Memorandum

To: Josh Arneson, Town Manager
Town of Richmond
P.O. Box 285
Richmond, VT 05477

From: Watershed Consulting

Date: January 29, 2025

Re: ***Southview Subdivision Stormwater Project – Soils Investigation***
Attachment A: Southview Subdivision Soil Report
Attachment B: Southview Subdivision Soil Borings Map
Attachment C: Button Underground Locating Field Report

Dear Josh,

Watershed Consulting is pleased to present this memorandum and summary report to close out Task 4 of the Southview Subdivision Stormwater Project.

Task 4, Soils Investigation, involved a desktop analysis of the site's hydrologic conditions, existing drainage infrastructure, and mapped hydrologic soil groups to identify locations for soils characterization.

Soil testing locations are selected through a variety of factors. Through the preliminary set of selected locations, we attempted to create an even spread of test points throughout the project area, understanding how groundwater and soil conditions vary across the site. We also chose locations that are along existing stormwater conveyances, places where there is room to add a feature, and places that may be representative of a mapped soil unit. From this initial analysis, six test locations were chosen. These were then sent to the Town of Richmond Highway Department and to DigSafe for review and clearance. Button Underground Locating was hired to locate and mark out any private utilities. Watershed Consulting also completed a GNSS survey of the utility markings left by Button Underground Locating and DigSafe. These surveyed lines are shown on the attached map (Attachment B).

The soils investigation field work was completed on January 15, 2025, by two members of Watershed Consulting and the subcontractor, Sierra Environmental Drilling. A GeoProbe, operated by Sierra Environmental Drilling, was used to complete 2"-diameter soil borings to at least the depth of groundwater or auger refusal. Of the six test locations originally chosen, only three borings were completed day-of at boring locations TP-1, TP-2, and TP-4. TP-3, located outside 54 Westall Drive, was dropped due to the presence of utilities and a ditch that could not be navigated by the GeoProbe drill rig. Similarly, TP-5 and TP-6 had to be dropped due to steeper slopes covered in snow, which also cannot safely be navigated by the drill rig. If necessary, these points can be revisited in the future in dry conditions.

The findings from the three completed borings are detailed below. The soil report data sheets and a map showing the boring locations are attached to this summary (Attachment A, B). The utility report generated by Button Underground Locating is also included (Attachment C).

TP-1

TP-1 was located at the cul-de-sac of Westall Extension near 77 Westall Extension. The boring was completed to a depth of 240". The topsoil layer was rocky and contained many coarse fragments. The entire soil profile consisted of well-draining sand. A seasonal high groundwater table was indicated at 193" in depth due to observed redoximorphic features and small clay lenses. No saturation or groundwater table was detected in the 240" of soil retrieved. NRCS soil maps of the area have this section mapped as Adams and Windsor loamy sands, in Hydrologic Soil Group (HSG) A, which is supported by our field observations. Given the very deep groundwater table and well-draining sand, this area would be well-suited to an infiltrating stormwater feature.

TP-2

TP-2 was located near 238 Westall Drive outside of an open, undeveloped lot. The boring was completed to a depth of 240". A topsoil layer of loamy sand was identified from 0-9", dry sand from 9-77", and a silt loam layer from 77-88". This silt loam layer was saturated at 80", perhaps functioning as a confining layer. Beneath this layer there were two more layers of sand from 88-142" and 142-240" in depth. Small lenses of clay were identified between the two sand layers at around 142", though the sand was dry. The material became very dense at around 228" in depth, as the auger likely reached the underlying glacial till. This area is also mapped as Adams and Windsor loamy sands (HSG A), which is supported by our field observations. Despite the confining layer, a shallow infiltration practice is still feasible in this area.

TP-4

TP-4 was located outside 191 Joan Ave on the edge of the road. The boring was completed to a depth of 120", with seasonal high groundwater indicators noted at 42" in depth and the groundwater table at 78". The topsoil consisted of a loamy sand to 8" in depth, followed by a rocky sand layer with road base and geotextile mixed in from 8-24" in depth. The next layer consisted of silt loam from 24-86", with redoximorphic features identified at 42" and groundwater saturation at 78" in depth. There was another sand layer from 86-99" with redoximorphic features throughout and a clay layer from 99-120", both saturated. This area is mapped as Duane and Deerfield soils, designated HSG A/D. The A/D designation implies high groundwater conditions, which was confirmed by our field observations. The shallow seasonal high groundwater table precludes many in-ground practices, though a very shallow surface feature or an underdrained feature may have potential under these conditions.

The next step will be to evaluate the feasibility of various STPs based on the documented soil conditions and topography of the site.

