Waite - Heindel
Environmental Management

HYDROGEOLOGIC EVALUATION of REDUCED ISOLATION DISTANCE from WELL to WASTEWATER PIPING

PECOR FAMILY GAME ROOM
598 Black Willow Lane, Charlotte, Vermont

TO: **Raymond III and Dominique Pecor, Owners;**
Chris Galipeau, Staff Engineer; Civil Engineering Associates

FR: **Craig Heindel, CPG**

DT: **7/29/2016**

This report presents my evaluation of the hydrogeologic conditions pertaining to the request to allow reduced isolation distances from the recently-drilled bedrock well proposed to serve the Family Game Room at the residence of Raymond III and Dominique Pecor at 598 Black Willow Lane, Charlotte, Vermont.

A. Summary: A bedrock well was drilled to serve the Family Game Room at the Pecor residence in Charlotte, Vermont (Well Tag #56918). The well was drilled at a location 24 feet from the sewage force-main serving neighboring residences, and 41 feet from the sewage force main serving the Family Game Room. The standard minimum separation distance from subsurface wastewater piping is 50 feet, per the VT Water Supply Rule (WSR), Appendix A, Section 11.4 ("Isolation and Separation Distances"), Table A11-1 ("Required Horizontal Minimum Separation Distances"). The log for the well indicates that 45 feet of clay overly the bedrock aquifer at this location.

In my professional judgment, this situation qualifies for a variance from the minimum separation distance from subsurface wastewater piping to the well because the thick clay overburden provides a high degree of hydrogeologic isolation between a possible leak from either of the two force-mains and the underlying bedrock aquifer.

B. Variance Request: This report provides technical justification for the request for a variance. A variance from minimum separation distances may be issued by the ANR Secretary if (paraphrasing WSR Section 11.4.0, first paragraph on p. 107) *". . . a written request from a qualified consultant provides technical justification for a reduction . . ."*.

C. Hydrogeologic Setting; Suitability for Reduction in Separation Distance: The purpose of the isolation distance from a well to subsurface wastewater piping is to provide protection to the well and aquifer from a potential leak of sewage or wastewater effluent out of the piping. In this instance, the well

log reports the presence of 45 feet of clay from the ground surface down to the top of bedrock. The well has 55 feet of casing, so the casing extends 10 feet down into bedrock. Forty-five feet of low-permeability clay is found at the well site.

Surficial Geology: The Vermont Geologic Survey's Surficial Geologic Map (2007; on ANR Natural Resources Atlas – see map in attachment) identifies this entire area as being underlain by lake bottom sediments described as "Silt, silty clay and/or clay containing ice rafted boulders". This mapping supports the assessment that this clay overburden is continuous beneath the two effluent force-mains and the well.

Soils: The NRCS soils mapping (see map in attachment) identifies this entire area as being underlain by Farmington series extremely rocky loam, whose parent material is described as coarse-loamy till, with the typical depth to bedrock of 10 to 20 inches. This mapping is not consistent with the well log, surficial geology map, or my field observations. Regardless, if till underlies some or all of the site, it also provides a low-permeability protective hydrogeologic setting that will prevent leakage from either of the effluent force-mains from impacting the well or the bedrock aquifer.

Conclusion: Based on this hydrogeologic setting, it appears that there is a significant thickness of low-permeability overburden over the bedrock aquifer in the vicinity of the well proposed to serve the Pecor Family Game Room and the two nearby wastewater effluent force-mains. Therefore, in professional judgment the Town of Charlotte, acting on behalf of the Secretary of the Vermont Agency of Natural Resources, would be justified in reducing the isolation distance from this well, and issuing a permit amendment to allow its proposed use. This situation qualifies for a variance from the minimum separation distance from subsurface wastewater piping to the well because the thick clay overburden provides a high degree of hydrogeologic isolation between a possible leak from either of the two force-mains and the underlying bedrock aquifer.

