CORPORATE ENVIRONMENTAL ADVISORS

Consultants | Engineers | Scientists

HYDROGEOLOGIC ASSESSMENT

SUTTON DOUGLAS DEVELOPMENT

December 17, 2021

Prepared For:
Land Design Collaborative
45 Lyman Street
Westborough, MA 01581

Prepared By:
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1.0 INTRODUCTION

Corporate Environmental Advisors (CEA) has been retained by Land Design Collaborative (LDC) to provide a hydrogeologic assessment for a new 31-home subdivision planned on a parcel adjacent to Mumford Street, Forest Street and Conservation Drive in Douglas and Duval Road in Sutton, Massachusetts. Sutton Douglas Development, LLC (SDD) intends to develop this parcel with 31 homes that will require individual private wells and septic systems. We understand that the abutters have raised several concerns, including:

- Negative impacts on the underlying aquifer causing neighboring wells to dry up.
- Contamination of the abutter's well water as a result of 31 new homes septic systems,
- Excavation into the underground springs re-routing the flows,
- Control of the breakout of the springs during and following construction.

SDD has requested that CEA review the available geologic and hydrogeologic information to evaluate the abutters concerns and provide adequate information to support SDD's efforts to obtain subdivision approval from the two towns. This report has been organized, as follows;

Section 2.0 Scope of Work

Section 3.0 Description of New Development

Section 4.0 Review of Available Geologic and Hydrogeologic Information

Section 5.0 Conceptual Hydrogeologic Model

Section 6.0 Discussion and Conclusions

2.0 SCOPE OF WORK

Based on the stated objectives, CEA performed the following tasks:

Task 1: Site Visit: CEA visited the project area on November 4, 2021, to perform a reconnaissance of the site to ascertain local geologic and hydrogeologic features that could impact groundwater supply development. The intent of the site visit was to better understand relevant features including the nature of the underlying aquifer materials (soils and bedrock), wetlands, streams, springs, and the site topography.

Task 2: Data Gathering: CEA performed data collection efforts to better understand the site geology and hydrogeology. We utilized two sources to obtain information on existingprivate wells.

- CEA contacted the health departments in both towns to determine whether they maintain data on private wells.
- The MassDEP maintains a database of existing water supply wells, and CEA has identified 97 private wells in the site vicinity along Duval Road, Forest Street, Mumford Street and Conservation Drive. CEA also determined the availability of state or federal hydrogeologic assessments that may provide additional relevant information.

The Client has conducted 27 test pits and three perc tests to ascertain the suitability of the soils for septic systems.

Task 3: Desktop Hydrogeologic Assessment: CEA compiled the information noted to assess the range of aquifer characteristics to determine well yield for the individual wells and aggregate impact for the planned development. This assessment also considered daily total water consumption for the 31-home subdivision and the impact this will have on the underlying bedrock aquifer, and the potential for these groundwater withdrawals to impact water supply on neighboring properties. In addition, CEA evaluated the test pit data and perc tests to address the concerns regarding the potential for the septic systems to contaminate drinking water supplies. We also note that there is concern about construction activities to intersect springs in the vicinity. The site visit and data collection also allowed CEA to better determine whether there is any validity to this concern.

Task 4: Hydrogeologic Assessment Report: CEA summarized the information gathered and provided this written hydrogeologic assessment for the planned groundwater use and septic

systems at this subdivision. This report considered the likely range of well yields expected and the typical water consumption for the planned residential dwellings. Our report also addresses the concerns regarding septic system impacts and the potential for springs to be intersected during construction. The intent of this hydrogeologic assessment is to provide sufficient information to support the Client's application for development of the planned subdivision. This report is of sufficient detail and quality for submission to the Planning Departments, Conservation Commissions, and/or Board of Health for the Towns of Sutton and Douglas. The Hydrogeologic Report provides sufficient analysis to support the technical conclusions, and provides recommendations, and/or mitigation measures, as appropriate.

3.0 DESCRIPTION OF NEW DEVELOPMENT

Sutton Douglas Development, LLC (SDD) has proposed to build a residential development on approximately 130 acres that straddles the towns of Sutton and Douglas Massachusetts (Attachment A). The proposed development will include 31 single family residential homes on 2-acre lots with individual septic systems and private drinking water wells for each home. This 130-acre parcel is currently undeveloped, and is in a rural part of Central, Massachusetts. The development will require the construction of new roads as shown on Attachment A and will also require installation of storm water drainage infrastructure and stormwater detention/infiltration basins. The proposed development is bordered by Duval Road to the north, Forest Street to the west, Mumford Street to the east and Conservation Drive and Cross Street to the south.

The Site is heavily wooded with a construction road that was blazed to enable initial data collection including test pits by the developer. The surrounding parcels include private homes on the noted streets, most of which include individual septic systems and private wells. The development will include entrance roads on both Duval Road and Forest Street.

CEA visited the Site and surrounding areas on November 4, 2021, to obtain a better understanding of the landscape, geomorphology, and geology of the area. The terrain is gently rolling and has a relatively thin cover of overburden that is 10 to 20 feet thick in most places, although shallow bedrock was observed in outcrop in some areas. This was confirmed by the test pits performed by LDC in March of 2021 (See Attachment B). The Site tour included observation of test pit remnants from earlier in 2021. The spoils from the test pits indicated granular sandy soils with little silts and clays. The certified Soil Evaluator performing the work characterized the soils as sandy loam.

4.0 REVIEW OF AVAILABLE GEOLOGIC AND HYDROGEOLOGIC INFORMATION

CEA performed a search of existing State and Federal resources to ensure that we obtained relevant information that would help with developing the conceptual hydrogeologic model for this Site. The following are the key resources that we have relied upon:

1) Surficial Materials of Massachusetts, A 1:24,000 Scale Geologic Map Database, Scientific Investigations Map 3402, US Geologic Survey, 2018
    a. Quadrangle 82-Oxford
    b. Quadrangle 88-Uxbridge
2) The Bedrock Geology of Massachusetts, US Geological Survey Professional Paper 1366 E-J, 1991
3) East Douglas Topographic Map, from Topozone.com
4) A Guide to Private Water systems in Pennsylvania, Penn state College of Agricultural Sciences, 2009
5) MADEP Private well database that summarizes private well information for each town in the state.
6) Groundwater (1979), R. Allan Freeze and John A Cherry
7) Groundwater and Wells (1986), Fletcher Driscoll

5.0 CONCEPTUAL HYDROGEOLOGIC MODEL

5.1 Description of Site Geology

The proposed residential development is situated in an area covered by glacial sediments that typically range from a few feet in thickness to over 100 feet thick in nearby areas. The Pleistocene glaciation provided significant scouring and erosion of bedrock and then the retreating ice sheet deposited significant layers of both stratified and unstratified glacial till in the vicinity. The literature and site observations are consistent with the overburden being glacial till that could be kame or kame terrace deposits. The local landforms suggest classic kettle and kame glacial landforms, with some evidence of drumlins in the vicinity.

The topography slopes down from the eastern flank of a kame terrace on the western edge of the parcel, declining by over 40 feet towards the eastern half of the parcel where wetlands are present. The elevation along the western perimeter of the property is approximately 190 feet above mean sea level (AMSL) and declines to approximately 145 feet AMSL in the east central part of the site which flattens out. There are some wetlands present in this flatter area, and then the topography gently declines to approximately 125 AMSL along the eastern perimeter of the site.

