12.0" Round Culvert n=0.012 L=70.0' S=0.4643 '/' Outflow=1.55 cfs 0.087 af

Pond 2P: Exist CB - Marlboro St Peak Elev=36.20' Inflow=1.55 cfs 0.087 af
12.0" Round Culvert n=0.012 L=150.0' S=0.0067 '/' Outflow=1.55 cfs 0.087 af

Pond 3P: Exist DMH High St Peak Elev=35.08' Inflow=1.55 cfs 0.087 af
18.0" Round Culvert n=0.012 L=330.0' S=0.0061 '/' Outflow=1.55 cfs 0.087 af

Pond 4P: Exist DMH - High-Portsmouth Peak Elev=33.11' Inflow=1.55 cfs 0.087 af
18.0" Round Culvert n=0.012 L=200.0' S=0.0050 '/' Outflow=1.55 cfs 0.087 af

Pond 5P: Exist High-St SD Peak Elev=32.35' Inflow=3.37 cfs 0.181 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=3.37 cfs 0.181 af

Pond P3: PAD3 Peak Elev=24.73' Storage=4 cf Inflow=4.61 cfs 0.271 af
15.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=4.61 cfs 0.271 af

Link PA-1: Point of Analysis #1 Inflow=7.38 cfs 0.540 af
Primary=7.38 cfs 0.540 af

Total Runoff Area = 4.078 ac Runoff Volume = 0.540 af Average Runoff Depth = 1.59"
81.85% Pervious = 3.338 ac 18.15% Impervious = 0.740 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 Runoff Area=27,290 sf 24.61% Impervious Runoff Depth=4.87"
Flow Length=250' Tc=7.5 min CN=80 Runoff=4.92 cfs 0.254 af

Subcatchment 2S: DA-2 Runoff Area=28,720 sf 20.65% Impervious Runoff Depth=4.54"
Flow Length=150' Slope=0.0400 '/' Tc=10.4 min CN=77 Runoff=4.41 cfs 0.249 af

Subcatchment 3S: DA-3 Runoff Area=89,740 sf 17.09% Impervious Runoff Depth=4.54"
Tc=12.0 min UI Adjusted CN=77 Runoff=13.12 cfs 0.779 af

Subcatchment 4S: DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=4.32"
Tc=6.0 min CN=75 Runoff=5.37 cfs 0.263 af

Reach 2R: Exeter River Avg. Flow Depth=0.45' Max Vel=2.87 fps Inflow=14.37 cfs 1.048 af
n=0.020 L=500.0' S=0.0050 '/' Capacity=406.94 cfs Outflow=13.99 cfs 1.048 af

Pond 1P: Exist CB-53 High Peak Elev=37.85' Inflow=4.41 cfs 0.249 af
12.0" Round Culvert n=0.012 L=70.0' S=0.4643 '/' Outflow=4.41 cfs 0.249 af

Pond 2P: Exist CB - Marlboro St Peak Elev=38.19' Inflow=4.41 cfs 0.249 af
12.0" Round Culvert n=0.012 L=150.0' S=0.0067 '/' Outflow=4.41 cfs 0.249 af

Pond 3P: Exist DMH High St Peak Elev=35.54' Inflow=4.41 cfs 0.249 af
18.0" Round Culvert n=0.012 L=330.0' S=0.0061 '/' Outflow=4.41 cfs 0.249 af

Pond 4P: Exist DMH - High-Portsmouth Peak Elev=33.62' Inflow=4.41 cfs 0.249 af
18.0" Round Culvert n=0.012 L=200.0' S=0.0050 '/' Outflow=4.41 cfs 0.249 af

Pond 5P: Exist High-St SD Peak Elev=34.11' Inflow=9.22 cfs 0.504 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=9.22 cfs 0.504 af

Pond P3: PAD3 Peak Elev=26.97' Storage=1,490 cf Inflow=13.12 cfs 0.779 af
15.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=9.97 cfs 0.785 af

Link PA-1: Point of Analysis #1 Inflow=21.91 cfs 1.552 af
Primary=21.91 cfs 1.552 af

Total Runoff Area = 4.078 ac Runoff Volume = 1.546 af Average Runoff Depth = 4.55"
81.85% Pervious = 3.338 ac 18.15% Impervious = 0.740 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 Runoff Area=27,290 sf 24.61% Impervious Runoff Depth=6.22"
Flow Length=250' Tc=7.5 min CN=80 Runoff=6.20 cfs 0.325 af

Subcatchment 2S: DA-2 Runoff Area=28,720 sf 20.65% Impervious Runoff Depth=5.86"
Flow Length=150' Slope=0.0400 '/' Tc=10.4 min CN=77 Runoff=5.63 cfs 0.322 af

Subcatchment 3S: DA-3 Runoff Area=89,740 sf 17.09% Impervious Runoff Depth=5.86"
Tc=12.0 min UI Adjusted CN=77 Runoff=16.78 cfs 1.005 af

Subcatchment 4S: DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=5.61"
Tc=6.0 min CN=75 Runoff=6.91 cfs 0.343 af

Reach 2R: Exeter River Avg. Flow Depth=0.48' Max Vel=3.02 fps Inflow=16.50 cfs 1.353 af
n=0.020 L=500.0' S=0.0050 '/' Capacity=406.94 cfs Outflow=16.01 cfs 1.353 af

Pond 1P: Exist CB-53 High Peak Elev=38.71' Inflow=5.63 cfs 0.322 af
12.0" Round Culvert n=0.012 L=70.0' S=0.4643 '/' Outflow=5.63 cfs 0.322 af

Pond 2P: Exist CB - Marlboro St Peak Elev=39.89' Inflow=5.63 cfs 0.322 af
12.0" Round Culvert n=0.012 L=150.0' S=0.0067 '/' Outflow=5.63 cfs 0.322 af

Pond 3P: Exist DMH High St Peak Elev=35.72' Inflow=5.63 cfs 0.322 af
18.0" Round Culvert n=0.012 L=330.0' S=0.0061 '/' Outflow=5.63 cfs 0.322 af

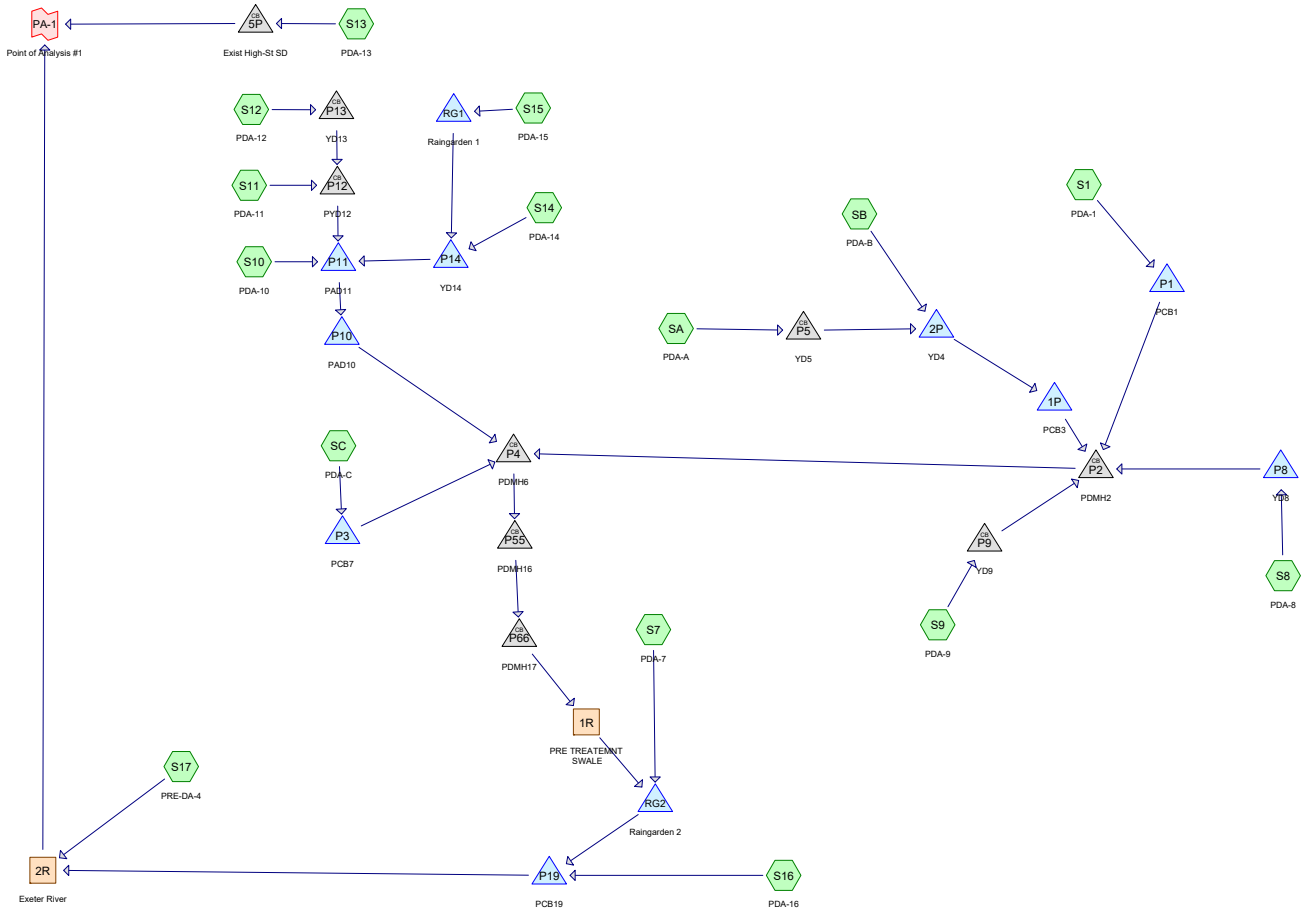
Pond 4P: Exist DMH - High-Portsmouth Peak Elev=33.81' Inflow=5.63 cfs 0.322 af
18.0" Round Culvert n=0.012 L=200.0' S=0.0050 '/' Outflow=5.63 cfs 0.322 af

Pond 5P: Exist High-St SD Peak Elev=35.70' Inflow=11.70 cfs 0.646 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=11.70 cfs 0.646 af

Pond P3: PAD3 Peak Elev=27.44' Storage=3,480 cf Inflow=16.78 cfs 1.005 af
15.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=10.76 cfs 1.010 af

Link PA-1: Point of Analysis #1 Inflow=26.69 cfs 1.999 af
Primary=26.69 cfs 1.999 af

Total Runoff Area = 4.078 ac Runoff Volume = 1.994 af Average Runoff Depth = 5.87"
81.85% Pervious = 3.338 ac 18.15% Impervious = 0.740 ac



Subcat Reach Pond Link

Routing Diagram for 5075.PEA-HSF-Post_020822
Prepared by Altus Engineering, Inc., Printed 2/14/2022
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.207	74	>75% Grass cover, Good, HSG C (S1, S10, S11, S12, S13, S14, S15, S16, S17, S7, S8, S9, SA, SB, SC)
0.468	98	Paved parking, HSG C (S1, S11, S12, S13, S16, S17, S7, S9, SA, SB, SC)
0.019	30	Porous Pavers, HSG C (S1, S12, S15, S7, S8, S9)
0.490	98	Roofs, HSG C (S1, S10, S11, S12, S13, S14, S15, S16, S7, S8, S9, SA, SB, SC)
0.164	98	Unconnected pavement, HSG C (S1, S10, S12, S13, S15, S7, S8, S9, SA, SB, SC)
0.730	70	Woods, Good, HSG C (S16, S17, S7, S8)
4.078	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
4.078	HSG C	S1, S10, S11, S12, S13, S14, S15, S16, S17, S7, S8, S9, SA, SB, SC
0.000	HSG D	
0.000	Other	
4.078		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.207	0.000	0.000	2.207	>75% Grass cover, Good	S1, S10, S11, S12, S13, S14, S15, S16, S17, S7, S8, S9, SA, SB, SC
0.000	0.000	0.468	0.000	0.000	0.468	Paved parking	S1, S11, S12, S13, S16, S17, S7, S9, SA, SB, SC
0.000	0.000	0.019	0.000	0.000	0.019	Porous Pavers	S1, S12, S15, S7, S8, S9
0.000	0.000	0.490	0.000	0.000	0.490	Roofs	S1, S10, S11, S12, S13, S14, S15, S16, S7, S8, S9, SA, SB, SC
0.000	0.000	0.164	0.000	0.000	0.164	Unconnected pavement	S1, S10, S12, S13, S15, S7, S8, S9, SA, SB, SC
0.000	0.000	0.730	0.000	0.000	0.730	Woods, Good	S16, S17, S7, S8
0.000	**0.000**	**4.078**	**0.000**	**0.000**	**4.078**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	40.30	40.10	17.2	0.0116	0.012	12.0	0.0	0.0
2	2P	40.50	40.40	7.1	0.0141	0.012	8.0	0.0	0.0
3	5P	31.40	30.00	300.0	0.0047	0.012	18.0	0.0	0.0
4	P1	39.60	38.40	83.4	0.0144	0.012	12.0	0.0	0.0
5	P10	38.40	37.70	30.0	0.0233	0.012	12.0	0.0	0.0
6	P11	39.50	38.50	51.1	0.0196	0.012	12.0	0.0	0.0
7	P12	39.80	39.60	32.2	0.0062	0.012	8.0	0.0	0.0
8	P13	40.10	39.80	53.6	0.0056	0.012	8.0	0.0	0.0
9	P14	39.80	39.60	18.3	0.0109	0.012	8.0	0.0	0.0
10	P19	23.50	16.90	20.0	0.3300	0.024	18.0	0.0	0.0
11	P2	38.30	37.70	121.3	0.0049	0.012	12.0	0.0	0.0
12	P3	41.10	39.70	18.1	0.0773	0.012	12.0	0.0	0.0
13	P4	37.60	37.10	61.4	0.0081	0.012	15.0	0.0	0.0
14	P5	41.25	40.60	37.0	0.0176	0.012	8.0	0.0	0.0
15	P55	37.00	30.10	73.9	0.0934	0.012	15.0	0.0	0.0
16	P66	30.00	29.75	52.4	0.0048	0.012	15.0	0.0	0.0
17	P8	38.85	38.40	91.6	0.0049	0.012	8.0	0.0	0.0
18	P9	40.50	40.10	25.3	0.0158	0.012	8.0	0.0	0.0
19	RG1	40.10	39.90	30.0	0.0067	0.012	8.0	0.0	0.0
20	RG2	24.50	23.60	60.0	0.0150	0.012	15.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1: PDA-1 Runoff Area=6,608 sf 74.79% Impervious Runoff Depth=4.62"
Tc=6.0 min CN=91 Runoff=1.11 cfs 0.058 af

Subcatchment S10: PDA-10 Runoff Area=1,486 sf 54.98% Impervious Runoff Depth=4.18"
Tc=6.0 min CN=87 Runoff=0.23 cfs 0.012 af

Subcatchment S11: PDA-11 Runoff Area=2,542 sf 78.68% Impervious Runoff Depth=4.84"
Tc=6.0 min CN=93 Runoff=0.44 cfs 0.024 af

Subcatchment S12: PDA-12 Runoff Area=4,457 sf 24.01% Impervious Runoff Depth=3.27"
Tc=6.0 min UI Adjusted CN=78 Runoff=0.57 cfs 0.028 af

Subcatchment S13: PDA-13 Runoff Area=3,110 sf 70.03% Impervious Runoff Depth=4.62"
Tc=6.0 min CN=91 Runoff=0.52 cfs 0.027 af

Subcatchment S14: PDA-14 Runoff Area=1,122 sf 22.01% Impervious Runoff Depth=3.37"
Tc=6.0 min CN=79 Runoff=0.15 cfs 0.007 af

Subcatchment S15: PDA-15 Runoff Area=10,477 sf 28.46% Impervious Runoff Depth=3.47"
Tc=6.0 min CN=80 Runoff=1.41 cfs 0.069 af

Subcatchment S16: PDA-16 Runoff Area=35,485 sf 2.78% Impervious Runoff Depth=2.89"
Tc=12.0 min CN=74 Runoff=3.35 cfs 0.196 af

Subcatchment S17: PRE-DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=75 Runoff=3.75 cfs 0.182 af

Subcatchment S7: PDA-7 Runoff Area=45,596 sf 24.08% Impervious Runoff Depth=3.27"
Tc=12.0 min UI Adjusted CN=78 Runoff=4.84 cfs 0.285 af

Subcatchment S8: PDA-8 Runoff Area=11,622 sf 22.06% Impervious Runoff Depth=3.18"
Tc=6.0 min CN=77 Runoff=1.45 cfs 0.071 af

Subcatchment S9: PDA-9 Runoff Area=7,898 sf 54.87% Impervious Runoff Depth=4.18"
Tc=6.0 min CN=87 Runoff=1.24 cfs 0.063 af

Subcatchment SA: PDA-A Runoff Area=3,785 sf 81.43% Impervious Runoff Depth=4.95"
Tc=6.0 min CN=94 Runoff=0.66 cfs 0.036 af

Subcatchment SB: PDA-B Runoff Area=6,514 sf 72.72% Impervious Runoff Depth=4.62"
Tc=6.0 min CN=91 Runoff=1.09 cfs 0.058 af