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ATTACHMENT

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ATTACHMENT

STATE OF VERMONT – DEPT. OF ENVIRONMENTAL CONSERVATION

Drinking Water & Groundwater Protection Division (DWGPD), 1 National Life Drive, Main Building – 2nd Floor, Montpelier, VT 05620-3251

Tel. (802) 828-1535 or (802) 585-4907

WELL COMPLETION REPORT

WELL LOCATION

Well Owner or Purchaser: Dominique Pecor

E-911 Address: 598 Black Willow Lane

WELL TAG No. 56918

Town: Charlotte

Subdivision Name: _____

Lot Number: _____

GEOGRAPHIC LOCATION (Complete A OR B, but not both) **Date Well Drilled:** 11/4/15

A. GPS Location: 44.282046 (Latitude Rdg) N -73.280682 (Longitude Rdg.) W _____ (GPS Make/Model) _____ (# of Satellites Used (Min. 3))

B. Attach Town Map with well location marked, if not providing GPS location.

WELL TYPE (Check one)
- ☒ Bedrock
- ☐ Gravel
- ☐ Monitoring
- ☐ Other: _____

WELL USE (Check one)
- ☒ Residential/Non-public
- ☐ Public water system
- ☐ Agricultural
- ☐ Industrial
- ☐ Other: _____

REASON FOR WELL (Check one)
- ☒ New supply
- ☐ Replace existing supply
- ☐ Deepen existing supply
- ☐ Additional supply
- ☐ Test/exploration
- ☐ Geothermal
- ☐ Other: _____

WELL CONSTRUCTION INFORMATION

DEPTHS
To bedrock 45 ft.
Total 240 ft

CASING
Total Length 55 ft.
Casing exposed _____ in.
Diameter _____ in.
Material _____
Weight _____ lb/ft

LINER OR INNER CASING
Total Length _____ ft.
Depth to liner top _____ ft.
Diameter _____ in.
Material _____
Weight _____ lb/ft
Seal type _____

SCREEN DETAILS
Make/Type _____
Material _____
Diameter _____ in
Depth to screen top _____
Slot size _____
Gravel pack (type/size) _____

WELL LOG

From	To	Formation and water-bearing fracture Information
0	45	Brown Clay
45	190	Limestone, White, M fractured Limestone
190	215	Limestone, whitish-Grey, M
215	240	

SEALING METHOD
- ☒ Drive Shoe
- ☐ Grouted – Grout type _____

YIELD TEST
Tested for 1 hr @ 10 GPM
Static Water Level 5 ft. (below land surface)
- ☐ Overflowing? (check if yes)
- ☐ Hydrofractured? _____ GPM

WELL DRILLER INFORMATION

☒ **Yes** ☐ **No; I provided property owner the Dept. of Health information, per 10 V.S.A. Section 1396(d)**

