

December 15, 2023

Mitchel Cypes, P.E.
Hinesburg Development Review Coordinator
Town of Hinesburg
10632 Route 116
Hinesburg, VT 05461

Stone Project No. 20231139
Subject: Professional Opinion, Proposed Subdivision, Observatory Road, Hinesburg, Vermont

Dear Mr. Cypes,

Stone Environmental, Inc. (Stone) is pleased to provide their professional opinion regarding the proposed PR&R Development, LLC eight-lot subdivision and planned unit development proposed to be located off Observatory Road in Hinesburg, Vermont. The professional opinion includes the following:

1. The likeliness that safe potable water, not contaminated by the adjacent Town landfill, could be provided to the proposed lots, and
2. The likeliness that the proposed development would have an adverse impact on the adjacent landfill and nearby existing wells.

The following files and data were reviewed by Stone to form their professional opinion:

1. The PR &R Development, LLC Overall Subdivision Plan,
2. The Site Investigation and Post-Closure Monitoring Reports prepared by Stone and associated files for the Hinesburg Closed Municipal Solid Waste Landfill,
3. The Hinesburg Review Board files available on <https://www.hinesburg.org/development-review-board/pages/2023-prr-prelimsub>,
4. The Vermont Geological Survey Surficial Geology (lithology and feature type) and Bedrock Geology (including faults and contacts) maps available on the on-line Vermont Natural Resources Atlas, and
5. Available Well Drillers logs adjacent to the proposed development available on the on-line Vermont Natural Resources Atlas.

Stone performed a site visit on October 27, 2023 to observe surficial topography, proposed subdivision location and the site features of the former landfill.

1.1 Proposed Subdivision

The Applicant/Landowner of the 61.26-acre property located north of the closed Hinesburg landfill (former landfill) has proposed and received preliminary plat approval for an 8-lot subdivision that would create seven

new building lots. There is an existing residence (lot #1) with an existing well and leachfield. All the proposed lots (#2 through #8) would have their own wells and leachfields.

1.2 Geology

The former landfill is located on a kame terrace deposit as shown on Figure 1, attached. A kame terrace is a deposit of usually well-defined stratigraphic layers of coarser materials such as sands and fine gravel that were deposited by glacial melt water flowing between the ice margin and a non-ice-covered slope. As the material is usually coarse, it can often be mined for sand and gravel such as from the pit that was located in the vicinity of the former landfill. The materials also freely allow water to infiltrate into the subsurface and recharge the bedrock aquifer.

The surficial geologic map shows that north and east of the former landfill, including likely some of the proposed development area, are predominantly glacial till. Tills are unsorted materials that are directly deposited by a glacier. The materials can be very dense and tightly packed. Unlike a kame terrace, glacial tills generally do not allow significant amounts of precipitation to freely infiltrate to recharge the bedrock aquifer.

The bedrock geological map shows the bedrock under and surrounding the proposed development is phyllite. Phyllite will fracture but does not generally form well developed interconnected long fracture networks.

1.3 Hydrogeology

Table 1 below shows a subset of the driller’s logs for domestic wells in the vicinity of the former landfill and proposed development.

Table 1: Water Supply Wells in Vicinity of Former Landfill

Well#	Depth (ft)	Yield (gpm)	Year Drilled	Depth to Bedrock (ft)	Locations from former landfill
58092	600	5	2021	27	Adjacent to northern boundary of landfill
29013	595	40	2004	15	
33827	600	0.75	2015	6	North of landfill
198	423	1	1984	17	
208	625	0	1984	10	
21515	1225	3	2003	13	
12902	1150	6	1999	deepen existing well	
236349	440	0	1988	12	Located on landfill
080607239	349	10	1991	164	
51551	245	60	2018	28	
6718	373	12	1987	58	East of landfill

Well#	Depth (ft)	Yield (gpm)	Year Drilled	Depth to Bedrock (ft)	Locations from former landfill
J-82	800	1	1986	25	
964	340	0	1986	12	
182	398	2	1983	80	West of landfill
F-16	325	12	1986	74	
236273	222	50	1988	50	
8-97	260	50	1990	70	
120	230	75	1980	115	
128	123	12	1980	78	South of landfill
J-62	225	80	1986	55	
4-2	245	60	1987	100	
774	325	15	1996	14	

Ft- feet, gpm- gallons per minute

When comparing the location of the private wells (please note that for older wells, some of the wells are likely mislocated) the highest yields are generally in bedrock wells drilled within the area of the kame terrace and thicker unconsolidated sands and other coarser materials. This includes the bedrock wells drilled on the landfill property and west of the landfill. Figure 2 shows the approximate locations of bedrock wells in the area surrounding the proposed development.