Subcatchment SC: PDA-C Runoff Area=5,057 sf 73.62% Impervious Runoff Depth=4.73"
Tc=6.0 min CN=92 Runoff=0.86 cfs 0.046 af

Reach 1R: PRE TREATEMNT SWALE Avg. Flow Depth=0.51' Max Vel=3.16 fps Inflow=9.04 cfs 0.429 af
n=0.025 L=100.0' S=0.0100 '/' Capacity=32.11 cfs Outflow=8.90 cfs 0.429 af

Reach 2R: Exeter River Avg. Flow Depth=0.40' Max Vel=3.61 fps Inflow=16.01 cfs 0.990 af
n=0.015 L=500.0' S=0.0050 '/' Capacity=542.58 cfs Outflow=15.64 cfs 0.990 af

Pond 1P: PCB3 Peak Elev=41.08' Storage=10 cf Inflow=1.75 cfs 0.093 af
12.0" Round Culvert n=0.012 L=17.2' S=0.0116 '/' Outflow=1.75 cfs 0.093 af

Pond 2P: YD4 Peak Elev=41.92' Storage=0 cf Inflow=1.75 cfs 0.093 af
8.0" Round Culvert n=0.012 L=7.1' S=0.0141 '/' Outflow=1.75 cfs 0.093 af

Pond 5P: Exist High-St SD Peak Elev=31.75' Inflow=0.52 cfs 0.027 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=0.52 cfs 0.027 af

Pond P1: PCB1 Peak Elev=40.15' Storage=7 cf Inflow=1.11 cfs 0.058 af
12.0" Round Culvert n=0.012 L=83.4' S=0.0144 '/' Outflow=1.11 cfs 0.058 af

Pond P10: PAD10 Peak Elev=39.39' Storage=3 cf Inflow=2.68 cfs 0.098 af
12.0" Round Culvert n=0.012 L=30.0' S=0.0233 '/' Outflow=2.68 cfs 0.098 af

Pond P11: PAD11 Peak Elev=40.49' Storage=3 cf Inflow=2.69 cfs 0.098 af
12.0" Round Culvert n=0.012 L=51.1' S=0.0196 '/' Outflow=2.68 cfs 0.098 af

Pond P12: PYD12 Peak Elev=40.58' Inflow=1.01 cfs 0.051 af
8.0" Round Culvert n=0.012 L=32.2' S=0.0062 '/' Outflow=1.01 cfs 0.051 af

Pond P13: YD13 Peak Elev=40.61' Inflow=0.57 cfs 0.028 af
8.0" Round Culvert n=0.012 L=53.6' S=0.0056 '/' Outflow=0.57 cfs 0.028 af

Pond P14: YD14 Peak Elev=40.90' Storage=0 cf Inflow=1.46 cfs 0.035 af
8.0" Round Culvert n=0.012 L=18.3' S=0.0109 '/' Outflow=1.46 cfs 0.035 af

Pond P19: PCB19 Peak Elev=26.74' Storage=857 cf Inflow=15.69 cfs 0.806 af
18.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=13.42 cfs 0.808 af

Pond P2: PDMH2 Peak Elev=42.36' Inflow=5.55 cfs 0.286 af
12.0" Round Culvert n=0.012 L=121.3' S=0.0049 '/' Outflow=5.55 cfs 0.286 af

Pond P3: PCB7 Peak Elev=41.57' Storage=6 cf Inflow=0.86 cfs 0.046 af
12.0" Round Culvert n=0.012 L=18.1' S=0.0773 '/' Outflow=0.86 cfs 0.046 af

Pond P4: PDMH6 Peak Elev=40.63' Inflow=9.04 cfs 0.429 af
15.0" Round Culvert n=0.012 L=61.4' S=0.0081 '/' Outflow=9.04 cfs 0.429 af

Pond P5: YD5 Peak Elev=41.74' Inflow=0.66 cfs 0.036 af
8.0" Round Culvert n=0.012 L=37.0' S=0.0176 '/' Outflow=0.66 cfs 0.036 af

Pond P55: PDMH16 Peak Elev=39.95' Inflow=9.04 cfs 0.429 af
15.0" Round Culvert n=0.012 L=73.9' S=0.0934 '/' Outflow=9.04 cfs 0.429 af

Pond P66: PDMH17 Peak Elev=33.13' Inflow=9.04 cfs 0.429 af
15.0" Round Culvert n=0.012 L=52.4' S=0.0048 '/' Outflow=9.04 cfs 0.429 af

Pond P8: YD8 Peak Elev=40.58' Storage=1 cf Inflow=1.45 cfs 0.071 af
8.0" Round Culvert n=0.012 L=91.6' S=0.0049 '/' Outflow=1.45 cfs 0.071 af

Pond P9: YD9 Peak Elev=41.38' Inflow=1.24 cfs 0.063 af
8.0" Round Culvert n=0.012 L=25.3' S=0.0158 '/' Outflow=1.24 cfs 0.063 af

Pond RG1: Raingarden 1 Peak Elev=43.25' Storage=591 cf Inflow=1.41 cfs 0.069 af
Discarded=0.07 cfs 0.038 af Primary=1.32 cfs 0.027 af Outflow=1.38 cfs 0.065 af

Pond RG2: Raingarden 2 Peak Elev=30.21' Storage=6,943 cf Inflow=13.32 cfs 0.714 af
Outflow=12.34 cfs 0.610 af

Link PA-1: Point of Analysis #1 Inflow=16.07 cfs 1.017 af
Primary=16.07 cfs 1.017 af

Total Runoff Area = 4.078 ac Runoff Volume = 1.163 af Average Runoff Depth = 3.42"
72.48% Pervious = 2.956 ac 27.52% Impervious = 1.122 ac

Summary for Subcatchment S1: PDA-1

Runoff = 1.11 cfs @ 11.96 hrs, Volume= 0.058 af, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	625	98	Roofs, HSG C
	3,550	98	Paved parking, HSG C
	767	98	Unconnected pavement, HSG C
*	100	30	Porous Pavers, HSG C
	1,566	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	6,608	91	Weighted Average
	1,666		25.21% Pervious Area
	4,942		74.79% Impervious Area
	767		15.52% Unconnected

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

Summary for Subcatchment S10: PDA-10

Runoff = 0.23 cfs @ 11.97 hrs, Volume= 0.012 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	790	98	Roofs, HSG C
	0	98	Paved parking, HSG C
	27	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	669	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	1,486	87	Weighted Average
	669		45.02% Pervious Area
	817		54.98% Impervious Area
	27		3.30% Unconnected

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

Summary for Subcatchment S11: PDA-11

Runoff = 0.44 cfs @ 11.96 hrs, Volume= 0.024 af, Depth= 4.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	443	98	Roofs, HSG C
	1,557	98	Paved parking, HSG C
	0	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	542	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	2,542	93	Weighted Average
	542		21.32% Pervious Area
	2,000		78.68% Impervious Area

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

Summary for Subcatchment S12: PDA-12

Runoff = 0.57 cfs @ 11.97 hrs, Volume= 0.028 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Adj	Description
	700	98		Roofs, HSG C
	240	98		Paved parking, HSG C
	130	98		Unconnected pavement, HSG C
*	100	30		Porous Pavers, HSG C
	3,287	74		>75% Grass cover, Good, HSG C
	0	70		Woods, Good, HSG C
	4,457	79	78	Weighted Average, UI Adjusted
	3,387			75.99% Pervious Area
	1,070			24.01% Impervious Area
	130			12.15% Unconnected

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

Summary for Subcatchment S13: PDA-13

Runoff = 0.52 cfs @ 11.96 hrs, Volume= 0.027 af, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	1,545	98	Roofs, HSG C
	390	98	Paved parking, HSG C
	243	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	932	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	3,110	91	Weighted Average
	932		29.97% Pervious Area
	2,178		70.03% Impervious Area
	243		11.16% Unconnected

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

Summary for Subcatchment S14: PDA-14

Runoff = 0.15 cfs @ 11.97 hrs, Volume= 0.007 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	247	98	Roofs, HSG C
	0	98	Paved parking, HSG C
	0	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	875	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	1,122	79	Weighted Average
	875		77.99% Pervious Area
	247		22.01% Impervious Area

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

Summary for Subcatchment S15: PDA-15

Runoff = 1.41 cfs @ 11.97 hrs, Volume= 0.069 af, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	2,806	98	Roofs, HSG C
	0	98	Paved parking, HSG C
	176	98	Unconnected pavement, HSG C
*	100	30	Porous Pavers, HSG C
	7,395	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	10,477	80	Weighted Average
	7,495		71.54% Pervious Area
	2,982		28.46% Impervious Area
	176		5.90% Unconnected

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

Summary for Subcatchment S16: PDA-16

Runoff = 3.35 cfs @ 12.04 hrs, Volume= 0.196 af, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	275	98	Roofs, HSG C
	710	98	Paved parking, HSG C
	0	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	28,300	74	>75% Grass cover, Good, HSG C
	6,200	70	Woods, Good, HSG C
	35,485	74	Weighted Average
	34,500		97.22% Pervious Area
	985		2.78% Impervious Area

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

Summary for Subcatchment S17: PRE-DA-4

Runoff = 3.75 cfs @ 11.97 hrs, Volume= 0.182 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

Area (sf)	CN	Description
0	98	Roofs, HSG C
4,250	98	Paved parking, HSG C
10,000	74	>75% Grass cover, Good, HSG C
17,650	70	Woods, Good, HSG C
31,900	75	Weighted Average
27,650		86.68% Pervious Area
4,250		13.32% Impervious Area

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

Summary for Subcatchment S7: PDA-7

Runoff = 4.84 cfs @ 12.04 hrs, Volume= 0.285 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Adj	Description
	5,519	98		Roofs, HSG C
	761	98		Paved parking, HSG C
	4,700	98		Unconnected pavement, HSG C
*	200	30		Porous Pavers, HSG C
	28,466	74		>75% Grass cover, Good, HSG C
	5,950	70		Woods, Good, HSG C
	45,596	79	78	Weighted Average, UI Adjusted
	34,616			75.92% Pervious Area
	10,980			24.08% Impervious Area
	4,700			42.81% Unconnected

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

Summary for Subcatchment S8: PDA-8

Runoff = 1.45 cfs @ 11.97 hrs, Volume= 0.071 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	2,508	98	Roofs, HSG C
	0	98	Paved parking, HSG C
	56	98	Unconnected pavement, HSG C
*	300	30	Porous Pavers, HSG C
	6,758	74	>75% Grass cover, Good, HSG C
	2,000	70	Woods, Good, HSG C
	11,622	77	Weighted Average
	9,058		77.94% Pervious Area
	2,564		22.06% Impervious Area
	56		2.18% Unconnected

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

Summary for Subcatchment S9: PDA-9

Runoff = 1.24 cfs @ 11.97 hrs, Volume= 0.063 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	1,689	98	Roofs, HSG C
	2,409	98	Paved parking, HSG C
	236	98	Unconnected pavement, HSG C
*	24	30	Porous Pavers, HSG C
	3,540	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	7,898	87	Weighted Average
	3,564		45.13% Pervious Area
	4,334		54.87% Impervious Area
	236		5.45% Unconnected

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

Summary for Subcatchment SA: PDA-A

Runoff = 0.66 cfs @ 11.96 hrs, Volume= 0.036 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	1,459	98	Roofs, HSG C
	1,408	98	Paved parking, HSG C
	215	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	703	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	3,785	94	Weighted Average
	703		18.57% Pervious Area
	3,082		81.43% Impervious Area
	215		6.98% Unconnected

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

Summary for Subcatchment SB: PDA-B

Runoff = 1.09 cfs @ 11.96 hrs, Volume= 0.058 af, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	1,677	98	Roofs, HSG C
	2,663	98	Paved parking, HSG C
	397	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	1,777	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	6,514	91	Weighted Average
	1,777		27.28% Pervious Area
	4,737		72.72% Impervious Area
	397		8.38% Unconnected

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

Summary for Subcatchment SC: PDA-C

Runoff = 0.86 cfs @ 11.96 hrs, Volume= 0.046 af, Depth= 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.65"

	Area (sf)	CN	Description
	1,080	98	Roofs, HSG C
	2,449	98	Paved parking, HSG C
	194	98	Unconnected pavement, HSG C
*	0	30	Porous Pavers, HSG C
	1,334	74	>75% Grass cover, Good, HSG C
	0	70	Woods, Good, HSG C
	5,057	92	Weighted Average
	1,334		26.38% Pervious Area
	3,723		73.62% Impervious Area
	194		5.21% Unconnected

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

Summary for Reach 1R: PRE TREATEMNT SWALE

Inflow Area = 1.413 ac, 49.54% Impervious, Inflow Depth = 3.64" for 10-yr event
Inflow = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af
Outflow = 8.90 cfs @ 11.99 hrs, Volume= 0.429 af, Atten= 2%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.16 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 2.5 min

Peak Storage= 285 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 32.11 cfs

4.00' x 1.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 10.00'
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 29.50', Outlet Invert= 28.50'

‡

Summary for Reach 2R: Exeter River

Inflow Area = 4.007 ac, 26.76% Impervious, Inflow Depth = 2.96" for 10-yr event
Inflow = 16.01 cfs @ 12.01 hrs, Volume= 0.990 af
Outflow = 15.64 cfs @ 12.08 hrs, Volume= 0.990 af, Atten= 2%, Lag= 4.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.61 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 9.2 min

Peak Storage= 2,182 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 3.00' Flow Area= 48.0 sf, Capacity= 542.58 cfs

10.00' x 3.00' deep channel, n= 0.015 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 22.00'
Length= 500.0' Slope= 0.0050 '/'
Inlet Invert= 15.00', Outlet Invert= 12.50'

‡

Summary for Pond 1P: PCB3

Inflow Area = 0.236 ac, 75.92% Impervious, Inflow Depth = 4.74" for 10-yr event
Inflow = 1.75 cfs @ 11.96 hrs, Volume= 0.093 af
Outflow = 1.75 cfs @ 11.96 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.1 min
Primary = 1.75 cfs @ 11.96 hrs, Volume= 0.093 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 41.08' @ 11.96 hrs Surf.Area= 13 sf Storage= 10 cf

Plug-Flow detention time= 0.3 min calculated for 0.093 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (774.9 - 774.6)

Volume	Invert	Avail.Storage	Storage Description
#1	40.30'	49 cf	**4.00'D x 3.90'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	40.30'	**12.0" Round Culvert** L= 17.2' Ke= 0.500 Inlet / Outlet Invert= 40.30' / 40.10' S= 0.0116 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.70 cfs @ 11.96 hrs HW=41.07' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.70 cfs @ 3.63 fps)

Summary for Pond 2P: YD4

Inflow Area = 0.236 ac, 75.92% Impervious, Inflow Depth = 4.74" for 10-yr event
Inflow = 1.75 cfs @ 11.96 hrs, Volume= 0.093 af
Outflow = 1.75 cfs @ 11.96 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min
Primary = 1.75 cfs @ 11.96 hrs, Volume= 0.093 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Peak Elev= 41.92' @ 11.96 hrs Surf.Area= 0 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.093 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (774.6 - 774.6)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	1 cf	**0.67'D x 3.00'H Vertical Cone/Cylinder**
#2	43.50'	37 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		38 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
43.50	5	0	0
44.00	142	37	37

Device	Routing	Invert	Outlet Devices
#1	Primary	40.50'	**8.0" Round Culvert** L= 7.1' Ke= 0.500 Inlet / Outlet Invert= 40.50' / 40.40' S= 0.0141 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=1.71 cfs @ 11.96 hrs HW=41.87' (Free Discharge)
1=Culvert (Inlet Controls 1.71 cfs @ 4.90 fps)

Summary for Pond 5P: Exist High-St SD

Inflow Area = 0.071 ac, 70.03% Impervious, Inflow Depth = 4.62" for 10-yr event
Inflow = 0.52 cfs @ 11.96 hrs, Volume= 0.027 af
Outflow = 0.52 cfs @ 11.96 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 11.96 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 31.75' @ 11.96 hrs
Flood Elev= 22.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.40'	**18.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 31.40' / 30.00' S= 0.0047 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=0.51 cfs @ 11.96 hrs HW=31.75' (Free Discharge)
1=Culvert (Barrel Controls 0.51 cfs @ 2.45 fps)

Summary for Pond P1: PCB1

Inflow Area = 0.152 ac, 74.79% Impervious, Inflow Depth = 4.62" for 10-yr event
Inflow = 1.11 cfs @ 11.96 hrs, Volume= 0.058 af
Outflow = 1.11 cfs @ 11.96 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.1 min
Primary = 1.11 cfs @ 11.96 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Peak Elev= 40.15' @ 11.97 hrs Surf.Area= 13 sf Storage= 7 cf

Plug-Flow detention time= 0.4 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (780.0 - 779.6)

Volume	Invert	Avail.Storage	Storage Description
#1	39.60'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	39.60'	**12.0" Round Culvert** L= 83.4' Ke= 0.500 Inlet / Outlet Invert= 39.60' / 38.40' S= 0.0144 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.08 cfs @ 11.96 hrs HW=40.14' (Free Discharge)
1=Culvert (Inlet Controls 1.08 cfs @ 2.50 fps)