The test pit logs suggest that the sandy loam comprising the overburden thins towards the center of the proposed development. Bedrock was encountered at the base of several of the test pits within a few feet of the surface and in other test pits cobbles or boulders were encountered. There do appear to be some areas of the site where bedrock may be rather shallow or was found in outcrop. Most of the test pits had 8 to greater than 10 feet of sandy loam present, and groundwater was encountered in several of the test pits. These sandy loam deposits have good drainage properties and as noted in the test pit logs, the overburden material has sufficient permeability to be suitable for septic system installation.

Although groundwater was encountered at the base of several test pits, we would expect that in the vicinity of the planned development the surficial soils are not thick enough to provide a continuous saturated zone capable of supporting shallow private wells. This finding is also supported by the surrounding residential properties which all have deep bedrock wells that support homeowner water supply needs.

Bedrock in the site vicinity has been identified as the Scituate Granitic Gneiss, which is a Proterozoic (likely > 1 billion-year-old) metamorphic rock. The Scituate Granitic Gneiss is a

very hard rock with little primary porosity. The granitic gneiss tends to be rather massive and has few fracture zones, but regionally this unit does provide a continuous saturated zone that is relied on for domestic drinking water supplies. Typically, massive bedrock units like the Scituate Granitic Gneiss have a few interconnected fracture zones that permit transmission of groundwater and a reliable source of water supply for domestic use.

5.2 Local Hydrogeology

As noted above, the kame deposits are relatively thin across the Site, although the glacial drift present in areas beyond the proposed development varies considerably, with some well logs suggesting over 100 feet of overburden present. Generally, the glacial drift deposits are only a few feet to a few tens of feet in thickness and the variability in these deposits does not lend to a reliable source of groundwater for either domestic or commercial use. Nevertheless, the overburden does provide a saturated zone that is important in recharging both local wetlands and drainage courses and is a critical source of recharge for the bedrock aquifer.

The shallow groundwater flow within the overburden materials will follow local topographic trends, particularly since the glacial deposits noted across the site are sandy loam. Groundwater was encountered in several of the test pits from approximately 7 to 11 feet in depth, and in a number of test pits bedrock was encountered without note of any weepage or saturated materials. The test pit data support the discontinuous nature of the saturated zone within the overburden. The shallow groundwater flow zone is under unconfined conditions and the hydraulic gradient will respond relatively quickly to trends in weather and precipitation.

There are currently no private domestic water supply wells on the proposed development site, with the exception of wells at both 61 Duval Road and 5 Forest Street. Much can be garnered from the existing private well logs from adjacent residential properties. Attachment B provides a summary from the Massachusetts Department of Environmental Protection website, containing a selection of all noted well data in adjacent areas in both Sutton and Douglas, Massachusetts. Specifically, this table lists 28 private wells in Sutton and 59 private wells in Douglas. The total depth of these 97 wells ranges from 125 feet to 600 feet below grade, and the depth to bedrock ranges from 0 to 139 feet below grade. The depth to groundwater noted during well installation was from 0 to 42 feet below grade, indicating that typically the noted water level was higher than the recorded top of bedrock. This indicates that the bedrock aquifer in this vicinity is under confined conditions, with the noted water level (potentiometric surface) being substantially higher than the top of bedrock. The trends in the bedrock aquifer's hydraulic gradient may not just be influenced by local conditions but can be controlled by larger regional trends, including significant surface water bodies, significant geologic features, and bedrock

topography. In this area, the Whitin Reservoir located approximately ½ mile southwest of the Site and Stevens Pond located approximately ¼ mile north of the Site are likely significant hydrologic influences on the bedrock aquifer. Specifically, these two significant surface water bodies are significant sources of recharge to the bedrock aquifer.

The pattern of private well development locally indicates that the Scituate Granitic Gneiss provides a reliable source of groundwater for domestic use. The existing well data presented in Attachment C indicates that there are almost 100 private wells currently using the bedrock aquifer for water supply needs within approximately 1/2 mile of the Site. Well drillers normally advance wells to the depth necessary to generate the required water supply for the residential dwelling. The high degree of variability in well depth reflects the discontinuous nature of the fracture zones (both vertical and horizontal) that supply most of the groundwater to the well. It is not unusual for a bedrock well to receive 90% to 100% of the water produced from just one or two fracture zones. Nevertheless, there are typically local and regional fracture zones that form a network of interconnected pathways that enable the bedrock aquifer to appear as one continuous groundwater source on a macro scale. There will be discrete areas within bedrock aquifer where the fractures are more variable and water production will be less, and the converse will also be true. Some of these more productive areas can be identified by examining satellite maps, topographic maps, and bedrock geology to identify regional lineaments and fracture traces. Examination of these predictors of more permeable zones within the bedrock aquifer may be advantageous for future water supply development for the individual residential properties in the proposed development.

5.3 Conceptual Hydrogeologic Model

The above description of local geology and hydrogeology helps to define a framework or model that can be used to help predict the impact the new water supply development will have on the bedrock aquifer. The following parameters are critical components to construct this conceptual hydrogeologic model:

Key parameters:

- Precipitation
- Runoff & Evapotranspiration
- Infiltration (Overburden and Bedrock)
- Bedrock Storativity (storage capacity)
- Hydraulic boundaries
- Hydraulic gradient
- Typical homeowner domestic water usage
- Septic System infiltration

The conceptual hydrogeologic model should be of a large enough scale to include most of the surrounding area that abuts the proposed development. Thus, to construct the conceptual model, we considered a block that is approximately 5000 ft by 5000 feet, and 500 feet in depth. This area is approximately 574 acres (See Attachment D) and extends from north of Duval Road to Conservation Road and Cross Street on the south, and from the Forest Road Development on the west to Mumford Road to the east. This area is about 4.4 times larger than the 130-acre proposed development. The intent was to consider the influence of groundwater withdrawals on neighboring areas considering existing groundwater usage. We assumed that the overburden averages 10 feet in thickness across the area, and that the bedrock aquifer is confined hydraulically across the area. As stated before, the overburden saturated zone is discontinuous and only 0 to a maximum of 5 feet in thickness across the site. Given the existing data we also assumed there are 100 homes within this model area and that they all have private wells and septic systems. The proposed development will result in a total of 131 homes within the model area.

We then made the following assumption regarding the key parameters:

Precipitation: 48 inches annually (NOAA data from Worcester, MA)

Runoff and Evapotranspiration: Approximately 25% of precipitation will runoff into streams and surface water bodies and an additional 25% will evaporate and return to the atmosphere.

Annual Infiltration: the USGS has estimated that 20 to 26 inches recharge to overburden aquifer, and we will assume that one half eventually flows into streams and lakes. Thus, we assumed approximately one foot is available for recharge of the bedrock aquifer

Bedrock Storativity: This is the amount of water stored in both primary and secondary openings in bedrock that is available under pumping conditions. According to Cherry and Freeze, fractured bedrock storativity typically ranges from 0.005 to 0.00005.

Hydraulic Boundaries: In this vicinity both Stevens Pond and Whitin Reservoir will serve as infinite recharge boundaries to the north and south of the block that defines the model area. This effectively means that both surface water bodies help to contribute makeup water if the private water withdrawals increase.

