**TOWN OF ACTON**
472 Main Street
Acton, Massachusetts, 01720
Telephone (978) 929-6630
Fax (978) 929-6340

**Engineering Department**

***INTERDEPARTMENTAL COMMUNICATION***

***To*: Board of Selectmen** ***Date:*** 5/23/2016

***From:*** **Engineering Department**

***Subject:*** **Site Plan Special Permit #04/22/16 - #462 – Country Properties, LLC – 429 Great Road**

We have reviewed the plans titled "Site Plan for Country Properties, LLC 429 Great Road, Acton, Massachusetts" dated April 22, 2016 for the above mentioned special permit and have the following comments:

1. The property is located in both Zones 3 and 4 of the Groundwater Protection District. The drainage design does not utilize clay lined detention basins required in the Groundwater District regulations however the use of Contech units meets the intent of the regulations.

2. The applicant states that the soil is classified as Hydrologic Group A and has designed a drainage system based on this assumption. The NRCS Middlesex Soil Survey Report actually classifies the soil as Group B, which affects how well drained the site is. We have attached a soil map of the area and the relevant sections of the Middlesex Soil Survey with this memo.

   The soil classification affects all stormwater calculations including: estimated stormwater runoff rate, runoff volume and the required size of the underground detention system. The entirety of subsurface infiltration area 2 and a portion of the roof drywell are located in the Group B area. Group B soil has a slower infiltration rate than Group A and the MA Stormwater standards requires the design to use the infiltration rate of the soil group at the spot where the infiltration is being proposed (see attached). Without the correct soil classification, we cannot confirm that the drainage system has been designed properly

3. We request a copy of the MassDOT permit for the work shown within the road layout of Great Road for our records.

4. Based on our turning templates, an emergency SU-30 vehicle (fire truck) can maneuver within the site. We will defer further comment to the Fire Department.

5. An as-built plan certified by a Massachusetts Licensed Surveyor showing the buildings, pavement, drainage, utilities, etc. should be required at the conclusion of construction. A

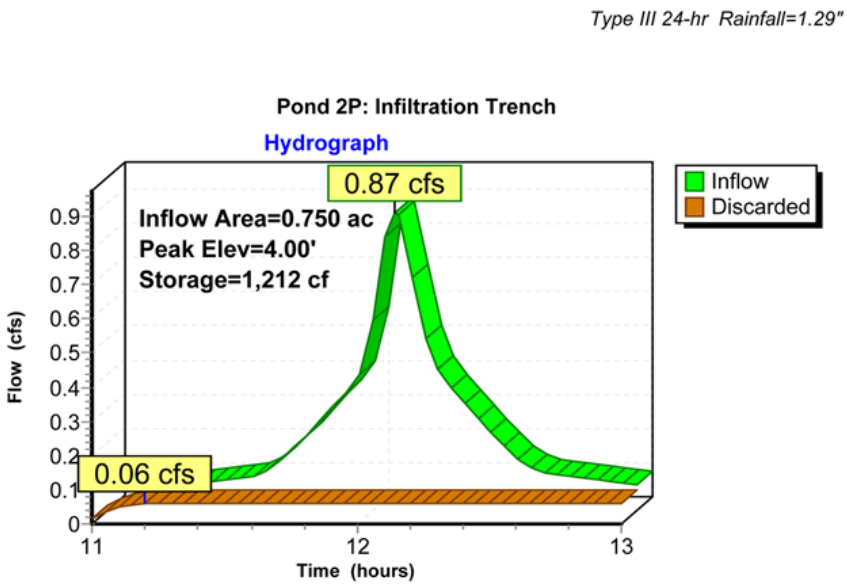
Professional Engineer should also stamp the as-built plan to certify that the site has been completed in accordance with the approved site plan and that all features required on the site by the approved plans, decisions, etc… have been field inspected by the PE and conform with the approved design. Any non-conforming features shall be clearly noted.

A=Rv÷(d+Kt)
A=1633.5cubic ft ÷[4 ft +(8.3"/hr/12"/ft *x* 2hr)]
A=303.4 sq. ft.
V=A *x* D
V=303.4 square ft *x* 4 ft
V=1203.6 cubic ft.[14]

To size an infiltration BMP using the "*Simple Dynamic*" Method, applicants may also use a computer model based on TR-20 as described below. As more fully set forth below, this computer model assumes that the *Required Water Quality Volume* is entering the infiltration BMP during the peak two hours of the storm and that runoff is being discharged from the BMP during the same two hour period at the Rawls Rate. This contemporaneous exfiltration allows a proponent to reduce the size of the infiltration BMP.