Summary for Pond P10: PAD10

Inflow Area = 0.461 ac, 35.43% Impervious, Inflow Depth = 2.55" for 10-yr event
Inflow = 2.68 cfs @ 11.98 hrs, Volume= 0.098 af
Outflow = 2.68 cfs @ 11.98 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min
Primary = 2.68 cfs @ 11.98 hrs, Volume= 0.098 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 39.39' @ 11.98 hrs Surf.Area= 3 sf Storage= 3 cf

Plug-Flow detention time= 0.1 min calculated for 0.098 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (778.3 - 778.2)

Volume	Invert	Avail.Storage	Storage Description
#1	38.40'	25 cf	**2.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	38.40'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 38.40' / 37.70' S= 0.0233 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.59 cfs @ 11.98 hrs HW=39.36' (Free Discharge)
1=Culvert (Inlet Controls 2.59 cfs @ 3.34 fps)

Summary for Pond P11: PAD11

Inflow Area = 0.461 ac, 35.43% Impervious, Inflow Depth = 2.55" for 10-yr event
Inflow = 2.69 cfs @ 11.98 hrs, Volume= 0.098 af
Outflow = 2.68 cfs @ 11.98 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min
Primary = 2.68 cfs @ 11.98 hrs, Volume= 0.098 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 40.49' @ 11.98 hrs Surf.Area= 3 sf Storage= 3 cf

Plug-Flow detention time= 0.1 min calculated for 0.098 af (100% of inflow)

Center-of-Mass det. time= 0.1 min (778.2 - 778.2)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	18 cf	**2.00'D x 5.70'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	39.50'	**12.0" Round Culvert** L= 51.1' Ke= 0.500 Inlet / Outlet Invert= 39.50' / 38.50' S= 0.0196 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.59 cfs @ 11.98 hrs HW=40.46' (Free Discharge)
1=Culvert (Inlet Controls 2.59 cfs @ 3.34 fps)

Summary for Pond P12: PYD12

Inflow Area = 0.161 ac, 43.86% Impervious, Inflow Depth = 3.84" for 10-yr event
Inflow = 1.01 cfs @ 11.97 hrs, Volume= 0.051 af
Outflow = 1.01 cfs @ 11.97 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 11.97 hrs, Volume= 0.051 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 40.58' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	39.80'	**8.0" Round Culvert** L= 32.2' Ke= 0.500 Inlet / Outlet Invert= 39.80' / 39.60' S= 0.0062 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.98 cfs @ 11.97 hrs HW=40.56' (Free Discharge)
1=Culvert (Barrel Controls 0.98 cfs @ 3.08 fps)

Summary for Pond P13: YD13

Inflow Area = 0.102 ac, 24.01% Impervious, Inflow Depth = 3.27" for 10-yr event
Inflow = 0.57 cfs @ 11.97 hrs, Volume= 0.028 af
Outflow = 0.57 cfs @ 11.97 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.57 cfs @ 11.97 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 40.61' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	40.10'	**8.0" Round Culvert** L= 53.6' Ke= 0.500 Inlet / Outlet Invert= 40.10' / 39.80' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.55 cfs @ 11.97 hrs HW=40.60' (Free Discharge)
1=Culvert (Barrel Controls 0.55 cfs @ 2.71 fps)

Summary for Pond P14: YD14

Inflow Area = 0.266 ac, 27.84% Impervious, Inflow Depth = 1.56" for 10-yr event
Inflow = 1.46 cfs @ 11.99 hrs, Volume= 0.035 af
Outflow = 1.46 cfs @ 11.99 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min
Primary = 1.46 cfs @ 11.99 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 40.90' @ 11.99 hrs Surf.Area= 0 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (744.9 - 744.9)

Volume	Invert	Avail.Storage	Storage Description
#1	39.80'	1 cf	**0.67'D x 3.50'H Vertical Cone/Cylinder**
#2	43.30'	25 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		26 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
43.30	5	0	0
45.40	19	25	25

Device	Routing	Invert	Outlet Devices
#1	Primary	39.80'	**8.0" Round Culvert** L= 18.3' Ke= 0.500 Inlet / Outlet Invert= 39.80' / 39.60' S= 0.0109 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=1.42 cfs @ 11.99 hrs HW=40.87' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.42 cfs @ 4.07 fps)

Summary for Pond P19: PCB19

Inflow Area = 3.275 ac, 29.77% Impervious, Inflow Depth = 2.96" for 10-yr event
Inflow = 15.69 cfs @ 12.04 hrs, Volume= 0.806 af
Outflow = 13.42 cfs @ 12.09 hrs, Volume= 0.808 af, Atten= 14%, Lag= 3.3 min
Primary = 13.42 cfs @ 12.09 hrs, Volume= 0.808 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 26.74' @ 12.09 hrs Surf.Area= 2,290 sf Storage= 857 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (838.6 - 838.5)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	8 cf	**2.00'D x 2.50'H Vertical Cone/Cylinder**
#2	26.00'	7,510 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		7,518 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	20	0	0
27.00	3,100	1,560	1,560
28.00	8,800	5,950	7,510

Device	Routing	Invert	Outlet Devices
#1	Primary	23.50'	**18.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 23.50' / 16.90' S= 0.3300 '/' Cc= 0.900 n= 0.024, Flow Area= 1.77 sf

Primary OutFlow Max=13.37 cfs @ 12.09 hrs HW=26.72' (Free Discharge)
1=Culvert (Inlet Controls 13.37 cfs @ 7.56 fps)

Summary for Pond P2: PDMH2

Inflow Area = 0.836 ac, 53.97% Impervious, Inflow Depth = 4.10" for 10-yr event
Inflow = 5.55 cfs @ 11.97 hrs, Volume= 0.286 af
Outflow = 5.55 cfs @ 11.97 hrs, Volume= 0.286 af, Atten= 0%, Lag= 0.0 min
Primary = 5.55 cfs @ 11.97 hrs, Volume= 0.286 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 42.36' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	38.30'	**12.0" Round Culvert** L= 121.3' Ke= 0.500 Inlet / Outlet Invert= 38.30' / 37.70' S= 0.0049 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=5.39 cfs @ 11.97 hrs HW=42.17' (Free Discharge)
1=Culvert (Barrel Controls 5.39 cfs @ 6.86 fps)

Summary for Pond P3: PCB7

Inflow Area = 0.116 ac, 73.62% Impervious, Inflow Depth = 4.73" for 10-yr event
Inflow = 0.86 cfs @ 11.96 hrs, Volume= 0.046 af
Outflow = 0.86 cfs @ 11.96 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.1 min
Primary = 0.86 cfs @ 11.96 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 41.57' @ 11.96 hrs Surf.Area= 13 sf Storage= 6 cf

Plug-Flow detention time= 0.5 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (776.0 - 775.5)

Volume	Invert	Avail.Storage	Storage Description
#1	41.10'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	41.10'	**12.0" Round Culvert** L= 18.1' Ke= 0.500 Inlet / Outlet Invert= 41.10' / 39.70' S= 0.0773 '/' Cc= 0.900

n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 11.96 hrs HW=41.57' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.84 cfs @ 2.33 fps)

Summary for Pond P4: PDMH6

Inflow Area = 1.413 ac, 49.54% Impervious, Inflow Depth = 3.64" for 10-yr event
Inflow = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af
Outflow = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af, Atten= 0%, Lag= 0.0 min
Primary = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 40.63' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	37.60'	**15.0" Round Culvert** L= 61.4' Ke= 0.500 Inlet / Outlet Invert= 37.60' / 37.10' S= 0.0081 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=8.76 cfs @ 11.97 hrs HW=40.50' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 8.76 cfs @ 7.14 fps)

Summary for Pond P5: YD5

Inflow Area = 0.087 ac, 81.43% Impervious, Inflow Depth = 4.95" for 10-yr event
Inflow = 0.66 cfs @ 11.96 hrs, Volume= 0.036 af
Outflow = 0.66 cfs @ 11.96 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
Primary = 0.66 cfs @ 11.96 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 41.74' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	41.25'	**8.0" Round Culvert** L= 37.0' Ke= 0.500 Inlet / Outlet Invert= 41.25' / 40.60' S= 0.0176 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.64 cfs @ 11.96 hrs HW=41.73' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.64 cfs @ 2.37 fps)

Summary for Pond P55: PDMH16

Inflow Area = 1.413 ac, 49.54% Impervious, Inflow Depth = 3.64" for 10-yr event
Inflow = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af
Outflow = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af, Atten= 0%, Lag= 0.0 min
Primary = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Peak Elev= 39.95' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	37.00'	**15.0" Round Culvert** L= 73.9' Ke= 0.500 Inlet / Outlet Invert= 37.00' / 30.10' S= 0.0934 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=8.76 cfs @ 11.97 hrs HW=39.82' (Free Discharge)
1=Culvert (Inlet Controls 8.76 cfs @ 7.14 fps)

Summary for Pond P66: PDMH17

Inflow Area = 1.413 ac, 49.54% Impervious, Inflow Depth = 3.64" for 10-yr event
Inflow = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af
Outflow = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af, Atten= 0%, Lag= 0.0 min
Primary = 9.04 cfs @ 11.97 hrs, Volume= 0.429 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 33.13' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	30.00'	**15.0" Round Culvert** L= 52.4' Ke= 0.500 Inlet / Outlet Invert= 30.00' / 29.75' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=8.76 cfs @ 11.97 hrs HW=33.01' (Free Discharge)
1=Culvert (Barrel Controls 8.76 cfs @ 7.14 fps)

Summary for Pond P8: YD8

Inflow Area = 0.267 ac, 22.06% Impervious, Inflow Depth = 3.18" for 10-yr event
Inflow = 1.45 cfs @ 11.97 hrs, Volume= 0.071 af
Outflow = 1.45 cfs @ 11.97 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min
Primary = 1.45 cfs @ 11.97 hrs, Volume= 0.071 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 40.58' @ 11.97 hrs Surf.Area= 0 sf Storage= 1 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (821.1 - 821.1)

Volume	Invert	Avail.Storage	Storage Description
#1	38.85'	1 cf	**0.67'D x 3.00'H Vertical Cone/Cylinder**
#2	41.85'	28 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		29 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.85	5	0	0
42.00	374	28	28

Device	Routing	Invert	Outlet Devices
#1	Primary	38.85'	**8.0" Round Culvert** L= 91.6' Ke= 0.500 Inlet / Outlet Invert= 38.85' / 38.40' S= 0.0049 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=1.40 cfs @ 11.97 hrs HW=40.50' (Free Discharge)
1=Culvert (Barrel Controls 1.40 cfs @ 4.02 fps)

Summary for Pond P9: YD9

Inflow Area = 0.181 ac, 54.87% Impervious, Inflow Depth = 4.18" for 10-yr event
Inflow = 1.24 cfs @ 11.97 hrs, Volume= 0.063 af
Outflow = 1.24 cfs @ 11.97 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min
Primary = 1.24 cfs @ 11.97 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 41.38' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	40.50'	**8.0" Round Culvert** L= 25.3' Ke= 0.500 Inlet / Outlet Invert= 40.50' / 40.10' S= 0.0158 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=1.21 cfs @ 11.97 hrs HW=41.35' (Free Discharge)
1=Culvert (Inlet Controls 1.21 cfs @ 3.46 fps)

Summary for Pond RG1: Raingarden 1

Inflow Area = 0.241 ac, 28.46% Impervious, Inflow Depth = 3.47" for 10-yr event
Inflow = 1.41 cfs @ 11.97 hrs, Volume= 0.069 af
Outflow = 1.38 cfs @ 11.99 hrs, Volume= 0.065 af, Atten= 3%, Lag= 1.4 min
Discarded = 0.07 cfs @ 11.18 hrs, Volume= 0.038 af
Primary = 1.32 cfs @ 11.99 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 43.25' @ 11.99 hrs Surf.Area= 639 sf Storage= 591 cf

Plug-Flow detention time= 67.7 min calculated for 0.065 af (94% of inflow)
Center-of-Mass det. time= 34.7 min (848.2 - 813.5)

Volume	Invert	Avail.Storage	Storage Description
#1	39.75'	2,190 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.75	375	0.0	0	0
40.75	375	40.0	150	150
41.00	375	33.0	31	181
42.50	375	5.0	28	209
43.50	725	100.0	550	759
44.00	5,000	100.0	1,431	2,190

Device	Routing	Invert	Outlet Devices
#1	Primary	40.10'	**8.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 40.10' / 39.90' S= 0.0067 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	43.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	41.00'	**0.06 cfs Exfiltration when above 41.00'**

Discarded OutFlow Max=0.06 cfs @ 11.18 hrs HW=41.09' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.28 cfs @ 11.99 hrs HW=43.25' (Free Discharge)
└**1=Culvert** (Passes 1.28 cfs of 2.70 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 1.28 cfs @ 1.63 fps)

Summary for Pond RG2: Raingarden 2

Inflow Area = 2.460 ac, 38.71% Impervious, Inflow Depth = 3.48" for 10-yr event
Inflow = 13.32 cfs @ 12.00 hrs, Volume= 0.714 af
Outflow = 12.34 cfs @ 12.04 hrs, Volume= 0.610 af, Atten= 7%, Lag= 2.3 min
Primary = 12.34 cfs @ 12.04 hrs, Volume= 0.610 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 30.21' @ 12.04 hrs Surf.Area= 3,627 sf Storage= 6,943 cf

Plug-Flow detention time= 103.9 min calculated for 0.610 af (85% of inflow)
Center-of-Mass det. time= 37.1 min (840.0 - 802.9)

Volume	Invert	Avail.Storage	Storage Description
#1	25.50'	10,027 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.50	2,200	0.0	0	0
26.50	2,200	40.0	880	880
26.75	2,200	33.0	182	1,062
28.25	2,200	5.0	165	1,227
31.00	4,200	100.0	8,800	10,027

Device	Routing	Invert	Outlet Devices
#1	Primary	24.50'	**15.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 24.50' / 23.60' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	29.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	30.25'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=12.08 cfs @ 12.04 hrs HW=30.20' (Free Discharge)
- **1=Culvert** (Passes 12.08 cfs of 13.31 cfs potential flow)
  - **2=Orifice/Grate** (Weir Controls 12.08 cfs @ 2.74 fps)
- **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link PA-1: Point of Analysis #1

Inflow Area = 4.078 ac, 27.52% Impervious, Inflow Depth = 2.99" for 10-yr event
Inflow = 16.07 cfs @ 12.07 hrs, Volume= 1.017 af
Primary = 16.07 cfs @ 12.07 hrs, Volume= 1.017 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1: PDA-1 Runoff Area=6,608 sf 74.79% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=91 Runoff=0.68 cfs 0.035 af

Subcatchment S10: PDA-10 Runoff Area=1,486 sf 54.98% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=87 Runoff=0.14 cfs 0.007 af

Subcatchment S11: PDA-11 Runoff Area=2,542 sf 78.68% Impervious Runoff Depth=2.93"
Tc=6.0 min CN=93 Runoff=0.27 cfs 0.014 af

Subcatchment S12: PDA-12 Runoff Area=4,457 sf 24.01% Impervious Runoff Depth=1.65"
Tc=6.0 min UI Adjusted CN=78 Runoff=0.29 cfs 0.014 af

Subcatchment S13: PDA-13 Runoff Area=3,110 sf 70.03% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=91 Runoff=0.32 cfs 0.016 af

Subcatchment S14: PDA-14 Runoff Area=1,122 sf 22.01% Impervious Runoff Depth=1.72"
Tc=6.0 min CN=79 Runoff=0.08 cfs 0.004 af

Subcatchment S15: PDA-15 Runoff Area=10,477 sf 28.46% Impervious Runoff Depth=1.80"
Tc=6.0 min CN=80 Runoff=0.74 cfs 0.036 af

Subcatchment S16: PDA-16 Runoff Area=35,485 sf 2.78% Impervious Runoff Depth=1.38"
Tc=12.0 min CN=74 Runoff=1.58 cfs 0.094 af

Subcatchment S17: PRE-DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=1.45"
Tc=6.0 min CN=75 Runoff=1.84 cfs 0.088 af

Subcatchment S7: PDA-7 Runoff Area=45,596 sf 24.08% Impervious Runoff Depth=1.65"
Tc=12.0 min UI Adjusted CN=78 Runoff=2.45 cfs 0.144 af

Subcatchment S8: PDA-8 Runoff Area=11,622 sf 22.06% Impervious Runoff Depth=1.58"
Tc=6.0 min CN=77 Runoff=0.73 cfs 0.035 af

Subcatchment S9: PDA-9 Runoff Area=7,898 sf 54.87% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=87 Runoff=0.72 cfs 0.036 af

Subcatchment SA: PDA-A Runoff Area=3,785 sf 81.43% Impervious Runoff Depth=3.03"
Tc=6.0 min CN=94 Runoff=0.42 cfs 0.022 af

Subcatchment SB: PDA-B Runoff Area=6,514 sf 72.72% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=91 Runoff=0.67 cfs 0.034 af

Subcatchment SC: PDA-C Runoff Area=5,057 sf 73.62% Impervious Runoff Depth=2.83"
Tc=6.0 min CN=92 Runoff=0.53 cfs 0.027 af

Reach 1R: PRE TREATEMNT SWALE Avg. Flow Depth=0.36' Max Vel=2.58 fps Inflow=4.69 cfs 0.234 af
n=0.025 L=100.0' S=0.0100 '/' Capacity=32.11 cfs Outflow=4.55 cfs 0.234 af