Hydraulic Gradient: In this instance the gradient is not well known. The surface water level in Stevens Pond is approximately 140 ft AMSL and the water level in Whitin Reservoir is approximately 181 ft AMSL. Based on the regional trends in topography we would expect that the hydraulic gradient in the unconfined overburden to be to the east or northeast across the area, and we would expect a similar trend in the bedrock aquifer. The key for this model was to assume that the bedrock is a confined aquifer, with water flowing through a few discrete fractures in this massive unit.

Typical Domestic Water Usage: The resources available suggest that typical domestic usage of water is 80 to 100 gpd per person. We assumed that the typical family contains 3.23 (Wikipedia) persons in Central Massachusetts, and we would expect daily usage to be from 258.4 to 323 gallons per day per household.

Estimated Septic System Discharge. The USEPA estimates that discharge to septic systems average 50 to 70 gpd per person. Thus, we would expect discharges to be 161.5 to 226.1 gpd per household.

Applying the Model Parameters

Based on the above assumptions and assigned values for the model parameters we developed an order magnitude estimate concerning groundwater withdrawals versus the capacity of the bedrock aquifer. The first step was to develop an estimate of the groundwater flux through the defined model area.

Determination of water available and annual flux through the model area:

Volume of Bedrock=	12.5 billion ft^3
Water available within this block (based on storativity) =	625,000 to 62.5 million ft^3
Recharge (Annual infiltration or flux) =	25.0 million ft^3

The range of storativity values coincided well with the annual recharge expected so we used the value of 25 million ft^3 as an estimate of annual water withdrawals that would be sustainable for the bedrock aquifer. This annual recharge equates to 187 million gallons. We then examined the current groundwater withdrawals with 100 homes and compared with the addition of the proposed 31 home development. To determine the net groundwater withdrawals, we assumed the amount of water produced by the private well is offset by the recharge from the septic system.

This calculation suggests that the average daily net groundwater withdrawals per household will be approximately 96.8 gal per day (gpd), which we rounded up to 100 gpd for ease of estimation. Thus, within the model area the existing residential use will consume approximately 10,000 gpd for domestic use, which equates to 3.65 million gallons per year (gpy). With the addition of 31 homes the annual usage in the model area will increase to 4.78 million gpy. The recharge estimate for the modeled area suggests that the available water would be approximately 187 million gpy. Thus, the available water flux through the modeled area is approximately 40 to 50 times what is required for the domestic use based on the above assumptions. These estimates are intended to be order of magnitude in nature, and there is of course variability both spatially and temporally in the physical parameters, and with trends in

climate and precipitation. Nevertheless, this first order magnitude estimate suggests that the addition of 31 new homes will not over-tax the bedrock aquifer and should not result in depletion of water available for domestic use in adjacent areas to the proposed development.

6.0 DISCUSSION

The intent of this discussion is to address the specific issues raised by abutters regarding the proposed development.

Negative impacts on the underlying aquifer causing neighboring wells to dry up.

As shown in the previous section it appears that the quantity of groundwater available in the bedrock aquifer is 1 to 2 orders of magnitude greater than the anticipated withdrawals from the bedrock aquifer even after the new development is completed. The fact that each existing home has a suitable private well that already provides adequate water for domestic water supply reinforces that the conceptual model presented for the bedrock aquifer is reasonable. On a macro-scale the granitic gneiss comprising the bedrock aquifer has sufficient interconnected fracture zones such that it is highly unlikely the contemplated new wells would result in neighboring wells that are hundreds of feet away to dry up. Typically, the zone of influence for a private well that is pumping sporadically at 5 to 10 gpm is on the order of tens to possibly 100 feet during the peak pumping periods. Thus, the zones of influence from nearby wells will usually not intersect on larger time scales (days), and it is most likely that there is either little or no influence on wells located on adjacent properties. It is our professional opinion that the addition of the 31 noted new homes with private wells will not cause excessive groundwater withdrawals that would result in adverse impact to neighboring wells located beyond the proposed development.

Contamination of the abutter's well water as a result of 31 new homes septicsystems

The perc tests performed by LDC in March of 2021 indicate that the subsurface soils are of suitable quality for installation of individual septic systems. Generally, there was 10 feet of overburden available to site each septic system, although there may be a handful of locations where some fill may be necessary due to very shallow bedrock. The normal operation of the septic systems within the sandy loam (that was the predominant soil type) should permit for adequate infiltration when the septic systems are in use, and the granular nature of these soils will promote adequate contact time for decomposition of remaining waste materials by indigenous bacteria. We do not believe there is a cogent argument that the 31 new septic systems will result in any off property or off-site adverse impacts.

Excavation into the underground springs re-routing the flows

The planned development will require some excavation and fill depending on grades for the roads and utilities. Generally, the LDC design team will look to minimize the excess cuts and fill required for the development. Based on the test pit logs the saturated zone in the overburden material was encountered from 7 to 11 feet below grade, and in many instances, groundwater was not encountered in the test pits that were up to 10 to 12 feet in depth. There is some potential that the water table would be encountered either during utility corridor construction or during basement construction, although we would expect this issue to be of a limited nature and extent. In those instances where groundwater seepage is encountered it will be necessary to determine whether the flow is ephemeral or longer term in nature, and then determine whether adjustment in construction practice or drainage may be required. There may be some situations where bedrock excavation/removal is required and there is the potential for groundwater seepage in those instances. In those cases, it is likely that the saturated zone encountered would constitute a zone within the overburden and the regolith at the top of the granitic gneiss. This shallow water bearing zone would be unconfined and not under artesian conditions that would result in intersection of a more substantial seep or spring. We believe it is very unlikely that any construction activities would intersect the bedrock aquifer where confinement and artesian conditions exist.