Sincerely,

Andres Torizzo
Principal

Anna Sherman
Water Resources Scientist

Attachment A

Soil Profile

Pit ID:	TP-1
Site Name:	Southview Subdivision
Sampling Method:	GeoProbe
Site Location:	84 Westall Ext, Richmond, VT
Excavated Pit Depth:	240"
Excavation Date:	1/15/25
Depth to Water Table:	Not observed
Start Time:	12:31 PM
Depth to SHGW	193"
Representative:	AS, AShep
Overall Site Notes:	

Site Photos

Depth (in)	Soil Texture (USDA)	Soil Color	Coarse Fragments (Quantity & Size)	Redoximorphic Features (Depth, Color and Abundance)	Roots (Quantity & Size)	Soil Structure	Soil Moisture	Additional Notes	Horizon Photos
0-11.5	Sand	Medium brown	Yes, many coarse fragments, avg size 0.5"	No	Yes, some small	Granular (soil aggregates)	Dry	Vegetated overlay, topsoil	
11.5-240	Sand	Light brown, yellow hues	Yes, few coarse fragments, avg size 0.3"	Small amount of redox if any found at 193"	No	Single grain (loose mineral/rock grains)	Dry to slightly moist	Long continuous sand layer, very well drained and not saturated through 15'. High water mark at 193" based on small amount of redox, though dry all the way through. Small plates of denser clay material but not even all the way through core, though potentially slowing some water at 200" down	

		Soil Profile	
		Pit ID:	TP-2
		Site Name:	Southview Subdivision
Sampling Method:	GeoProbe	***Site Location:***	238 Westall Dr, Richmond, VT
Excavated Pit Depth:	240"	***Excavation Date:***	1/15/25
Depth to Water Table:	80"	***Start Time:***	1:00 PM
Depth to SHGW	N/A	***Representative:***	AS, AShep
Overall Site Notes:			

Site Photos

Depth (in)	Soil Texture (USDA)	Soil Color	Coarse Fragments (Quantity & Size)	Redoximorphic Features (Depth, Color and Abundance)	Roots (Quantity & Size)	Soil Structure	Soil Moisture	Additional Notes	Horizon Photos
0-9	Loamy sand	Dark brown	No	No	Yes, few small	Granular (soil aggregates)	Slightly moist	Vegetated overlay	 
9-77	Sand	Orange-yellow-light brown	No	No	No	Single grain (loose mineral/rock grains)	Dry		 
77-88	Silt loam	Light brown	No	No	No	Single grain (loose mineral/rock grains)	Moist to saturated	Potential confining layer, very fine sand, potential GW around 80"	 

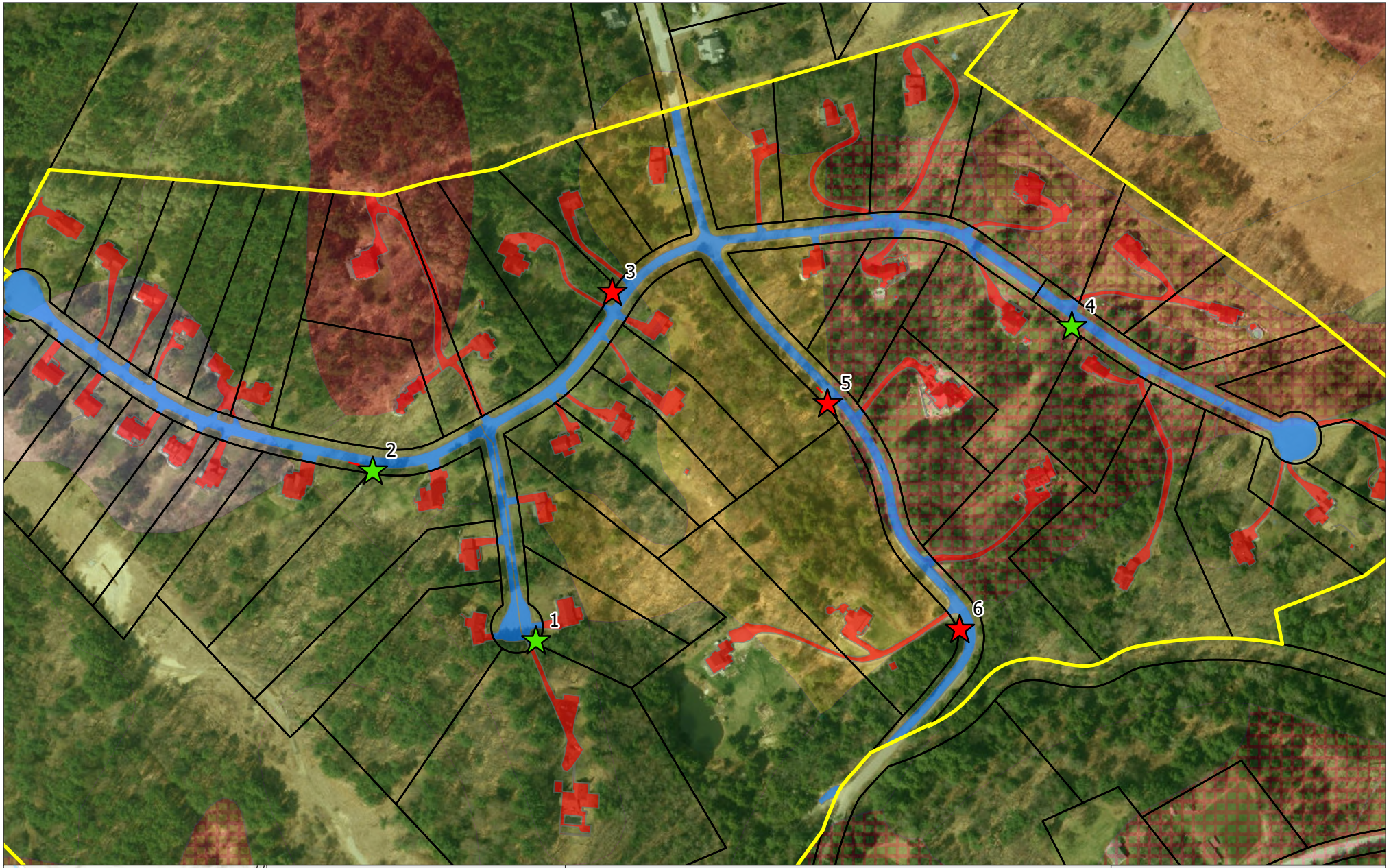
88-142	Sand	Light brown	No	No	No	Single grain (loose mineral/rock grains)	Dry			
142-240	Sand	Medium brown-gray	Yes, many coarse fragments, avg size 0.2"	No	No	Single grain (loose mineral/rock grains)	Dry	Small clump of clay near top of this layer, very gravelly, got very dense after 19 feet, probable till		