Reach 2R: Exeter River Avg. Flow Depth=0.25' Max Vel=2.67 fps Inflow=7.58 cfs 0.456 af
n=0.015 L=500.0' S=0.0050 '/' Capacity=542.58 cfs Outflow=6.95 cfs 0.456 af

Pond 1P: PCB3 Peak Elev=40.88' Storage=7 cf Inflow=1.09 cfs 0.056 af
12.0" Round Culvert n=0.012 L=17.2' S=0.0116 '/' Outflow=1.08 cfs 0.056 af

Pond 2P: YD4 Peak Elev=41.29' Storage=0 cf Inflow=1.09 cfs 0.056 af
8.0" Round Culvert n=0.012 L=7.1' S=0.0141 '/' Outflow=1.09 cfs 0.056 af

Pond 5P: Exist High-St SD Peak Elev=31.68' Inflow=0.32 cfs 0.016 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=0.32 cfs 0.016 af

Pond P1: PCB1 Peak Elev=40.02' Storage=5 cf Inflow=0.68 cfs 0.035 af
12.0" Round Culvert n=0.012 L=83.4' S=0.0144 '/' Outflow=0.68 cfs 0.035 af

Pond P10: PAD10 Peak Elev=38.93' Storage=2 cf Inflow=1.04 cfs 0.045 af
12.0" Round Culvert n=0.012 L=30.0' S=0.0233 '/' Outflow=1.04 cfs 0.045 af

Pond P11: PAD11 Peak Elev=40.03' Storage=2 cf Inflow=1.04 cfs 0.045 af
12.0" Round Culvert n=0.012 L=51.1' S=0.0196 '/' Outflow=1.04 cfs 0.045 af

Pond P12: PYD12 Peak Elev=40.31' Inflow=0.56 cfs 0.028 af
8.0" Round Culvert n=0.012 L=32.2' S=0.0062 '/' Outflow=0.56 cfs 0.028 af

Pond P13: YD13 Peak Elev=40.45' Inflow=0.29 cfs 0.014 af
8.0" Round Culvert n=0.012 L=53.6' S=0.0056 '/' Outflow=0.29 cfs 0.014 af

Pond P14: YD14 Peak Elev=40.26' Storage=0 cf Inflow=0.55 cfs 0.010 af
8.0" Round Culvert n=0.012 L=18.3' S=0.0109 '/' Outflow=0.55 cfs 0.010 af

Pond P19: PCB19 Peak Elev=24.84' Storage=4 cf Inflow=6.54 cfs 0.368 af
18.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=6.55 cfs 0.368 af

Pond P2: PDMH2 Peak Elev=39.93' Inflow=3.21 cfs 0.161 af
12.0" Round Culvert n=0.012 L=121.3' S=0.0049 '/' Outflow=3.21 cfs 0.161 af

Pond P3: PCB7 Peak Elev=41.46' Storage=5 cf Inflow=0.53 cfs 0.027 af
12.0" Round Culvert n=0.012 L=18.1' S=0.0773 '/' Outflow=0.53 cfs 0.027 af

Pond P4: PDMH6 Peak Elev=38.88' Inflow=4.69 cfs 0.234 af
15.0" Round Culvert n=0.012 L=61.4' S=0.0081 '/' Outflow=4.69 cfs 0.234 af

Pond P5: YD5 Peak Elev=41.62' Inflow=0.42 cfs 0.022 af
8.0" Round Culvert n=0.012 L=37.0' S=0.0176 '/' Outflow=0.42 cfs 0.022 af

Pond P55: PDMH16 Peak Elev=38.24' Inflow=4.69 cfs 0.234 af
15.0" Round Culvert n=0.012 L=73.9' S=0.0934 '/' Outflow=4.69 cfs 0.234 af

Pond P66: PDMH17 Peak Elev=31.44' Inflow=4.69 cfs 0.234 af
15.0" Round Culvert n=0.012 L=52.4' S=0.0048 '/' Outflow=4.69 cfs 0.234 af

Pond P8: YD8 Peak Elev=39.47' Storage=0 cf Inflow=0.73 cfs 0.035 af
8.0" Round Culvert n=0.012 L=91.6' S=0.0049 '/' Outflow=0.73 cfs 0.035 af

Pond P9: YD9 Peak Elev=41.02' Inflow=0.72 cfs 0.036 af
8.0" Round Culvert n=0.012 L=25.3' S=0.0158 '/' Outflow=0.72 cfs 0.036 af

Pond RG1: Raingarden 1 Peak Elev=43.13' Storage=516 cf Inflow=0.74 cfs 0.036 af
Discarded=0.06 cfs 0.025 af Primary=0.50 cfs 0.007 af Outflow=0.56 cfs 0.032 af

Pond RG2: Raingarden 2 Peak Elev=29.90' Storage=5,830 cf Inflow=6.81 cfs 0.378 af
Outflow=5.10 cfs 0.274 af

Link PA-1: Point of Analysis #1 Inflow=7.01 cfs 0.472 af
Primary=7.01 cfs 0.472 af

Total Runoff Area = 4.078 ac Runoff Volume = 0.606 af Average Runoff Depth = 1.78"
72.48% Pervious = 2.956 ac 27.52% Impervious = 1.122 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1: PDA-1 Runoff Area=6,608 sf 74.79% Impervious Runoff Depth=6.13"
Tc=6.0 min CN=91 Runoff=1.45 cfs 0.077 af

Subcatchment S10: PDA-10 Runoff Area=1,486 sf 54.98% Impervious Runoff Depth=5.66"
Tc=6.0 min CN=87 Runoff=0.31 cfs 0.016 af

Subcatchment S11: PDA-11 Runoff Area=2,542 sf 78.68% Impervious Runoff Depth=6.36"
Tc=6.0 min CN=93 Runoff=0.57 cfs 0.031 af

Subcatchment S12: PDA-12 Runoff Area=4,457 sf 24.01% Impervious Runoff Depth=4.65"
Tc=6.0 min UI Adjusted CN=78 Runoff=0.80 cfs 0.040 af

Subcatchment S13: PDA-13 Runoff Area=3,110 sf 70.03% Impervious Runoff Depth=6.13"
Tc=6.0 min CN=91 Runoff=0.68 cfs 0.036 af

Subcatchment S14: PDA-14 Runoff Area=1,122 sf 22.01% Impervious Runoff Depth=4.76"
Tc=6.0 min CN=79 Runoff=0.21 cfs 0.010 af

Subcatchment S15: PDA-15 Runoff Area=10,477 sf 28.46% Impervious Runoff Depth=4.87"
Tc=6.0 min CN=80 Runoff=1.96 cfs 0.098 af

Subcatchment S16: PDA-16 Runoff Area=35,485 sf 2.78% Impervious Runoff Depth=4.21"
Tc=12.0 min CN=74 Runoff=4.84 cfs 0.286 af

Subcatchment S17: PRE-DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=4.32"
Tc=6.0 min CN=75 Runoff=5.37 cfs 0.263 af

Subcatchment S7: PDA-7 Runoff Area=45,596 sf 24.08% Impervious Runoff Depth=4.65"
Tc=12.0 min UI Adjusted CN=78 Runoff=6.81 cfs 0.405 af

Subcatchment S8: PDA-8 Runoff Area=11,622 sf 22.06% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=77 Runoff=2.04 cfs 0.101 af

Subcatchment S9: PDA-9 Runoff Area=7,898 sf 54.87% Impervious Runoff Depth=5.66"
Tc=6.0 min CN=87 Runoff=1.65 cfs 0.086 af

Subcatchment SA: PDA-A Runoff Area=3,785 sf 81.43% Impervious Runoff Depth=6.48"
Tc=6.0 min CN=94 Runoff=0.85 cfs 0.047 af

Subcatchment SB: PDA-B Runoff Area=6,514 sf 72.72% Impervious Runoff Depth=6.13"
Tc=6.0 min CN=91 Runoff=1.43 cfs 0.076 af

Subcatchment SC: PDA-C Runoff Area=5,057 sf 73.62% Impervious Runoff Depth=6.24"
Tc=6.0 min CN=92 Runoff=1.12 cfs 0.060 af

Reach 1R: PRE TREATEMNT SWALE Avg. Flow Depth=0.61' Max Vel=3.45 fps Inflow=12.14 cfs 0.590 af
n=0.025 L=100.0' S=0.0100 '/' Capacity=32.11 cfs Outflow=12.01 cfs 0.590 af

Reach 2R: Exeter River Avg. Flow Depth=0.45' Max Vel=3.83 fps Inflow=18.94 cfs 1.446 af
n=0.015 L=500.0' S=0.0050 '/' Capacity=542.58 cfs Outflow=18.55 cfs 1.446 af

Pond 1P: PCB3 Peak Elev=41.23' Storage=12 cf Inflow=2.27 cfs 0.123 af
12.0" Round Culvert n=0.012 L=17.2' S=0.0116 '/' Outflow=2.27 cfs 0.123 af

Pond 2P: YD4 Peak Elev=42.66' Storage=1 cf Inflow=2.28 cfs 0.123 af
8.0" Round Culvert n=0.012 L=7.1' S=0.0141 '/' Outflow=2.27 cfs 0.123 af

Pond 5P: Exist High-St SD Peak Elev=31.81' Inflow=0.68 cfs 0.036 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=0.68 cfs 0.036 af

Pond P1: PCB1 Peak Elev=40.24' Storage=8 cf Inflow=1.45 cfs 0.077 af
12.0" Round Culvert n=0.012 L=83.4' S=0.0144 '/' Outflow=1.44 cfs 0.077 af

Pond P10: PAD10 Peak Elev=39.85' Storage=5 cf Inflow=3.71 cfs 0.142 af
12.0" Round Culvert n=0.012 L=30.0' S=0.0233 '/' Outflow=3.71 cfs 0.142 af

Pond P11: PAD11 Peak Elev=40.95' Storage=5 cf Inflow=3.71 cfs 0.142 af
12.0" Round Culvert n=0.012 L=51.1' S=0.0196 '/' Outflow=3.71 cfs 0.142 af

Pond P12: PYD12 Peak Elev=40.98' Inflow=1.37 cfs 0.071 af
8.0" Round Culvert n=0.012 L=32.2' S=0.0062 '/' Outflow=1.37 cfs 0.071 af

Pond P13: YD13 Peak Elev=40.75' Inflow=0.80 cfs 0.040 af
8.0" Round Culvert n=0.012 L=53.6' S=0.0056 '/' Outflow=0.80 cfs 0.040 af

Pond P14: YD14 Peak Elev=41.61' Storage=1 cf Inflow=2.05 cfs 0.056 af
8.0" Round Culvert n=0.012 L=18.3' S=0.0109 '/' Outflow=2.05 cfs 0.056 af

Pond P19: PCB19 Peak Elev=27.43' Storage=3,444 cf Inflow=20.93 cfs 1.177 af
18.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=15.18 cfs 1.182 af

Pond P2: PDMH2 Peak Elev=45.18' Inflow=7.38 cfs 0.387 af
12.0" Round Culvert n=0.012 L=121.3' S=0.0049 '/' Outflow=7.38 cfs 0.387 af

Pond P3: PCB7 Peak Elev=41.65' Storage=7 cf Inflow=1.12 cfs 0.060 af
12.0" Round Culvert n=0.012 L=18.1' S=0.0773 '/' Outflow=1.12 cfs 0.060 af

Pond P4: PDMH6 Peak Elev=42.46' Inflow=12.14 cfs 0.590 af
15.0" Round Culvert n=0.012 L=61.4' S=0.0081 '/' Outflow=12.14 cfs 0.590 af

Pond P5: YD5 Peak Elev=41.84' Inflow=0.85 cfs 0.047 af
8.0" Round Culvert n=0.012 L=37.0' S=0.0176 '/' Outflow=0.85 cfs 0.047 af

Pond P55: PDMH16 Peak Elev=41.82' Inflow=12.14 cfs 0.590 af
15.0" Round Culvert n=0.012 L=73.9' S=0.0934 '/' Outflow=12.14 cfs 0.590 af

Pond P66: PDMH17 Peak Elev=34.84' Inflow=12.14 cfs 0.590 af
15.0" Round Culvert n=0.012 L=52.4' S=0.0048 '/' Outflow=12.14 cfs 0.590 af

Pond P8: YD8 Peak Elev=42.03' Storage=29 cf Inflow=2.04 cfs 0.101 af
8.0" Round Culvert n=0.012 L=91.6' S=0.0049 '/' Outflow=2.03 cfs 0.101 af

Pond P9: YD9 Peak Elev=41.79' Inflow=1.65 cfs 0.086 af
8.0" Round Culvert n=0.012 L=25.3' S=0.0158 '/' Outflow=1.65 cfs 0.086 af

Pond RG1: Raingarden 1 Peak Elev=43.32' Storage=633 cf Inflow=1.96 cfs 0.098 af
Discarded=0.06 cfs 0.048 af Primary=1.85 cfs 0.045 af Outflow=1.91 cfs 0.093 af

Pond RG2: Raingarden 2 Peak Elev=30.47' Storage=7,900 cf Inflow=18.27 cfs 0.995 af
Outflow=16.09 cfs 0.891 af

Link PA-1: Point of Analysis #1 Inflow=18.90 cfs 1.482 af
Primary=18.90 cfs 1.482 af

Total Runoff Area = 4.078 ac Runoff Volume = 1.633 af Average Runoff Depth = 4.80"
72.48% Pervious = 2.956 ac 27.52% Impervious = 1.122 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1: PDA-1 Runoff Area=6,608 sf 74.79% Impervious Runoff Depth=7.55"
Tc=6.0 min CN=91 Runoff=1.76 cfs 0.095 af

Subcatchment S10: PDA-10 Runoff Area=1,486 sf 54.98% Impervious Runoff Depth=7.06"
Tc=6.0 min CN=87 Runoff=0.38 cfs 0.020 af

Subcatchment S11: PDA-11 Runoff Area=2,542 sf 78.68% Impervious Runoff Depth=7.79"
Tc=6.0 min CN=93 Runoff=0.69 cfs 0.038 af

Subcatchment S12: PDA-12 Runoff Area=4,457 sf 24.01% Impervious Runoff Depth=5.98"
Tc=6.0 min UI Adjusted CN=78 Runoff=1.02 cfs 0.051 af

Subcatchment S13: PDA-13 Runoff Area=3,110 sf 70.03% Impervious Runoff Depth=7.55"
Tc=6.0 min CN=91 Runoff=0.83 cfs 0.045 af

Subcatchment S14: PDA-14 Runoff Area=1,122 sf 22.01% Impervious Runoff Depth=6.10"
Tc=6.0 min CN=79 Runoff=0.26 cfs 0.013 af

Subcatchment S15: PDA-15 Runoff Area=10,477 sf 28.46% Impervious Runoff Depth=6.22"
Tc=6.0 min CN=80 Runoff=2.46 cfs 0.125 af

Subcatchment S16: PDA-16 Runoff Area=35,485 sf 2.78% Impervious Runoff Depth=5.49"
Tc=12.0 min CN=74 Runoff=6.28 cfs 0.373 af

Subcatchment S17: PRE-DA-4 Runoff Area=31,900 sf 13.32% Impervious Runoff Depth=5.61"
Tc=6.0 min CN=75 Runoff=6.91 cfs 0.343 af

Subcatchment S7: PDA-7 Runoff Area=45,596 sf 24.08% Impervious Runoff Depth=5.98"
Tc=12.0 min UI Adjusted CN=78 Runoff=8.67 cfs 0.521 af

Subcatchment S8: PDA-8 Runoff Area=11,622 sf 22.06% Impervious Runoff Depth=5.86"
Tc=6.0 min CN=77 Runoff=2.61 cfs 0.130 af

Subcatchment S9: PDA-9 Runoff Area=7,898 sf 54.87% Impervious Runoff Depth=7.06"
Tc=6.0 min CN=87 Runoff=2.03 cfs 0.107 af

Subcatchment SA: PDA-A Runoff Area=3,785 sf 81.43% Impervious Runoff Depth=7.91"
Tc=6.0 min CN=94 Runoff=1.03 cfs 0.057 af

Subcatchment SB: PDA-B Runoff Area=6,514 sf 72.72% Impervious Runoff Depth=7.55"
Tc=6.0 min CN=91 Runoff=1.73 cfs 0.094 af

Subcatchment SC: PDA-C Runoff Area=5,057 sf 73.62% Impervious Runoff Depth=7.67"
Tc=6.0 min CN=92 Runoff=1.36 cfs 0.074 af

Reach 1R: PRE TREATEMNT SWALE Avg. Flow Depth=0.68' Max Vel=3.68 fps Inflow=15.22 cfs 0.744 af
n=0.025 L=100.0' S=0.0100 '/' Capacity=32.11 cfs Outflow=14.91 cfs 0.744 af

Reach 2R: Exeter River Avg. Flow Depth=0.48' Max Vel=4.00 fps Inflow=21.35 cfs 1.876 af
n=0.015 L=500.0' S=0.0050 '/' Capacity=542.58 cfs Outflow=20.85 cfs 1.876 af

Pond 1P: PCB3 Peak Elev=41.38' Storage=14 cf Inflow=2.76 cfs 0.151 af
12.0" Round Culvert n=0.012 L=17.2' S=0.0116 '/' Outflow=2.75 cfs 0.151 af