Drilled by: Robert Frost

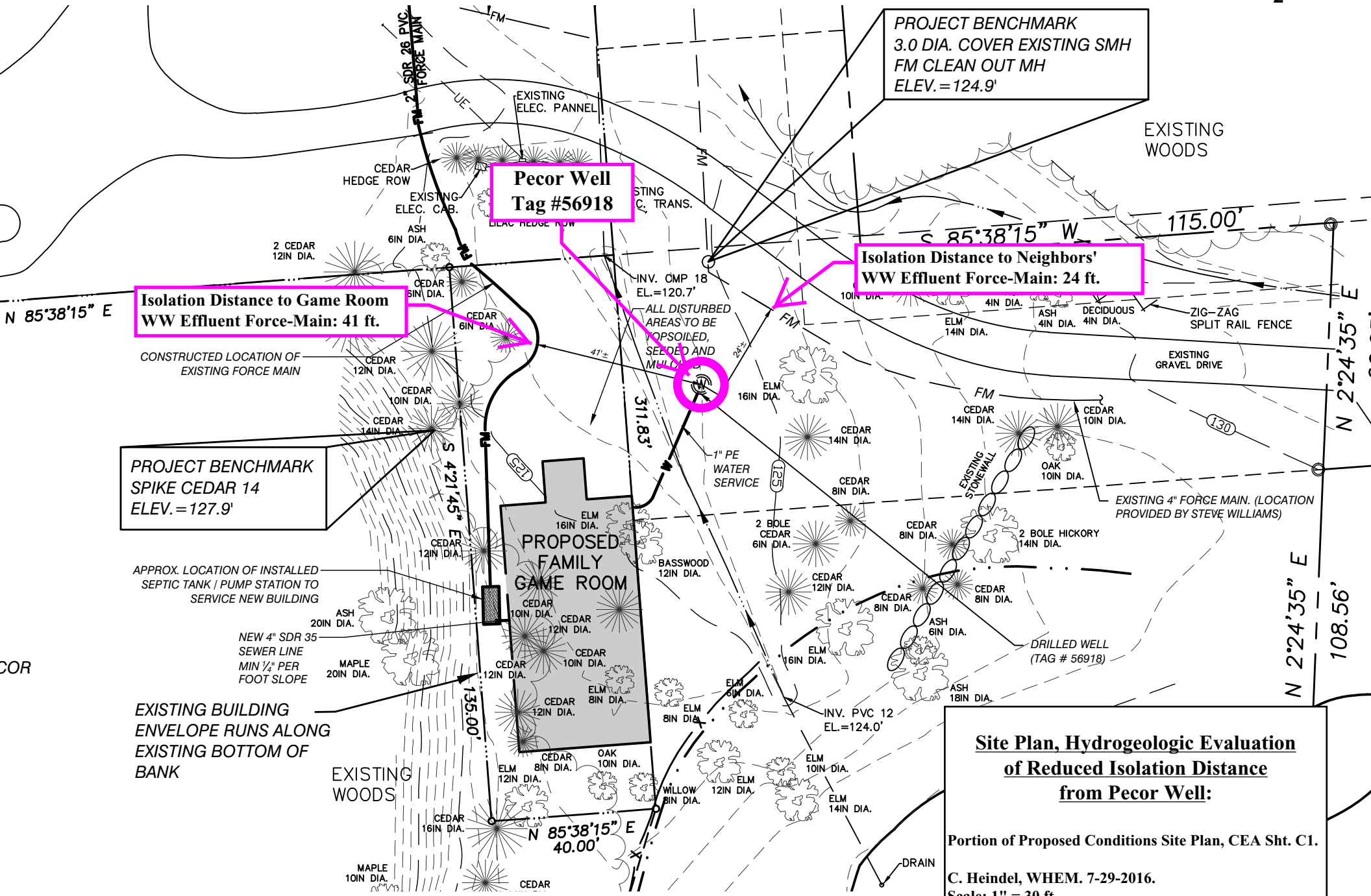
Signature of Qualifying Individual

Company: VTWP

Lic # 222

COMMENTS AND SITE SKETCH

White Copy - DWGPD Yellow Copy - Owner Pink Copy - Driller 1/10/13