Control of the breakout of the springs during and following construction

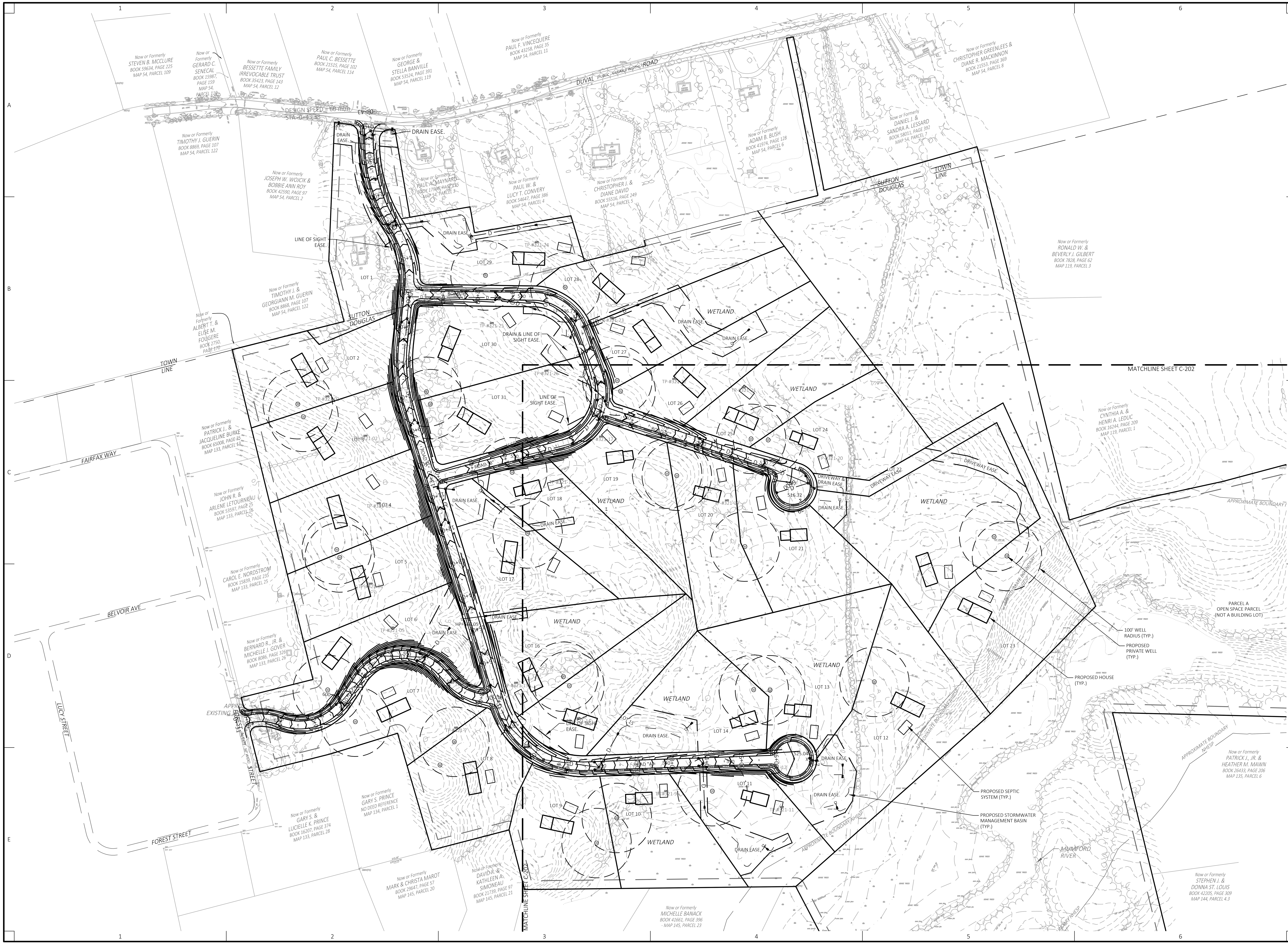
As noted in the previous response we believe that any seeps encountered during construction activities will be limited in extent and will likely be drained as part of construction. In the rare instance where a permanent seep is encountered it may be necessary to design suitable drainage to address this issue. Once again, we do not believe this will be a significant issue for this development.

Conclusions

CEA was retained by LDC to address issues raised by abutters regarding the potential for the proposed 31-home subdivision to adversely impact the groundwater supply and groundwater quality. CEA's hydrogeologic assessment performed for this project indicates the following:

1) The bedrock aquifer comprised of the Scituate Granitic Gneiss exhibits suitable characteristics for providing the required domestic water needs for the new subdivision.
2) Our hydrogeologic assessment indicates that the new private wells will not adversely impact the abutters wells.
3) The data obtained from the test pits on site indicate that the soils consist of sandy loam and appear ideal for the installation of individual septic systems for each home. We do not believe that the new septic systems will adversely impact groundwater quality either on the proposed development site or on abutter properties.
4) We believe the potential for intersecting a seep or spring during construction is possible, but we believe it will be possible to address these drainage issues during project construction.

ATTACHMENT A
FIGURES DEPICTING PROPOSED SUTTON DOUGLAS DEVELOPMENT



LAND DESIGN COLLABORATIVE

Chauncy Place | Terrace North | Suite 1
45 Lyman Street
Westborough, MA 01581

508.952.6300 | LDCollaborative.com

Project Owner:
Sutton Douglas Development LLC
C/O
Flynn Group Consulting
2 Summer Street, Suite 8
Natick, MA 01760

Project Applicant:
Sutton Douglas Development LLC
C/O
Flynn Group Consulting
2 Summer Street, Suite 8
Natick, MA 01760

Project Title:
Preliminary Plan
Sutton Douglas Development
Sutton, MA
(Worcester County)

Sheet Title:
GRADING, DRAINAGE & UTILITY PLAN

Local Permitting

No:	Date:	Revision | Issue:

Drawn By:	CMP	Checked By:	WMB
Date:	08/30/2021	Project No.:	20-0083

Scale: 1" = 120'

Sheet No.:
C-201

ZONING SUMMARY TABLE: DOUGLAS & SUTTON		
RA DISTRICT (DOUGLAS) R-1 DISTRICT (SUTTON)		
	DOUGLAS	SUTTON
USE: SINGLE FAMILY DWELLING	REQUIRED	REQUIRED
MINIMUM LOT AREA	90,000 S.F.	80,000 S.F.
MINIMUM FRONTAGE	200'	250'
MINIMUM FRONT YARD	50'	50'
MINIMUM SIDE YARD	25'	20'
MINIMUM REAR YARD	25'	50'
MINIMUM LOT WIDTH	N/A	250'
MAXIMUM BUILDING HEIGHT	35'	35'
MAXIMUM NUMBER OF BUILDING STORIES	2 1/2 STORIES	N/A
MAXIMUM LOT COVERAGE	N/A	10%
MINIMUM OPEN SPACE	N/A	N/A

Prepared by:

LAND DESIGN COLLABORATIVE
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Drawn By:	CMP	Checked By:	WMB
Date:	09/20/2021	Project No.:	21-0083

0 60 120 240 360
Scale: 1" = 120'

SUTTON DOUGLAS DEVELOPMENT
PROPOSED CONDITIONS

Mumford Street and 5 Forest Street, Douglas, MA
61 Duval Road, Sutton, MA

N W E S

Prepared for:

Sutton Douglas Development LLC
C/O
FLYNN build & develop™
2 Summer Street, Suite 8
Natick, MA 01760

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ATTACHMENT B
TEST PIT LOGS & PERC TEST RESULTS

Commonwealth of Massachusetts
City/Town of DOUGLAS

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

A. Facility Information

SUTTON DOUGLAS DEVELOPMENT LLC
Owner Name

3 PJ MURPHY LANE
Street Address

135-12
Map/Lot #

HOPKINTON
City

MA
State

01748
Zip Code

B. Site Information

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

2. Soil Survey Available? ☑ Yes ☐ No If yes: NRCS SOIL SURVEY
Source

73A
302B
317B
422C
Soil Map Unit

WHITMAN SANDY LOAM, MONTAUK SANDY LOAM, SCITUATE SANDY LOAM, CANTON SANDY LOAM
Soil Name

~~Soil Limitations~~

LOAMY SAND
Soil Parent material

KAME TERRACE
Landform

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes:
Year Published/Source

Map Unit

SCITUATE GRANITE GNEISS
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:
Wetland Type

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

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-01 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND (Landform) KAME (Position on Landscape (SU, SH, BS, FS, TS)) BACKSLOPE

3. Distances from: Open Water Body _____ feet; Property Line _____ feet; Drainage Way _____ feet; Drinking Water Well _____ feet; Wetlands _____ 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 @ LOT 31

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"	Ap	SANDY LOAM	2.5Y 3/3								
4-18"	B1	↓	10YR 5/6								
18-130"	C	LOAMY SAND	5Y 6/2	47"	7.5YR 5/4	5%		10%			

Additional Notes:
EVIDENCE OF REDOX AT 29"
SEEPAGE AT 120"
GROUNDWATER AT 127"

Commonwealth of Massachusetts
City/Town of Douglas

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: 321-02 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACK SLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 19

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"	Ap	SANDY LOAM	2.5Y 3/3								
4-24"	Bw1	↓	10YR 5/6								
24-121"	C	LOAMY SAND	5Y 6/2	36"	7.5YR 5/6	5%		5%			