Bedrock wells drilled north and east of the proposed development in the areas where till is present are generally quite deep and have low yields due to the tills allowing less water to infiltrate and recharge the bedrock aquifer.

The post-closure monitoring reports demonstrate that shallow groundwater flow in the former landfill property flows south to southeast. Deeper groundwater flows generally east to slightly southeast. The flow in the bedrock will likely somewhat mirror the flow in the surficial materials. Groundwater flow under the former landfill is away from the proposed development.

1.4 Professional Opinion

The following professional opinion was formed based on the review of available files and data and the site visit on October 27, 2023.

The likeliness that safe potable water, not contaminated by the adjacent Town landfill, could be provided to the proposed lots.

It is Stone's professional opinion that it is highly likely bedrock wells could be drilled as shown on the Proposed Overall Subdivision Plan that will produce safe potable water not contaminated by the adjacent Town landfill.

As stated above, groundwater is flowing southeast to east under the landfill, away from the proposed development. If any of the proposed bedrock wells in the southern part of the development are located in the area of the kame terrace, they may be recharged from the area directly north of the wells, again, away from the landfill. Also, the water demand for a single home is too low to reverse the groundwater flow direction and force groundwater from below the landfill to migrate north.

The likeliness that the proposed development would have an adverse impact on the adjacent landfill and nearby existing wells.

It is Stone's professional opinion that the bedrock wells proposed for the development as shown on the PR&R Development, LLC Overall Subdivision Plan will not have an adverse impact on the adjacent landfill and nearby existing bedrock wells.

If the proposed bedrock wells are located below the kame terrace deposits, they will be hydraulically upgradient and crossgradient from other existing wells below the kame terrace. Considering the relatively high yields that wells located below the kame terrace reportedly exhibit and the low demand of domestic use wells, there is unlikely to be interference between the proposed bedrock wells and existing wells. Significant pumping rates will be required to create a large enough cone of depression for the proposed bedrock wells to interfere with existing downgradient and crossgradient wells.

The wells proposed for the development are also unlikely to adversely affect the existing domestic bedrock wells located north and east of the proposed development. As phyllite will generally not develop long interconnected fracture networks, the fractures supplying groundwater to the proposed bedrock wells will likely not be connected on the same fractures that provide groundwater to wells north and east of the proposed development.

We appreciate the opportunity to provide our professional opinion to the Town of Hinesburg Development Review Board. Please do not hesitate to reach out with questions using the contact information below.