Pond 2P: YD4 Peak Elev=43.52' Storage=1 cf Inflow=2.76 cfs 0.151 af
8.0" Round Culvert n=0.012 L=7.1' S=0.0141 '/' Outflow=2.76 cfs 0.151 af

Pond 5P: Exist High-St SD Peak Elev=31.85' Inflow=0.83 cfs 0.045 af
18.0" Round Culvert n=0.012 L=300.0' S=0.0047 '/' Outflow=0.83 cfs 0.045 af

Pond P1: PCB1 Peak Elev=40.32' Storage=9 cf Inflow=1.76 cfs 0.095 af
12.0" Round Culvert n=0.012 L=83.4' S=0.0144 '/' Outflow=1.76 cfs 0.095 af

Pond P10: PAD10 Peak Elev=40.39' Storage=6 cf Inflow=4.64 cfs 0.186 af
12.0" Round Culvert n=0.012 L=30.0' S=0.0233 '/' Outflow=4.64 cfs 0.186 af

Pond P11: PAD11 Peak Elev=41.49' Storage=6 cf Inflow=4.64 cfs 0.186 af
12.0" Round Culvert n=0.012 L=51.1' S=0.0196 '/' Outflow=4.64 cfs 0.186 af

Pond P12: PYD12 Peak Elev=41.36' Inflow=1.70 cfs 0.089 af
8.0" Round Culvert n=0.012 L=32.2' S=0.0062 '/' Outflow=1.70 cfs 0.089 af

Pond P13: YD13 Peak Elev=40.90' Inflow=1.02 cfs 0.051 af
8.0" Round Culvert n=0.012 L=53.6' S=0.0056 '/' Outflow=1.02 cfs 0.051 af

Pond P14: YD14 Peak Elev=42.47' Storage=1 cf Inflow=2.57 cfs 0.077 af
8.0" Round Culvert n=0.012 L=18.3' S=0.0109 '/' Outflow=2.57 cfs 0.077 af

Pond P19: PCB19 Peak Elev=27.93' Storage=6,953 cf Inflow=27.15 cfs 1.534 af
18.0" Round Culvert n=0.024 L=20.0' S=0.3300 '/' Outflow=16.33 cfs 1.534 af

Pond P2: PDMH2 Peak Elev=48.69' Inflow=9.23 cfs 0.484 af
12.0" Round Culvert n=0.012 L=121.3' S=0.0049 '/' Outflow=9.23 cfs 0.484 af

Pond P3: PCB7 Peak Elev=41.72' Storage=8 cf Inflow=1.36 cfs 0.074 af
12.0" Round Culvert n=0.012 L=18.1' S=0.0773 '/' Outflow=1.35 cfs 0.074 af

Pond P4: PDMH6 Peak Elev=44.75' Inflow=15.22 cfs 0.744 af
15.0" Round Culvert n=0.012 L=61.4' S=0.0081 '/' Outflow=15.22 cfs 0.744 af

Pond P5: YD5 Peak Elev=41.95' Inflow=1.03 cfs 0.057 af
8.0" Round Culvert n=0.012 L=37.0' S=0.0176 '/' Outflow=1.03 cfs 0.057 af

Pond P55: PDMH16 Peak Elev=44.15' Inflow=15.22 cfs 0.744 af
15.0" Round Culvert n=0.012 L=73.9' S=0.0934 '/' Outflow=15.22 cfs 0.744 af

Pond P66: PDMH17 Peak Elev=37.13' Inflow=15.22 cfs 0.744 af
15.0" Round Culvert n=0.012 L=52.4' S=0.0048 '/' Outflow=15.22 cfs 0.744 af

Pond P8: YD8 Peak Elev=44.58' Storage=29 cf Inflow=2.61 cfs 0.130 af
8.0" Round Culvert n=0.012 L=91.6' S=0.0049 '/' Outflow=2.77 cfs 0.130 af

Pond P9: YD9 Peak Elev=42.28' Inflow=2.03 cfs 0.107 af
8.0" Round Culvert n=0.012 L=25.3' S=0.0158 '/' Outflow=2.03 cfs 0.107 af

Pond RG1: Raingarden 1 Peak Elev=43.38' Storage=673 cf Inflow=2.46 cfs 0.125 af
Discarded=0.06 cfs 0.056 af Primary=2.32 cfs 0.064 af Outflow=2.38 cfs 0.120 af

Pond RG2: Raingarden 2 Peak Elev=30.67' Storage=8,698 cf Inflow=22.94 cfs 1.265 af
Outflow=20.88 cfs 1.161 af

Link PA-1: Point of Analysis #1 Inflow=21.33 cfs 1.921 af
Primary=21.33 cfs 1.921 af

Total Runoff Area = 4.078 ac Runoff Volume = 2.086 af Average Runoff Depth = 6.14"
72.48% Pervious = 2.956 ac 27.52% Impervious = 1.122 ac

SECTION 11

STORMWATER INSPECTION AND MAINTENANCE MANUAL

STORMWATER MANAGEMENT
INSPECTION AND MAINTENANCE MANUAL

FOR

Phillips Exeter Academy
High Street Faculty Neighborhood Development

35 High Street, 8 Gilman Lane, & 10 Gilman Lane
(Tax Map 71, Lots 117-119)
Exeter, NH

Proper inspection, maintenance, and repair are key elements in maintaining a successful stormwater management program on a developed property. Routine inspections ensure permit compliance and reduce the potential for deterioration of infrastructure or reduced water quality. The following responsible parties shall be in charge of managing the stormwater facilities:

RESPONSIBLE PARTIES:

Owner: *Phillips Exeter Academy*
Name *Company* *Phone*

Inspection and Maintenance : _____
Name *Phone*

NOTE: Inspection and maintenance responsibilities transfer to future property owners.

Included in this Inspection and Maintenance Manual are the following components:

- Drainage Features and Site BMP Functions and Maintenance Descriptions
- Regular Inspection and Maintenance Guidance for Bioretention Systems
- Checklists for Inspection of Bioretention Systems
- Guidelines for Control of Invasive Species
- Stormwater System Operations and Maintenance Report Form
- Site Grading and Drainage Plan

RAINGARDENS AND INFILTRATION BASINS (BIORETENTION SYSTEMS)

Function – Raingardens and infiltration ponds provide treatment to runoff prior to directing it to stormwater systems by filtering sediment and suspended solids, trapping them in the bottom of the garden and in the filter media itself. Additional treatment is provided by the native water-tolerant vegetation which removes nutrients and other pollutants through bio-uptake. Stormwater detention and infiltration can also be provided as the filtering process slows runoff, decreases the peak rate of discharge and promotes groundwater recharge.

Detention ponds temporarily store runoff and allow for its controlled release during and after a storm event, decreasing peak rates of runoff and minimizing flooding.

Raingardens, infiltration ponds, and detention ponds shall be managed (Per AGR 3800 and RSA 430:53) to: prevent and control the spread of invasive plant, insect, and fungal species; minimize the adverse environmental and economic effects invasive species cause to agriculture, forests, wetlands, wildlife, and other natural resources of the state; and protect the public from potential health problems attributed to certain invasive species.

Maintenance

- Reference attached "Regular Inspection and Maintenance Guidance for Bioretention Systems / Tree Filters
- Inspect annually and after significant rainfall event.
- If a raingarden does not completely drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore its filtration and/or infiltration function(s), including but not limited to removal of accumulated sediments and/or replacement or reconstruction of the filter media.
- Replace any riprap dislodged from spillways, inlets and outlets.
- Remove any obstructions, litter and accumulated sediment or debris as warranted but no less than once a year.
- Mowing of any grassed area in or adjacent to a raingarden shall be performed on a monthly basis (when areas are not inundated) to keep the vegetation in vigorous condition. The cut grass shall be removed to prevent the decaying organic litter from clogging the filter media or choking other vegetation.
- Select vegetation should be maintained in healthy condition. This may include pruning, removal and replacement of dead or diseased vegetation.
- Remove any invasive species, Per AGR 3800 and RSA 430:53.

POROUS PAVERS

Function – Porous pavement (Pavers) is designed to capture rainwater runoff containing suspended solids, nutrients and pollutants. Proper maintenance of porous pavement is crucial for ensuring its longevity and functionality to infiltrate runoff.

Maintenance

- Reference attached "Regular Inspection and Maintenance Guidance for Permeable Pavements
- New porous pavement shall be inspected several times in the first month after construction and at least annually thereafter. Inspections shall be conducted after major storms to check for surface ponding that might indicate possible clogging.
- Inspect annually for pavement deterioration or spalling.
- Vacuum sweeping shall be performed once a year or as needed to maintain permeability. Power washing may be required prior to vacuum sweeping to dislodge trapped particles.
- Sand and abrasives shall not be used for winter maintenance, as they will clog the pores; de-icing materials shall be used instead.
- Never reseal or repave with impermeable materials. If the porous pavement is damaged, it can be repaired using conventional, non-porous patching mixes as long as the cumulative area repaired does not exceed 10 percent of the paved area.

CULVERTS AND DRAINAGE PIPES

Function – Culverts and drainage pipes convey stormwater away from buildings, walkways, and parking areas and to surface waters or closed drainage systems.

Maintenance

- Culverts and drainage pipes shall be inspected semi-annually, or more often as needed, for accumulation of debris and structural integrity. Leaves and other debris shall be removed from the inlet and outlet to insure the functionality of drainage structures. Debris shall be disposed of on site where it will not concentrate back at the drainage structures or at a solid waste disposal facility.
- Riprap Areas - Culvert outlets and inlets shall be inspected during annual maintenance and operations for erosion and scour. If scour or creek erosion is identified, the outlet owner shall take appropriate means to prevent further erosion. Increased lengths of riprap may require a NHDES Wetlands Permit modification.

CATCH BASINS

Function – Catch basins collect stormwater, primarily from paved surfaces and roofs. Stormwater from paved areas often contains sediment and contaminants. Catch basin sumps serve to trap sediment, trace metals, nutrients and debris. Hooded catch basins trap hydrocarbons and floating debris.

Maintenance

- Remove leaves and debris from structure grates on an as-needed basis.
- Sumps shall be inspected and cleaned (as needed) on an annual basis to protect water quality and infiltration capacity. Catch basin debris shall be disposed of at a solid waste disposal facility.

DRIP EDGES

Function – Drip edges are to provide erosion control of surface where impervious surfaces meet non-impervious surfaces, such as building or roadway edges.

Maintenance

- Drip edges should be inspected annually for erosion, rutting, and migration of stone. Any areas experiencing erosion shall be properly maintained by replacing or adding additional stone to the area of concern.

LANDSCAPED AREAS - FERTILIZER MANAGEMENT

Function – Fertilizer management involves controlling the rate, timing and method of fertilizer application so that the nutrients are taken up by the plants thereby reducing the chance of polluting the surface and ground waters. Fertilizer management can be effective in reducing the amounts of phosphorus and nitrogen in runoff from landscaped areas, particularly lawns.

NOTE: SLOW OR CONTROLLED RELEASE FERTILIZE IS REQUIRED WITHIN THE 250 FOOT SHORELAND PROTECTION AREA. SEE PLANS FOR LOCATIONS.

Maintenance

- Have the soil tested by your landscaper or local Soil Conservation Service for nutrient requirements and follow the recommendations.
- Do not apply fertilizer to frozen ground.
- Clean up any fertilizer spills.
- Do not allow fertilizer to be broadcast into water bodies.
- When fertilizing a lawn, water thoroughly, but do not create a situation where water runs off the surface of the lawn.

LANDSCAPED AREAS - LITTER CONTROL

Function – Landscaped areas tend to filter debris and contaminates that may block drainage systems and pollute the surface and ground waters.

Maintenance

- Litter Control and lawn maintenance involves removing litter such as trash, leaves, lawn clippings, pet wastes, oil and chemicals from streets, parking lots, and lawns before materials are transported into surface waters.
- Litter control shall be implemented as part of the grounds maintenance program.

CONTROL OF INVASIVE PLANTS

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described as noted below and as described in the UNH Guidelines for Control of Invasive Species in these appendix.

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

GENERAL CLEAN UP

Upon completion of the project, the contractor shall remove all temporary stormwater structures (i.e., temporary stone check dams, silt fence, temporary diversion swales, catch basin inlet basket, etc.). Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform to the existing grade, prepared, and seeded. Remove any sediment in catch basins and clean drain pipes that may have accumulated during construction.

Once in operation, all paved areas of the site should be swept at least once annually, preferably at the end of winter prior to significant spring rains.

APPENDIX

A. BIORETENTION SYSETMS
    a. REGULAR INSPECTION AND MAINTENANCE GUIDANCE
    b. CHECKLIST FOR INSPECTION

B. GUIDELINES FOR CONTROL OF INVASIVE SPECIES

C. STORMWATER SYSTEM OPERATIONS AND MAINTENANCE REPORT

D. GRADING AND DRAINAGE PLANS

Regular Inspection and Maintenance Guidance for Bioretention Systems / Tree Filters

Maintenance of bioretention systems and tree filters can typically be performed as part of standard landscaping. Regular inspection and maintenance is critical to the effective operation of bioretention systems and tree filters to insure they remain clear of leaves and debris and free draining. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less frequent maintenance needs depending on a variety of factors including but not limited to: the occurrence of large storm events, overly wet or dry periods, regional hydrologic conditions, and the upstream land use.

ACTIVITIES

The most common maintenance activity is the removal of sediment and organic debris from the system and bypass structures. Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system, including infiltration rate and nutrient uptake. Vegetation care is important to system productivity and health.

ACTIVITY	FREQUENCY
CLOGGING AND SYSTEM PERFORMANCE	
A record should be kept of the time to drain for the system completely after a storm event. The system should drain completely within 72 hours.	After every major storm in the first few months, then annually at minimum.
Check to insure the filter surface remains well draining after storm events. **Remedy**: If filter bed is clogged, draining poorly, or standing water covers more than 50% of the surface 48 hours after a precipitation event, then remove top few inches of discolored material. Till, or rake remaining material as needed.	
Check inlets and outlets for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet and overflow if obstructed.	Quarterly initially, annually as a minimum thereafter.
Check for animal burrows and short-circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets, outlets, sidewalls.	
VEGETATION	
Check for robust vegetation coverage throughout the system and dead or dying plants. **Remedy:** Vegetation should cover > 75% of the system and should be cared for as needed.	Annually or as needed

CHECKLIST FOR INSPECTION OF BIORETENTION SYSTEM / TREE FILTERS

Location:
Inspector:
Date:
Time:
Site Conditions:
Days Since Last Rain Event:

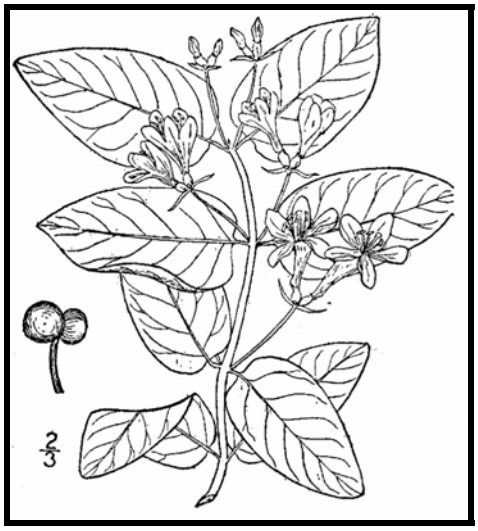
Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
1. Initial Inspection After Planting and Mulching		
Plants are stable, roots not exposed	**S** **U**	
Surface is at design level, no evidence of preferential flow/shoving	**S** **U**	
Inlet and outlet/bypass are functional	**S** **U**	
2. Debris Cleanup (1 time/year minimum, Spring/Fall)		
Litter, leaves, and dead vegetation removed from the system	**S** **U**	
Prune/mow vegetation	**S** **U**	
3. Standing Water (1 time/year and/or after large storm events)		
No evidence of standing water after 24-48 hours since rainfall	**S** **U**	
4. Vegetation Condition and Coverage		
Vegetation condition good with good coverage (typically > 75%)	**S** **U**	
5. Other Issues		
Note any additional issues not previously covered.	**S** **U**	

Corrective Action Needed	Due Date
1.	
2.	
3.	
Inspector Signature	**Date**

UNIVERSITY of NEW HAMPSHIRE COOPERATIVE EXTENSION

Methods for Disposing Non-Native Invasive Plants

Prepared by the Invasives Species Outreach Group, volunteers interested in helping people control invasive plants. Assistance provided by the Piscataquog Land Conservancy and the NH Invasives Species Committee. Edited by Karen Bennett, Extension Forestry Professor and Specialist.



Tatarian honeysuckle
Lonicera tatarica
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*. Vol. 3: 282.

Non-native invasive plants crowd out natives in natural and managed landscapes. They cost taxpayers billions of dollars each year from lost agricultural and forest crops, decreased biodiversity, impacts to natural resources and the environment, and the cost to control and eradicate them.

Invasive plants grow well even in less than desirable conditions such as sandy soils along roadsides, shaded wooded areas, and in wetlands. In ideal conditions, they grow and spread even faster. There are many ways to remove these non-native invasives, but once removed, care is needed to dispose the removed plant material so the plants don't grow where disposed.

Knowing how a particular plant reproduces indicates its method of spread and helps determine the appropriate disposal method. Most are spread by seed and are dispersed by wind, water, animals, or people. Some reproduce by vegetative means from pieces of stems or roots forming new plants. Others spread through both seed and vegetative means.