		Soil Profile	
		Pit ID:	TP-4
		Site Name:	Southview
Sampling Method:	GeoProbe	***Site Location:***	191 Joan Ave, Richmond VT
Excavated Pit Depth:	120"	***Excavation Date:***	1/15/25
Depth to Water Table:	78"	***Start Time:***	1:41 PM
Depth to SHGW	42"	***Representative:***	AS, AShep
Overall Site Notes:			

Site Photos

Depth (in)	Soil Texture (USDA)	Soil Color	Coarse Fragments (Quantity & Size)	Redoximorphic Features (Depth, Color and Abundance)	Roots (Quantity & Size)	Soil Structure	Soil Moisture	Additional Notes	Horizon Photos
0-8	Loamy sand	Dark brown	Yes, many coarse fragments, avg size 0.5"	No	Yes, few small, few medium	Granular (soil aggregates)	Dry	Vegetated overlay	 
8-24	Sand	Gray-light brown	Yes, many coarse fragments, avg size 0.75"	No	No	Single grain (loose mineral/rock grains)	Dry	Big rock in this layer, many coarse fragments, likely road base material, textile from liner observed, gravelly mix, mixed with sand	  
24-86	Silt loam	Yellow-medium brown	No	Yes, black and orange concentrations, found at 42"	No	Single grain (loose mineral/rock grains)	Dry	GW found at 78"	   

86-99	Sand	Medium brown	Yes, many coarse fragments, avg size 0.5"	Yes, orange concentrations	No	Single grain (loose mineral/rock grains)	Saturated		 
99-120	Clay	Gray-medium brown	Yes, some coarse fragments, avg size 0.5"	No	No	Massive (continuous, unconsolidated mass)	Saturated		 



Southview Subdivision

Richmond, VT

Soil Borings Map

Attachment B

Map Date: 1/28/2025

Legend

- Parcels
- 3 Acre Site Boundary
- Electric Utility Lines (Surveyed)

Boring Completed

- Not completed due to utility conflicts, snow and/or slopes
- Boring completed, see report

Total Impervious - 10.34 acres

- Privately Owned Land - 6.58 acres
- Town of Richmond - 3.75 acres

Hydrologic Group

- A/D
- B
- C
- C/D
- D
- not rated

0 200 400 Feet

Scale: 1" = 305'