Additional Notes:
EVIDENCE OF REDOX @ 24"
INFERENCE @ 81"
GROUNDWATER @ 110"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-03 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND / MED. SAND (Landform) KAME (Position on Landscape (SU, SH, BS, FS, TS)) BACKSLOPE

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

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

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

Soil Log @ LOT 20

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			
0-6"	Ap	SANDY LOAM	2.5Y 3/3								
6-25"	B	"	10YR 5/6								
25-125"	C	LOAMY SAND	5Y 4/2	37"	7.5YR 5/6	5%		5%			

Additional Notes:
LENSES OF MED. SAND
INTERFACE @ 110"
GROUNDWATER @ 120"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 32/04 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS PINES MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND Landform: KNOLL Position on Landscape (SU, SH, BS, FS, TS): BACKSLOPE

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

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

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

Soil Log @ LOT 21

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			
0-2"	A	SANDY LOAM	2.5Y 3/3								
2-21"	B	↓	10YR 5/6								
21-136"	C	LOAMY SAND	5Y 6/2	40"	7.5YR 5/6	5%		10%			

Additional Notes:
EVIDENCE OF REDOX @ 27"
WETNESS OF SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 32/05 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30'S (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: SANDY LOAM KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 26

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			
0-8"	AP	SANDY LOAM	2543/3								
8-26"	BW		10YR5/4								
26-110"	C		2544/3	47"	7.5YR5/6	5%		10%			

Additional Notes:
EVIDENCE OF REDOX @ 28"
IMPERVIOUS AT 83"
LARGE ANGULAR BOULDERS

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-06 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30'S (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 27

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			
0-2"	Ap	SANDY LOAM	2.5Y 3/3								
2"-25"	Bw	"	10YR 5/6								
25-121"	C	LOAMY SAND	5Y 4/2	35"	7.5YR 5/6	5%		10%			

Additional Notes:
EVIDENCE OF REDOX @ 27"
LEDGE @ 80"
GROUNDWATER @ 118"
BIG ROCKS WITHIN HOLE

Commonwealth of Massachusetts
City/Town of Douglas

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: 321-07 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 29

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"	Ap	SANDY LOAM	2.5Y 3/3								
4-30"	Bw	"	10YR 5/6								
30-140"	C	LOAMY SAND	5Y 6/2	47"	7.5YR 5/6	5%		10%	LOOSE SINGLE GRAIN		

Additional Notes:
EVIDENCE OF REDOX @ 33"
WEEPAGE @ 130"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-03 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 26

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			
0-6"	Ap	SANDY LOAM	7.5YR 3/3								
6-36"	Bw	"	10YR 5/6	37"	7.5YR 5/6	5%		10%	LOOSE SINGLE GRAIN		
36-131"	C	LOAMY SAND	5Y 6/2								

Additional Notes:
WEEPAGE @ 123"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-09 (Hole #) 3/24/21 (Date) AM (Time) SUNNY 30'S (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 30

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	Ap	SANDY LOAM	2.5Y 3/3								
10-25"	Bw	"	10YR 5/6								
25-118"	C	LOAMY SAND	5Y 6/2	37"	7.5YR 5/6	5%		5%	LOOSE STRATIFIED CHROMA		

Additional Notes:
LENSES OF SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-10 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND (Landform) KAME (Position on Landscape (SU, SH, BS, FS, TS)) BACKSLOPE

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

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

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

Soil Log @ LOT 2

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"	Ap	SANDY LOAM	5YR 2/1								
4-24"	Bw	↓	7.5YR 5/6								
24-95"	C	LOAMY SAND	7.5YR 4/4	38"	7.5YR 5/6	5%		10%	LOOSE SINGLE GRAIN		

Additional Notes:
REFUSAL @ 95"
EVIDENCE OF REDOX @ 32"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-11 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND Landform: KAME Position on Landscape (SU, SH, BS, FS, TS): BACKSLOPE

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

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

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

Soil Log @ LOT 3

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"	Ap	SANDY LOAM	5YR 2/1								
4-32"	Bw	↓	2.5YR 5/6								
32-123"	C	LOAMY SAND	2.5Y 6/4	56"	7.5YR 5/6	5%		15%	PLATY		

Additional Notes:
EVIDENCE OF REDOX @ 36"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-12 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-8% (Slope (%)

Description of Location: _____

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

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

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

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

Soil Log @ LOT 4

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			
0-3"	Ap	SANDY LOAM	5YR 2/1								
3-26"	B1	4	2.5YR 5/6								
26-100"	C	LOAMY SAND	2.5Y 4/4	29"	7.5YR 5/6	5%					

Additional Notes:
TOP OF ROCK @ 48" / REFUSAL @ 100"
LENSES OF SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-13 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS PINES MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-5% (Slope (%))

Description of Location: _____

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

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

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

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

Soil Log @ 2075

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			
0-3"	Ap	SANDY LOAM	5YR 2/1								
3-27"	Bw	"	7.5YR 5/6								
27-85"	C	LOAMY SAND	7.5YR 6/4	30"	7.5YR 5/6	5%		15%	PLATY		

Additional Notes:
BOULDERS @ 85"
LENSES OF SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-14 (Hole #) | 3/31/21 (Date) | AM (Time) | CLOUDY 50'S (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) | OAKS, PINES, MAPLES (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2-3% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND | KAME (Landform) | BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 6

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			
0-3"	Ap	SANDY LOAM	5YR2/1								
3-28"	Bw	"	2.5Y5/4								
28-122"	C	LOAMY SAND	2.5Y6/4	40"	7.5YR5/6	5%		10%	PLATY		

Additional Notes:
EVIDENCE OF REDOX @ 32" / SEEPAGE @ 112" / GROUNDWATER @ 120"
LENSES OF SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-15 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS PINES PINES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 7

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9"	Ap	SANDY LOAM	5YR 2/1								
9-30"	Bw	"	7.5YR 5/6								
30-129"	C	LOAMY SAND	7.5YR 6/4	36"	7.5YR 5/6		20% →		PLATY		

Additional Notes:
LENSES OF SAND
SURFACE ROCKS AND BOULDERS

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-16 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FIELD (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS)

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

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

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

Soil Log @ LOT 17

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			
0-5"	Ap	SANDY LOAM	5YR 2/1								
5-28"	B	"	2.5Y 5/4								
28-110"	C	LOAMY SAND	2.5Y 4/4	35"	7.5YR 5/6	5%		10%	PLATY		

Additional Notes:
LENSES OF SAND
REFUSAL AT 110"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-17 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS)

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

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

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

Soil Log LOT 16 OR LOT 18

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"	AP	SANDY LOAM	5YR 2/1								
4-29"	B	↓	7.5YR 5/6								
29-111"	C	LOAMY SAND	2.5Y 6/4	39"	7.5YR 5/6	5%		5%	PLATY		

Additional Notes:
LENSES OF SAND
EVIDENCE OF REDOX AT 33"
TOP OF ROCK AT 54"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-18 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50s (Weather) _____ (Latitude) _____ (Longitude)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FIELD (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-8% (Slope (%)

Description of Location: _____

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

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

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

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

Soil Log @ LOT 9

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"	Ap	SANDY LOAM	5Y 2/1								
4-28"	Bw	"	2.5Y 5/4								
28-105"	C	LOAMY SAND	2.5Y 6/4	38"	7.5YR 5/6	5%		5%	PLATY		