Site Plan, Hydrogeologic Evaluation of Reduced Isolation Distance from Pecor Well:

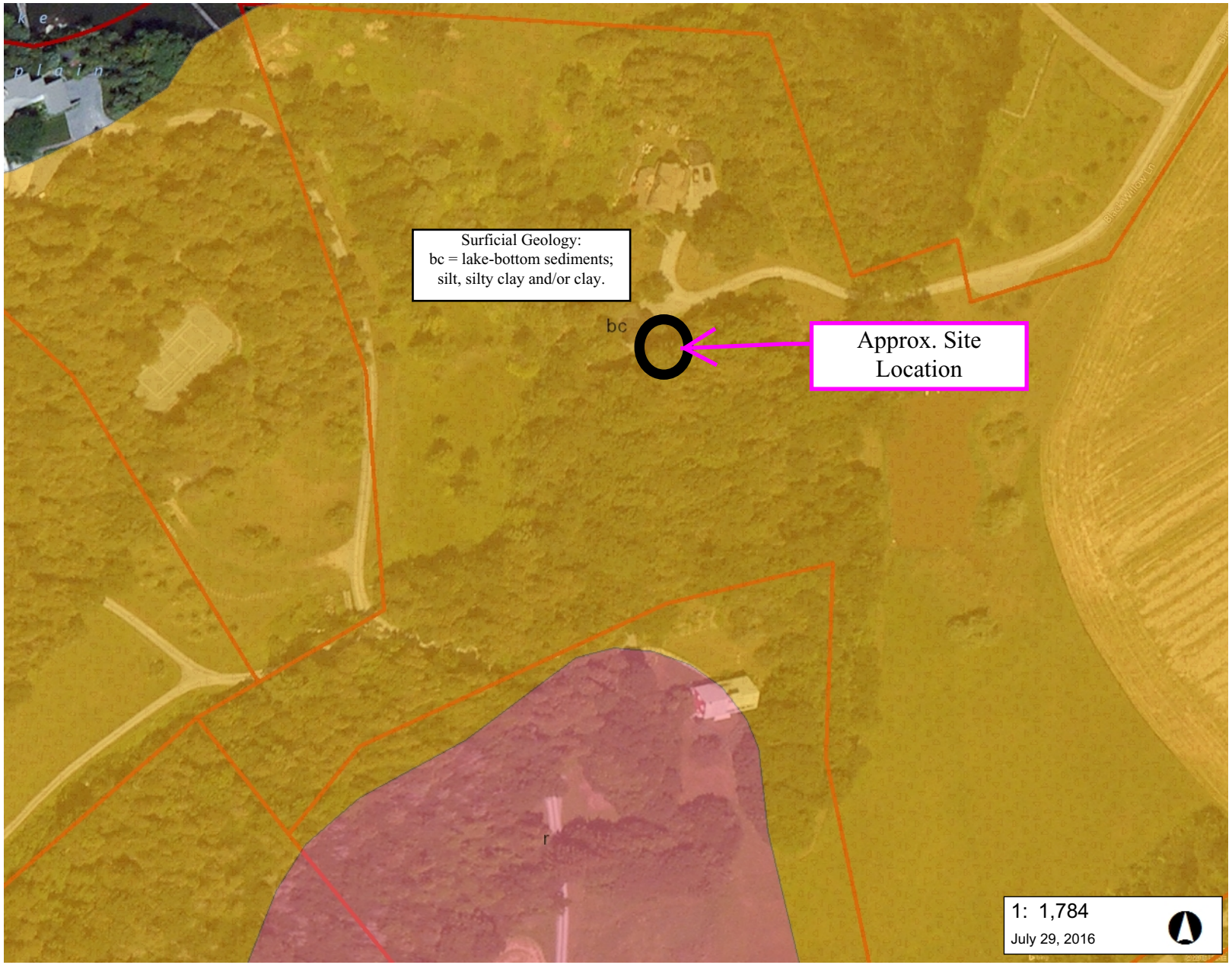
Portion of Proposed Conditions Site Plan, CEA Sht. C1.