Because movement and disposal of viable plant parts is restricted (see NH Regulations), viable invasive parts can't be brought to most transfer stations in the state. Check with your transfer station to see if there is an approved, designated area for invasives disposal. This fact sheet gives recommendations for rendering plant parts non-viable.

Control of invasives is beyond the scope of this fact sheet. For information about control visit www.nhinvasives.org or contact your UNH Cooperative Extension office.

New Hampshire Regulations

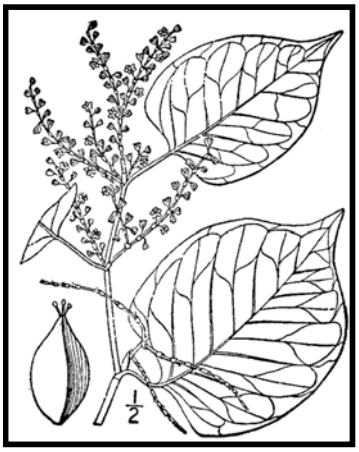
Prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable. (Agr. 3802.04)

No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, listed in Table 3800.1 of the New Hampshire prohibited invasive species list. (Agr 3802.01)

How and When to Dispose of Invasives?

To prevent seed from spreading remove invasive plants before seeds are set (produced). Some plants continue to grow, flower and set seed even after pulling or cutting. Seeds can remain viable in the ground for many years. If the plant has flowers or seeds, place the flowers and seeds in a heavy plastic bag "head first" at the weeding site and transport to the disposal site. The following are general descriptions of disposal methods. See the chart for recommendations by species.

Burning: Large woody branches and trunks can be used as firewood or burned in piles. For outside burning, a written fire permit from the local forest fire warden is required unless the ground is covered in snow. Brush larger than 5 inches in diameter can't be burned. Invasive plants with easily airborne seeds like black swallow-wort with mature seed pods (indicated by their brown color) shouldn't be burned as the seeds may disperse by the hot air created by the fire.



Japanese knotweed
Polygonum cuspidatum
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*. Vol. 1: 676.

Bagging (solarization): Use this technique with softer-tissue plants. Use heavy black or clear plastic bags (contractor grade), making sure that no parts of the plants poke through. Allow the bags to sit in the sun for several weeks and on dark pavement for the best effect.

Tarping and Drying: Pile material on a sheet of plastic and cover with a tarp, fastening the tarp to the ground and monitoring it for escapes. Let the material dry for several weeks, or until it is clearly nonviable.

Chipping: Use this method for woody plants that don't reproduce vegetatively.

Burying: This is risky, but can be done with watchful diligence. Lay thick plastic in a deep pit before placing the cut up plant material in the hole. Place the material away from the edge of the plastic before covering it with more heavy plastic. Eliminate as much air as possible and toss in soil to weight down the material in the pit. Note that the top of the buried material should be at least three feet underground. Japanese knotweed should be at least 5 feet underground!

Drowning: Fill a large barrel with water and place soft-tissue plants in the water. Check after a few weeks and look for rotted plant material (roots, stems, leaves, flowers). Well-rotted plant material may be composted. A word of caution- seeds may still be viable after using this method. Do this before seeds are set. This method isn't used often. Be prepared for an awful stink!

Composting: Invasive plants can take root in compost. Don't compost any invasives unless you know there is no viable (living) plant material left. Use one of the above techniques (bagging, tarping, drying, chipping, or drowning) to render the plants nonviable before composting. Closely examine the plant before composting and avoid composting seeds.

Be diligent looking for seedlings for *years* in areas where removal and disposal took place.

Suggested Disposal Methods for Non-Native Invasive Plants

This table provides information concerning the disposal of removed invasive plant material. If the infestation is treated with herbicide and left in place, these guidelines don't apply. Don't bring invasives to a local transfer station, unless there is a designated area for their disposal, or they have been rendered non-viable. This listing includes wetland and upland plants from the New Hampshire Prohibited Invasive Species List. The disposal of aquatic plants isn't addressed.

<table>
<tr><th>Woody Plants</th><th>Method of Reproducing</th><th>Methods of Disposal</th></tr>
<tr><td rowspan="2">Norway maple
(Acer platanoides)
European barberry
(Berberis vulgaris)
Japanese barberry
(Berberis thunbergii)
autumn olive
(Elaeagnus umbellata)
burning bush
(Euonymus alatus)
Morrow's honeysuckle
(Lonicera morrowii)
Tatarian honeysuckle
(Lonicera tatarica)
showy bush honeysuckle
(Lonicera x bella)
common buckthorn
(Rhamnus cathartica)
glossy buckthorn
(Frangula alnus)</td><td rowspan="2">Fruit and Seeds
  </td><td>Prior to fruit/seed ripening
Seedlings and small plants
▪ Pull or cut and leave on site with roots exposed. No special care needed.
Larger plants
▪ Use as firewood.
▪ Make a brush pile.
▪ Chip.
▪ Burn.</td></tr>
<tr><td>After fruit/seed is ripe
Don't remove from site.
▪ Burn.
▪ Make a covered brush pile.
▪ Chip once all fruit has dropped from branches.
▪ Leave resulting chips on site and monitor.</td></tr>
<tr><td rowspan="2">oriental bittersweet
(Celastrus orbiculatus)
multiflora rose
(Rosa multiflora)</td><td rowspan="2">Fruits, Seeds, Plant Fragments
  </td><td>Prior to fruit/seed ripening
Seedlings and small plants
▪ Pull or cut and leave on site with roots exposed. No special care needed.
Larger plants
▪ Make a brush pile.
▪ Burn.</td></tr>
<tr><td>After fruit/seed is ripe
Don't remove from site.
▪ Burn.
▪ Make a covered brush pile.
▪ Chip – only after material has fully dried (1 year) and all fruit has dropped from branches. Leave resulting chips on site and monitor.</td></tr>
</table>

Non-Woody Plants	Method of Reproducing	Methods of Disposal
garlic mustard *(Alliaria petiolata)* spotted knapweed *(Centaurea maculosa)* ▪ Sap of related knapweed can cause skin irritation and tumors. Wear gloves when handling. black swallow-wort *(Cynanchum nigrum)* ▪ May cause skin rash. Wear gloves and long sleeves when handling. pale swallow-wort *(Cynanchum rossicum)* giant hogweed *(Heracleum mantegazzianum)* ▪ Can cause major skin rash. Wear gloves and long sleeves when handling. dame's rocket *(Hesperis matronalis)* perennial pepperweed *(Lepidium latifolium)* purple loosestrife *(Lythrum salicaria)* Japanese stilt grass *(Microstegium vimineum)* mile-a-minute weed *(Polygonum perfoliatum)*	**Fruits and Seeds** 	**Prior to flowering** Depends on scale of infestation Small infestation ▪ Pull or cut plant and leave on site with roots exposed. Large infestation ▪ Pull or cut plant and pile. (You can pile onto or cover with plastic sheeting). ▪ Monitor. Remove any re-sprouting material. **During and following flowering** Do nothing until the following year or remove flowering heads and bag and let rot. Small infestation ▪ Pull or cut plant and leave on site with roots exposed. Large infestation ▪ Pull or cut plant and pile remaining material. (You can pile onto plastic or cover with plastic sheeting). ▪ Monitor. Remove any re-sprouting material.
common reed (*Phragmites australis*) Japanese knotweed *(Polygonum cuspidatum)* Bohemian knotweed *(Polygonum x bohemicum)*	**Fruits, Seeds, Plant Fragments** Primary means of spread in these species is by plant parts. Although all care should be given to preventing the dispersal of seed during control activities, the presence of seed doesn't materially influence disposal activities.	**Small infestation** ▪ Bag all plant material and let rot. ▪ Never pile and use resulting material as compost. ▪ Burn. **Large infestation** ▪ Remove material to unsuitable habitat (dry, hot and sunny or dry and shaded location) and scatter or pile. ▪ Monitor and remove any sprouting material. ▪ Pile, let dry, and burn.

January 2010

Inspection & Maintenance Checklist

BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance/ Cleanout Threshold
Paved surfaces:			
Pavement Sweeping	Routinely	N/A	N/A
Litter & Trash Removal	Routinely	N/A	Parcel will be free of litter/trash.
Deicing Agents	N/A	Keep De-Icing Log	**Low Salt**
Closed Drainage System:			
Drainage Pipes	1 time per 2 years	Check for sediment accumulation & clogging.	Less than 2" sediment depth
Catch Basins	Annually	Check for sediment accumulation (Less than 24" sediment), blocked hood, and floating debris.	Clean Sumps. Remove all floating debris.
Drain Manhole	Annually	Check for sediment, debris, and obstructions.	Remove all Obstructions.

BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
BMPs:			
Raingardens or Infiltration Pond	Annually	• Check infiltration rates and filter media. • Check for trash & debris. • Check for sediment buildup. • Check for vegetation stability. • Check for excess woody vegetation growth. • Check for invasive species.	Remove trash & debris, sediment, woody vegetation, and invasive species. Side slopes and berm are to be mowed. Replant vegetation if required.
Vegetated Swale	Annually	Check for sediment buildup, vegetation loss and invasive species, debris, and damage.	Remove sediment, debris and invasive species, repair damage, and mow grass monthly to a depth of 4 inches.
Riprap Outlet Protection	Annually	Check for sediment buildup and structure damage.	Remove excess sediment and repair damage.
Stone Berm Level Spreader	Annually	Check for sediment buildup, debris and signs of erosion.	Remove sediment and debris. Immediately repair.

STORM WATER SYSTEM OPERATION AND MAINTENANCE REPORT

General Information		
Project Name		
Owner		
Inspector's Name(s)		
Inspector's Contact Information		
Date of Inspection	**Start Time:**	**End Time:**
Type of Inspection: ☐ Annual Report ☐ Post-storm event ☐ Due to a discharge of significant amounts of sediment		
Notes:		

General Site Questions and Discharges of Significant Amounts of Sediment			
Subject		**Status**	**Notes**
A discharge of significant amounts of sediment may be indicated by (but is not limited to) observations of the following. Note whether any are observed during this inspection:			*Notes/ Action taken:*
1	Do the current site conditions reflect the attached site plan?	❑Yes ❑No	
2	Is the site permanently stabilized, temporary erosion and sediment controls are removed, and stormwater discharges from construction activity are eliminated?	❑Yes ❑No	
3	Is there evidence of the discharge of significant amounts of sediment to surface waters, or conveyance systems leading to surface waters?	❑Yes ❑No	
4	Is there evidence of concentrated flows of stormwater such as rills or channels that cause erosion when such flows are not filtered, settled or otherwise treated to remove sediment?	❑Yes ❑No	
5	Is there evidence of deposits of sediment from the site on any adjacent property or stormwater system.	❑Yes ❑No	
6	Is there evidence of discharges from the site to streams running through or along the site where visual observations indicate significant amounts of sediment present in them.	❑Yes ❑No	
7	Is there evidence of invasive species within the stormwater treatment areas?	❑Yes ❑No	

Permit Coverage and Plans				
#	BMP/Facility	Inspected	Corrective Action Needed and Notes	Date Corrected
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		☐Yes ☐No		
		☐Yes ☐No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		

POA #1
(EXETER RIVER)

HIGH STREET (ROUTE 27/108)

PORTSMOUTH AVENUE (ROUTE 108)

OFF-SITE FLOW (TO EXETER RIVER)

POA #1
(EXETER RIVER)

SITE DEVELOPMENT AREA

NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM NAD 83

LEGEND

- PROPERTY LINE
- WETLAND/SOILS BOUNDARY
- 60 EXISTING CONTOUR
- EXISTING PAVEMENT/CURB
- EXISTING TREELINE
- WATERSHED BOUNDARY
- Tc PATH
- OFF SITE FLOW PATH
- SURFACE FLOW DIRECTION
- 1 1 1 SUBCATCHMENT/POND/REACH
- POA POINT OF ANALYSIS

GRAPHIC SCALE
20 0 10 20 40
(IN FEET)

P5075

CASE #22-02

TOWN OF EXETER PROJECT REFERENCE

ENGINEER:

ALTUS ENGINEERING, INC.

133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

THIS DRAWING HAS NOT BEEN RELEASED FOR CONSTRUCTION

ISSUED FOR:
DRAINAGE STUDY

ISSUE DATE:
FEBRUARY 8, 2022

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	INITIAL SUBMITTAL	CDB	02/08/22

DRAWN BY: RLH
APPROVED BY: CDB
DRAWING FILE: 5075SITE.DWG

SCALE:
(24"x36") 1"=20'

OWNER/APPLICANT:

SIGILL. PHILLIP EXONIENSIS ACADEMIA NOV HAN 1781 FINIS ORIGINE PENDET XAPITI GEOT

Phillips Exeter Academy
20 Main Street
Exeter, NH 03833

PROJECT:
PHILLIPS EXETER ACADEMY

HIGH STREET FACULTY NEIGHBORHOOD

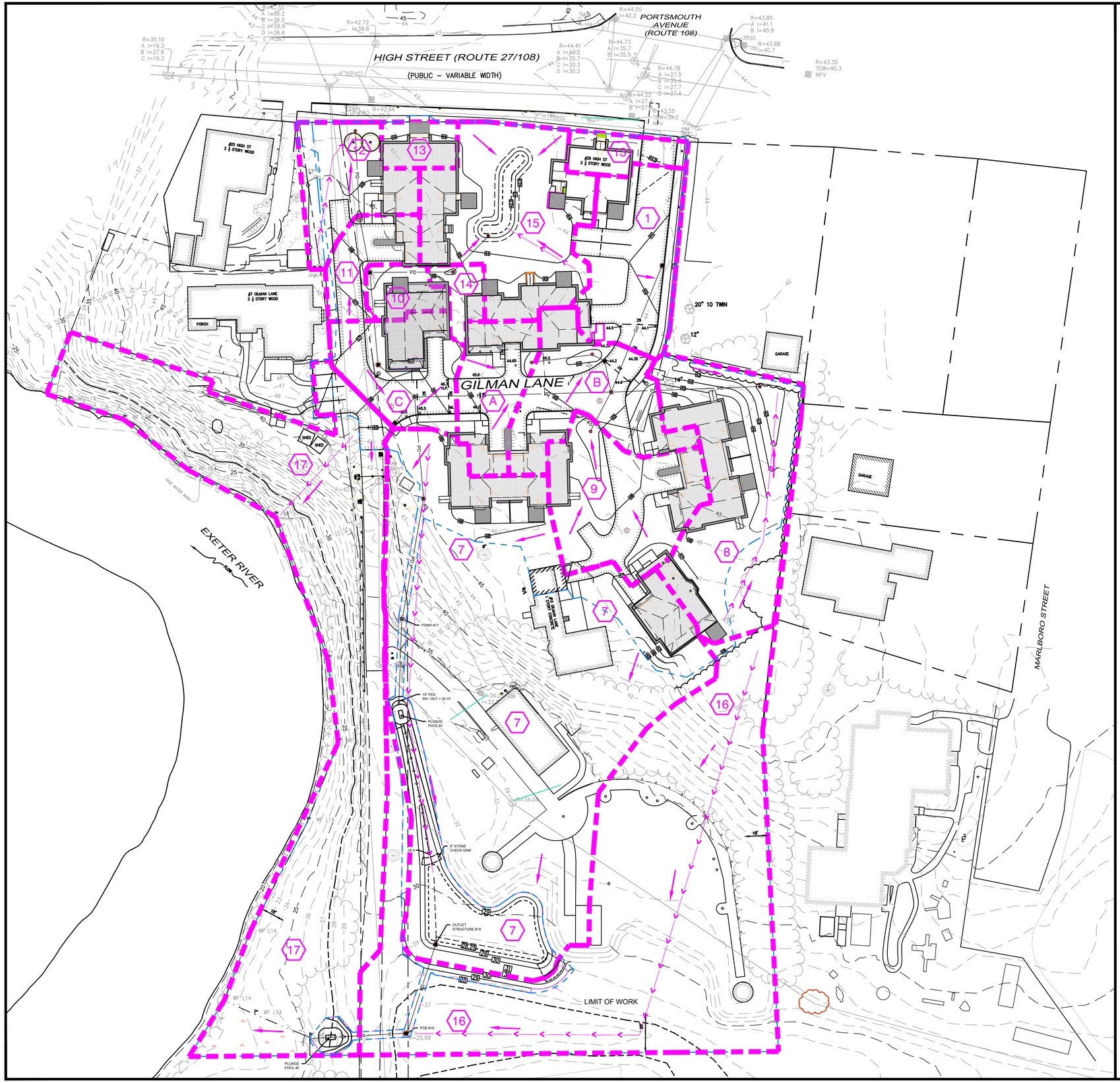
TAX MAP 71, LOTS 117-119
EXETER, NH 03833

TITLE:

PRE-DEVELOPMENT WATERSHED PLAN

SHEET NUMBER:

W1.1



NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM NAD 83

CASE #22-02

TOWN OF EXETER PROJECT REFERENCE

LEGEND

- PROPERTY LINE
- WETLAND/SOILS BOUNDARY
- 60 EXISTING CONTOUR
- EXISTING PAVEMENT/CURB
- EXISTING TREELINE
- WATERSHED BOUNDARY
- Tc PATH
- SURFACE FLOW DIRECTION
- 1 / A / 1 SUBCATCHMENT/POND/REACH
- POA POINT OF ANALYSIS

GRAPHIC SCALE

30 0 15 30 60

(IN FEET)

P5075

ENGINEER:

ALTUS ENGINEERING, INC.