Additional Notes:
EVIDENCE OF REDOX AT 28"
LENSES OF SAND
REFUSAL AT 105"
SURFACE ROCKS AND BOULDERS

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-19 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8 (Slope (%))

Description of Location: _____

2. Soil Parent Material: MEDIUM SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 8

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"	Ap	SANDY LOAM	5Y 2/1								
4"-29"	Bw	"	2.5Y 5/6								
29"-99"	C	MED. SAND	2.5Y 6/4	32"	7.5YR 5/6	5%		10%			

Additional Notes:
TOP OF ROCK @ 99"

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-20 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS PINES MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: MEDIUM SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS)

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

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

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

Soil Log @ LOT 10

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			
0-5"	Ap	SANDY LOAM	5YR 2/1								
5-25"	Bw	LOAMY SAND	2.5Y 5/6								
25-99"	C	MED. SAND	2.5Y 6/4	56"	7.5YR 5/6	5%			LOOSE		

Additional Notes:
EVIDENCE OF REDOX @ 33"
GROUNDWATER AT 99"
MTH. LAUREL

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 32/21 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-8% (Slope (%)

Description of Location: _____

2. Soil Parent Material: MEDIUM SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS)

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

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

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

Soil Log @ LOT 11

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"-6"	Ap	SANDY LOAM	5YR 2/1								
6"-30"	Bw	LOAMY SAND	2.5Y 5/6	28"	7.5YR 5/6	5%		15%	LOOSE SINGLE GRAIN		
30"-103"	C	MED. SAND	2.5Y 6/4								

Additional Notes:
WEEPAGE AT 70"
A LOT OF COBBLES
WITH. LAURIE

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-22 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINE, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: FINE SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 12

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			
0-5"	Ap	SANDY LOAM	5YR 2/1								
5-18"	Bw	LOAMY SAND	2.5Y 5/6								
18-68"	C	FINE SAND	2.5Y 7/3					5%			

Additional Notes:
SEEPAGE AT 20"
GROUNDWATER AT 22"
REDOX THROUGHOUT
LENSES OF COURSE SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-23 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINE TREES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-8% (Slope (%)

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS)

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

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

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

Soil Log @ LOT 14

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			
0-8"	A	SANDY LOAM	5YR 2/1								
8-28"	B	SL	2.5Y 5/6								
28-109"	C	LOAMY SAND	2.5Y 6/4	30"	7.5YR 5/6	5%		5%			

Additional Notes:
SEEPAGE AT 100"
EVIDENCE OF REDOX 18"
LENSES OF SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-24 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50'S (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-9% (Slope (%))

Description of Location: _____

2. Soil Parent Material: LOAMY SAND KAME (Landform) BACK-SLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 13

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"-8"	Ap	SANDY LOAM	5YR 2/1								
8"-28"	B1O	↓	2.5Y 5/6								
28"-108"	C	LOAMY SAND	2.5Y 6/4	28"	7.5YR 5/6	5%		5%			

Additional Notes:
SOIL WET
LENSES OF LOAM AT BOTTOM

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-25 (Hole #) 3/31/21 (Date) 10AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-8% (Slope (%)

Description of Location: _____

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

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

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

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

Soil Log @ LOT 25

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"	Ap	SANDY LOAM	5YR 2/1								
4-25"	B1	"	2.5Y 5/6								
25-66"	C1	LOAMY SAND	2.5Y 6/4	31"	7.5YR 5/6	5%					
66-107	C	SANDY LOAM	2.5Y 6/2								

Additional Notes:
DEPTH TO REF AT 95"
GROUNDWATER AT 109"

Commonwealth of Massachusetts
City/Town of POWNALL

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: 32L-26 (Hole #) 3/31/21 (Date) AM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: SANDY LOAM KAME (Landform) BACKSLOPE (Position on Landscape (SU, SH, BS, FS, TS))

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

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

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

Soil Log @ LOT 24

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			
0-3"	Ap	SANDY LOAM	5YR 2/1								
3-23"	B		2.5Y 5/6								
23-84"	C		2.5Y 6/4	27"	7.5YR 5/6	5%		5%			

Additional Notes:
SEEPAGE AT 30"
EVIDENCE OF REDOX AT 18"
LENSES OF FINE SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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: 321-27 (Hole #) 3/31/21 (Date) 1PM (Time) CLOUDY 50's (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) OAKS, PINES, MAPLES (Vegetation) FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 2-8% (Slope (%))

Description of Location: _____

2. Soil Parent Material: SANDY LOAM Landform: KAME Position on Landscape (SU, SH, BS, FS, TS): BACKSLOPE

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

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

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

Soil Log @ LOT 22

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			
0-5"	Ap	SANDY LOAM	10YR 2/1								
5"-27"	Bw	↓	2.5Y 5/6								
27"-105"	C	↓	2.5Y 7/3	26"	7.5YR 5/6	5%		5%			

Additional Notes:
IMPERVIOUS AT 36"
LENSES OF SAND

Commonwealth of Massachusetts
City/Town of DOUGLAS

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

D. Determination of High Groundwater Elevation

1. Method Used:

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

_____ Index Well Number _____ Reading Date

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

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

2. Estimated Depth to High Groundwater: UNABLE _____ 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: UNABLE _____ inches Lower boundary: _____ inches

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

Commonwealth of Massachusetts
City/Town of DOUGLAS

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.

Signature of Soil Evaluator	Date 7/8/2021
LAWRENCE C. GREENE 2685 Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License 6/30/2022
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 DOUGLAS

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A. Site Information

SUTTON DOUGLAS DEVELOPMENT LLC
Owner Name

3 R.T. MURPHY LANE
Street Address or Lot #

HOPKINTON | MA | 01748
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

Date	3/24/21	3/24/21
Time		
Observation Hole #	321-01 LOT 31	321-02 LOT 19
Depth of Perc	50"	56"
Start Pre-Soak		
End Pre-Soak		
Time at 12"	10:50	11:00
Time at 9"	11:02	11:07
Time at 6"	11:22	11:19
Time (9"-6")	20 MIN	12 MIN
Rate (Min./Inch)	7 MIN/INCH	4 MIN/INCH
Test Passed:	☑	☑
Test Failed:	☐	☐

LARI GREENE
Test Performed By:

Board of Health Witness

Comments:

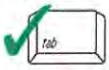
Commonwealth of Massachusetts
City/Town of DOUGLAS

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Site Information

SUTTON DOUGLAS DEVELOPMENT LLC
Owner Name

3 PJ MURPHY LANE
Street Address or Lot #

HOPKINTON | MA | 01748
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date / Time	Date / Time
	3/24/21	
Observation Hole #	321-04 LOT 21	321-07 LOT 29
Depth of Perc	45"	52"
Start Pre-Soak		
End Pre-Soak		
Time at 12"	11:05	9:48
Time at 9"	11:13	10:01
Time at 6"	11:29	10:18
Time (9"-6")	16 MIN	17 MIN
Rate (Min./Inch)	6 MIN/INCH	6 MIN/INCH
Test Passed:	☑	☑
Test Failed:	☐	☐

LAR GREENE
Test Performed By:

Board of Health Witness

Comments:

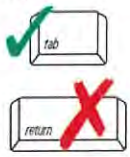
Commonwealth of Massachusetts
City/Town of DOUGLAS