C. Heindel, WHEM. 7-29-2016.
Scale: 1" = 30 ft.

Surficial Geology, Pecor Vicinity

Vermont Agency of Natural Resources

vermont.gov



LEGEND

Surficial Geology (Linear Featu

- Rockline
- Striation
- Til Fabric

Surficial Geology (Feature Typ

- Glacial deposit
- Glaciofluvial deposit
- Glaciofluvial
- Eolian deposit
- Glaciolacustrine deposit
- Postglacial fluvial deposit
- Champlain Sea deposit
- Champlain Sea landform
- Pluvial deposit
- Bedrock exposure
- Surface Water

Surficial Geology (Lithology)

- till
- terminal moraine
- moraine
- isolated kame
- kame terrace
- kame moraine
- outwash
- esker
- eolian sand
- lake gravel
- beach gravel

NOTES

Map created by C. Heindel using ANR's Natural Resources Atlas

297.0 0 148.00 297.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 149 Ft. 1cm = 18 Meters

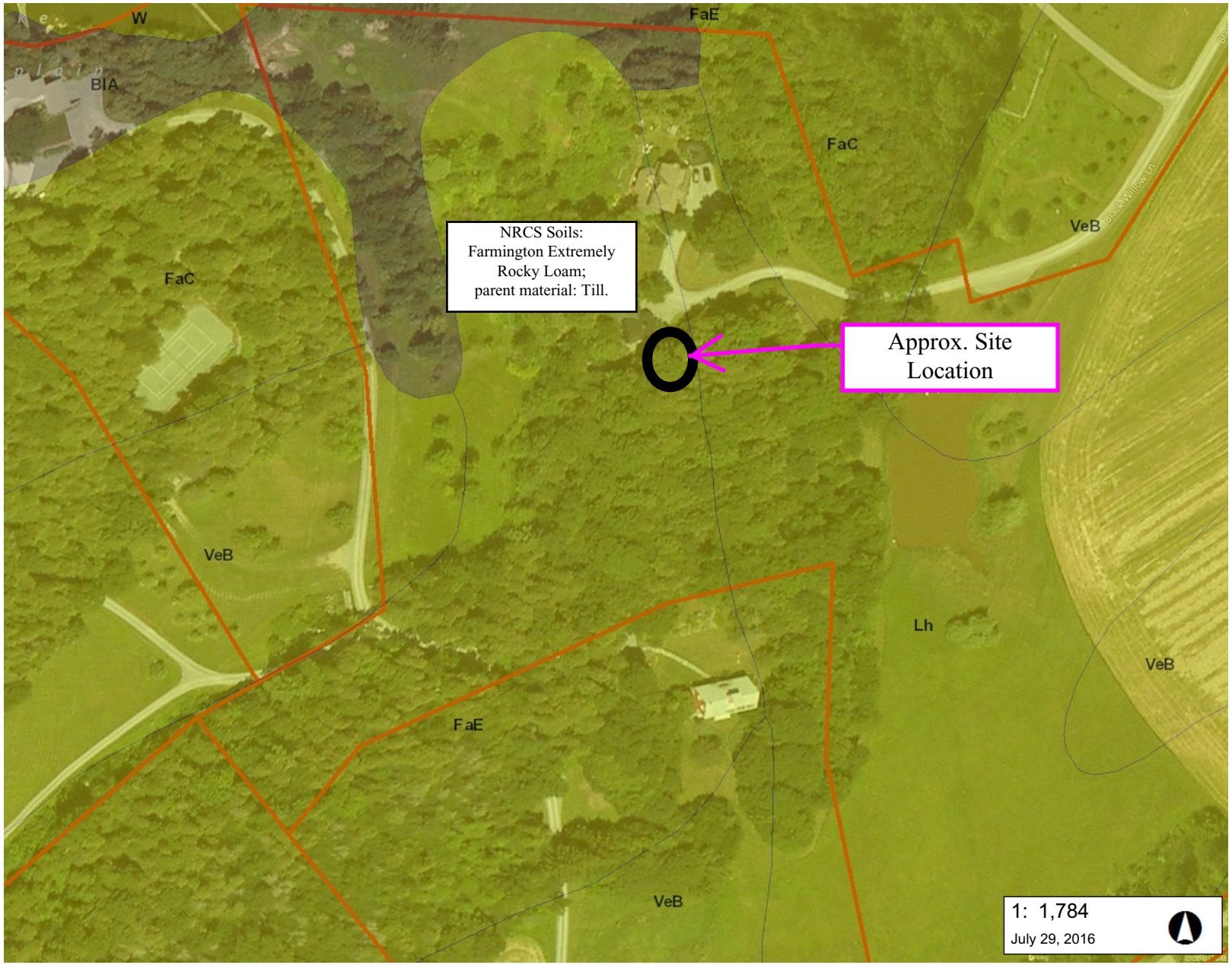
THIS MAP IS NOT TO BE USED FOR NAVIGATION

VERMONT

NRCS Soils, Pecor Vicinity

Vermont Agency of Natural Resources

vermont.gov



LEGEND

Soils

- <all other values>
- Association
- Consociation
- Undifferentiated group
- Complex

Parcels (where available)

Town Boundary

NOTES

Map created by C. Heindel using ANR's Natural Resources Atlas

297.0 0 148.00 297.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 149 Ft. 1cm = 18 Meters

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FaE: Farmington extremely rocky loam, 20 to 60 percent slopes

The Farmington component makes up 80 percent of the map unit. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is low. This component is on ridges on glaciated uplands. The parent material consists of coarse-loamy till. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches.

Important farmland classification: NPSL	Land capability: 7 e	Vermont Agricultural Value Group: 11

Vermont Residential Onsite Waste Disposal Group and Subgroup: IVb

This unit is generally not suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. Steep slopes in association with the depth to bedrock is the limiting condition. Cut and fill site modifications that reduce the slope gradient are difficult to achieve due to the depth to bedrock.

PHYSICAL and CHEMICAL PROPERTIES

Soil name	Depth (In)	Typical texture	Clay (Pct)	Soil reaction (pH)	Permeability (In/Hr)	Organic matter (Pct)	EROSION FACTORS Kw	Kf	T
Farmington	0-7	L	10-27	5.1 - 7.3	0.6-2	2.0-6.0	.28	.28	1
	7-17	SIL	10-27	5.6 - 7.8	0.6-2	0.0-1.0	.43	.43	
	17-27	UWB	---	---	0.01-20	---	---	---	

WATER FEATURES **SOIL FEATURES**

Soil name	Hydrologic group	Depth to seasonal high water table (Feet)	Flooding Frequency	Flooding Duration	Ponding Frequency	Ponding Duration	Hydric soil?	Depth to bedrock (range in inches)
Farmington	D	---	None		None		No	10-20

LAND USE LIMITATIONS

Soil name	Land use	Rating	Reason **
Farmington	Dwellings with basements:	Very limited	Slope
Farmington	Pond reservoir areas:	Very limited	Slope

AGRICULTURAL YIELD DATA

Crop name	Yield / acre

WOODLAND MANAGEMENT

Soil name	Management concern	Rating	Reason	Vermont natural communities
Farmington	Harvest equip operability:	Poorly suited	Slope	Mesic Maple-Ash-Hickory-Oak Forest, Transition Hardwoods Limestone Forest Variant, Limestone Bluff Cedar-Pine Forest, Temperate Calcareous Outcrop, Northern Hardwoods Limestone Forest Variant, Temperate Calcareous Cliff, Boreal Calcareous Cliff
Farmington	Road suitability:	Poorly suited	Slope	
Farmington	Erosion hazard (off-road):	Severe	Slope/erodibility	