7 UTILITY & SOILS ANALYSIS


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7.1 Utility Analysis

SCHEMATIC DESIGN PROGRAM

Re: Florence Roche Elementary School SCI File #19088.00
342 Main St, Groton, MA 01450 Site

To: Meryl Nistler, AIA, LEED AP
Studio G Architects

From: Jeffrey Pilat
Stephen Garvin, PE December 1, 2020 R.1

The following narrative describes the existing utility infrastructure on site, method of obtaining all utilities and evaluation of impact on existing utilities, and hardscape based on the schematic design program, as well as permitting requirements and estimated time to acquire the anticipated permits.

Overview (Civil + Infrastructure)

The Florence Roche Elementary School site on Main Street in Groton, MA is bordered by the Craftsmen Lumber Company, plus wooded and grassed areas to the North, to the South of the lot are residential homes on Champney Street; Main Street (Route 111) is to the West of the property; and to the East of the site is Luina Greine Farm and wooded and grassed areas. The existing site includes concrete walkways and asphalt parking areas abutting the entirety of all of the Florence Roche Elementary School, Groton Dunstable Regional Middle School North and Groton Dunstable Regional Middle School South school buildings. An athletic track and grass playfields are located east of the schools. **Zoning District: O**

All major utilities (water, sewer, drainage, gas, telecom, and electric) are available in vicinity of the existing sites and within adjacent public streets and drives. Since the Florence Roche School site is within Conservation jurisdictional areas, the schematic design option will need to adhere to the Stormwater Management policy, the local wetland bylaw, and permitting requirements.

Site Access and Circulation

The schematic chosen option will provide a minimum 20' wide unobstructed fire access around the entire building for emergency vehicles. The widths and configuration of the access drives shall be approved by the Fire Department. The proposed parking lots located throughout the site around the building will provide ADA/MAAB access to the building and the playing fields.

As per section 218-23 of the Town of Groton Bylaw regulation for public and private school parking spaces, the total minimum requirement is 1.5 spaces per classroom. The maximum number is 1 parking space per 3 seats per classroom. However, this requirement could be waived by the planning board via the Dover Amendment.

Total Parking Spaces provided: 106

Primary Parking Area

The schematic chosen option includes a primary parking area for the school campus located to the southwest of the building. This lot will contain a total of 75 (+/-) parking spaces, of which 6 will be ADA accessible parking spaces. This lot accounts for approx. 71% of the total 106 parking spaces.

Secondary Parking Areas

Samiotes Consultants, Inc.
Civil Engineers + Land Surveyors

20 A Street
Framingham, MA 01701-4102

T 508.877.6688
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www.samiotes.com

The schematic chosen option will have secondary parking areas located between the Groton Dunstable Middle School and Florence Roche Elementary School, north and northeast of the new primary parking area. These lots will contain 28 (+/-) standard parking spaces, of which 7 will be ADA accessible parking spaces. This lot accounts for approx. 26% of the total 106 parking spaces.

A small parking lot containing 3 spaces will be located between the Elementary and Middle School. This lot accounts for approx. 3% of the total 106 parking spaces.

Pavement and Curbing

The schematic chosen option will include the replacement of the existing concrete / asphalt sidewalks, asphalt drive aisles and curbing within the working limits to provide new vehicular and pedestrian access throughout the campus. The new curbing will consist of vertical granite curbing within vehicular areas and sloped or mountable granite curbing for areas that will be accessed by snow plows or emergency vehicles. The schematic chosen option will provide ADA accessible walkways and building egresses throughout the Florence Roche school campus.

Water Service

As part of the schematic design option, the existing fire protection lines and domestic services will be abandoned. A new, dedicated fire protection service for the school and hydrant loop will be installed to meet the requirements of the local fire department. Hydrant flow testing should be conducted in the next phase to confirm adequate flows and pressure can be achieved without a fire pump. The fire protection line will be brought in from the existing 12" dia. Ductile Iron line in Champney St. and will loop around the Florence Elementary School. The new water service will connect to the existing 12" dia. Ductile Iron water line in the center of the site and the record 8" dia. Ductile Iron water line within the campus. The new fire protection service and a separate new domestic line will be installed off of the new main and will be brought into the mechanical room (to be coordinated with the MEP consultant).