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Site Information

SUTTON DOUGLAS DEVELOPMENT LLC
Owner Name

3PJ MURPHY LANE
Street Address or Lot #

HOPKINTON | MA | 01748
City/Town | State | Zip Coce

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date	Time	Date	Time
	3/24/21		3/31/21	
Observation Hole #	321-04 LOT 27		321-14 LOT 6	
Depth of Perc	48"		44"	
Start Pre-Soak				
End Pre-Soak				
Time at 12"	9:55		12:17	
Time at 9"	10:04		12:25	
Time at 6"	10:17		12:34	
Time (9"-6")	13 MIN		9	
Rate (Min./Inch)	5MIN/INCH		3MIN/INCH	
Test Passed:	☑		☑	
Test Failed:	☐		☐	

LAR GREENE
Test Performed By:

Board of Health Witness

Comments:

ATTACHMENT C
PRIVATE WELL DATA
SUTTON & DOUGLAS, MA

Private Well Data for Douglas, MA

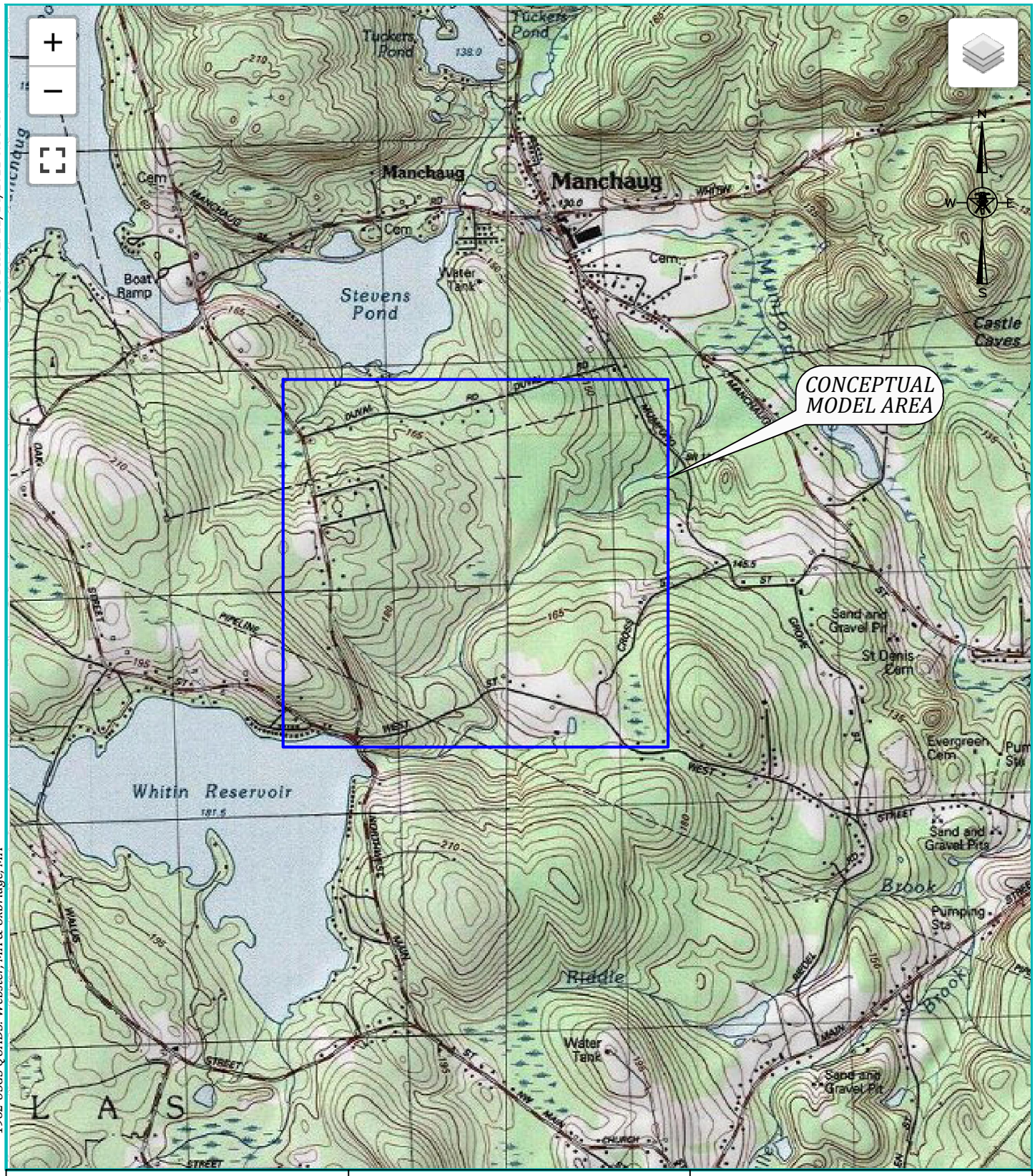
WellID	Town	StreetNu	StreetName	DateComplete	WellType	TotalDepth	DepthtoBedrock	WaterLevel
102617	DOUGLAS	11	Belvoir Ave.	05/08/2001	Domestic	300.00	10.00	17.00
606929	DOUGLAS	16	BELVOIR ROAD	05/24/2012	Domestic	520.00	8.00	34.00
668753	DOUGLAS	20	BIRCH STREET	05/17/2021	Domestic	300.00	155.00	20.00
662592	DOUGLAS	64	BIRCH STREET	02/18/2019	Domestic	560.00	12.00	14.00
637877	DOUGLAS		Birch Street	01/07/1974	Domestic	200.00	5.00	20.00
637831	DOUGLAS		Birch Street	04/23/1979	Domestic	430.00	13.00	15.00
637830	DOUGLAS		Birch Street	07/21/1979	Domestic	225.00	14.00	18.00
637736	DOUGLAS		Birch Street	04/13/1984	Domestic	200.00	25.00	20.00
637714	DOUGLAS		Birch Street	12/03/1984	Domestic	400.00	145.00	50.00
637664	DOUGLAS		Birch Street	11/25/1985	Domestic	125.00	0	5.00
637641	DOUGLAS		Birch Street	08/06/1986	Domestic	245.00	50.00	72.00
637632	DOUGLAS	28	Birch Street	09/29/1986	Domestic	240.00	55.00	20.00
114971	DOUGLAS	12	Birch Street	07/01/2002	Domestic	265.00	220.00	60.00
4395	DOUGLAS	70	Birch Street	05/05/2000	Domestic	180.00	28.00	4.00
3832	DOUGLAS		Birch Street	06/05/2000	Domestic	400.00	210.00	22.00
637771	DOUGLAS		Birch Street & West Stre	06/03/1983	Domestic	500.00	125.00	50.00
637203	DOUGLAS		Conservation Drive	05/07/1997	Domestic	260.00	85.00	20.00
637184	DOUGLAS		Conservation Drive	08/04/1997	Domestic	300.00	180.00	20.00
637170	DOUGLAS		Conservation Drive	10/28/1997	Domestic	300.00	190.00	20.00
637158	DOUGLAS		Conservation Drive	12/11/1997	Domestic	400.00	160.00	5.00
637154	DOUGLAS		Conservation Drive	12/18/1997	Domestic	200.00	118.00	20.00
637139	DOUGLAS		Conservation Drive	04/13/1998	Domestic	205.00	0	5.00
637138	DOUGLAS		Conservation Drive	04/16/1998	Domestic	0	125.00	10.00
637134	DOUGLAS		Conservation Drive	04/30/1998	Domestic	380.00	185.00	10.00
637133	DOUGLAS		Conservation Drive	05/04/1998	Domestic	285.00	155.00	10.00
637057	DOUGLAS		Conservation Drive	02/10/1999	Domestic	123.00	69.00	20.00
637056	DOUGLAS		Conservation Drive	02/11/1999	Domestic	0	64.00	30.00
637055	DOUGLAS		Conservation Drive	02/12/1999	Domestic	0	64.00	40.00
637052	DOUGLAS		Conservation Drive	02/19/1999	Domestic	503.00	94.00	10.00
637051	DOUGLAS		Conservation Drive	02/16/1999	Domestic	275.00	104.00	0.00
637048	DOUGLAS		Conservation Drive	03/24/1999	Domestic	280.00	100.00	15.00
637047	DOUGLAS		Conservation Drive	03/26/1999	Domestic	160.00	62.00	30.00
637043	DOUGLAS		Conservation Drive	04/01/1999	Domestic	220.00	59.00	20.00
637042	DOUGLAS		Conservation Drive	04/06/1999	Domestic	320.00	83.00	25.00
637040	DOUGLAS		Conservation Drive	04/08/1999	Domestic	160.00	92.00	15.00
655862	DOUGLAS	2	CROSS STREET	11/29/2016	Domestic	500.00	155.00	23.00
637902	DOUGLAS		Cross Street	11/21/1966	Domestic	118.00	65.00	18.00
637741	DOUGLAS		Cross Street	02/28/1984	Domestic	600.00	78.00	0
637524	DOUGLAS		Cross Street	07/14/1989	Domestic	600.00	70.00	38.00
637499	DOUGLAS	23	Cross Street	08/17/1990	Domestic	160.00	89.00	40.00
637410	DOUGLAS		Cross Street	05/07/1992	Domestic	200.00	70.00	15.00
637401	DOUGLAS		Cross Street	07/27/1992	Domestic	425.00	47.00	0.00
637284	DOUGLAS		Cross Street	05/09/1996	Domestic	300.00	98.00	40.00
637267	DOUGLAS	30	Cross Street	07/08/1996	Domestic	320.00	125.00	18.00
156184	DOUGLAS	14	Cross Street	11/15/2007	Domestic	220.00	76.00	17.00
4427	DOUGLAS		Cross Street	12/09/1999	Domestic	405.00	125.00	4.00
637754	DOUGLAS		Forest Street	11/03/1983	Domestic	420.00	10.00	40.00
637739	DOUGLAS		Forest Street	03/22/1984	Domestic	180.00	15.00	10.00
637734	DOUGLAS		Forest Street	04/16/1984	Domestic	220.00	10.00	20.00
637732	DOUGLAS		Forest Street	04/18/1984	Domestic	240.00	10.00	20.00
637821	DOUGLAS		Mumford Street	11/07/1979	Domestic	275.00	134.00	25.00
148030	DOUGLAS	95	Mumford Street	03/16/2007	Domestic	320.00	120.00	13.00
137579	DOUGLAS	95	Mumford Street	06/21/2005	Domestic	200.00	100.00	21.00
137503	DOUGLAS	103	Mumford Street	02/24/2005	Domestic	600.00	82.00	18.00
133153	DOUGLAS	105	Mumford Street	02/07/2005	Domestic	600.00	90.00	4.00
122308	DOUGLAS	60	Mumford Street	09/05/2003	Domestic	420.00	75.00	9.00
4406	DOUGLAS	11	Mumford Street	04/04/2000	Domestic	360.00	115.00	24.00
137580	DOUGLAS	99	Mumforo Street	06/17/2005	Domestic	600.00	0.00	21.00
637277	DOUGLAS		Munford Road	06/08/1996	Domestic	370.00	110.00	20.00