Sincerely,

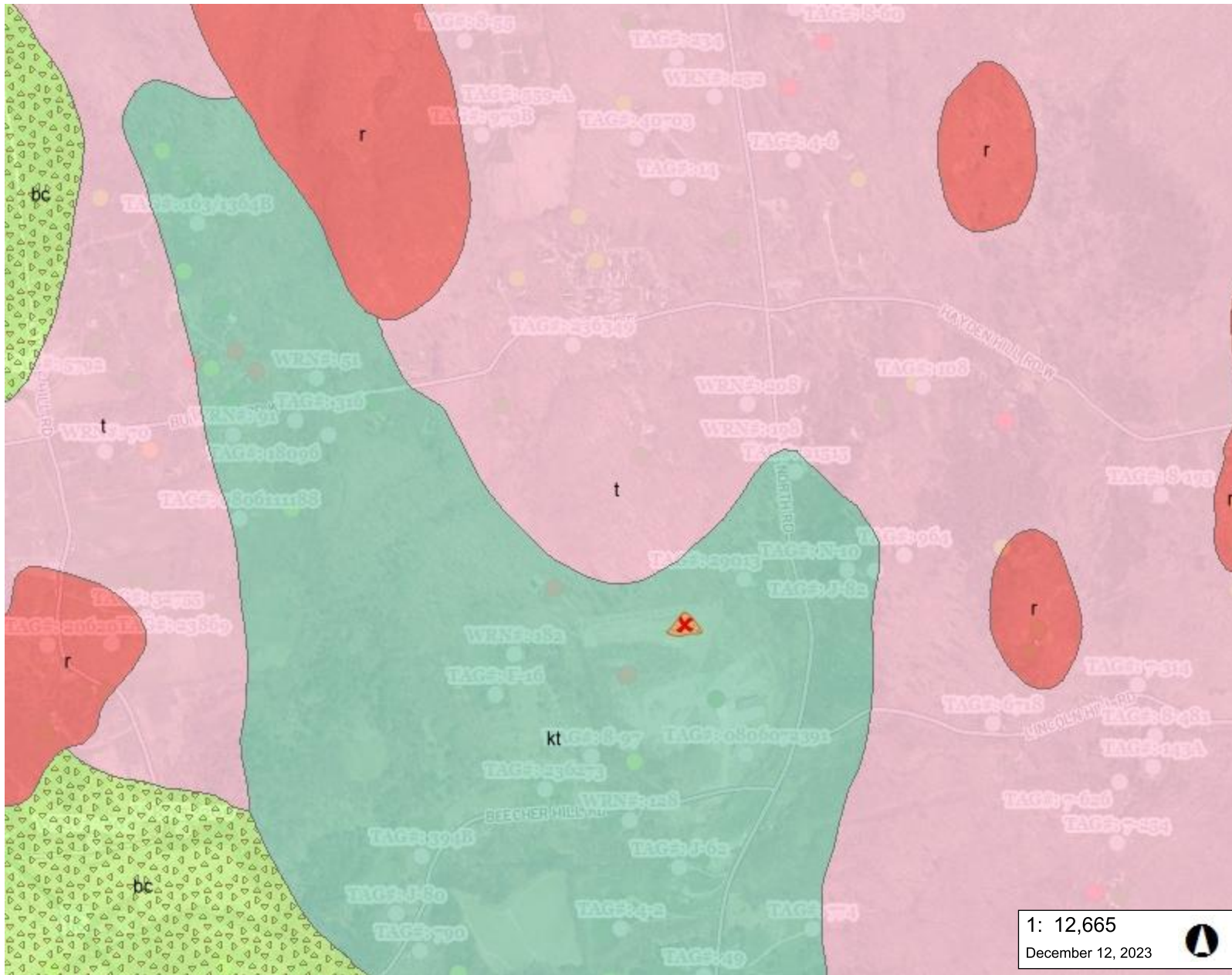


Michael B Smith
Senior Hydrogeologist
Mobile / 802.223.1513
Email / msmith@stone-env.com

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Attachments: Figures

Figures



LEGEND

Landfills

- OPERATING
- CLOSED

Surficial Geology (Lithology)

- till
- terminal moraine
- moraine
- isolated kame
- kame terrace
- kame moraine
- outwash
- esker
- eolian sand
- lake gravel
- beach gravel
- delta gravel
- delta
- lake sand
- pebbly sand
- boulders in sand
- delta sand
- silt, silty clay, and clay
- varved clay
- boulders in clay
- wave-washed till
- fluvial gravel
- fluvial sand
- alluvium