133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

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ISSUED FOR: DRAINAGE STUDY

ISSUE DATE: FEBRUARY 8, 2022

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	INITIAL SUBMITTAL	CDB	02/08/22

DRAWN BY: RLH
APPROVED BY: CDB
DRAWING FILE: 5075SITE.DWG

SCALE: (24"x36") 1"=30'

OWNER/APPLICANT:

Phillips Exeter Academy
20 Main Street
Exeter, NH 03833

PROJECT:

PHILLIPS EXETER ACADEMY

HIGH STREET FACULTY NEIGHBORHOOD

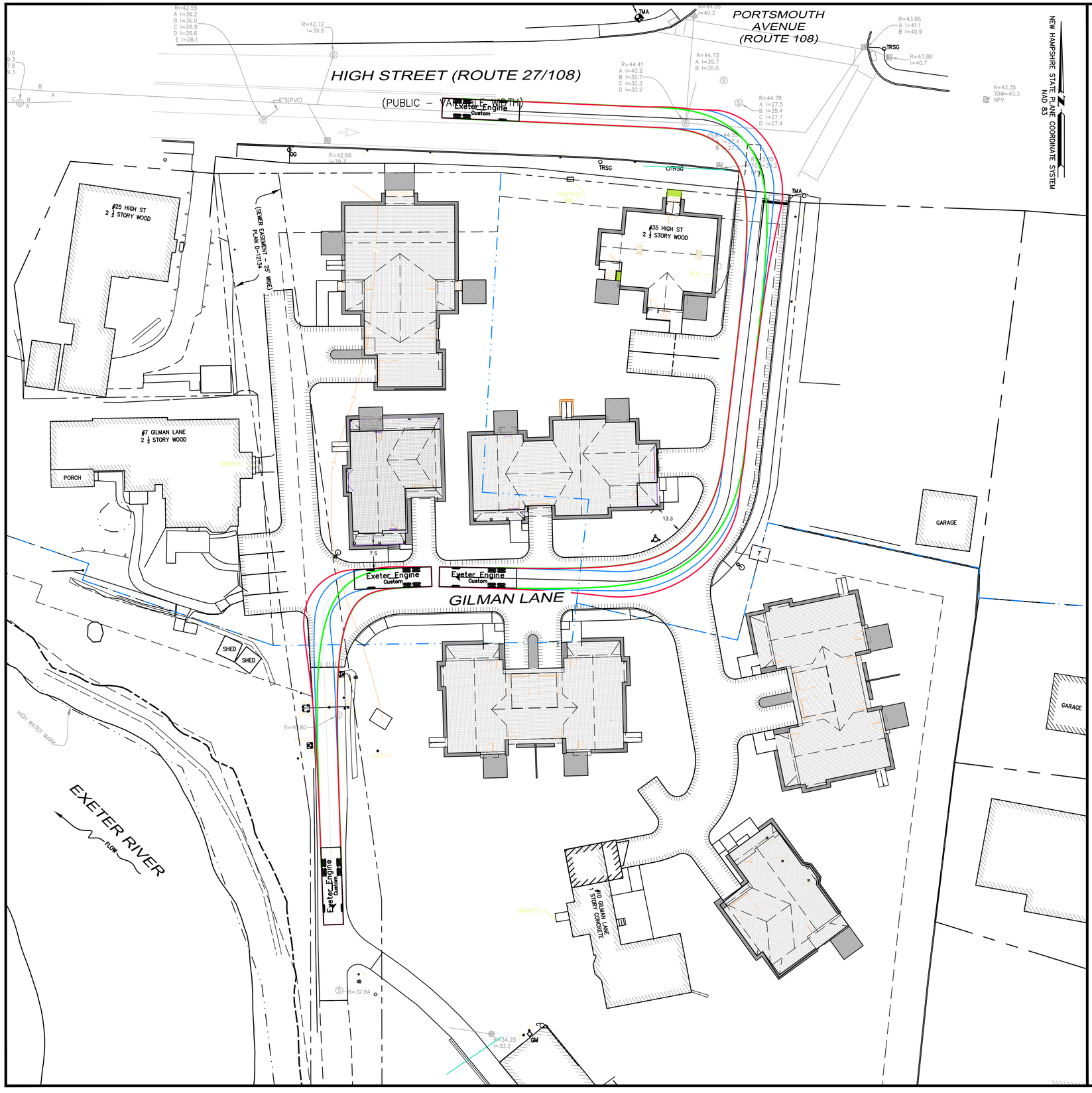
EXETER, NH 03833

TITLE:

POST-DEVELOPMENT WATERSHED PLAN

SHEET NUMBER:

W2.1



GRAPHIC SCALE

20 0 10 20 40

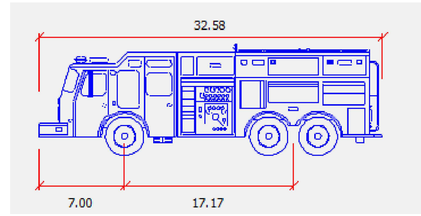
(IN FEET)

CASE #22-02

TOWN OF EXETER PROJECT REFERENCE

APPROVED FOR THE RECORD:

EXETER PLANNING BOARD *DATE*



ENGINE TRUCK – EXETER

ENGINEER:

ALTUS ENGINEERING, INC.

133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

ARCHITECT:

MARKET SQUARE ARCHITECTS

104 Congress Street
Suite 203
Portsmouth, NH 03801
(603) 501-0202

THIS DRAWING HAS NOT BEEN RELEASED FOR CONSTRUCTION

ISSUED FOR:

SITE PLAN REVIEW

ISSUE DATE:

FEBRUARY 14, 2022

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	INITIAL SUBMITTAL	CDB	02/14/22

DRAWN BY: RLH
APPROVED BY: CDB
DRAWING FILE: 5075SITE.DWG

SCALE: (24"x36") 1"=20'

OWNER/APPLICANT:

Phillips Exeter Academy
20 Main Street
Exeter, NH 03833

PROJECT:

PHILLIPS EXETER ACADEMY

HIGH STREET FACULTY NEIGHBORHOOD

TAX MAP 71, LOTS 117-119
EXETER, NH 03833

TITLE:

TRUCK TURNING - ENGINE TRUCK

SHEET NUMBER:

EX-2

P5075

EMERGENCY USE ENTRANCE

HIGH STREET (ROUTE 27/108)

(PUBLIC – VARIABLE WIDTH)

PORTSMOUTH AVENUE (ROUTE 108)

NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM NAD 83

#25 HIGH ST 2 ½ STORY WOOD

#35 HIGH ST 2 ½ STORY WOOD

#7 GILMAN LANE 2 ½ STORY WOOD

PORCH

GARAGE

GARAGE

GARAGE

#10 GILMAN LANE 1 STORY CONCRETE

SHED

SHED

GILMAN LANE

RELOCATE GATE CONTROL PANEL

EXETER RIVER

flow

HIGH WATER MARK

ASSIGNED EASEMENT - 25' WIDE PLAN D-42434

6"S(PVC)

GRANITE

CAMERA

CONTROL PNL

M/L

Inferno Custom

TMA

TRSG

OTRSG

GM

GRAPHIC SCALE

20 0 10 20 40

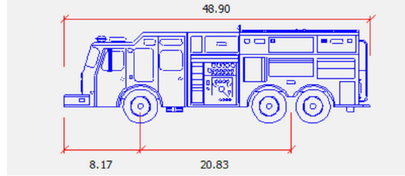
(IN FEET)

CASE #22-02

TOWN OF EXETER PROJECT REFERENCE

APPROVED FOR THE RECORD:

EXETER PLANNING BOARD DATE



INFERNO – FIRE PUMPER TRUCK

P5075

ENGINEER:
ALTUS ENGINEERING, INC.
133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

ARCHITECT:
MARKET SQUARE ARCHITECTS
104 Congress Street
Suite 203
Portsmouth, NH 03801
(603) 501-0202

THIS DRAWING HAS NOT BEEN RELEASED FOR CONSTRUCTION

ISSUED FOR: SITE PLAN REVIEW

ISSUE DATE: FEBRUARY 14, 2022

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	INITIAL SUBMITTAL	CDB	02/14/22

DRAWN BY: RLH
APPROVED BY: CDB
DRAWING FILE: 5075SITE.DWG

SCALE: (24"x36") 1"=20'

OWNER/APPLICANT:
Phillips Exeter Academy
20 Main Street
Exeter, NH 03833

PROJECT:
PHILLIPS EXETER ACADEMY
HIGH STREET FACULTY NEIGHBORHOOD
TAX MAP 71, LOTS 117-119
EXETER, NH 03833

TITLE:
TRUCK TURNING - FIRE TRUCK

SHEET NUMBER:
EX-1

ALTUS ENGINEERING, INC.

Civil
Site Planning
Environmental
Engineering

133 Court Street
Portsmouth, NH
03801-4413

DRAINAGE MEMO
(For Bioretention ISR)

High Street Faculty Neighborhood Development

35 High Street, 8 Gilman Lane, & 10 Gilman Lane
Tax Map 71, Lots 117-119

This supplemental Drainage Memo is intended to address the associated drainage design and modelling revisions for the use of the Enhanced Bioretention with Internal Storage Reservoir (ISR) Stormwater treatment system. During the municipal review of the project, the applicant was requested to increase the phosphorus and nitrogen removal rates from the site due to the proximity to the Exeter River. Gravel wetlands were recommended for consideration because of the high P&N removal rates. Due to the proximity to the Observatory, ballfields, and trails, the applicant would like to consider the use of the ISR, which is similar to a bioretention raingarden with a top media layer that can be seeded and will blend more seamlessly in with the environment.

The UNH Stormwater Center has produced the following performance curves that can be found in Appendix F of the 2017 NH Small MS4 General Permit (MS4). As indicated in the curve, the ISR has shown higher P&N removal rates than the gravel wetland treatment system.

Figure 3-15: BMP Performance Curve: Enhanced Bio-filtration with Internal Storage Reservoir (ISR)
BMP Performance Table

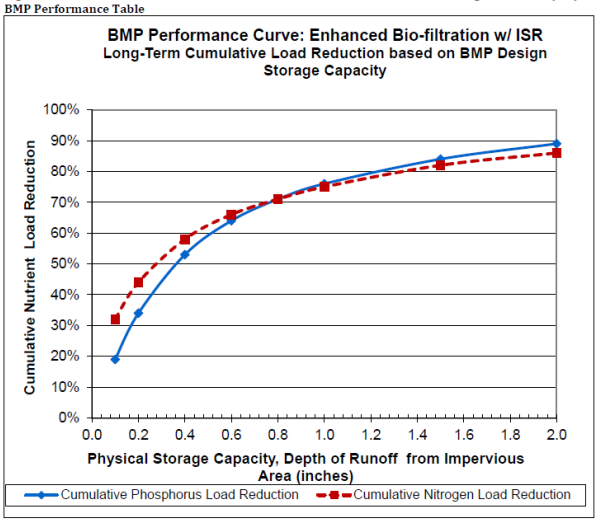
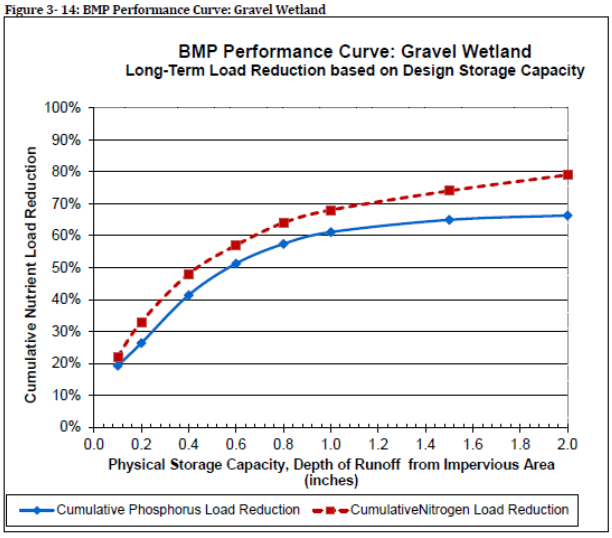


Figure 3- 14: BMP Performance Curve: Gravel Wetland



The previously proposed Bioretention raingarden and the ISR system both have an 18-inche rock base and 18-inches of filter media. The primary difference between the two systems is that there is an impermeable liner in the ISR system and the outlet pipe is raised. This forces a longer travel path for the stormwater and a saturation zone in the storage (reservoir) area which increases nitrogen and phosphorus removal.

The ISR system has been updated in the drainage model and the following table illustrates the results compared to the initial modeling of the standard raingarden.

Stormwater Modeling Summary
Peak Q (cfs) for Type III 24-Hour Storm Events

	2-Yr Storm (3.70 inch)	10-Yr Storm (5.65 inch)	25-Yr Storm (7.19 inch)	50-Yr Storm (8.63 inch)
POA #1 (Exeter River)				
Pre-Development	7.38	16.25	21.91	26.69
~~Post- Development (Raingarden)~~	~~7.01~~	~~16.07~~	~~18.90~~	~~21.33~~
Post-Development (ISR)	6.10	15.15	18.00	20.63

As the above table demonstrates, the proposed peak rates of runoff are slightly lower with the IRS system and continue to provide a decrease compared to the pre-development conditions.

Based on the performance curves from the UNH Stormwater Center for the ISR pollutant removals and the modeling results for the system, Altus recommends the ISR system for use in this condition to meet the conditions for increased pollutant removals and stormwater management.

Attachments:

- ISR BMP Worksheet
- Standard Bioretention ISR Detail

Cory D. Belden, PE

BIORETENTION SYSTEM WITH INTERNAL STORAGE RESERVOIR
(UNH Stormwater Center Specification)

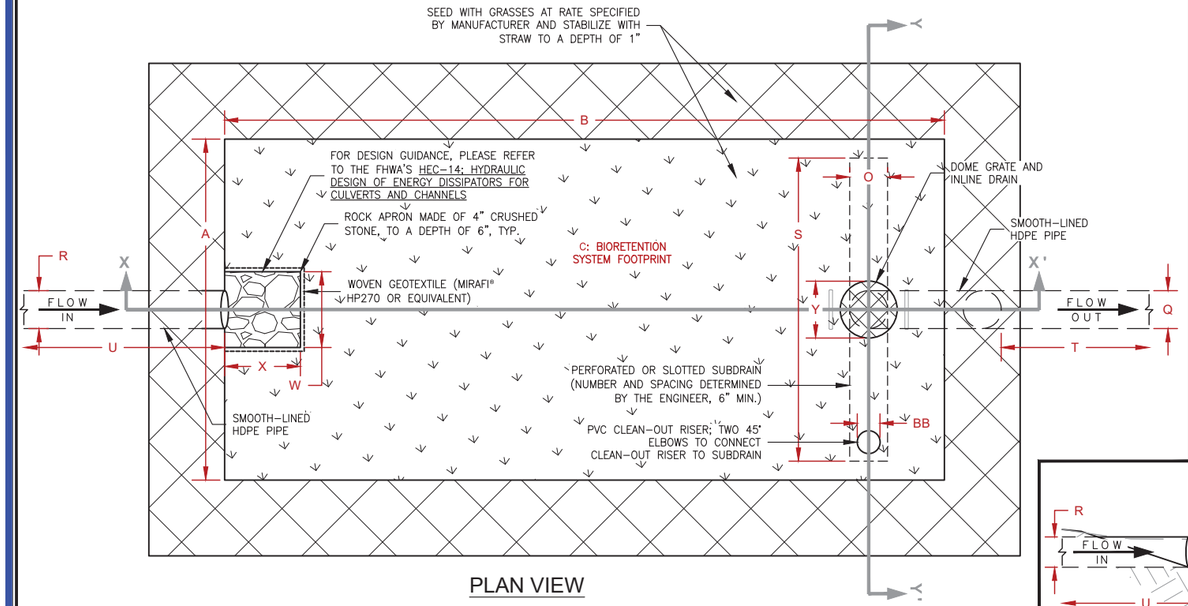
Type/Node Name: **Bioretention ISR (Node RG2)**

Enter the node name in the drainage analysis if applicable.