N

VERMONT WATERSHED CONSULTING

Attachment C

BUTTON
UNDERGROUND
LOCATING

Locate Field Report

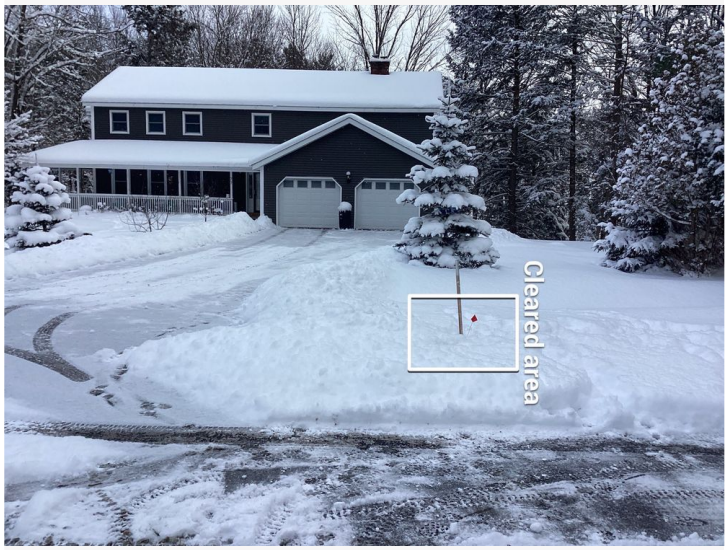
Watershed Consulting - Southview Dr, Richmond, VT 05477

Locate Summary

Button Underground Locating located the following utilities in the area of proposed excavation:

GSSI SIR 4000

- SIR 4000 is a ground penetrating radar (GPR) that utilizes radio transmitting antennas sending and receive radio signals transmitted through the ground and display data contrasting with material and soil type based on radio wave time windows. GPR identifies metallic and plastic targets in the ground and provides hyperbolic data markers to display the data. GPR is susceptible to adverse conditions such as heavy clay, highly saturated soils and other material dialectic issues. In ideal conditions it can have a penetrating depth of 15ft.



Point #1, Westall ext: Area clear (red flag is dig safe flag noting "no VEC, no GMP")

Project: Watershed Consulting-Richmond
Creator: Michael Peters
Tags: Proposed Excavation

Point #2, Westall rd: Electrical line in close proximity to stake. Recommend moving stack back 3'-5'.

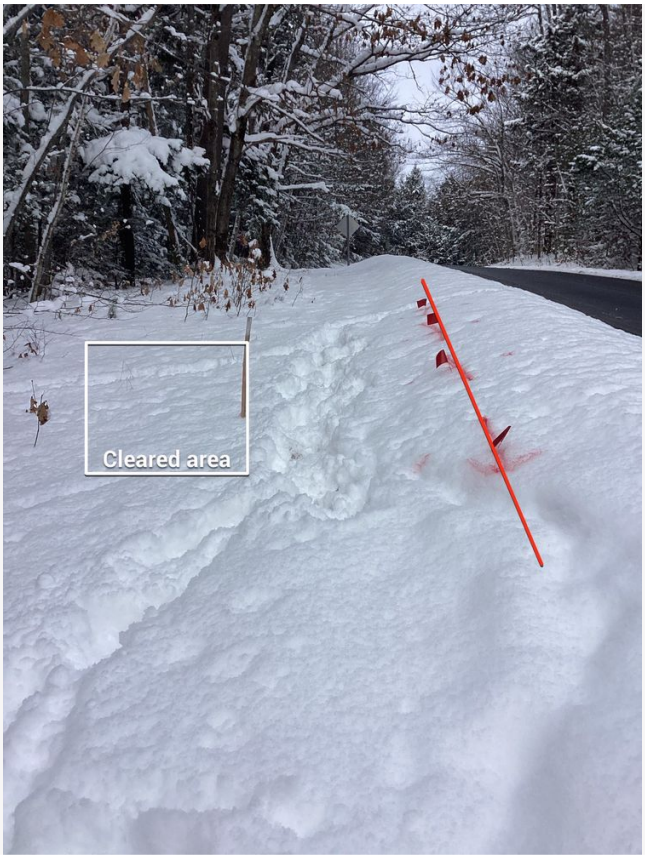
Project: Watershed Consulting-Richmond
Creator: Michael Peters
Tags: Electric, Proposed Excavation

Point #3, Westall rd: electrical line crossing stake. Drill area should be moved back 3'-5'. Orange unmarked digsafe flag also present. Please refer to their report for findings.

Project: Watershed Consulting-Richmond
Creator: Michael Peters
Tags: Electric, Proposed Excavation

Point #6, Southview Dr: electrical line crossing stake. Drill area should be moved back 3'-5'. Orange unmarked digsafe flag also present. Please refer to their report for findings.

Project: Watershed Consulting-Richmond
Creator: Michael Peters
Tags: Electric, Proposed Excavation



Point #5, southview dr: electrical line near stake. Recommend moving Drill area back 1'-2'.

Project: Watershed Consulting-Richmond
Creator: Michael Peters
Tags: Electric, Proposed Excavation

Point #4, Joanne ave: Area clear (red flag is dig safe flag noting "no VEC, no GMP")

Project: Watershed Consulting-Richmond
Creator: Michael Peters
Tags: Proposed Excavation