A comprehensive flow testing of the municipal main and services for the Elementary School is recommended as part of future design phases. Due to the age of existing utility plans, the location and routing of underground utility services should be confirmed and updated.

Sanitary Sewage

For the schematic design option, all existing sewer lines and structures will be removed up within the limit of the new building. A new 3,000 gal. grease trap will be provided on the exterior as part of the internal plumbing system. The new sewer service and manholes will tie into the 8" existing sewer main at a new manhole located within the school site. A condition assessment to verify location and condition of all sewer services and mains is recommended for future design phases. No on-site septic or sewerage treatment plant is proposed as part of this design.

Gas Service

For the schematic design option, the existing gas services (by the MEP consultant and Gas Company) will be evaluated to ensure adequate pressure and volume. As a part of this design option, a new gas line will be tied into the existing underground service in the north parking lot and brought into the mechanical room (to be coordinated with the MEP consultant and Gas company).

Electric & Communication Services

For the schematic option, the electrical services will be updated to accommodate the loading requirements for the design as indicated in the electrical engineer's report. A new concrete encased duct bank will be provided for the primary feed connecting to the service within the public right-of-way to a new transformer located on site. Secondary electric feeds located in the limits of proposed work will be replaced and routed underground into a new electric manhole between the Groton Dunstable Middle School and the Florence Roche Elementary School. A new service will be provided to the main electrical room (to be coordinated with the Electrical consultant).

Communications (Telephone, Cable TV, and Fiber Optic) located within the limits of proposed work will be replaced and routed underground from the existing systems within the right-of-way into a new manhole. A new service will be provided into the building's main distribution room (to be coordinated with the Electrical consultant).

Stormwater Management

In the schematic solution for the new elementary school, the proposed building & site development will need to mitigate any increase to the peak rate of runoff from the site, as the project is increasing the site's impervious area. Any new stormwater management system would need to comply with the Town of Groton Conservation Commission regulations and DEP's Stormwater Management Policy. The following are possible stormwater systems that can be utilized on site for the proposed Elementary School sites.

Subsurface Structures (Infiltration tanks): Subsurface structures are underground systems that capture runoff, and gradually infiltrate it into the groundwater. There are a number of underground infiltration systems that can be installed to enhance groundwater recharge. Subsurface structures are constructed to store stormwater temporarily and let it percolate into the underlying soil. These structures are used for small drainage areas (typically less than 2 acres). They are feasible only where the soil is adequately permeable and the maximum water table and/or elevation is sufficiently low. They can be used to control the quantity as well as quality of stormwater runoff, if properly designed and constructed. The structures serve as storage chambers for captured stormwater, while the soil matrix provides treatment.

Rain Garden(s)/ Bioretention: Bioretention is a technique that uses soils, plants, and microbes to treat stormwater before it is infiltrated and/or discharged. Bioretention cells (also called rain gardens in residential applications) are shallow depressions filled with sandy soil topped with a thick layer of mulch and planted with dense native vegetation. Stormwater runoff is directed into the cell via piped or sheet flow. The runoff percolates through the soil media that acts as a filter. There are two types of bioretention cells: those that are designed solely as an organic filter. Filtering bioretention areas and those configured to recharge groundwater in addition to acting as a filter exfiltrating bioretention areas. Bioretention areas remove pollutants through filtration, microbe activity, and uptake by plants; contact with soil and roots provides water quality treatment better than conventional infiltration structures. Studies indicate that bioretention areas can remove from 80% to 90% of TSS. If properly designed and installed, bioretention areas remove phosphorus, nitrogen, metals, organics, and bacteria to varying degrees. Bioretention areas help reduce stress in watersheds that experience severe low flows due to excessive impervious cover.

Deep Sump Catch Basins/ Drywell combo: A drywell is pre-cast concrete barrel and riser with an open bottom that permits runoff to infiltrate into the ground. The drywell is combined with deep sump catch basins (also known as oil and grease or hooded catch basins) that act as underground retention systems designed to remove trash, debris, and course sediment from stormwater runoff, and serve as temporary spill containment devices for floatables such as oil and grease. that provides pretreatment. An 80% TSS removal is awarded to the deep sump catch basin/leaching drywell pretreatment combination provided the system is off-line. Drywells have grates on them to provide for the safe overflow from these devices in severe storm events.