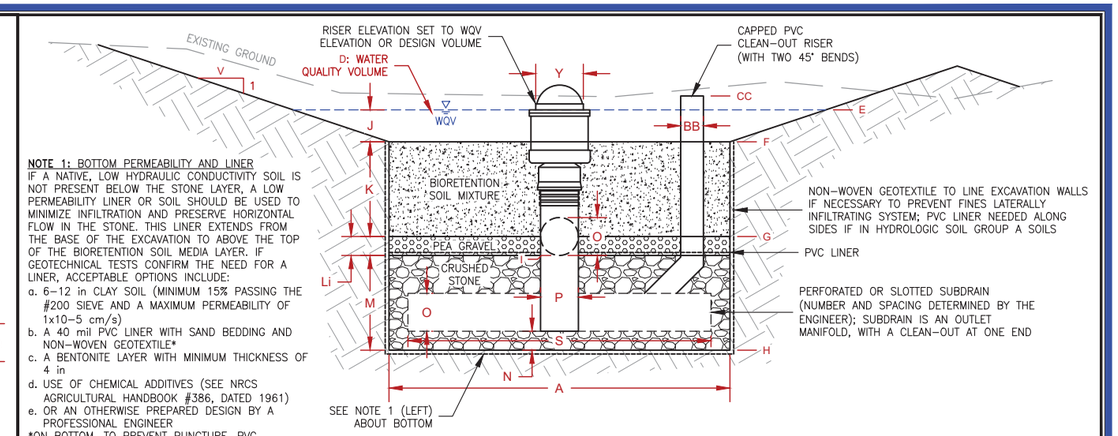
2.46	ac	A = Area draining to the practice	
0.95	ac	A_I = Impervious area draining to the practice	
0.39	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.40	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.98	ac-in	WQV= 1" x Rv x A	
3,550	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
355	cf	10% x WQV (check calc for sediment forebay)	
888	cf	25% x WQV (check calc for water stored in saturated zone)	
deep sumps/swale		Method of Pretreatment	
	cf	If pretrt is sed forebay: V_{SED} (sediment forebay volume)	**≥ 10%WQV**
4,545	cf	Volume below lowest orifice[1]	**≥ 100%WQV**
1,100	cf	Water stored in voids of saturated zone	**≥ 26%WQV**
0.08	cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec)[2]	
29.01	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.04	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**< $2Q_{WQV}$**
49.31	hours	T_{ED} = Drawdown time of extended detention = 2WQV/Q_{WQV}	**≥ 24-hrs**
18.00	in	Depth of Filter Media	**≥ 18"**
3.00	:1	Pond side slopes	**≥ 3:1**
N/A		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of ≤6")?	
30.85	ft	Peak elevation of the 50-year storm event (E_{50})	
31.00	ft	Berm elevation of the pond	
YES		E_{50} ≤ the berm elevation?	**← yes**

1. Volume stored above the wetland soil and below the high flow by-pass.

Designer's Notes:



PLAN VIEW



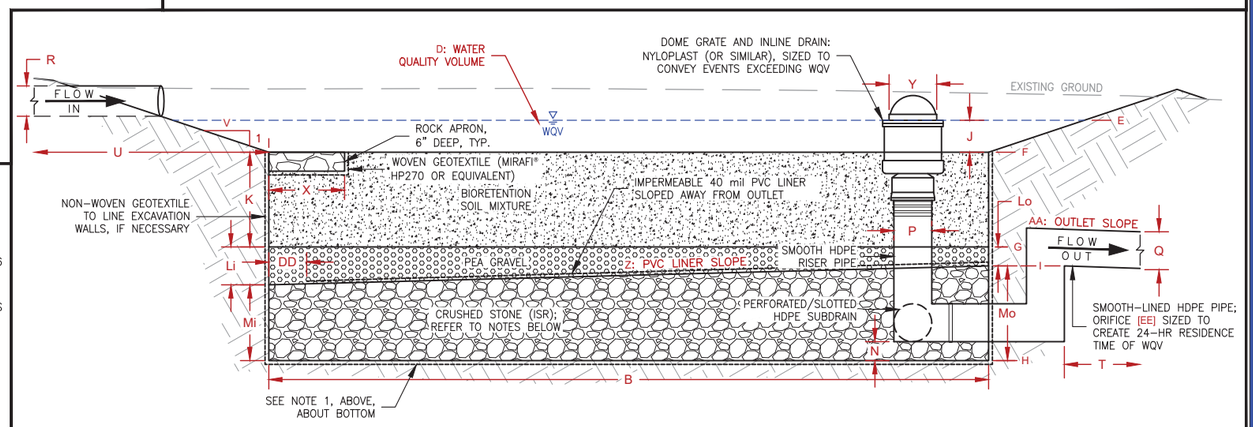
NOTE 1: BOTTOM PERMEABILITY AND LINER
IF A NATIVE, LOW HYDRAULIC CONDUCTIVITY SOIL IS NOT PRESENT BELOW THE STONE LAYER, A LOW PERMEABILITY LINER OR SOIL SHOULD BE USED TO MINIMIZE INFILTRATION AND PRESERVE HORIZONTAL FLOW IN THE STONE. THIS LINER EXTENDS FROM THE BASE OF THE EXCAVATION TO ABOVE THE TOP OF THE BIORETENTION SOIL MEDIA LAYER. IF GEOTECHNICAL TESTS CONFIRM THE NEED FOR A LINER, ACCEPTABLE OPTIONS INCLUDE:

a. 6–12 in CLAY SOIL (MINIMUM 15% PASSING THE #200 SIEVE AND A MAXIMUM PERMEABILITY OF 1x10−5 cm/s)
b. A 40 mil PVC LINER WITH SAND BEDDING AND NON-WOVEN GEOTEXTILE*
c. A BENTONITE LAYER WITH MINIMUM THICKNESS OF 4 in
d. USE OF CHEMICAL ADDITIVES (SEE NRCS AGRICULTURAL HANDBOOK #386, DATED 1961)
e. OR AN OTHERWISE PREPARED DESIGN BY A PROFESSIONAL ENGINEER

ON BOTTOM, TO PREVENT PUNCTURE, PVC "SANDWICHED" BETWEEN SAND AND NON-WOVEN GEOTEXTILE. ON SIDES, PVC SANDWICHED BETWEEN TWO LAYERS ON NON-WOVEN GEOTEXTILE.

SECTION Y-Y'

NOTE: ADDITIONAL OUTLET STRUCXTURES ABOVE THE ELEVATION OF THE WQV OR DESIGN VOLUME MAY BE NECESSARY TO CONVEY LARGE FLOWS.



SECTION X-X'

NOTES:

1. FOR FULL BIORETENTION STORMWATER SYSTEM SPECIFICATIONS, PLEASE REFER TO THE UNH STORMWATER CENTER'S BIORETENTION SPECIFICATIONS PUBLICATION, DATED FEBRUARY 2017, FOUND AT: https://www.unh.edu/unhsc/sites/default/files/media/unhsc_bsm_spec_2-28-17_0.pdf
2. SYSTEM FOOTPRINT NEED NOT BE RECTANGULAR. ANY SHAPE IS POSSIBLE. THESE DETAILS USE THE RECTANGULAR SHAPE AS AN EXAMPLE.
3. THESE DETAILS ARE NOT TO SCALE; FOR DIMENSIONS AND SPECIFICATIONS, REFERENCE EACH LETTER TO THE TABLE OF METRICS.
4. BIORETENTION SOIL MIX SHALL NOT BE PLACED UNTIL AFTER ENGINEERING APPROVAL AND INSPECTION OF SUBGRADE.
5. BIORETENTION SYSTEM IS RECOMMENDED TO HAVE PRETREATMENT (FOREBAY, SWALE, OR OTHER APPROVED STRUCTURE). PRETREATMENT IS REQUIRED FOR PROJECTS REQUIRING ALTERATION OF TERRAIN (AOT) PERMITTING.
6. PLANT THE SYSTEM AS SPECIFIED; AT A MINIMUM, SEED THE SYSTEM FLOOR AND SIDE SLOPES WITH RYE GRASS MIXTURE CONTAINING PERENNIAL AND WINTER RYES, AT A RATE SPECIFIED BY THE MANUFACTURER. STABILIZE THE SLOPES WITH STRAW TO A DEPTH OF 1".
7. GENERAL CONSTRUCTION GUIDELINES:
   - 7.1. VERIFY THAT NO FOREIGN OR DELETERIOUS MATERIAL OR LIQUID SUCH AS PAINT, PAINT WASHOUT, CONCRETE SLURRY, ASPHALT/CONCRETE LAYERS OR CHUNKS, CEMENT, PLASTER, OILS, GASOLINE, DIESEL FUEL, PAINT THINNER, TURPENTINE, TAR, ROOFING COMPOUND, SOLID WASTE, OR ACID HAS BEEN DEPOSITED IN PLANTING SOIL (BIORETENTION MEDIA OR LOAM ON SIDE SLOPES).
   - 7.2. PROCEED WITH PLACEMENT OF ANY SUBSURFACE MATERIALS ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.
   - 7.3. COMPACT EACH BLENDED LIFT OF BIORETENTION SOIL MEDIA TO 75% OF MAXIMUM STANDARD PROCTOR DENSITY ACCORDING TO ASTM D698.
   - 7.4. GRADE SOIL MEDIA TO A SMOOTH, UNIFORM SURFACE PLANE WITH LOOSE, UNIFORMLY FINE TEXTURE. ROLL AND RAKE, REMOVE RIDGES, AND FILL DEPRESSIONS TO MEET FINISH GRADES.
   - 7.5. LIGHTLY COMPACT FINISHED FLOOR ELEVATION AND FINISHED SLOPES USING THE BUCKET OF AN EXCAVATOR, NON-MOTORIZED ROLLER, HAND TAMP, OR OTHER MEANS, THEN ROUGHEN SURFACE WITH A RAKE TO LOOSEN SOILS BEFORE SEEDING.
   - 7.6. DO NOT COMPACT THE SUBGRADE AT THE BOTTOM OF EXCAVATION.
8. BIORETENTION SOIL MEDIA (BSM) MIXTURE SPECIFICATIONS:
   - 8.1. STICKS AND ROOTS SHOULD BE MINIMIZED IN THE BSM MIXTURE, AND PREFERABLY LIMITED TO NOTHING LARGER THAN 4.76 mm (0.187 in).
   - 8.2. DEBRIS AND OTHER FOREIGN MATERIALS SHOULD BE MINIMIZED.
   - 8.3. ORGANIC MATTER SHOULD MAKE UP A MINIMUM OF 3% BY VOLUME AND A MAXIMUM 8% BY VOLUME OF THE BSM.
   - 8.4. BSM MIXTURE SHOULD HAVE A SOIL REACTION pH OF 6 TO 7.
   - 8.5. CATION EXCHANGE CAPACITY (CEC) OF BSM SHOULD BE A MINIMUM OF 10 meq PER 100 mL AT A pH OF 7.0.
9. IF BSM IS PURCHASED FROM A MANUFACTURER, BSM MIXTURE SHALL NOT CONTAIN THE FOLLOWING:
   - 9.1. UNACCEPTABLE MATERIALS: CONCRETE SLURRY, CONCRETE LAYERS OR CHUNKS, CEMENT, PLASTER, BUILDING DEBRIS, ASPHALT, BRICKS, OILS, GASOLINE, DIESEL FUEL, PAINT THINNER, TURPENTINE, TAR, ROOFING COMPOUND, ACID, SOLID WASTE, OR OTHER EXTRANEOUS MATERIALS THAT ARE HARMFUL TO PLANTS.
   - 9.2. UNSUITABLE MATERIALS: STONES, ROOTS, PLANTS, SOD, CLAY LUMPS, OR POCKETS OF COARSE SAND THAT EXCEED A COMBINED MAXIMUM OF 5% BY DRY WEIGHT OF THE MANUFACTURED SOIL.
   - 9.3. LARGE MATERIALS: STONES, CLODS, ROOTS, CLAY LUMPS EXCEEDING 0.187 in (4.76 mm) IN ANY DIMENSION.
10. ORGANIC SOIL AMENDMENTS:
    - 10.1. NO COMPOST SHOULD BE USED IN THE PLANTING MIX (USED ON THE SIDE SLOPES AND SURROUNDING AREA) UNLESS SPECIFIED BY THE ENGINEER.
    - 10.1. SPHAGNUM PEAT: PARTIALLY DECOMPOSED SPHAGNUM PEAT MOSS, FINELY DIVIDED OR OF GRANULAR TEXTURE WITH 100% PASSING THROUGH A 1/2-in (13 mm) SIEVE, WITH A pH OF 3.4 TO 4.8.
    - 10.2. WOOD DERIVATIVES: SHREDDED WOOD, WOOD CHIPS, GROUND BARK, OR WOOD WASTE; OF UNIFORM TEXTURE AND FREE OF STONES, STICKS, SOIL, OR TOXIC MATERIAL.
11. THE CRUSHED STONE LAYER SHOULD CONSIST OF AASHTO #5 STONE (3/4-in).
12. THE VOLUME OF WATER CONTAINED ABOVE THE BSM ELEVATION AND BELOW THE HIGH FLOW SPILLWAY IS STATISTICALLY DESIGNED TO HOLD A SPECIFIC RUNOFF VOLUME.
13. THE DESIGN VOLUME ABOVE THE BSM IS PREFERABLY THE WQV. THIS VOLUME MAY NOT BE ACHIEVABLE FOR RETROFIT INSTALLATIONS

BIORETENTION SYSTEM DESIGN METRICS

ID	DESIGN PARAMETER	MIN	DESIGN	UNITS
A	SYSTEM FLOOR WIDTH			FT
B	SYSTEM FLOOR LENGTH			FT
C	BIORETENTION FOOTPRINT AREA			SF
D	WATER QUALITY VOLUME			CF
E	WQV AND RISER CAP ELEVATION			FT
F	SYSTEM FLOOR ELEVATION			FT
G	BOTTOM BSM ELEVATION			FT
H	BOTTOM STONE ELEVATION			FT
I	TOP STONE/OUTLET INVERT ELEVATION			FT
J	WQV PONDING DEPTH			IN
K	BSM MEDIA DEPTH	18		IN
Li	INLET END PEA GRAVEL DEPTH			IN
Lo	OUTLET END PEA GRAVEL DEPTH	3		IN
Mi	INLET END CRUSHED STONE DEPTH			IN
Mo	OUTLET END CRUSHED STONE DEPTH	14		IN
N	SUBDRAIN DEPTH ABOVE BOTTOM	4		IN
O	PERFORATED SUBDRAIN DIAMETER	6		IN

BIORETENTION SYSTEM DESIGN METRICS

ID	DESIGN PARAMETER	MIN	DESIGN	UNITS
P	RISER PIPE DIAMETER	6		IN
Q	OUTLET PIPE DIAMETER	6		IN
R	INFLOW PIPE DIAMETER			IN
S	PERFORATED SUBDRAIN LENGTH			FT
T	OUTLET PIPE LENGTH			FT
U	INFLOW PIPE LENGTH			FT
V	SLOPE GRADE (RUN PER 1ft RISE)			FT
W	ROCK APRON WIDTH			FT
X	ROCK APRON LENGTH			FT
Y	RISER DOME GRATE DIAMETER			IN
Z	PVC LINER SLOPE			%
AA	OUTLET PIPE SLOPE			%
BB	CLEAN-OUT RISER DIAMETER			IN
CC	CLEAN-OUT RISER ELEVATION			FT
DD	PVC LINER GAP	0.18		FT
EE	OUTLET PIPE ORIFICE DIAMETER	1		IN

ACCEPTABLE PARTICLE SIZE DISTRIBUTION OF FINAL BIORETENTION SOIL MIX

MEDIA TYPE	SIEVE #	SIZE (in)	SIZE (mm)	% PASSING
COARSE SAND	4	0.187	4.76	100
MEDIUM SAND	10	0.079	2.00	95
FINE SAND	40	0.017	0.42	40–15
SILTS	200	0.003	0.075	10–20
CLAYS	<200	PAN	PAN	0–5

BIORETENTION SOIL MEDIA COMPONENTS:*

– AMOUNTS MIXED BY TOTAL VOLUME
- 60–85% – SAND (0.5 TO 2.0 mm) (SEE SPECS ABOVE)
- 15–25% – LOAM OR TOPSOIL
- 3–8% – ORGANIC MATTER
- 0–5% – WATER TREATMENT RESIDUALS OR IRON FILINGS**

*ALTERNATELY, USE MEDIA SPECIFIED IN THE ALTERATION OF TERRAIN RULES, Env-Wq 1508.07(k)
**THIS IS AN AMENDMENT USED FOR ENHANCED PHOSPHORUS ADSORPTION

INTERNAL STORAGE RESERVOIR (ISR) NOTES:

- THE HYBRID BIORETENTION SYSTEM HARBORS AN ANAEROBIC INTERNAL STORAGE RESERVOIR FOR NITROGEN REMOVAL.
- THE ISR IS SEPARATED BY AN IMPERMEABLE PVC LINER BETWEEN THE PEA GRAVEL AND CRUSHED STONE LAYERS.
- THE PVC LINER SLOPES FROM THE OUTLET TOWARDS THE INLET TO MAXIMIZE STORAGE RETENTION AND PROVIDE EXTRA TREATMENT/FILTER TIME VIA PLUG FLOW THROUGH CRUSHED STONE.
- DESIGN GUIDELINES FOR THE SUBSURFACE GRAVEL WETLAND SPECIFICATIONS (UNHSC, 2016) IDENTIFIED THAT THE WATER VOLUME IN THE ISR BE AT LEAST 0.26*WQV [WATER QUALITY VOLUME], OR 26% OF THE WQV.
- PVC LINER THICKNESS OF 40 TO 60 mil, PREFERABLY SEAMLESS. IF SEAMS ARE UNAVOIDABLE, THE SEAMS SHOULD BE SEALED.

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No.	Date	Revision
02	10 Sept 2019	DES Revisions
01	12 Mar 2019	Initial design

Designed: JCB | Checked: TPB/JJH | Approved: TPB/JJH

GRAPHIC SCALE
N/A - DRAWING NOT TO SIZE
Original Drawing Size = 34 x 22 in.

Project:
STANDARD DETAIL BIORETENTION ISR
STORMWATER SYSTEM

Date: 10 SEPT 2019

Sheet No. 01 of 01

Please see additional plan attachments under "Supporting Documents" posted for this meeting