*a.* Use Equation 1 to determine the *Required Recharge Volume*
*b.* Select a 24-hour rainfall event that generates the *Required Recharge Volume* during the peak 2 hours. Use only the Site's impervious drainage area and the default NRCS Initial Abstraction of 0.2S and Type III storm. Set the storm duration for 24 hours, but use a start time of 11 hours and an end time of 13 hours. This creates a truncated hydrograph where most of the rainfall typical of a 24-hour Type III Storm occurs in just 2 hours. Selecting the correct precipitation depth is an iterative process. Various precipitation depths must be tested to determine which depth generates the *Required Recharge Volume*, using the Win TR-20 method (or other software based on TR-20). Each precipitation depth evaluated generates a runoff hydrograph. The area under the hydrograph is a volume. The correct result is achieved when the volume under the inflow hydrograph equals the *Required Recharge Volume.*
c. Using the resulting inflow hydrograph, choose an appropriate exfiltration structure with an appropriate bottom area and storage volume.[15]
d. Use recharge system bottom as maximum infiltrative surface area. Do not use sidewalls.[16]
e. Assume stormwater exfiltrates from the device over the peak 2-hour period of the rainfall event determined in step b above
**f. Set exfiltration rates no higher than the Rawls Rates for the corresponding soil at the specific location where infiltration is proposed (see Table 2.3.3).**
g. Assume exfiltration rate is constant.
h. Using the computer model, confirm adequate *Storage Volume*.
i. Go to STEP 5 to confirm that the bottom of the proposed infiltration BMP is large enough to ensure that the practice will drain completely in 72 hours or less. For purposes of the STEP 5 evaluation, assume the exfiltration rates are no higher than the Rawls Rates.

[14] The storage volume calculated using this "*Simple Dynamic*" Method is measurably less than the 1633.5 cubic feet that resulted from the "*Static*" Method.
[15] An applicant may have to select several different size infiltration structures before s/he identifies a structure that is adequately sized.
[16] If the recharge system includes stone or other media, remember that the effective storage volume only includes the voids between the stone or other media. See footnote 11.




## Table 2.3.3. 1982 Rawls Rates[18]

| Texture Class | NRCS Hydrologic Soil Group (HSG) | Infiltration Rate Inches/Hour |
|---|---|---|
| Sand | A | 8.27 |
| Loamy Sand | A | 2.41 |
| Sandy Loam | B | 1.02 |
| Loam | B | 0.52 |
| Silt Loam | C | 0.27 |
| Sandy Clay Loam | C | 0.17 |
| Clay Loam | D | 0.09 |
| Silty Clay Loam | D | 0.06 |
| Sandy Clay | D | 0.05 |
| Silty Clay | D | 0.04 |
| Clay | D | 0.02 |

[18] Rawls, Brakensiek and Saxton, 1982

Soil Map—Middlesex County, Massachusetts
(429 Great Road)

# Map Unit Legend

| Middlesex County, Massachusetts (MA017) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| 6A | Scarboro mucky fine sandy loam, 0 to 3 percent slopes | 0.0 | 1.0% |
| 626B | Merrimac-Urban land complex, 0 to 8 percent slopes | 1.5 | 41.8% |
| 631C | Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky | 2.0 | 57.1% |
| **Totals for Area of Interest** | | **3.6** | **100.0%** |

*Available water capacity:* Canton–moderate; Charlton–moderate
*Soil reaction:* Canton–extremely acid to moderately acid; Charlton–very strongly acid to moderately acid
*Depth to bedrock:* Canton–more than 60 inches; Charlton–more than 60 inches
*Depth to high water table:* Canton–more than 6 feet; Charlton–more than 6 feet
*Hydrologic group:* Canton–B; Charlton–B

Where this complex is mapped, land is committed to residential and commercial use.

The Canton soils are suited and Charlton soils are well suited to the establishment of lawns, landscaping, and vegetable gardens. Proper maintenance includes periodic watering during the dry season, as these soils are somewhat susceptible to drought.

The Canton part of this unit has moderate potential productivity for eastern white pine and low potential productivity for northern red oak. The Charlton soils' potential productivity for both eastern white pine and northern red oak is moderate. The Urban land section of this map unit is not rated for woodland products.