Water Quality Units (WQU): A proprietary separator is a flow-through structure with a settling or separation unit to remove sediments and other pollutants. They typically use the power of swirling or flowing water to separate floatables and coarser sediments, are typically designed and manufactured by private businesses, and come in different sizes to accommodate different design storms and flow conditions. Since proprietary separators can be placed in almost any location on a site, they are particularly useful when either site constraints prevent the use of other stormwater techniques or as part of a larger treatment train.

Based on the schematic design option, the network of drainage pipes and structures near the proposed building will need to be reconfigured. New deep sump catch basins will be installed in each parking lot and drive aisle to capture runoff that will be routed into an infiltration system through a network of new manholes and water quality units. The first proposed infiltration system will be located underground in the northern parking lot and will serve as storage chambers for captured stormwater within the northern parking areas and drive aisles. This system will overflow into the existing drainage line to the east of the Groton Dunstable Middle School. The second infiltration system will be located underground in the primary parking lot to the southwest of Florence Roche Middle School. This system will serve as a storage chamber for the captured stormwater within this parking lot / associated drive aisles and the play field to the west of the school, which will be comprised of a network of field underdrains to capture and convey stormwater. This system will overflow to the southwest into the existing detention area located within the school's main campus driveway. Both of these systems will be sized to mitigate the increase in impervious area and required attenuation of peak flows.

Site Constraints

Four wetland resource areas exist within or near the project limits that have not yet been formally flagged and/or located as part of this initial feasibility study. The first is the wetland located on the northern portion of the school campus; the second environmentally-protected area is a wetland on the eastern side of the site; the third and fourth areas are wetlands with their associated hydrologic connection located at the south eastern side of the lot; and finally, the fifth is a wetland at the southwestern corner of the site across Main Street. Disturbances within the wetland resource areas would require the replication of wetlands in new upland areas. The site is also located within the Petapawag Areas of Critical Environmental Concern (ACECs) which makes up a majority of Groton (see Figure 1 below). Work within the ACEC will require approval from the Natural Heritage and Endangered Species (NHESP) program. The impacts of the design to the ACEC will need to be evaluated by an Environmental Engineering consultant.