Private Well data for Sutton, MA

WellID	Town	StreetNumbe	StreetName	DateComplete	WellType	TotalDepth	DepthtoBedrock	WaterLevel
307016	SUTTON		Duval Road	07/23/1974	Domestic	175.00	28.00	20.00
306993	SUTTON		Duval Road	09/22/1975	Domestic	145.00	21.00	20.00
306740	SUTTON	95	Duval Road	08/26/1985	Domestic	220.00	70.00	35.00
306696	SUTTON		Duval Road	08/05/1986	Domestic	150.00	10.00	10.00
306695	SUTTON		Duval Road	08/06/1986	Domestic	150.00	10.00	10.00
306578	SUTTON		Duval Road	07/04/1989	Domestic	185.00	48.00	8.00
306197	SUTTON	61	Duval Road	02/06/1998	Domestic	360.00	10.00	20.00
306158	SUTTON	21	Duval Road	12/04/1998	Domestic	505.00	110.00	45.00
306154	SUTTON	62	Duval Road	12/30/1998	Domestic	125.00	18.00	30.00
136888	SUTTON	Lot 43	Duval Road	12/20/2004	Domestic	500.00	0.00	21.00
129864	SUTTON	65	Duval Road	02/11/2004	Domestic	500.00	50.00	20.00
111974	SUTTON	49	Duval Road	09/06/2002	Domestic	155.00	25.00	10.00
618639	SUTTON	8 1/2	MUMFORD STREET	01/09/2013	Domestic	500.00	10.00	42.00
307019	SUTTON		Torrey Road	05/09/1974		295.00	8.00	18.00
306771	SUTTON		Torrey Road	04/24/1985	Domestic	200.00	100.00	30.00
306660	SUTTON		Torrey Road	07/20/1987	Domestic	0	120.00	15.00
306505	SUTTON		Torrey Road	10/22/1991	Domestic	305.00	139.00	20.00
306483	SUTTON	61	Torrey Road	10/28/1992	Domestic	385.00	105.00	40.00
306436	SUTTON	5	Torrey Road	10/19/1993	Domestic	225.00	10.00	25.00
306368	SUTTON		Torrey Road	02/27/1995	Domestic	300.00	15.00	20.00
306367	SUTTON		Torrey Road	03/17/1995	Domestic	300.00	15.00	20.00
306279	SUTTON	2R	Torrey Road	11/04/1996	Domestic	145.00	6.00	25.00
306170	SUTTON		Torrey Road	09/19/1998	Domestic	180.00	100.00	0
132476	SUTTON	Lot 3	Torrey Road	06/25/2004	Domestic	200.00	5.00	20.00
137667	SUTTON	Lot 2A	Torry Road	10/02/2006	Domestic	375.00	126.00	16.00
13884	SUTTON		Torry Road	12/31/2000	Domestic	500.00	86.00	22.00
13870	SUTTON		Torry Road	10/15/1999	Domestic	185.00	100.00	8.00
120778	SUTTON	8R	Tory Road	03/01/2003	Domestic	165.00	11.00	20.00

ATTACHMENT D
CONCEPTUAL HYDROGEOLOGIC MODEL
MAP SHOWING MODEL AREA

PLOT DATE: 12/14/2021 6:54 PM



1982 USGS QUADS: Webster, MA & Uxbridge, MA

CEA PROJECT NO.: 1208-21

SCALE 1" = 2,000'

0 1000 2000 3000 4000

FEET

FIGURE 1

CONCEPTUAL HYDROGEOLOGIC MODEL AREA

SUTTON DOUGLAS DEVELOPMENT

Corporate Environmental Advisors
21 East Main Street Westborough, MA
1-800-358-7960