The Canton and Charlton soils have moderate limitations for use as sites for the construction of dwellings or as sites for local roads, due to slope. The Canton soil has severe limitations for septic tank absorption fields, as it readily absorbs but does not adequately filter sewage effluent. The inadequate treatment capacity may result in the pollution of ground water. Low-density development can help to reduce this impact. The Charlton soil has moderate limitations for septic tank absorption fields, due to slope.

Both Canton and Charlton soils have good potential for woodland wildlife habitat.

Capability subclass: Canton–3e; Charlton–3e; Urban land–none assigned

## 631C—Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky

This nearly level to rolling complex consists of very deep, well drained Charlton soils; areas of Urban land; and shallow, somewhat excessively drained Hollis soils on uplands. Individual areas of this unit are irregular in shape and range from 10 to 700 acres in size. The soils and Urban land in this complex are so intermingled that it was not practical to map them separately. This complex is about 40 percent Charlton soils, 40 percent Urban land, 10 percent Hollis soils, and 10 percent other soils. Up to 2 percent of the surface is bedrock outcrop.

The typical sequence, depth, and composition of the layers of the Charlton soil are as follows—

*Surface layer:*
0 to 5 inches, dark brown fine sandy loam

*Subsoil:*
5 to 22 inches, yellowish brown sandy loam

*Substratum:*
22 to 32 inches, grayish brown gravelly sandy loam
32 to 65 inches, firm grayish brown gravelly sandy loam

In the northeastern part of the county, the substratum is typically friable gravelly or very gravelly loam sand. In some areas, the subsoil is redder.

The typical sequence, depth, and composition of the layers of the Hollis soil are as follows—

*Surface layer:*
0 to 2 inches, black fine sandy loam

*Subsoil:*
2 to 14 inches, dark yellowish brown fine sandy loam

*Bedrock:*
14 inches

Some areas have a substratum of pale yellow fine sandy loam. The bedrock may be granite, gneiss, schist, phyllite, or conglomerate.

In the Urban land portion of this complex, the original soil is covered by impervious surfaces such as asphalt, concrete, and buildings. In most cases, the underlying soil has been cut away or covered by fill from surrounding areas of Charlton soils.

Included in this complex in mapping are rock outcrops and areas, generally smaller than 6 acres each, of Canton and Montauk soils at higher elevations; Scituate soils in low, wet areas; and loamy Udorthents where the original soil has been removed, replaced, or covered with more than 20 inches of loamy fill material. Included areas comprise 10 percent of the unit.

### *Major soil properties—*

*Permeability:* Charlton–moderate or moderately rapid; Hollis–moderate or moderately rapid
*Available water capacity:* Charlton–moderate; Hollis–very low
*Soil reaction:* Charlton–very strongly acid to moderately acid; Hollis–very strongly acid to moderately acid
*Depth to bedrock:* Charlton–more than 60 inches; Hollis–10 to 20 inches
*Depth to high water table:* Charlton–more than 6 feet; Hollis–more than 6 feet
*Hydrologic group:* Charlton–B; Hollis–D

Where this complex is mapped, the land is committed to residential or commercial uses.

The Hollis soils are poorly suited and Charlton soils are well suited to the establishment of lawns, landscaping, and vegetable gardens. Proper maintenance includes periodic watering during the dry season.

The Charlton soils in this map unit have moderate potential productivity for eastern white pine while the Hollis soils have low potential productivity for this species. Charlton has moderate potential productivity for northern red oak, while the Hollis soils have low potential productivity. The Urban land section of this map unit is not rated for woodland products.

Charlton soils have moderate limitations for the construction of dwellings. In areas of Hollis soils, filling or blasting is necessary for installation of deep foundations.

Areas of Hollis soils have severe limitations for septic tank absorption fields because of the soils' shallow depth to bedrock (fig. 22). Adjacent areas of Charlton soils have moderate limitations for septic tank absorption fields because of their slopes, but onsite investigation is necessary to locate these spots.

The Charlton soils have good potential for woodland wildlife habitat, but the Hollis soils have poor potential for the same.

Capability subclass: Charlton–3e; Urban land–none assigned; Hollis–6s

## 652—Udorthents, refuse substratum

This unit consists of areas that have been used for solid waste disposal (landfills and dumps). They are typically constructed from alternating layers, several inches to several feet thick, of refuse and soil material. These map units take the form of high mounds, often rising abruptly from the surrounding landscape, and range in size from 6 to 100 acres. Slopes of the tops are predominantly 2 to 8 percent, and side slopes 15 to 35 percent, commonly following the perimeter of the map units.