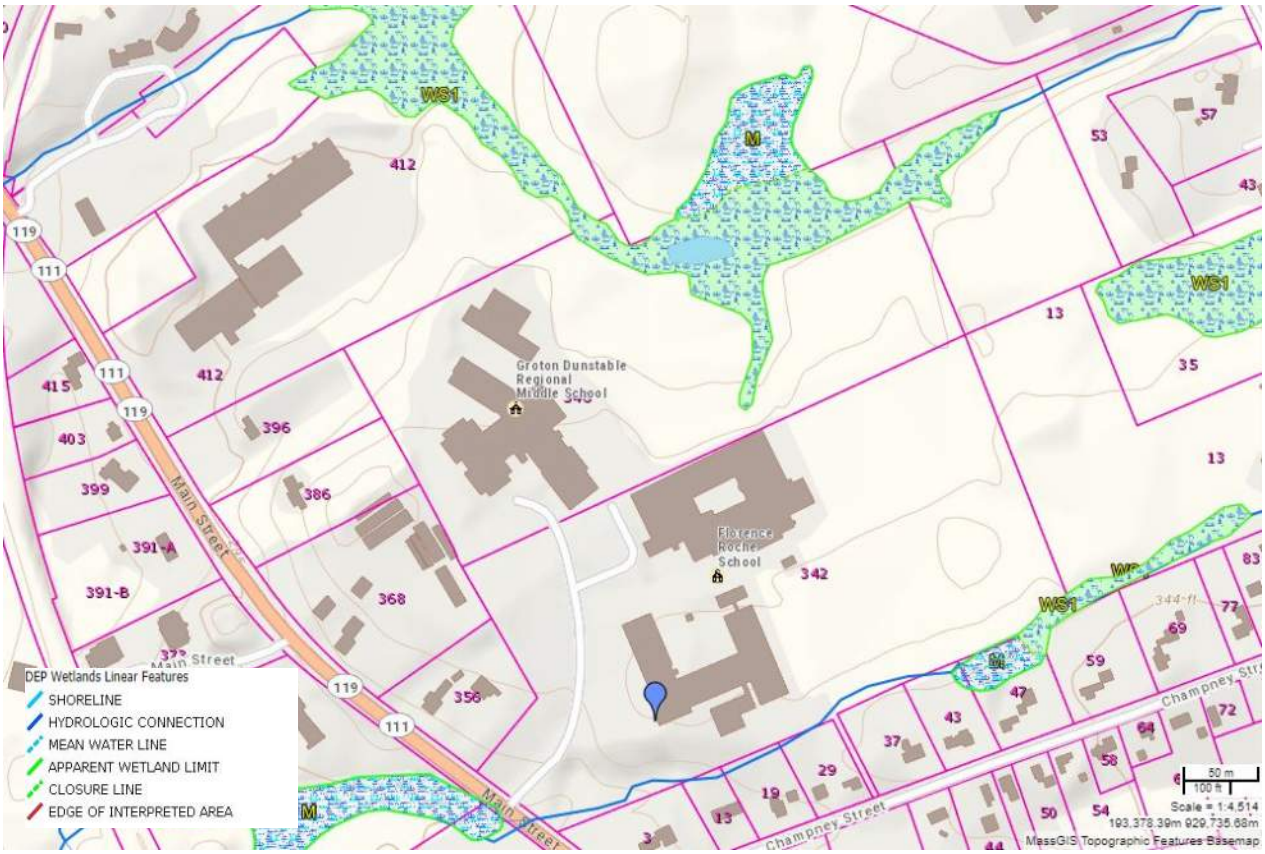

Figure 1: Florence Roche School Wetland Delineation Overlay Plan

Groton Conservation Commission and DEP

The schematic design option will require the creation of a new 20'-wide fire access drive aisle, which crosses into the 100' wetland buffer zone. Work within 100' of Bordering Vegetated Wetlands will require approval from the Groton Conservation Commission, with a review by DEP. The project has been designed such that it would minimize or avoid BVW filling and replication to the greatest extent possible, and utilize existing degraded areas. The proposed footprint of the building is outside of the 50' BVW with the required emergency access road (pervious stabilized stone dust) withing the existing limit of the (impervious) track. It is anticipated that approval will be granted by the Con Com based on our previous experience of working with the Town.

PROPOSED DEVELOPMENTS

The schematic option includes demolishing the existing Florence School building and constructing a new stand-alone Elementary school in the eastern location of the site, as shown on the Site Plan Sketch. A proposed playfield would be positioned in the southwest corner of the campus in the existing school building's location. This layout would require new utility connections / piping and structures, which could be placed within the school campus's site and connect to the municipal system. Please see the below recommendations and impacts for this project alternative:

- Stormwater Management
  - Condition assessment of existing drainage system in locations prior to municipal connection.
  - Cleaning of all remaining drainage structures and pipe networks that are tied into.
  - Provide the new playfield with an underdrainage system.
  - Provide foundation drainage for the proposed new construction.
  - Installation of additional stormwater collection structures at low points (assume fifteen).
  - Installation of water quality units (assume four).
  - Utilization of rain gardens and Low Impact Design.
  - Re-grade impervious areas for proper drainage and tributary areas to stormwater structures.
  - Detention / Infiltration BMP's to offset additional imperviousness.
  - Include Pervious Pavement as an option (it is recommended not to "mix + match" pervious materials on site).
- Sewer
  - Condition assessment of existing sewer system.
  - Cleaning of all existing sewer structures and pipe network.
  - Installation of a 3,000-gallon Kitchen grease trap.
  - Installation of additional sewer manholes (assume five).
  - A new sanitary sewer service connection to the existing 8" campus sewer main.
- Water
  - The fire protection connection to the proposed buildings would be supplied from the campus 12" water main – will need to be flow tested.
  - New domestic water connection would also be supplied from the new campus 12" water main.
- Parking
  - Required parking spaces – minimum of 1.5 spaces per classroom. The maximum number is 1 parking space per 3 seats per classroom, we may request a waiver or variance to seek relief.
  - Total Parking Spaces provided: 106
  - Provide required number of ADA parking spaces.
  - Emergency Vehicle access – Emergency Vehicle / Fire truck access has been designed per Groton FD radius requirements and widths.
  - Car and School Bus Drop-off areas – Traffic Engineer has evaluated the site for vehicular accessibility and capacity.