1: 12,665
December 12, 2023

NOTES

Map created using ANR's Natural Resources Atlas

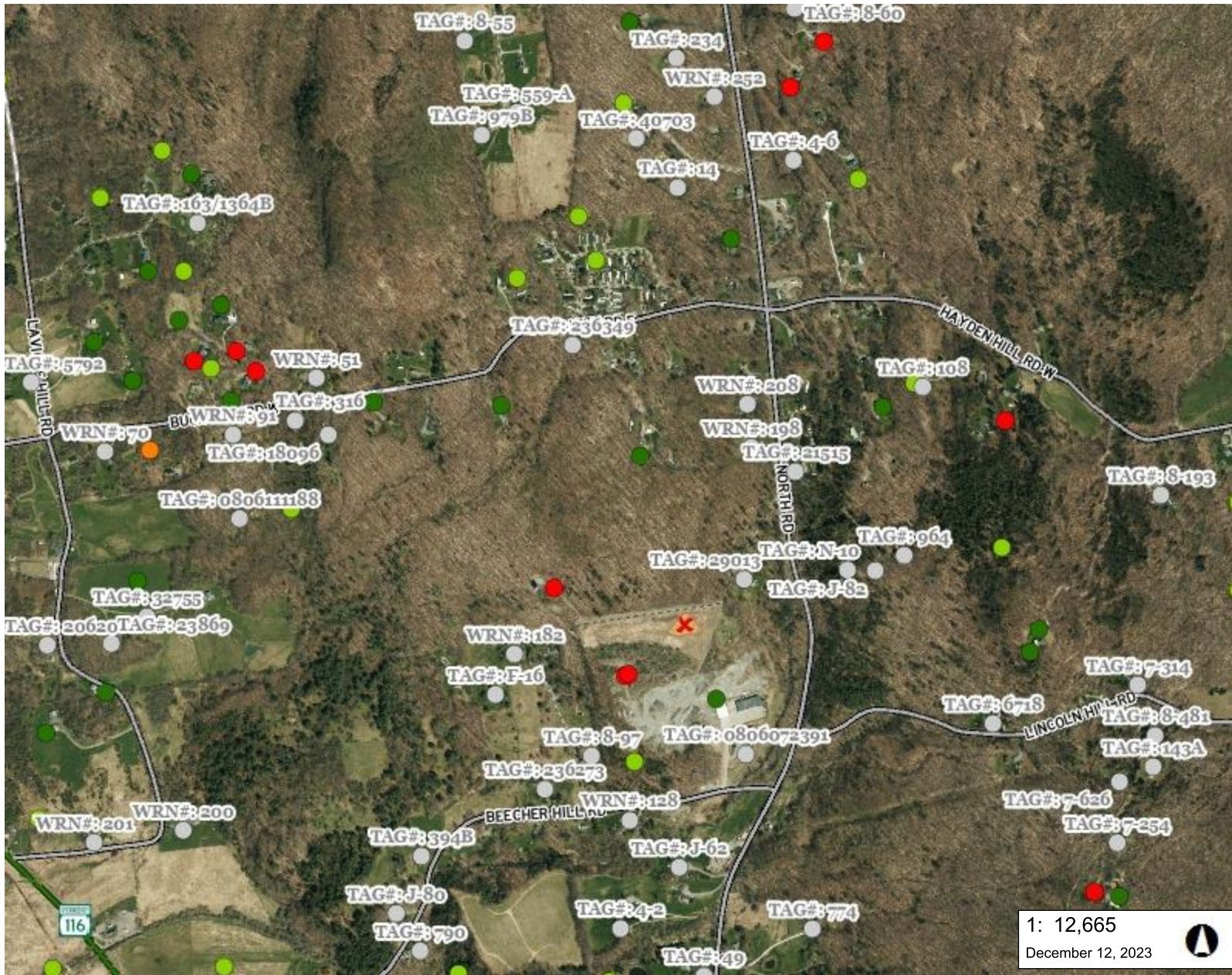
Figure 1: Geology



WGS_1984_Web_Mercator_Auxiliary_Sphere
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1" = 1055 Ft. 1cm = 127 Meters
THIS MAP IS NOT TO BE USED FOR NAVIGATION

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LEGEND

Landfills

- OPERATING
- CLOSED

Private Wells

- GPS Located
- Screen Digitized
- E911 Address Matched
- Welldriller/Clarion
- Unknown Location Method
- Incorrectly Located

Roads

- Interstate
- US Highway; 1
- State Highway
- Town Highway (Class 1)
- Town Highway (Class 2,3)
- Town Highway (Class 4)
- State Forest Trail
- National Forest Trail
- Legal Trail
- Private Road/Driveway
- Proposed Roads

Town Boundary

1: 12,665
December 12, 2023



NOTES

Map created using ANR's Natural Resources Atlas

Figure 2: Well Locations

643.0 0 322.00 643.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 1055 Ft. 1cm = 127 Meters
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