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March 23, 2023

Ms. Joy Dubin Grossman, Assistant Town Manager
Town of Hinesburg
10632 VT Route 116
Hinesburg, VT 05461

Submitted via email at jdubingrossman@hinesburg.org

Re: Professional Opinion on Findings of 2022 Monitoring at the Hinesburg Closed Municipal Waste Landfill, 907 Beecher Hill Road, Hinesburg, VT

Dear Ms. Dubin Grossman:

KAS, Inc. (KAS) is pleased to present our professional opinion regarding the findings and recommendations outlined in the spring and fall 2022 groundwater monitoring reports prepared by Stone Environmental, Inc. (Stone) for the Town of Hinesburg closed municipal landfill located at 907 Beecher Hill Road. I have fully reviewed the data obtained by Stone during the spring 2022 and fall 2022 groundwater and drinking water monitoring events, as presented in their summary reports. The following is my professional opinion regarding the findings and the recommendations. Alternative recommendations and conclusions are also presented, where applicable.

Project Understanding

KAS understands the Town of Hinesburg municipal landfill operated from 1972 until 1988 and the landfill was closed with a permanent cap by 1992. The landfill reportedly accepted municipal solid waste from the Town of Hinesburg and the Town of Richmond during its operation. The landfill is located on an approximate 38-acre parcel with several residential properties on Forest Edge Road, which adjoins the property to the west. Beecher Brook is located approximately 550 feet east of the landfill and runs north to south.

A landfill closure plan was reportedly prepared in 1990; however, the historical monitoring requirements outlined in this plan were reportedly never completed except for drinking water supply well sampling at three locations for a period of twenty (20) years. During this monitoring period, iron and manganese were reportedly detected at concentrations above the State of Vermont secondary drinking water standard. In July 2021, the Vermont Department of Environmental Conservation (VT DEC) reportedly collected five (5) private drinking water supply well samples and found exceedances of the Vermont Groundwater Enforcement Standard (VGES) for methylene chloride at 152 Forests Edge Road and polyfluoroalkyl substances (PFAS) in the Hinesburg Highway Garage water supply well. In June 2021, vinyl chloride and manganese exceeded the VGES in a bedrock monitoring well (MW-3D), which lies downgradient of the landfill. In 2021, Stone reportedly oversaw the installation of additional monitoring wells, as well as point-of-entry treatment (POET) systems at 152 Forests Edge and the Hinesburg Highway Garage. Following this work, Stone reportedly provided a recommendation for



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semi-annual groundwater monitoring. Additionally, it is understood Stone prepared a Post Closure Landfill Monitoring Plan dated November 18, 2021.

Per stipulations outlined in the November 18, 2021 Post Closure Landfill Monitoring Plan, Stone completed semi-annual monitoring in the spring and fall 2022 which included the collection of groundwater, drinking water, and surface water samples. Specifically, seven (7) groundwater monitoring wells were sampled and analyzed for PFAS, volatile organic compounds (VOCs), total metals, sodium, chloride, and chemical oxygen demand (COD). Drinking water supply samples were reportedly collected from three (3) nearby locations (152 Forest Edge Road, 56 Forests Edge Road/685 Beecher Hill Road, and Hinesburg Highway Garage) for analysis of VOCs and PFAS. Surface water was monitored for physiochemical parameters upstream and downstream of the landfill.

Generally similar results were obtained during the spring and fall 2022 monitoring events. The direction of the overburden groundwater flow was inferred to be to the southeast at a hydraulic gradient of approximately 6.8%. The direction of the bedrock groundwater flow was similarly measured to be the southeast at a hydraulic gradient of approximately 1.8%. PFAS were detected in three (3) monitoring wells located downgradient of the landfill at levels above VGES. Arsenic and manganese were reported above VGES in five (5) and three (3) wells, respectively. The bedrock aquifer southeast of the landfill contained the highest concentrations of leachate indicator parameters. The Hinesburg Highway Garage and the 56 Forests Edge Road/685 Beecher Hill Road supply wells contained perfluorooctanoic acid (PFOA) and/or total regulated PFAS above the Vermont Drinking Water Health Advisory (DWHA). The total regulated PFAS were below the DWHA in the 152 Forests Edge Road and 56 Forests Edge Road water supply samples. No VOCs were reported above VGES in any of the groundwater monitoring wells; however, methylene chloride was detected above the VGES in the 152 Forest Edge Road drinking water supply. The source of methylene chloride has not been determined. No indications of leachate impacts were noted in surface water.

Opinion on Recommendations

Stone presented the following recommendations in their most recent report (fall 2022). KAS' opinion regarding each of these recommendations is presented in bold italic.

1. Continued semi-annual monitoring of seven monitoring wells, MW-1R, MW-2S/-2D, MW-3S/-3D, MW-4S/-4D for PFAS, VOCs, total metals including arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc, chloride, sodium and COD.

KAS agrees with this recommendation, which matches the scope presented in the November 18, 2021 Post Closure Landfill Monitoring Plan. Semi-annual monitoring is standard for post-closure sampling programs in Vermont.



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2. Continued semi-annual monitoring of two surface water locations (upgradient and downgradient of the landfill) in Beecher Brook for physical and chemical field parameters including pH, specific conductance, temperature, dissolved oxygen (DO), oxidation reduction potential (ORP), and turbidity.

KAS agrees with this recommendation (see previous response).

3. Continued semi-annual monitoring of drinking water supplies including 152 Forests Edge Road, 56 Forests Edge Road/685 Beecher Hill Road, and Hinesburg Highway Garage for PFAS and VOCs.
 - For 152 Forests Edge Road and Hinesburg Highway Garage POET systems, additional samples should be collected from the mid and effluent sample locations for PFAS and VOCs analysis.

KAS agrees with this recommendation (see response to #1). Sampling the mid and effluent of POET systems for contaminants of concern is critical for monitoring the effectiveness of each system and should continue to be completed.

4. Installation of POET systems at the 56 Forests Edge Road and 685 Beecher Hill Road properties. It should be noted installation of POET systems occurred on January 26, 2023 at 56 Forests Edge Road and January 18, 2023 at 685 Beecher Hill Road.
 - Following installation, samples should be collected from the influent, mid, and effluent sample locations for PFAS analysis. Samples were collected on January 27, 2023 and data is pending. Future monitoring of the influent, mid, and effluent should occur semi-annually for PFAS and VOCs analysis. This monitoring will assist in determining carbon changeout schedules.

It appears this recommendation has already been implemented. KAS agrees with continued monitoring of the influent, mid and effluent locations of these POET systems on a semi-annual basis.

5. Continued operation and maintenance of the POET systems.

KAS agrees with this recommendation, which is standard practice once a POET system is in place.

6. Expand the drinking water monitoring to four nearby residential properties based on distance and direction from the landfill. The drinking water samples shall be analyzed for PFAS and VOCs semi-annually.

The locations are as follows:

- Krista Willet at 490 North Road, located southeast of landfill,
- Robert Mello and Priscilla Reidinger at 182 Forests Edge Road, located west of landfill,
- Tyler Eastman and Jessica Godfrey at 794 Beecher Hill Road, located south of landfill, and,



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- Timothy and Linda Parent at 413 North Road, south of landfill.

KAS agrees with this recommendation with the following notes for consideration;

KAS does not see the private well for 490 North Road indicated on the VT Agency of Natural Resources atlas mapping program or on Stone's Site Plans. It is presumed Stone has done appropriate due diligence to confirm this well exists as noted in Table 9 in their 2022 monitoring reports. Similarly, KAS notes there is a residence at 455 North Road that is presumably on private drinking water. Given its location, this well should be further explored and, should a private well be confirmed, this location should be included for testing to rule out the presence of contaminants of concern.

182 Forests Edge Road is topographically cross gradient and possibly at a slightly higher elevation than the landfill; however, due to its close proximity to the MW-2S / MW-2D well network, where total regulated PFAS have been detected, KAS agrees that this location should be tested. KAS also recommends 206 Forests Edge Road be tested given that it was historically part of the landfill monitoring program and is in the same general proximity as 182 Forests Edge Road.

KAS notes that 413 North Road was reportedly previously tested by the VT DEC for PFAS and VOCs in September 2021. This provides promising data to suggest that this private well may not be impacted; however, additional confirmatory testing is advised. Similarly, the VT DEC also reportedly tested the private well at 714 Beecher Hill Road in September 2021 with similar non-detect VOC and PFAS results. Given this well's location relative to the other locations Stone is recommending to test, KAS recommends that this location also be included in the expanded round of drinking water testing.

To summarize, KAS recommends the following locations be sampled as part of the expanded drinking water testing program:

- 1) 182 Forests Edge Road;***
 - 2) 206 Forests Edge Road;***
 - 3) 714 Beecher Hill Road;***
 - 4) 794 Beecher Hill Road;***
 - 5) 413 North Road;***
 - 6) 490 North Road; and,***
 - 7) Should a private well exist at 455 North Road, this location should also be tested.***
7. If the preventive action level (PAL) as established by the Groundwater Protection Rule and Strategy (GWPRS) §12-602 is exceeded at any of the water supply wells, then additional drinking water locations will be evaluated to be monitored. If PFAS and VOCs are not detected above the



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PAL at the water supply wells for two consecutive rounds, then monitoring shall cease.

KAS agrees with this general approach while taking into account KAS' additional comments and recommendations presented in #6 above.

In addition to the recommendations discussed above, KAS also recommends to expand the monitoring well network to further define and monitor the shallow overburden and bedrock aquifer to the south and southwest of current wells MW-3S and MW-3D along the northern side of Beecher Hill Road and eastern side of Forests Edge Road. This data would be useful as part of the long-term post closure monitoring program to monitor the potential for plume migration towards the additional private drinking water wells located along Beecher Hill Road and North Road. This data may also be useful in further evaluating the source of methylene chloride and determine whether this VOC is present in the shallow overburden and bedrock aquifer further downgradient of the landfill and near 152 Forests Edge Road.

KAS appreciates the opportunity to provide our professional opinion to the Town of Hinesburg. Please feel free to reach out to me via e-mail to JeremyR@kas-consulting.com or by phone at 802-383-0486 with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "J.R.", written over a light blue circular stamp or watermark.

Jeremy Roberts, P.G.
Principal / Environmental Program Manager

cc. KAS #603230053