Permitting Schedule

Due to wetland resource areas located on and adjacent to the site, any renovations or construction to the school will require approval from the Groton Conservation Commission and DEP at a minimum. In this situation, the Conservation Commission approved plans are the prerequisite for the site plan approval plans to the Groton Planning Board.

Prior to beginning construction, the project site will require to develop a Stormwater Pollution Prevention Plan SWPPP and filing an ENOI with the EPA by the site operator.

At this point it appears that MEPA permitting will not be required for the site, due to the fact that the project does not trigger the thresholds such as, but not limited to:

1. Direct alteration of 50 or more acres of land.

2. Creation of ten or more acres of impervious area.
3. Alteration requiring a variance in accordance with the Wetlands Protection Act.
4. New withdrawal or Expansion in withdrawal of: 2,500,000 or more gpd from a surface water source.

A full review of thresholds shall be completed once the project is approved and it is recommended that we seek a letter of determination at that time. A meeting with the Town of Groton Land Use Director/Town Planner is required to coordinate and facilitate the required permits and approximately how long the process will take. A completed Form of Intent is to be submitted to the Land Use Department and within 10 business days of the Land Use Director/Town Planner's receipt of the Form of Intent a meeting will be scheduled to determine if the Form of Intent is complete. All Issuing Authority Meetings will be scheduled within 30 days after an application is submitted. Prior to the conclusion of the public informational meeting, each Issuing Authority shall determine its first meeting date with the applicant, and notify the Land Use Director/Town Planner of such date. Except as otherwise provided in G.L. c. 43D, or except as waived or extended for good cause, each Issuing Authority must act on the permit, license or other approval within its purview and file its decision with the Town Clerk within the time period, if any, required by the applicable law, but in no event later than 180 days after the date of mailing of the notification that the Master Application is complete. The applicant shall apply for all other development related permits, approvals and licenses from the commonwealth of Massachusetts and Federal Permits. The applicant is responsible for the recording of certain permit(s) at the Registry of Deeds.

The Permitting time line expected to take up to 4-8 months.

- Groton Conservation Commission & DEP: approximately 60-120 Days
- Groton Stormwater Permit: approximately 60-120 Days
- Groton Earth Removal Stormwater Advisory Committee 60-120 Days
- Groton Sewer Connection Permit: approximately 30-60 Days
- Groton Water Connection Permit: approximately 30-60 Days
- Groton Fire Flow Test: approximately 30-60 Days
- Groton Water Extension Permit: approximately 30-60 Days
- Groton Planning Board (Site Plan Review, Special Permit, Sign Permit as part of Special Permit: approximately 45-120 Days
- Groton DPW: approximately 30-60 Days
- NH&ESP for Petapawag Areas of Critical Environmental Concern (ACECs): approximately 60-120 Days
- NPDES/SWPPP: approximately 14 Days by GC, prior to commencing construction
- Massachusetts Clean Water Act, Sewer Extension/Connection Permits: approximately 60-120 Days
- Hazardous Waste Management Act: approximately 30-60 Days
- Zoning Board (Zoning Appeals, Special Permit, Variance): approximately 60-120 Days if required

If you have any questions or comments regarding this memo, please call or email me at jpilat@samiotes.com 508-877-6688 ext 23 or Stephen Garvin, PE at sgarvin@samiotes.com (ext 13).

P:\Projects\2019\19088.00 Florence Roche School Groton\Documents\MSBA\SD\19088.00 Florence School Groton Main St Site SD 12-01-20

Commonwealth of Massachusetts
City/Town of Groton

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

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 405B/256B (Soil Map Unit)

Fine Sandy Loam/Deerfield Fine Loamy Sand
Soil Name

Soil Limitations

Coarse Loamy Melt-Out Till/Sandy Outwash
Soil Parent material

Ground Moraines/Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

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

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): 06/25/20 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

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

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

Deep Observation Hole Number: TP-1 (Hole #) | 07-07-20 (Date) | 8:00 (Time) | Sunny 70's (Weather) | (Latitude) | (Longitude:)

1. Land Use: Pavement (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Ground Morraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	Fill										Asphalt
4-16	Fill										Base Material
16- 72	C1	Sandy Loam	10 YR 5/4				3%	3%	Massive	Friable	
72-120	C2	Sandy Loam	10YR 5/4	120"	10YR 5/6	2%	1%	20%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW=312.90

Commonwealth of Massachusetts
City/Town of Groton

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

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

Deep Observation Hole Number: TP-2 (Hole #) | 07-07-20 (Date) | 8:45 (Time) | Sunny 70's (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Pavement (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 4% (Slope (%))

Description of Location: Southern Parking Lot

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Morraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	Fill										Asphalt
4-16	Fill										Base Material
16-72	C1	Sandy Loam	10YR 5/4				3%	3%	Massive	Friable	
72-120"	C2	Sandy Loam	10YR 5/4	120"	10YR 5/6	2%	2%	20%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW= 319.00

Commonwealth of Massachusetts
City/Town of Groton

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

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #TP#1	Obs. Hole #TP#2
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	120 inches	120 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

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

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

2. Estimated Depth to High Groundwater: 120 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

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

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 16 inches Lower boundary: 120 inches

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

Commonwealth of Massachusetts
City/Town of Groton

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

F. Certification

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

Daniel Schumacher
Signature of Soil Evaluator

07-07-2020
Date

SE14279
Typed or Printed Name of Soil Evaluator / License #

12-01-21
Expiration Date of License

Name of Approving Authority Witness

Approving Authority

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

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

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

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654 (Soil Map Unit)

Udorthents
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

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

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): 06/25/20 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

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

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

Deep Observation Hole Number: TP-3 (Hole #) | 07-07-2020 (Date) | 9:30 (Time) | Sunny 70's (Weather) | (Latitude) | (Longitude:)

1. Land Use: Pavement (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.) | 2% (Slope (%)

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other ____ feet

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

5. Groundwater Observed: ☒ Yes ☐ No If yes: 104" Depth Weeping from Pit | 120" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	Fill										Asphalt
4-32	Fill										Base Material
32-48	Fill										Sub base
48-72	C1	Sandy Loam	10YR 5/4				3%	3%	Massive	Friable	
72-120	C2	Sandy Loam	10YR 5/4	84	10YR 5/6	2%	3%	20%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW=319.10

Commonwealth of Massachusetts
City/Town of Groton

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

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

Deep Observation Hole Number: TP-4 (Hole #) 7-7-2020 (Date) 10:30 (Time) Sunny 70's (Weather) _____ (Latitude) _____ Longitude:

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0 (Slope (%))

Description of Location: Southern Parking Lot

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | SU (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16	A	Loam	10YR 3/2						Granular	Friable	
16-28	C1	Sandy Loam	10YR 5/4				3%	3%	Massive	Friable	
28-114	C2	Sandy Loam	10YR 5/4				3%	50%	Massive	Friable	Shale

Additional Notes:
NRCS Soil Group: B, ESHGW not observed.

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D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #3	Obs. Hole #4
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	84" inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

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

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

2. Estimated Depth to High Groundwater: 84" inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

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

☒ Yes ☒ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	TP3-48 inches	Lower boundary:	TP3-120 inches
c. If no, at what depth was impervious material observed?	Upper boundary:	TP4-28 inches	Lower boundary:	TP4-108 inches

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F. Certification

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

Signature of Soil Evaluator	07-07-2020 Date
SE14279 Typed or Printed Name of Soil Evaluator / License #	12-01-21 Expiration Date of License
Name of Approving Authority Witness	Approving Authority

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

Field Diagrams: Use this area for field diagrams: